SITRANS F flowmeters

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You can download all instructions, catalogs and certificates for SITRANS F free of charge at the following Internet address:
www.siemens.com/sitransf

Product overview

Overview

	Application	Description	Catalog page	Software for parameterization
SITRANS F M electromagnetic flowmeters - Pulsed DC magnetic flowmeter				
	MAG 5000 / 6000 transmitter range in robust IP 67 polyamid enclosures for compact or remote mounting. 19", back of panel and front of panel enclosure program.	**Transmitter MAGFLO MAG 5000/6000** • Superior signal resolution for optimum turn down ratio • Comprehensive self-diagnostic, for error indication and logging • Multi-lingual display and keypad interface • Custody transfer approval: PTB, OIML R75, OIML R117, OIML R49 and MI-001	4/26	SIMATIC PDM
	MAG 6000 I and MAG 6000 I Ex d in robust die-cast aluminium enclosure for demanding applications and where explosion proof protection is necessary.	**Transmitter MAGFLO MAG 6000 I / 6000 I Ex d** • Remote and compact mounting with all sensors • Explosion proof design: ATEX 2G D and FM class 1 div. 2 • Multi-lingual display and touchpad keypad • Comprehensive self-diagnostics	4/38	SIMATIC PDM
	Designed for the general industry environment. The obstructionless performance of the MAG 1100 is unaffected by the suspended solids, viscosity and temperature challenges.	**Flow sensors MAGFLO MAG 1100** • Metering tube DN 2 ... DN100 (1/12“ ... 4“) flangeless design. • Corrosion resistant AISI 316 stainless steel housing. • Highly resistant liner ceramic or PFA and electrodes fitting most extreme process media. • Temperature rating up to 200 °C (390 °F) • ATEX 2G D approval version • FM class 1 Div 2	4/42	
	Specially designed for the food & beverage and pharmaceutical industry.	**Flow sensors MAGFLO MAG 1100 Food** • AISI 316 stainless steel enclosure • Hygienic seal, 3A and EHEDG-approved construction • Easy to clean • Supplied with connections according to your specification • ATEX 2G approval version • FM class 1 Div 2	4/49	
	The MAG 5100 W designed for all water and waste applications in water plants and industrial applications.	**Flow sensors MAGFLO MAG 5100 W** • Metering tube DN 25 ... DN 1200 (1‴ ... 48″) • NBR Hard Rubber or EPDM lining • Integral grounding electrodes as standard • Increased low flow accuracy for water leak detection • Drinking water approvals and custody transfer approvals , OIML R49, MI-001 and PTB	4/57	

	Application	Description	Catalog page	Software for parameterization
	The MAG 3100 series with its flexibility in the choice of linings, electrodes and flange material allows the measurement of even the most extreme process media.	**Flow sensors MAGFLO MAG 3100** • For a wide range of pipe dimensions: DN 15 ... DN 2000 (½" ... 78") • Wide range of liner and electrode materials • High temperature version for application with temperatures up to 180 °C (355 °F) • High pressure solutions • Approved according to PTB, OIML R75, OIML R117, FM and ATEX	4/63	
SITRANS F M electromagnetic flowmeters - High power AC magnetic flowmeter				
	Designed for heavy-duty applications like pulp & paper stock over 3%; heavy mining slurries and mining slurries with magnetic particles.	**Transmitter Transmag 2** • Magnetic flowmeter with a very strong pulsed AC magnetic field • PROFIBUS PA or HART communication • Self-test function	4/78	SIMATIC PDM
	Application in conjunction with transmitter Transmag 2	**Flow sensor 911/E** • Metering tube: DN 15 ... DN 600 (½" ... 24") • Metering tube liner: rubber, PTFE, Novolak • Integral smartPLUG for storing of calibration values • Temperature of medium: -20 ... +150 °C (-4 ... +300 °F)	4/83	
SITRANS F M electromagnetic flowmeters - Battery operated magnetic watermeter				
	Battery operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation.	**Water meter MAG 8000** • Battery operated water meter • Metering tube DN 25 ... DN 600 (1" ... 24") • Remote and compact installation IP68/ NEMA 6P enclosure • Custody transfer approval: OIML R49 and MI-001 • Drinking water approvals	4/93	SIMATIC PDM and Flow Tool
SITRANS F C mass flowmeters				
	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	**Flow sensors MASSFLO MASS 2100 (Single tube design) and FC300** • DI 1.5, DI 3, DI 6, DI 15, DI 25, DI 40 and DN4 • Flow from 0.1 ... 52,000 kg/h • Pipe material: 1.4435 (316L); 2.4602 Hastelloy C-22 • Accuracy typically ≤ 0.1% of flow rate 0.0005 g/cm^3 and 0.5 °C • Liquid temp./pressure: -50 ... +180°C (-58 ... +356 °F) / Up to 410 bar (5946 psi) • Approved according to ATEX EEx ia IIC T3 ... T6	4/139	

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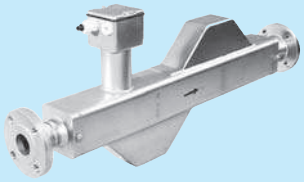
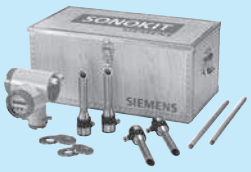
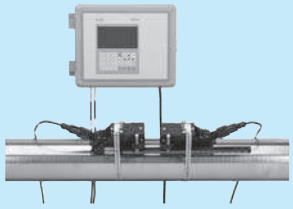
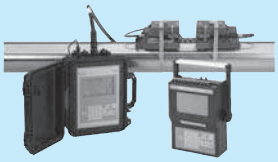
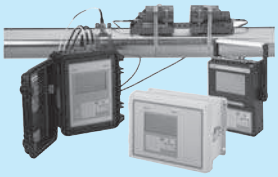
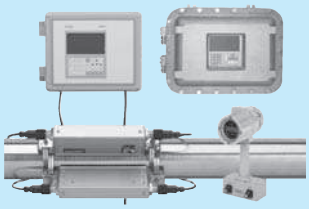
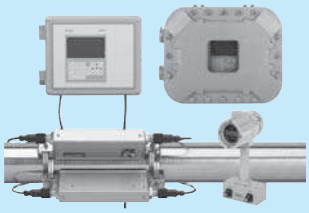
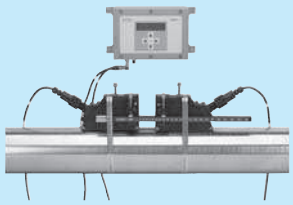
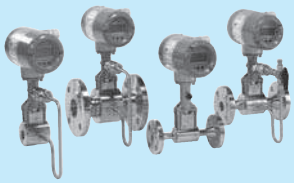
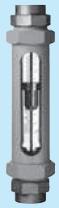
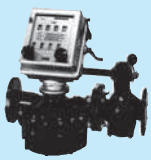
Product overview

	Application	Description	Catalog page	Software for parameterization
 	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	**Flow sensor MC2 (Dual tube design)** • Standard MC2 - DN 50, DN 65, DN 80, DN 100 and DN 150 - Flow from 0 ... 510 000 kg/h / 112 400 lb/h - Tube material: W 1.4571 (316Ti) and Hastelloy C4 • Hygienic MC2 - Approvals: EHEDG - DN 20, DN 25, DN 40, DN 50, DN 65 and DN 80 - Flow from 0 ... 113 600 kg/h / 250 000 lb/h - Tube material: W 1.4435 (316L) - Connectors: DIN 11851, DIN 32676 and DIN 11864-2A • Accuracy: ≤ 0.15% of rate • Density: ≤ 0.001 g/cm³ • Liquid temp.: -50 ... +180 °C (-58 ... +356 °F) • Pressure: < 100 bar (1450 psi) • Approvals: ATEX EEx em [ib] IIC T2 ... T6	4/153	
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato	**Transmitters MASS 6000 and MASS 6000 Ex d** • Digital signal processing measuring 30 times a second. • 3 current, 2 freq. and 2 relay outputs • Adaptive batch function • SENSORPROM memory unit making it easy to start up the flowmeter. • Easy retrofitting of communication modules (AOM) • Approved according to ATEX [EEx ia] IIC / EEx de [ia/ib] IIC T6	4/116, 4/127	SIMATIC PDM
SITRANS F US ultrasonic in-line flowmeters				
	SITRANS FUS060 is a time based transmitter designed for ultrasonic flowmetering for any pipe in the F US in-line series up to DN 4000	**SITRANS FUS060 transmitter** • EEx approved according to ATEX • HART communication + 1 analog output, 1 digital output for frequency or pulse and 1 relay output for alarms and flow direction • PROFIBUS PA communication with 1 digital output for frequency or pulse • Multi-functional output for process control • Easy menu based local operation with two-line display	4/172	
	The main application for SONO 3300 ultrasonic flowmeters is to measure the volume of: • Water and treated waste water • Oil and liquid gases • Hot water/cooling systems	**SONO 3300 / FUS060** • Ex approved according to ATEX • DN 50 … DN 300 (2" … 12") steel pipes • PN 10 ... PN 40 or class 150 ... class 300 pressure rates • Flow 0.3 … 3200 m³/h • No pressure drop • FUS060 transmitter for separate mounting • Signal cables on the sensor to transducer are highly protected from aggressive environment by protection of stainless steel pipes	4/177	

	Application	Description	Catalog page	Software for parameterization
	The main application for SONO 3100 ultrasonic flowmeters is to measure the volume of: • Water and treated waste water • Oil and liquid gases • Liquid cryogenic application • District heating systems	**SONO 3100 / FUS060** • DN 100 ... DN 1200 (4" ... 48") • Pipe in carbon or stainless steel • Replaceable transducers under pressure • ATEX approved • Measure of all liquids less than 350 Cst, conductive or non-conductive • No pressure drop • 4-track on request • Special material on request	4/182	
	Installation of one, two or four transducer sets in existing concrete or steel pipes.	**SONOKIT** • DN 100 ... DN 4000 (4" ... 160") • Control and display unit • Temperature of medium: -20 ... +200 °C (-4 ... +395 °F) • Installation on empty pipes or pipes under pressure (hot-tap installation)	4/189	
	Battery or mains powered ultrasonic flowmeter for use within water based district heating, cooling systems and utility. The FUS380 can also be used for water irrigation systems. SITRANS FUS380 / FUE380 are designed to work with the SITRANS FUE950 energy calculator	**FUS380 / FUE380** • *FUS380/FUE380:* DN 50 ... DN 1200 (2" ... 48") • *FUE380:* Approved for custody transfer according to EN 1434 Class 2, OIML R75 and MID • *FUS380/FUE380:* Red brass or painted carbon steel flanges and metering tube. AISI transducers • Water temperatures 2 … 200 °C (35.6 ... 392 °F) • Battery or mains powered	4/197, 4/202	
	Universal thermal energy calculator- for district heating and cooling applications.	**SITRANS FUE950** • Choice of battery, 230 V AC +15%/ -30% or 24 V AC • 24 months memory • Plug-in modules for data output, extra input, M-Bus • Complete set with sensors and sensor pockets • Meets the requirements of OIML R 75 and EN 1434	4/212	
	Battery operated ultrasonic retrofit flowmeter for water applications within irrigation. Installation of one or two transducer sets in existing PVC or concrete pipes.	**SITRANS FUS880** • Irrigation flowmeter FUS880 • Battery operated or mains supply • DN 200 ... DN 1200 (8" ... 48") • Wetted transducer technology • Remote installation IP67	4/218	
	Accessories or spare parts for older flowmeter systems type SITRANS F US SONOFLO	Spare parts for senors and transmitter to older flowmeter type SONOFLO: E.g. transducer type SONO 3200, coaxial cables, SONO 3000 transmitter spare parts, SENSORPROM	4/223	
SITRANS F US ultrasonic clamp-on flowmeters				
	Dedicated flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	**SITRANS FUS1010 General purpose** • Basic function dedicated meter • Full range of safety approvals, I/O's and enclosure types available • Has wide applicability but not the special functions found with FUH1010, FUG1010 and FUE1010 meters • Hazardous area approvals: FM, CSA, ATEX	4/236	

Product overview

	Application	Description	Catalog page	Software for parameterization
	Portable flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	**SITRANS FUP1010 Portable** • Basic function portable meter • Has all the capabilities of the FUS1010 meter but in a battery powered, portable configuration • Ideal for high accuracy flow survey applications • Not available with hazardous area approvals • Unclassified, ordinary location approvals: UL, ULc, CE	4/243	
	Portable and dedicated energy meters are ideal for thermal energy / power applications: • Chilled & hot water submetering • Condenser water, potable water • Glycol and brine solution • Thermal storage	**SITRANS FUE1010 Energy** • Accurate absolute and differential temperature measurement with two matched 1000 Ω RTD elements installed on supply and return side of the heating or cooling system • Efficiency calculation (kW/ton, EER or COP) available in systems with optional analog input • Dedicated available with hazardous area approvals: FM, CSA • Portable available with unclassified/ordinary locations approval: UL, ULc, FM	4/248	
	Dedicated hydrocarbon flowmeters are ideal for crude oil, refined petroleum or liquefied gas. There are three application areas: • Viscosity compensated volumetric flowmeters • Standard volume (Net) mass flowmeters • Interface detectors/density meters	**SITRANS FUH1010 Oil** • Volumetric flowmeters output viscosity compensated gross volume to external RTU's or flow computers • Mass flowmeters output standard volume (net) mass flow, API, liquid identification, density, interface & pig detection • Interface Detectors are used for liquid identification and API density output, but do not output flow • Hazardous area approvals: FM, CSA, ATEX	4/254	
	Dedicated gas flowmeters are ideal for most natural and process gas industry applications, including: • Checkmetering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production	**SITRANS FUG1010 Gas** • Suitable for most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc.) with typical minimum operating pressure of 10 barg (145 psig). • Standard volume or mass flow output for fixed gas compositions • Analog input for pressure and temperature compensation • Hazardous area approvals: FM, CSA, ATEX	4/260	
	Dedicated flowmeter is a basic option for many clean liquid applications in the: • Water Industry • Wastewater Industry • HVAC & Power Industries • Processing Industry	**SITRANS FUS1020 Basic** • Has FUS1010 system function but without the same I/O capability or safety approval ratings • This basic meter is intended for single liquid applications that do not require these features • Not available with hazardous area approvals • Unclassified, ordinary locatons approvals: UL, ULc, CE	4/266	
Continuous measurement - Open channel flow				
	High accuracy ultrasonic flow monitor for open channels to complete system studies	**OCM III** • High accuracy on unique or non-standard weirs and flumes • AC and DC operation. • Automatically switches to battery operation for uninterrupted power. • Low power remote monitoring	4/276	

	Application	Description	Catalog page	Software for parameterization
SITRANS F X Vortex Flowmeter				
	Measurement of steam, gases and liquids in: • Chemical • HVAC / Power plants • Oil & Gas • Food & Beverage • Pharma	**SITRANS FX300** • Flange DN 15 … DN 300 (½" … 12") Sandwich DN 15 … DN 100 (½" … 4") • 2-wire device 4 ... 20 mA, with integrated temperature and pressure sensors for compensation • HART communication • Medium temp.: -40 … 240 °C (-40 … 464 °F) • Medium pressure: up to 100 bar (1450 psi) • Hazardous area approvals: FM, CSA, ATEX	4/279	
SITRANS F VA variable area meters				
	Measurement of flow of transparent liquids and gases.	**Tubux** • Glass flow tube with various float materials • Connections: G ¼" ... G 3", alternatively with adhesive bushing • Temperature of medium: max. 150 °C (302 °F) • Optionally available with contacts	4/292	
	Measurement of flow of liquids and gases, also highly suitable for corrosive media, high temperatures and high pressures.	**FVA250** • All-metal variable area meter with various float materials • Connections: DN 15 ... DN 100 (½" ... 4") • Temperature of medium: -20 °C ... +300 °C (-4 ... +572 °F) • Optionally available with analog output or contacts	4/300	
SITRANS F O delta p - primary differential pressure devices				
	Measurement of flow with orifice plates and metering pipes for mounting between flanges, e.g. together with SITRANS P transmitters, DS III and DS III PA series.	• Nominal diameters DN 10 ... DN 1000 (0.4" ... 40") • Temperature of medium: -200 ... +500 °C (-328 ... +932 °F) for vapors, gases and liquids. SITRANS P transmitters • DS III series • DS III PA series • DS III FF series	4/308	
SITRANS F I flap flowmeters				
	Measurement of flow of liquids and gases, e.g. for use with domestic installations and heating systems.	**Gardex** • Baffle plate flowmeter • Nominal diameters: DN 25 ... DN 300 (1" ... 12") • Temp. of medium: max. 300 °C (572 °F) • Optionally available with analog output or contacts	4/338	
SITRANS F R liquid meters				
	**Rotary-piston meters** Industrial design for measurement of flowing liquids	• DN 15 ... DN 80 (½" ... 3") for industrial requirements • DN 25 (1") as acid-resistant version • With the required registers and quantity preset registers • Temperature of medium: from -30 ... +300 °C (-22 ... +572 °F)	4/359	
	**Automatic batchmeter** Any quantity of liquid can be preselected and filled automatically.	• DN 25 ... DN 50 (1" ... 2") • Temperature of medium: from -30 ... +300 °C (-22 ... +572 °F)	4/368	

Introduction

Overview

Criteria for selection of flowmeter

Each method for measuring flow has specific properties, and each flow measuring point is characterized by specific requirements. The table shown below compares the properties of the various measuring instruments and thus provides assistance in selection of the optimum device.

This section of the field device catalog includes the following instruments for measuring flow:

- Electromagnetic
- Coriolis mass flow
- Ultrasonic
- Vortex volumetric- and mass flow
- Variable area meter
- Orifice plate
- Flap
- Rotary-piston meters and drum meters

To measure concentration in binary mixtures, it is possible to evaluate the sound velocity measurements of the ultrasonic flow method. The SITRANS F has been specially developed for use with alcohol/water mixtures.

Measuring principle		**Electro-magnetic**	**Coriolis**	**Ultrasonic (In-line)**	**Vortex**	**Orifice plate**	**Rotary-piston meter**	**Variable area meter**
Medium		Liquid (conductive)	Liquid or gas	Liquid	Steam/vapor, gases, liquid	Liquid, vapor, gas	Liquid	Liquid or gas
Nominal diameter		DN 2 … 2000 (0.08" … 78")	1.5 … 150 mm (0.06" … 6")	DN 50 … 4000 (2" … 160")	DN 15 … 300 (½" … 12")	DN 10 … 1000 (0.4" … 40")	DN 15 … 80 (½" … 3")	DN 10 … 100 (0.4" … 4") G½" … G3"
Temperature range	°C (°F)	-40 … +200 (-40 … +392)	-50 … +180 (-58 … +356)	-200 ... +250 (-328 ... +482)	-40 ... +240 (-40 ... +464)	-200 … +500 (-328 … +932)	-30 … +300 (-22 … +572)	-20 … +300 (-4 … +572)
Max. pressure	bar (psi)	160 (2 320), optional higher	Up to 410 (Up to 5 950)	40 (580) 430 (6 235)	100 (1 450)	315 (4 569)	63 (914)	40 (580)
Accuracy	%	± 0.25 or ± 0.5	± 0.1 or ± 0.15	± 0.5 … ± 2	± 0.75 … ± 1	± 0.5 … ± 2	± 0.2 … ± 0.5	± 2
Repeatability	%	0.1 … 0.2	0.05	0.2	0.1	0.5	0.005	0.5
Dynamic response range		1:100	1:100	1:100	1:25	1:6	1:10	1:10
Start-of-scale value	m/s (ft/s)	0 (0)	0 (0)	0.1 (0.33)	0.4 (1.31) 2.0 (6.56)	R_a > 500	0.3 (0.98)	0.2
Full-scale value						$R_e < 10^8$		
• For liquids	m/s (ft/s)	0.25 … 10 (0.825 … 33)	10 (32.8)	10 (32.8)	10 (32.8)	3	3	3.5 (11.4)
• For steam/vapor, gases	m/s (ft/s)		Approx. 300 (1000)		80 (262.5)	50/25 (164/82)		60 (197)
Measured values								
• Volume flow		•	•	•	•	•	•	•
• Sound velocity				•				
• Sound amplitude				•				
• Density			•					
• Mass flow			•	•	•			
• Bidirectional measurement		•	•	•		•		
Use								
• For custody transfer		•	•	•			•	
• As batching system		•	•				•	
• In viscosity range	mPa·s (cp)	0.1 … 100 000 (0.1 … 100 000)	0 ... 100 000 (0 ... 100 000)	0 ... 350 (0 ... 350)	0 … 10 (0 … 10)	0 … 10 (0 … 10)	0.3 … 350 000 (0.3 … 350 000)	0.5 … 100 (0.5 … 100)
Power supply		Mains or battery	Mains	Mains or battery	2-wire	2-wire	non	non

Communication solutions

Transmitter	HART	PROFIBUS PA	PROFIBUS DP	Modbus RTU RS485	Modbus RTU RS232	Modbus RTU IrDA
SITRANS F M MAG 5000	• 1) 2) 4)					
SITRANS F M MAG 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 1) 5)		
SITRANS F M MAG 5000/6000 CT 8)						
SITRANS F M MAG 6000 I	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 1) 5)		
SITRANS F M MAG 6000 I Ex-d	• 1) 2) 4) 5)	• 1) 6) 7)				
SITRANS F M Transmag 2	• 1) 4)	• 1) 6) 7)				
SITRANS FM MAG 8000				• 1)	• 1)	• 1) 3)
SITRANS F C MASS 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 1)		
SITRANS F C MASS 6000 Ex-d	• 1) 2) 4) 5)	• 1) 5) 6) 7)				
SITRANS FUS060	• 1)	• 1) 6)				
SITRANS FUS080 (FUS380)				• 1) 5)	• 1) 5)	• 1)
SITRANS FUE080 (FUS380)				• 1) 5)	• 1) 5)	• 1)
SITRANS FX300	• 1)					

1) Supports SIMATIC PDM
2) Supports AMS
3) Supports Siemens Flow Tool
4) Supports HH275/375
5) Pluggable add-on modules
6) Profile 2
7) Profile 3
8) CT versions are not approved with communication modules.

Introduction

Technical specifications PROFIBUS PA/DP

General specifications	
PROFIBUS device profile	3.00 Class B
Certified	Yes, according to Profile for process control devices v3.00.
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP

Physical layer specifications	
Applicable standard	EN 50170 vol. 2
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 1.5 Mbits/s
Number of stations	Up to 32 per line segment, (maximum total of 126)

Cable specification (Type A)	
Cable design	Two wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm², corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

Physical layer specifications	
Applicable standard	EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 Kbits/second
Number of stations	Up to 32 per line segment, (maximum total of 126)
Max. basic current [I_B]	14 mA
Fault current [I_{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)

Preferred cable specification (Type A)	
Cable design	Two wire twisted pair
Conductor area (nominal)	0.8 mm² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20%
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data		
Required sensor electronics	Compact mounted SITRANS F C MASSFLO MASS 6000 Ex-d	Compact or remote mounted SITRANS F M MAGFLO MAG 6000 Industry Ex-d
FISCO	Yes	Yes
Max. U_I	17.5 V	17.5 V
Max. I_I	380 mA	380 mA
Max. P_I	5.32 V	5.32 V
Max. L_I	10 µH	0 µH
Max. C_I	5 nF	0 nF
Max. U_o	1.3 V	-
Max. I_o	50 µA	-

FISCO cable requirements	
Loop resistance R_C	15 ... 150 Ω/km
Loop inductance L_C	0.4 ... 1 mH/km
Capacitance C_C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master.
MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services:

Input (Master view)	Parameter	MAG 6000	MASS 6000
	Mass flow		✓
	Volume flow	✓	✓
	Temperature		✓
	Density		✓
	Fraction A[1)]		✓
	Fraction B[1)]		✓
	Pct Fraction A[1)]		✓
	Totalizer 1	✓	✓
	Totalizer 2[2)]	✓	✓
	Batch progress[2)]	✓	✓
	Batch setpoint	✓	✓
	Batch compensation	✓	✓
	Batch status (running ...)	✓	✓
Output (Master view)	Set Totalizer 1+2	✓	✓
	Set Mode Totalizer 1+2	✓	✓
	Batch control (start, stop ...)	✓	✓
	Batch setpoint	✓	✓
	Batch compensation	✓	✓

[1)] Requires a SENSORPROM containing valid fraction data.
[2)] Value returned is dependent on the BATCH function.
When ON, Batch progress is returned.
When OFF, TOTALIZER 2 is returned.

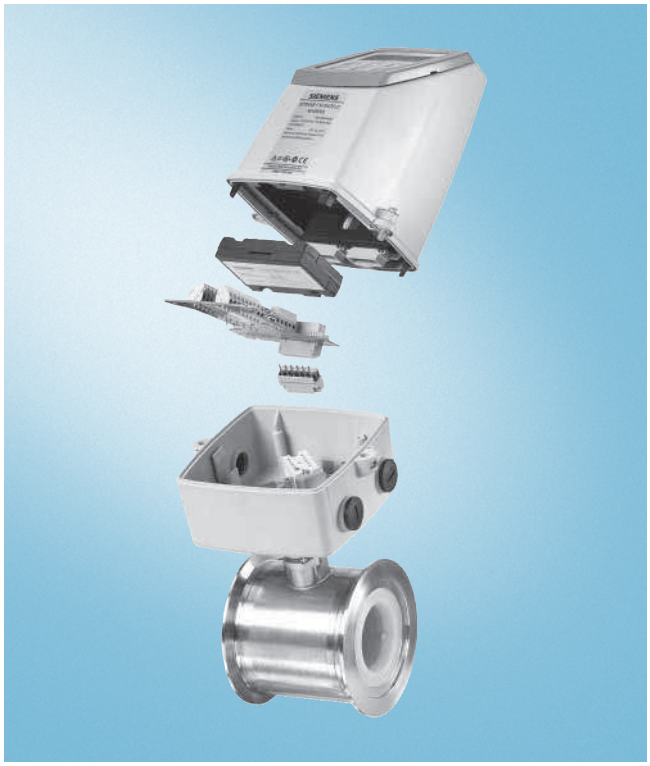
System information MAGFLO electromagnetic flowmeters

Overview

SITRANS F M family

SITRANS F M electromagnetic flowmeters are designed for measuring the flow of electrically conductive mediums.

Benefits



Greater flexibility

- Wide product program
- Compact or remote installation using the same transmitter and sensor
- USM II communication platform for easy integration with all systems

Easier to commission for MAG 5000, 6000, 6000 I

All MAGFLO pulsed DC electromagnetic flowmeters feature a unique SENSORPROM memory unit which stores sensor calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

The factory settings matching the sensor size are stored in the SENSORPROM unit. Also customer specified settings are downloaded to the unit. Should the transmitter be replaced, the new transmitter will upload all previous settings and resume measurement without any need for reprogramming.

Further, the „fingerprint“ used in connection with the MAGFLO Verificator is stored during the initial sensor calibration.

Easier to service

Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

USM II the Universal Signal Module with "plug & play" simplicity, makes it easy to access and integrate the flow measurement with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.

Application

Electromagnetic flowmeters are suitable for measuring the flow of almost all electrically conducting liquids, pastes and slurries.

A prerequisite is that the medium must have a minimum conductivity of 5 µS/cm. The temperature, pressure, density and viscosity have no influence on the result.

The main applications of the electromagnetic flowmeters can be found in the following sectors:

- Water and waste water
- Chemical and pharmaceutical industries
- Food and beverage industry
- Mining, aggregates and cements industries
- Pulp and paper industry
- Steel industry
- Power; utility and chilled water industry

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

SITRANS F M

System information MAGFLO electromagnetic flowmeters

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com





	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	MAG 1100	MAG 1100 HT	MAG 1100 F	911/E	MAG 8000/ MAG 8000 CT
Industry									
Water / waste water	**XX**		**X**	**XXX**	**XX**				**XXX**
Chemical	**XXX**	**XXX**	**XXX**	**X**	**XXX**	**XXX**	**XX**		**XX**
Pharma	**XX**	**XX**	**XX**	**X**	**XX**	**XX**	**XXX**		**XX**
Food & beverage	**X**	**X**	**X**	**X**	**XX**		**XXX**		**XX**
Mining, aggregates & cement	**XXX**			**X**	**XX**			**XXX**	**XX**
HPI	**XX**	**X**	**XX**	**X**	**XX**	**X**			**XX**
Other	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XXX**	**XX**
Design									
Compact	●	●	●	●	●		●	●	●
Remote	●	●	●	●	●	●	●	●	●
Constant field (DC)	●	●	●	●	●	●	●	●	●
Alternating field (AC)								●	
Battery operated constant filed									●
Size									
DN 2 (1/12“)					●				
DN 3 (1/8“)					●				
DN 6 (1/4“)					●				
DN 10 (3/8“)					●		●		
DN 15 (½“)	●	●	●		●	●	●	●	
DN 20 (3/4“)								●	
DN 25 (1“)	●	●	●	●	●	●	●	●	●
DN 32 (1¼“)							●	●	
DN 40 (1½“)	●	●	●	●	●	●	●	●	●
DN 50 (2“)	●	●	●	●	●	●	●	●	●
DN 65 (2½“)	●	●	●	●	●	●	●	●	●
DN 80 (3“)	●	●	●	●	●	●	●	●	●
DN 100 (4“)	●	●	●	●	●	●	●	●	●
DN 125 (5“)	●	●	●	●				●	●
DN 150 (6“)	●	●	●	●				●	●
DN 200 (8“)	●	●	●	●				●	●
DN 250 (10“)	●	●	●	●				●	●
DN 300 (12“)	●	●	●	●				●	●
DN 400 (16“)	●			●				●	●
DN 450 (18“)	●			●				●	●
DN 500 (20“)	●			●				●	●
DN 600 (24“)	●			●				●	●
DN 700 (28“)	●			●					
DN 750 (30“)	●			●					
DN 800 (32“)	●			●					
DN 900 (36“)	●			●					
DN 1000 (40“)	●			●					
DN 1050 (42“)	●			●					
DN 1100 (44“)	●			●					
DN 1200 (48“)	●			●					
DN 1400 (54“)	●								
DN 1500 (60“)	●								
DN 1600 (66“)	●								
DN 1800 (72“)	●								
DN 2000 (78“)	●								

● = available, **X** = can be used, **XX** = often used, **XXX** = most often used

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	 MAG 3100	MAG 3100 HT	MAG 3100 P	 MAG 5100 W	 MAG 1100	MAG 1100 HT	 MAG 1100 F	 911/E	 MAG 8000/ MAG 8000 CT
Process connection									
Wafer design					●	●			
Sanitary process connections							●		
Flanges	●	●	●	●				●	●
Flange norms									
EN 1092-1	●	●	●	●				●	●
ANSI B 16.5 class 150	●	●	●	●				●	●
ANSI B 16.5 class 300	●	●						●	
AWWA class D	●			●					
AS 2129	●	●							
AS 4087, PN 16	●	●		●					●
AS 4087, PN 21	●	●							
AS 4087, PN 35	●	●							
JIS 10K	3)	3)						●	
Pressure rating [1]									
PN 6	●								
PN 10	●	●	●	●				●	●
PN 16	●	●	●	●	●		●	●	●
PN 25	●	●						●	
PN 40	●	●	●	●	●	●	●	●	●
PN 63	●								
PN 100	●								
Accuracy									
0.2%									●
0.25%	●	●	●	●	●	●	●		
0.4%									●
0.5%	●	●	●	●	●	●	●	●	
Grounding electrodes, incl. [2]	●			●				(●)	●
Cable glands									
PG 13.5								●	
M20	●	●	●	●	●	●	●	●	●
½" NPT	●	●	●	●	●	●	●	●	
Materials / temperature:									
Liner material / max . temperatures									
NBR Hard Rubber: 70 °C (158 °F)				●					●
EPDM: 70 °C (158 °F)	●			●				● [5]	●
Neoprene: 70 °C (158 °F)	●			●				●	
PTFE: 100 °C (212 °F)	●								
PTFE: 130 °C (266 °F)		●	●					●	
PTFE: 180 °C (356 °F)		●						(●)[4]	
Ebonite: 95 °C (203 °F)	●								
Linatex: 70 °C (158 °F)	●								
Ceramic: 150 °C (302 °F)[6]					●		●		
Ceramic: 200 °C (392 °F)						●			
PFA: 100 °C (212 °F)	●								
PFA: 150 °C (302 °F)		●	●		●		●		
Novolak: 130 °C (266 °F)								●	

● = available
1) Pressure may be limited by the liner material chosen
2) Not for PTFE and PFA liner and tantalum/platinum electrodes. For 911/E grounding electrodes are optional
3) On request
4) 150 °C (302 °F)
5) 95 °C (203 °F)
6) ATEX: 180 °C (356 °F)

System information MAGFLO electromagnetic flowmeters

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com






	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	MAG 1100	MAG 1100 HT	MAG 1100 F	911/E	MAG 8000/ MAG 8000 CT
Materials (continued):									
Electrodes									
S/S AISI 316 Ti	●	●						●	
Hastelloy C	●	●	●	●	●		●	●	●
Platinum	●	●			●	●	●	●	
Titanium	●	●						●	
Tantalum	●	●						●	
Monel								●	
Flange/housing material									
Carbon steel	●	●	●	●				●	●
Stainless steel / carbon steel	●	●						●	
Polished stainless steel	●	●			●	●	●		
Approvals (Order as specials except for MAG 8000 CT version):									
Custody transfer									
Cold water - MI 001 (EU)				●					●
Cold water - DANAK TS 22.36.001	●								
Cold water pattern approval - OIML R 49 (Denmark and Germany)			●	●					
Cold water pattern approval Germany (PTB)	●	●		●	●	●	●		●
Heat meter pattern approval - OIML R 75 (Denmark)	●		●		●				
Hot water pattern approval - PTB (Germany)	●				●		●		
Other media than water pattern approval - OIML R 117	●				●		●		
Hazardous areas									
ATEX - 2G D zone 1	●	●	●		●	●	●		
FM - class 1, div 2	●	●	●	●	●	●	●		
Hygienic									
3A							●		
Drinking water									
WRAS (WRc) - (UK) EPDM liner	●			●					●
NSF - (US) NBR & EPDM liner				●					●
ACS (FR) EPDM liner	●			●					●
Belgaque (B) EPDM liner	●			●					●
DVGW-W270 (D) EPDM liner	●			●					●
Other									
GOSS / GOST (Russia)	●	●	●	●	●	●	●		●
CRN (Canada)	●	●	●	●	●	●	●		●
Other national approvals, see internet	●	●	●	●	●	●	●	●	●
MAGFLO Verificator compatible[1)]	●	●	●	●	●	●	●		

● = available
[1)] Only for MAG 5000 and MAG 6000 transmitters.

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com




	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex d	MAG 6000 + Ex barriere	MAG 6000 + Cleaning unit	Transmag 2	MAG 8000
Industry								
Water / waste water	**XXX**	**XXX**	**XX**	**X**		**XX**		**XXX**
Chemical	**X**	**XX**	**XX**	**XXX**	**X**			**XX**
Pharma	**X**	**XXX**	**XX**	**XXX**	**X**			**XX**
Food & beverage	**XX**	**XXX**	**XX**					**XX**
Mining, aggregates & cement	**XX**	**X**	**XX**	**X**			**XXX**	**XX**
HPI	**X**	**X**	**X**	**XX**				**XX**
Other	**XX**	**XX**	**XX**	**XX**			**X**	**X**
Design								
Compact	●	●	●	●			●	●
Remote	●	●	●	●	●	●	●	●
Constant field (DC)	●	●	●	●	●	●		●
Alternating field (AC)							●	
Battery operated constant field								●
Enclosure transmitter								
Polyamide, IP67	●	●						
Die-cast aluminium			●	●			●	
Stainless steel		●						● [1]
19" rack	●	●			●	●		
Back of panel	●	●			●	●		
Panel mounting	●	●			●	●		
IP67 wall mounting	●	●	●	●	●	●		
Accuracy								
0.2%								●
0.25%		●	●	●	●	●		
0.4%								●
0.5%	●						●	
Communication								
HART	●	●	●	●	●	●	●	
PROFIBUS PA		●	●	●	●	●	●	
PROFIBUS DP		●	●		●	●		
MODBUS RTU/RS 485		●	●		●	●		● [2]
Batching		●	●	●	●	●		
Electrode cleaning						●		
Cable glands								
PG 13,5					●	●	●	
M20	●	●	● [4]	●			●	●
½" NPT	●	●	●	●			●	
Power supply								
24 V	● [3]	● [3]	●	●		● [3]		● [3][5]
115 V - 230 V	●	●	●	●	●	●	●	● [5]
Battery								●

● = available, **X** = can be used, **XX** = often used, **XXX** = most often used

[1] IP68 enclosure
[2] Modbus RTU also as serial RS232
[3] 12/24 V AC/DC
[4] M25
[5] Main power with battery backup

SITRANS F M

System information MAGFLO electromagnetic flowmeters

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex d	MAG 6000 + Ex barriere	MAG 6000 + Cleaning unit	Transmag 2	MAG 8000
Approvals:								
Custody transfer								
Cold water - MI-001 (EU)	●	●						●
Cold water - DANAK TS 22.36.001		●						
Cold water pattern approval - OIML R 49 (Denmark and Germany)	●	●						●
Cold water pattern approval Germany (PTB)	●	●						●
Heat meter pattern approval - OIML R 75 (Denmark)		●						
Hot water pattern approval Germany (PTB)		●						
Other media than water pattern approval - OIML R 117		●						
Hazardous areas								
ATEX - 2G D zone 1				●	(●)			
FM - class 1 div 2	●	●	●					
UL / cUL - general safety	●	●			●	●		
Other								
C - tick (Australia)	●	●	●	●	●	●		
GOSS / GOST (Russia)	●	●	●	●	●	●		●
Other national approvals, see internet	●	●	●	●	●	●	●	●
MAGFLO Verificator compatible	●	●						

● = available

For more national approvals please check our internet page
http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=en&objid=10806954&subtype=134400&caller=view

Practical examples of ordering

SITRANS F M compact installation

MAG 6000 transmitter + MAG 3100 sensor = MAG 6000 compact mounted on a MAG 3100 sensor

Example

Sensor	**7ME6310-3TC11-1JA1**
Pipe size	DN 100
Liner	Neoprene
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	**MAG 6000, Polyamide, 115/230 V AC**
Accuracy	0.25%
Supply	230 V AC

Note:
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

SITRANS F M remote installation

Wall bracket + MAG 6000 =

MAG 3100 + 2 x cable = MAG 3100 remote installation

Example

Sensor	**7ME6310-3TC11-1AA1**
Pipe size	DN 100
Liner	Neoprene
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	**7ME6920-1AA10-0AA0**
Accuracy	0.25%
Supply	230 V AC
Wall mounting kit	**FDK-085U1018**
Cable kit with sensor cabel and electrode cable	**A5E01181647**

System information MAGFLO electromagnetic flowmeters

Function

All electromagnetic flowmeters are based on Faraday's law of induction:

$U_M = B \cdot v \cdot d \cdot k$

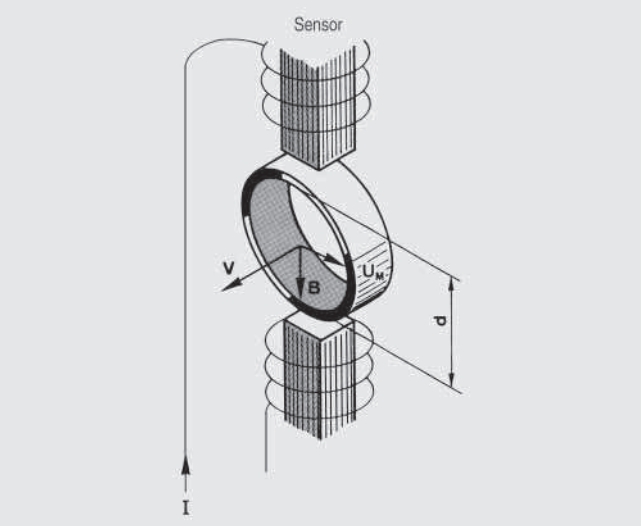
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

B = Magnetic flux density which permeates the flowing medium perpendicular to the flow direction.

v = flow velocity of medium

d = internal diameter of metering tube

k = proportionality factor or sensor constant



Function and measuring principle of electromagnetic measurement

An electromagnetic flowmeter generally consists of a magnetically non-conducting metering tube with an internal electrically non-conducting surface, magnet coils connected in series and mounted diametrically on the tube, and at least two electrodes which are inserted through the pipe wall and are in contact with the measured medium. The magnet field coils through which the current passes generate a pulsed electromagnetic field with the magnetic flux density B perpendicular to the pipe axis.

This magnetic field penetrates the magnetically non-conducting metering tube and the medium flowing through it, which must have a minimum electrical conductivity.

According to Faraday's law of induction, a voltage U_M is generated in an electrically conducting medium, and is proportional to the flow velocity v of the medium, the magnetic flux density B, and the distance between the electrodes d (internal diameter of pipe).

The signal voltage U_M is tapped by the electrodes which are in contact with the medium, and passed through the insulating pipe wall. The signal voltage U_M which is proportional to the flow velocity is converted by an associated transmitter into appropriate standard signals such as 4 to 20 mA.

MAGFLO diagnostics

The diagnostic functions are all internal tools in the meter:

- Identification in clear text and error log
- Error categories: function; warning; permanent and fatal errors
- Transmitter self-check including all outputs and the accuracy
- Sensor check: coil and electrode circuit test
- Overflow
- Empty pipe: partial filling; low conductivity; electrode fouling

MAGFLO Verificator (Mag 5000 and 6000)

The MAGFLO Verificator is an external tool designed for MAG 5000 and MAG 6000 with MAG 1100, MAG 1100 Food, MAG 3100 or MAG 5100 W sensors to verify the entire product, the installation and the application.

The goal is to improve the operation, reduce downtime and maintain measurement accuracy as long as possible.

Thus we have developed the SIEMENS MAGFLO Verificator a highly advanced instrument to carry out the complex verification and performance check of the entire flowmeter system, according to unique SIEMENS patented principles. The whole verification test is automated and easy to operate so there is no opportunity for human error or influence. The system is traceable to international standards and tested by WRc (Water Research Council).

MAGFLO Verificator

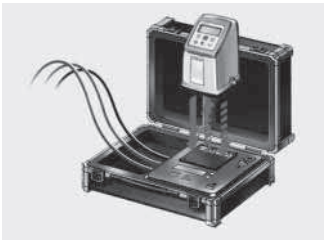
- Stand alone Verificator to measure a number of selected parameters in the flow sensor and a transmitter which affects the integrity of the flow measurement
- Up to 20 measurements can be stored in the Verificator
- The Verificator can be connected via a serial cable to a PC enabling download of the data. A Windows OC program enables printing and management of verificator reports.

Verification - Steps

Verification of a SITRANS F M MAGFLO flowmeter consists of the following test routines
1. Transmitter test
2. Flowmeter and cable insulation test
3. Sensor magnetism test

1. Transmitter test

The transmitter test is the traditional way of on-site testing on the market and checks the complete electronic system from signal input to output.

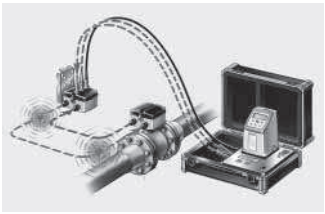


Transmitter test

Using the excitation power output, which is generated to drive the magnetic field of the sensor, the verificator simulates flow signal to the transmitter input. By measuring the transmitter outputs the verificator calculates its accuracy against defined values. Test includes:

- Excitation power to drive the magnetic field
- Signal function from signal input to output
- Signal processing – gain, offset and linearity
- Test of analogue and frequency output

2. Insulation test



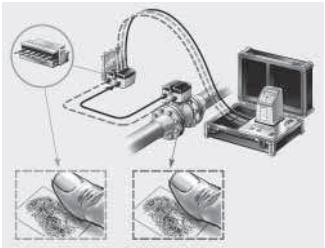
Flowmeter insulation test

The verification test of the flowmeter insulation is a „cross talk" test of the entire flowmeter which ensures that the flow signal generated in the sensor is not affected by any external influences.

In the "cross-talk" test the verificator generates a high voltage disturbance within the coil circuit and then looks for any "crosstalk" induced in the flow signal circuit. By generating dynamic disturbances close-coupled to the flow signal, the flowmeter is tested for noise immunity to a maximum level:

- EMC influence on the flow signal
- Moisture in sensor, connection and terminal box
- Non-conductive deposit coating the electrodes within the sensor
- Missing or poor grounding, shielding and cable connection.

3. Sensor magnetism test



Sensor magnetism test

The verification of the sensor magnetism is a "boost" test of the magnetic field coil. The test ensures that the magnetism behaviour is like the first time, by comparing the current sensor magnetism with the "fingerprint" which was determined during initial calibration and stored in the SENSORPROM memory unit.

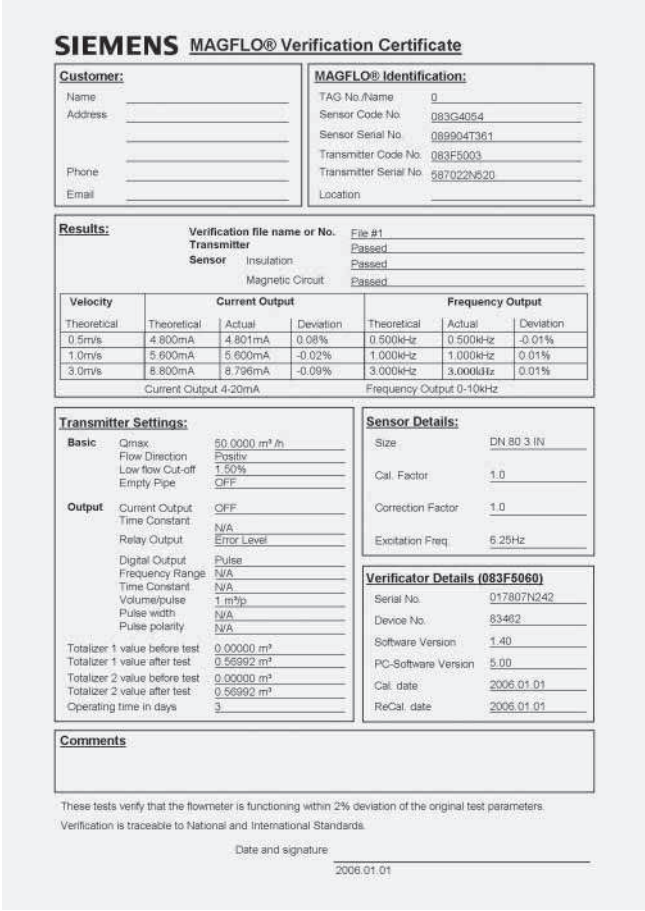
In the "boost" test the verificator changes the magnetic field in certain pattern and with high voltage to get quick stable magnetic condition. This unique test is fulfilled without any interference or compensation of surrounding temperature or interconnecting cabling.

- Changes in dynamic magnetic behaviour
- Magnetic influence inside and outside the sensor
- Missing or poor coil wire and cable connection

Certificate

The test certificate generated by a PC contains:

- Test result with passed or failed
- Installation specification
- Flowmeter specification and configuration
- Verificator specification with date of calibration ensuring traceability to international standards.



SIEMENS MAGFLO® Verification Certificate

Customer:
Name
Address
Phone
Email

MAGFLO® Identification:
TAG No./Name 0
Sensor Code No. 083G4054
Sensor Serial No. 089904T361
Transmitter Code No. 083F5003
Transmitter Serial No. 587022N520
Location

Results:
Verification file name or No. File #1
Transmitter
Sensor Insulation Passed
Magnetic Circuit Passed

Velocity	Current Output			Frequency Output		
Theoretical	Theoretical	Actual	Deviation	Theoretical	Actual	Deviation
0.5m/s	4.800mA	4.801mA	0.08%	0.500kHz	0.500kHz	-0.01%
1.0m/s	5.600mA	5.600mA	-0.02%	1.000kHz	1.000kHz	0.01%
3.0m/s	8.800mA	8.796mA	-0.09%	3.000kHz	3.000kHz	0.01%
	Current Output 4-20mA			Frequency Output 0-10kHz		

Transmitter Settings:
Basic: Qmax 50.0000 m³/h; Flow Direction Positiv; Low flow Cut-off 1.50%; Empty Pipe OFF
Output: Current Output OFF; Time Constant N/A; Relay Output Error Level; Digital Output Pulse; Frequency Range N/A; Time Constant N/A; Volume/pulse 1 m³/p; Pulse width N/A; Pulse polarity N/A
Totalizer 1 value before test 0.00000 m³
Totalizer 1 value after test 0.56992 m³
Totalizer 2 value before test 0.00000 m³
Totalizer 2 value after test 0.56992 m³
Operating time in days 3

Sensor Details:
Size DN 80 3 IN
Cal. Factor 1.0
Correction Factor 1.0
Excitation Freq. 6.25Hz

Verificator Details (083F5060)
Serial No. 017807N242
Device No. 83462
Software Version 1.40
PC-Software Version 5.00
Cal. date 2006.01.01
ReCal. date 2006.01.01

Comments

These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters.
Verification is traceable to National and International Standards.

Date and signature
2006.01.01

Description	Order No.
MAGFLO Verificator	
• 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 50 Hz	**FDK-083F5060**
• 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 60 Hz	**FDK-083F5061**

Note:
It is mandatory to have the Verificator return to the factory once a year for check and re-verification.

System information MAGFLO electromagnetic flowmeters

Technical specifications

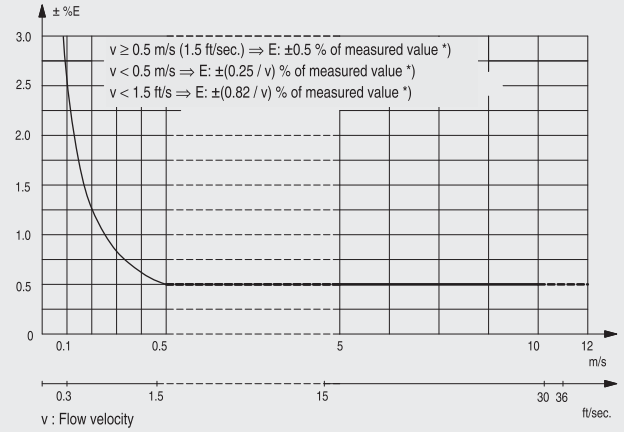
Flowmeter Calibration and traceability

To ensure continuous accurate measurement, flowmeters must be calibrated. All measuring instrumentation, used in the calibration of the flowmeters, has either been calibrated by a UKAS or DANAK accedited laboratory or has been calibrated against certified master sensors. This provides an unbroken chain of measurement-traceability to national standards.

Siemens Flow Instruments can provide accredited calibration in the flow range from 0.0001 m^3/h to 4350 m^3/h.

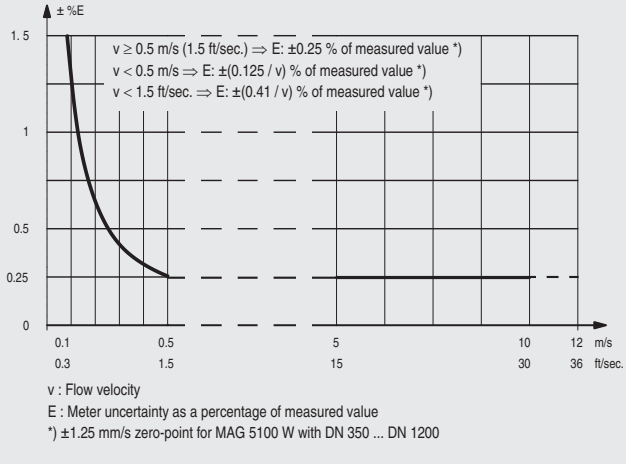
The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including the US (NIST traceability).

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit.



Flowmeter uncertainty:

- MAG 5000,
- MAG 6000 or MAG 6000 I used with MAG 1100 PFA



Flowmeter uncertainty:

- MAG 6000 or MAG 6000 I used with MAG 3100, MAG 1100 (Ceramic) or MAG 5100 W

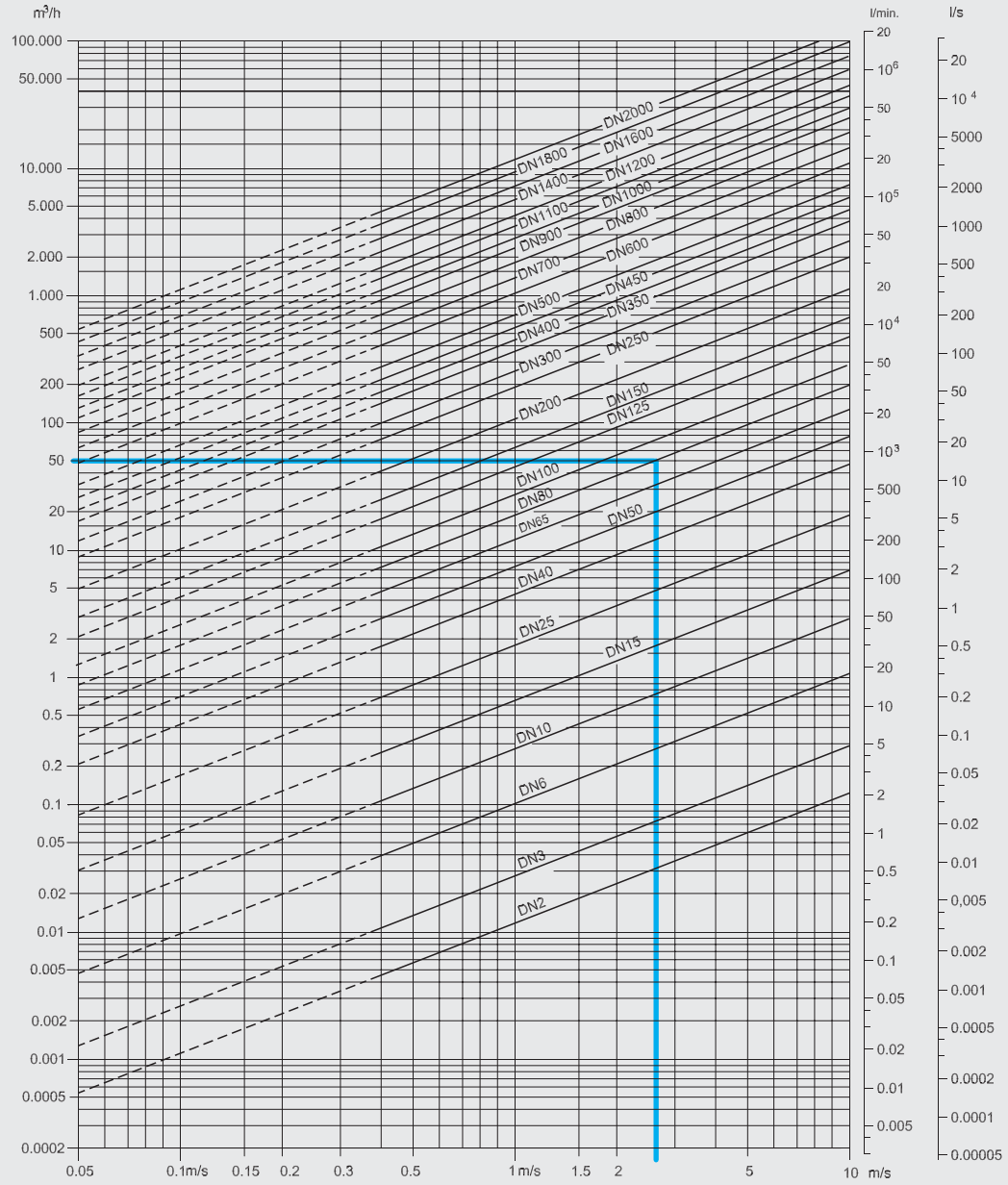
Reference conditions

Reference conditions (ISO 9104 and DIN EN 29104)	
Temperature medium	20 °C ± 5 K (68 °F ± 9 °F)
Temperature ambient	20 °C ± 5 K (68 °F ± 9 °F)
Supply voltage	U_n ± 1%
Warming-up time	30 minutes
Incorporation in conductive pipe section	
• Inlet section	10 x DN (DN ≤ 1200/48") 5 x DN (DN > 1200/48")
• Outlet section	5 x DN (DN ≤ 1200/48") 3 x DN (DN > 1200/48")
Flow conditions	Fully developed flow profile

Additions in the event of deviations from reference conditions	
Current output	As pulse otput (± 0.1% of actual flow + 0.05% FSO)
Effect of ambient temperature	
• Display / frequency / pulse output	< ± 0.003% / K act.
• Current output	< ± 0.005% / K act.
Effect of supply voltage	< 0.005% of measuring value on 1% change
Repeatability	± 0.1% of actual flow for v ≥ 0.5 m/s (1.5 ft/s) and conductivity > 10 µS/cm

Selection of sensor

Metric



Sizing table (DN 2 … DN 2000)

The table shows the relationship between flow velocity v, flow quantity Q and sensor dimension DN.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.25 m/s

Max. measuring range: 0 to 10 m/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 1 to 3 m/s.

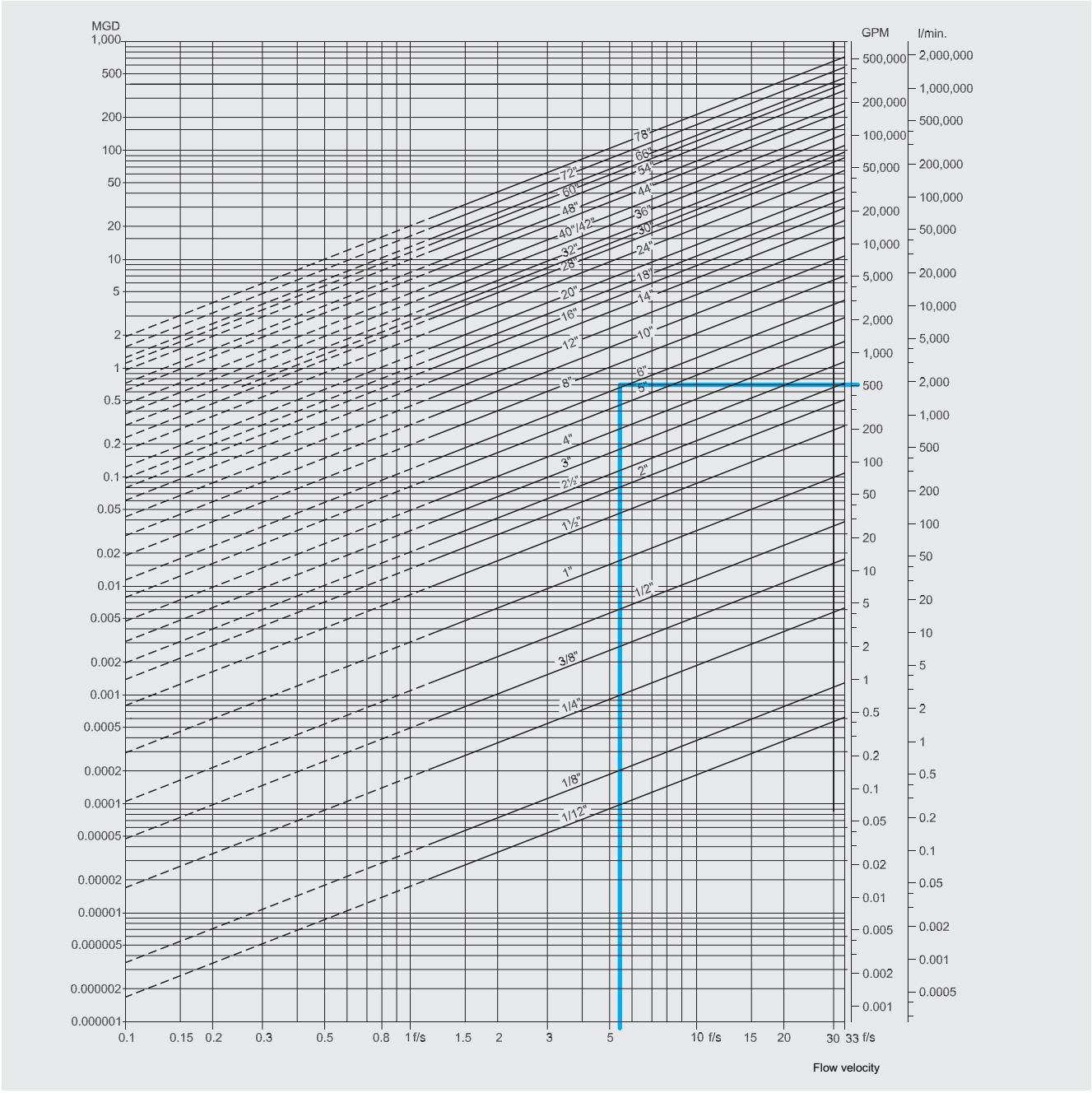
Example:

Flow quantity of 50 m^3/h and a sensor dimension of DN 80 gives a flow velocity of 2.7 m/s, which is within the recomented measuring range of 1 to 3 m/s.

Flow velocity calculation formula	Units
$v = 1273.24 \cdot Q / DN^2$ or	v : [m/s], Q : [l/s], DN : [mm]
$v = 353.68 \cdot Q / DN^2$	v : [m/s], Q : [m^3/h], DN : [mm]

Link to „Sizing program“: www.siemens.com/flow-productsizing

Imperial



Sizing table ($^1/_{12}$" … 78")

The table shows the relationship between flow velocity v, flow quantity Q and sensor dimension size.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.8 ft/s

Max. measuring range: 0 to 33 ft/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 3 to 10 ft/s.

Example:

Flow quantity of 500 GPM and a sensor dimension of 6" gives a flow velocity of 5.6 ft/s, which is within the recommended measuring range of 3 to 10 ft/s.

Flow velocity calculation formula	Units
$v = 0.408 \cdot Q / (\text{Pipe I.D.})^2$ or	v : [ft/s], Q : [GPM], Pipe I.D. : [inch]
$v = 283.67 \cdot Q / (\text{Pipe I.D.})^2$	v : [ft/s], Q : [MGD], Pipe I.D. : [inch]

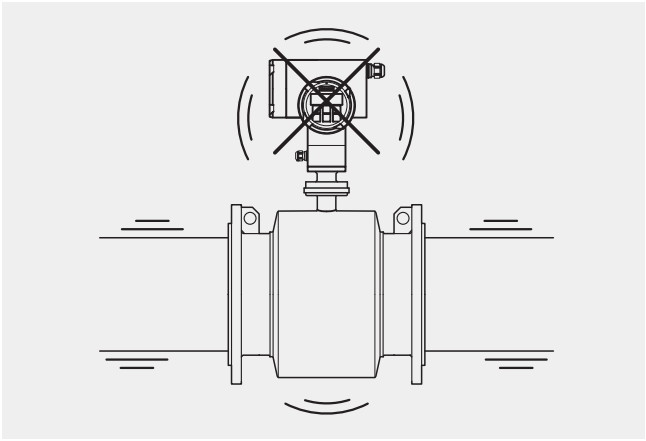
Link to „Sizing program“: www.siemens.com/flow-productsizing

Installation conditions

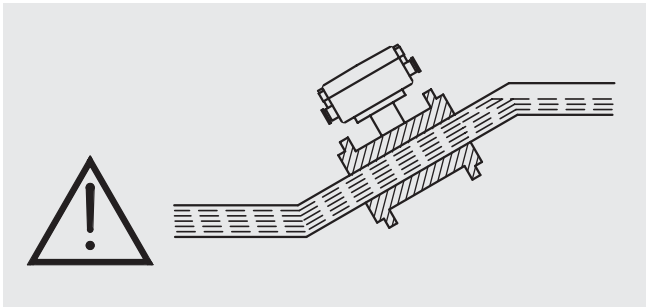
Vibrations

Strong vibrations should be avoided.

In applications with strong vibrations, we recommend remote mounting of the transmitter.



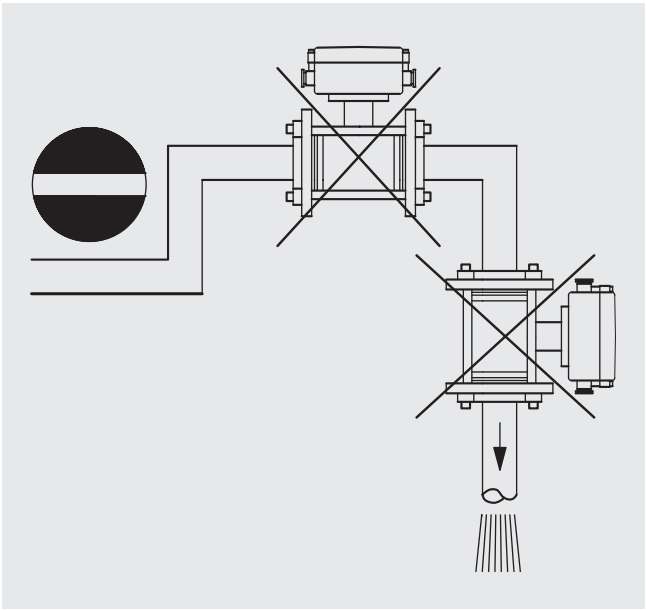
The sensor must always be completely filled with liquid.



Install in pipelines which are always full

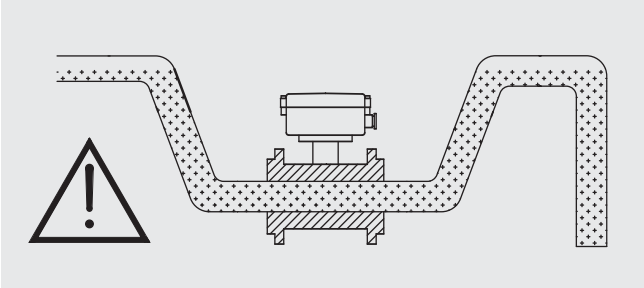
The sensor must always be completely filled with liquid. Therefore avoid:

- Installation at the highest point in the pipe system
- Installation in vertical pipes with free outlet



Do not install in pipelines which can run empty

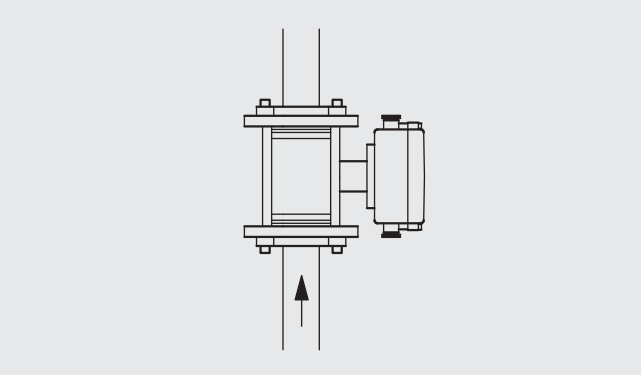
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

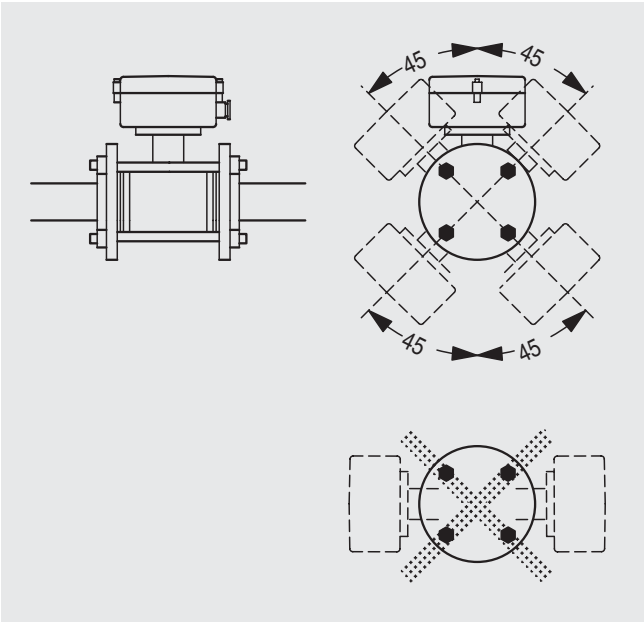
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



Install in vertical pipes with upward flow direction

Installation in horizontal pipes

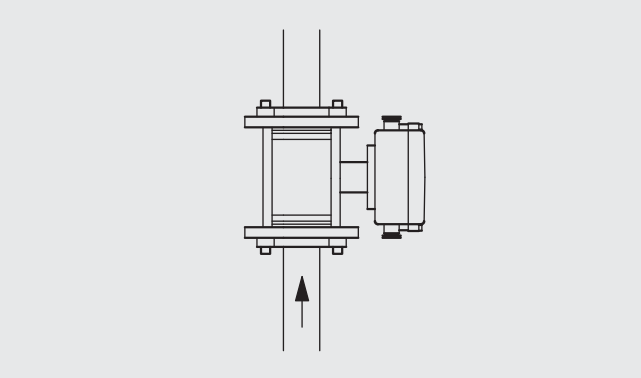
The sensor must be mounted as shown in the below figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.



If using empty pipe detection, the sensor can be tilted 45°.

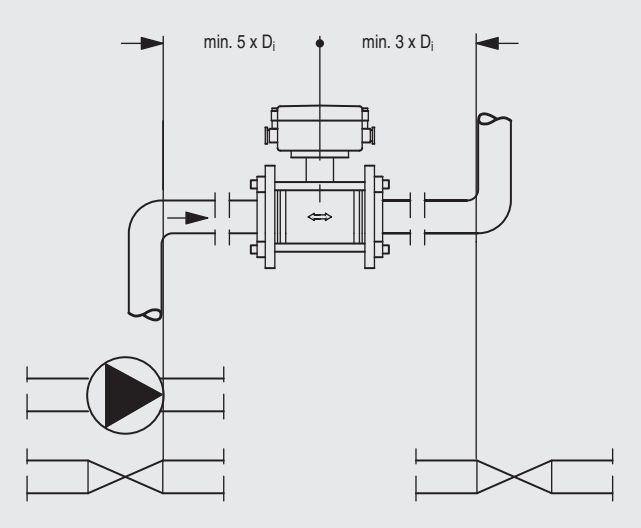
Measuring abrasive liquids and liquids containing particles

Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



Install in vertical pipelines with upward flow direction if measuring abrasive liquids

Inlet and outlet conditions

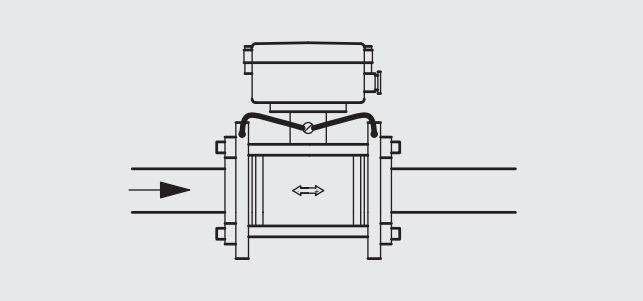


Installation between elbows, pumps and valves: standard inlet and outlet pipe sections

To achieve maximum accurate flow measurement it is essential to have straight length of inlet and outlet pipes and a certain distance between the flowmeter and pumps or valves.

It is also important to center the flowmeter in relation to pipe flange and gaskets.

Potential equalization

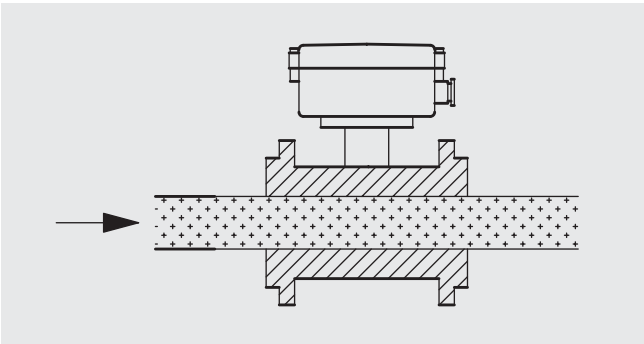


Potential equalization

The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

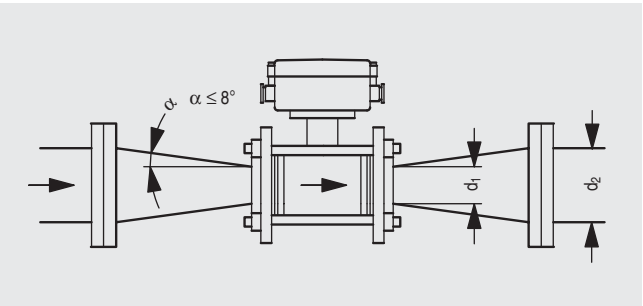
- Wire jumper between sensor and adjacent flange (MAG 1100, MAG 3100)
- Direct metallic contact between sensor and fittings (MAG 1100 Food)
- Build-in grounding electrodes (MAG 3100, MAG 5100 W)
- Optional grounding/protection flanges/rings (MAG 1100, MAG 3100, MAG 8000)
- Optional graphite gaskets on MAG 1100 (standard for MAG 1100 High Temperature)
- MAG 8000 installed in plastic or coated pipes: two grounding rings to be used.

Vacuum



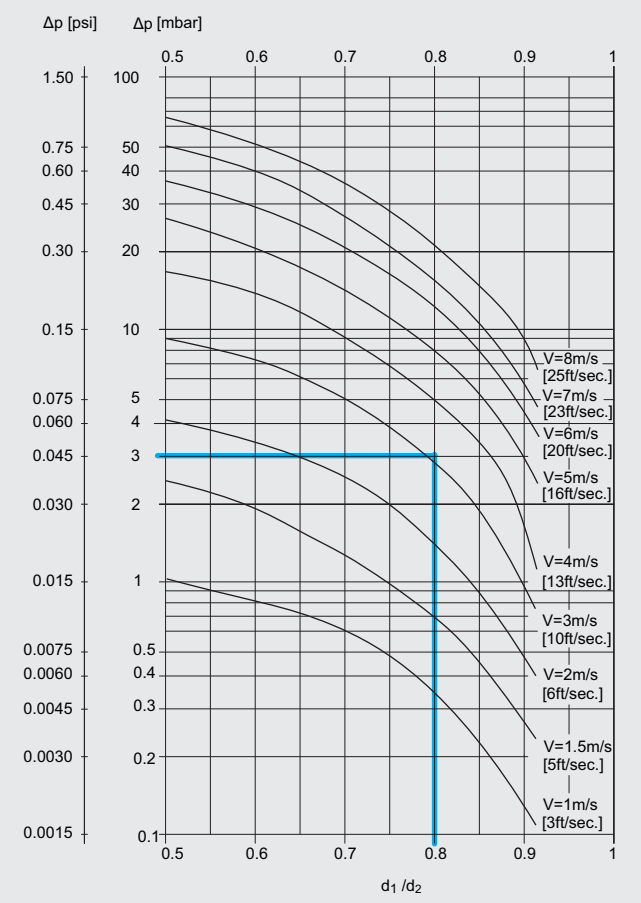
Avoid a vaccum in the measuring pipe, since this can damage certain liners.

Installation in large pipes



Reduction in nominal pipe diameter

The flowmeter can be installed between two reducers (e.g. DIN 28545). Assuming that at 8° the following pressure drop curve applies. The curves are applicable to water.

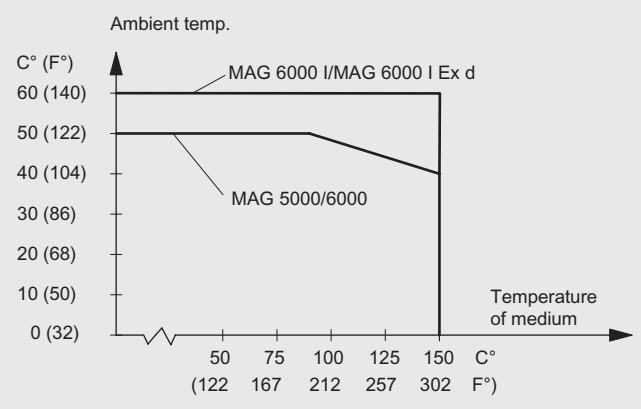


Pressure drop as function of diameter reduction between reducers

Example:

Flow velocity (v) of 3 m/s (10 ft/s) in a sensor with a diameter reduction DN 100 (4") to DN 80 (3") (d_1/d_2 = 0.8) gives a pressure drop of 2.9 mbar (0.04 psi).

Ambient temperature



Max. ambient temperature as a function of temperature of medium

The transmitter can be installed either compact or remote.

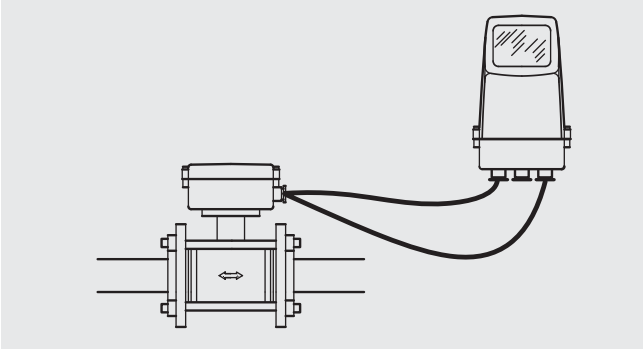
With compact installation the temperature of medium must be according to the graph.

Sensor cables and conductivity of medium

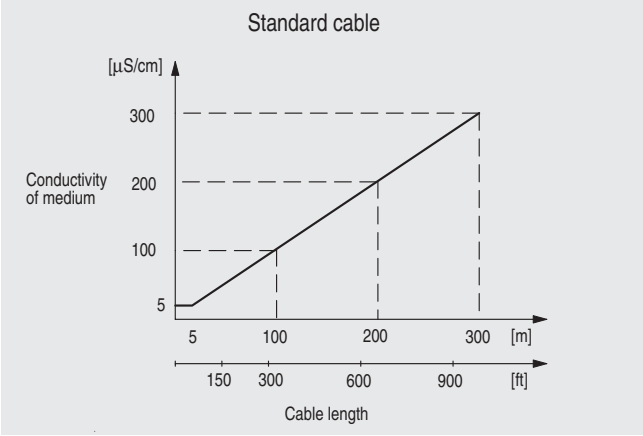
Compact installation:

Liquids with an electrical conductivity ≥ 5 µS/cm.

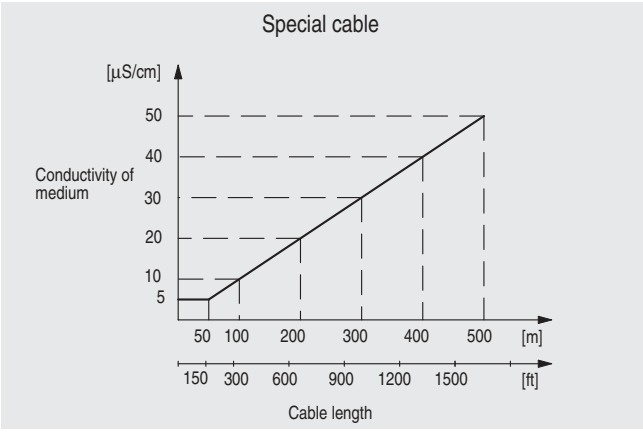
Remote installation:



Remote installation



Minimum conductivity of medium (using standard electrode cable)



Minimum conductivity of medium (using special electrode cable)

Note

For detection of empty sensor the minimum sensor conductivity must always be ≥ **20 µS/cm** and the maximum length of electrode cable when remotely mounted is 50 m (150 ft). Special shield cable must be used.

For **DN 2, DN 3** or for remote mounting in Ex applications special cable cannot be used, empty sensor cannot be detected and the conductivity must be ≥ **30 µS/cm**. For remote mounted CT installations the maximum cable length is 200 m (600 ft).

Transmitter MAGFLO MAG 5000/6000

Overview

Transmitter MAG 5000/6000 compact version (left) and 19“ insert version (right)

The MAG 5000 and 6000 are microprocessor-based transmitters engineered for high performance, easy installation, commissioning and maintenance. The transmitters evaluate the signals from the SITRANS F M MAGFLO sensors type MAG 1100, MAG 1100 F, MAG 3100 and MAG 5100 W.

Transmitter types:

- MAG 5000: Max. measuring error 0.5% of rate (incl. sensor)
- MAG 6000: Max. measuring error 0.25% of rate (incl. sensor, see also sensor specifications) and with additional features such as: Plug & Play insert bus modules; integrated batch functions.

Benefits

- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection.
- 3 lines, 20 characters display in 11 languages.
- Flow rate in various units
- Totalizer for forward, reverse and net flow as well as additional information available
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging (see under SITRANS F M MAGFLO diagnostics)
- Batch control
- Custody transfer approval: PTB, OIML R75, R117, OIML R 49 and MI-001,
- MAG 6000 with add-on bus modules for HART, MODBUS RTU/RS485, PROFIBUS PA and DP

Application

The MAG flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries. The main applications can be found in:

- Water and waste water
- Chemical and pharmaceutical industries
- Food & beverage industries
- Power generation and utility

Design

The transmitter is designed as either IP67 NEMA 4X enclosure for compact or wall mounting or 19" version as a 19” insert as a base to be used in:

- 19" rack systems
- Panel mounting IP65/NEMA 4
- Back of panel mounting IP20/NEMA 2
- Wall mounting IP66/NEMA 4

Several options on 19” versions are available such as:

- Transmitters mounted in safe area for Ex ATEX approved flow sensors (incl. barriers)
- Transmitters with electrode cleaning unit

Function

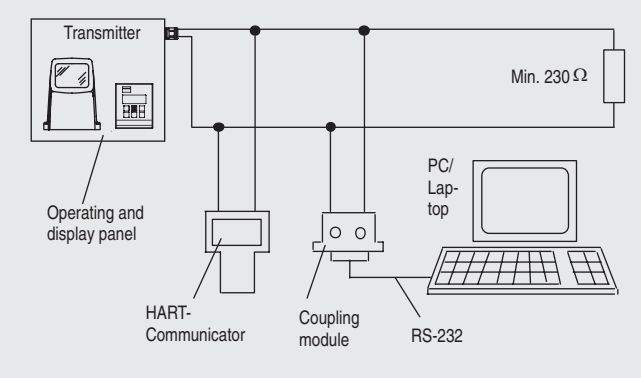
The MAG 5000/6000 are microprocessor-based transmitters with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

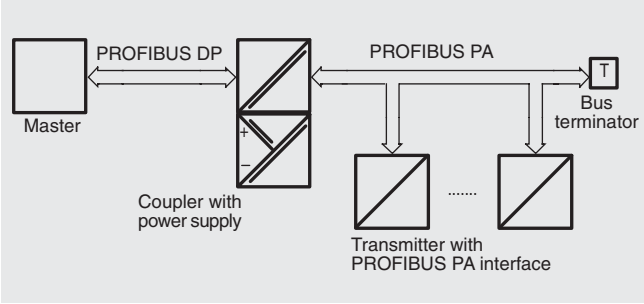
Displays and controls

Operation of the transmitter can be carried out using:

- Control and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or MODBUS communication



HART communication



PROFIBUS PA communication

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	> 1 x 10^{14} Ω
Input	
Digital input	11 ... 30 V DC, R_i = 4. 4 KΩ
• Activation time	50 ms
• Current	$I_{DC\ 11\ V}$ = 2.5 mA, $I_{DC\ 30\ V}$ = 7 mA
Output	
Current output	
• Signal range	0 ... 20 mA or 4 ... 20 mA
• Load	< 800 Ω
• Time constant	0.1 … 30 s, adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle (uni/bidirectional)
Pulse (active)	DC 24 V, 30 mA, 1 KΩ ≤ R_i ≤ 10 KΩ, short-circuit-protected (power supplied from flowmeter)
Pulse (passive)	DC 3 … 30 V, max. 110 mA, 200 Ω ≤ R_i ≤ 10 KΩ (powered from connected equipment)
Time constant	0.1 … 30 s, adjustable
Relay output	
Time constant	Changeover relay, same as current output
Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 ... 9.9% of maximum flow
Galvanic isolation	All inputs and outputs are galvanically isolated
Max. measuring error (incl. sensor and zero point)	
MAG 5000	0.5% of rate
MAG 6000	0.25% of rate
Rated operation conditions	
Ambient temperature	
• Operation	• Display version: -20 ... +50 °C (-4 ... +122 °F) • Blind version: -20 ... +60 °C (-4 ... +140 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)
Mechanical load	
Compact version	18 ... 1000 Hz, 3,17 G rms, sinusoidal in all directions to IEC 68-2-36
19“ insert	1 ... 800 Hz, 1 G, sinusoidal in all directions to IEC 68-2-36

Degree of protection	
Compact version	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH_2O 30 min.)
19“ insert	IP20/NEMA 2 to IEC 529 and DIN 40050
EMC performance	
Emitted interference	To EN 50081-1 (Light industry)
Noise immunity	To EN 50082-1 (Industry)
Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Time constant	Time constant as current output time constant
Design	
Enclosure material	
• Compact version	Fiber glass reinforced polyamide; optional (IP67 only): AISI 316 stainless steel
• 19“-insert	Standard 19“ insert of aluminium/steel (DIN 41494), width: 21 TE, height: 3 HE
• Back of panel	IP20/NEMA 2; Aluminium
• Panel mounting	IP65/NEMA 4; ABS plastic
• Wall mounting	IP66/NEMA 4; ABS plastic
Dimensional drawings	
Compact version	See dimensional drawings
19“ insert	See dimensional drawings
Weight	
Compact version	0.75 kg (2 lb)
19“ insert	See dimensional drawings
Power supply	• 115 ... 230 V AC +10% -15%, 50 ... 60 Hz, 17 VA • 11 ... 30 V DC or 11 ... 24 V AC
Power consumption	• 230 V AC: 17 VA • 24 V AC : 9 W, I_N = 380 mA, I_{ST} = 8 A (30 ms) • 12 V DC : 11 W, I_N = 920 mA, I_{ST} = 4 A (250 ms)
Certificates and approvals	CE, ULc general purpose, C-tick; FM Class 1, div 2
Custody transfer approval (MAG 5000/6000 CT)	• PTB OIML R49 (cold water pattern approval); MI-001 • PTB and DANAK OIML R75 (hot water pattern approval) (MAG 6000 CT) • PTB and DANAK OIML R117 (cold water/milk, beer etc. pattern approval) (MAG 6000 CT)
Communication	
Standard	
• MAG 5000	Without serial communication or HART as option
• MAG 6000	Prepared for client mounted add-on modules
Optional (MAG 6000 only)	HART, MODBUS RTU/RS485, PROFIBUS PA, PROFIBUS DP as add-on modules
• MAG 5000/6000 CT	no communication moduls approved

Transmitter MAGFLO MAG 5000/6000

Safety barrier (e/ia)

Application	**For use with MAG 5000/6000 19" and MAG 1100 Ex ATEX/MAG 3100 Ex ATEX**		
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX		
	MAG 3100 Ex [EEx e ia] IIC ATEX		
Cable parameter	Group	Capacity in µF	Inductance in mH
• Electrode	IIC	≤ 4.1	≤ 80
	IIB	≤ 45	≤ 87
	IIA	≤ 45	≤ 87
Ambient temperature			
• During operation	-20 ... +50 °C (-4 ... +122 °F)		
• During storage	-20 ... +70 °C (-4 ... +158 °F)		
Enclosure			
• Material	Standard 19" insert in aluminium/steel (DIN 41494)		
• Width	21 TE (4.75")		
• Height	3 HE (5.25")		
• Rating	IP20 / NEMA 2 to EN 60529 and DIN 40050		
• Mechanical load	1 g, 1 … 800 Hz sinusoidal in all directions to EN 60068-2-36		
EMC performance			
• Emission	EN 50081-1 (Light industry)		
• Immunity	EN 50082-2 (Industry)		

Electrode cleaning unit

Application	**For use with transmitters MAG 5000 and 6000 19" to clean the electrodes on sensors MAG 1100 or MAG 3100**
	NB: Must not be used with intrinsically safe ATEX sensors
	NB: Not to be used with sensors with Hastelloy and Tantalum electrodes
Cleaning voltage	
AC cleaning	60 V AC
DC cleaning	30 V DC
Cleaning period	60 s + 60 s pause period
Relay	
• Load	42 V/2 A
Operation	Switch relay activated when cleaning is in progress
• Automatic	Yes
• Manual	No
Indicator lamps	LEDs: "ON" and "CLEANING"
Supply voltage and power consumption	115 … 230 V AC, +10% … -15%, 50 … 60 Hz, 7 VA cleaning, 5 VA stand by 11 … 30 V DC / 11 … 24 V AC, 50 … 60 Hz, 7 VA cleaning, 5 VA stand by
Ambient temperature	
• During operation	-20 ... +50 °C (-4 ... +122 °F)
• During storage	-20 ... +70 °C (-4 ... +158 °F)
Enclosure	
• Material	Standard 19" insert in aluminium/steel (DIN 41494)
• Width	21 TE (4.75")
• Height	3 HE (5.25")
• Rating	IP20 / NEMA 2 to EN 60529 and DIN 40050
• Mechanical load	1 g, 1 … 800 Hz sinusoidal in all directions to EN 60068-2-36

Cleaning unit

The Siemens cleaning unit can be used with MAG 5000 or 6000 in 19" insert version.

The cleaning unit can be used in applications where the liner and subsequently the electrodes may be coated with deposits. If the coating is electrically insulating, the electrode signal will be reduced. If the coating is electrically inductive, the electrode signal will be partly short-circuited and in both cases the accuracy of the meter will decrease (dependent on coating type and thickness).

Note:

The cleaning unit cannot be used for inflammable or explosive media!

Mode of operation

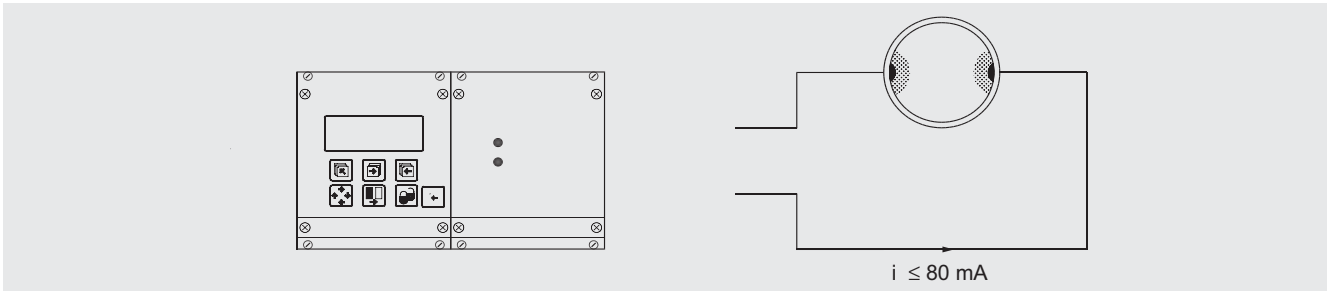
The cleaning unit cleans the electrodes electro-chemically by applying a voltage to the electrodes for approx. 60 seconds. While cleaning, the transmitter stores and holds the latest measured flow reading on the display and also the signal outputs. After an additional pausing period of 60 seconds the flowmeter resumes normal measurement and the cleaning is now completed.

The relay in the transmitter activates the cleaning cycle. In the relay output menu (under cleaning) the cleaning interval can be set between 1 hour and 24 hours.

Cleaning should only take place with liquid in the pipe.This can be detected via the empty pipe function. It is therefore recommended to select “empty pipe detection” ON when using the cleaning.

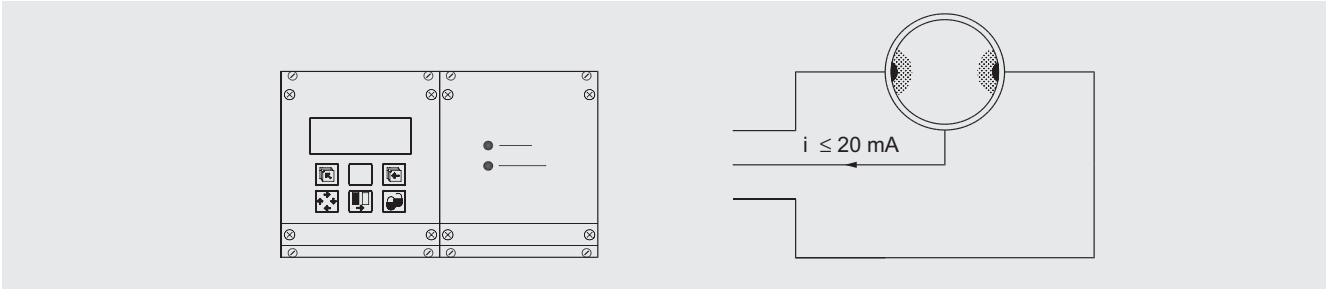
The cleaning sequence can also be controlled manually through the electrical input of the transmitter. Before this is done, ensure that the measuring pipe is full.

AC cleaning



AC-cleaning is used to remove fatty deposits on the electrodes. These fatty deposits are seen in waste water applications, in abattoirs and water applications with oil residuals. During the cleaning process, the surface of the electrodes get warmer, which tends to soften grease particles and the gas bubbles generated mechanically lift deposits away from the surface of the electrodes.

DC cleaning



DC-cleaning is used to eliminate electrically conductive deposits in the measuring pipe influencing the measuring accuracy.

Particularly in district heating applications an electrically conductive deposit (magnetite) may occur and short-circuit the electrode signal. In this case the accuracy of the meter decreases and the signal/noise conditions of the meter become inferior. The problem only arises if the conductivity of the water is less than approx. 250 µS/cm.

During DC-cleaning electrolysis takes place where the flow of electrons removes the particle deposits from the electrode area.

Note:

Do not use DC-cleaning on sensors with Tantalum or Hastelloy electrodes.

Transmitter MAGFLO MAG 5000/6000

Selection and Ordering Data

Transmitter MAG 5000

Description	Order No.[F]	Symbol
Transmitter MAG 5000 Blind for compact and wall mounting; IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6910-1AA30-0AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6910-1AA10-0AA0**	
Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X, fibre-glass reinforced polyamide		
► • 11 ... 30 V DC / 11 ... 24 V AC	**7ME6910-1AA30-1AA0**	
► • 115/230 V AC, 50/60 Hz	**7ME6910-1AA10-1AA0**	
• 115/230 V AC, 50/60 Hz, with HART	**7ME6910-1AA10-1BA0**	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer; IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6910-1AA30-1AB0**	
• 115/230 V AC, 50/60 Hz	**7ME6910-1AA10-1AB0**	
Transmitter MAG 5000 for 19" rack and wall mounting		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6910-2CA30-1AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6910-2CA10-1AA0**	

Transmitter MAG 6000

Description	Order No.[F]	Symbol
Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1AA30-0AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-1AA10-0AA0**	
Transmitter MAG 6000 for compact and wall mounting; IP67/NEMA 4X, fibre-glass reinforced polyamide		
► • 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1AA30-1AA0**	
► • 115/230 V AC, 50/60 Hz	**7ME6920-1AA10-1AA0**	
IP67/NEMA 4X, AISI 316 stainless steel (only for sensor with SS terminal box)		Picture is still missing
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1QA30-1AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-1QA10-1AA0**	

► Available ex stock

Description	Order No.[F]	Symbol
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer (no communication moduls possible); IP67/NEMA 4X, fibre-glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1AA30-1AB0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-1AA10-1AB0**	
Transmitter MAG 6000 SV for compact and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" IP67/NEMA 4X, fibre-glass reinforced polyamide		
11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1AB30-1AA0**	
115/230 V AC, 50/60 Hz	**7ME6920-1AB10-1AA0**	
Transmitter MAG 6000 for 19" rack and wall mounting		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-2CA30-1AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-2CA10-1AA0**	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1"		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-2CB30-1AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-2CB10-1AA0**	
MAG 6000 with IP66/NEMA 4X enclosure; 115/230 V AC, 50/60 Hz	**7ME6920-2EA10-1AA0**	
MAG 6000 with electrode cleaning unit, complete mounted with IP66/NEMA 4X mounting enclosure		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-2PA30-1AA0**	
• 115/230 V AC, 50/60 Hz	**7ME6920-2PA10-1AA0**	
MAG 6000 with safety barrier for ATEX 2G D approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure, ATEX, 115/230 V AC, 50/60 Hz		
• For ATEX 2G D sensors	**7ME6920-2MA11-1AA0**	
MAG 6000 SV, 19" insert, in IP66/NEMA 4X , ABS plastic enclosure, excitation frequency 44 Hz for Batch application DN ≤ 25/1", 11 … 30 V DC, 11 … 24 V AC, 50/60 Hz	**7ME6920-2EB30-1AA0**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

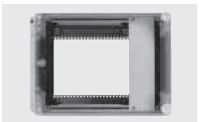
Transmitter MAGFLO MAG 5000/6000

Communication modules for MAG 6000

Description	Order No.[F)]	Symbol
HART (not for MAG 6000 I)	► FDK-085U0226	
MODBUS RTU/RS485	► FDK-085U0234	
PROFIBUS PA Profile 3	► FDK-085U0236	
PROFIBUS DP Profile 3	► FDK-085U0237	

Accessories for MAG 5000 and MAG 6000

Description	Order No.[F)]	Symbol
Wall mounting unit for IP67/NEMA 4X version, wall bracket, terminal box in polyamide		
• 4 x M20 cable glands	► FDK-085U1018	
• 4 x ½“ NPT cable glands	► FDK-085U1053	
Cable for standard electrode or coil, 3 x 1.5 mm² / 18 gage with shield PVC		
• 10 m (33 ft)	► FDK-083F0121	
• 20 m (65 ft)	► FDK-083F0210	
• 40 m (130 ft)	► FDK-083F0211	
• 60 m (200 ft)	► FDK-083F0212	
• 100 m (330 ft)	FDK-083F0213	
• 150 m (500 ft)	FDK-083F3052	
• 200 m (650 ft)	FDK-083F3053	
• 500 m (1650 ft)	FDK-083F3054	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm²		
• 10 m (33 ft)	FDK-083F3020	
• 20 m (65 ft)	► FDK-083F3095	
• 40 m (130 ft)	FDK-083F3094	
• 60 m (200 ft)	FDK-083F3093	
• 100 m (330 ft)	FDK-083F3092	
• 150 m (500 ft)	FDK-083F3056	
• 200 m (650 ft)	FDK-083F3057	
• 500 m (1650 ft)	FDK-083F3058	
Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²		 
• 10 m (33 ft)	A5E01181647	
• 20 m (65 ft)	A5E01181656	
• 40 m (130 ft)	A5E01181686	
• 60 m (200 ft)	A5E01181689	
• 100 m (330 ft)	A5E01181691	
• 150 m (500 ft)	A5E01181699	
• 200 m (650 ft)	A5E01181703	
• 500 m (1640 ft)	A5E01181705	
Cable glands, for above cable, 2 pcs.		 ½“ NPT M20
• M20	A5E00822490	
• ½“ NPT	A5E00822501	

Description	Order No.[F)]	Symbol
Sealing screws for sensor/transmitter, 2 pcs	FDK-085U0221	
Terminal box, in polyamide, inclusive lid		
• M20	► FDK-085U1050	
• ½" NPT	FDK-085U1052	
Terminal box lid, in polyamid	FDK-085U1003	
Terminal box for MAG 6000, in stainless steel, inclusive lid		
• M20	A5E00836867	
• ½" NPT	A5E00836868	
Terminal box (3A) for MAG 1100 Food in polyamide, inclusive lid		
• M20	A5E00822478	
• ½" NPT	A5E00822479	
Potting kit for terminal box of MAG sensors for IP68/NEMA 6P	► FDK-085U0220	
19“ cleaning unit for electrode cleaning (21TE) incl. back plate		
• 11 ... 30 V DC / 11 ... 24 V AC	FDK-083F5039	
• 115 ... 230 V AC, 50/60 Hz	FDK-083F5036	
19“ safety barrier (21 TE) [EEx e ia] IIC for MAG 1100 ATEX and MAG 3100 ATEX, incl. back plate	FDK-083F5034	
Panel mounting enclosure for 19“ insert (21 TE); IP65/NEMA 4 enclosure in ABS plastic for front panel mounting	FDK-083F5030	
Panel mounting enclosure for 19“ insert (42 TE); IP65/NEMA 4 enclosure in ABS plastic for front panel mounting	FDK-083F5031	
Back of panel mounting enclosure for 19“ insert (21 TE); IP20/NEMA 2 enclosure in aluminium	FDK-083F5032	
Back of panel mounting enclosure for 19“ insert (42 TE); IP20/NEMA 2 enclosure in aluminium	FDK-083F5033	

► Available ex stock

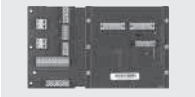
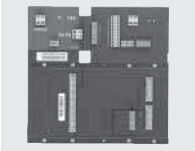
F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Transmitter MAGFLO MAG 5000/6000

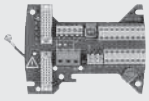
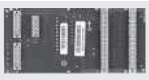
Description	Order No.[F)]	Symbol
IP66/NEMA 4, wall mounting enclosure for 19" inserts (without backplates)		
• 21 TE	FDK-083F5037	
• 42 TE ►	FDK-083F5038	
Front cover (7TE)	FDK-083F4525	

► Available ex stock

Back plates (if wall enclosure IP66 is used as part)

Description	Order No.[F)]	Symbol
Wall unit enclosure IP66, 12 ... 24 V, 115 ... 230 V		
• Transmitter	FDK-083F4121	
• Transmitter ia/e and safety barrier	FDK-083F4122	
• Transmitter ia/ib and safety barrier (only for sensors produced before October 2007)	FDK-083F4120	
• Transmitter and cleaning unit	FDK-083F4124	

Spare parts

Description	Order No.[F)]	Symbol
Connection plate		
• 12 ... 24 V	FDK-083F4149	
• 115 ... 230 V	FDK-083F4148	
19" enclosure, 12 ... 24 V, 115 ... 230 V		
• Transmitter	FDK-083F4117	
• Transmitter ia and safety barrier	FDK-083F4118	
• Transmitter ia/ib and safety barrier (only for sensors produced before October 2007)	FDK-083F4119	
• Transmitter and cleaning unit	FDK-083F4123	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order)		
• 2 kB (for MAG 5000/6000/ MAG 6000 I)	FDK-085U1005	
• 250 B (for MAG 2500/3000)	FDK-085U1008	
Display unit for MAG 5000/6000		
• black neutral front	FDK-085U1038	
• Siemens front	FDK-085U1039	

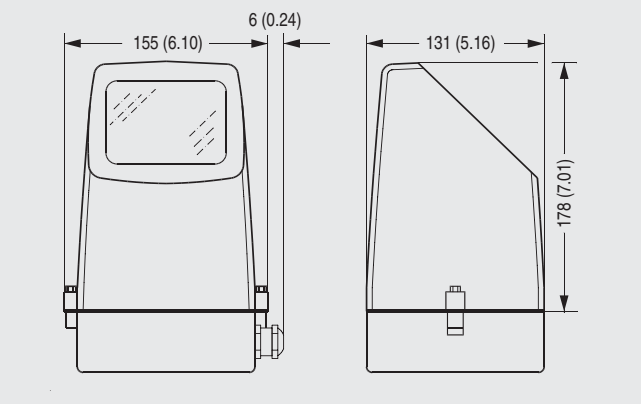
Sun Shields for MAG 5000/6000 transmitters

Description	Order No.[F)]	Symbol
Sun shield for remote MAG 5000/6000 transmitters	A5E01209496	
Sun Shield for compact MAG 5000/6000 transmitters on MAG 3100 (DN 15 ... 2000 (½" ... 78") or MAG 5100 (DN 150 ... 1200 (6" ... 48")	A5E01209500	

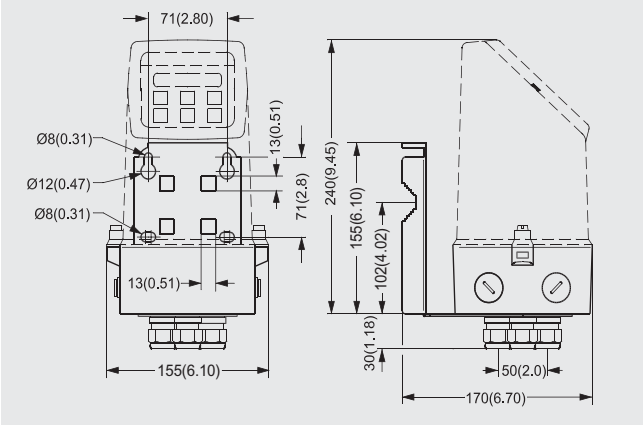
F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

Transmitter IP67/NEMA 4X compact polyamide

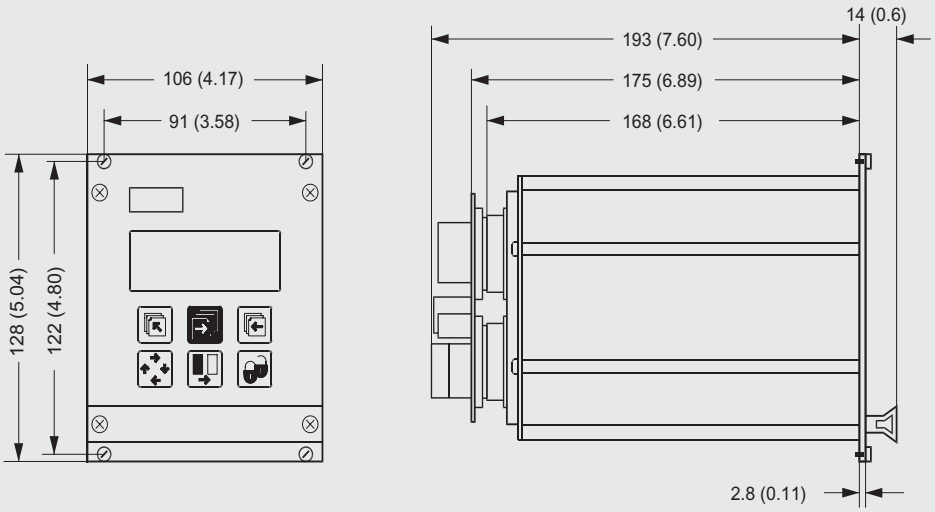


Transmitter compact mounted



Transmitter wall mounted

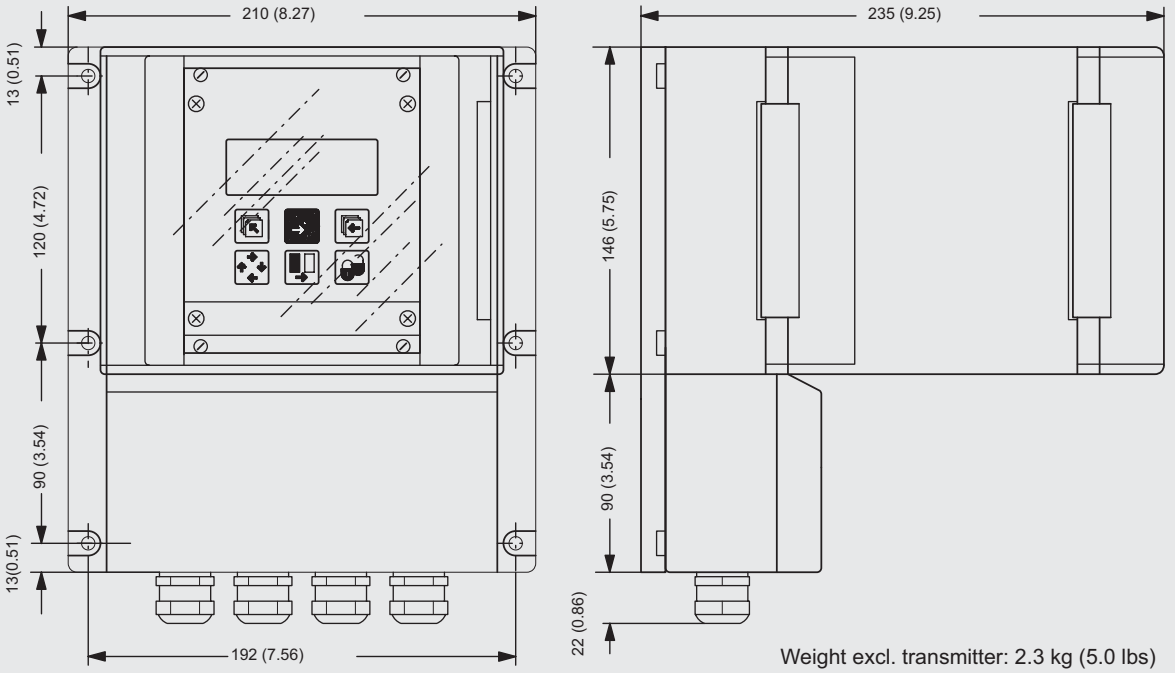
Transmitter, 19" IP20/ NEMA 2 standard unit



Weight incl. back print 0.8 kg /1.8 lbs

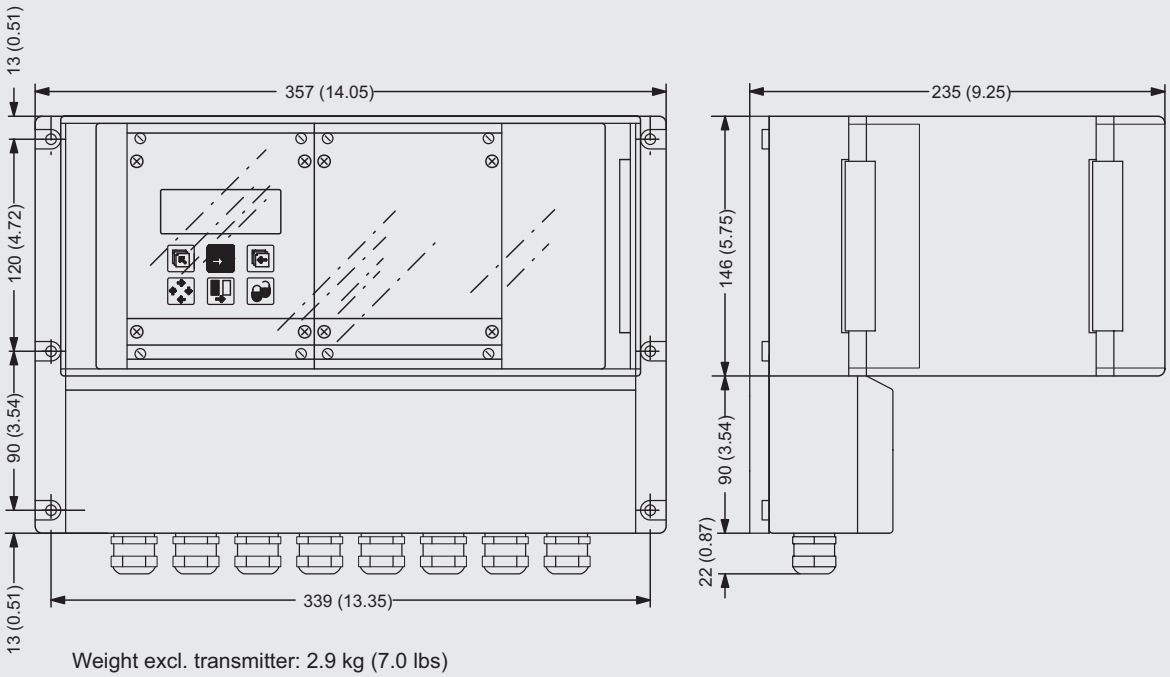
Transmitter MAGFLO MAG 5000/6000

Transmitter, wall mounting IP66/NEMA 4, 21 TE



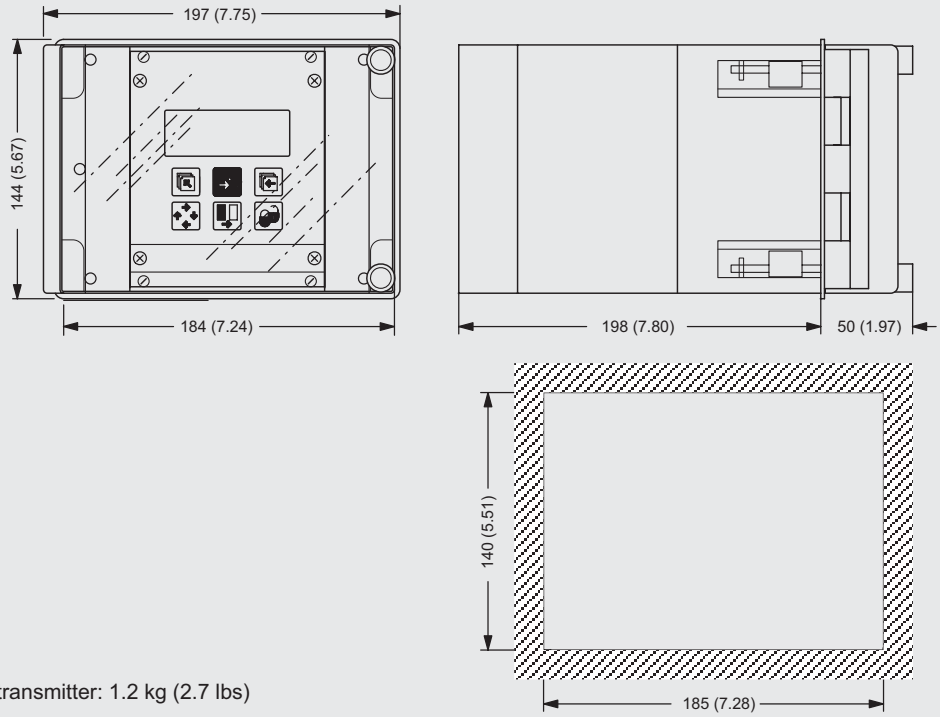
Weight excl. transmitter: 2.3 kg (5.0 lbs)

Transmitter, wall mounting IP66/NEMA 4, 42 TE



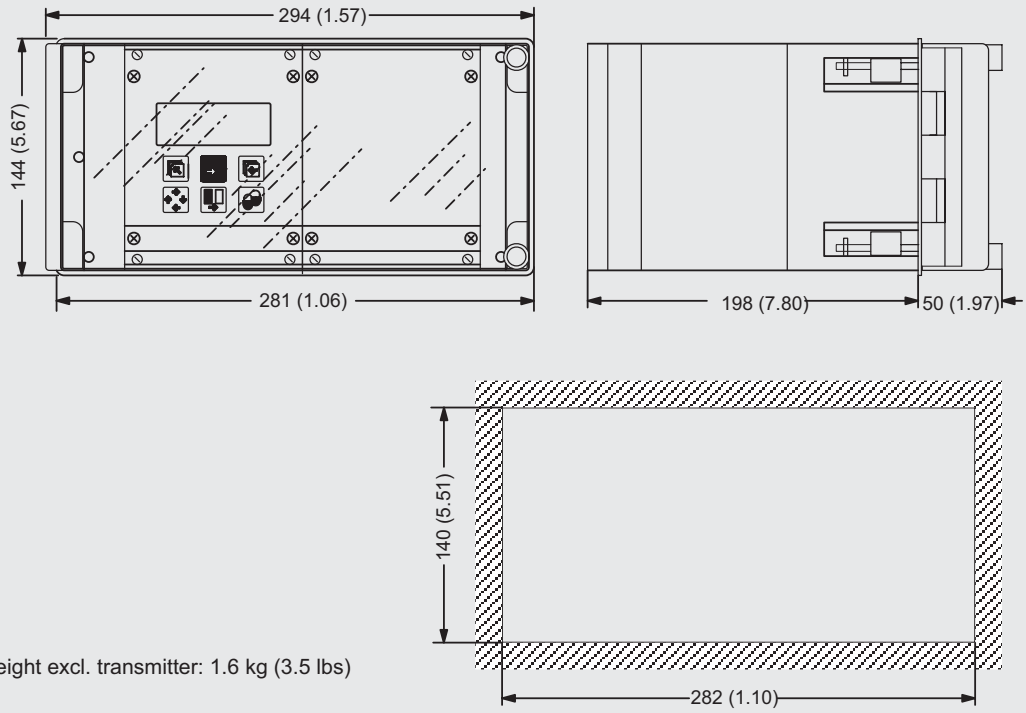
Weight excl. transmitter: 2.9 kg (7.0 lbs)

Transmitter, panel front IP65/NEMA 4, 21 TE



Weight excl. transmitter: 1.2 kg (2.7 lbs)

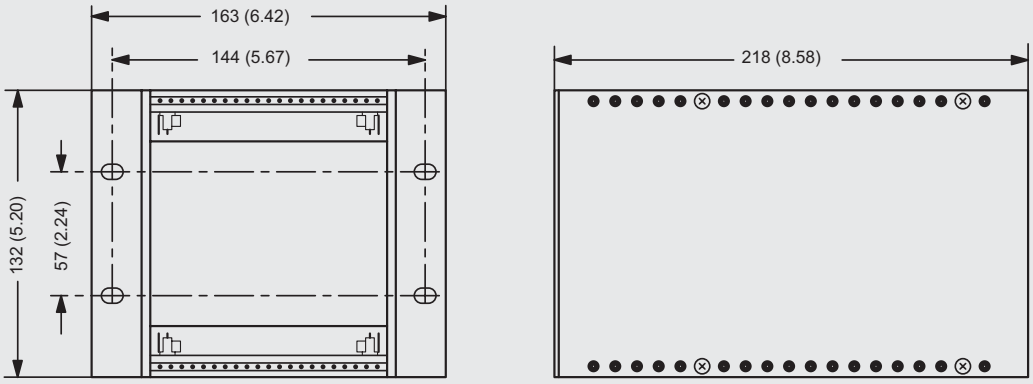
Transmitter, panel front IP65/NEMA 4, 42 TE



Weight excl. transmitter: 1.6 kg (3.5 lbs)

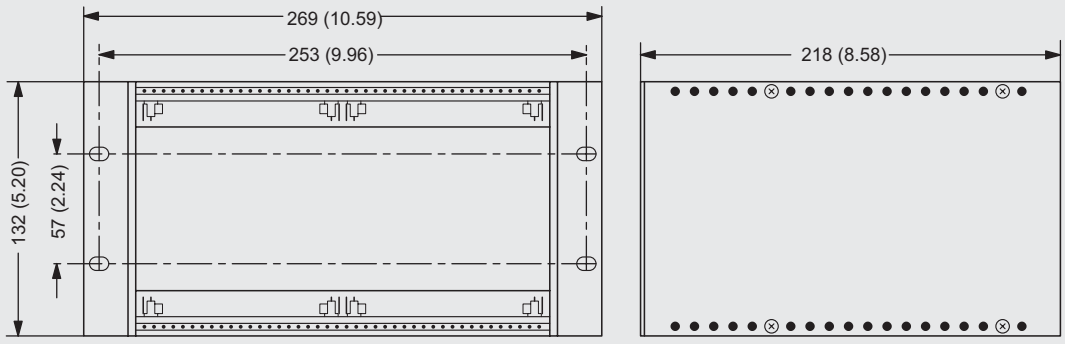
Transmitter MAGFLO MAG 5000/6000

Transmitter, back of panel IP20/NEMA 2, 21 TE



Weight: 0.7 kg (1.6 lbs)

Transmitter, back of panel IP20/NEMA 2, 42 TE



Weight: 0.9 kg (2.0 lbs)

Schematics

Electrical connection

Grounding

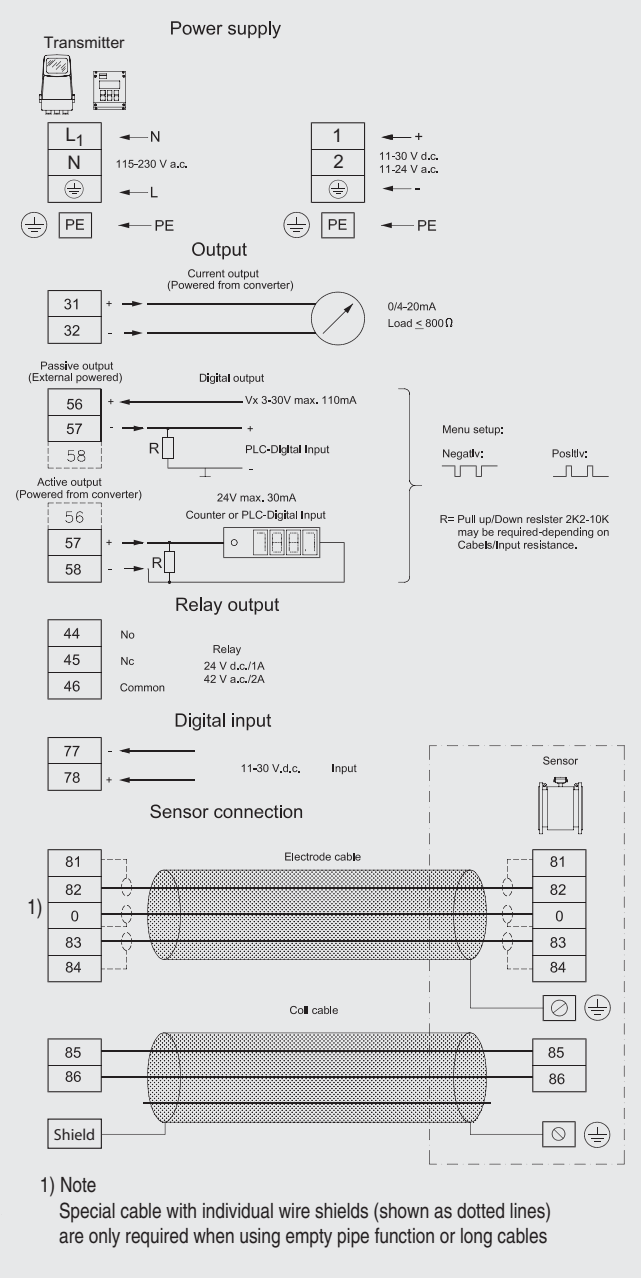
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If the output cable length is long in noisy environment, we recommend to use screened cable.



1) Note
Special cable with individual wire shields (shown as dotted lines) are only required when using empty pipe function or long cables

Transmitter
MAGFLO MAG 6000 I/6000 I Ex d

Overview

The SITRANS F M MAGFLO MAG 6000 I/I Ex d transmitter is designed for the demands in the process industry. The robust die cast aluminium housing provides superb protection, even in the most harsh industrial environments. Full input and output functionality is given even in the Ex version.

Benefits

- Full range of ATEX rated flowmeters with intrinsically safe rated input and outputs
- For compact or remote installation
- HART, PROFIBUS PA/DP, MODBUS RTU/RS485 add-on communication modules available
- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Flow rate in various units
  - Totalizer for forward, reverse and net flow as well as much more information available.
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging
- Batch control

Design

The transmitter is designed for either compact or remote installation in non-hazardous or hazardous areas (compact mounted transmitter to be ordered together with the sensors).

Function

The following functions are available:

- Flow rate
- 2 measuring ranges
- 2 totalizers
- Low flow cut-off
- Flow direction
- Error system
- Operating time
- Uni-/bidirectional flow
- Limit switches and pulse output
- Batch control

The MAG 6000 I/6000 I Ex d is a microprocessor-based transmitter with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

Displays and keypads

Operation of the transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or MODBUS communication

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	> 1 x 10^{14} Ω
Input	
Digital input	DC 11 ... 30 V, Ri = 4.4 kΩ
• Activation time	50 ms
• Current	$I_{DC\ 11\ V}$ = 2.5 mA, $I_{DC\ 30\ V}$ = 7 mA
Output	
Current output	
• Signal range	0 ... 20 mA or 4 ... 20 mA (active/passive)
• Load	< 560 Ω
• Time constant	0.1 … 30 s, adjustable
Digital output	
Frequency	0 … 10 kHz, 50% duty cycle (uni-/bidirectional)
Time constant	0.1 … 30 s, adjustable
Pulse (passive)	3 … 30 V DC, max 110 mA (30 mA Ex version), 200 Ω ≤ Ri ≤ 10 kΩ (powered from connected equipment)
Time constant	0.1 … 30 s, adjustable
Relay output	
Time constant	Changeover relay, same as current output
Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 … 9.9% of maximum flow
Galvanic isolation	All inputs and outputs are galvanic isolated
Max. measuring error	
MAG 6000 I/MAG 6000 I Ex d	0.25% of rate

Transmitter
MAGFLO MAG 6000 I/6000 I Ex d

Technical specifications (continued)

Rated operation conditions	
Ambient temperature	
• Operation	
- MAG 6000 I	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I Ex	-10 … +60 °C (+14 … +140 °F)
• Storage	-40 … +70 °C (-40 … +158 °F)
Mechanical load	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 Transmitter: 1.14 grms
Degree of protection	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH_2O 30 min.)
EMC performance	EN 61326
Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Keypad	Capacitive touch keypad with LED light for feedback indication
Time constant	Time constant as current output time constant
Design	
Enclosure material	Die cast aluminium, painted
• Wall mounting	Wall mounting bracket enclosed for remote version
Dimensional drawings	See dimensional drawings
Weight	See dimensional drawings
Power supply	• Non Ex d: 18 ... 90 V DC; 115 ... 230 V AC; 50 ... 60 Hz • Ex d: 18 ... 30 V DC • Ex d: 115 ... 230 V AC; 50 ... 60 Hz
Power consumption	• 230 V AC: 21.5 VA • 24 V DC: 12 W, I_N = 380 mA, I_{ST} = 1 A (3 ms)
Certificates and approvals	
MAG 6000 I	• CE • C-tick • FM Class 1, div 2 • FM Class 1, Zone 2 • CSA Class 1, div 2 • CSA Class 1, Zone 2
MAG 6000 I Ex (to be used with ATEX 2G D sensors)	• SIRA 03 ATEX 2072X • EX II 2 (1) (2) G D • EEx d e [ia] ia [ib] ib IIC, T6
Cable entries	Remote installation • MAG 6000 I: 2 x M25(for supply/output) and 2 x M16 (for sensor connection) or 2 x ½" NPT (for supply/output) and 2 x M16 (for sensor connection) • MAG 6000 I Ex ATEX 2G D: 2 x M20 (for supply/output) and 2 x M16 (for sensor connection)

Communication	
Non ATEX versions	HART, MODBUS RTU/RS 485, PROFIBUS PA, PROFIBUS DP add-on modules
ATEX 2G D	HART, PROFIBUS PA available as integrated version

Selection and Ordering data		Order No.
SITRANS F M Transmitter MAGFLO MAG 6000 I / Ex d	F)	7ME6930-
Remote, local display, die cast aluminium		2BA■■-1■A■
Supply voltage		
115 ... 230 V AC, 50 ... 60 Hz; 18 ... 90 V DC		2
ATEX 2G D, 18 ... 30 V DC		4
ATEX 2G D, 115 ... 230 V AC, 50 ... 60 Hz		5
Ex approval		
None ATEX; FM/CSA class1 div 2		0
ATEX 2G D (For ATEX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340)		2
Communication		
None (add-on modules can be ordered separately, see below)		A
HART		B
PROFIBUS PA Profile 3		F
PROFIBUS DP Profile 3 (not Ex version)		G
MODBUS RTU/RS 485 (not Ex version)		E
Cable gland entries		
Metric		0
½" NPT		2

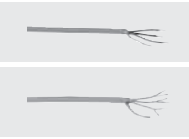
Communication modules for MAG 6000 I (All standard outputs can still be used)

Description		**Order No.**	**Symbol**
HART (only for MAG 6000 I/Ex)	F)	**FDK-085U0321**	
MODBUS RTU/RS485	F)	**FDK-085U0234**	
PROFIBUS PA Profile 3	F)	**FDK-085U0236**	
PROFIBUS DP Profile 3	F)	**FDK-085U0237**	

F) Subject to export regulations AL: 9I999, ECCN: N.

Transmitter
MAGFLO MAG 6000 I/6000 I Ex d

Accessories MAG 6000 I

Description	Order No.[F)]	Symbol
Cable for standard electrode or coil, 3 x 1.5 mm²/ 18 gage with shield PVC		
• 10 m (33 ft) ►	**FDK-083F0121**	
• 20 m (65 ft) ►	**FDK-083F0210**	
• 40 m (130 ft) ►	**FDK-083F0211**	
• 60 m (200 ft) ►	**FDK-083F0212**	
• 100 m (330 ft)	**FDK-083F0213**	
• 150 m (500 ft)	**FDK-083F3052**	
• 200 m (650 ft)	**FDK-083F3053**	
• 500 m (1650 ft)	**FDK-083F3054**	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm² (cannot be used for Ex applications)		
• 10 m (33 ft)	**FDK-083F3020**	
• 20 m (65 ft) ►	**FDK-083F3095**	
• 40 m (130 ft)	**FDK-083F3094**	
• 60 m (200 ft)	**FDK-083F3093**	
• 100 m (330 ft)	**FDK-083F3092**	
• 150 m (500 ft)	**FDK-083F3056**	
• 200 m (650 ft)	**FDK-083F3057**	
• 500 m (1650 ft)	**FDK-083F3058**	
Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²		
• 10 m (33 ft)	**A5E01181647**	
• 20 m (65 ft)	**A5E01181656**	
• 40 m (130 ft)	**A5E01181686**	
• 60 m (200 ft)	**A5E01181689**	
• 100 m (330 ft)	**A5E01181691**	
• 150 m (500 ft)	**A5E01181699**	
• 200 m (650 ft)	**A5E01181703**	
• 500 m (1640 ft)	**A5E01181705**	

► Available ex stock

Spare parts

Description	Order No.[F)]	Symbol
Display	**FDK-085U3122**	
Accessory bag including cable gland inserts coil & electrode connectors	**FDK-085U3144**	
Electronics cover with glas-plate Non Ex	**7ME5933-0AC01**	
Cover for connection board incl. gasket	**7ME5933-0AC02**	
Cover for connection board incl. gasket	**7ME5933-0AC03**	
Safety clamp	**7ME5933-0AC06**	

Pictures are still missing

Complete spare part PCB unit

Description	Order No.[F)]	Symbol
MAG 6000 I (Not ATEX)	**FDK-085U3123**	
MAG 6000 I Ex d 18 ... 30 V DC Spare PCB unit for use with ATEX sensors with increased safety e (For ATEX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 >DN300)	**A5E01013340**	
MAG 6000 I Ex d 115 ... 230 V AC Spare PCB unit for use with ATEX sensors with increased safety e (For ATEX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 >DN300)	**A5E01013127**	
Ex d version 18 ... 30 V DC for sensors with intrinsic safety ib 7ME633 and 7ME613 (for sensors ≤ DN 300 (12"): 7ME6130, 7ME6150 and 7ME6330)	**FDK-085U3124**	
Ex d version 115 ... 230 V AC for sensors with intrinsic safety ib 7ME633 and 7ME613 ≤ DN 300 (12") (for sensors ≤ DN 300 (12"): 7ME6130, 7ME6150 and 7ME6330)	**FDK-085U3125**	

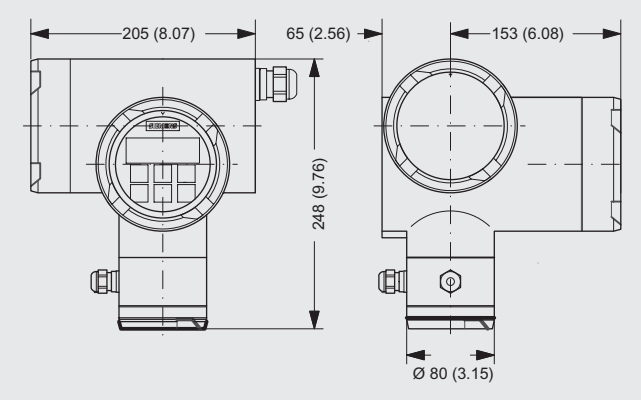
Please use online Product selector to get latest updates.

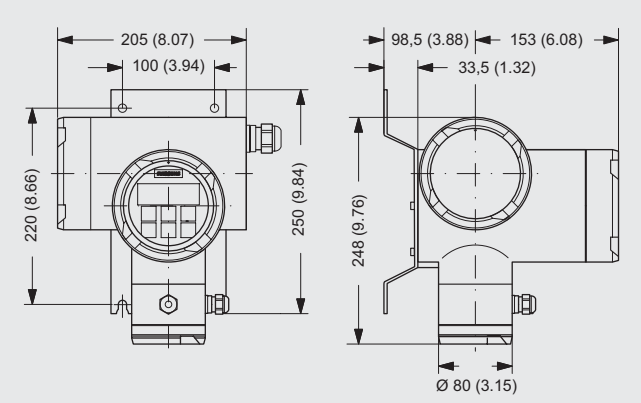
Product selector link:
www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

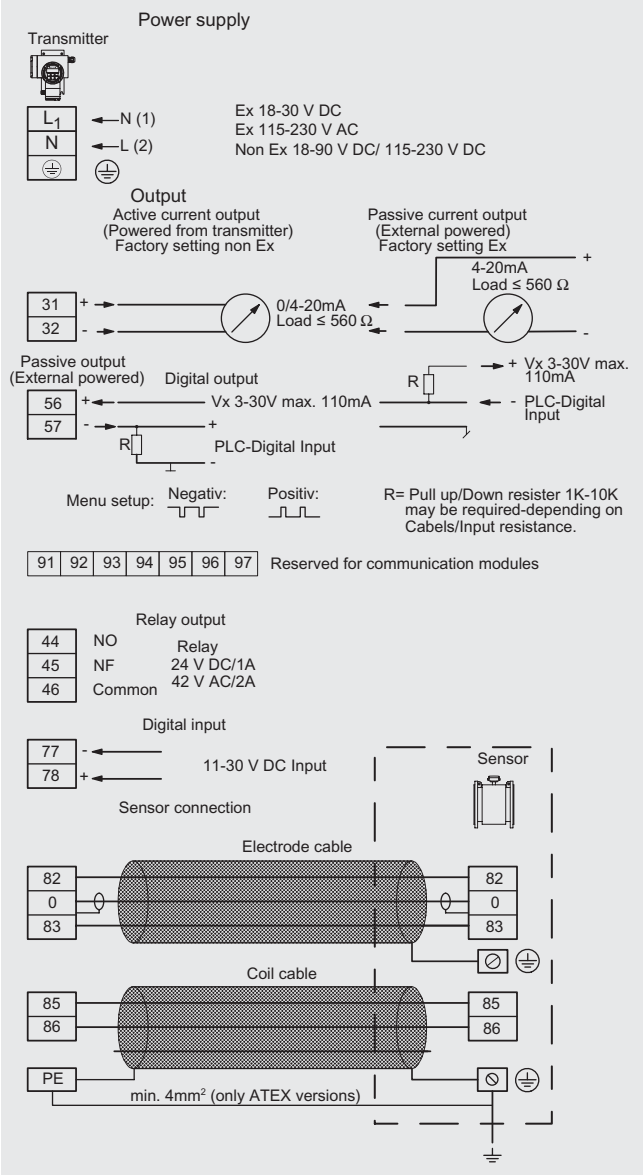
Dimensional drawings





Dimensions in mm (inch), weight: 6 kg (13.5 lbs)

Schematics



MAGFLO MAG 1100

Overview

The SITRANS F M MAGFLO MAG 1100 is an electromagnetic flow sensor in a compact wafer design designed for flow applications in the process industry.

Benefits

- Sensor sizes: DN 2 to 100 (1/12” to 4”)
- Compact wafer design meets EN 1092, DIN and ANSI flange standards
- Corrosion resistant AISI 316 stainless steel sensor housing
- Highly resistant liner and electrodes fitting most extreme process media
- Temperature rating up to 200 °C (390 °F)
- Hose proof IP67/NEMA 4X/6 enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M MAGFLO electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Pharmaceutical industry
- Water treatment like e.g. chemical dosing

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Simple on site upgrade to IP68/NEMA 6P
- Ex ATEX 2G D version
- FM Class 1 Div 2

Mode of operation

The flow measuring principle is based on Faraday’s law of electromagnetic induction were the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAGFLO MAG 5000, 6000 or 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, PROFIBUS DP & PA, MODBUS RTU/RS 485.

Technical specifications

Version	MAG 1100	MAG 1100 HT (High temperature)
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency	DN 2 ... 65 (1/12“ … 2½”): 12.5 Hz DN 80, 100 (3”, 4”): 6.25 Hz	DN 15 ... 50 (1“ … 2”): 12.5 Hz DN 80, 100 (3”, 4”): 6.25 Hz
Process connection		
Nominal size		
• MAG 1100 (Ceramic)	DN 2 … DN 100 (1/12" … 4")	DN 15 … DN 100 (½” … 4")
• MAG 1100 (PFA)	DN 10 … DN 100 (3/8" … 4")	
Mating flanges	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent Option: DN 2 ... 10 (1/12” ... 3/8”): G½” / NPT ½” pipe connection adapters	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent
Rated operating conditions		
Ambient conditions		
Ambient temperature[1)]		
• Sensor	-40 … +100 °C (-40 … +212 °F)	-40 … +100 °C (-40 … +212 °F)
• Sensor ATEX	-20 … +60 °C (-4 … +140 °F)	-20 … +50 °C (-4 … +122 °F)
• Compact transmitter MAG 5000/6000	-20 … +50 °C (-4 … +122 °F)	
• Compact transmitter MAG 6000 I	-20 … +60 °C (-4 … +140 °F)	
• Compact transmitter MAG 6000 I Ex d	-10 … +60 °C (+14 … +140 °F)	
Temperature of medium		
• MAG 1100 (Ceramic)	-20 … +150 °C (-4 … +302 °F)	-20 … +200 °C (-4 … +392 °F)
• MAG 1100 ATEX (Ceramic)	-20 … +150 °C (-4 … +302 °F)	-20 … +180 °C (-4 … +356 °F)
• MAG 1100 (PFA)	-30 … +130 °C (-20 … +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
Temperature shock		
• MAG 1100 (Ceramic)		
- Duration ≤ 1 min, followed by 10 min rest	• DN 2, 3 (1/12”, 1/8”) No limitations • DN 6, 10, 15, 25: Max. ΔT ≤ 80 °C/min (¼”, 3/8”, ½”, 1”: Max. ΔT ≤ 80 K/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1½”, 2”, 2½”: Max. ΔT ≤ 70 K/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3”, 4”: Max. ΔT ≤ 60 K/min)	• DN 15, 25: Max. ΔT ≤ 80 °C/min (½”, 1”: Max. ΔT ≤ 80 K/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1½”, 2”: Max. ΔT ≤ 70 K/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3”, 4”: Max. ΔT ≤ 60 K/min)
• MAG 1100 (PFA)	Max. ±100 °C (210 °F) momentarily	
Operating pressure		
• MAG 1100 (Ceramic)	• DN 2 ... 65: 40 bar (1/12” … 2½”: 580 psi) • DN 80: 37.5 bar (3”: 540 psi) • DN 100: 30 bar (4”: 435 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})	• DN 15 ... 50: 40 bar (½” … 2”: 580 psi) • DN 80: 37.5 bar (3”: 540 psi) • DN 100: 30 bar (4”: 435 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})
• MAG 1100 (PFA)	20 bar (290 psi) Vacuum: 0.02 bar_{abs} (0.3 psi_{abs})	
Mechanical load	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms • For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms
Enclosure rating		
• Standard	IP67 to EN 60529 (NEMA 4X/6), 1 mH_2O for 30 min	IP67 to EN 60529 (NEMA 4X/6), 1 mH_2O for 30 min
• Option on sensor (no ATEX)	IP68 to EN 60529 (NEMA 6P), 10 mH_2O cont.	IP68 to EN 60529 (NEMA 6P), 10 mH_2O cont.
EMC	89/336 EEC	89/336 EEC

Design		
Weight	See Dimensional drawings	See Dimensional drawings
Material		
• Enclosure		
- MAG 1100	Stainless steel AISI 316L (1.4404)	Stainless steel AISI 316L (1.4404)
• Terminal box		
- Standard	Fibre glass reinforced polyamide (no ATEX)	Stainless steel AISI 316 (1.4436)
- Option	Stainless steel AISI 316 (1.4436)	
• Fixing studs	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001
• Gaskets		
- Standard	EPDM (max. 150 °C, PN 40 (max. 300 °F, 600 psi)	Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi)
- Option	• Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi) • PTFE (max. 130 °C, PN 25 (max. 270 °F, 300 psi)	
• Pipe connection adapters: DN 2, 3, 6 and 10 (1/12“, 1/8“, ¼” and 3/8”)	• Stainless steel, AISI 316 • Hastelloy • PVDF	
Liner		
• MAG 1100 (Ceramic)	• DN 2, 3 (1/12“, 1/8“): Zirconium oxide (ZrO_2) (ceramic) • DN 6 ... 100 (¼“ ... 4“): Aluminium oxide Al_2O_3	DN 15 ... 100 (½“ ... 4“): Aluminium oxide Al_2O_3
• MAG 1100 (PFA)	Reinforced PFA (no ATEX)	
Electrodes		
• MAG 1100 (Ceramic)	• DN10 ... 100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy • DN 2 ... 6 (1/12“ ... ¼”): Platinium	Platinum with gold / Titanium brazing alloy
• MAG 1100 (PFA)	• DN 10 ... 15 (3/8" ... ½"): Hastelloy C276 • DN 25 ... 100 (1" ... 4"): Hastelloy C22	
Cable entries	• Remote installation 2 x M20 or 2 x½ NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½” NPT - MAG 6000I: 2 x M25 (for supply/output) - MAG 6000I Ex d: 2 x M20 (for supply/output)	Remote installation 2 x M20 or 2 x ½“ NPT
Certificates and approvals		
Conforms to	PED – 97/23 EC and CRN (PFA)	PED – 97/23 EC and CRN (PFA)
Ex approvals		
MAG 1100 (Ceramic)		
• ATEX sensor or Compact with MAG 6000 I Ex	ATEX 2G D sensor Ex d e ia IIB T3 - T6	ATEX 2G D sensor Ex d e ia IIB T3 - T6
• Sensor with/without MAG 5000/6000 /6000 I	FM Class 1 div 2	FM Class 1 div 2
MAG 1100 (PFA)		
• Sensor with/without MAG 5000/6000/6000 I	FM Class 1 div 2	

1) Conditions are also dependent on liner characteristics

For technical specification for transmitter - please see transmitter pages.

Selection and Ordering data		Order No.
Sensor SITRANS F M		
MAGFLO MAG 1100 EPDM gaskets included	F)	7ME6110 - ■■A■0 - ■■■■
Diameter		
DN 2 (1/12“)	▶	1D
DN 3 (1/8“)	▶	1H
DN 6 (¼“)	▶	1M
DN 10 (3/8“)	▶	1R
DN 15 (½“)	▶	1V
DN 25 (1“)	▶	2D
DN 40 (1½“)	▶	2R
DN 50 (2“)	▶	2Y
DN 65 (2½“)	▶	3F
DN 80 (3“)	▶	3M
DN 100 (4“)	▶	3T
Liner material		
PFA - DN 10 ... 100 (3/8“ ... 4“) (no ATEX)	▶	1
Ceramic	▶	2
Electrode material		
Hastelloy C (only with PFA liner)	▶	1
Platinum (only with ceramic liner)	▶	2
Transmitter		
Sensor for remote transmitter (order transmitter separately)		A
Sensor ATEX 2G D for remote transmitter (order transmitter separately)		B
MAG 6000 I, Aluminium 18 ... 90 V DC, 115 ... 230 V AC		C
MAG 6000 I, Aluminium 18 ... 30 V DC, ATEX 2G D		D
MAG 6000 I, Aluminium 115 ... 230 V, ATEX 2G D		E
MAG 6000 Polyamid, 11 ... 30 V DC / 11 … 24 V AC		H
MAG 6000, Polyamid, 115/230 V AC		J
MAG 5000, Polyamid, 11 ... 30 V DC / 11 ... 24 V AC		K
MAG 5000, Polyamid, 115/230 V AC		L
Communication		
No communication, add-on possible	▶	A
HART		B
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)		F
PROFIBUS DP Profile 3 (no ATEX) (only MAG6000/MAG6000 I)		G
MODBUS RTU/RS 485 (no ATEX) (only MAG6000/MAG6000 I)		E
Cable glands/terminal box		
Metric	▶	1
½" NPT		2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		3
½" NPT: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		4

▶ Available ex stock

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (no ATEX sensors)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

Selection and Ordering data		Order No.
Sensor SITRANS F M		
MAGFLO MAG 1100 HT High Temperature Ceramic liner, Platinum electrode, Graphite gaskets included	F)	7ME6120 - ■■A20 - 2■A■
Diameter		
DN 15 (½“)		1V
DN 25 (1“)		2D
DN 40 (1½“)		2R
DN 50 (2“)		2Y
DN 80 (3“)		3M
DN 100 (4“)		3T
Transmitter		
Sensor for remote transmitter (order transmitter separately)		A
Sensor ATEX 2G D for remote transmitter (order transmitter separately)		B
Cable glands/terminal box		
Metric: SS terminal box		3
½" NPT: SS terminal box		4

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (no ATEX sensors)	**Y41**

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I Ex ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be premounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

F) Subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 1100

4

Accessories for MAGFLO MAG 1100 sensor		Order No.[F]
Pipe connection ½" external thread		
For DN 2 ... 10 (1/12“ ... 3/8“) sensor 2 pipe connections, 2 EPDM gaskets, 12 pcs M4 x 12 screws		
• ½" G, ISO 7-1 tappered thread, SS 316	▶	**FDK-083G0080**
• ½" G, ISO 7-1 tappered thread, Hastelloy C	▶	**FDK-083G4332**
• ½" NPT thread, SS 316	▶	**FDK-083G4330**
• ½" NPT thread, Hastelloy C	▶	**FDK-083G4331**
For DN 2…10 (1/12”…3/8”) sensor 2 PVDF pipe connections (Max. 70 °C, PN 8 bar/max 158 °F, 116 PSI), 1 grounding ring, 3 PTFE gaskets, 6 pcs. M4 x 12 and 6 pcs. M4 x 20 screws		
• ½”G, ISO 7-1 tapered thread PVDF incl. grounding ring Hastelloy C22		**A5E01018395**
• ½” NPT thread PVDF incl. grounding ring Hastelloy C22		**A5E01018400**
EPDM gaskets		
Material: EPDM; each set includes: 2 EPDM gaskets, 2 earthing wires, 3 M6 screws		
• DN 2 ... 10, 1/12“ ... 3/8“		**FDK-083G3116**
• DN 15, ½“		**FDK-083G3117**
• DN 25, 1“		**FDK-083G3119**
• DN 40, 1½“		**FDK-083G3121**
• DN 50, 2“		**FDK-083G3122**
• DN 65, 2½“		**FDK-083G3123**
• DN 80, 3“		**FDK-083G3124**
• DN 100, 4“		**FDK-083G3125**
PTFE gaskets		
Material: PTFE; each set includes: 2 gaskets, 2 earthing wires, 3 M6 screws		
• DN 2 ... 10, 1/12“ ... 3/8“		**FDK-083G0156**
• DN 15, ½“		**FDK-083G0157**
• DN 25, 1“		**FDK-083G0159**
• DN 40, 1½“		**FDK-083G0161**
• DN 50, 2“		**FDK-083G0162**
• DN 65, 2½“		**FDK-083G0163**
• DN 80, 3“		**FDK-083G0164**
• DN 100, 4“		**FDK-083G0165**
Graphite gaskets		
Material: Graphite; conductive, each set includes: 2 gaskets (conductive, can also be used as grounding ring)		
• DN 2 ... 10, 1/12“ ... 3/8“		**FDK-083G0116**
• DN 15, ½“		**FDK-083G0117**
• DN 25, 1“		**FDK-083G0119**
• DN 40, 1½“		**FDK-083G0121**
• DN 50, 2“		**FDK-083G0122**
• DN 65, 2½“		**FDK-083G0123**
• DN 80, 3“		**FDK-083G0124**
• DN 100, 4“		**FDK-083G0125**
Grounding ring (S/S)		
Material: AISI 316 (mat. no. 1.4436); each set includes: 1 grounding ring, 3 teflon gaskets, 1 earth strap, 1 M6 screw		
• DN 2 ... 10, 1/12“ ... 3/8“		**FDK-083G0686**
• DN 15, ½“		**FDK-083G0687**
• DN 25, 1“		**FDK-083G0689**
• DN 40, 1½“		**FDK-083G0691**
• DN 50, 2“		**FDK-083G0692**
• DN 65, 2½“		**FDK-083G0693**
• DN 80, 3“		**FDK-083G0694**
• DN 100, 4“		**FDK-083G0695**

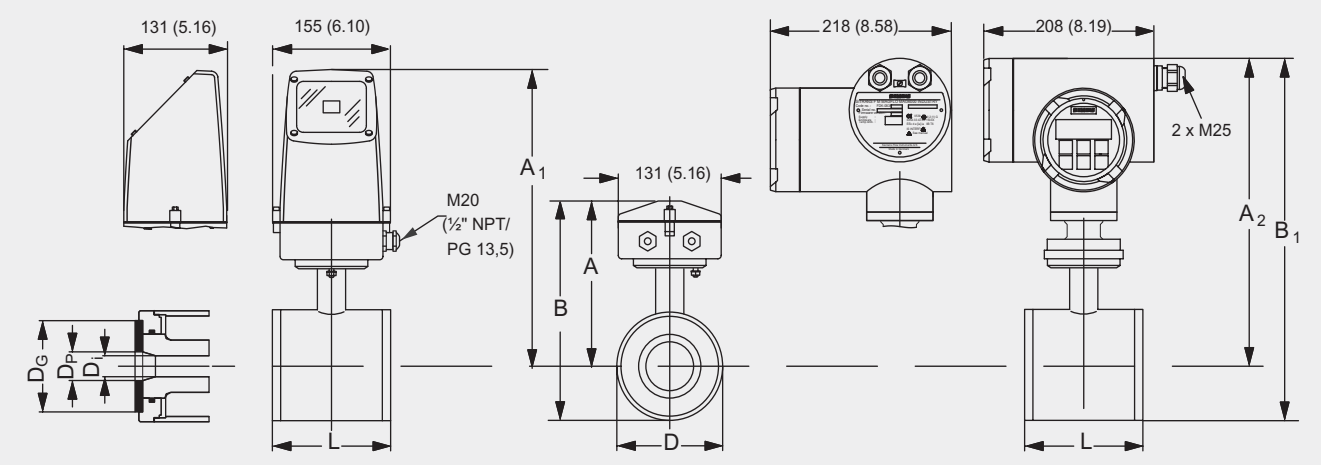
Accessories for MAGFLO MAG 1100 sensor	Order No.[F]
Grounding ring (Hastelloy C)	
Material: Hastelloy C; each set includes: 1 grounding ring, 3 teflon gaskets, 1 earth strap, 1 M6 screw	
• DN 2 ... 10, 1/12“ ... 3/8“	**FDK-083G3256**
• DN 15, ½“	**FDK-083G3257**
• DN 25, 1“	**FDK-083G3259**
• DN 40, 1½“	**FDK-083G3261**
• DN 50, 2“	**FDK-083G3262**
• DN 65, 2½“	**FDK-083G3263**
• DN 80, 3“	**FDK-083G3264**
• DN 100, 4“	**FDK-083G3265**
Grounding ring (Tantalum)	
Material: Tantalum	
• DN 2 ... 10, 1/12“ ... 3/8“	**A5E01181599**
• DN 15, ½“	**A5E01181606**
• DN 25, 1“	**A5E01181610**
• DN 40, 1½“	**A5E01181613**
• DN 50, 2“	**A5E01181615**
• DN 65, 2½“	**A5E01181616**
• DN 80, 3“	**A5E01181619**
• DN 100, 4“	**A5E01181622**
Studs and nuts	
for DN 100 PN 25/40, 8 M20 studs, 16 M20 nuts	
Material: AISI 304 (mat. no. 1.4305)	
• DN 100, 4“	**FDK-083G0226**

▶ Available ex stock.

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

Sensor MAG 1100, compact/remote



Important note: For compact installation with MAG 6000 I/Ex - transmitter to be supported to avoid tension on the sensor part

Size DN	A[1] [mm]	B[1] [mm]	A_1 / A_2[3] [mm]	B_1 [mm]	D [mm]	D_i [mm]	D_i (PFA) [mm]	D_P [mm]	D_G [mm]	Weight[2] [kg]
2	161	186	315	340	48.7	2		17.3	34	2.2
3	161	186	315	340	48.7	3		17.3	34	2.2
6	161	186	315	340	48.7	6		17.3	34	2.2
10	161	186	315	340	48.7	10	10	13.6	34	2.2
15	161	186	315	340	48.7	15	16	17.3	40	2.2
25	169	201	323	354	63.5	25	26	28.5	56	2.7
40	179	221	333	375	84.0	40	38	43.4	75	3.4
50	188	239	342	393	101.6	50	50	54.5	90	4.2
65	198	258	351	412	120.9	65	66	68.0	112	5.5
80	204	270	357	424	133.0	80	81	82.5	124	7.0
100	217	296	370	450	159.0	100	100	107.1	145	10.0

Size [inch]	A[1] [inch]	B[1] [inch]	A_1 / A_2[3] [inch]	B_1 [inch]	D [inch]	D_i [inch]	D_i (PFA) [inch]	D_P [inch]	D_G [inch]	Weight[2] [lbs]
1/12	6.34	7.33	12.40	13.39	1.92	0.08		0.68	1.34	4.8
1/8	6.34	7.33	12.40	13.39	1.92	0.12		0.68	1.34	4.8
¼	6.34	7.33	12.40	13.39	1.92	0.24		0.68	1.34	4.8
3/8	6.34	7.33	12.40	13.39	1.92	0.39	0.39	0.53	1.34	4.8
½	6.34	7.33	12.40	13.39	1.92	0.59	0.63	0.68	1.57	4.8
1	6.66	7.92	12.72	13.94	2.50	0.98	1.02	1.12	2.20	4.9
1½	7.05	8.70	13.11	14.76	3.31	1.57	1.50	1.71	2.95	7.5
2	7.40	9.41	13.47	15.47	4.00	1.97	1.97	2.15	3.54	9.2
2½	7.80	10.16	13.82	16.22	4.76	2.56	2.60	2.68	4.41	12
3	8.03	10.63	14.06	16.70	5.24	3.15	3.19	3.25	4.88	15
4	8.54	11.65	14.57	17.72	6.26	3.94	3.94	4.22	5.91	22

1) 14.5 mm/0.57" shorter when the AISI terminal box is used (Ex or high temperature 200 °C (390 °F) version)

2) With transmitter MAG 5000 or MAG 6000 installed, weight is increased by approximately 0.8 kg (1.8 lb).
With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs)

3) A_2 is 3 mm (0.12") shorter than A_1

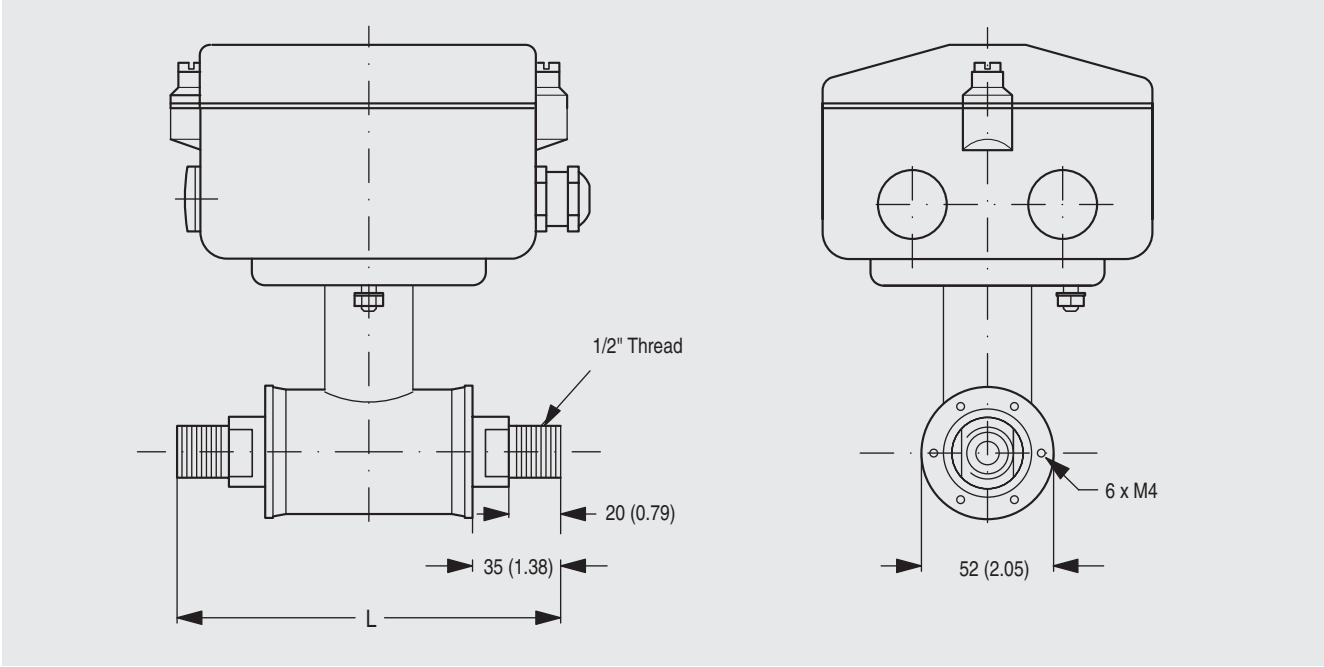
MAGFLO MAG 1100

The total build-in length “L” [mm]/[inch] before assembling depends on the gasket selected

Size		EPDM		Graphite		PTFE (Teflon)		Without gasket		Earthing ring	
DN	Inch	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
2 ... 10 [1]	1/12 ... 3/8	64	2.52	66	2.60	70	2.75	64	2.52	77	3.03
15	½	65	2.56	66	2.60	70	2.75	64	2.52	77	3.03
25	1	80	3.15	81	3.19	85	3.35	79	3.10	92	3.62
40	1½	95	3.74	96	3.78	100	3.94	94	3.70	107	4.21
50	2	105	4.13	106	4.17	110	4.33	104	4.05	117	4.61
65	2½	130	5.12	131	5.15	135	5.31	129	5.05	142	5.60
80	3	155	6.10	156	6.14	160	6.30	154	6.00	167	6.57
100	4	185	7.28	186	7.31	190	7.48	184	7.20	197	7.76

[1] Mounting between two flanges

Sensor MAG 1100 DN 2 ... 10 (1/12“ ... 3/8“) with adapters



The MAG 1100 DN 2, 3, 6 and 10 (1/12“, 1/8“, ¼” and 3/8”) are prepared for assembly with the ½” pipe connections.

The length “L“ varies dependent on the gasket choice.

Without gasket		EPDM		Graphite		Teflon	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
150	5.9	150	5.9	152	6.0	156	6.1

Important note:
For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.

Overview

The electromagnetic sensor SITRANS F M MAGFLO MAG 1100 Food is designed to meet applications in the food and beverage industry.

Benefits

- Sensor sizes: DN 10 to DN 100 (3/8" to 4")
- AISI 316 stainless steel enclosure
- Sensor: Hygienic connection, 3A and EHEDG authorized construction
- Sanitary design for CIP / SIP cleaning
- Conforms to FDA
- Easy commissioning, the SENSORPROM unit automatically updates settings
- Hose proof IP67/NEMA 4X/6 enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints

Application

The main applications of the SITRANS F M MAGFLO electromagnetic sensors can be found in the following fields:

- Food industry
- Beverage industry
- Pharmaceutical industry

Design

- Unique mechanical design with a wide range of customer specified sanitary connection
- Compact or remote mounting possible easy "plug & play" field changeable
- Simple on site upgrade to IP68/NEMA 6P
- Ex ATEX 2G D version for hazardous areas (ceramic liner)

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction were the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a sensor and an associated transmitter SITRANS F M MAGFLO MAG 5000, 6000 and 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as PROFIBUS DP & PA, MODBUS RTU/RS485, HART.

Technical specifications

Measuring principle	Electromagnetic induction
Excitation frequency	DN 10 ... 65 (¼" ... 2½"): 12.5 Hz DN 80 ... 100 (3", 4"): 6.25 Hz
Process connection	
Nominal size	DN 10 ... DN 100 (3/8" ... 4")
Process connection	Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting
Rated operating conditions	
Ambient conditions	
Ambient temperature[1]	
• Sensor	-40 ... +100 °C (-40 ... +212 °F)
• Sensor ATEX	-20 ... +60 °C (-4 ... +140 °F)
• Compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)
• Transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)
• Compact transmitter MAG 6000 I Ex d	-10 ... +60 °C (+14 ... +140 °F)
Temperature of medium	
MAG 1100 Food (Ceramic)	-20 ... +150 °C (-4 ... +300 °F) Suitable for steam sterilization
MAG 1100 Food (PFA)	-30 ... +130 °C (-20 ... +270 °F) Suitable for steam steralization at 150 °C (300 °F)
Temperature shock	
MAG 1100 Food	
• Duration ≤ 1 min, followed by 10 min rest	• DN 10, 15, 25: Max. ΔT ≤ 80 °C/min (3/8", ½", 1": Max. ΔT ≤ 80 K/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1½", 2", 2½": Max. ΔT ≤ 70 K/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 60 K/min)
MAG 1100 Food (PFA)	Max. ± 100 °C (210 °F) momentarily
Operating pressure	
MAG 1100 Food (Ceramic)	DN 10 ... 65: 40 bar (3/8" ... 2½": 580 psi) DN 80: 37.5 bar (3": 540 psi) DN 100: 30 bar (4": 435 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})
MAG 1100 Food (PFA)	20 bar (290 psi) Vacuum: 0.02 bar_{abs} (0.3 psi_{abs})

[1] Conditions are also dependent on liner characteristics

MAGFLO MAG 1100 Food

Technical specifications (continued)

Mechanical load	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36
	Sensor: 3.17 grms
	Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms
	Sensor with compact MAG 6000 I/MAG 6000 I Ex mounted transmitter: 1.14 grms
	For compact installation with the MAG 6000 I/MAG 6000 I Ex, transmitter to be supported to avoid tension on sensor part.
Enclosure rating	
Standard	IP67 to EN 60529 (NEMA 4X), 1 mH_2O for 30 min
Option on sensor (not for ATEX)	IP68 to EN 60529 (NEMA 6), 10 mH_2O cont.
EMC	89/336 EEC
Design	
Weight	See Dimensional drawings
Material	
Enclosure	
• MAG 1100 Food	Stainless steel AISI 316L (1.4404)
Terminal box (remote version only)	
• Standard	Fibre glass-reinforced polyamide
• Option	Stainless steel AISI 316 (1.4436)
• Ex ATEX (remote version only)	Stainless steel AISI 316 (1.4436)
Liner	
MAG 1100 Food (Ceramic)	Aluminium oxide Al_2O_3 (ceramics)
MAG 1100 Food (PFA)	Reinforced PFA (teflon) (no ATEX)
Electrodes	
MAG 1100 Food (Ceramic)	Platinum with gold / Titanium brazing alloy
MAG 1100 Food (PFA)	• DN 10 ... 15 (3/8" ... ½"): Hastelloy C276 • DN 25 ... 100 (1" ... 4"): Hastelloy C22
Cable entries	• Remote installation 2 x M20 or 2 x ½ NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½"NPT - MAG 6000I: 2 x M25 (for supply/output) - MAG 6000I Ex. d: 2 x M20 (for supply/output)
Certificates and approvals	
MAG 1100 Food (Ceramic)	3A (sensor with Polyamid terminal box), transmitter not part of the approval
	EHEDG authorized construction
• Ex ATEX approvals for sensor or compact with Mag 6000 I Ex	ATEX 2G D sensor EEx d e ia IIB T3 - T6
• Sensor with/without MAG 5000/6000/ 6000 I	FM Class 1 div 2
MAG 1100 Food (PFA)	3A (sensor with Polyamid terminal box), transmitter not part of the approval
	FM Class 1 div 2
Conforms to	PED – 97/23/EC and CRN (PFA)
	FDA

Accessories

Weld-in adapter	
Adapter for welding onto dairy pipe	Tri-Clover ISP 2037, DIN 11850, SMS 3008, BS 4825-1
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", ½", 1", 1½", 2", 2½" and 3")	PN 40 (600 psi)
• DN 100 (4")	PN 25 (350 psi)
Clamp adapter	Tri-Clamp ISP 2852, DIN 32676, SMS 3016, BS 4825-3
DN 10, 15, 25, 40 and 50 (3/8", ½", 1", 1½", and 2")	PN 16 (200 psi)
DN 65, 80 and 100 (2½", 3" and 4")	PN 10 (150 psi)
Thread adapter	
DIN 11851	
• DN 10, 15, 25, and 40 (3/8", ½", 1", and 1½")	PN 40 (600 psi)
• DN 50, 65, 80 and 100 (2", 2½", 3" and 4")	PN 25 (350 psi)
ISO 2853, BS 4825-4	
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", ½", 1", 1½", 2", 2½ and 3")	PN 16 (200 psi)
SMS 1145	
• DN 25, 40, 50, 65 and 80 (1", 1½", 2", 2½" and 3")	PN 6 (80 psi)
Design	
Material	
Adapter	Stainless steel AISI 316/Stainless steel AISI 304 (ISO 2852)
Gasket	
• MAG 1100 Food (Ceramic)	FKM/FPM with stainless steel insert (AISI 304) (-20 ... +150 °C (-4 ... +302 °F))
• MAG 1100 Food (PFA)	EPDM (-20 ... +150 °C (-4 ... +302 °F))
	NBR (-20 ... +100 °C (-4 ... +212 °F))

Note:

When combined sensor and adapter, the operating pressure is the lower rated of the pair.

Selection and Ordering data		Order No.
Sensor SITRANS F M MAGFLO MAG 1100 Food F)		**7ME6140 -**
Diameter		
DN 10 (3/8“)	▶	**1R**
DN 15 (½“)	▶	**1V**
DN 25 (1“)	▶	**2D**
DN 40 (1½“)	▶	**2R**
DN 50 (2“)	▶	**2Y**
DN 65 (2½“)	▶	**3F**
DN 80 (3“)	▶	**3M**
DN 100 (4“)	▶	**3T**
Process connections		
No adaptors (specials see accessories)	▶	**A**
Weld in		
DIN 11850	▶	**B**
ISO 2037 (DS/SMS3008)	▶	**C**
BS 4825-1	▶	**D**
Tri-Clamp®		**E**
Clamp type		
DIN 32676		**G**
ISO 2852 (SMS 3016)		**H**
BS 4825-3		**J**
Tri-Clamp®		**K**
Threaded type		
DIN 11851		**M**
SMS 1145		**N**
Liner material		
PFA (no ATEX)	▶	**1**
Ceramic	▶	**2**
Gasket material		
EPDM (FDA) (only with PFA liner)	▶	**0**
NBR (only with PFA liner)	▶	**1**
FPM/FKM (FDA) (only with ceramic liner)	▶	**2**
Electrode material		
Hastelloy C (only with PFA liner)	▶	**1**
Platinum (only with ceramic liner)	▶	**2**
Transmitter		
Sensor for remote transmitter (order transmitter separately) 3A		**A**
Sensor ATEX 2G D for remote transmitter (order transmitter separately) 3A		**B**
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC		**C**
MAG 6000 I, Aluminium 18 ... 30 V DC, ATEX 2G D		**D**
MAG 6000 I Aluminium 115 ... 230 V, ATEX 2G D		**E**
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC		**H**
MAG 6000, Polyamid, 115/230 V AC		**J**
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC		**K**
MAG 5000, Polyamid, 115/230 V AC		**L**
Communication		
No communication, add-on possible	▶	**A**
HART		**B**
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)		**F**
PROFIBUS DP Profile 3 (no ATEX) (only MAG6000/MAG6000 I)		**G**
MODBUS RTU/RS 485 (no ATEX) (only MAG6000/MAG6000 I)		**E**

Selection and Ordering data		Order No.
Sensor SITRANS F M MAGFLO MAG 1100 Food F)		**7ME6140 -**
Cable glands/terminal box		
Metric		**1**
½" NPT		**2**
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)		**3**
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)		**4**

▶ Available ex stock.

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (no ATEX sensors)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I EX ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates. Product selector link: www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 1100 Food

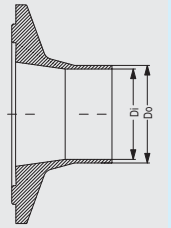
Accessories Order No.[F)]

Weld in connection fittings for MAG 1100 Food

Each of the following accessory order nos. comprises:

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11850



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		
10	13	10	10	▶	**FDK-083G2116**
15	19	16	15	▶	**FDK-083G2117**
20	23	20	15	▶	**FDK-083G2118**
25	29	26	25	▶	**FDK-083G2119**
32	35	32	25	▶	**FDK-083G2120**
40	41	38	40	▶	**FDK-083G2121**
50	53	50	50	▶	**FDK-083G2122**
65	70	66	65	▶	**FDK-083G2123**
80	85	81	80	▶	**FDK-083G2124**
100	104	100	100	▶	**FDK-083G2125**

ISO 2037 (DS/SMS3008)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		
10	13	10	10	▶	**FDK-083G2116**
15	19	16	15	▶	**FDK-083G2117**
20	23	20	15	▶	**FDK-083G2118**
25	25.6	22.6	25	▶	**FDK-083G2109**
28	28.6	25.6	25	▶	**FDK-083G2100**
33.7	34.3	31.3	25	▶	**FDK-083G2110**
38	38.6	35.6	40	▶	**FDK-083G2111**
40	40.6	37.6	40	▶	**FDK-083G2101**
51	51.6	48.6	50	▶	**FDK-083G2112**
63.5	64.1	60.3	65	▶	**FDK-083G2113**
70	70.6	66.8	65	▶	**FDK-083G2103**
76.1	76.7	72.9	80	▶	**FDK-083G2114**
88.9	88.9	84.9	80	▶	**FDK-083G2104**
101.6	102.5	97.6	100	▶	**FDK-083G2115**
114.3	115.6	110.3	100	▶	**FDK-083G2105**

Tri-Clamp® (BS 4825-1)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	
10	12.7	9.4	10	**FDK-083G2276**
15.9	19.05	15.75	15	**FDK-083G2277**
25	25.4	22.1	25	**FDK-083G2279**
38	38.1	34.8	40	**FDK-083G2281**
51	50.8	47.5	50	**FDK-083G2282**
63.5	63.5	60.2	65	**FDK-083G2283**
76.1	76.2	72.9	80	**FDK-083G2284**
102	101.6	97.38	100	**FDK-083G2285**

Tri-Clamp® is a registered trademark of Ladish Co.

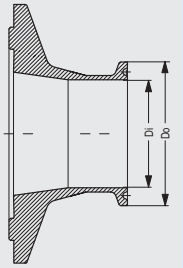
▶ Available ex stock.

D_o: outer diameter
D_i: inner diameter

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

4

Accessories				Order No.[F]
Clamp-type connection fittings for MAG 1100 Food				
Sanitary pipe fittings for Clamp types				
Each of the following accessory order nos. comprises:				
2 pcs. fittings 2 pcs. clamps (to join flow sensor and fitting)				
DIN 32676				
Adapter			Sensor	
DN (mm)	D_o (mm)	D_i (mm)	DN (mm)	
10	34	10	10	**FDK-083G2186**
15	34	16	15	**FDK-083G2187**
20	34	20	15	**FDK-083G2188**
25	50.5	26	25	**FDK-083G2179**
33.7	50.5	31.3	25	**FDK-083G2190**
40	50.5	38	40	**FDK-083G2181**
50	64	50	50	**FDK-083G2182**
65	91	66	65	**FDK-083G2183**
80	106	81	80	**FDK-083G2184**
100	119	100	100	**FDK-083G2185**
ISO 2852 (SMS 3016, BS 4825-3)				
Adapter			Sensor	
DN (mm)	D_o (mm)	D_i (mm)	DN (mm)	
10	34	10	10	**FDK-083G2186**
15	34	16	15	**FDK-083G2187**
20	34	20	15	**FDK-083G2188**
25	50.5	22.6	25	**FDK-083G2189**
25	50.5	26	25	**FDK-083G2179**
33.7	50.5	31.3	25	**FDK-083G2190**
38	50.5	35.6	40	**FDK-083G2191**
40	50.5	38	40	**FDK-083G2181**
51	64	48.6	50	**FDK-083G2192**
63.5	77.5	60.3	65	**FDK-083G2193**
76.1	91	72.9	80	**FDK-083G2194**
101.6	119	97.6	100	**FDK-083G2195**
Tri-Clamp®				
Adapter			Sensor	
DN (mm)	D_o (mm)	D_i (mm)	DN (mm)	
10	34	10	10	**FDK-083G2286**
15	34	16	15	**FDK-083G2287**
25	50.5	22.6	25	**FDK-083G2289**
38	50.5	35.6	40	**FDK-083G2291**
51	64	48.6	50	**FDK-083G2292**
63.5	77.5	60.3	65	**FDK-083G2293**
76.1	91	72.9	80	**FDK-083G2294**
101.6	119	97.6	100	**FDK-083G2295**



Tri-Clamp® is a registered trademark of Ladish Co.

D_o: outer diameter
D_i: inner diameter

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 1100 Food

Accessories — Order No.[F)]

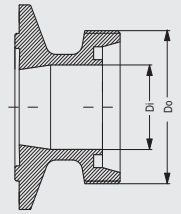
Threaded type connection fittings for MAG 1100 Food

Sanitary pipe fittings for Threaded types

Each of the following accessory order nos. comprises:

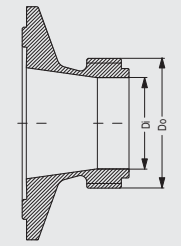
2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11851



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.[F)]
10	28	10	10	**FDK-083G2156**
15	34	16	15	**FDK-083G2157**
20	44	20	15	**FDK-083G2158**
25	52	26	25	**FDK-083G2159**
32	58	32	25	**FDK-083G2160**
40	65	38	40	**FDK-083G2161**
50	78	50	50	**FDK-083G2162**
65	95	66	65	**FDK-083G2163**
80	110	81	80	**FDK-083G2164**
100	130	100	100	**FDK-083G2165**

ISO 2853



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.[F)]
25	37	22.6	25	**FDK-083G2149**
38	51	35.6	40	**FDK-083G2151**
51	64	48.6	50	**FDK-083G2152**
63.5	78	60.3	65	**FDK-083G2153**
76.1	91	72.9	80	**FDK-083G2154**
101.6	118	97.6	100	**FDK-083G2155**

BS 4825-4

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.[F)]
25	37	22.6	25	**FDK-083G2149**
38	51	35.6	40	**FDK-083G2151**
51	64	48.6	50	**FDK-083G2152**
63.5	78	60.3	65	**FDK-083G2153**
76.1	91	72.9	80	**FDK-083G2154**
101.6	126	97.6	100	**FDK-083G2145**

Accessories — Order No.[F)]

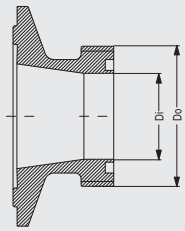
Threaded type connection fittings for MAG 1100 Food

Sanitary pipe fittings for Threaded types

Each of the following accessory order nos. comprises:

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

SMS 1145



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.[F)]
25	40	22.6	25	**FDK-083G2139**
32	48	29.6	25	**FDK-083G2140**
38	60	35.6	40	**FDK-083G2141**
51	70	48.6	50	**FDK-083G2142**
63.5	85	60.3	65	**FDK-083G2143**
76	98	72	65	**FDK-083G2144**

D_o: outer diameter
D_i: inner diameter

Spare parts for MAG 1100 Food — Order No.[F)]

Gaskets

(2 pcs., between flow sensor and adapter)

MAG 1100 Food (ceramic)

Rubber: FKM/FPM (FDA)

	Order No.[F)]
• DN 10 ▶	**A5E00915707**
• DN 15 ▶	**A5E00915764**
• DN 25 ▶	**A5E00915771**
• DN 40 ▶	**A5E00915773**
• DN 50 ▶	**A5E00915775**
• DN 65 ▶	**A5E00915780**
• DN 80 ▶	**A5E00915782**
• DN 100 ▶	**A5E00915784**

MAG 1100 Food (PFA)

Rubber: EPDM (FDA)

	Order No.[F)]
• DN 10 ▶	**FDK-083G2206**
• DN 15 ▶	**FDK-083G2207**
• DN 25 ▶	**FDK-083G2209**
• DN 40 ▶	**FDK-083G2211**
• DN 50 ▶	**FDK-083G2212**
• DN 65 ▶	**FDK-083G2213**
• DN 80 ▶	**FDK-083G2214**
• DN 100 ▶	**FDK-083G2215**

Rubber: NBR

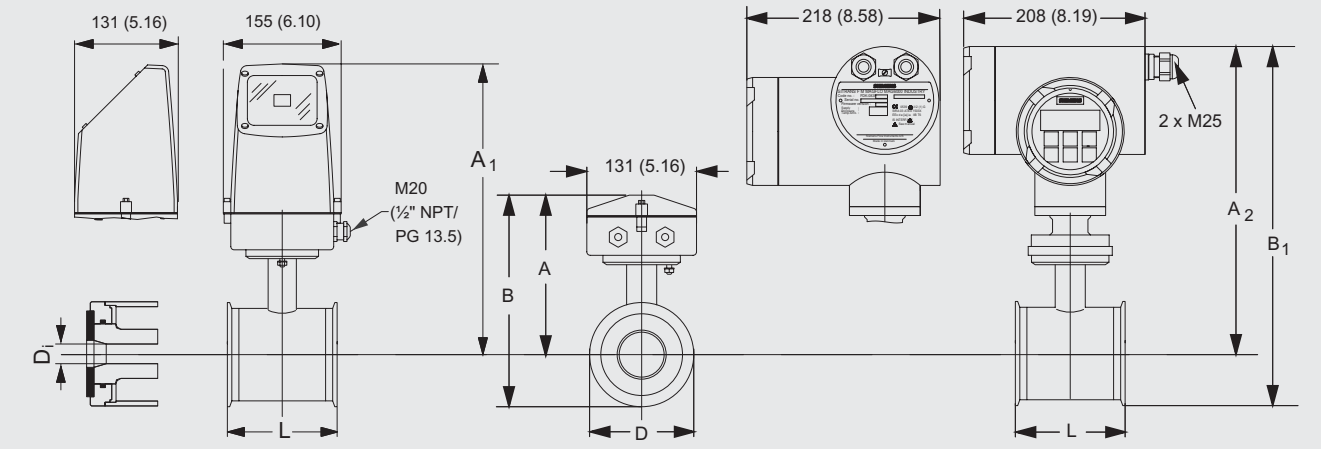
	Order No.[F)]
• DN 10 ▶	**FDK-083G2216**
• DN 15 ▶	**FDK-083G2217**
• DN 25 ▶	**FDK-083G2219**
• DN 40 ▶	**FDK-083G2221**
• DN 50 ▶	**FDK-083G2222**
• DN 65 ▶	**FDK-083G2223**
• DN 80 ▶	**FDK-083G2224**
• DN 100 ▶	**FDK-083G2225**

▶ Available ex stock.

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

Sensor MAG 1100 Food compact/remote



Important note:
For compact installation with MAG 6000 I/Ex - transmitter to be supported to avoid tension on the sensor part.

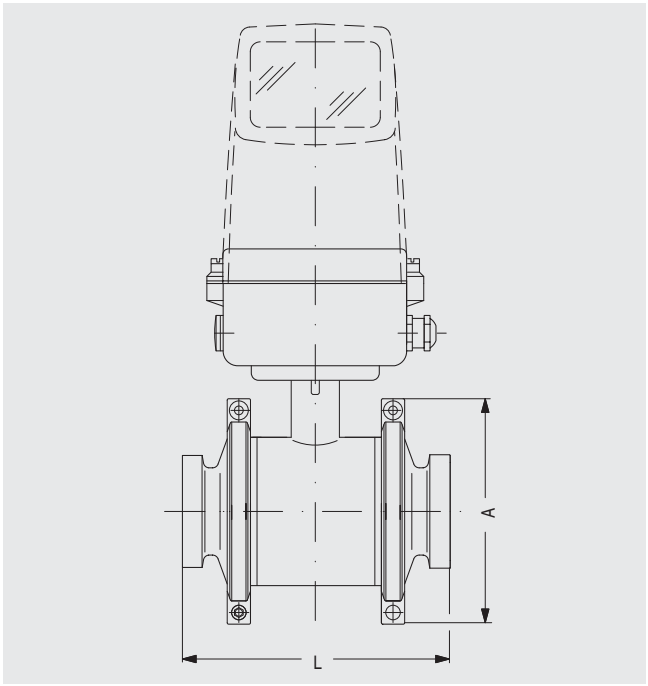
Size DN	L [mm]	A [mm]	A_1 / A_2 3) [mm]	B2) [mm]	B_1 [mm]	D [mm]	D_i (Al_2O_3) [mm]	D_i PFA [mm]	Weight1) [kg]
10	64	161	315	193.7	344.7	64.0	10	10	2.2
15	64	161	315	193.7	344.7	64.0	15	16	2.2
25	79	169	323	207.5	359.0	77.5	25	26	2.7
40	94	179	333	228.0	379.0	91.0	40	38	3.4
50	104	188	342	247.7	398.7	119.0	50	50	4.2
65	131	197.5	351	262.6	413.6	130.0	65	66	5.5
80	156	204	357	281.0	432.0	155.0	80	81	7.0
100	186	217	370	308.0	459.0	183.0	100	100	10.0

Size [inch]	L [inch]	A [inch]	A_1 / A_2 3) [inch]	B2) [inch]	B_1 [inch]	D [inch]	D_i (Al_2O_3) [inch]	D_i PFA [inch]	Weight1) [lb]
3/8	2.52	6.34	12.40	7.62	13.57	2.52	0.39	0.39	4.8
½	2.52	6.34	12.40	7.62	13.57	2.52	0.59	0.63	4.8
1	3.11	6.66	12.72	8.17	14.13	3.05	0.98	1.02	4.9
1½	3.70	7.05	13.11	8.98	14.92	3.58	1.57	1.50	7.5
2	4.09	7.40	13.47	9.75	15.70	4.68	1.97	1.97	9.2
2½	5.16	7.78	13.82	10.34	16.28	5.12	2.56	2.60	12.0
3	6.14	8.03	14.06	11.06	17.01	6.10	3.15	3.19	15.0
4	7.32	8.54	14.57	12.13	18.07	7.20	3.94	3.94	22.0

1) With transmitter MAG 5000 or MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lb)
With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs)
2) 14.5 mm (0.57“) shorter when the AISI terminal box is used (always ATEX version)
3) A_2 is 3 mm (0.12“) shorter than A_1

MAGFLO MAG 1100 Food

Sensor MAG 1100 Food compact/separate – build-in length



Size		A		L[1)]	
DN	Inch	[mm]	[inch]	[mm]	[inch]
10	3/8	99	3.90	146	5.75
15	½	99	3.90	146	5.75
25	1	113	4.45	161	6.34
40	1½	126	4.96	176	6.93
50	2	154	6.06	186	7.32
65	2½	165	6.50	223	8.78
80	3	200	7.87	258	10.16
100	4	225	8.86	288	11.34

[1)] The total build-in length “L” is independent of the adapter type selected.

Overview

The SITRANS F M MAGFLO MAG 5100 W is an electromagnetic flow sensor designed to meet ground water, drinking water, waste water, sewage or sludge applications.

Benefits

- DN 25 to DN 1200 (1" to 48")
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA and AS.
- NBR Hard Rubber liner for all water applications
- Drinking water EPDM liner with approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design.
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprint.

Application

The main applications of the SITRANS F M MAGFLO electromagnetic flow sensors can be found in the following fields:

- Water abstraction
- Water treatment
- Water distribution network (leak detection management)
- Custody transfer water meters
- Irrigation
- Waste water treatment
- Filtration plant (e.g. reverse osmosis and ultra filtration)
- Industrial water applications

Mode of operation

The flow measuring principle is based on Faradays law of electromagnetic induction were the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Function

- Highly resistant to a wide range of chemicals
  - Pattern approval OIML R49 (Denmark, Germany)
  - conforms to ISO 4064 and EN 14154
  - MI-001 Custody Transfer approval for billing (EU)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAGFLO MAG 5000, MAG 6000 or MAG 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems, e.g. HART, PROFIBUS DP & PA, MODBUS RTU/RS485.

MAGFLO MAG 5100 W

Technical specifications

Design	Full bore sensor	Coned bore sensor	Full bore sensor
Nominal size	DN 25 ... 40 (1" ... 1½")	DN 50 ... 300 (2" ... 12")	DN 350 ... 1200 (14" ... 48")
Measuring principle	Electromagnetic induction		
Excitation frequency	12.5 Hz	• 50 ... 65 mm (2" ... 2½"): 12.5 Hz • 80 ... 150 mm (3" ... 6"): 6.25 Hz • 200 ... 300 mm (8" ... 12"): 3.125 Hz	DN 350 ... 450 (14" ... 18"): 3.125 Hz DN 500 ... 1200 (20" ... 48"): 1.5625 Hz
Process connection			
Flanges		Flat face flanges	
• EN 1092-1	PN 40 (580 psi)	• 50 ... 300 mm: PN 16 (2" ... 12": 230 psi) • 200 ... 300 mm: PN 10 (8" ... 12": 145 psi)	• PN 10 (145 psi) • PN 16 (230 psi)
• ANSI B16.5	Class 150 lb	Class 150 lb ~20 bar (290 psi)	--
• AWWA C-207	--	--	28" ... 48": Class D
• AS4087	PN 16 (230 psi) DN 50 ... 1200 (2" ... 48"), 14 bar (232 psi)		
Rated Operation conditions			
Ambient temperature			
• Sensor	-40 ... +70 °C (-40 ... +158 °F)		
• With compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)		
• With compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)		
Operating pressure	0.01 ... 40 bar (0.15 ... 580 psi)	0.03 ... 20 bar (0.44 ... 290 psi)	0.01 ... 16 bar (0.15 ... 232 psi)
Enclosure rating			
• Standard	IP67 to EN 60529 / NEMA 4X/6 (1 mH_2O for 30 minutes)		
• Option	IP68 to EN 60529 / NEMA 6P (10 mH_2O continuously)		
Pressure drop at 3 m/s (10 ft/s)	As straight pipe	Max. 25 mbar (0.36 psi)	As straight pipe
Medium conditions			
Temperature of medium			
• NBR	-10 ... +70 °C (14 ... +158 °F)		
• EPDM	-10 ... +70 °C (14 ... +158 °F)		
EMC	89/336 EEC		
Design			
Weight	See dimensional drawings		
Material			
• Housing and flanges	Carbon steel, St 37.2		
• Terminal box	Standard Fibre glass reinforced polyamide		
• Measuring pipe	AISI 304 (1.4301)		
• Liner	NBR Hard Rubber (hydro carbon resistent) EPDM		
• Electrodes	Hastelloy C276		
• Grounding electrodes standard	Hastelloy C276		
Certificates and approvals			
Custody Transfer (only together with MAG 5000/6000 CT), order as special	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2" ... 12") MI 001 cold water (EU): DN 50 ... 300 (2" ... 12")		
Approvals	FM Class 1, Div 2		
Drinking water approvals			
• EPDM	NSF61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS listed (F), DVGW W270 (D) Belaqua (B)		
• NBR	NSF61 (Cold water, US)		
Approvals	PED – 97/23 EC[1], CRN		

[1] For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval.

Selection and Ordering data		Order No.
SITRANS F M Flowsensor MAGFLO MAG 5100 W	F)	7ME6520-
Hastelloy electrodes, carbon steel flanges		■■■1■-2■■■
Diameter		
DN 25 (1“)	▶	2D
DN 40 (1½“)	▶	2R
DN 50 (2“)	▶	2Y
DN 65 (2½“)	▶	3F
DN 80 (3“)	▶	3M
DN 100 (4“)	▶	3T
DN 125 (5“)	▶	4B
DN 150 (6“)	▶	4H
DN 200 (8“)	▶	4P
DN 250 (10“)	▶	4V
DN 300 (12“)	▶	5D
DN 350 (14“)	▶	5K
DN 400 (16“)	▶	5R
DN 450 (18“)	▶	5Y
DN 500 (20“)	▶	6F
DN 600 (24“)	▶	6P
DN 700 (28“)	▶	6Y
DN 750 (30“)	▶	7D
DN 800 (32“)	▶	7H
DN 900 (36“)	▶	7M
DN 1000 (40“)	▶	7R
42“	▶	7U
44“	▶	7V
DN 1200 (48“)	▶	8B
Flange norm and pressure rating		
to EN 1092-1		
PN 10 (DN 200 ... 1200/8“ ... 48“)	▶	B
PN 16 (DN 50 ... 1200/2“ ... 48“)	▶	C
PN 16, non PED (DN 700 ... 1200/28“ ... 48“)		D
PN 40 (DN 25 ... 40/1“ ... 1½“)	▶	F
to ANSI B16.5		
class 150 (1“ ... 24“)	▶	J
to AWWA C-207		
Class D (28“ ... 48“)		L
to AS 4087		
PN 16		N
Liner material		
EPDM		2
NBR Hard Rubber		3
Transmitter		
Sensor for remote transmitter (Order transmitter separately)		A
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC		C
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC		H
MAG 6000, Polyamid, 115/230 V AC		J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC		K
MAG 5000, Polyamid, 115/230 V AC		L
Communication		
None	▶	A
HART		B
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)		F
PROFIBUS DP Profile 3 (only MAG6000/MAG6000 I)		G
MODBUS RTU/RS 485 (only MAG6000/MAG6000 I)		E

Selection and Ordering data		Order No.
SITRANS F M Flowsensor MAGFLO MAG 5100 W	F)	7ME6520-
Hastelloy electrodes, carbon steel flanges		■■■1■-2■■■
Cable glands/terminal box		
Metric		1
½" NPT		2

▶ Available ex stock.

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

Description		Order No.	Symbol
Potting kit for terminal box of MAGFLO sensors for IP68/NEMA 6P (Not ATEX)	F)	**FDK-085U0220**	

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

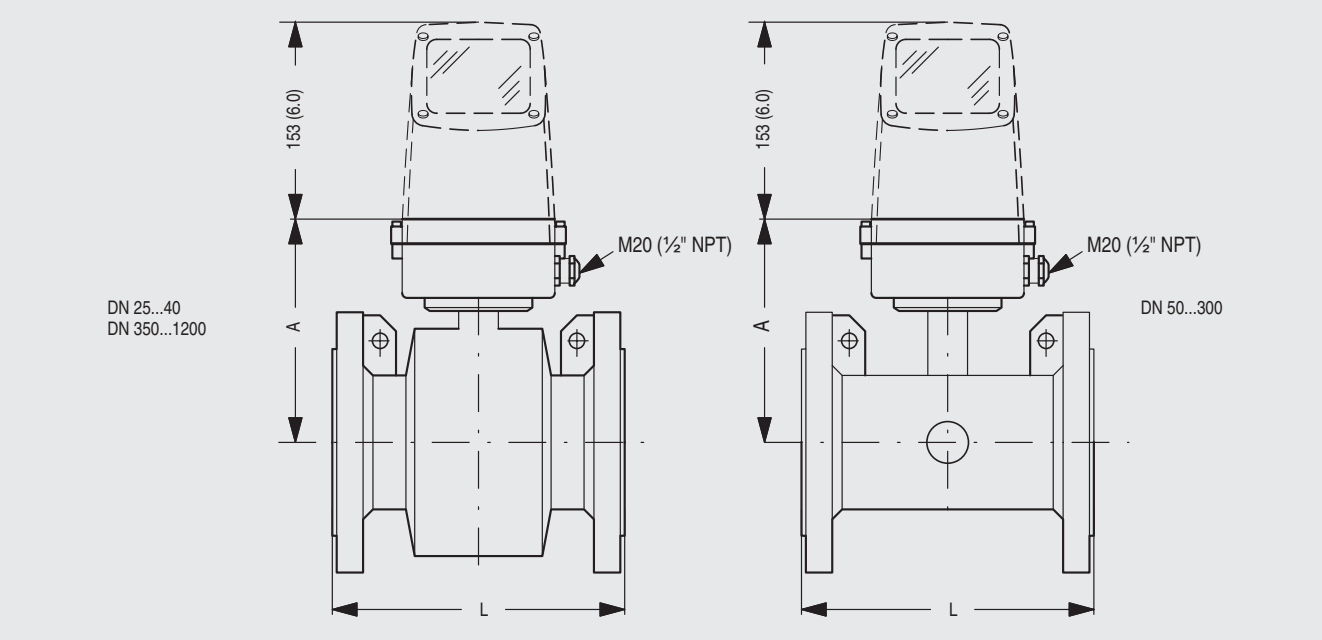
Product selector link:
www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 5100 W

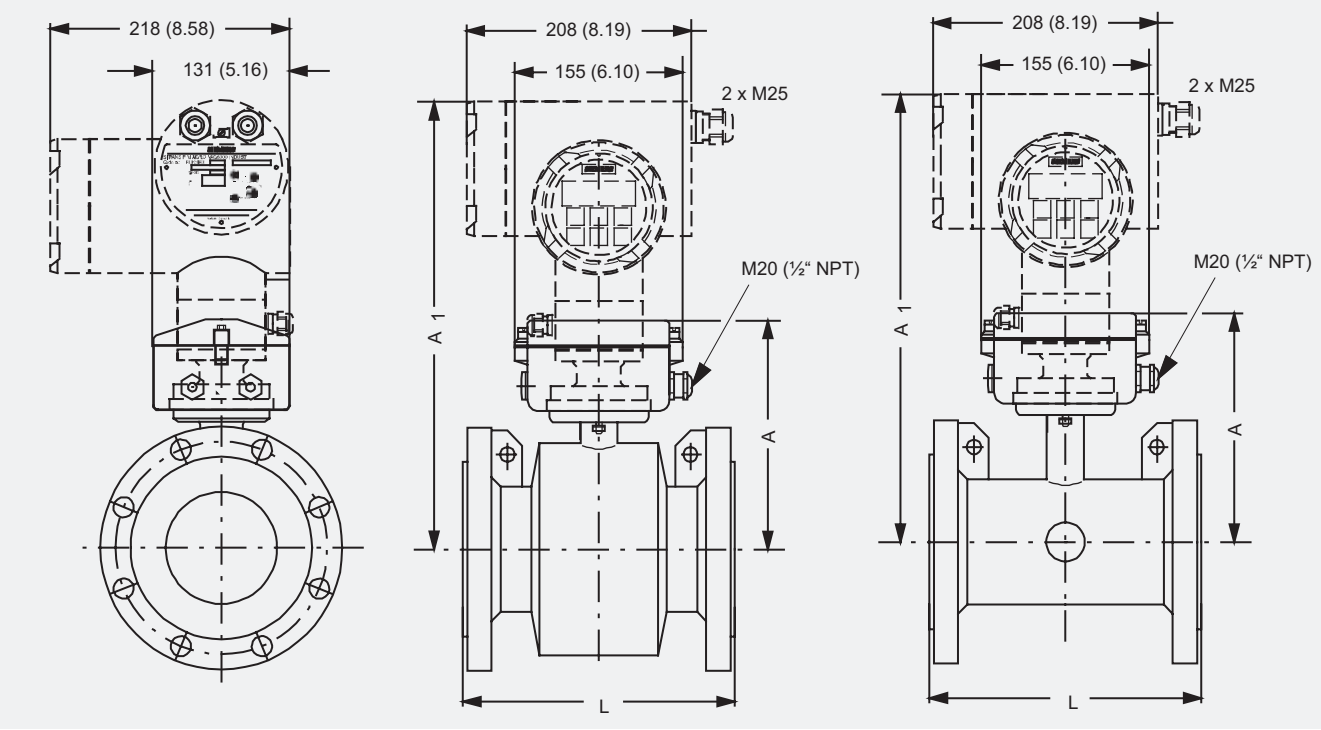
Dimensional drawings



Nominal size		A		L									
				PN 10		PN 16		PN 40		Class 150 / AWWA		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
25	1	187	7.4	-	-	-	-	200	7.9	200	7.9	200	7.87
40	1½	197	7.8	-	-	-	-	200	7.9	200	7.9	200	7.87
50	2	188	7.4	-	-	200	7.9	-	-	200	7.9	200	7.87
65	2½	194	7.6	-	-	200	7.9	-	-	200	7.9	200	7.87
80	3	200	7.9	-	-	200	7.9	-	-	200	7.9	200	7.87
100	4	207	8.1	-	-	250	9.8	-	-	250	9.8	250	9.84
125	5	217	8.5	-	-	250	9.8	-	-	250	9.8	250	9.84
150	6	232	9.1	-	-	300	11.8	-	-	300	11.8	300	11.81
200	8	257	10.1	350	13.8	350	13.8	-	-	350	13.8	350	13.78
250	10	284	11.2	450	17.7	450	17.7	-	-	450	17.7	450	17.72
300	12	310	12.2	500	19.7	500	19.7	-	-	500	19.7	500	19.69
350	14	382	15.0	550	21.7	550	21.7	-	-	550	21.7	550	21.65
400	16	407	16.0	600	23.6	600	23.6	-	-	600	23.6	600	23.62
450	18	438	17.2	600	23.6	600	23.6	-	-	600	23.6	600	23.62
500	20	463	18.2	600	23.6	600	23.6	-	-	600	23.6	600	23.6
600	24	514	20.2	600	23.6	600	23.6	-	-	600	23.6	600	23.6
700	28	564	22.2	700	27.6	700	27.6	-	-	700	27.6	700	27.6
750	30	591	23.3	-	-	-	-	-	-	750	29.5	750	-
800	32	616	24.3	800	31.5	800	31.5	-	-	800	31.5	800	31.5
900	36	663	26.1	900	35.4	900	35.4	-	-	900	35.4	900	35.4
1000	40	714	28.1	1000	39.4	1000	39.4	-	-	1000	39.4	1000	39.4
	42	714	28.1	-	-	-	-	-	-	1000	39.4	-	-
	44	765	30.1	-	-	-	-	-	-	1100	43.3	-	-
1200	48	820	32.3	1200	47.2	1200	47.2	-	-	1200	47.2	1200	47.2

- not available

MAG 5100 W / 6000 I Compact



Nominal size		A		A_1		L									
						PN 10		PN 16		PN 40		Class 150/AWWA		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
25	1	187	7.4	340	13.4	-	-	-	-	200	7.9	200	7.9	200	7.87
40	1½	197	7.8	350	13.8	-	-	-	-	200	7.9	200	7.9	200	7.87
50	2	188	7.4	341	13.4	-	-	200	7.9	-	-	200	7.9	200	7.87
65	2½	194	7.6	347	13.7	-	-	200	7.9	-	-	200	7.9	200	7.87
80	3	200	7.9	353	13.9	-	-	200	7.9	-	-	200	7.9	200	7.87
100	4	207	8.1	360	14.2	-	-	250	9.8	-	-	250	9.8	250	9.84
125	5	217	8.5	370	14.6	-	-	250	9.8	-	-	250	9.8	250	9.84
150	6	232	9.1	385	15.2	-	-	300	11.8	-	-	300	11.8	300	11.81
200	8	257	10.1	410	16.1	350	13.8	350	13.8	-	-	350	13.8	350	13.78
250	10	284	11.2	437	17.2	450	17.7	450	17.7	-	-	450	17.7	450	17.72
300	12	310	12.2	463	18.2	500	19.7	500	19.7	-	-	500	19.7	500	19.69
350	14	382	15.0	535	21.1	550	21.7	550	21.7	-	-	550	21.7	550	21.65
400	16	407	16.0	560	22.1	600	23.6	600	23.6	-	-	600	23.6	600	23.62
450	18	438	17.2	591	23.3	600	23.6	600	23.6	-	-	600	23.6	600	23.62
500	20	463	18.2	616	24.3	600	23.6	600	23.6	-	-	600	23.6	600	23.6
600	24	514	20.2	667	26.3	600	23.6	600	23.6	-	-	600	23.6	600	23.6
700	28	564	22.2	717	28.2	700	27.6	700	27.6	-	-	700	27.6	700	27.6
750	30	591	23.3	744	29.3	-	-	-	-	-	-	750	29.5	750	-
800	32	616	24.3	779	30.7	800	31.5	800	31.5	-	-	800	31.5	800	31.5
900	36	663	26.1	826	32.5	900	35.4	900	35.4	-	-	900	35.4	900	35.4
1000	40	714	28.1	877	34.5	1000	39.4	1000	39.4	-	-	1000	39.4	1000	39.4
	42	714	28.1	877	34.5	-	-	-	-	-	-	1000	39.4	-	-
	44	765	30.1	928	36.5	-	-	-	-	-	-	1100	43.3	-	-
1200	48	820	32.3	983	38.7	1200	47.2	1200	47.2	-	-	1200	47.2	1200	47.2

- not available

MAGFLO MAG 5100 W

Weight

Nominal size		PN 10		PN 16		PN 40		Class 150/AWWA		AS	
[mm]	[inch]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]
25	1	-	-	-	-	4	9	4	9	4	9
40	1½	-	-	-	-	7	15	6	13	7	15
50	2	-	-	9	20	-	-	8	20	9	20
65	2½	-	-	10.7	24	-	-	11	24	10.7	24
80	3	-	-	11.6	26	-	-	13	28	11.6	26
100	4	-	-	15.2	33	-	-	19	41	15.2	33
125	5	-	-	20.4	45	-	-	24	52	20.4	45
150	6	-	-	26	57	-	-	29	64	26	57
200	8	48	106	48	106	-	-	56	124	48	106
250	10	64	141	69	152	-	-	79	174	69	152
300	12	76	167	86	189	-	-	110	243	86	189
350	14	104	229	125	274	-	-	139	307	115	254
400	16	119	263	143	314	-	-	159	351	125	277
450	18	136	299	173	381	-	-	182	400	141	311
500	20	163	359	223	491	-	-	225	495	189	418
600	24	236	519	338	744	-	-	320	704	301	664
700	28	270	595	314	692	-	-	273	602	320	704
750	30	-	-	-	-	-	-	329	725	-	-
800	32	346	763	396	873	-	-	365	804	428	944
900	36	432	951	474	1043	-	-	495	1089	619	1362
1000	40	513	1130	600	1321	-	-	583	1282	636	1399
	42	-	-	-	-	-	-	687	1512	-	-
	44	-	-	-	-	-	-	763	1680	-	-
1200	48	643	1415	885	1948	-	-	861	1896	813	1789

- not available

With transmitter MAG 5000 and MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lbs), with MAG 6000 I, weight is increased by 5.5 kg (12.1 lb).

Overview

The SITRANS F M MAGFLO MAG 3100 is an electromagnetic flow sensor in a large variety that meets the demands of almost every flow application.

Benefits

- Wide range of sizes: DN 15 to DN 2000 (½" to 78")
- Wide pressure range: PN 6 to PN 100
  ANSI Class 150 / 300, AS 2129 / AS 4087. On request up to 690 bar (10000 psi)
- Wide range of electrode and liner material to fit even the most extreme process media
- Fully welded construction provides a ruggedness that suits the toughest applications and environments
- Easy commissioning, the SENSORPROM unit automatically updates settings.
- Designed to allow patented MAGFLO in-situ verification using the SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M MAGFLO electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Steel industry
- Mining
- Utility
- Power generation & distribution
- Oil & gas / HPI
- Water & waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Ex ATEX and FM versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Approvals for PTB, OIML R75 and OIML R117
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Build-in length according to ISO 13359
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction were the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, PROFIBUS DP & PA, MODBUS RTU/RS485.

Technical specifications

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Nominal size	DN 15 ... DN 2000 (½" ... 78")	DN 15… DN 300 (½"... 12")	DN 15… DN 300 (½"... 12")
Measuring principle	electromagnetic induction		
Excitation frequency	• DN 15 ... 65 (½" … 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 1200 (8" ... 48"): 3.125 Hz • DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz	• DN 15 ... 65 (½" … 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz	• DN 15 ... 65 (½" … 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz
Process connection			
Flanges	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 65 ... 2000 (2½" … 48"): PN 6 (87 psi) • DN 200 ... 2000 (8" … 48"): PN 10 (145 psi) • DN 65 ... 2000 (2½" … 78"): PN 16 (232 psi) • DN 200 ... 600 (8" … 24"): PN 25 (362 psi) • DN 15 ... 600 (½" … 24"): PN 40 (580 psi) • DN 50 ... 300 (2" … 12"): PN 63 (913 psi) • DN 25 ... 300 (1" … 12"): PN 100 (1450 psi) ANSI B16.5 (~BS 1560), raised face • ½" ... 24": Class 150 (20 bar (290 psi)) • ½" ... 24": Class 300 (50 bar (725 psi)) AWWA C-207, flat face 28" ... 78": Class D (10 bar) AS 2129, raised face ½" ... 48": Table E AS 4087, raised face: • PN 16 (DN 50 ... 1200, 16 bar (232 psi)) • PN 21 (DN 50 ... 600, 21 bar (304 psi)) • PN 35 (DN 50 ... 600, 35 bar (508 psi)) Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 15 ... 300 (½" … 12"): PN 40 (580 psi) • DN 65 ... 300 (2½" … 12"): PN 16 (232 psi) • DN 200 ... 300 (8" … 12"): PN 10 (145 psi) • DN 200 ... 300 (8" … 12"): PN 25 (362 psi) ANSI B16.5 (~BS 1560), raised face: • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) AS 2129, raised face ½" ... 12": Table E Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 15 ... 50 (½" … 2"): PN 40 (580 psi) • DN 65 ... 300 (2½" … 12"): PN 16 (232 psi) • DN 200 ... 300 (8" … 12"): PN 10 (145 psi) ANSI B16.5 (~BS 1560), raised face • ½" ... 12": Class 150 (20 bar (290 psi))
Rated operation conditions			
Ambient temperature (conditions also dependent on liner characteristiques)			
• Sensor	-40 … +100 °C (-40 … +212 °F)	-40 … +100 °C (-40 … +212 °F)	-40 … +100 °C (-40 … +212 °F)
• Sensor ATEX	-20 … +60 °C (-4 … +140 °F)	for up to 150 °C (302 °F) temperature of medium: -20 … +60 °C (-4 … +140 °F) for 150 ... 180 °C (302 ... 356 °F) temperature of medium: -20 … +50 °C (-4 … +122 °F)	-20 … +60 °C (-4 … +140 °F)
• With compact transmitter MAG 5000/6000	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)
• With compact transmitter MAG 6000 I	-20 … +60 °C (-4 … +140 °F)	-20 … +60 °C (-4 … +140 °F)	-20 … +60 °C (-4 … +140 °F)
• With compact transmitter MAG 6000 I Ex d	-10 … +60 °C (14 … 140 °F)	-10 … +60 °C (14 … 140 °F)	-10 … +60 °C (14 … 140 °F)

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Operating pressure			
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	• Neoprene 0.01 ... 100 bar (0.15 ... 1450 psi) • EPDM 0.01 ... 40 bar (0.15 ... 580 psi) • Linatex® 0.01 ... 40 bar (0.15 ... 580 psi) • Ebonite 0.01 ... 100 bar (0.15 ... 1450 psi) • PTFE (DN ≤ 300, PN ≤ 50 bar/ ≤ 12", PN ≤ 725 psi) PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar/ 14" ≤ DN ≤ 24", PN ≤ 580 psi) • PFA - DN 25 ... 100 (1" … 4"): 0.01 ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" … 12") (130/180 °C (266 °F/356°F)): 0.3 ... 50 bar (4 ... 725 psi) (180 °C (356 °F) PTFE has factory mounted grounding SS rings type E & SS terminal box) • PFA - DN 25 ... 100 (1" … 4"): 0.01 ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" … 12") : 0.3 ... 50 bar (4 ... 725 psi) • PFA - DN 15 ... 100 (1" … 4"): 0.01 ... 50 bar (0.15 ... 725 psi)
Enclosure rating	IP67/NEMA 4X/6 to EN 60529, 1 mH_2O for 30 min Option: IP68/NEMA 6P to EN 60529,10 mH_2O cont. (no ATEX)	IP67/NEMA 4X/6 to EN 60529, 1 mH_2O for 30 min Option: IP68/NEMA 6P to EN 60529,10 mH_2O cont. (no ATEX)	IP67/NEMA 4X/6 to EN 60529, 1 mH_2O for 30 min Option: IP68/NEMA 6P to EN 60529, 10 mH_2O cont. (no ATEX)
Pressure drop at 3 m/s	As straigth pipe		
Test pressure	1.5 x PN (where applicable)		
Mechanical load	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms
Temperature of medium	• Neoprene 0 … +70 °C (32 … 158 °F) • EPDM -10 … +70 °C (14 … 158 °F) • Linatex® (rubber) -40 … +70 °C (-40 … +158 °F) (for temperatures below -20 °C (15 °F) AISI 304 or 316 flanges must be used) • Ebonite 0 … 95 °C (32 … 203 °F) • PTFE -20 … +100 °C (-4 … +212 °F) • PFA -20 … +100 °C (-4 … +212°F)	• PTFE -20 … +130 °C (-4 … +266 °F) • PTFE -20 … +180 °C (-4 ... +356 °F) Factory mounted grounding rings type E and SS terminal box. Can only be used with remote transmitter. • PFA -20 … +150 °C (-4 … +300 °F)	• PTFE -20 … +130 °C (-4 … +266 °F) • PFA -20 … +150 °C (-4 … +300 °F)
EMC	89/336 ECC	89/336 ECC	89/336 ECC
Design			
Weight	See dimensional drawings		
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316 L (1.4404) flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316 L (1.4404) flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm)
Measuring pipe material	AISI 304 (1.4301) (AISI 316L (1.4404) flanges and housing, polished has measuring pipe of AISI 316L (1.4435))	AISI 304 (1.4301) (AISI 316L (1.4404) flanges and housing, polished has measuring pipe of AISI 316L (1.4435))	AISI 304 (1.4301)
Electrode material	• AISI 316 Ti (1.4571) • Hastelloy C276 (PFA: Hastelloy C22) • Platinum/Iridium, • Titanium • Tantalum	• AISI 316 Ti (1.4571) • Hastelloy C276 (PFA: Hastelloy C22) • Platinum/Iridium, • Titanium • Tantalum	Hastelloy C276 (PFA: Hastelloy C22)
Grounding Electrode material	Material as measuring electrodes: Exceptions - see ordering data	No grounding electrodes	No grounding electrodes

MAGFLO MAG 3100

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Design (continued)			
Terminal box (remote version only)	• Standard Fibre glass-reinforced polyamide • Option Stainless steel AISI 316 (1.4436) • Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)	• Stainless steel AISI 316 (1.4436) • Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)	• Standard Fibre glass-reinforced polyamide • Option Stainless steel AISI 316 (1.4436) • Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)
Cable entries	• Remote installation 2 x M20 or 2 x ½ NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½"NPT - MAG 6000 I: 2 x M25(for supply/output) - MAG 6000 I Ex. d: 2 x M20 (for supply/output)	• Remote installation 2 x M20 or 2 x ½ NPT	• Remote installation 2 x M20 or 2 x ½ NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½"NPT - MAG 6000 I: 2 x M25(for supply/output) - MAG 6000 I Ex. d: 2 x M20 (for supply/output)
Certificates and approvals			
Conforms to	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN
Material certificate EN 10204 3.1	On request	On request	Pipe and flange certificate available as option
Ex approvals	ATEX 2G D sensor • DN 15 ... 300: EEx d e ia IIC T4 - T6 • DN 350 ... 2000 EEx e ia IIC T4 - T6 Non ATEX sensors • FM Class 1 Div 2 • CSA Class 1, Div 2	ATEX 2G D sensor • DN 15 ... 300: EEx d e ia IIC T3 - T6 Non ATEX sensors • FM Class 1 Div 2 • CSA Class 1, Div 2	ATEX 2G D sensor • DN 15 ... 300: EEx d e ia IIC T3 - T6 Non ATEX sensors • FM Class 1 Div 2 • CSA Class 1, Div 2
Drinking water approvals	EPDM lining: • WRAS (WRc, BS6920 cold water, GB) • ACS listed (F) • DVGW W270 (D) • Belaqua (B)		
Custody transfer (CT) (≤ DN2000) (only together with MAG 5000/6000 CT), order as special	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)

Technical specification for transmitter - please see transmitter pages.

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAGFLO MAG 3100 F)	**7ME6310-**
Diameter	
DN 15 (½“) (PTFE liner only)	1V
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
DN 350 (14“)	5K
DN 400 (16“)	5R
DN 450 (18“)	5Y
DN 500 (20“)	6F
DN 600 (24“)	6P
DN 700 (28“)	6Y
DN 750 (30“)	7D
DN 800 (32“)	7H
DN 900 (36“)	7M
DN 1000 (40“)	7R
DN 1050 (42“)	7U
DN 1100 (44“)	7V
DN 1200 (48“)	8B
DN 1400 (54“)	8F
DN 1500 (60“)	8K
DN 1600 (66“)	8P
DN 1800 (72“)	8T
DN 2000 (78“)	8Y
Flange norm and pressure rating	
to EN 1092-1	
PN 6 (DN 65 ... 2000 (2½“ ... 78“))	A
PN 10 (DN 200 ... 2000 (8“ ... 78“))	B
PN 16 (DN 65 ... 1200 (2½“ ... 48“))	C
PN 16, non PED (DN 700 ... 2000 (28“ ... 78“))	D
PN 25 (DN 200 ... 600 (8“ ... 24“))	E
PN 40 (DN 15 ... 600 (½“ ... 24“))	F
PN 63 (DN 50 ... 300 (2“ ... 12“)), not PTFE or PFA	G
PN 100 (DN 25 ... 300 (1“ ... 12“)), not PTFE or PFA	H
to ANSI B16.5	
Class 150 (½“ ... 24“)	J
Class 300 (½“ ... 24“)	K
to AWWA C207	
Class D (28“ ... 78“)	L
to AS	
2129, table E	M
4087, PN 16 (DN 50 ... 1200 (2“ ... 48“))	N
4087, PN 21 (DN 50 ... 600 (2“ ... 24“))	P
4087, PN 35 (DN 50 ... 600 (2“ ... 24“))	Q
Flange material	
Carbon steel flanges ASTM A 105	1
Stainless steel flanges, AISI 304	2
Stainless steel flanges and sensor body, AISI 316L, polished	3

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAGFLO MAG 3100 F)	**7ME6310-**
Liner material	
Neoprene	1
EPDM	2
PTFE (DN ≤ 300, PN ≤ 50 bar / ≤ 12“, PN ≤ 725 psi), PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar / 14“ ≤ DN ≤ 24“, PN ≤ 580 psi)	3
Ebonite	4
Linatex (PN ≤ 40 bar (580 psi) DN ≤ 600 (24“))	5
PFA (DN 25, 50, 80, 100 (1", 2", 3", 4")) (PN ≤ 40 bar (580 psi)	7
Electrode material (Grounding electrodes not for PTFE/PFA liner or Pressure PN 100)	
AISI 316 TI	1
Hastelloy C276 (PFA liner: Hastelloy C22)	2
Platinum (DN ≤ 300/12") (no grounding electrodes)	3
Titanium (not PFA liner)	4
Tantalum (DN ≤ 600 (24")) (no grounding electrodes)	5
Transmitter with display	
Sensor for remote transmitter (Order transmitter sep.)	A
Sensor ATEX 2G D for remote transmitter (Order transmitter separately)	B
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I Alu. 18 ... 30 V DC, ATEX 2G D	D
MAG 6000 I Alu. 115 ... 230 V, ATEX 2G D	E
MAG 6000 Polyamid, 11… 30 V DC / 11…24 V AC	H
MAG 6000, Polyamid, 115/230 V AC	J
MAG 5000, Polyamid, 11… 30 V DC / 11…24 V AC	K
MAG 5000, Polyamid, 115/230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)	F
PROFIBUS DP Profile 3 (no ATEX) (only MAG6000/MAG6000 I)	G
MODBUS RTU/RS 485 (no ATEX) (only MAG6000/MAG6000 I)	E
Cable glands/terminal box	
Metric	1
½" NPT	2
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	3
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	4

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (no ATEX)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 3100

Description	Order No.	Symbol
Potting kit for terminal box of MAGFLO sensors for IP68/NEMA 6P (Not ATEX) F)	**FDK-085U0220**	

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAGFLO MAG 3100 HT (High Temperature) F)	**7ME6320 -**
Diameter	
DN 15 (½“)	**1V**
DN 25 (1“)	**2D**
DN 40 (1½“)	**2R**
DN 50 (2“)	**2Y**
DN 65 (2½“)	**3F**
DN 80 (3“)	**3M**
DN 100 (4“)	**3T**
DN 125 (5“)	**4B**
DN 150 (6“)	**4H**
DN 200 (8“)	**4P**
DN 250 (10“)	**4V**
DN 300 (12“)	**5D**
Flange norm and pressure rating	
to EN 1092-1	
PN 10 (DN 200 ... 300 (8“ ... 12“))	**B**
PN 16 (DN 65 ... 300 (2½“ ... 12“))	**C**
PN 25 (DN 200 ... 300 (8“ ... 12“))	**E**
PN 40 (DN 15 ... 300 (½“ ... 12“))	**F**
to ANSI B16.5	
Class 150 (½“ ... 12“)	**J**
Class 300 (½“ ... 12“)	**K**
to AS	
2129, table E	**M**
Flange material	
Carbon steel flanges ASTM A 105	**1**
Stainless steel flanges, AISI 304	**2**
Stainless steel flanges and sensor body, AISI 316L, polished	**3**
Liner material	
PTFE (130 °C (266 °F))	**2**
PTFE including type E protection rings AISI 316 (180 °C (356 °F))	**3**
PFA (150 °C (302 °F)) (DN 25, 50, 80, 100 (1", 2", 3", 4 "))	**7**
Electrode material (no grounding electrodes)	
AISI 316 TI	**1**
Hastelloy C276 (PFA liner: Hastelloy C22)	**2**
Platinum	**3**
Titanium (not for PFA)	**4**
Tantalum	**5**
Transmitter with display	
Sensor for remote transmitter (Order transmitter separately)	**A**
Sensor ATEX 2G D for remote transmitter (Order transmitter separately)	**B**
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC	**C**
MAG 6000 I, Alu. 18 ... 30 V DC, ATEX 2G D	**D**
MAG 6000 I, Alu. 115 ... 230 V, ATEX 2G D	**E**
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC	**H**
MAG 6000, Polyamid, 115/230 V AC	**J**
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC	**K**
MAG 5000, Polyamid, 115/230 V AC	**L**

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAGFLO MAG 3100 HT (High Temperature) F)	**7ME6320 -**
Communication	
No communication, add-on possible	**A**
HART	**B**
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)	**F**
PROFIBUS DP Profile 3 (only MAG6000/MAG6000 I)	**G**
MODBUS RTU/RS 485 (only MAG6000/MAG6000 I)	**E**
Cable glands/terminal box	
Metric	**1**
½" NPT	**2**
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	**3**
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	**4**

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer specific converter setup	**Y20**
Tag name made, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Other postproduction requirements (add desired text)	**Y99**

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

F) Subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 3100

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAGFLO MAG 3100 P F)	7ME6340-
Diameter	
DN 15 (½“)	1V
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
Flange norm and pressure rating	
to EN 1092-1	
PN 10 (DN 200 ... 300 (8“ … 12“))	B
PN 16 (DN 65 ... 300 (2½“ … 12“))	C
PN 40 (DN 15 ... 50 (½“ … 2“)	F
to ANSI B16.5	
Class 150 (½“ ... 12“)	J
Flange material	
Carbon steel flanges ASTM A 105	1
Liner material	
PTFE (130 °C (266 °F))	3
PFA (150 °C (302 °F)) (DN 25, 50, 80, 100 (1", 2", 3", 4"))	7
Electrode material	
Hastelloy C276 (PFA: Hastelloy C22)	2
Transmitter	
Sensor for remote transmitter (Order transmitter separately)	A
Sensor ATEX 2G D for remote transmitter (Order transmitter separately)	B
MAG 6000 I, Aluminium, 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminium, 18 ... 30 V DC, ATEX 2G D	D
MAG 6000 I, Aluminium, 115 ... 230 V AC, ATEX 2G D	E
MAG 6000, Polyamid, 11 … 30 V DC/11 ... 24V AC	H
MAG 6000, Polyamid, 115/230 V AC	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC	K
MAG 5000, Polyamid, 115/230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG6000/MAG6000 I)	F
PROFIBUS DP Profile 3 (no ATEX) (only MAG6000/MAG6000 I)	G
MODBUS RTU/RS 485 (no ATEX) (only MAG6000/MAG6000 I)	E
Cable glands/terminal box	
Metric	1
½" NPT	2
Metric SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	3
½" NPT SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	4

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Material certificate according to EN 10204 3.1 (Pending)	**C12**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Power cable wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box IP68 with wired cable (specify cable order no.) (no ATEX)	**Y41**
Customer specific test	**Y90**
Other postproduction requirements (add desired text)	**Y99**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

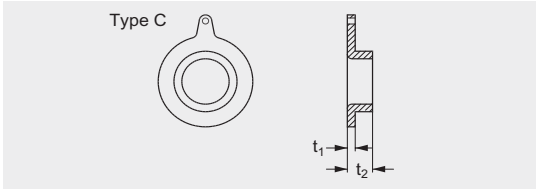
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data

MAG 3100 Type C Grounding and protection rings

AISI 304 grounding and protection rings **type C** for all liners except PTFE and PFA



DN	PN 6	PN 10	PN 16	PN 25	PN 40	AS2129, Table E
	Order No.[F)]	Order No.[F)]	Order No.[F)]	Order No.[F)]	Order No.[F)]	Order No.[F)]
DN 25					FDK-083N8361	FDK-083N8361
DN 40					FDK-083N8362	FDK-083N8362
DN 50					FDK-083N8344	FDK-083N8344
DN 65	FDK-083N8345		FDK-083N8345		FDK-083N8345	FDK-083N8346
DN 80	FDK-083N8347		FDK-083N8347		FDK-083N8347	FDK-083N8347
DN 100	FDK-083N8070		FDK-083N8025		FDK-083N8025	FDK-083N8025
DN 125	FDK-083N8071		FDK-083N8071		FDK-083N8071	FDK-083N8071
DN 150	FDK-083N8072		FDK-083N8008		FDK-083N8008	FDK-083N8008
DN 200	FDK-083N8074	FDK-083N8011	FDK-083N8011	FDK-083N8011	FDK-083N8075	FDK-083N8011
DN 250	FDK-083N8078	FDK-083N8013	FDK-083N8013	FDK-083N8013	FDK-083N8079	FDK-083N8013
DN 300	FDK-083N8080	FDK-083N8012	FDK-083N8012	FDK-083N8081	FDK-083N8082	FDK-083N8012
DN 350	FDK-083N8083	FDK-083N8039	FDK-083N8039	FDK-083N8084	FDK-083N8085	FDK-083N8039
DN 400	FDK-083N8099	FDK-083N8100	FDK-083N8100	FDK-083N8101	FDK-083N8102	FDK-083N8100
DN 450	FDK-083N8103	FDK-083N8103	FDK-083N8104	FDK-083N8104	FDK-083N8105	FDK-083N8104
DN 500	FDK-083N8107	FDK-083N8107	FDK-083N8108	FDK-083N8108	FDK-083N8109	FDK-083N8108
DN 600	FDK-083N8111	FDK-083N8111	FDK-083N8112	FDK-083N8112		FDK-083N8113
DN 700	FDK-083N8300	FDK-083N8294	FDK-083N8294			FDK-083N8372
DN 750						FDK-083N8366
DN 800	FDK-083N8303	FDK-083N8304	FDK-083N8304			FDK-083N8373
DN 900	FDK-083N8306	FDK-083N8307	FDK-083N8307			FDK-083N8396
DN 1000	FDK-083N8309	FDK-083N8310	FDK-083N8310			FDK-083N8397
DN 1100		FDK-083N8367	FDK-083N8367			FDK-083N8367
DN 1200	FDK-083N8312	FDK-083N8313	FDK-083N8313			FDK-083N8398
DN 1400	FDK-083N8467	FDK-083N8468	FDK-083N8469			
DN 1500	FDK-083N8471	FDK-083N8472	FDK-083N8473			
DN 1600	FDK-083N8475	FDK-083N8476	FDK-083N8477			
DN 1800	FDK-083N8479	FDK-083N8480	FDK-083N8481			
DN 2000	FDK-083N8483	FDK-083N8484	FDK-083N8485			

Size	ANSI Class 150	ANSI Class 300
	Order No.[F)]	Order No.[F)]
1“	FDK-083N8361	FDK-083N8361
1½“	FDK-083N8362	FDK-083N8362
2“	FDK-083N8344	FDK-083N8344
2½“	FDK-083N8345	FDK-083N8345
3“	FDK-083N8347	FDK-083N8347
4“	FDK-083N8025	FDK-083N8025
5“	FDK-083N8071	FDK-083N8071
6“	FDK-083N8008	FDK-083N8073
8“	FDK-083N8011	FDK-083N8076
10“	FDK-083N8013	FDK-083N8079
12“	FDK-083N8012	FDK-083N8082
14“	FDK-083N8039	FDK-083N8085
16“	FDK-083N8100	FDK-083N8102
18“	FDK-083N8104	FDK-083N8106
20“	FDK-083N8107	FDK-083N8110
24“	FDK-083N8113	FDK-083N8114

Size	AWWA C207
	Order No.[F)]
28“	FDK-083N8302
30“	FDK-083N8366
32“	FDK-083N8305
36“	FDK-083N8308
40“	FDK-083N8311
42“	FDK-083N8394
44“	FDK-083N8395
48“	FDK-083N8314
54“	FDK-083N8470
60“	FDK-083N8474
66“	FDK-083N8478
72“	FDK-083N8482
78“	FDK-083N8486

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

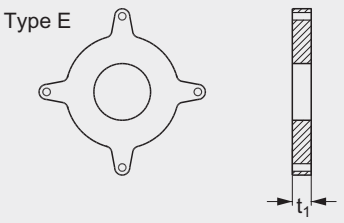
MAGFLO MAG 3100

Selection and Ordering data

MAG 3100, 3100 HT, MAG 3100 P Type E grounding and protection ring

1 pc. AISI 316 grounding and protection rings **type E** for PTFE liners

Note:
For MAG 3100 HT High temperature version 7ME6320... for PTFE 180 °C versions. - grounding ring type E is included and factory mounted.



DN	PN 6	PN 10	PN 16	PN 25	PN 40
	Order No.[F]	Order No.[F]	Order No.[F]	Order No.[F]	Order No.[F]
DN 15					**FDK-083N8365**
DN 25					**FDK-083N8271**
DN 40					**FDK-083N8278**
DN 50					**FDK-083N8282**
DN 65	**FDK-083N8284**		**FDK-083N8285**		**FDK-083N8286**
DN 80	**FDK-083N8288**		**FDK-083N8289**		**FDK-083N8290**
DN 100	**FDK-083N8116**		**FDK-083N8117**		**FDK-083N8118**
DN 125	**FDK-083N8120**		**FDK-083N8121**		**FDK-083N8122**
DN 150	**FDK-083N8124**		**FDK-083N8125**		**FDK-083N8126**
DN 200	**FDK-083N8129**	**FDK-083N8130**	**FDK-083N8130**	**FDK-083N8131**	**FDK-083N8132**
DN 250	**FDK-083N8135**	**FDK-083N8136**	**FDK-083N8137**	**FDK-083N8138**	**FDK-083N8139**
DN 300	**FDK-083N8144**	**FDK-083N8144**	**FDK-083N8145**	**FDK-083N8146**	**FDK-083N8147**
DN 350	**FDK-083N8152**	**FDK-083N8153**	**FDK-083N8154**	**FDK-083N8155**	**FDK-083N8156**
DN 400	**FDK-083N8160**	**FDK-083N8161**	**FDK-083N8162**	**FDK-083N8163**	**FDK-083N8164**
DN 450	**FDK-083N8168**	**FDK-083N8169**	**FDK-083N8170**	**FDK-083N8171**	**FDK-083N8172**
DN 500	**FDK-083N8177**	**FDK-083N8178**	**FDK-083N8179**	**FDK-083N8180**	**FDK-083N8181**
DN 600	**FDK-083N8186**	**FDK-083N8187**	**FDK-083N8188**	**FDK-083N8189**	

Protection of PTFE liner use 2 pcs.
Earthing of PTFE lined flowmeter use 1 pc.

Size	ANSI	
	Class 150	**Class 300**
	Order No.[F]	Order No.[F]
½“	**FDK-083N8365**	**FDK-083N8365**
1“	**FDK-083N8272**	**FDK-083N8272**
1½“	**FDK-083N8279**	**FDK-083N8279**
2“	**FDK-083N8283**	**FDK-083N8283**
2½“	**FDK-083N8287**	**FDK-083N8287**
3“	**FDK-083N8291**	**FDK-083N8292**
4“	**FDK-083N8118**	**FDK-083N8119**
5“	**FDK-083N8122**	**FDK-083N8123**
6“	**FDK-083N8126**	**FDK-083N8127**
8“	**FDK-083N8370**	**FDK-083N8133**
10“	**FDK-083N8140**	**FDK-083N8141**
12“	**FDK-083N8148**	**FDK-083N8149**
14“	**FDK-083N8157**	**FDK-083N8158**
16“	**FDK-083N8165**	**FDK-083N8166**
18“	**FDK-083N8173**	**FDK-083N8174**
20“	**FDK-083N8182**	**FDK-083N8183**
24“	**FDK-083N8190**	**FDK-083N8191**

Protection of PTFE liner use 2 pcs.
Grounding of PTFE lined flowmeter use 1 pc.

AS2129, Table E	
DN	Order No.[F]
DN 15	**FDK-083N8365**
DN 25	**FDK-083N8272**
DN 40	**FDK-083N8280**
DN 50	**FDK-083N8281**
DN 65	**FDK-083N8284**
DN 80	**FDK-083N8293**
DN 100	**FDK-083N8117**
DN 125	**FDK-083N8121**
DN 150	**FDK-083N8128**
DN 200	**FDK-083N8134**
DN 250	**FDK-083N8143**
DN 300	**FDK-083N8151**
DN 350	**FDK-083N8153**
DN 400	**FDK-083N8161**
DN 450	**FDK-083N8176**
DN 500	**FDK-083N8185**
DN 600	**FDK-083N8193**

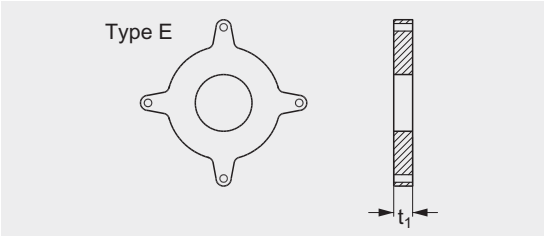
Protection of PTFE liner use 2 pcs.
Grounding of PTFE lined flowmeter use 1 pcs.

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P type E grounding and protecting ring

1 pc. Hastelloy C-276 grounding and protection ring **type E** for PTFE liners

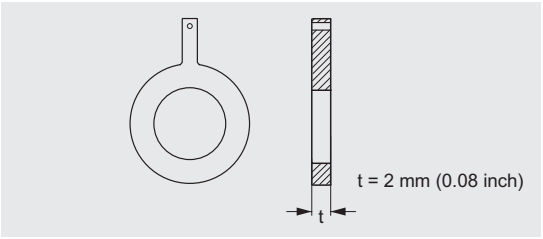


DN	PN 6	PN 16	PN 40	Size	ANSI Class 150	ANSI Class 300
	Order No.[F]	Order No.[F]	Order No.[F]		Order No.[F]	Order No.[F]
DN 15			**FDK-083N8487**	½“	**FDK-083N8487**	**FDK-083N8487**
DN 25			**FDK-083N8488**	1“	**FDK-083N8489**	**FDK-083N8489**
DN 40			**FDK-083N8490**	1½“	**FDK-083N8491**	**FDK-083N8491**
DN 50			**FDK-083N8492**	2“	**FDK-083N8493**	**FDK-083N8493**
DN 65	**FDK-083N8494**	**FDK-083N8495**	**FDK-083N8496**	2½“	**FDK-083N8497**	**FDK-083N8497**
DN 80	**FDK-083N8498**	**FDK-083N8499**	**FDK-083N8500**	3“	**FDK-083N8501**	**FDK-083N8502**
DN 100	**FDK-083N8503**	**FDK-083N8504**	**FDK-083N8505**	4“	**FDK-083N8506**	**FDK-083N8507**

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings: Flat rings

1 pc. AISI 316 grounding **flat ring** for all liners (not PTFE 180 °C)



DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	ANSI Class 300
	Order No.[F]	Order No.[F]	Order No.[F]		Order No.[F]	Order No.[F]
DN 15			**A5E01191969**	½“	**A5E01191968**	
DN 25			**A5E01150880**	1“	**A5E01150022**	**A5E01150378**
DN 40			**A5E01191952**	1½“	**A5E01191961**	
DN 50			**A5E01150918**	2“	**A5E01151121**	**A5E01151194**
DN 65		**A5E01191940**	**A5E01191954**	2½“	**A5E01191962**	
DN 80		**A5E01152876**	**A5E01152876**	3“	**A5E01152910**	**A5E01153422**
DN 100		**A5E01158875**	**A5E01159072**	4“	**A5E01159146**	**A5E01159628**
DN 125		**A5E01191941**	**A5E01191956**	5“	**A5E01191963**	
DN 150		**A5E01191943**	**A5E01191957**	6“	**A5E01191964**	
DN 200	**A5E01191951**	**A5E01191944**	**A5E01191958**	8“	**A5E01191965**	
DN 250	**A5E01191950**	**A5E01191946**	**A5E01191959**	10“	**A5E01191966**	
DN 300	**A5E01191949**	**A5E01191947**	**A5E01191960**	12“	**A5E01191967**	

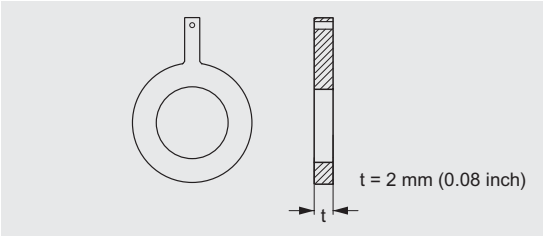
F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MAGFLO MAG 3100

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings : Flat rings

1 pc. Hastelloy C-276 grounding **flat ring** for all liners (not PTFE 180 °C)

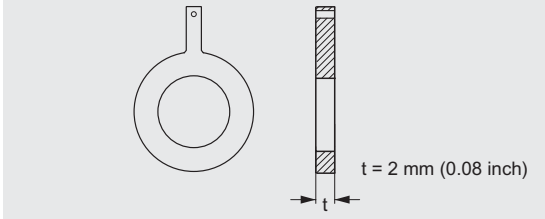


DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	ANSI Class 300
	Order No.[F]	Order No.[F]	Order No.[F]		Order No.[F]	Order No.[F]
DN 15			**A5E01191981**	½“	**A5E01191989**	
DN 25			**A5E01150882**	1“	**A5E01150028**	**A5E01150379**
DN 40			**A5E01191982**	1½“	**A5E01191990**	
DN 50			**A5E01150922**	2“	**A5E01151124**	**A5E01151197**
DN 65		**A5E01191971**	**A5E01191983**	2½“	**A5E01191991**	
DN 80		**A5E01152889**	**A5E01152889**	3“	**A5E01152913**	**A5E01153424**
DN 100		**A5E01158886**	**A5E01159074**	4“	**A5E01159150**	**A5E01159629**
DN 125		**A5E01191973**	**A5E01191984**	5“	**A5E01191992**	
DN 150		**A5E01191974**	**A5E01191985**	6“	**A5E01191993**	
DN 200	**A5E01191978**	**A5E01191975**	**A5E01191986**	8“	**A5E01191994**	
DN 250	**A5E01191979**	**A5E01191976**	**A5E01191987**	10“	**A5E01191995**	
DN 300	**A5E01191980**	**A5E01191977**	**A5E01191988**	12“	**A5E01191996**	

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings : Flat rings

1 pc. Tantalum grounding **flat ring** for all liners (not PTFE 180 °C)

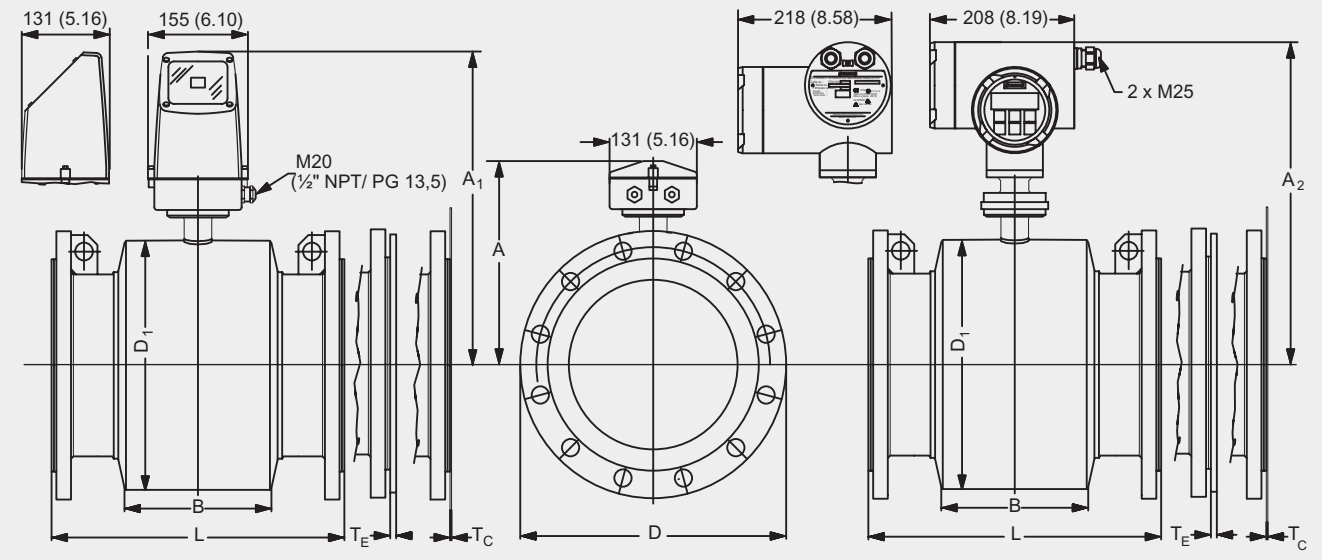


DN	PN 16	PN 40	Size	ANSI Class 150	ANSI Class 300
	Order No.[F]	Order No.[F]		Order No.[F]	Order No.[F]
DN 15		**A5E01192007**	½“	**A5E01192010**	
DN 25		**A5E01150883**	1“	**A5E01150030**	**A5E01150381**
DN 40		**A5E01192008**	1½“	**A5E01192011**	
DN 50		**A5E01150926**	2“	**A5E01151129**	**A5E01151199**
DN 65	**A5E01192005**	**A5E01192009**	2½“	**A5E01192012**	
DN 80	**A5E01152890**	**A5E01152890**	3“	**A5E01152916**	**A5E01153427**
DN 100	**A5E01158891**	**A5E01159076**	4“	**A5E01159156**	**A5E01159631**

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

MAG 3100, MAG 3100 HT, MAG 3100 P sensor with compact or remote transmitter



Metric

DN	A[1]	A1/A2[8]	B	D1	L[2]										TC[3]	TE[3]	Weight[4]
					EN 1092-1-201						ANSI 16.5		AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D			
					PN 6, 10,	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300					
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	187	338	59	104	-	-	-	200	-	-	200	200	200	-	-	6	4
25	187	338	59	104	-	-	-	200	-	260	200	200	200	-	1.2	6	5
40	197	348	82	124	-	-	-	200	-	280	200	200	200	-	1.2	6	8
50	205	356	72	139	-	-	-	200	276	300	200	200	200	-	1.2	6	9
65	212	363	72	154	200	200/-	-	200	320	350	200	272	200	-	1.2	6	11
80	222	373	72	174	200	200/-	-	272	323	340	272	272	200[5]	-	1.2	6	12
100	242	393	85	214	250	250/-	-	250	380	400	250	310	250	-	1.2	6	16
125	255	406	85	239	250	250/-	-	250	420	450	250	335	250	-	1.2	6	19
150	276	427	85	282	300	300/-	-	300	415	450	300	300	300	-	1.2	6	27
200	304	455	137	338	350	350/-	350	350	480	530	350	350	350	-	1.2	8	40
250	332	483	157	393	450	450/-	450	450	550	620	450	450	450	-	1.2	8	60
300	357	508	157	444	500	500/-	500	500	600	680	500	500	500	-	1.6	8	80
350	362	513	270	451	550	550/-	550	550	-	-	550	550	550	-	1.6	8	110
400	387	538	270	502	600	600/-	600	600	-	-	600	600	600	-	1.6	10	125
450	418	569	310	563	600	600/-	600	600	-	-	600	600	600	-	1.6	10	175
500	443	594	350	614	600	600/-	625	680	-	-	600	730	600[6]	-	1.6	10	200
600	494	645	430	715	600	600/-	750	800	-	-	600	860	600[7]	-	1.6	10	287
700	544	695	500	816	700	875/700	-	-	-	-	-	-	700	700	2.0	-	330
750	571	722	556	869	-	-/-	-	-	-	-	-	-	750	750	2.0	-	360
800	606	757	560	927	800	1000/800	-	-	-	-	-	-	800	800	2.0	-	450
900	653	804	630	1032	900	1125/900	-	-	-	-	-	-	900	900	2.0	-	530
1000	704	906	670	1136	1000	1250/1000	-	-	-	-	-	-	1000	1000	2.0	-	660
1100	755	906	770	1238	-	-/-	-	-	-	-	-	-	1100	1100	2.0	-	1140
1200	810	961	792	1348	1200	1500/1200	-	-	-	-	-	-	1200	1200	2.0	-	1180
1400	925	1076	1000	1675	1400	-/1400	-	-	-	-	-	-	-	1400	2.0	-	1600
1500	972	1123	1020	1672	1500	-/1500	-	-	-	-	-	-	-	1500	3.0	-	2460
1600	1025	1176	1130	1915	1600	-/1600	-	-	-	-	-	-	-	1600	3.0	-	2140
1800	1123	1274	1250	1974	1800	-/1800	-	-	-	-	-	-	-	1800	3.0	-	2930
2000	1223	1374	1375	2174	2000	-/2000	-	-	-	-	-	-	-	2000	3.0	-	3665

1) 13 mm shorter with AISI terminal box (Ex and high temperature version)
2) When earthing flanges are used, the thickness of the earthing flange must be added to the build-in length
3) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C (356 °F) PTFE sensor)
4) Weights are approx. (for PN 16) without transmitter
5) PN 35 DN 80 = 272 mm
6) PN 35 DN 500 = 680 mm
7) PN 35 DN 600 = 750 mm
8) A_2 is 1.6 mm shorter than A_1
- not available
D = Outside diameter of flange, see flange tables

MAGFLO MAG 3100

MAG 3100, MAG 3100 HT, MAG 3100 P sensor with compact or remote transmitter

Imperial

Size	A[1]	A_1/A_2[8]	B	D_1	L[2]									AS 2129 E AS 4087 PN 16, 21, 35	T_C[3]	T_E[3]	Weight[4]
					EN 1092-1-201						ANSI 16.5		AWWA C-207 Class D				
					PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300					
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[in.]	[in.]	[lb]
½	7.36	13.31	2.32	4.09	-	-	-	7.87	-	-	7.87	7.87	-	7.87	-	0.24	11
1	7.36	13.31	2.32	4.09	-	-	-	7.87	-	10.24	7.87	7.87	-	7.87	0.05	0.24	13
1½	7.76	13.70	3.23	4.88	-	-	-	7.87	-	11.02	7.87	7.87	-	7.87	0.05	0.24	17
2	8.07	14.01	2.83	5.47	-	-	-	7.87	10.87	11.81	7.87	7.87	-	7.87	0.05	0.24	28
2½	8.35	14.29	2.83	6.06	7.87	7.87/-	-	7.87	12.60	13.78	7.87	10.71	-	7.87	0.05	0.24	30
3	8.74	14.69	2.83	6.85	7.87	7.87/-	-	10.71	12.72	13.39	10.71	10.71	-	7.87[5]	0.05	0.24	33
4	9.53	15.47	3.35	8.43	9.84	9.84/-	-	9.84	14.96	-	9.84	12.20	-	9.84	0.05	0.24	44
5	10.04	15.98	3.35	9.41	9.84	9.84/-	-	9.84	16.54	-	9.84	13.10	-	9.84	0.05	0.24	55
6	10.87	16.81	5.39	11.10	11.81	11.81/-	-	11.81	16.34	-	11.81	11.81	-	11.81	0.05	0.24	66
8	11.97	17.91	5.39	13.31	13.78	13.78/-	13.78	13.78	18.90	-	13.78	13.78	-	13.78	0.05	0.31	110
10	13.07	19.02	6.18	15.47	17.72	17.72/-	17.72	17.72	-	-	17.72	17.72	-	17.72	0.05	0.31	155
12	14.05	20.00	6.18	17.48	19.69	19.69/-	19.69	19.69	-	-	19.69	19.69	-	19.69	0.06	0.31	176
14	14.25	20.20	10.63	17.76	21.65	21.65/-	21.65	21.65	-	-	21.65	21.65	-	21.65	0.06	0.31	242
16	15.24	21.18	10.63	19.76	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-	23.62	0.06	0.39	275
18	16.45	22.40	12.20	22.16	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-	23.62	0.06	0.39	385
20	17.44	23.39	13.78	24.17	23.62	23.62/-	24.61	26.77	-	-	23.62	28.70	-	23.62[6]	0.06	0.39	335
24	19.45	25.39	16.93	28.15	23.62	23.62/-	29.53	31.50	-	-	23.62	33.80	-	23.62[7]	0.06	0.39	630
28	21.42	27.36	19.69	32.13	27.56	34.45/27.56	-	-	-	-	-	-	27.56	27.56	0.08	-	725
30	22.48	28.43	21.89	34.21	-	-/-	-	-	-	-	-	-	29.52	-	0.08	-	830
32	23.86	29.80	22.05	36.50	31.50	39.37/31.50	-	-	-	-	-	-	31.50	31.50	0.08	-	990
36	25.71	31.65	24.80	40.63	35.43	44.29/35.43	-	-	-	-	-	-	35.43	35.43	0.08	-	1160
40	27.72	35.67	26.38	44.72	39.37	49.21/39.37	-	-	-	-	-	-	39.37	39.37	0.08	-	1453
42	27.72	35.67	26.38	44.72	-	-/-	-	-	-	-	-	-	39.37	-	0.08	-	1453
44	29.72	35.67	30.31	48.74	-	-/-	-	-	-	-	-	-	43.31	43.31	0.08	-	-
48	31.89	37.83	31.18	53.07	47.24	59.06/47.24	-	-	-	-	-	-	47.24	47.24	0.08	-	2592
54	36.42	42.36	39.37	65.94	55.12	-/55.12	-	-	-	-	-	-	55.12	-	0.12	-	2940
60	38.27	44.21	40.15	65.83	59.06	59.06/59.06	-	-	-	-	-	-	59.06	-	0.12	-	3422
66	40.35	46.30	44.49	75.39	62.99	-/62.99	-	-	-	-	-	-	63.00	-	0.12	-	3904
72	44.21	50.16	49.21	77.72	70.87	-/70.87	-	-	-	-	-	-	70.87	-	0.12	-	4846
78	48.15	54.09	54.13	85.59	78.74	-/78.74	-	-	-	-	-	-	78.74	-	0.12	-	6806

1) 0.512 inch shorter with AISI terminal box (Ex and high temperature version)
2) When earthing flanges are used, the thickness of the earthing flange must be added to the build-in length
3) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C (356 °F) PTFE sensor)
4) Weights are for ANSI 150 without transmitter
5) PN 35 DN 80 = 10.70 inch
6) PN 35 DN 500 = 26.77 inch
7) PN 35 DN 600 = 29.53 inch
8) A_2 is 0.06“ shorter than A_1

- not available
D = Outside diameter of flange, see flange tables

Selection and Ordering data

Product designation	Order No.
SITRANS FM MAGFLO - Electromagnetic flowmeters	
Calibrations/recalibration for MAG 1100, 1100 F, 5100 W and 3100	
Accessories for SITRANS F M	**FDK -**
Calibration	**O.R.** [2]
Standard production calibration	**-**
Zero-point 2x25%, 2x90%	
Standard production calibration - Matched pair	
Size < DN 350 (14")	**O.R.**
Size DN 300 ... 1200 (12“ ... 48")	**O.R.**
Larger sizes	**O.R.**
Customer specified calibration up to 10 point [1]	
Size ≤ DN 150 (6“)	**O.R.**
Size DN 200 ... 300 (8“ ... 12“)	**O.R.**
Size DN 350 ... 600 (14“ ... 24“)	**O.R.**
Size DN 700 ... 1100 (28“ ... 48“)	**O.R.**
Add-on: Matched pair of any above	**O.R.**
Larger sizes	**O.R.**
Accredited calibration ISO/IEC 17025 - Matched pair [1]	
Accredited calibration report with up to 21 points [1]	
Size ≤ DN 150 (6“)	**O.R.**
Size DN 200 ... 300 (8“ ... 12“)	**O.R.**
Size DN 350 ... 600 (14“ ... 24“)	**O.R.**
Size DN 700 ... 1100 (28“ ... 48“)	**O.R.**
Larger sizes	**O.R.**
CT-calibration and authority seal	
Up to DN 300 (12“) for PTB and DANAK	
Size ≤ DN 150 (6“)	**O.R.**
Size DN 200 ... 300 (8“ ... 12“)	**O.R.**
Larger sizes	**O.R.**
Customer witnessed calibration	
Any of above calibration	
Add-on price per sensor	**O.R.**
Size DN 200 ... 300 (8“ ... 12“)	
Daily rates available on request for larger project.	

1) **Size** dependent restriction on maximum 42,682 flow rates may apply.

2) **Ordering O.R.** As we need dedicated information from the customer on the individual sensor, we must have the calibration forms filed and sent together with the order.

Transmitter Transmag 2 with sensor 911/E

Overview

SITRANS F M transmitter Transmag 2

SITRANS F M Transmag 2 is a pulsed alternating field magnetic flowmeter where the magnetic field strength is much higher than conventional DC pulsed magnetic flowmeters.

This makes it ideal for difficult applications like:

- High concentrated paper stock > 3%
- Heavy mining slurries
- Mining slurries with magnetic particles.

Transmag 2 is used with the SITRANS F M 911/E sensor, available with diameters of DN 15 to DN 600.

Benefits

- Fast signal processing with 16-bit technology
- Automatic recognition of sensor type and calibration data as result of SmartPLUG
- PROFIBUS PA (profile 3.0) / HART communication
- Simple menu operation with two-line display
- Self-monitoring functions
- Internal simulator (for all input and output functions)
- Monitoring of sensor using magnetizing current and reference voltage as well as wet electrode function
- Analog output and digital outputs for pulses, device status, limits, flow direction, frequency output
- Optional passive switch input for resetting the counter values or for switching off the measuring equipment (PZR)
- With pulsed alternating field for minimum conductivity of ≥ 1 µS/cm, on request 0.1 µS/cm depending on medium
- Split mode

Application

The main applications of the SITRANS F M transmitter Transmag 2 can be found in the following sectors:

- Pulp & Paper Industry
- Mining Industry

The measuring procedure with pulsed alternating field patented by Siemens AG is particularly suitable for media with a high solids content, or magnetically conducting media.

Design

The complete flowmeter consists of a flow sensor and an associated transmitter from the SITRANS F M Transmag 2 for pulsed alternating field. These are available as remote and compact versions (SITRANS F M 911/E compact version with Transmag 2 only possible with nominal diameters DN 65 to DN 600 (2½" to 24"). They operate according to Faradays law of induction where an electric voltage is induced in a conductor moving through a magnetic field.

Function

Function

The Transmag 2 is a microprocessor-based transmitter with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

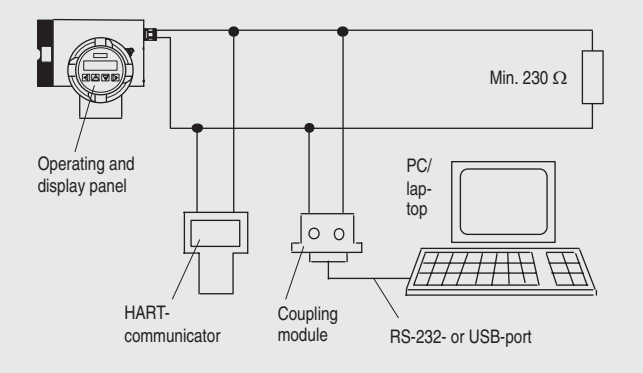
The magnetic flux density in the sensor is additionally monitored by reference coils.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

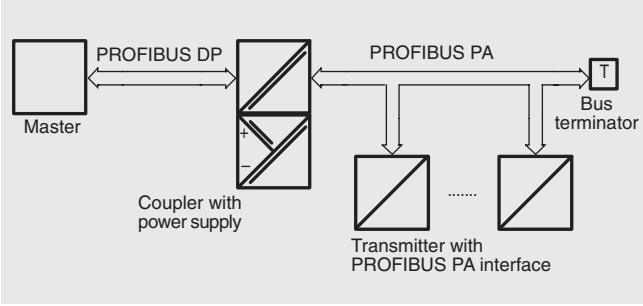
Displays and keypad

Operation of the Transmag 2 transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication



HART communication



PROFIBUS PA communication

Technical specifications

Mode of operation and design

Measuring principle	Electromagnetic with pulsed alternating field (PAC)
Magnetic field excitation	Automatic power supply synchronization
- 50 Hz AC power supply	Bipolar (16.7 Hz) Bipolar with prepulse (10 Hz) Unipolar (8.33 Hz)
- 60 Hz AC power supply	Bipolar (20 Hz) Bipolar with prepulse (12 Hz) Unipolar (10 Hz)

Outputs

Electrical isolation	Outputs electrically isolated from one another and from the power supply, max. 60 V permissible against PE/equipotential bonding
Current output	0/4 ... 20 mA Only for 20 mA / HART devices (7ME5034-0…. or 7ME5034-2….)
• Signal	
- Upper limit	0/4 … 20 mA, selectable
- Failure	20 … 22.5 mA
• Load	3.6; 20 or 24 mA
- Output	max. 600 Ω, max. load voltage 15 V DC
- For HART communication	≥ 250 Ω
Communication	Via analog output with PC coupling module or HART communicator
• Protocol	HART, version 5.1
Digital output	
Signal	
• Output	Configurable as active or passive signals
- Active signal	24 V DC, ≤ 24 mA, R_i = 170 Ω
- Passive signal	Open collector, max. 30 V DC, 200 mA
Output configuration	
• Pulse	
- Pulse significance	≤ 5000 pulses/s
- Pulse width	≥ 0.1 ms
• Limit frequency	≤ 10,000 Hz
• Limits	Limits for flow and quantity, flow direction, alarm
Digital output 2 (relay) (only 7ME5034-0….)	
Relay	NC or NO function
• Rating	Max. 5 W, max. 50 V AC/DC, max. 200 mA
• Output configuration	Limits for flow and quantity, flow direction, alarm
Digital input (optional to digital output 2) (only 7ME5034-2….)	
• Input function configurable as high-active or low-active	Set measured value or counter to zero
• Signal voltage	Max. 30 V DC, R_i = 3 k: High level: +11 ... +30 V DC Low level: -30 ... +5 V DC

For PROFIBUS devices

PROFIBUS PA (for PROFIBUS-devices 7ME5034-1….)	
• Communication	Layer 1 and 2 according to PROFIBUS PA Transmission according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS PA and DP V1 (EN 50170) Device class B, device profile 3.0 Max. 4 simultaneous C2 connections
• Bus voltage	9 ... 32 V DC permissible
• Current consumption from bus	10 mA; limited to ≤ 15 mA in event of fault by electrical current limitation

Accuracy under reference conditions

Measuring tolerance of pulse output	
• With v > 0.25 m/s (0.82 ft/s)	≤ ±0.5% of measured value ±0.0012 m/s (0.0039 ft/s)
• With v < 0.25 m/s (0.82 ft/s)	±0.0025 m/s (0.0082 ft/s)
Measuring tolerance of analog output	As pulse output plus ±0.1% conversion error ±20 µA
Repeatability	0.2% of measured value
Reference conditions	
• Process temperature	25 °C ±5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ±5 °C (77 °F ± 9 °F)
• Warm-up time	Min. 30 min
• Installation conditions	Inlet pipe section ≥ 10 x DN Outlet pipe section ≥ 5 x DN Installed centered in pipe
• Medium	Water without gaseous or solid components

Rated operating conditions

Installation conditions	See also sensors
Ambient temperature	
• Remote design	-20 ... +60 °C (-4 ... +140 °F)
• Compact design	-20 ... +60 °C (-4 ... +140 °F), process temperature up to 60 °C (up to 140 °F)
• Display module	0 ... 50 °C (32 ... 122 °F)
Storage	-25 ... +80 °C (-13 ... +176 °F)
Degree of protection	IP67/NEMA 4X
Electromagnetic compatibility (EMC)	
• Emitted interference	To EN 61326 for use in industrial areas
• Noise immunity	To EN 61326 for use in industrial areas NAMUR NE21 for use in residential areas

Transmitter Transmag 2 with sensor 911/E

Medium conditions	
• Process temperature with compact design	-20 ... +130 °C (-4 ... 266 °F) depending on sensor and ambient temperature
Minimum conductivity of medium	
• With SITRANS F M 911/E sensors	≥ 1 µS/cm, on request 0.1 µS/cm depending on medium
Design	
Weight of transmitter	4.4 kg (9.7 lb)
Compact versions	Transmitter fixed onto metering tube
Remote version	Transmitter must be connected to sensor using shielded cable
Maximum cable length	100 m (328 ft)
Housing	Die-cast aluminium, painted
Displays and keypad	
General display	LCD, backlid, two lines with 16 characters each
Multi-display for	Flow, quantity, flow velocity
Keypad	4 keys for entering parameters
Power supply	
corresponding to rating plate	
• AC supply	100 ... 250 V AC ± 15%, 47 ... 63 Hz
• Power consumption	Approx. 120 ... 630 VA, depending on sensor
Power failure	Bridging of min. 1 power supply cycle (> 20 ms)
Line fuse	100 ... 230 V AC: T1.6A
Magnet current fuse	F5A / 250 V
Certificates and approvals	
Pressure equipment directive	Device is not subject to the pressure equipment directive

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data		Order No.
SITRANS F M electromagnetic transmitter Transmag 2 for alternating field	F)	7ME5034 - ■■■■■ - ■AA0
Output/communication		
4 ... 20 mA with HART protocol		0
PROFIBUS PA connection		1
4 ... 20 mA with HART protocol, digital input		2
Auxiliary supply		
110 ... 230 V AC		AA
Operator display and keypad		
Without		0
With		1
Design		
Remote design		1
Compact design (DN 65 and above)		2
Cable glands		
M20/M16 x 1.5		1
½" NPT		2

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Strengthened mounting bracket for wall and pipeline installation	**A02**
Rating plate inscription English	**B11**
Measuring range, specify in plain text: Y01: 0 to ... m^3/h	**Y01**
Pulse significance, specify in plain text: Y02: 0 to ... pulses/l	**Y02**
Setting of digital outputs, specify in plain text: Y03: Setting of digital outputs: ...	**Y03**
Measuring-point number (max. 8 characters), specify in plain text: Y15:	**Y15**
Measuring-point description (max. 16 characters), specify in plain text: Y16:	**Y16**
Stainless steel tag plate	**Y17**
Special design specify in plain text, state quotation	**Y99**

Selection and Ordering data		Order No.	Order code
SITRANS F M Transmag 2 and sensor 911/E	F)	7ME5930 -	
Cable for remote versions		■■A00 - 0■A0	■■■
• Without cable		0A	
• Suitable for sensor 911/E with alternating field, IP67 Magnet current cable 3 x 1.0 mm^2 (3 x 0.0016 $inch^2$), electrode/reference cable 7 x 0.5 mm^2 (7 x 0.0008 $inch^2$)			
- Length: 5 m (16.4 ft)		5B	
- Length: 10 m (32.8 ft)		5C	
- Specify other length: in plain text		5Z	J1Y
Later 3-point calibration certificate for SITRANS F M			
• Without		A	
• For SITRANS 911E up to DN 600, 24" (please specifiy Comm.-No. in plain text)		B	

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Tag plate of stainless steel	
• Y30 - tag number (max. 16 digits, specifiy in plain text	**Y17**
• Special design, specify quotation No./date in plain text	**Y99**

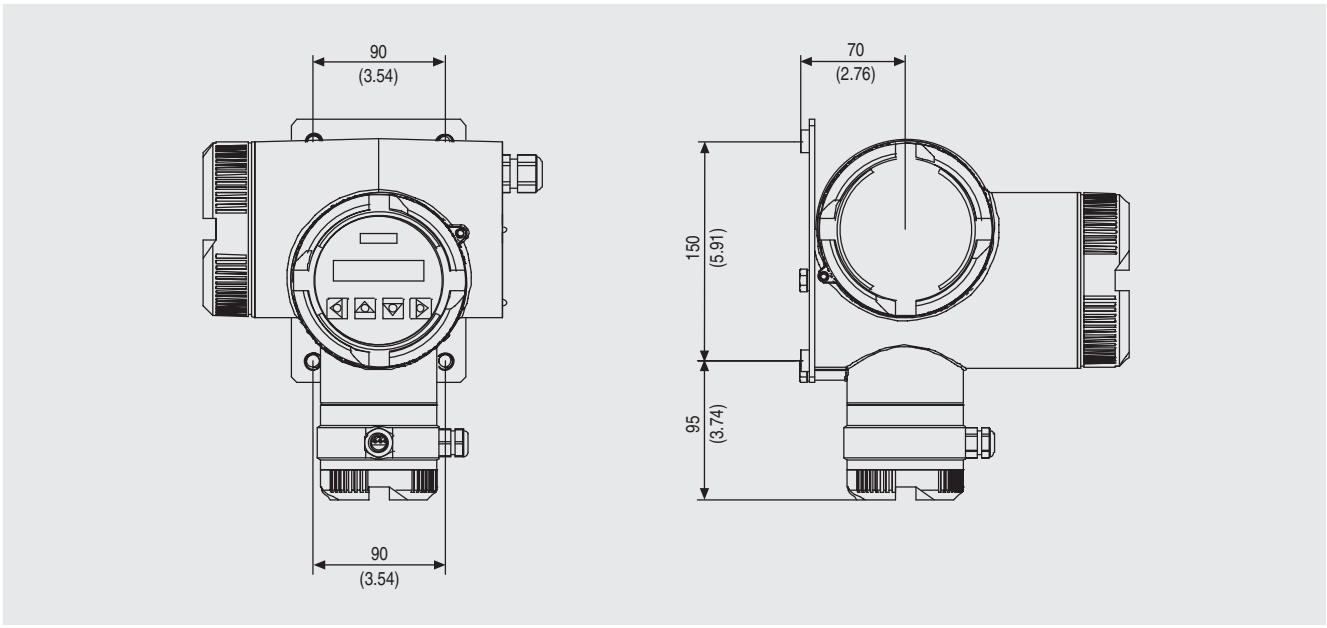
Selection and Ordering data		Order No.
Accessories		
Instruction Manual for SITRANS F M Transmag 2		
German	F)	**A5E00102774**
English	F)	**A5E00102775**
HART modem		
• with RS232 interface	► D)	**7MF4997-1DA**
• with USB interface	► D)	**7MF4997-1DB**
SIMATIC PDM		**See Section 9**

► Available ex stock

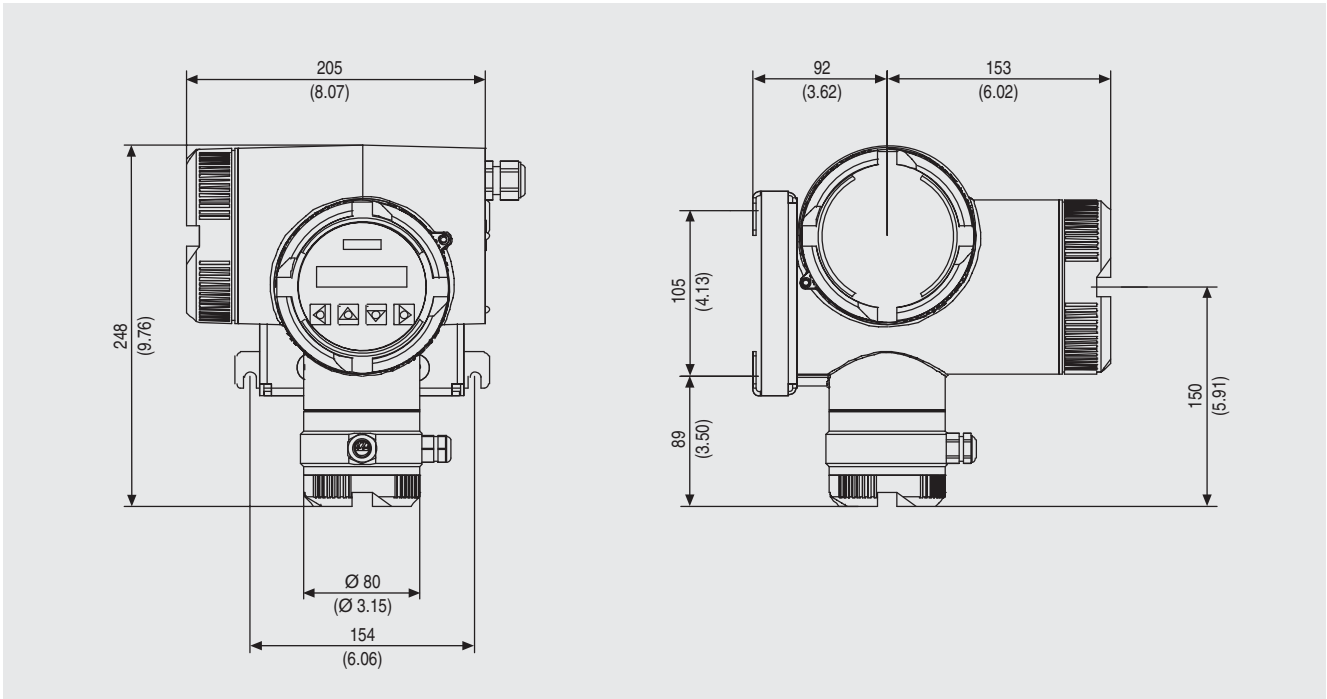
D) Subject to export regulations AL: N, ECCN: EAR99H.
F) Subject to export regulations AL: 9I999, ECCN: N.

Transmitter Transmag 2 with sensor 911/E

Dimensional drawings



SITRANS F M transmitter Transmag 2 with standard mounting plate, dimensions in mm (inch)



SITRANS F M transmitter Transmag 2 with optional mounting plate also for pipeline mounting, dimensions in mm (inch)

Transmitter Transmag 2 with sensor 911/E

Overview

Benefits

- Fully-welded steel fitting
- Metering tube liners available made of hard/soft rubber, PTFE or Novolak
- Various flange connections available to EN 1092-1, ANSI B16.5
- Input amplifier with integral data component (smartPLUG) for all calibration values and customized settings if required.

Technical specifications

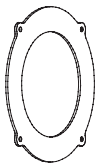
911/E sensor

Mode of operation and design	
Measuring principle	Pulsed alternating field
Process connection	
Nominal diameters	DN 15 ... 600 (½" ... 24")
Metering tube connections	EN 1092-1, ANSI B16.5, others on request
Rated operating conditions	
Installation conditions	See system information
• Minimum process temperature	-20 °C (-4 °F)
• With hard rubber liner	Max. 90 °C (194 °F) Option: 100 °C (212 °F)
• With PTFE liner	• 150 °C (300 °F) at 25 bar (363 psi) • 100 °C (194 °F) at 40 bar (580 psi)
• With Novolak liner	130 °C (266 °F) at 40 bar (580 psi)
Ambient temperature limits	
• Remote versions	• -20 ... +65 °C (-4 ... +149 °F) • -20 ... +40 °C (-4 ... +104 °F) with a process temperature > 130 °C (> 266 °F)
• Compact versions from DN 65 (2½")	• -20 ... +65 °C (-4 ... +149 °F) with a process temperature ≤ 60 °C (≤ 140 °F) • -20 ... +40 °C (-4 ... +104 °F) with a process temperature 60 ... 130 °C (140 ... 266 °F), depends on used sensor and its liner
Degree of protection	IP67/NEMA 4X Optional IP68/NEMA 6
Medium conditions	
Minimum conductivity	> 1 µS/cm, on request 0.1 µS/cm depending on medium
Maximum flow velocity	12 m/s (39.4 ft/s)
Full scale value of flow velocity	0.15 ... 12 m/s (0.49 ... 39.4 ft/s)

4

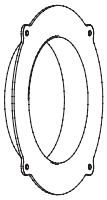
Transmitter Transmag 2 with sensor 911/E

Protection washers for liners



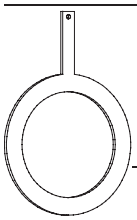
Function	Protection of liner during transport.
Contact with medium	Yes, but the protection washers can be removed prior to installation of the sensor in the pipeline if they are not resistant to the measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, optionally Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by • 6 mm for DN 15 to DN 150 (0.24" for ½" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	Yes, can be used for PTFE liners up to PN 10 (MWP 145 psi) and for soft rubber; cannot be used for other liners.
Order No.	**7ME592x-....**

Protection rings for liners



Function	To protect the edges of liners from abrasion (e.g. gravel, sand etc.). Used mainly with soft rubber liners and for PTFE liners at high temperatures from 100 to 150 °C (212 to 300 °F).
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, optionally Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by • 6 mm for DN 15 to DN 150 (0.24" for ½" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	No, optional for PTFE and soft rubber liners. They are required for PTFE liners of PN 16 (MWP 232 psi) or more instead of protection washers, and must be ordered separately.
Order No.	**7ME591x-....**

Earthing washers



Function	Electrical reference and earthing of the medium. Required if the pipelines are not electrically conducting or are lined (plastic pipelines, concrete pipelines etc.). All earthing rings must be connected to the earthing screw present on the sensor.
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, or Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by 2 mm (0.08") per earthing ring.
Standard	No, only optional. Required between the medium and sensor for equipotential bonding between non-conducting pipelines or lined pipelines.
Order No.	**7ME590x-....**

Sensor cables between sensor and transmitter

The signal voltage proportional to the flow and present at the electrodes of the EMF is only a few µV to mV. Superimposed on this are electrochemical interferences resulting from the contact between the electrodes and liquid, and which can be up to several Volt. Also frequently superimposed are line frequency interferences, interferences resulting from vibrations on the pipelines or signal cables, as well as strong magnetic fields in the vicinity. Sufficient shielding must therefore be provided, as well as fixed routing of the signal cables (electrode and magnet current cable) in the case of remote versions. This also applies to devices with integral preamplifier (smartPLUG). The cable length between the sensor and transmitter must not exceed 100 m (328 ft).

Attention must also be paid to the cable routing. Signal cables must be routed free of vibration, and protected against strong magnetic and stray fields. In case of doubt, the sensor cables must be routed in earthed steel conduit.

Notes on pressure equipment directive

The devices are designed for liquids of danger group "Gases of fluid group 1". The categories differ according to the version, and are listed in the table below.

The minimum temperature is defined at -10 °C (14 °F) for the flange materials C22.8 (1.0460) and ST52-5 (1.0570).
The minimum temperature is defined at -20 °C (-4 °F) for the flange material 1.4571/316Ti.

Classification according to pressure equipment directive (PED 97/23/EC)

Nominal diameter		Nominal pressure		Permissible media	Category
DN	(inches)	PN	(MWP psi)		
15 ... 25	(½" ... 1")	10 ... 40	(145 ... 580)	Gases fluid group 1 and liquids fluid group 1	Article 3.3
32 ... 100	(1¼" ... 4")	10	(145)	Gases fluid group 1 and liquids fluid group 1	I
32 ... 50	(1¼" ... 2")	16	(232)	Gases fluid group 1 and liquids fluid group 1	I
32 ... 40	(1¼" ... 1½")	25	(363)	Gases fluid group 1 and liquids fluid group 1	I
100 ... 350	(4" ... 12")	10	(145)	Gases fluid group 1 and liquids fluid group 1	II
65 ... 200	(2½" ... 8")	16	(232)	Gases fluid group 1 and liquids fluid group 1	II
50 ... 125	(2" ... 5")	25	(363)	Gases fluid group 1 and liquids fluid group 1	II
32 ... 80	(1¼" ... 3")	40	(580)	Gases fluid group 1 and liquids fluid group 1	II
350 ... 600	(14" ... 24")	10	(145)	Gases fluid group 1 and liquids fluid group 1	III
250 ... 600	(10" ... 24")	16	(232)	Gases fluid group 1 and liquids fluid group 1	III
150 ... 600	(6" ... 24")	25	(363)	Gases fluid group 1 and liquids fluid group 1	III
100 ... 600	(4" ... 24")	40	(580)	Gases fluid group 1 and liquids fluid group 1	III

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Rubber liner	F) 7ME51 ■■ - ■■■■■ - ■■■	0 ■■■
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Liner		
Hard rubber		
• VHE/H3b max. 90 °C (194 °F)	1	
• VHE/G31 up to 100 °C (212 °F)	2	
• VHE/181 (potable water - KTW)	3	
Soft rubber VWE/R61	4	
Neoprene BWE/DN 63	5	
Soft rubber VWE/1645 (potable water - KTW)	6	
Nominal diameter		
DN 15 (½")	A	
DN 20 (¾")	B	
DN 25 (1")	C	
DN 32 (1¼")	D	
DN 40 (1½")	E	
DN 50 (2")	F	
DN 65 (2½")	G	
DN 80 (3")	H	
DN 100 (4")	J	
DN 125 (5")	K	
DN 150 (6")	L	
DN 200 (8")	M	
DN 250 (10")	N	
DN 300 (12")	P	
DN 350 (14")	Q	
DN 400 (16")	R	
DN 500 (20")	S	
DN 600 (24")	T	
Other nominal diameters: specify in plain text	Z	J 1 Y
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)	A	
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti	B	
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)	C	
ANSI 300 RF, steel, to 20 bar (290 psi)	D	
JIS 10 K, mat. No. 1.0570	E	
Other connection form	Z	K 1 Y
Electrode material		
Mat. No. 1.4571/316Ti	1	
Hastelloy C4 (mat. No. 2.4610)	2	
Titanium	3	
Tantalum	4	
Monel	5	
Platinum head with shaft, mat. No. 1.4571/316Ti	7	
Other materials: specify in plain text	9	L 1 Y

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Rubber liner	F) 7ME51 ■■ - ■■■■■ - ■■■	0 ■■■
Sealing material		
Viton	1	
EPDM	2	
Kalrez	3	
Protection washers, protection rings		
Without	0	
With protection washers (only for soft rubber and Neoprene; order as accessory)	1	
With protection rings (only for soft rubber and Neoprene; order as accessory)	2	
Cable gland		
½" NPT	B	
M16 x 1.5	C	
Degree of protection		
IP67/NEMA4X	B	
IP68/NEMA6, cable length 5 m (16.4 ft)	C	
IP68/NEMA6, cable length 10 m (32.8 ft)	D	
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)	E	

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	**A01**
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	**A02**
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	**A03**
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	**A04**
Replaceable electrodes above DN 100 (4")	**A05**
Replaceable electrodes above DN 100 (4"), replaceable under pressure	**A06**
With 3-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B06**
With 6-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B07**
Rating plate inscription in English	**B11**
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	**C12**
Factory certificate to EN 10204-2.2	**C14**
Silicone-free materials	**Y04**
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	**Y15**
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	**Y16**
Stainless steel tag plate	**Y17**
Special design, specify quotation No./date in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Novolak liner	F) 7ME52 ■■ - 0 ■■■■ - ■■■ 0	■■■
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Nominal diameter		
DN 50 (2")	F	
DN 65 (2½")	G	
DN 80 (3")	H	
DN 100 (4")	J	
DN 125 (5")	K	
DN 150 (6")	L	
DN 200 (8")	M	
DN 250 (10")	N	
DN 300 (12")	P	
DN 350 (14")	Q	
DN 400 (16")	R	
DN 500 (20")	S	
DN 600 (24")	T	
Other nominal diameters: specify in plain text	Z	J 1 Y
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)	A	
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti	B	
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)	C	
ANSI 300 RF, steel, to 20 bar (290 psi)	D	
JIS 10 K, mat. No. 1.0570	E	
Other connection form	Z	K 1 Y
Electrode material		
Mat. No. 1.4571/316Ti	1	
Hastelloy C4 (mat. No. 2.4610)	2	
Titanium	3	
Tantalum	4	
Platinum head with shaft, mat. No. 1.4571/316Ti	7	
Other materials: specify in plain text	9	L 1 Y
Sealing material		
Viton	1	
EPDM	2	
Kalrez	3	
Protection washers, protections rings		
Without	0	
With protection rings (order as accessory)	2	
Cable gland		
½" NPT	B	
M16 x 1.5	C	

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Novolak liner	F) 7ME52 ■■ - 0 ■■■■ - ■■■ 0	■■■
Degree of protection		
IP67/NEMA4X	B	
IP68/NEMA6, cable length 5 m (16.4 ft)	C	
IP68/NEMA6, cable length 10 m (32.8 ft)	D	
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)	E	

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	**A01**
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	**A02**
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	**A03**
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	**A04**
Replaceable electrodes above DN 100 (4"), replaceable under pressure	**A06**
With 3-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B06**
With 6-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B07**
Rating plate inscription in English	**B11**
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	**C12**
Factory certificate to EN 10204-2.2	**C14**
Silicone-free materials	**Y04**
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	**Y15**
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	**Y16**
Stainless steel tag plate	**Y17**
Special design, specify quotation No./date in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
PTFE liner	F) 7ME53 ■■ - 0 ■■■ 0 - ■■■ 0	■■■
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Nominal diameter		
DN 25 (1")	C	
DN 32 (1¼")	D	
DN 40 (1½")	E	
DN 50 (2")	F	
DN 65 (2½")	G	
DN 80 (3")	H	
DN 100 (4")	J	
DN 125 (5")	K	
DN 150 (6")	L	
DN 200 (8")	M	
DN 250 (10")	N	
DN 300 (12")	P	
DN 350 (14")	Q	
DN 400 (16")	R	
DN 500 (20")	S	
DN 600 (24")	T	
Other nominal diameters: specify in plain text	Z	J 1 Y
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)	A	
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti	B	
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)	C	
ANSI 300 RF, steel, to 20 bar (290 psi)	D	
JIS 10 K, mat. No. 1.0570	E	
Other connection form	Z	K 1 Y
Electrode material		
Mat. No. 1.4571/316Ti	1	
Hastelloy C4 (mat. No. 2.4610)	2	
Titanium	3	
Tantalum	4	
Platinum head with shaft, mat. No. 1.4571/316Ti	7	
Other materials: specify in plain text	9	L 1 Y

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
PTFE liner	F) 7ME53 ■■ - 0 ■■■ 0 - ■■■ 0	■■■
Protection washers, protections rings		
With protection washers (included as standard with PTFE, mat. No. 1.4571/316Ti)	1	
With protection rings required for PN 16 (MWP 232 psi) and above, order as accessory)	2	
With protection washers of other material (order as accessory)	3	
Cable gland		
½" NPT	B	
M16 x 1.5	C	
Degree of protection		
IP67/NEMA4X	B	
IP68/NEMA6, cable length 5 m (16.4 ft)	C	
IP68/NEMA6, cable length 10 m (32.8 ft)	D	
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)	E	

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	**A01**
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	**A02**
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	**A03**
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	**A04**
Replaceable electrodes above DN 100 (4"), replaceable under pressure	**A06**
With 3-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B06**
With 6-point calibration certificate up to DN 600 (24") or Q_{max} > 2000 m^3/h (8805 USgpm)	**B07**
Rating plate inscription in English	**B11**
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	**C12**
Factory certificate to EN 10204-2.2	**C14**
Silicone-free materials	**Y04**
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	**Y15**
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	**Y16**
Stainless steel tag plate	**Y17**
Special design, specify quotation No./date in plain text	**Y99**

You can find accessories for SITRANS F M 911/E in the Online Catalog on the Internet at www.siemens.com/fi01.

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection washers for flow sensor 911E (per pair) F)	7ME5922 -	
Liner		
Hard rubber/soft rubber		1
PTFE		0
Nominal diameter		
Material 1.4571/316 Ti		
DN 15 (½")		A A
DN 20 (¾")		B A
DN 25 (1")		C A
DN 32 (1¼")		D A
DN 40 (1½")		E A
DN 50 (2")		F A
DN 65 (2½")		G A
DN 80 (3")		H A
DN 100 (4")		J A
DN 125 (5")		K A
DN 150 (6")		L A
DN 200 (8")		M A
DN 250 (10")		N A
DN 300 (12")		P A
Other nominal diameters: specify in plain text		Z A J 1 Y
Material Hastelloy C4/2.4610		
DN 15 (½")		A B
DN 20 (¾")		B B
DN 25 (1")		C B
DN 32 (1¼")		D B
DN 40 (1½")		E B
DN 50 (2")		F B
DN 65 (2½")		G B
DN 80 (3")		H B
DN 100 (4")		J B
DN 125 (5")		K B
DN 150 (6")		L B
DN 200 (8")		M B
DN 250 (10")		N B
DN 300 (12")		P B
Other nominal diameters: specify in plain text		Z B J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Special design, specify quotation No./date in plain text	**Y99**

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection rings for flow sensor 911E (per pair) F)	7ME5912 -	
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
for PTFE, material 1.4571/316 Ti		
DN 15 (½")		A A
DN 20 (¾")		B A
DN 25 (1")		C A
DN 32 (1¼")		D A
DN 40 (1½")		E A
DN 50 (2")		F A
DN 65 (2½")		G A
DN 80 (3")		H A
DN 100 (4")		J A
DN 125 (5")		K A
DN 150 (6")		L A
DN 200 (8")		M A
DN 250 (10")		N A
DN 300 (12")		P A
Other nominal diameters: specify in plain text		Z A J 1 Y
for Hard/Soft rubber, Novolak material 1.471/316 Ti		
DN 15 (½")		A B
DN 20 (¾")		B B
DN 25 (1")		C B
DN 32 (1¼")		D B
DN 40 (1½")		E B
DN 50 (2")		F B
DN 65 (2½")		G B
DN 80 (3")		H B
DN 100 (4")		J B
DN 125 (5")		K B
DN 150 (6")		L B
DN 200 (8")		M B
DN 250 (10")		N B
DN 300 (12")		P B
Other nominal diameters: specify in plain text		Z B J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Tag plate of stainless steel	
• Y30 - tag number (max. 16 digits, specifiy in plain text	**Y17**
• Special design, specify quotation No./date in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Earthing rings for flow sensor 911E (per unit) F)	7ME5902-	■■■ ■■■
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
Material 1.4571/316 Ti		
DN 15 (½")		AA
DN 20 (¾")		BA
DN 25 (1")		CA
DN 32 (1¼")		DA
DN 40 (1½")		EA
DN 50 (2")		FA
DN 65 (2½")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
DN 350 (14")		QA
DN 400 (16")		RA
DN 500 (20")		SA
DN 600 (24")		TA
DN 700 (28")		UA
DN 800 (32")		VA
DN 900 (36")		WA
DN 1000 (40")		XA
Other nominal diameters: specify in plain text		ZA J1Y
Material Hastelloy C4/2.4610		
DN 15 (½")		AB
DN 20 (¾")		BB
DN 25 (1")		CB
DN 32 (1¼")		DB
DN 40 (1½")		EB
DN 50 (2")		FB
DN 65 (2½")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
DN 350 (14")		QB
DN 400 (16")		RB
DN 500 (20")		SB
DN 600 (24")		TB
Other nominal diameters: specify in plain text		ZB J1Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

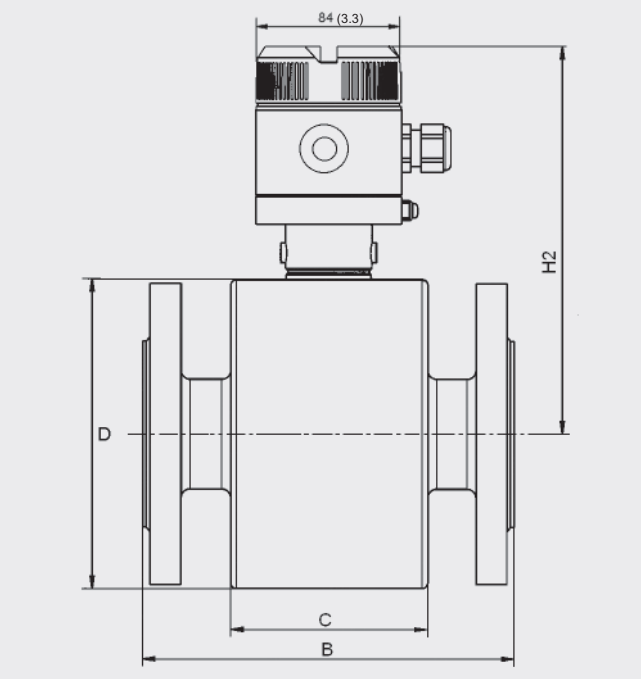
Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Special design, specify quotation No./date in plain text	**Y99**

Selection and Ordering data	Order No.	Order code
SITRANS F M Transmag 2 and sensor 911/E F)	7ME5930-	
Cable for remote versions	■■A00-0■A0	■■■
• Without cable	0A	
• Suitable for sensor 911/E with alternating field, IP67 Magnet current cable 3 x 1.0 mm² (3 x 0.0016 inch²), electrode/reference cable 7x0,5 mm² (7 x 0.0008 inch²)		
- Length: 5 m (16.4 ft)	5B	
- Length: 10 m (32.8 ft)	5C	
- Specify other length: in plain text	5Z	J1Y
Later 3-point calibration certificate for SITRANS F M		
• Without	A	
• For SITRANS 911E up to DN 600, 24" (please specifiy Comm.-No. in plain text)	B	

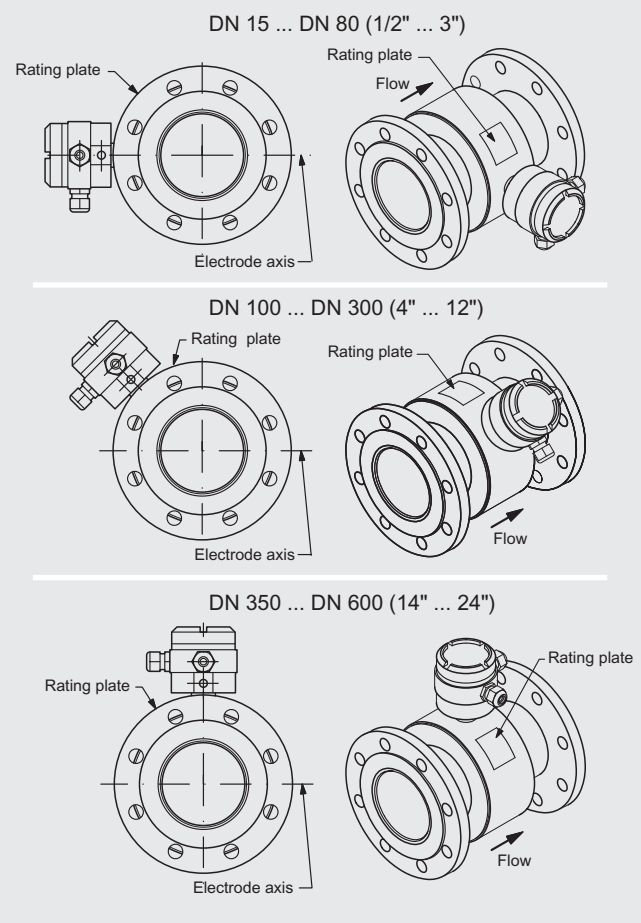
Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Tag plate of stainless steel	
• Y30 - tag number (max. 16 digits, specifiy in plain text	**Y17**
• Special design, specify quotation No./date in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

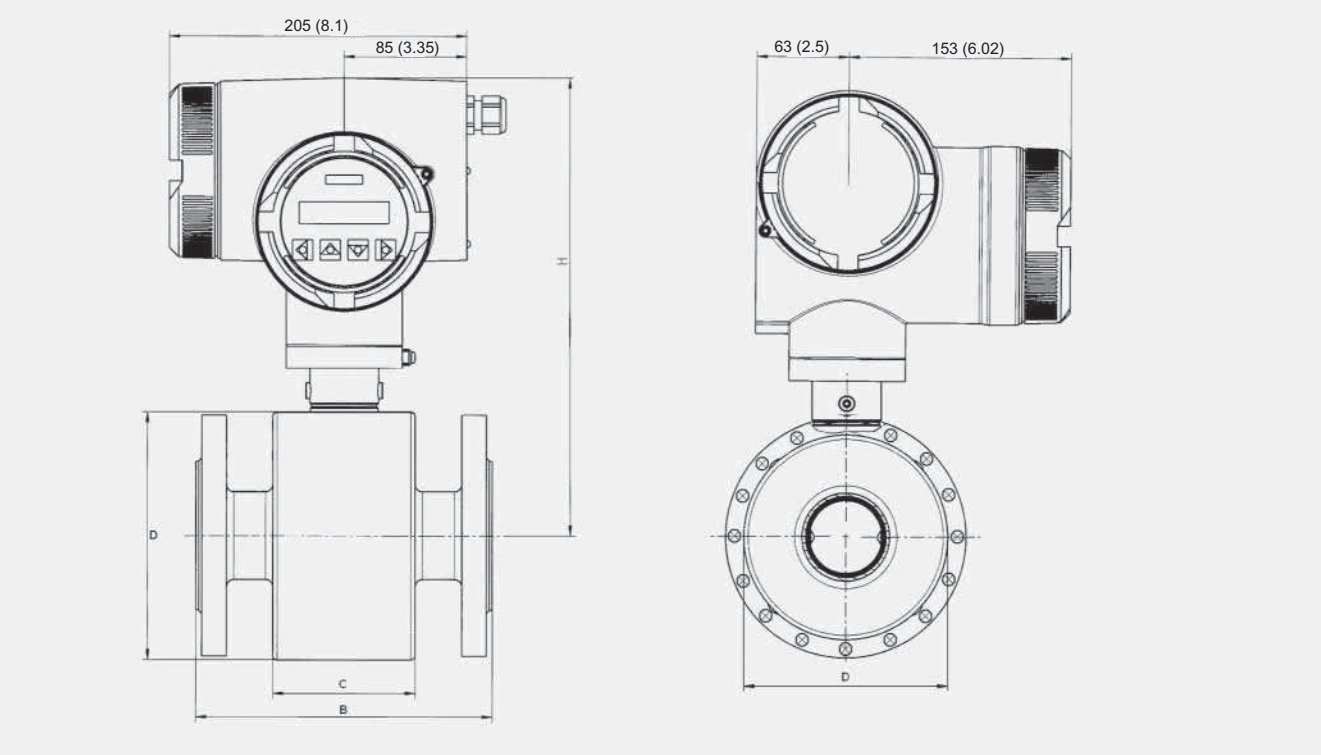


SITRANS F M flow sensor 911/E, remote version, dimensions in mm (inches)



Electrode placement

Transmitter Transmag 2 with sensor 911/E



SITRANS F M flow sensor 911/E, compact version, dimensions in mm (inches)

Build-in length 911/E [in mm and inches]

Nominal diameter	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 500	DN 600
	½“	¾“	1“	1 ¼“	1 ½“	2“	2 ½“	3“	4“	5“	6“	8“	10“	12“	14“	16“	20“	24“
	Build-in llength B[1]																	
Hard rubber version Soft rubber / neopren version PTFE-liner without protection washers	270 (10.63)			280 (11.02)			330 (12.99)	340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)	500 (19.68)	550 (21.65)	600 (23.62)	650 (25.59)	780 (30.71)
PTFE-liner with protection washers	270 (10.83)			280 (11.02)			330 (12.99)	340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)	500 (19.68)	550 (21.65)	600 (23.62)	650 (25.59)	780 (30.71)
Novolak-version	-					275 (10.83)	325 (12.79)	335 (13.19)	333 (13.11)	362 (14.25)		401 (15.79)	460 (18.11)	489 (19.25)	538 (21.18)	588 (23.15)	638 (25.12)	772 (30.39)
	Dimensions of sensor housing																	
Housing width C	170 (6.69)											240 (9.45)			306 (12.05)	360 (14.17)	412 (16.22)	552 (21.73)
Height H with compact version	281 (11.06)					285 (11.22)	291 (11.46)	298 (11.73)	314 (12.36)	326 (12.83)	345 (13.58)	371 (14.61)	408 (16.06)	441 (17.36)	553 (21.77)	578 (22.76)	633 (24.92)	688 (27.09)
Height H2 with remote version	175 (6.89)					180 (7.08)	187.5 (7.38)	195 (7.68)	215 (8.46)	230 (9.06)	252.5 (9.94)	285 (11.22)	330 (12.99)	370 (14.57)	347 (13.66)	372 (14.65)	424 (16.69)	477 (18.78)
Housing diameter D	135 (5.315)			169 (6.654)		184 (7.244)	249 (9.803)		274 (10.79)	298 (11.73)	324 (12.76)	394 (15.51)	442 (17.40)	492 (19.37)	469 (18.46)	536 (21.10)	631 (24.84)	746 (29.37)
Weight of PN10 Version in kg (MWP 145 psi version in lb)	8.0 (17.6)	8.5 (18.7)		11.0 (24.3)	11.5 (25.4)	25.0 (55.1)	26 (57.3)		28 (61.7)	34 (75.0)	38 (83.8)	68 (149.9)	80 (176.4)	90 (198.4)	110 (242.5)	150 (330.7)	210 (463)	370 (860)

[1] Tolerance for build-in lenght: B + 0.0 mm (0.00 inches) /- 4.0 mm (-0.157 inches).
With protection rings or washers for > DN25 + 6.0 mm, > DN200 + 10.0 mm (> 1” + 0.236 inches. > 8” + 0.394 inches)

Battery operated water meter MAG 8000/MAG 8000 CT

Overview

MAG 8000 is a battery powered electromagnetic water meter designed according to the global water meter standard OIML R49 and the European CEN EN 14154.
The meter fulfills the special customer demands to water applications within abstraction, distribution network, revenue metering as well as irrigation. All functionalities integrated in one meter to optimize water supply and use of highly scanty resources.

MAG 8000 is a comprehensive meter which intelligent information and high performance measurement as well as the easy to install concept take cost of owner ship and customer service to a new level for water meter.

Features like 6 years maintenance-free battery-powered operation and no moving parts provide long-term accuracy measurement.

Benefits

Easy to install
- Compact or remote solution with factory mounted cable
- IP68/NEMA 6P enclosure. Sensor can be buried
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities

Superior measurement
- Down to 0.2% maximum uncertainty
- OIML R49 type approval
- Bi-directional measurement

Long lasting performance/Cost of Ownership
- Verification according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001
- No moving parts means less wear and tear
- 6 years operation in typical revenue application
- Robust construction build for the application

Intelligent information, easy to access
- Advanced information on site
- Data logger for consumption profile
- Advanced statistics and diagnostics
- Add-on communication module

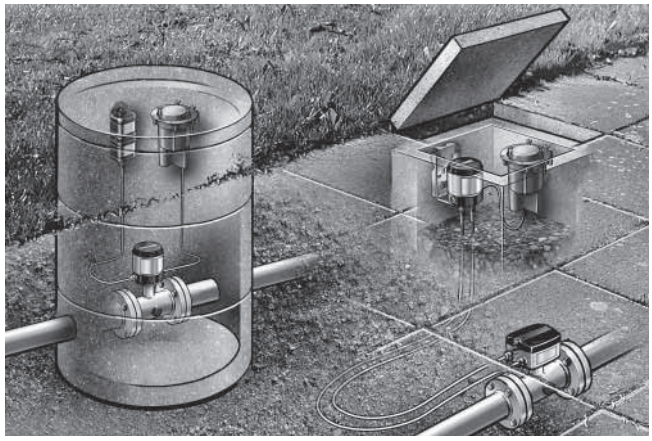
Application

MAG 8000 has been developed as a stand alone water meter for applications within:
- Abstraction
- Distribution network (from treatment plant to customer)
- Revenue metering (measuring water delivered for billing purpose)
- Irrigation (measuring water delivered for billing purpose and water consumption)

Design

MAG 8000 is designed according to OIML R49 and CEN EN 14154 water meter standards with focus on minimized power consumption.

The product program consists of
- Basic version: For general water applications
- Advanced version: With advanced information and functionality.
- A Custody Transfer version for water billing, with type approval after OIML R49 and verified according to MI-001 for DN 50 to DN 300
- Sensor sizes from DN 25 to 600 (1" to 24")
- Compact and remote installation in IP68/NEMA 6P enclosure and factory mounted cable
- Flexible power supply; internal or external battery pack or mains power supply with battery back-up possibilities
- Add-on communication modules
- PC configuration SIMATIC PDM and Flow Tool PC configuration software
- Customer setting from factory



Add-on communication module (left), PC-IrDA connection (right)

Battery operated water meter MAG 8000/MAG 8000 CT

Function

MAG 8000 is a microprocessor-based water meter with graphical display and key for optimum customer operation and information on site. The transmitter drives the magnetic field in the sensor, evaluates the flow signal from the sensor and calculates the volume passing through. It delivers the required information via the integrated pulse output or communication interfaces as part of a system solution. Its intelligent functionality, information and diagnostics ensure optimum meter performance and information to optimize water supply and billing.

MAG 8000 can be ordered as a Basic or an Advanced version. The Basic version is selected for general water applications whereas the Advanced version is for more advanced functionality and information. Both versions are configured to achieve 6 years battery operation in typical revenue applications.

MAG 8000 CT is identical to the Basic and the Advanced versions. Only difference is that revenue parameters and data are protected against manipulation. The Custody Transfer version also includes additional labels, verification and user sealings to verify the CT meter according to MID.

Some information is accessible via the display whereas all information is accessible via the IrDA and communication interface with the PC Flow Tool or PDM software. Data and parameters are registered in a EEprom. They can all be read, but changing the information demands a software password or a hardware key attached to the printed circuit board.

Features / Version	MAG 8000 Basic	MAG 8000 Advanced
Measuring frequency in battery power mode (Manually selected)	1/15 or 1/30 Hz	from 6.25 to 1/30 Hz depending of sensor size
Output MAG 8000	2 FW/RV/AI/CA (max. 50 Hz pulse rate)	2 FW/RV/AI/CA (max. 100 Hz pulse rate)
Output MAG 8000 CT	2 FW/AI (max. 50 Hz pulse rate)	2 FW/AI (max. 100 Hz pulse rate)
Communication	Add-on	Add-on
Data logger	Yes	Yes
Insulation test	-	Yes
Leakage detection	-	Yes
Meter utilization	-	Yes
Statistics	-	Yes
Tariff	-	Yes
Settle date (Revenue)	-	Yes

Technical specifications

Meter

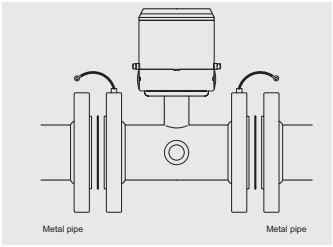
Accuracy MAG 8000	
• Standard calibration	± 0.4% of rate ± 2mm/s
• Extended calibration	± 0.2% of rate ± 2mm/s
Accuracy MAG 8000 CT	
• Custody transfer	• OIML R49 for DN 50 ... DN 300, Class 1 and 2 with turn down up to Q3/Q1 = 400 at Q2/Q1 =1.6 • MI-001 verification for DN 50 ... DN 300, Class 2 with turn down ratio Q3/Q1 = 80, Q3/Q1 = 63 or Q3/Q1 = 25 at Q2/Q1 = 6,3
Media conductivity	Clean water > 20 µs/cm
Temperature MAG 8000	
• Ambient	-20 ... +60 °C (-4 ... +140 °F)
• Media	0 ... 70 °C (32 ... +158 °F)
• Storage	-40 ... +70 °C (-22 ... +158 °F)
Temperature MAG 8000 CT	
• Ambient	-20 ... +60 °C (-4 ... +140 °F)
• Media	0.1 ... 30 °C (32 ... +70 °F)
• Storage	-40 ... +70 °C (-22 ... +158 °F)
Enclosure	• IP68/NEMA 6P rating; Cable glands mounted requires Sylgard potting kit to remain IP68/NEMA 6P, otherwise IP67/NEMA 4 rating is obtained; Factory mounted cable provides IP68/NEMA 6P rating
Approvals MAG 8000	**Drinking water approval** • NSF 61 (cold water) USA, • WRAS (BS 6920 cold water) UK, • ACS Listed France, • DVGW W270 Germany, • Belaqua (B) • OIML R49 pattern approval
Approvals MAG 8000 CT	**Drinking water approval** • NSF 61 (cold water) USA, • WRAS (BS 6920 cold water) UK, • ACS Listed France, • DVGW W270 Germany, • Belaqua (B) • OIML R49 pattern approval • MI-001 approval (Number: DK-0200-MI-001-002)
Conformity	• CEN EN 14154, ISO 4064 • PED: 97/23EC • EMC: EN 61000-6-3, EN 61000-6-2, EN 61326-1

Sensor

Size, flange and pressure range MAG 8000	
• EN 1092-1 (DIN 2501)	• DN 25 and DN 40: PN 40 • DN 50 … 150: PN 16 • DN 200 … 600: PN 10 or PN 16
• ANSI 16.5 Class 150 lb	• 1” … 2”: 580 psi • 2” … 6”: 230 psi • 8” … 24”: 145 or 230 psi
• AS 4087	DN 50 … 600: PN 16
Size, flange and pressure range MAG 8000 CT	
• EN 1092-1 (DIN 2501)	• DN 50 … 300: PN 16
• ANSI 16.5 Class 150 lb	• 2” … 12”: 230 psi

Sensor (Fortsetzung)

• AS 4087	DN 50 … 300: PN 16
Max. excitation frequency (Transmitter decide the selected excitation frequency)	• 6.25 Hz for sensor size DN 25 ... 150 (1" ... 6") • 3.125 Hz for sensor size DN 200 … 600 (9" … 24")
Liner	EPDM
Electrode and grounding electrodes	Hastelloy C276



Grounding straps are pre-mounted from the factory on each side of the sensor.

Transmitter

Installation MAG 8000	Integral (compact) or remote with factory mounted cable in 5, 10, 20 or 30 m lengths with IP68/NEMA 6P connectors. Connection is made at the transmitter bottom.
Installation MAG 8000 CT	Integral (compact) or remote with factory mounted cable in 5 or 10 m lengths with IP68/NEMA 6P connectors. Connection is made at the transmitter bottom MI-001 verified meters only Integral (compact) mounted.
Enclosure	Stainless steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 6 … 8 mm (0.02 ... 0.026 ft) is included in the standard delivery)
Display and key	• Display with 8 digits for main information. Index, menu and status symbols for dedicated information • Key for toggling through the information and reset customer totalizer and call-up function • Selectable default information and accessible menus: - Operator - Meter - Service - Data Logger - Statistic and leakage (only Advanced version) - Revenue and Tariffs (only Advanced version) • Totalized information can be displayed with 1, 2, 3 decimals or automatic adjustment for maximum resolution
Flow unit MAG 8000	
• Europe std.	Volume in m^3 and flow rate in m^3/h
• US std.	Volume in Gallon and flow rate in GPM
• Australian std.	Volume in Ml and flow rate as Ml/d
	Other units selectable: • Volume: m^3 x 100, l x 100, G x 100, G x 1000, MG, CF x 100, CF x 1000, AF, Al, kl • Flow: m^3/min, m^3/d, l/s, l/min, GPS, GPH, GPD, MGD, CFS, CFM, CFH • Other units are ordered from factory or manually configured on-site by sticking a label on the display and changing the scaling factors
Flow unit MAG 8000 CT	
• Europe std.	Volume in m^3 and flow rate in m^3/h
Digital output MAG 8000	• 2 passive outputs (MOS), individual galvanically isolated • Maximum load ± 35 V DC, 50 mA short circuit protected • Output A function Programmable as pulse volume – forward – reverse – forward/net – reverse/net • Output B function Programmable as pulse volume (like output A), alarm or call-up • Output Max. pulse rate of 50 Hz (only Basic version) and 100 Hz (only Advanced version), pulse width of 5, 10, 50, 100, 500 ms
Digital output MAG 8000 CT	• 2 passive outputs (MOS), individual galvanically isolated • Maximum load ± 35 V DC, 50 mA short circuit protected • Output A function Programmable as pulse volume – forward • Output B function - Alarm • Output Max. pulse rate of 50 Hz (only Basic version) and 100 Hz (only Advanced version), pulse width of 5, 10, 50, 100, 500 ms
Communication	IrDA: Standard integrated infrared communication interface with MODBUS RTU protocol Add-on modules: • RS 232 serial interface with MODBUS RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS 485 serial interface with MODBUS RTU (+/-/GND), multi-drop with up to 32 devices with max. 1000 m cable MODBUS RTU protocol is an open protocol (further information available on request) Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud

4

Battery operated water meter MAG 8000/MAG 8000 CT

Power supply	Auto detection of power source with display symbol for operation power. Internal battery pack: 2 D-Cell 3.6 V/33 Ah External battery pack: 4 D-Cell 3.6 V/66 Ah Mains Power supply: • 12 ... 24 V AC/DC (10 … 32 V) 2 VA • 115 ... 230 V AC (85 … 264 V) 2 VA Both mains power supply systems are upgradable for battery backup via internal D-Cell (3.6 V 16.5 Ah) or external battery pack. The power supply has 3 m (9.8 ft) power cable for external connection to mains supply.

Features

Application Identification

Tag number (visible on display if numbers are selected) and meter location, up to 15 characters per information.

Time and date

Real time clock and date (max. 15 min. change per year)

Totalizer MAG 8000

- 2 totalizer: Forward, Reverse, Bidirectional netflow calculation and free selectable start value.
- 1 customer totalizer, following totalizer 1 setting and resetable via display key or software with logging of date and time.

Totalizer MAG 8000 CT

- 2 totalizer: Forward
- 1 customer totalizer, following totalizer 1 setting and resetable via display key or software with logging of date and time.

Measurement MAG 8000

- Free selectable volume and flow unit, where m^3 and m^3/h is default in display. All other units are displayed with a display label.
- Excitation frequency in battery operation (manually selected):
  - Basic, max. selectable excitation frequency of 1/15 Hz
  - Advanced, max. selectable excitation frequency of 6.25 Hz and sensor related
  - Default excitation frequency is selected for typically 6 years operation in a revenue application;
    1/15 Hz for DN 25 … 150 (1“ … 6“)
    1/30 Hz for DN 200 … 600 (8“ … 24“)
- Excitation frequency with mains power follow maximum sensor excitation frequency.
- Filter constant is adjustable
- Low flow cut off, % of Qn (Q3)
- Empty pipe detection (active symbol on display when active)
- Filter selection for mains power frequency (50/60 Hz)
- Correction factor for change flow direction or to adjust flow measurement

Measurement MAG 8000 CT

- Volume and flow unit, is m^3 and m^3/h as default in the display, if the meter has to obtain the MI-001 certification
- Excitation frequency in battery operation (manually selected):
  - Basic, max. selectable excitation frequency of 1/15 Hz
  - Advanced, max. selectable excitation frequency of 6.25 Hz and sensor related
  - Default excitation frequency is selected for typically 6 years operation in a revenue application;
    1/15 Hz for DN 25 … 150 (1“ … 6“)
    1/30 Hz for DN 200 … 300 (8“ … 12“)
- Excitation frequency with mains power follow maximum sensor excitation frequency.
- Low flow cut off, % of Qn (Q3)
- Empty pipe detection (active symbol on display when active)
- Filter selection for mains power frequency (50/60 Hz)

Data logger

- Logging of 26 records: selectable as daily, weekly or monthly logging
- Each logging includes:
  - Consumption on totalizer 1
  - Consumption on totalizer 2
  - Alarm in current period (13 alarms)
  - Meter status (8 values)
- Alarm on high or low consumption for selected logging period
- Totalizer 1 values for all 26 periods can be read on the display

Alarm

- Active alarm is indicated on the display
- Monitoring of all alarms with statistic recording on each alarm
  - Total hours an alarm has been active
  - Numbers of time the alarm has been activated
  - First time an alarm appears
  - Last time the alarm disappears
- Fatal faults is monitored before each measurement and interrupt the measurement, if active
  - Signal insulation – Flow signal immunity is influenced (only Advanced version)
  - Coil current – Fault in driving magnetic sensor field
  - Amplifier – Fault in signal circuit
  - Check sum – Fault in calculation or handling of data
- Warning faults
  - Low Power – customer selectable battery alarm level or power drop out
  - Flow overflow – Flow in sensor exceeds Q_{max} (Q4) (125% Q_n (Q3))
  - Pulse overflow on output A and B – Selected pulse volume is too small compared to actual flow rate and max. output pulse rate.
  - Consumption – saved data logger consumption exceeds customer selected limit on high or low consumption
  - Leakage – Leakage detected based on customer settings (only Advanced version)
  - Empty pipe – no water in the pipe / sensor
  - Low impedance - measured electrode impedance below customer low impedance level
  - Flow limit – actual flow exceeds selected high flow limited

Meter status (tamper monitoring of revenue data)

Monitoring of important revenue parameters and data

- Changing totalizers 1 and 2
- Changing Tariff totalizer
- Changing Tariff settings
- Changing date and time
- Alarm has been active (see alarm log for details)
- Fault log has been reset
- Hardware Key has been broken
- Meter has been repowered

Data protection

- All data stored in an EEPROM. Totalizers 1 and 2 are backed up every 10 min, statistic every hour and power consumption and temperature measurement every 4 hour.
- Password protection of all parameters and hardware protection of calibration and revenue parameters.

Battery power management

- Optimal battery information on remaining capacity.
- Calculated capacity includes all consuming elements and available battery capacity is adjusted related to change in ambient temperature.
- Numbers of power ups
- Date and time registered for first and last time power alarm.

Diagnostic

- Continuous self test including
  - Coil current to drive the magnetic field
  - Signal input circuit
  - Data calculation, handling and storing
- Features
  - Alarm statistics and logging for fault analyzing
  - Electrode impedance to check actual media contact
  - Flow simulation to check pulse and communication signal chain for correct scaling
  - Number of sensor measurements (excitations)
  - Transmitter temperature (battery capacity calculation)
  - Low impedance alarm for change in media
  - Flow alarm when defined high flow exceeds
  - Verification mode for fast measure performance check
- Advanced version includes
  - Insulation „Cross-Talk“ test
  - Meter utilization
  - Consumption profile
  - Statistic flow and consumption data

Insulation test (only Advanced version)

Test of signal immunity against disturbance and bad installation. Test interval is selectable and measurement is interrupted during the test period of 4 min.

Leakage detection (only Advanced version)

Monitoring the lowest flow or volume during selected time window within 24 hours. Leakage is detected over a selectable period where monitored value exceed the possible leakage level. Min and max values are stored with date registration. Last store value visible on the display.

Meter Utilization (only Advanced version)

6 registers for monitoring total time the meter has operated in different flow intervals. Registered intervals are free selectable as % of Qn (Q3)

Tariff (only Advanced version)

6 tariff registers count the volume delivered within the selected tariff windows, based on time of day or flow rates or a combination.

Tariff can also be used for consumption profile where consumption is related to different time intervals or flow rates.

Tariff values visible on the display.

Settling date (only Advanced version)

On a predefined date the totalizer 1 index value is stored. Old values are stored to show the latest two totalized 1 index values.

Settling values visible on the display.

Statistic (only Advanced version)

- Min. flow rate with time and date registration
- Max. flow rate with time and date registration
- Min. daily consumption with date registration
- Max. daily consumption with date registration
- Latest 7 days total and daily consumption
- Actual month consumption
- Latest month consumption

PC Configuration Software

- Flow Tool for parameter configuration and data collection via IrDA interface (free download from internet).
  - Meter configuration – online and offline mode
  - Own parameter settings
  - Parameter documentation
  - Print and export of data and parameters
- Flow Tool meter device drivers
  - Versions 1.0, 2.0 and 3.0
  - Latest version downloadable from the Internet
- PDM 6.0 Service Pack 2 – Basic and Online version

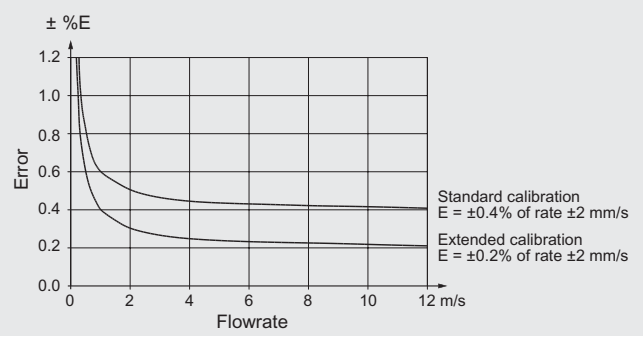
Battery operated water meter MAG 8000/MAG 8000 CT

MAG 8000 water meter uncertainty

To ensure continuous accurate measurement, water meters must be calibrated. Calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK and UKAS.

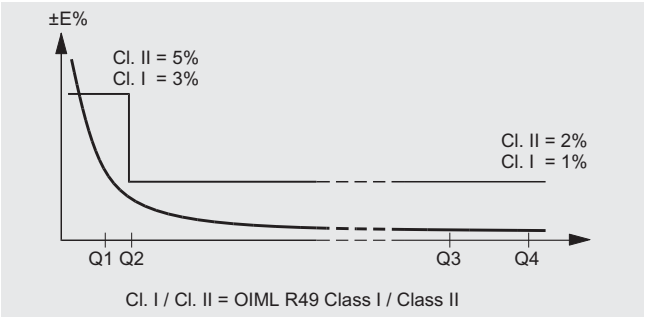
The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Coorporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including US (NIST traceability).

The selected calibration determines the accuracy of the meter. A standard calibration results in max ± 0.4% uncertainty and an extended calibration ± 0.2%. A calibration certificate follows every sensor and calibration data are stored in the meter unit.



MAG 8000 CT (Revenue program) water meter type approval

MAG 8000 CT program is type approved and verified according to international water meter standard OIML R49. The Custody Transfer program is approved as Class I and Class II, for the sensor program from DN 50 to DN 300, at different Q3 and Q3/Q1. Q2/Q1 = 1.6 and follows standard OIML R49 specification.



OIML R49 Pattern approval specification for Class I (1%)

Size	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	250	250	250	250	250	250	250	250	160
Q4 [m^3/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m^3/h]	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**
Q2 [m^3/h]	0.40	0.64	1.00	1.60	2.50	4.00	6.40	10.0	16.0
Q1 [m^3/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0

OIML R49 Pattern approval specification for Class II (2%)

Size	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	400	400	400	400	400	400	400	400	250
Q4 [m^3/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m^3/h]	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**
Q2 [m^3/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0
Q1 [m^3/h]	0.16	0.25	0.40	0.63	1.00	1.60	2.5	4.0	6.4

MAG 8000 CT (Revenue program) MI-001

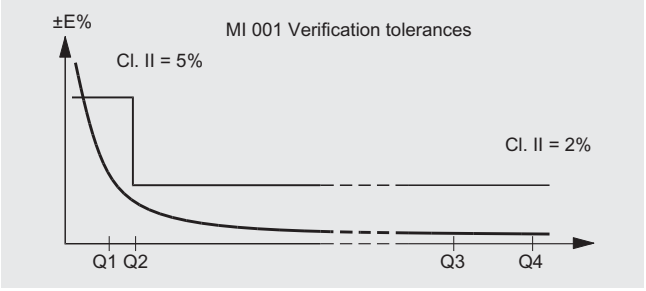
MAG 8000 CT program is type approved according to international water meter standard OIML R49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II aproval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 300.

The MID certification is obtained as a modul B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R49

Module D : Quality insurance approval of production



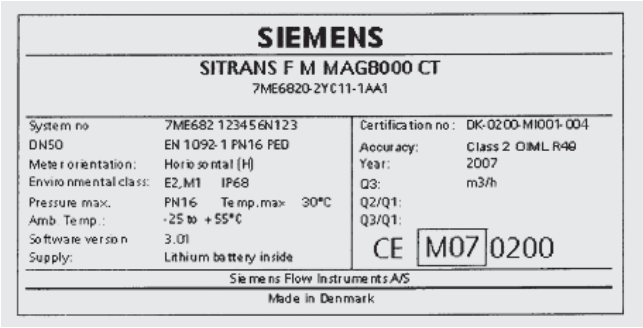
MAG 8000 CT MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1,25 and Q2/Q1 = 6,3 measurering ranges se below table:

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25
Q4 [m^3/h]	19	31	50	75	125	188	313	500	750
Q3 [m^3/h]	**15**	**25**	**40**	**60**	**100**	**150**	**250**	**400**	**600**
Q2 [m^3/h]	3.78	6.30	10.1	15.1	25.2	37.8	63.0	100.8	151.2
Q1 [m^3/h]	0.60	1.00	1.60	2.40	4.0	6.0	10.0	16.0	24.0

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63
Q4 [m^3/h]	19	31	50	75	125	188	313	500	750
Q3 [m^3/h]	**15**	**25**	**40**	**60**	**100**	**150**	**250**	**400**	**600**
Q2 [m^3/h]	1.50	2.50	4.0	6.0	10.0	15.0	25.0	40.0	60.0
Q1 [m^3/h]	0.24	0.40	0.63	0.95	1.59	2.38	3.97	6.35	9.52

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m^3/h]	19	31	50	75	125	188	313	500	750
Q3 [m^3/h]	**15**	**25**	**40**	**60**	**100**	**150**	**250**	**400**	**600**
Q2 [m^3/h]	1.18	1.97	3.15	4.73	7.88	11.81	19.69	31.50	47.25
Q1 [m^3/h]	0.19	0.31	0.50	0.75	1.25	1.88	3.13	5.00	7.50

The Label is placed on the side of the encapsulation. An example of the product label is shown below:

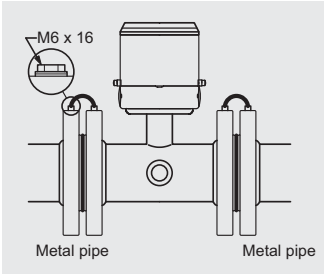


Installation conditions

Please refer to “System information MAGFLO electromagnetic flowmeters”.
MAG 8000 CT has to be mounted in Integral (compact) and horizontal position only, to obtain the MI-001 certification.
Battery packs must be installed with the top part in upwards direction to reach maximum capacity.

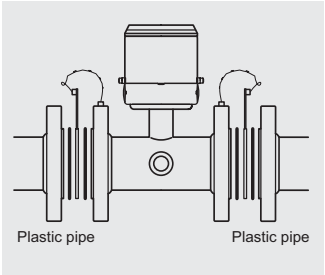
Bonding and grounding

The sensor body must be grounded using grounding/bonding straps and/or grounding rings to protect the flow signal against stray electrical noise and/or lightning. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body.



Metal pipelines

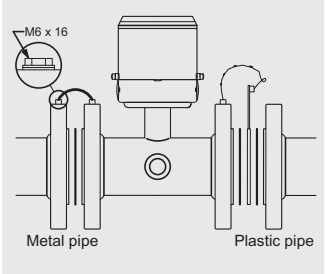
On metal pipelines, connect the straps to both flanges



Plastic pipelines

On plastic pipelines and lined metal pipes, optional grounding rings must be used at both ends.

Grounding rings has to be ordered separately see „gounding ring KIT“

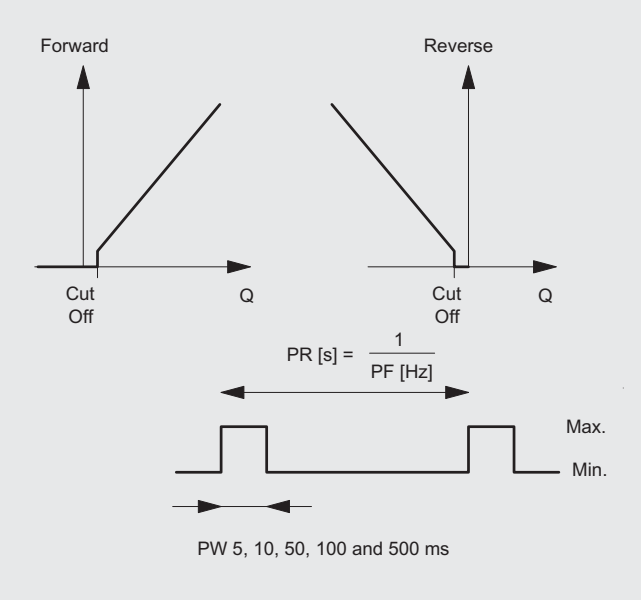


Combination of metal and plastic pipelines

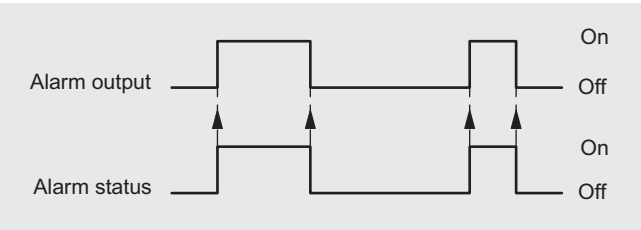
A combination of metal and plastic requires straps for metal pipeline and grounding rings for plastic pipeline.

Battery operated water meter MAG 8000/MAG 8000 CT

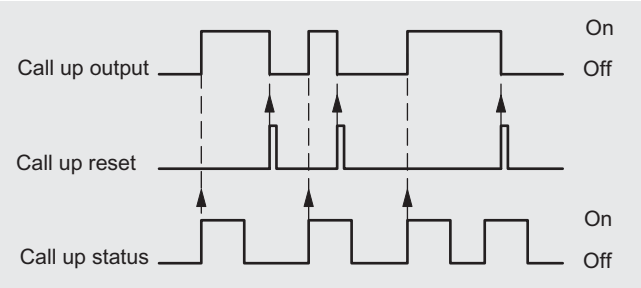
Output configuration MAG 8000



Pulse volume: Output A/B configured as volume per pulse, the output delivers a pulse when the preset volume has passed the selected direction, calculated on forward/reverse or Net forward/reverse flow. The volume per pulse is freely scalable, from 0.0001 to 10,000 meter-unit per pulse. PR = pulse rate and PF = pulse frequency.

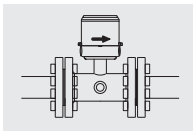
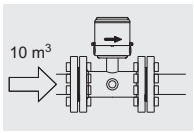
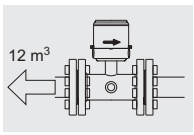
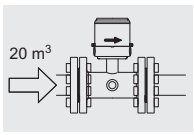


Alarm: The alarm will follow the internal alarm status.



Call up: The “call-up” output is active until manually reset via key on display or via communication. The call-up function is activated when an alarm is activated.

MAG 8000 has a special net pulse output that includes bidirectional flow calculations. This is special for installations where the meter is connected to a system with only one input. The example shows that over time, the net pulse output indicates the bidirectional totalized meter calculations. Same principle for forward and reverse flow calculations.

Flow	Net totalizer in meter display (Bi-directional) Volume [m^3]	Pulse output forward Uni-directional mode Volume [m^3]		Pulse output net forward Bi-directional mode Volume [m^3]	
	Volume [m^3]	Internal calculation	Delivered volume	Internal calculation	Delivered volume
	0	-	0	0	0
	10	-	10	0	10
	-2	-	0	-12	0
	18	-	20	-12+20=	8
Total accounted volume [m^3] Forward/reverse	18F	-	30F		18F

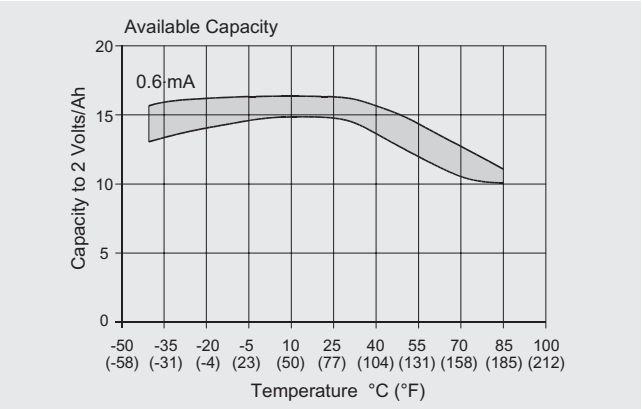
Output configuration MAG 8000 CT

MAG 8000 CT has same out put functionality as MAG 8000, due to MI-001 is only forward flow (output A predefined) and output B as Alarm output available).

Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter. A program is available to calculate your expected operation time.

MAG 8000 calculates the remaining capacity every 4 hours and included all consuming elements. Calculation compensates for temperature influence on battery capacity (drawing).



The effect from other temperatures can be seen from the figure. A variation in temperature from 15 °C to 55 °C (59 to 131 °F) reduces the capacity by 17% in the table from 15 Ah to 12.5 Ah.

At typical revenue scenario of expected battery operation time can be seen in the table. For other scenario use the battery operation calculation program (Download from the Internet).

The measurement is only completed if the system has no active fatal faults or the empty pipe is active. Maximum battery specification is 10 years operation.

Scenario - Revenue application	
Output A	Pulse rate max. 10 Hz
Output B	Alarm or call-up
Meter dialog	1 hour per month
Add-com	None
Temperature profile	• 5% @ 0 °C (32 °F) • 80% @ 15 °C (59 °F) • 15% @ 50 °C (122 °F)

Excitation frequency (24 h operation)		**1/30 Hz**	**1/15 Hz**	**3,125 Hz**	**6,25 Hz**
One D-Cell battery 16.5 Ah Internal mains backup for 10 years operation	DN 25 ... 200 (1" ... 8")	1½ year	1 year	20 days	10 days
	DN 250 … 600 (10" ... 24")	1 year	8 months	10 days	NA
Two D-Cell battery 33 Ah Internal battery pack	DN 25 ... 200 (1" ... 8")	8 year	6 year	4 months	2 months
	DN 250 … 600 (10" ... 24")	6 year	4 year	2 months	NA
Four D-Cell battery 66 Ah External battery pack	DN 25 ... 200 (1" ... 8")	10 year	10 year	8 months	4 months
	DN 250 ... 600 (10" ... 24")	10 year	8 year	4 months	NA

External battery pack can be used as battery backup for mains power supply.

Serial RS 232/RS 485 add-on communication modules are designed for mains powered systems as the battery operation time will be reduced. At 1 hour communication per month (all meter data collected 2 times per day) and the module is connected, the operation time is reduced to:

- RS 232 at low excitation frequency to 10% and at high excitation frequency to 80% of calculated operation time
- RS 485 at low excitation frequency to 50% and at high excitation frequency to 90% of calculated operation time

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 water meter	F) 7ME6810-
Diameter	
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
DN 350 (14“)	5K
DN 400 (16“)	5R
DN 450 (18“)	5Y
DN 500 (20“)	6F
DN 600 (24“)	6P
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 600 (8" ... 24"))	B
PN 16 (DN 50 ... 600 (2" ... 24"))	C
PN 40 (DN 25 ... 40 (1" ... 1½"))	F
ANSI B16.5	
Class 150	J
AS4087	
PN 16	N
Sensor version	
EPDM liner and Hastelloy electrodes	3
Calibration	
Standard ± 0.4% of rate ± 2 mm/s	1
Extended ± 0.2% of rate ± 2 mm/s DN 50 ... 300 (2" ... 12")	2
Region version	
Europe (m^3, m^3/h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (ML, l/h, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version remote, 5 m (16.4 ft) mounted cable on sensor with IP68/NEMA 6P plugs	B
Do - 10 m (32.8 ft)	C
Do - 20 m (65.6 ft)	D
Do - 30 m (98.4 ft)	E
Advanced version integral on sensor	K
Advanced version remote, 5 m mounted cable on sensor with IP68/NEMA 6P plugs	L
Do - 10 m (32.8 ft)	M
Do - 20 m (65.6 ft)	N
Do - 30 m (98.4 ft)	P
Communication interface	
No additional "add-on" communication module installed	A
Serial RS 485 with MODBUS RTU (Terminated as end device)	B
Serial RS 232 with MODBUS RTU	C

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 water meter	F) 7ME6810-
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed [1]	1
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	3
115/230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	4

[1] Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Selection and Ordering data	Order Code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Flow unit	
l/s	L00
MGD	L01
CFS	L02
l/min	L03
m^3/min	L04
GPM	L05
CFM	L06
l/h	L07
m^3/h	L08
GPH	L09
CFH	L10
GPS	L11
Ml/d	L12
m^3/d	L13
GPD	L14
Totalizer Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	L20
Totalizer 1 = NET, net flow	L22
Totalizer 2 = FW, forward flow	L30
Totalizer 2 = NET, net flow	L31
Volume unit	
m^3	L40
Ml	L41
G	L42
AF	L43
l x 100	L44
m^3 x 100	L45
G x 100	L46
CF x 100	L47
MG	L48
G x 1000	L49
CF x 1000	L50
Al	L51
kl	L52

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Pulse set up (default pulse A= forward and pulse B = Alarm)	
A function = RV, reverse flow	**L62**
A function = FWnet, forward net flow	**L63**
A function = RVnet, reverse net flow	**L64**
A function = Off	**L65**
Volume per pulse A = x 0.0001	**L70**
Volume per pulse A = x 0.001	**L71**
Volume per pulse A = x 0.01	**L72**
Volume per pulse A = x 0.1	**L73**
Volume per pulse A = x 1	**L74**
B function = FW, forward flow	**L80**
B function = RV, forward flow	**L81**
B function = FWnet, forward net flow	**L82**
B function = RVnet, reverse net flow	**L83**
B function = Alarm	**L84**
B function = Call up	**L85**
Volume per pulse B = x 0.0001	**L90**
Volume per pulse B = x 0.001	**L91**
Volume per pulse B = x 0.01	**L92**
Volume per pulse B = x 0.1	**L93**
Volume per pulse B = x 1	**L94**
Various	
Protection of CT parameters	**M02**
Data logger set up (default month logging)	
DataloggerInterval = Daily	**M31**
DataloggerInterval = Weekly	**M32**
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	**M81**
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	**M82**
2 x 5 m (16.4 ft) pulse A+B and communication cable	**M83**
20 m (65.6 ft) pulse cable A+B	**M84**
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	**M85**
2 x 20 m (65.6 ft) pulse A+B and communication cable	**M86**
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	**M87**
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	**M89**

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Selection and Ordering data	Order No.								
SITRANS F M									
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes F)	**7ME6820-**								
				0		**-**			
Diameter									
DN 50 (2“)/Q3 63 m^3/h (m^3) without verification or DN 50 (2“)/Q3 15 m^3/h (m^3) with MI-001 verification	**2**	**Y**							
DN 65 (2½“)/Q3 100 m^3/h (m^3) without verification or DN 65 (2½“)/Q3 25 m^3/h (m^3) with MI-001 verification	**3**	**F**							
DN 80 (3“)/Q3 150 m^3/h (m^3) without verification or DN 80 (3“)/Q3 40 m^3/h (m^3) with MI-001 verification	**3**	**M**							
DN 100 (4“)/Q3 250 m^3/h (m^3) without verification or DN 100 (4“)/Q3 60 m^3/h (m^3) with MI-001 verification	**3**	**T**							
DN 125 (5“)/Q3 400 m^3/h (m^3) without verification or DN 125 (5“)/Q3 100 m^3/h (m^3) with MI-001 verification	**4**	**B**							
DN 150 (6“)/Q3 629 m^3/h (m^3) without verification or DN 150 (6“)/Q3 150 m^3/h (m^3) with MI-001 verification	**4**	**H**							
DN 200 (8“)/Q3 997 m^3/h (m^3) without verification or DN 200 (8“)/Q3 250 m^3/h (m^3) with MI-001 verification	**4**	**P**							
DN 250 (10“)/Q3 1600 m^3/h (m^3) without verification or DN 250 (10“)/Q3 400 m^3/h (m^3) with MI-001 verification	**4**	**V**							
DN 300 (12“)/Q3 2500 m^3/h (m^3) without verification or DN 300 (12“)/Q3 600 m^3/h (m^3) with MI-001 verification	**5**	**D**							
Flange norm and pressure rating									
EN 1092-1									
PN 16			**C**						
ANSI B16.5									
Class 150			**J**						
AS4087									
PN 16			**N**						
Approval/Verification									
Without verification according to OIML R49				**0**					
MI-001 Q3/Q1 = 25				**1**					
MI-001 Q3/Q1 = 63				**2**					
MI-001 Q3/Q1 = 80				**3**					
Region version									
Europe (m^3, m^3/h, 50 Hz)1)					**1**				
USA (m^3, m^3/h, 60 Hz)					**2**				
Transmitter type and installation									
Basic version integral on sensor1)						**A**			
Basic version remote, 5 m (16.4 ft) mounted cable on sensor with IP68/NEMA 6P plugs						**B**			
Do - 10 m (32.8 ft)						**C**			
Advanced version integral on sensor1)						**K**			
Advanced version remote, 5 m mounted cable on sensor with IP68/NEMA 6P plugs						**L**			
Do - 10 m (32.8 ft)						**M**			
Communication interface									
No additional "add-on" communication module installed							**A**		
Serial RS 485 with MODBUS RTU (Terminated as end device)							**B**		
Serial RS 232 with MODBUS RTU							**C**		

Selection and Ordering data	Order No.								
SITRANS F M									
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes F)	**7ME6820-**								
				0		**-**			
Power supply									
Internal battery (no battery included)								**0**	
Internal battery pack installed2)								**1**	
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included								**2**	
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)								**3**	
115/230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)								**4**	

1) Integral (compact) transmitter is mandatory for MI-001 certified products

2) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Selection and Ordering data	Order Code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Pulse set up (default pulse A= forward and pulse B = Alarm)	
Volume per pulse A = x 0.001 m^3	**L71**
Volume per pulse A = x 0.01 m^3	**L72**
Volume per pulse A = x 0.1 m^3	**L73**
Volume per pulse A = x 1 m^3	**L74**
Data logger set up (default month logging)	
DataloggerInterval = Daily	**M31**
DataloggerInterval = Weekly	**M32**
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	**M81**
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	**M82**
2 x 5 m (16.4 ft) pulse A+B and communication cable	**M83**
20 m (65.6 ft) pulse cable A+B	**M84**
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	**M85**
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	**M87**
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	**M89**

F) Subject to export regulations AL: 9I999, ECCN: N.

Battery operated water meter MAG 8000/MAG 8000 CT

Accessories

Description	Order No.[F)]	Symbol
PC Flow Tool on CD (Download for free from www.siemens.com/flow)	**FDK-087L6001**	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	**FDK-087L4163**	
Battery backup for mains power supply, one pc. D-cell (3.6 V, 16.5 Ah) Attention on note [1)]	**FDK-087L4201**	
Internal battery pack, one set D-cell (3.6 V 33 Ah) and accessories for replacement Attention on note [1)]	**FDK-087L4150**	
External battery pack IP68/NEMA 6P with connector, four D-cell (3.6 V 66 Ah) Attention on note [1)]	**FDK-087L4151**	
Mains power supply 12 ... 24 V AC/DC with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	**FDK-087L4210**	
Mains power supply 115 ... 230 V AC with battery backup up and 3 m (9.8 ft) power cable for external connection (no battery included)	**FDK-087L4211**	
RS 232 add-on module, point to point communication interface with MODBUS RTU protocol	**FDK-087L4212**	
RS485 add-on module, multidrop communication interface with MODBUS RTU protocol	**FDK-087L4213**	
One cable entry 6 ... 8 mm (0.02 ... 0.026 ft) M20 brass glands package (1 pc)	**FDK-087L4196**	
One cable entry 3.5 ... 5 mm (0.011 ... 0.016 ft) M12 brass glands with M20 reduction. Package of 10 pcs	**FDK-087L4154**	

Description	Order No.[F)]	Symbol
One cable entry 6 ... 8 mm (0.02 ... 0.026 ft) M20 brass glands package (10 pcs)	**FDK-087L4155**	
One cable entry 8 ... 11 mm (0.026 ... 0.036 ft) M20 brass glands package (10 pcs)	**FDK-087L4156**	
One cable entry 11 ... 15 mm (0.036 ... 0.049 ft) M20 brass glands package (10 pcs)	**FDK-087L4157**	
Two cable entries 3.5 ... 5 mm (0.011 ... 0.016 ft) M20 brass glands package (10 pcs)	**FDK-087L4158**	
Two cable entries 5.5 ... 7.5 mm (0.018 ... 0.024 ft) M20 brass glands package (10 pcs)	**FDK-087L4159**	
IP68/NEMA 6P potting kit	**FDK-085U0220**	
MAG 8000 Hardware key to access protected parameters	**FDK-087L4165**	
MAG 8000 demo - training unit pack operating on Alkaline batteries. Transmitter with Flow tool CD, IrDA interface adapter and hardware key (No dangerous goods limitations)	**FDK-087L4080**	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	**FDK-087L4142**	

[1)] Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

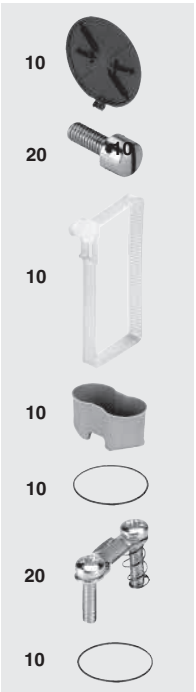
MAG 8000 has built in Hastelloy grounding electrodes, when installed in PVC or coated pipelines, grounding rings must be installed additionally.

Grounding rings, type C must be used for sizes > DN 300. Grounding rings DN 25 to DN 300 in stainless steel are packed in pairs and sold as a “grounding ring kit”. The corresponding order number for each of the dimensions are described in the below table.

Dimension	Order No.[F)]	Symbol
DN 25	A5E01002946	
DN 40	A5E01002947	
DN 50	A5E01002948	
DN 65	A5E01002950	
DN 80	A5E01002952	
DN 100	A5E01002953	
DN 125	A5E01002954	
DN 150	A5E01002955	
DN 200	A5E01002957	
DN 250	A5E01002958	
DN 300	A5E01002962	

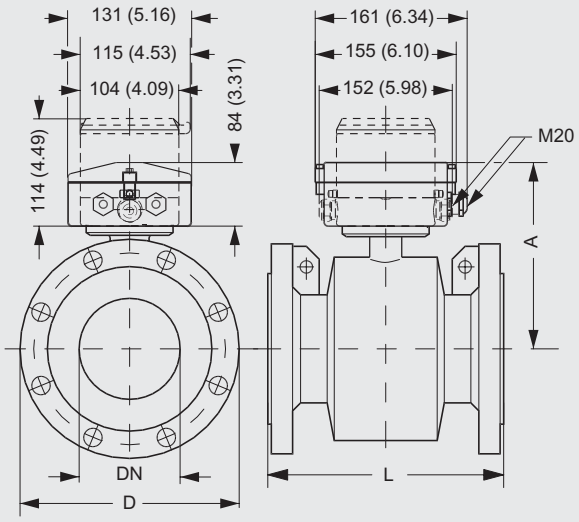
Spare parts

Description	Order No.[F)]	Symbol
MAG 8000 (Basic version) transmitter compact replacement kit. System number specified by ordering. No battery included	FDK-087L4166	
MAG 8000 (Basic version) transmitter remote replacement kit. System number specified by ordering. No battery included	FDK-087L4202	
MAG 8000 (Advanced version) transmitter compact replacement kit. System number specified by ordering. No battery included	FDK-087L4203	
MAG 8000 (Advanced version) transmitter remote replacement kit. System number specified by ordering . No battery included.	FDK-087L4204	
MAG 8000 (Basic version) transmitter PCB replacement kit	A5E01171569	
MAG 8000 (Advanced version) transmitter PCB replacement kit	FDK-087L4168	

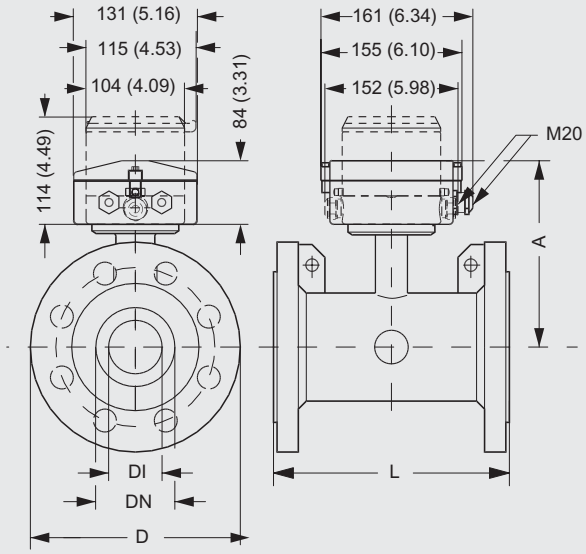
Description	Order No.[F)]	Symbol
Enclosure top including plastic lid, screws and blank product label	FDK-087L4167	
Cable for external battery pack, 1.5 m (4.92 ft) with IP68/NEMA 6P connector	FDK-087L4152	
Service tool kit package with various component for service and replacement.	FDK-087L4162	
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4108	
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - M20	On request	
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4109	
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - M20	On request	
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4110	
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - M20	On request	
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4111	
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - M20	On request	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings



DN 25 & 40 (1" & 1½") & DN 350 ... DN 600 (14" ... 24")



DN 50 - 300 (2" - 12")

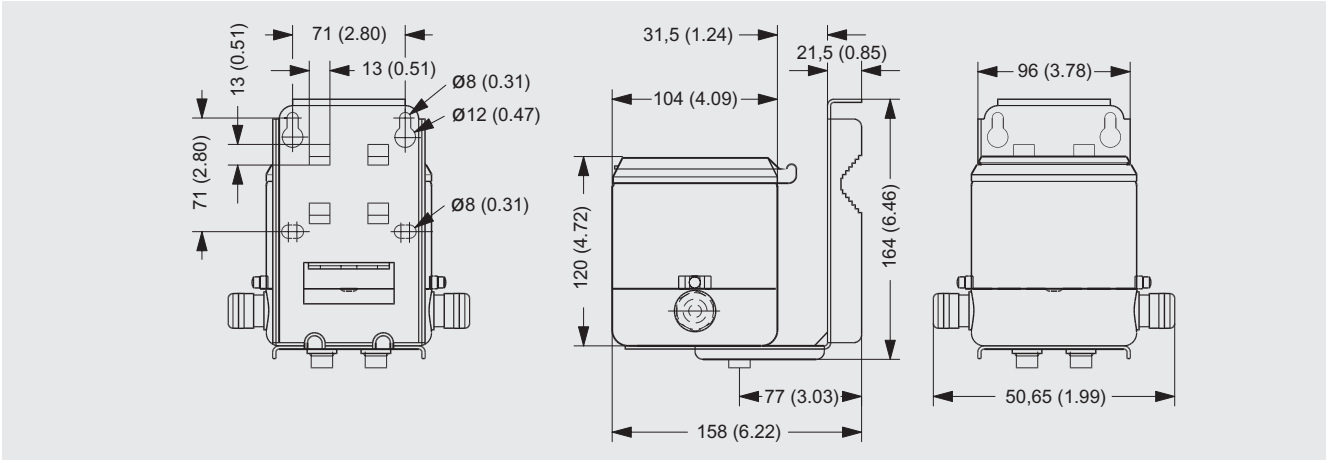
Nominal DN size	A	L, lenghts					D, diameter		Weight [1]	
		EN 1092-1 PN 10	EN 1092-1 PN 16	EN 1092-1 PN 40	ANSI 16.5 Class 150	AS 4087 PN 16	DI	D		
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm (inch)	mm (inch)	kg	lbs
25 (1)	194 (7.7)	-	-	200	7.9	200	25 (0.98)	See flange table	6	13
40 (1½)	204 (8.1)	-	-	200	7.9	200	40 (1.57)	See flange table	9	20
50 (2)	195 (7.7)	-	200	-	7.9	200	42 (1.65)	See flange table	11	25
65 (2½)	201 (8)	-	200	-	7.9	200	55 (2.17)	See flange table	13	29
80 (3)	207 (8.2)	-	200	-	7.9	200	67 (2.64)	See flange table	15	34
100 (4)	214 (8.5)	-	250	-	9.8	250	81 (3.19)	See flange table	17	38
125 (5)	224 (8.9)	-	250	-	9.8	250	101 (3.98)	See flange table	22	50
150 (6)	239 (9.5)	-	300	-	11.8	300	131 (5.16)	See flange table	28	63
200 (8)	264 (10.5)	350	350	-	13.8	350	169 (6.65)	See flange table	50	113
250 (10)	291 (11.5)	450	450	-	17.7	450	212 (8.35)	See flange table	71	160
300 (12)	317 (12.6)	500	500	-	19.7	500	265 (10.43)	See flange table	88	198
350 (14)	369 (14.6)	550	550	-	21.7	550	350 (13.78)	See flange table	111	250
400 (16)	394 (15.6)	600	600	-	23.6	600	400 (15.75)	See flange table	126	284
450 (18)	425 (16.8)	600	600	-	23.6	600	450 (17.72)	See flange table	175	394
500 (20)	450 (17.8)	600	600	-	26.8	600	500 (19.68)	See flange table	225	507
600 (24)	501 (19.8)	600	600	-	32.3	600	600 (23.62)	See flange table	288	649

[1] For remote version the sensor weight is reduced with 2 kg (4.5 lb)

SITRANS F M

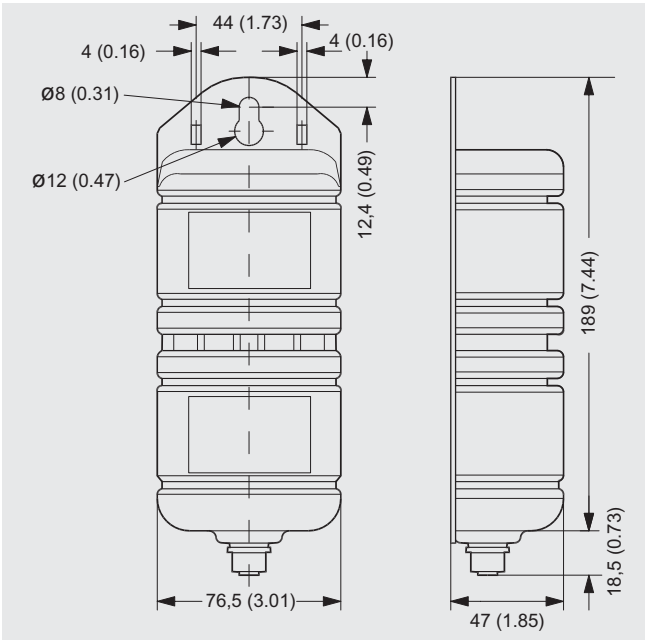
Battery operated water meter MAG 8000/MAG 8000 CT

Remote version



Dimensions in mm (inch), weight 3.5 kg (8 lbs)

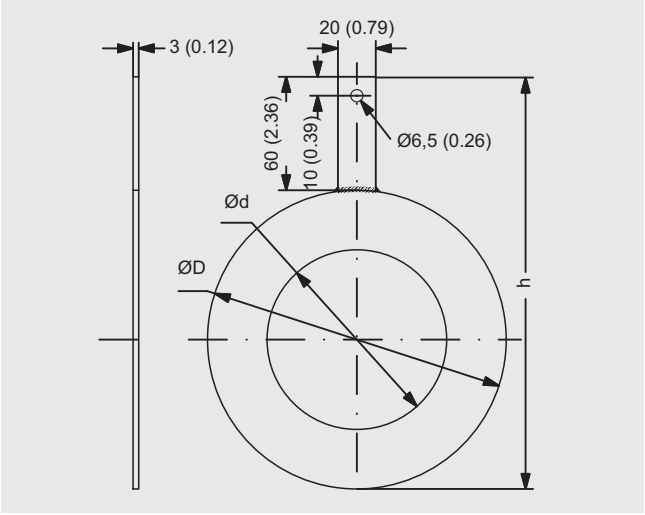
External battery pack



Dimensions in mm (inch), weight 2.0 kg (4.5 lbs)

Battery pack has to be mounted in upwards position to ensure maximum battery capacity.

Grounding rings

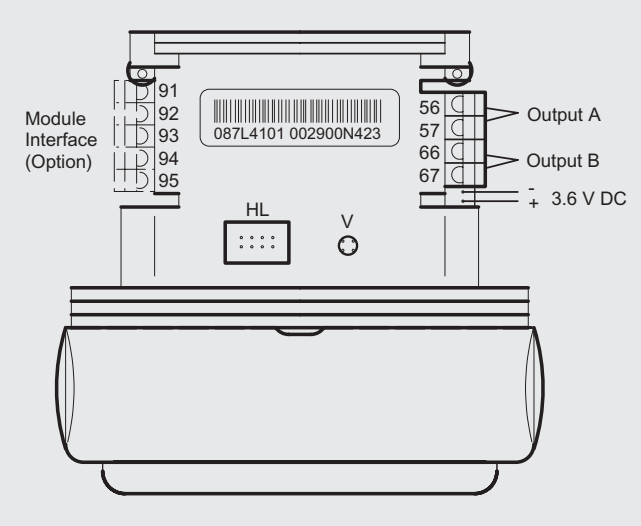


Dimensions in mm for grounding rings MAG 8000 DN 25 to DN 300

Dimension	Internal diameter (d)	Outside diameter (D)	h
DN 25	27	68	88
DN 40	38	88	105
DN 50	52	100	113
DN 65	64	120	123
DN 80	79	133	130
DN 100	95	158	145
DN 125	115	188	155
DN 150	145	216	175
DN 200	193	268	200
DN 250	246	324	230
DN 300	295	374	253

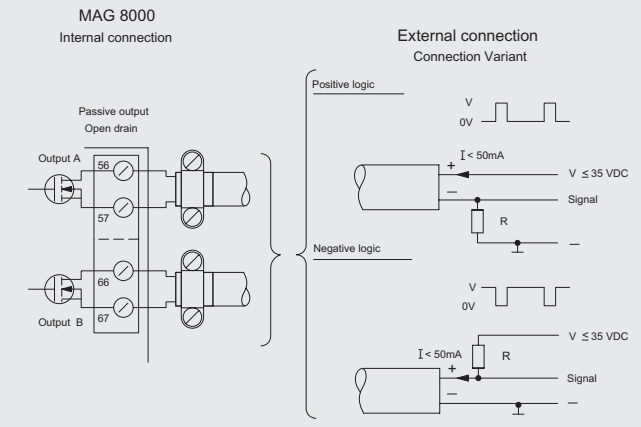
Schematics

Electrical installation and pulse output – Connection diagram



HL = Hardware lock key connection
V = Push button for verification mode

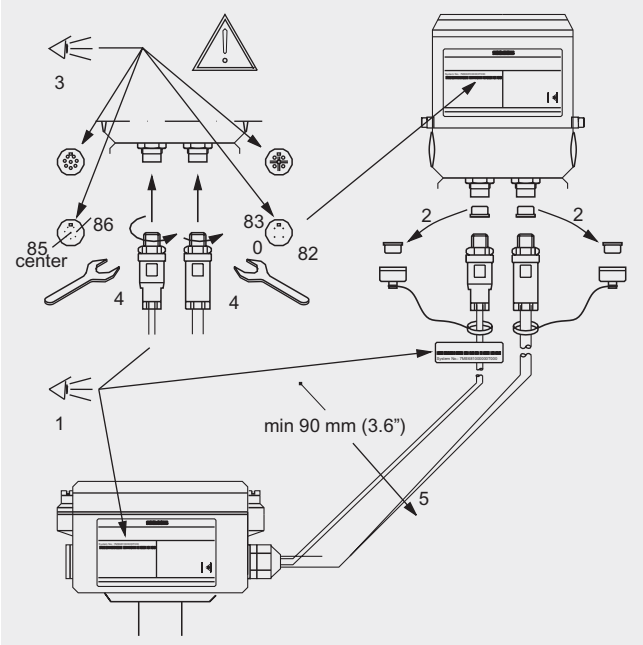
Pulse wire connection



The pulse output can be configured as volume, alarm or call-up. The output can be connected as positive or negative logic.
R = pull up/down is selected in relation to the Vx power supply and with a max. current I of 50 mA.

Use shielded cable to avoid EMC problems. Make sure the shield is correct mounted under the cable clamp (no pig tail).

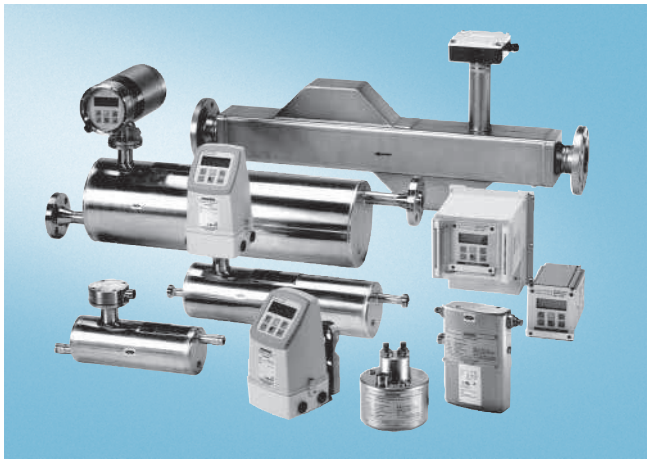
Remote installation



Remote solutions have factory mounted sensor cable with IP68/ NEMA 6P plugs. Sensor cable has meter label (1) with system number to ensure transmitter and sensor are correct matched. The dust cover on the cable end and on the transmitter bottom must be screwed together for future protection (2). The connectors must be clean and duly fastened to secure a good signal detection (3+4).

System information
MASSFLO coriolis mass flowmeters

Overview



SITRANS F C MASSFLO coriolis mass flowmeters are designed for measurement of a variety of liquids and gases. The meter is a multi parameter device offering accurate measurement of mass flow, volume flow, density, temperature and fraction.

Transmitter	Page	Com-pact	Remote	Ex-Approval	Sensor	Page
MASS 6000 IP67 Polyamide enclosure	4/116	No	Yes	No	FC300 DN 4	4/135
		No	Yes	No	MASS 2100 DI 1.5	4/139
		Yes	Yes	No	MASS 2100 DI 3 ... 40	4/143
		No	Yes	No	MASS MC2 DN 50 ... 150	4/153
		No	Yes	Yes	MASS MC2-Ex DN 50 ... 150	4/153
		No	Yes	No	MASS MC2 Hygienic DN 20 ... 80	4/153
MASS 6000 19"	4/120	No	Yes	No	FC300 DN 4	4/135
		No	Yes	No	MASS 2100 DI 1.5	4/139
		No	Yes	No	MASS 2100 DI 3 ...40	4/143
		No	Yes	No	MASS MC2 DN 50 ... 150	4/153
		No	Yes	Yes	MASS MC2-Ex DN 50 ... 150	4/153
		No	Yes	No	MASS MC2 Hygienic DN 20 ... 80	4/153
MASS 6000 Ex 19"	4/120	No	Yes	Yes	FC300 DN 4	4/135
		No	Yes	Yes	MASS 2100-Ex DI 1.5	4/139
		No	Yes	Yes	MASS 2100-Ex DI 3 ... 40	4/143
MASS 6000 Ex-d Stainless steel enclosure	4/127	No	Yes	Yes	FC300 DN 4	4/135
		No	Yes	Yes	MASS 2100-Ex DI 1.5	4/139
		Yes	Yes	Yes	MASS 2100-Ex DI 3 ... 40	4/143
		No	Yes	No	MASS MC2 DN 50 ... 150	4/153
		No	Yes	No	MASS MC2 Hygienic DN 20 ... 80	4/153

Benefits

Greater flexibility

- Wide product program
- Uniform sensor interface enabling "plug & play" for all transmitters
- Compact or remote installation using the same transmitters and sensors

Easier to commission

All MASSFLO coriolis flowmeters feature a SENSORPROM memory unit which stores sensor calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

The factory settings matching the sensor size are stored in the SENSORPROM unit. Also customer specified settings are downloaded to the unit.

Easier to service

- Comprehensive self diagnosis and service menu enhances trouble shooting and meter verification.
- Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

USM II the Universal Signal Module with "plug & play" simplicity makes it easy to access and integrate the flowmeter with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.

Application

Coriolis mass flowmeters are suitable for measuring liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install. The coriolis flowmeter is recognized for its high accuracy in a wide turn down range.

The main applications of the coriolis flowmeter can be found in all industries, such as:	
Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Automotive	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots
Oil & gas	Filling of gas bottles, furnace control, CNG-dispensers, Test separators, LPG
Water & waste water	Dosing of chemicals for water treatment

Please see Product selector www.pia-selector.automation.siemens.com **on the Internet, since some constrains might be related to some of the features**

	 MASS 2100 DI 1.5	 MASS 2100 DI 3 to 40	 FC300 DN 4	 MC2 DN 50 to 150	 MC2 Hygienic DN 20 to 80	 MASS 6000 IP67	 MASS 6000 19“	 MASS 6000 Ex-d	 SIFLOW FC070 Std/Ex
Design									
Compact		●				●		●	
Remote	●	●	●	●		●	●	●	●
Transmitter enclosure									
Polyamid, IP67/NEMA4X						●			
Noryl (SIMATIC S7-300), IP20/NEMA 2									●
Stainless steel IP67/NEMA4X								●	
19" rack IP20/NEMA2 aluminium							●		
Back of panel IP20/NEMA2 aluminium							●		
Wall mounting IP66/NEMA4 ABS plastic							●		
Front of panel IP66/NEMA4 ABS plastic							●		
Communication									
HART						●	●	●	
PROFIBUS PA						●	●	●	
PROFIBUS DP						●	●		
MODBUS RTU / RS 485						●	●		●
MODBUS RTU / RS 232									●
Supply voltage									
24 V DC									●
24 V AC/DC						●	●	●	
115/230 V AC						●	●		
Pipe size									
DI 1.5 (1/16”)	●								
DI 3 (1/8”)		●							
DN 4 (1/6”)			●						
DI 6 (¼”)		●							
DI 15 (½”)		●							
DN 20 (¾”)				●	●				
DN 25 (1”)		●		●	●				
DN 40 (1½”)		●			●				
DN 50 (2”)				●	●				
DN 65 (2½”)				●	●				
DN 80 (3”)				●	●				
DN 100 (4”)				●					
DN 150 (6”)				●					
Process connection norms and pressure									
Pipe thread									
NPT ANSI/ASME B.20.1; PN 100	●	●	●						
ISO 228/1; PN 100	●	●	●						
Flange									
EN 1092-1 PN 40		●		●					
EN 1092-1 PN 100		●		● [1)]					
ANSI B16.5 Class 150		●		●					
ANSI B16.5 Class 300				●					
ANSI B16.5 Class 600		●		● [1)]					

● = available

1) Not available for DN 100 and DN 150 sensors

SITRANS F C

System information
MASSFLO coriolis mass flowmeters

Please see Product selector www.pia-selector.automation.siemens.com **on the Internet, since some constrains might be related to some of the features**

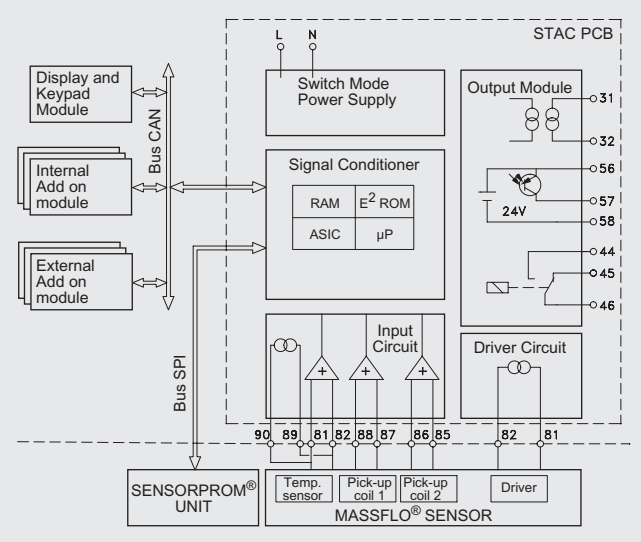
	 MASS 2100 DI 1.5	 MASS 2100 DI 3 to 40	 FC300 DN 4	 MC2 DN 50 to 150	 MC2 Hygienic DN 20 to 80	 MASS 6000 IP67	 MASS 6000 19“	 MASS 6000 Ex-d	 SIFLOW FC070 Std/Ex
Dairy									
DIN 11851 PN 25		●		●[1]	●				
DIN 11851 PN 40		●							
DIN 11864-2A					●				
Clamp ISO 2852 PN 16		●							
ISO 2853 PN 16		●							
DIN 32676 Tri-Clamp PN 10/PN 16				●	●				
Others on request	●	●	●	●	●				
Pipe material									
Stainless steel 1.4435 (316L)	●	●	●		●				
Stainless steel 1.4571 (316 Ti)				●					
Hastelloy C - 22	●	●	●						
Hastelloy C - 4				●					
With heating jacket									
Internal U - tube		●							
Pressure rating									
PN 10				●					
PN 16		●		●					
PN 25		●		●					
PN 40		●		●	●				
PN 100	●	●	●	●[2]					
High pressure version[3]	●	●	●						
Accuracy									
Flow error ≤ 0.1% of rate	●	●	●						
Flow error ≤ 0.15% of rate				●	●				
Density error ≤ 0.001 g/cm³	●			●	●				
Density error ≤ 0.0015 g/cm³		●[4]	●						
Density error ≤ 0.0005 g/cm³		●							
Cable glands									
PG 13.5							●		
½“ NPT				●	●	●			
M20				●	●	●		●	
Approvals									
Harzardous areas									
ATEX Zone 0	●	●	●						
ATEX Zone 1	●	●	●	●	●			●	
ATEX Zone 2	●	●	●	●		●	●	●	●
UL Class 1 Division 1	●[5]	●[5]	●[5]						
UL Class 1 Division 2	●[5]	●[5]	●[5]			●	●[6]		
CSA/FM Class 1 Division 2	●[5]	●[5]	●[5]			●	●[6]		
Type approvals									
GOSS/Gost (Russia)	●	●		●		●	●	●	
CRN		●	●						

● = available

1) Not available for DN 150 sensor
2) Not available for DN 100 and DN 150 sensors
3) Please see technical specifications
4) DI 3 and DI 6
5) Sensor pressure max. 100 bar (1450 psi)
6) Only IP66 version approved

Function

The flow measuring principle is based on coriolis law of movement. The flowmeter consists of a sensor type MASS 2100/ FC300 or MC2 and a transmitter MASS 6000.



The MASSFLO sensors are energized by an electro mechanical driver circuit which oscillates the pipe at its resonant frequency.

Two pick-ups, 1 and 2 are placed symmetrically on both sides of the driver. When liquid or gas flows through the sensor, coriolis force will act on the measuring pipe and cause a pipe deflection which can be measured as a phase shift on pick-up 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated via a „phase locked loop“, to ensure a stable output from the 2 pick-ups in the region of 80 to 110 mV.

The temperature of the sensor is measured by a Pt1000, in a wheatstone configuration (4-wire).

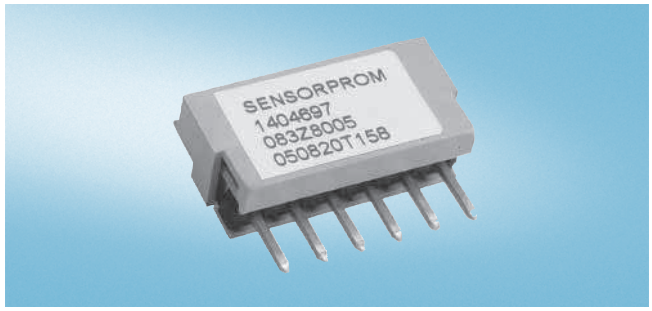
The flow proportional signal from the 2 pick-ups, the temperature measurement and the driver frequency are fed into the MASS 6000 transmitter for calculations of mass, volume, fraction, temperature and density.

The analog to digital conversion takes place in an ultra low noise ASIC with 23 bit signal resolution. The signal transfer function is based on a patented DFT technology (Discrete Fourier Transformation). The ASIC is constructed as a state machine gate array, which enables fast signal processing and filtering.

The ASIC has a built in noise filter, which can be used to improve the meters performance if the installation and application conditions are not ideal. Typically influence from process noise such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

For communication purposes the ASIC has a CAN interface with a Siemens specific protocol. This concept is known as the USM II (Universal Signal Module) concept. The idea is that extra output modules or communication modules can be connected to this bus, making it possible to configure the flowmeter for the precise task in hand.

When the internal CAN bus detects the installed module, it is automatically programmed to factory settings via the SENSORPROM memory unit, and the new menu is visible in the MASS 6000 display.



SENSORPROM flow memory unit

Currently the USM platform handles all present and future communication protocols, e.g., PROFIBUS DP, PROFIBUS PA, HART and MODBUS.

Integration

Installation of MASS 2100/FC300 and MC2 sensors

Installation requirements/System design information

The SITRANS F C MASSFLO mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 4X and IP66/NEMA 4. The flowmeter is bidirectional and can be installed in any orientation.
It is important to ensure that the meter tubes are always completely filled with homogeneous fluid. Otherwise measuring errors may occur.
The corrosion resistance of the fluid wetted materials must be evaluated.
The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. The **Sizing Program** (download from http://www.siemens.com/flow-productsizing) can be used to calculate the pressure drop.
The following points are to be considered during installation:

The preferred flow direction is indicated by the arrow on the flowmeter. Flow in this direction will be indicated as positive.

Installation orientation

- MASS 2100/FC300 – sensors
  The optimal installation orientation is horizontal.
- MC2 – sensors
  The optimal installation orientation is vertical with the flow upwards.

Supports

- In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. vibrations), the sensor should be installed in rigid pipelines. Two supports or hangers should be installed symmetrically and stress free in close proximity to the process connections.

Shut off devices

- To conduct a system zero adjustment, shut off devices are required in the pipeline
  - in horizontal installations at the outlet for FC300 and MC2 and the inlet for MASS 2100.
  - in vertical installations at the inlet.
- When possible, shut off devices should be installed both up- and downstream of the flowmeter.

System information
MASSFLO coriolis mass flowmeters

Installation: straight run requirements

- The mass flowmeter does not require any flow conditioning inlet straight sections. Care should be exercised to ensure that any valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flowmeter.

System design information

- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the highest point in the system.
  Advantageous are installations in low pipeline sections, at the bottom of a U-section in the pipeline.
- Long drop lines downstream from the flowmeter should be avoided to prevent the meter tube from draining.
- The flowmeter should not come into contact with any other objects. Avoid attachments to the housing.
- When the cross-section of the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section and outside the section between the shut off devices. The direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.1 to 0.2 bar (0.5 to 3 psi).
- Assure that operation below the vapor pressure cannot occur when a vacuum exists in the meter tube or for fluids which boil readily.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, transformers etc.
- When operating more than one meter in one or multiple interconnected pipelines, the sensor should be spaced distant from each other or the pipelines should be decoupled to prevent cross talk.

Zero adjustment

- In order to adjust the zero under operating conditions it must be possible to reduce the flow rate to „ZERO“ while the meter tube is completely filled. A bypass line is optimal when the process cannot be shut down. It is important for accurate measurements that during the zero adjustment there are no gas bubbles in the flowmeter. It is also important that the pressure and temperature in the meter tube be the same as that which exists during operation.

Technical specifications

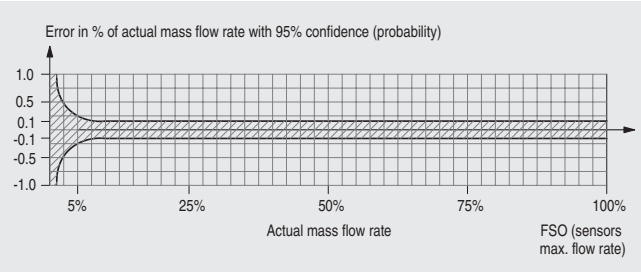
Flowmeter uncertainty/specifications

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including the US (NIST traceability).

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit.

MASS 2100 sensors and MASS 6000 transmitters



	5%		50%		100%	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16”)	1	(2.2)	32.5	(71.6)	65	(140)
DI 3 (1/8”)	12	(26)	125	(275)	250	(550)
DN 4 (1/6")	17.5	(38)	175	(386)	350	(770)
DI 6 (¼”)	50	(110)	500	(1 102)	1 000	(2 200)
DI 15 (½”)	280	(617)	2 800	(6 173)	5 600	(12 345)
DI 25 (1”)	1 250	(2 756)	12 500	(27 558)	25 000	(55 100)
DI 40 (1½”)	2 600	(5 732)	26 000	(57 320)	52 000	(114 600)

- For flow > 5% of the sensors max. flow rate, the error can be read directly from the curve.
- For flow < 5% of the sensors max. flow rate, use the formula to calculate the error.
- The error curve is plotted from the formula:

$$E = \pm\sqrt{(0.10)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]
Z = Zero point error [kg/h]
qm = Mass flow [kg/h]

Sensor type		**FC300**	**MASS 2100**					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16”)	DI 3 (1/8”)	DI 6 (¼“)	DI 15 (½“)	DI 25 (1”)	DI 40 (1½“)
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	% of rate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200	1.500	6.000
Density								
Density error	[g/cm^3]	0.0015	0.001	0.0015	0.0015	0.0005	0.0005	0.0005
Repeatability error	[g/cm^3]	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Range	[g/cm^3]	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9

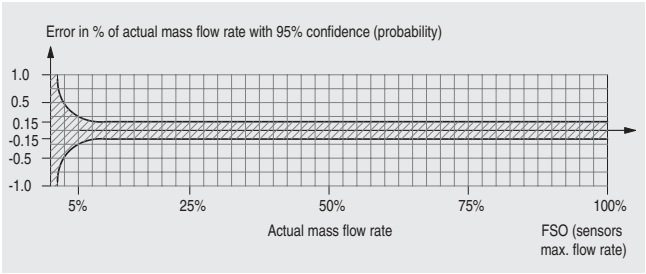
Sensor type		FC300	MASS 2100					
Temperature								
Error	[°C (°F)]	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)
Brix								
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1	0.1	0.1

Sensor type		MASS MC2				
Sensor size (standard version)		DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 150 (6")
Sensor size (hygienic version)		DN 20 (¾"), DN 25 (1"), DN 40 (1½"), DN 50 (2"),	DN 65 (2½")	DN 80 (3")		
Number of measuring pipes		2	2	2	2	2
Mass flow:						
Linearity error	% of rate	0.15	0.15	0.15	0.15	0.15
Repeatability error	% of rate	0.1	0.1	0.1	0.1	0.1
Max. zero point error	[kg/h (lb/h)]	DN 20 0.6 (1.32), DN 25 0.96 (2.12), DN 40 2.85 (6.28), DN 50 5.52 (12.17)	11.34	14.76	24.96	66.00
Density						
Density error	(Standard) [g/cm^3]	0.005	0.005	0.005	0.005	0.005
	(Extended) [g/cm^3]	0.001	0.001	0.001	0.001	Not available
Range	[kg/dm^3]	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5
Repeatability error	[g/l]	±0.1	±0.1	±0.1	±0.1	±0.1
Temperature						
Error	[°C (°F)]	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)
Brix [1]						
Error	[°Brix]	0.2	0.2	0.2	0.2	Not available

[1] Extended density calibration required.

Flowmeter uncertainty/specifications

MASS MC2 sensors and MASS 6000 transmitters



	5%		50%		100%	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 20 (¾")	150	(330)	3 000	(6 614)	6 000	(13 228)
DN 25 (1")	240	(529)	4 800	(10 582)	9 600	(21 164)
DN 40 (1½")	712	(1 570)	14 250	(31 416)	28 500	(62 832)
DN 50 (2")	2 130	(4 695)	21 300	(46 958)	42 600	(93 900)
DN 65 (2½")	4 350	(9 590)	43 500	(95 900)	87 000	(191 800)
DN 80 (3")	5 670	(12 500)	56 700	(125 002)	113 400	(250 000)
DN 100 (4")	9 600	(21 164)	96 000	(211 643)	192 000	(423 300)
DN 150 (6")	25 500	(56 217)	255 000	(562 178)	510 000	(1 124 356)

$$E = \pm\sqrt{(0.15)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]
Z = Zero point error [kg/h]
qm = Mass flow [kg/h]

$Q_{max.}$ at 2 bar pressure loss at 1 g/cm^3

Reference conditions (ISO 9104 and DIN/EN 29104)	
Flow conditions	Fully developed flow profile
Temperature, medium	20 °C ± 2 K (68 °C ± 3.6 °F)
Temperature, ambient	20 °C ± 2 K (68 °C ± 3.6 °F)
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm^3
Brix	40 °Brix
Supply voltage	U_n ±1%
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Additions in the event of deviations from reference conditions	
Current output	As pulse output (± 0.1% of actual flow +0.05% FSO)
Effect of ambient temperature	• Display/frequency/pulse output: < ± 0.003% / K act. • Current output: < ± 0.005% / K act.
Effect of supply voltage	< 0.005% of measuring value on 1% alteration

MASSFLO MASS 6000 IP67 compact/remote

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

The MASS 6000 IP67 transmitter can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100/MC2 and FC300 sensors.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn down ratio on flow and density accuracy
- Advanced diagnosis and service menu enhances trouble shooting and meter verification
- Built-in batch controller with compensation and monitoring comprising 2 built in totalizers
- Multi parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as °BRIX or °PLATO
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes
- User configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on 5 order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
  - All modules can be fitted as true "plug & play"
  - Module and transmitter are automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal

Application

SITRANS F C MASSFLO mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

The main applications for the MASS 6000 IP67 transmitter can be found in:

- Food and beverage industries
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed in an IP67/NEMA 4X compact polyamide enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40 (1/8" to 1½") and remote mounted for the entire sensor series.

The MASS 6000 IP67 is available as standard with 1 current-, 1 frequency/pulse- and 1 relay output and can be fitted with add-on modules for bus communication.

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built in totalizes which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Error system consisting of error-log, error pending menu
- Display of operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter trouble shooting

MASSFLO MASS 6000 IP67 compact/remote

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3, (lbs/ft^3)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 30 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, flow direction
Digital input	11 ... 30 V DC (R_i = 13.6 KΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 • Reverse flow indicated by negative sign
Zero point adjustment	Manual via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F), max. rel. humidity 80% to 31 °C (87.8 °F) decreasing to 50% at 40 °C (104 °F) according to UL 3101
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA & DP, MODBUS RTU RS 485
Enclosure	
Material	Fibre glass-reinforced polyamide
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 m w.g. for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36

Supply voltage	
24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	10 W
230 V version	
• Supply	115/230 V AC, 50 ... 60 Hz
• Fluctuation	+10% ... -10%
• Power consumption	26 VA
Fuse	
• 230 V version	T400 mA, T 250 V (IEC 127) - Not to be changed by user
• 24 V version	T1 A, T 250 V (IEC 127) - Not to be changed by user
EMC performance	
Emission	EN 50081-1 (Light industry)
Immunity	EN 50082-2 (Industry)
NAMUR	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Evironment	
Environmental conditions acc. to UL 3101:	• Altitude up to 2000 m • POLLUTION DEGREE 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis
Cable glands	Two types of cable gland are available in polyamide in the following dimensions: M20 or ½" NPT

MASSFLO MASS 6000 IP67 compact/remote

Selection and Ordering data	Order No.
SITRANS F C MASSFLO MASS 6000 transmitter F) Transmitter for wall mounting with wall mounting bracket, fibreglass reinforced polyamide (1 current output, 1 frq./pulse output and 1 relay output)	7ME4110- ■AA■0-■■A■
Version	
Remote IP67/NEMA 4X enclosure	2
Supply voltage	
115/230 V AC, 50 ... 60 Hz	1
24 V AC/DC	2
Display/Keypad	
with display	1
Serial communication	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
MODBUS RTU RS 485	E
Cable glands	
M20	1
½" NPT	2

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

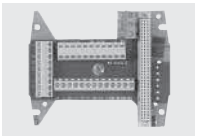
Accessories

Cable glands

Description	Order No.F)	Symbol
Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2-off		
• M20	A5E00822490	
• ½" NPT	A5E01163775	

Spare parts for compact or remote IP67 version

Description	Version	Power supply	Order No.F)	Symbol
MASS 6000 transmitter IP67/NEMA 4X, fibreglass reinforced polyamide	1 current output 1 frq./pulse output 1 relay output	115/230 V AC, 50/60 Hz	7ME4110-1AA10-1AA0	
		24 V AC/DC	7ME4110-1AA20-1AA0	

Description	Order No.F)	Symbol
Wall mounting unit for IP67/NEMA 4X version with wall bracket and with		
• 4 x M20 cable glands	FDK-085U1018	
• 4 x ½" NPT cable glands	A5E01164211	
Connection board/PCB Supply voltage: 115/230 V / 24 V AC/DC	FDK-083H4260	
Terminal box kit with		
• M20 cable glands	A5E00832338	
• ½" NPT cable glands	A5E00832342	
With this kit you are able to mount the MASS 6000 IP67/NEMA 4X transmitter on the MASS 2100 sensor and make it to a compact system. (The kit consisting of a terminal box in polyamide, cable and connector between PCB and sensor piedestal, PCB, seal and screws (4 pcs.) for mounting on sensor)		

Description	Order No.F)	Symbol
Terminal box with		
• M20 cable glands	FDK-085U1050	
• ½" NPT cable glands	A5E01164206	
Terminal box – in polyamide exclusive lid	FDK-085U1002	
Terminal box – **lid** in polyamide	FDK-085U1003	

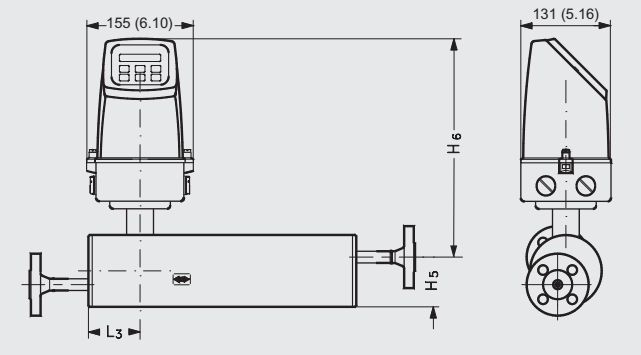
Add-on module

Description	Order No.F)	Symbol
HART	FDK-085U0226	
PROFIBUS PA Profile 3	FDK-085U0236	
PROFIBUS DP Profile 3	FDK-085U0237	
MODBUS RTU RS 485	FDK-085U0234	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings

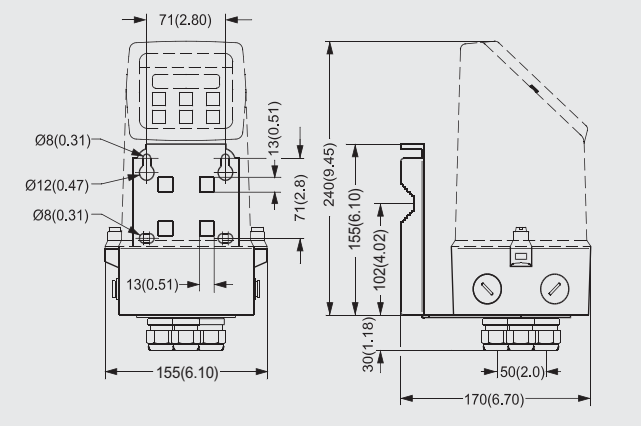
Compact



MASS 2100

Sensor size [DN (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	246 (9.69)	328 (12.91)
6 (¼)	62 (2.44)	72 (2.83)	256 (10.08)	328 (12.91)
15 (½)	75 (2.95)	87 (3.43)	267 (10.51)	353 (13.90)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	443 (17.44)
40 (1½)	75 (2.95)	227 (8.94)	271 (10.67)	497 (19.57)

Transmitter wall mounted



Schematics

Electrical connection

Grounding

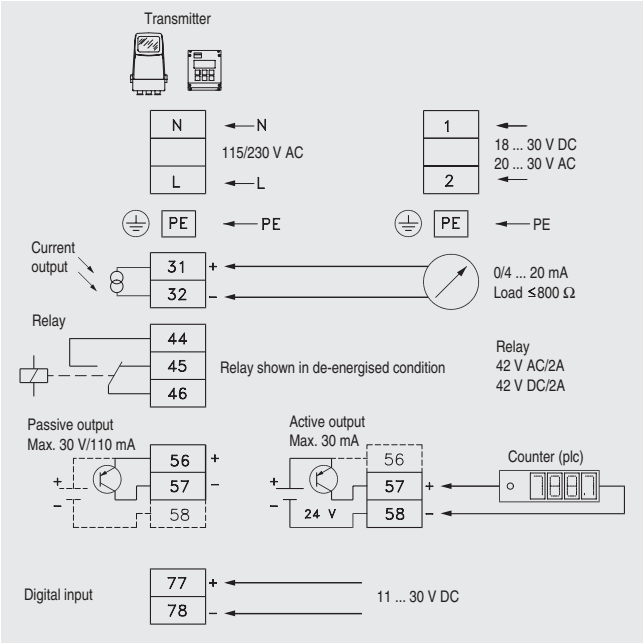
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables are used in a noisy environment, it is recommend that shielded cables be used.



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MASSFLO MASS 6000
for 19" insert/19" wall mounting

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.
The MASS 6000 transmitter delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

The MASS 6000 19" transmitter can be connected to all sensors of types MASS 2100/MC2/FC300 and are available in different versions depending of number of output facilities, Ex protection and grade of enclosure.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn down ratio on flow and density accuracy
- Advanced diagnosis and service menu enhances trouble shooting and meter verification
- Built in batch controller with compensation and monitoring comprising 2 built in totalizers
- Multi parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as °BRIX or °PLATO
- Many output capacities, up to 3 current outputs, 2 frequency/pulse and 2 relay (excludes the possibility of an add-on module
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes
- User configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on 5 order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
  - All modules can be fitted as true "plug & play"
  - Module and transmitter automatically configured through the SENSORPROM
- Transmitter available with ATEX and UL approval
- All electrical connections are easy accessible on the large back plane PCB

Application

SITRANS F C MASSFLO coriolis mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter can measure both liquids and gases.

The main applications for the MASS 6000 19" transmitter can be found in:

- Chemical and pharmaceutical industries
- Food and beverage industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed as a 19" insert as base to be used in:

- 19" rack system
- Panel mounting IP66/NEMA 4
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4

The MASS 6000 19" is available as standard or as ATEX approved transmitter which is to be mounted in the safe area.

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 2 output versions available as standard:
  - 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
  - 3 current outputs, 2 frequency/pulse outputs, 2 relay outputs, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter trouble shooting

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3 (lbs/ft^3)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 30 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, direction
Digital input	11 ... 30 V DC
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults • Reverse flow indicated by negative sign
Zero point adjustment	Manual via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA & DP, MODBUS RTU RS 485
Enclosure 19”	
Material	Aluminium/steel (DIN 41494)
Rating	IP20/NEMA 1 to IEC 529 and DIN 40050 (1 m w.g. for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36
Supply voltage	• 115/230 V AC +10% ... -10%, 50 ... 60 Hz • 18 ... 30 V DC or 20 ... 30 V AC
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W I_N = 250 mA, I_{ST} = 2 A (30 ms)
EMC performance	
Emission	EN 50081-1 (Light industry)
Immunity	EN 50082-2 (Industry)
Ex approval	[EEx ia] IIC, DEMKO 03 ATEX 135251X
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis
Fuse	T 400 mA, T 250 V (IEC 127), not replaceable by operator
Cable	• Max. 300 m • C: max. 300 [pF/m]; L_C/R_C: max. 100 [µH/Ω] • The total cable capacity must be max. 200 nF
Cable glands	The cable gland is available in polyamide, in dimension: PG 13.5

SITRANS F C

MASSFLO MASS 6000 for 19" insert/19" wall mounting

Selection and Ordering data	Order No.
SITRANS F C MASSFLO MASS 6000 transmitter F) Transmitter for rack and wall mounting	7ME4110- 2■■■■-■■A0
Enclosure	
19 inch insert IP20/NEMA 1 (rack)	C
19 inch insert in IP66/NEMA 4 (wall mounting)	E
Output configuration	
1 current, 1 frequency, 1 relay	A
3 current, 2 frequency, 2 relay	C
Supply voltage	
115/230 V AC, 50/60 Hz	1
24 V AC/DC	2
Ex Approvals	
Standard (No Ex-approval)	0
ATEX	1
UL Class 1, Div. 2 (only IP66/NEMA 4 version)	5
Display/Keypad	
With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output)	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
MODBUS RTU RS 485	E

Attention (Ex applications)!

MC2 Ex version sensors must only be connected to MASS 6000 standard. The MASS 6000 connector board must be replaced by a connection board approved FDK-083H4294 or FDK-083H4295 (see connection boards/PCB for MASS 6000 and MC2 sensors).

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Accessories

Enclosure

Description	Order No.F)	Symbol
Enclosure in ABS plastic for front panel mounting IP66/NEMA 4, for one 19" transmitter insert (21 TE)	**FDK-083F5030**	
Enclosure in ABS plastic for front panel mounting IP66/NEMA 4, for two 19" transmitter inserts (42 TE)	**FDK-083F5031**	
Enclosure in aluminium for back of panel mounting IP20/NEMA 1, for one 19" transmitter insert (21 TE)	**FDK-083F5032**	
Enclosure in aluminium for back of panel mounting IP20/NEMA 1, for two 19" transmitter inserts (42 TE)	**FDK-083F5033**	
Front cover (7 TE)	**FDK-083F4525**	

Cable glands

Description	Order No.F)	Symbol
Cable glands, screwed entries type Pg 13.5 in nickel-plated brass, 2-off	**FDK-083G3140**	
Cable glands, screwed entries type Pg 13.5 in polyamide (100 °C (212 °F)) black, 2-off	**FDK-083G0228**	

Spare parts 19" versions

Enclosure (without PCB, connection board)

Description	Order No.F)	Symbol
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for one 19" transmitter insert (21 TE)	**FDK-083F5037**	
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for two 19" transmitter inserts (42 TE)	**FDK-083F5038**	

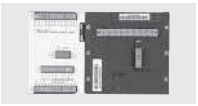
Add-on module

Note:
Only possible to connect to MASS 6000 versions with 1 current output

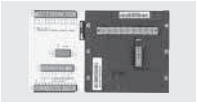
Description	Order No.F)	Symbol
HART	**FDK-085U0226**	
PROFIBUS PA Profile 3	**FDK-085U0236**	
PROFIBUS DP Profile 3	**FDK-085U0237**	
MODBUS RTU RS 485	**FDK-085U0234**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

Description	Version	Order No.[F)]	Symbol
Connection board MASS 6000 for 19“ rack mounting version	24 V 115/230 V	**FDK-083H4272**	
Connection board MASS 6000 EEx [ia] IIC for 19“ rack mounting version	24 V 115/230 V	**FDK-083H4273**	
Connection board MASS 6000 for 19“ wall mounting version	24 V 115/230 V	**FDK-083H4274**	
Connection board MASS 6000 EEx [ia] IIC for 19“ wall mounting version	24 V 115/230 V	**FDK-083H4275**	

Connection boards/PCB for MASS 6000 and MC2 sensors

Description	Version	Order No.[F)]	Symbol
Connection board MASS 6000 for 19“ rack mounting version	24 V 115/230 V	**FDK-083H4272**	
Connection board MASS 6000 for Ex application [1)] and 19“ rack mounting version (connection board MASS 6000 to MC2 sensors Ex approved)	24 V 115/230 V	**FDK-083H4294**	
Connection board MASS 6000 for 19“ wall mounting version	24 V 115/230 V	**FDK-083H4274**	
Connection board MASS 6000 for Ex application [1)] and 19“ wall mounting version (connection board MASS 6000 to MC2 sensors Ex approved)	24 V 115/230 V	**FDK-083H4295**	

[1)] Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK-083H4294 or FDK-083H4295.

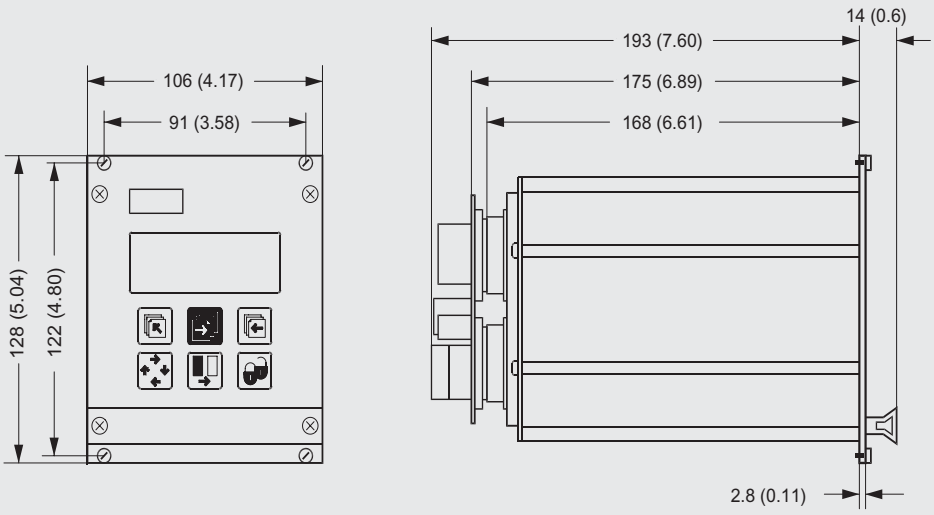
Description	Order No.[F)]	Symbol
Wall mounting enclosure for MASS 6000 19” version IP66/NEMA 4 (21 TE) with connection board/PCB for **Ex application connected to MC2 Ex sensors**	**FDK-083H4296**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MASSFLO MASS 6000
for 19" insert/19" wall mounting

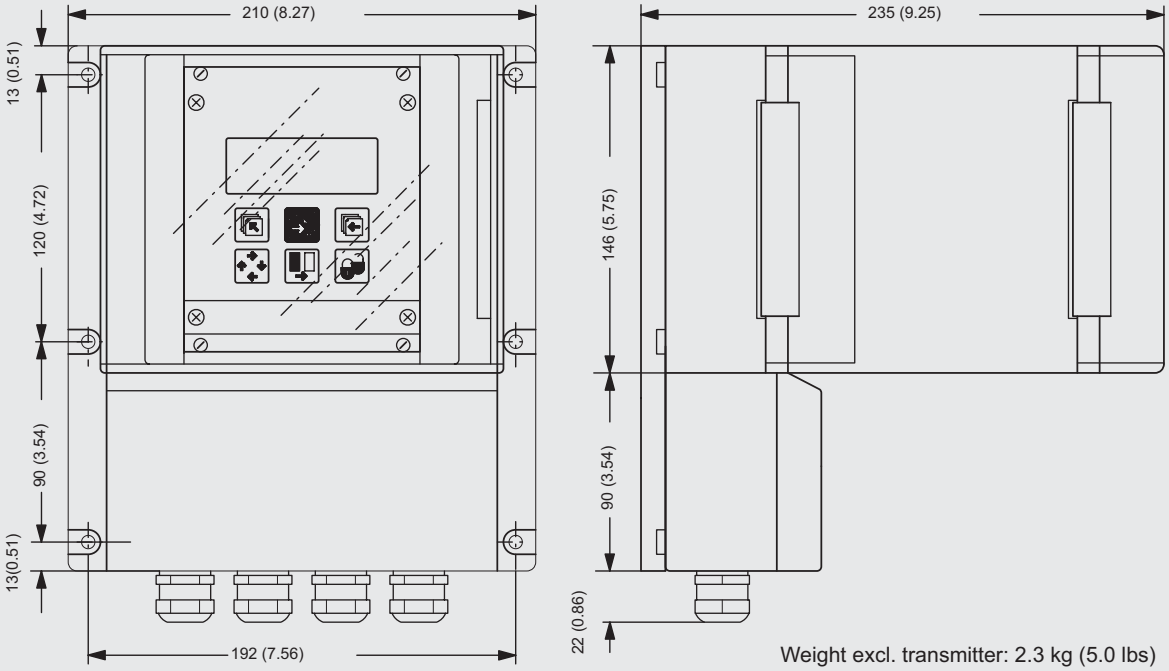
Dimensional drawings

Transmitter 19" insert



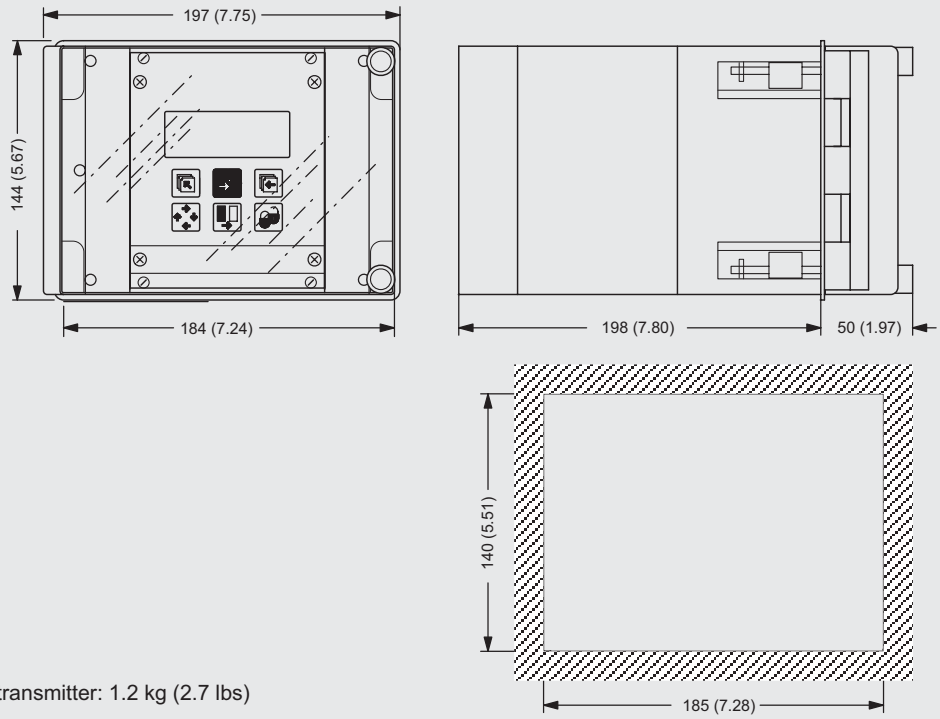
Weight incl. back print 0.8 kg /1.8 lbs

Transmitter 19" wall mounting



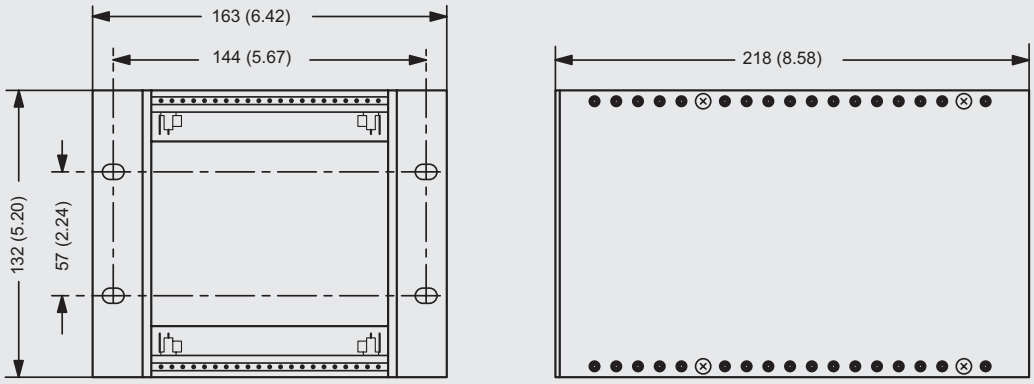
Weight excl. transmitter: 2.3 kg (5.0 lbs)

Transmitter 19“ front of panel



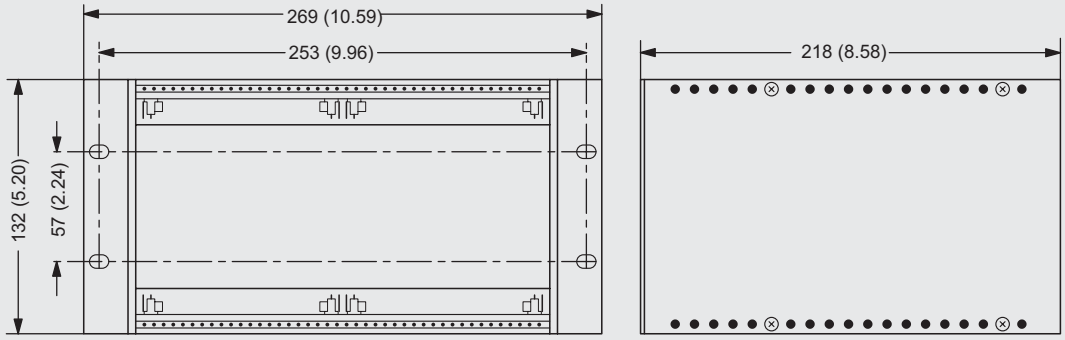
Weight excl. transmitter: 1.2 kg (2.7 lbs)

Transmitter back of panel



Weight: 0.7 kg (1.6 lbs)

Transmitter back of panel, 42 TE



Weight: 0.9 kg (2.0 lbs)

MASSFLO MASS 6000
for 19" insert/19" wall mounting

Schematics

Electrical connection

Grounding

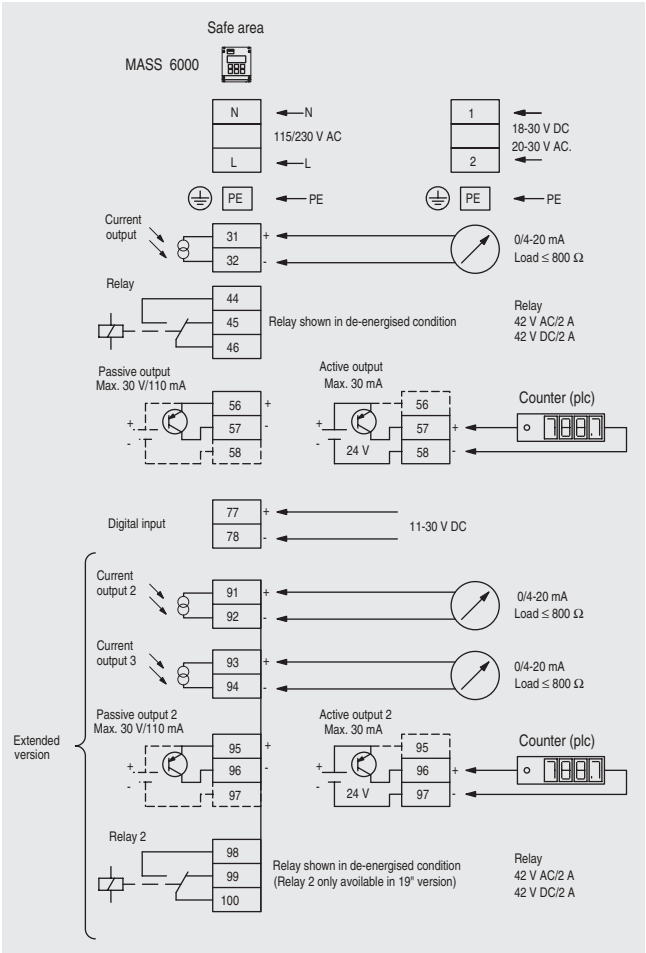
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables in noise environment, we recommend to use screened cable.



MASSFLO MASS 6000 Ex-d compact/remote

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction flow.

The MASS 6000 Ex-d transmitter is manufactured in stainless steel (AISI 316L) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long troublefree lifetime. The Ex-d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100.

Benefits

- Fully stainless steel flameproof EEx-d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- ATEX approved transmitter which can be mounted in harzardous area Zone 1 or Zone 2
- Sensor and transmitter interface intrinsically safe EEx ia IIC
- Exchange of transmitter directly in hazardous area without shut down of process pipe line due to ia IIC sensor/transmitter interface
- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn down ratio on flow and density accuracy
- Advanced diagnosis and service menu enhances trouble shooting and meter verification
- Built in batch controller with compensation and monitoring comprising 2 built in totalizers
- Multi parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as °BRIX or °PLATO
- 1 current output, 1 frequency/pulse and 1 relay as standard output
- Current output can be selected as passive or active output
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes
- User configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on 5 order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality
  - All modules can be fitted as true "plug & play"
  - Module and transmitter automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal

Application

SITRANS F C MASSFLO mass flowmeters are suitable for all applications within the entire process industry where there is a demand for accurate flow measurement in hazardous area. The meter can measure both liquids and gases.

The main applications for the MASS 6000 Ex-d transmitter can be found in:

- Chemical process industry
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry

Design

The transmitter is designed in an Ex-d compact stainless steel enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40, and remote mounted for the entire sensor series.

The MASS 6000 Ex-d is available as standard with 1 current-, 1 frequency/pulse- and 1 relay output and can be fitted with add-on modules for bus communication

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 4X as compact and IP66/NEMA 4 as remote
- Supply voltage 24 V AC/DC.
- MASS 6000 Ex-d is ATEX approved together with all MASS 2100 sensors

SITRANS F C

MASSFLO MASS 6000 Ex-d compact/remote

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter trouble shooting

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3 (lbs/ft^3)], temperature [°C (°F)]
Current output	Classified EEx ia, selectable as active or passive outputs. Default setting is active mode.
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 350 Ω
Time constant	0.1 ... 30 s adjustable
Current characteristics	
Active mode	U_o = 24 V, I_o = 82 mA, P_o = 0.5 W, C_o = 125 nF, L_o = 2.5 mH
Passive mode (max input from external barrier)	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 52 nF, L_i = 100 µH
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0.1 ... 30 s adjustable
Passive	6 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ
Output characteristics	
Active mode	Not available
Passive mode (max input from external barrier)	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 52 nF, L_i = 100 µH
Relay	
Type	Change-over relay
Load	30 V/100 mA
Functionality	Error level, error number, limit, direction
Output characteristics	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 0 nF, L_i = 0 mH
Digital input	11 ... 30 V DC (R_i = 13.6 KΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Output characteristics	U_i = 30 V, I_i = 3.45 mA, P_i = 0.10 W, C_i = 0 nF, L_i = 0 mH
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow
Empty pipe	Detection of empty sensor
Density	0 ... 2.9 g/cm^3
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output • Reverse flow indicated by negative sign
Zero point adjustment	Manual via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA
HART	
Active mode	U_o = 6.88 V, I_o = 330 mA, P_o = 0.57 W, C_o = 20 nF, L_o = 100 µH
Passive mode (max input from external barrier)	U_i = 10 V, I_i = 200 mA, P_i = 0.5 W, C_i = 0 nF, L_i = 0 µH
PROFIBUS PA	
Active mode	Not available
Passive mode	U_i = 17.5 V, I_i = 380 mA, P_i = 5.32 W, C_i = 5 nF, L_i = 10 µH
Enclosure	
Material	Stainless steel AISI 316 W1.4435
Rating	• Compact mounted on sensor: IP67/NEMA 4X to IEC 529 and DIN 40050 • Remote mounted: IP66/NEMA 4 to IEC 529 and DIN 40050
Load	18 ... 1000 Hz random, 1.14 G rms, in all directions, to IEC 68-2-36, Curve E

Technical specifications (continued)

Supply voltage	
24 V AC	
• Range	20 ... 30 V AC
• Power consumption	6 VA I_N = 250 mA, I_{ST} = 2 A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm²
24 V DC	
• Range	18 ... 30 V DC
• Power consumption	6 VA I_N = 250 mA, I_{ST} = 2 A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm²
EMC performance	
Emission	EN 50081-1 (Light industry)
Immunity	EN 50082-2 (Industry)
NAMUR	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Ex approval	EEx-de [ia/ib] IIC T6, DEMKO 03 ATEX 135253X
Temperature class:	Process liquid temperature:
• T6	• T < 85 °C (185 °F)
• T5	• 85 °C < T < 100 °C (185 °F < T < 212 °F)
• T4	• 100 °C < T < 135 °C (212 °F < T < 275 °F)
• T3	• 135 °C < T < 180 °C (275 °F < T < 356 °F)

Selection and Ordering data

Selection and Ordering data	Order No.
SITRANS F C MASSFLO MASS 6000 transmitter F) Transmitter Ex-d for remote mounting inclusive wall mounting kit	7ME4110- 2 ■■■■-■■A■
Enclosure	
Ex-d SS with 5 m (16.5 ft) cable	G
Ex-d SS with 10 m (32.8 ft) cable	H
Ex-d SS with 25 m (82.0 ft) cable	J
Output configuration	
1 current, 1 frequency, 1 relay	A
Supply voltage	
24V AC/DC	2
Ex approvals	
ATEX	1
Display/Keypad	
With display	1
Serial communication	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
Cable gland	
M20	1

Note:
Only communication modules with Ex approvals are allowed.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and ordering data

Spare parts for MASS 6000 Ex-d

Description	Version	Power supply	Order No.F)	Symbol
MASS 6000 Ex-d transmitter	1 current output 1 frq./pulse output 1 relay output	24 V AC/DC	**7ME4110-1FA21-1AA0**	

Description	Order No.F)
Wall mounting kit for remote Ex-d inclusive sensor cable of 5 m	**FDK-083H0231**
Wall mounting kit for remote Ex-d inclusive sensor cable of 10 m	**FDK-083H0232**
Wall mounting kit for remote Ex-d inclusive sensor cable of 25 m	**FDK-083H0233**

Add-on module for remote and compact MASS 6000 Ex-d

Description	Order No.F)	Symbol
HART	**FDK-085U0226**	
PROFIBUS PA Profile 3	**FDK-085U0236**	

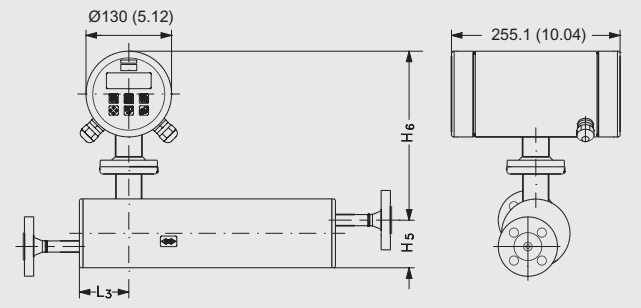
Description	Order No.F)	Symbol
Ex-d transmitter insert	**FDK-083H3061**	
Front lid	**FDK-085U2373**	
Srews and washers between piedestal and sensor (4 pcs.), seal (1 pc.)	**FDK-085U2374**	
Package display unit	**FDK-083H0235**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MASSFLO MASS 6000 Ex-d compact/remote

Dimensional drawings

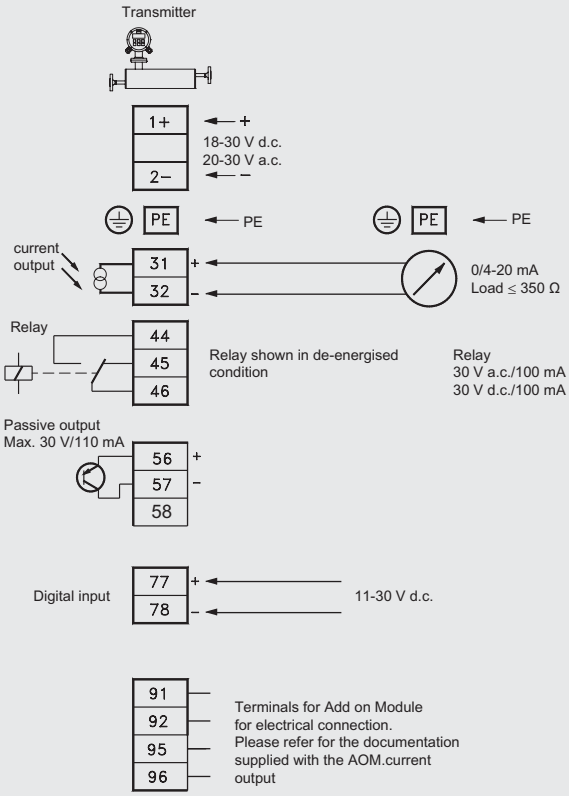
MASS 6000 Ex-d compact version



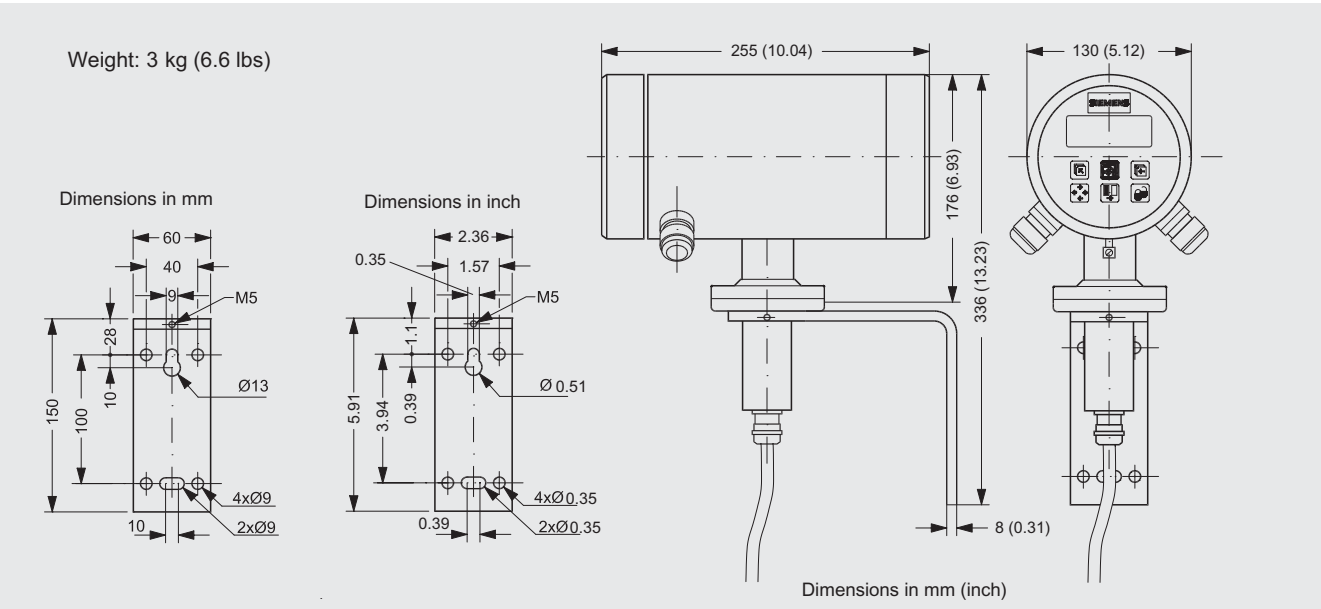
Sensor size [DN (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	307 (12.1)	389 (15.32)
6 (¼)	62 (2.44)	72 (2.83)	317 (12.48)	389 (15.32)
15 (½)	75 (2.95)	87 (3.43)	328 (12.91)	414 (16.30)
25 (1)	75 (2.95)	173 (6.81)	332 (13.07)	504 (19.84)
40 (1½)	75 (2.95)	227 (8.94)	332 (13.07)	558 (21.97)

Schematics

Electrical connection compact or remote



MASS 6000 Ex-d remote version



SIFLOW FC070

Overview

SIFLOW FC070 is based on the latest developments within the digital processing technology – engineered for high performance, fast flow step response, immunity against process generated noise, easy to install, commission and maintain.

SIFLOW FC070 is available in two versions:

- SIFLOW FC070 Standard
- SIFLOW FC070 Ex

The SIFLOW FC070 transmitter delivers true multi-parameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

SIFLOW FC070 is designed for integration in a variety of automation systems, i.e.

- Central mounted in S7-300, C7
- Decentralized in ET 200M for use with S7-300 and S7-400 as PROFIBUS DP masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP masters
- Stand-alone via a MODBUS RTU master, i.e. SIMATIC PDM

The SIFLOW FC070 transmitter can be connected to all sensors of types MASS 2100, MC2 and FC300.

Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via MODBUS
- Dedicated mass flow chip with high performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn down ratio on flow and density accuracy
- Advanced diagnostics enhancing trouble shooting and meter verification
- Built-in batch controller with two-stage control and compensation
- Digital outputs for direct batch control, frequency/pulse
- MODBUS RTU RS 232/485 interface for connection to SIMATIC PDM or any other MODBUS master
- Digital input for batch control, zero adjust
- Extensive simulation options for measurement values, I/O and errors easy communication/fault finding
- Multiple LED's for easy indication of flow, error and I/O state
- SENSORPROM technology automatically configures the transmitter during start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type and I/O settings
  - Any values or settings changed by the user is stored automatically
  - Automatically re-programming of a new transmitter, without loss of settings and accuracy
  - Transmitter replacement in less than 30 seconds
- Four-wire Pt1000 measurement ensuring optimum accuracy mass flow, density and fraction flow
- Fraction flow computation based on 5th order algorithm matching all applications

Application

SIFLOW FC070 mass flowmeters are suitable for all applications within the entire process industry, where a there is a demand for accurate flow measurement. The meters are suitable for measuring on liquid and gas.

The main applications for the SIFLOW FC070 transmitter can be found in the following industries:

- Food and beverage
- Pharmaceutical
- Automotive
- Oil and gas
- Power generation and utility
- Water and waste water

Design

SIFLOW FC070 is designed in an IP20 SIMATIC S7-300 enclosure and for use in central and de-central cabinets where sensors: FC300, MASS 2100 and MC2 are remotely mounted.

Function

The following key functionality is available:

- Mass flow rate, volume flow rate, density, temperature and fraction flow
- Two built-in totalizers which can freely be set for counting mass, volume or fraction
- 1 frequency/pulse/batch output, 1 two-stage batch output, 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Two-stage batch controller
- Automatic zero point adjustment with zero point evaluation feed back
- Limit functionality
- Comprehensive status and error reporting

SIFLOW FC070

Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Measurement functions	
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached.
Digital input	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	• Nominal voltage: 24 V DC • Lower limit: 15 V DC • Upper limit: 30 V DC • Current: 2 ... 15 mA
Low signal	• Nominal voltage: 0 V DC • Lower limit: -3 V DC • Upper limit: 5 V DC • Current: -15 ... 15 mA
Input	Approx. 10 kΩ
Switching	Max. 100 Hz.
Digital output 1 and 2	
Functions	• Output 1: Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch • Output 2: Quadrature pulse, quadrature frequency, 2-stage batch
Voltage supply	3 ... 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 ... 10 kΩ
Switching frequency	0 ... 12 kHz 50% duty cycle
Functions	Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch
Communication	
MODBUS RS 232C	• Max. baudrate: 115.200 baud • Max. line length: 15 m at 115.200 baud • Signal level: according to EIA-RS 232C
MODBUS RS 485	• Max. baudrate: 115.200 baud • Max. line length: 1200 m at 115.200 baud • Signal level: according to EIA-RS 485 • Bus termination: Integrated. Can be enabled by inserting wire jumpers.
Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V
Power	
Supply	24 V DC nominal
Tolerance	20.4 V DC ... 28.8 V DC
Consumption	Max. 6 W
Fuse	T1 A/125 V, not to be changed by user
Environment	
Ambient temperature	• Storage -40 ... +70 °C (-40 ... +158 °F) • Operation 0 ... +60 °C (32 ... 140 °F)
Operation conditions	Horizontally mounted rail. For vertically mounted rail, the maximum operating temperature is +45°C (+113 °F).
Altitude	• Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)
Enclosure	
Material	Noryl, color: athracite
Rating	IP20/NEMA 2 according to IEC 60529
Mechanical load	According to SIMATIC standards (S7-300 devices)
Approvals	
SIFLOW FC070 Standard	CE, cULus, ATEX II 3G EEx nA IIC
SIFLOW FC070 Ex	CE, cULus, UL Haz.Loc., FM, ATEX II 3 G EEx nA II T4 and II (1) G [EEx ia] IIC
Electromagnetic compatibility	Requirements of EMC law; Noise immunity according to IEC 61000-6-2, tested according to: IEC 61000-4-2, 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6 Emitted interference according to EN 50081-2, tested according to EN 55011, class A, group 1
NAMUR	Within the limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE21
Programming tools	
SIMATIC S7	Configuration trough backplane P-BUS and PLC program
SIMATIC PCS7	Configuration trough backplane P-BUS and PLC/WinCC face-plates
SIMATIC PDM	Through MODBUS port RS 232C and RS 485

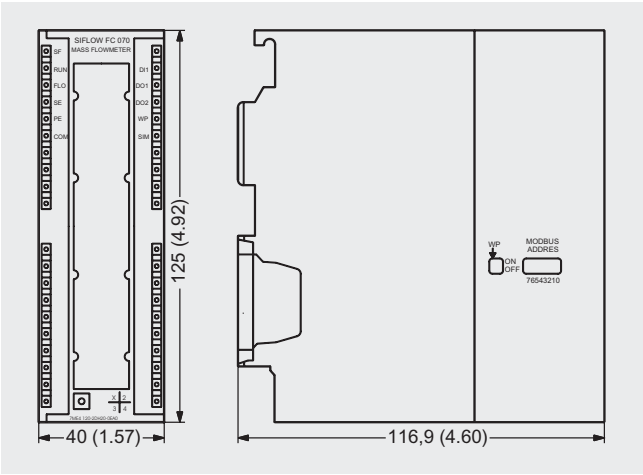
Selection and Ordering Data

Description		Order No.
SIFLOW FC070 flow transmitter Remember to order 40 pin front plug connector.	F)	**7ME4120-2DH20-0EA0**
40 pin front plug with screw contacts		**6ES7392-1AM00-0AA0**
SIFLOW FC070 Ex flow transmitter Remember to order 20 pin front plug connector.		**7ME4120-2DH21-0EA0**
20 pin front plug with screw contacts		**6ES7392-1AJ00-0AA0**

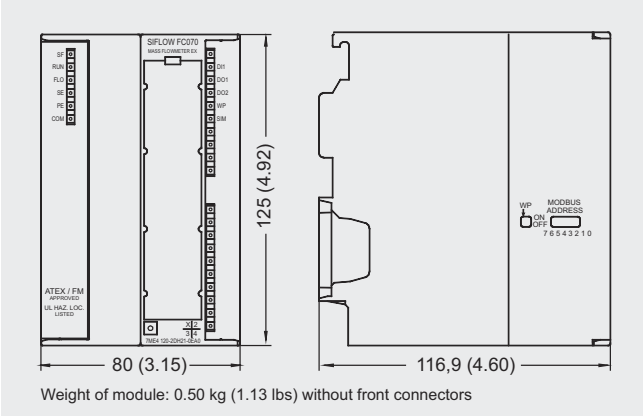
Accessories

Description		Order No.
Cable with multiplug for connecting MASS 2100 and FC300 sensors		
• 5 m (16.4 ft)	F)	**FDK-083H3015**
• 10 m (32.8 ft)	F)	**FDK-083H3016**
• 25 m (82 ft)	F)	**FDK-083H3017**
• 50 m (164 ft)	F)	**FDK-083H3018**
• 75 m (246 ft)	F)	**FDK-083H3054**
• 150 m (492 ft)	F)	**FDK-083H3055**
Cable without multiplug for connecting MC2 sensors		
• 5 m (16.4 ft)	F)	**FDK-083H3001**
• 25 m (82 ft)	F)	**FDK-083H3002**
• 75 m (246 ft)	F)	**FDK-083H3003**
• 150 m (492 ft)	F)	**FDK-083H3004**
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300		
• 160 mm (6.3")		**6ES7 390-1AB60-0AA0**
• 482 mm (18.9")		**6ES7 390-1AE80-0AA0**
• 530 mm (20.8")		**6ES7 390-1AF30-0AA0**
• 830 mm (32.7")		**6ES7 390-1AJ30-0AA0**
• 2000 mm (78.7")		**6ES7 390-1BC00-0AA0**
Shield connecting element For mounting on S7-300 rail. 80 mm wide with 2 rows for 4 shield terminal elements each (no shield terminal elements included)		**6ES7390-5AA00-0AA0**
Shield terminal element for 1 cable with 3 to 8 mm in dia. 2 pieces		**6ES7390-5BA00-0AA0**
Shield terminal element for 1 cable with 4 to 13 mm in dia. 2 pieces		**6ES7390-5CA00-0AA0**

Dimensional drawings



SIFLOW FC070, dimensions in mm (inch)



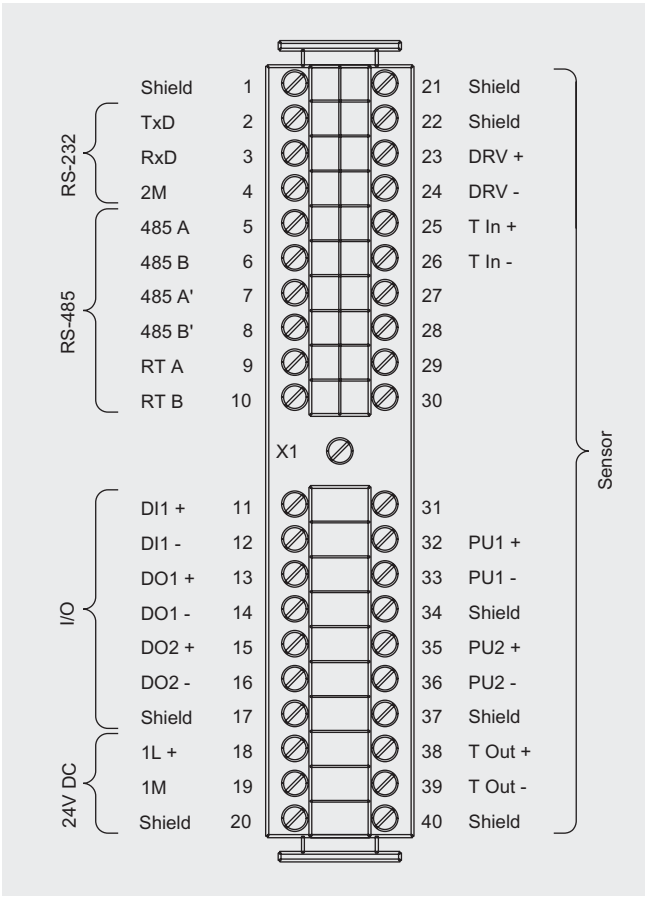
Weight of module: 0.50 kg (1.13 lbs) without front connectors

SIFLOW FC070 Ex, dimensions in mm (inch)

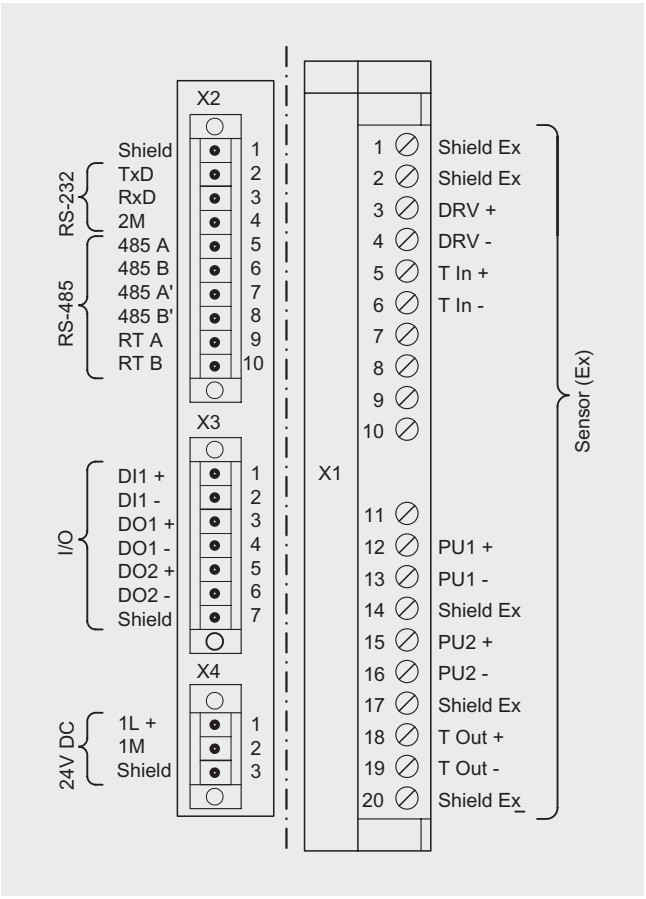
F) Subject to export regulations AL: 9I999, ECCN: N.

SIFLOW FC070

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex, electrical connection

Overview

SITRANS FC300 is a new range of compact coriolis mass flowmeters sensors suitable for flow measurement of a variety kind of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down range and density accuracy. The ease of installation through a plug & play interface ensures optimum performance and operation.

A new designed encapsulation in stainless steel with a surprisingly low weight of only 3.5 kg (7.7 lb), ensures a rigid and robust sensor performance for a wide range of applications.

Benefits

- High accuracy better than 0.1% of mass flow rate
- Large dynamic turn down range better than 100:1
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3 (0.000036 lb/inch^3) with a repeatability better than 0.0002 g/cm^3 (0.0000072 lb/inch^3)
- One tube without internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food & beverage and pharmaceutical applications
- Larger wall thickness, ensures optimal lifetime and corrosion resistance and high pressure durability
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non ideal and unstable process conditions (pressure, temperature, density-changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector & SENSORPROM enable true plug & play. Installation and commissioning in less than 10 min.
- Intrinsically safe Ex-design ia IIC as standard
- Sensor pipe available in high quality AISI 316L stainless steel 1.4435 or Hastelloy C22 2.4602 offering optimum corrosion resistance
- Rugged and space saving sensor design in stainless steel matching all applications
- High pressure program as standard
- The sensor calibration factor is also valid for gas measurement

Application

The industry today has an increasing demand for mass flowmeters with a reduced physical size without loss of performance. The meters must be suitable for installation in traditional process industry environment as well as OEM equipment for instance within automotive or appliance industry. Independent of industry application the meter must deliver accurate and reliable measurements. The new and versatile design of the FC300 offers this flexibility and the main applications for the SITRANS FC300 DN 4 can be found in:

Chemical industry	Liquid and gas measurement in normal as well as corrosive environments
Cosmetic industry	Dosing of essence & fragrances
Pharmaceutical industry	High speed dosing and coating of pills, filling of ampuls/injectors
Food & beverage industry	Filling, dosing of flavorings, colors and additives, in-line density measurement Measurement and dosing of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The FC300 sensor consists of a single tube bended in double omega pipe geometry, welded directly to the process connectors at each end. The sensor is available in 2 material configurations, AISI 316L or Hastelloy C22 with ¼"-NPT or G¼"-ISO process connections.

The enclosure is made of stainless steel AISI 316L 1.4409 with a grade of encapsulation of IP66/NEMA4. The enclosure has a very robust design and with an overall size of 130 x 200 x 60 mm (5.12" x 7.87" x 2.36") the sensor is very compact and requires only little installation space.

The sensor can be delivered in a standard version with a maximum liquid temperature of 115 °C (239 °F) or a high temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The sensor can be mounted directly on any given plane surface or if desired with the enclosed quick release clamp fitting which, along with its compact design and multi-plug electrical connector, will keep installation costs and time to a minimum.

Function

The measuring principle is based on coriolis force of movement, see "System information MASSFLO coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines for SITRANS FC300 sensor

Horizontal installation as shown in figure A is recommended with gas or liquid applications.

This installation is also recommended when the flow is low or the liquid contains solid particles or air bubbles.

Horizontal installation as shown in figure B can be used for liquid applications especially where the flow velocity exceeds 1 m/s.

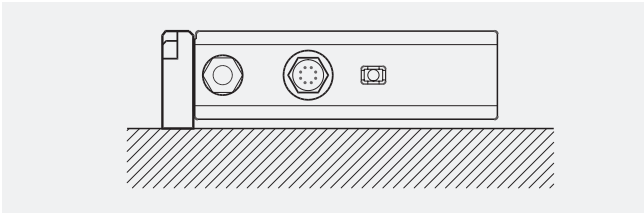
SITRANS FC300

Vertical installation as shown in figure C can be used for liquid or gas applications.

For liquid applications upwards flow is recommended to facilitate the removal of air bubbles and to avoid partly emptying of the sensor.
For gas applications we recommend to place the flow inlet high on the sensor and the outlet low to remove impurities and oil films.

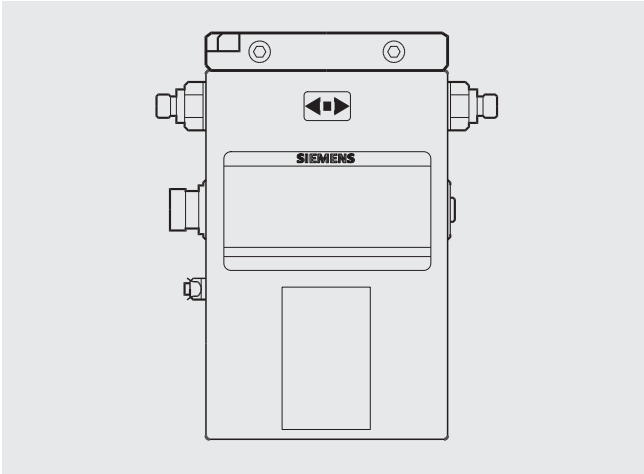
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.1 to 0.2 bar.
- Mount the sensor on a vibration free and plane wall or steel frame
- Locate the sensor low in the system in order to avoid underpressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal mounting (fig. A)



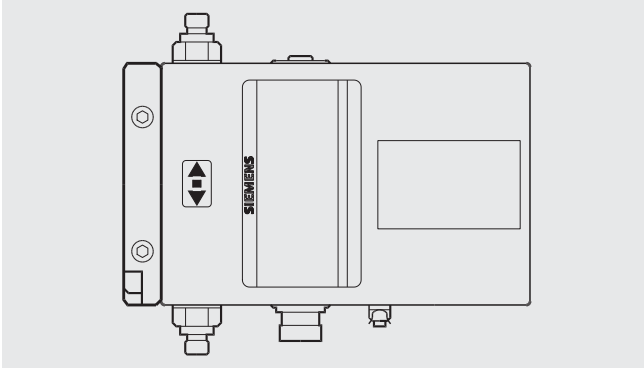
Liquid or gas and low flow applications

Horizontal mounting (fig. B)



Liquid applications

Vertical mounting (fig. C)



Liquid and gas applications

Technical specifications

Sensor size	DN 4 (1/6“)
Mass flow	
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)
Accuracy, mass flow	0.1% of rate
Repeatability	0.05 of rate
Max. zero point error	0.010 kg/h (0.022 lb/h)
Density	
Density range	0 ... 2.9 g/cm^3 (0 ... 0.105 lb/inch^3)
Density error	0.0015 g/cm^3 (0.000036 lb/inch^3)
Repeatability error	0.0002 g/cm^3 (0.0000072 lb/inch^3)
Temperature	
Standard	-40 ... +115 °C (-40 ... +239 °F)
High temperature version	-40 ... +180 °C (-40 ... +356 °F)
Temperature error	0.5 °C
Brix	
Measuring range	0 ... 100 Brix
Brix error	0.3 Brix
Inside pipe diameter	
Stainless steel version	3.5 mm (0.14“)
Hastelloy version	3.0 mm (0.12“)
Pipe wall thickness	
Stainless steel version	0.25 mm (0.0098“)
Hastelloy version	0.5 mm (0.0196“)
Liquid pressure measuring pipe[1]	
Stainless steel	130 bar (1885 psi) at 20 °C (68 °F)
Hastelloy C22	410 bar (5945 psi) at 20 °C (68 °F)
Materials	1.4435 (AISI 316L) Stainless steel
Measuring pipe and connection	2.4602 (Hastelloy C22)
Enclosure[2]	
Material	1.4404 (AISI 316L) Stainless steel
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G¼” male
ANSI/ASME B1.20.1	¼” NPT male
Ex approval	EEx ia IIC T3-T6
	05ATEX138072X
	UL/CSA (under preparation)
Weight	3.5 kg (7.7 lb)
Dimensions	135 x 205 x 58 mm (5.31“ x 8.07“ x 2.28“)

[1] According to DIN 2413, DIN 17457
[2] Housing is not rated for pressure containment.

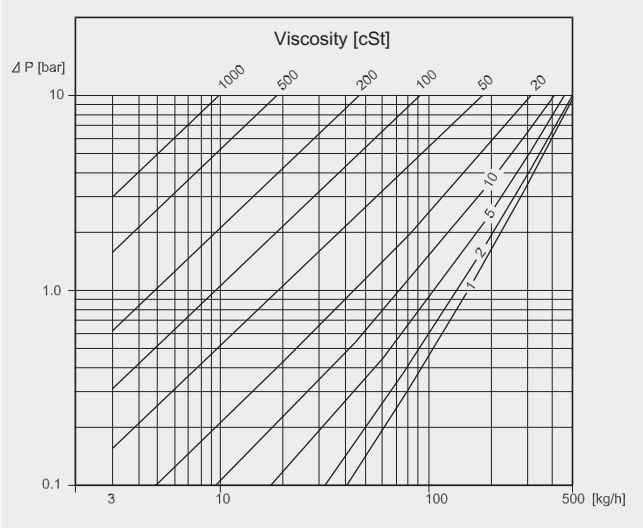
Selection and Ordering data	Order No.	Order code
SITRANS F C Flow sensors		
SITRANS FC300 DN 4 (1/6“) sensor, without heating jacket[1]	F)	7ME4400 - ■■■■■ - ■A■■ ■■■
Pipe material and temperature		
Stainless steel 1.4435/316L		
115 °C (239 °F)		1G
180 °C (356 °F)		1H
2.4602/Hastelloy C22		
115 °C (239 °F)		2G
180 °C (356 °F)		2H
Pressure		
PN 100		D
PN 130 (316L)		G
PN 410 (C-22)		Q
Process connection		
Pipe thread		
G ¼“ male		10
¼“ NPT male		11
Configuration		
Standard		1
Density		2
Brix/Plato		3
Fraction (specification required)		9 N0Y
Cable		
No cable		A
5 m (16 ft) cable		B
10 m (32 ft) cable		C
25 m (82 ft) cable		D
50 m (164 ft) cable		E
75 m (246 ft) cable		F
150 m (492 ft) cable		G
Calibration		
Standard calibration 3 flow x 2 points		1
Standard calibration matched pair 3 flow x 2 points		2
Accredited calibration matched pair 5 flow x 2 points (DANAK)		3
Extended calibration customer specified select Y60, Y61, Y62 or Y63 (see additional information)		8

[1] Not possible to order DN 4 sensor with heating jacket

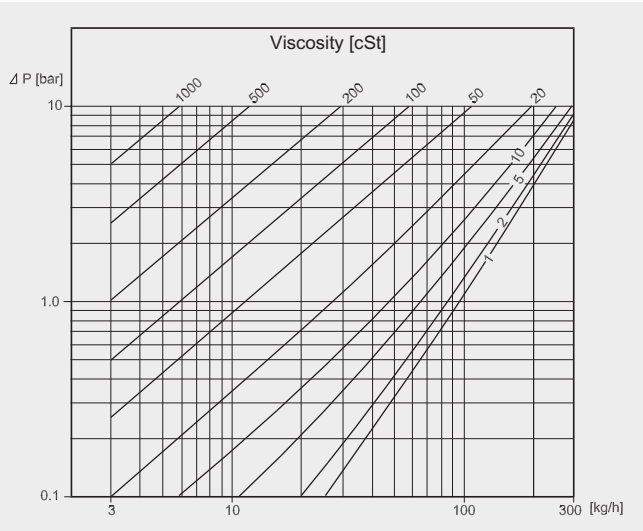
Selection and Ordering data	Order code
Additional information	
Please add “-Z“ to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1B	C12
Welding certificate NDT-Penetrant: ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer specific transmitter setup	Y20
Customer specified, matched pair (5x2)	Y60
Customer specified calibration (5x2)	Y61
Customer specified, matched pair (10x1)	Y62
Customer specified calibration (10x1)	Y63
Special version	Y99

Characteristic curves

Pressure drop



Stainless steel 316L



Hastelloy C22

Spare parts

Description	Order No.[F]
Multiple plug for cable mounting	**FDK-083H5056**

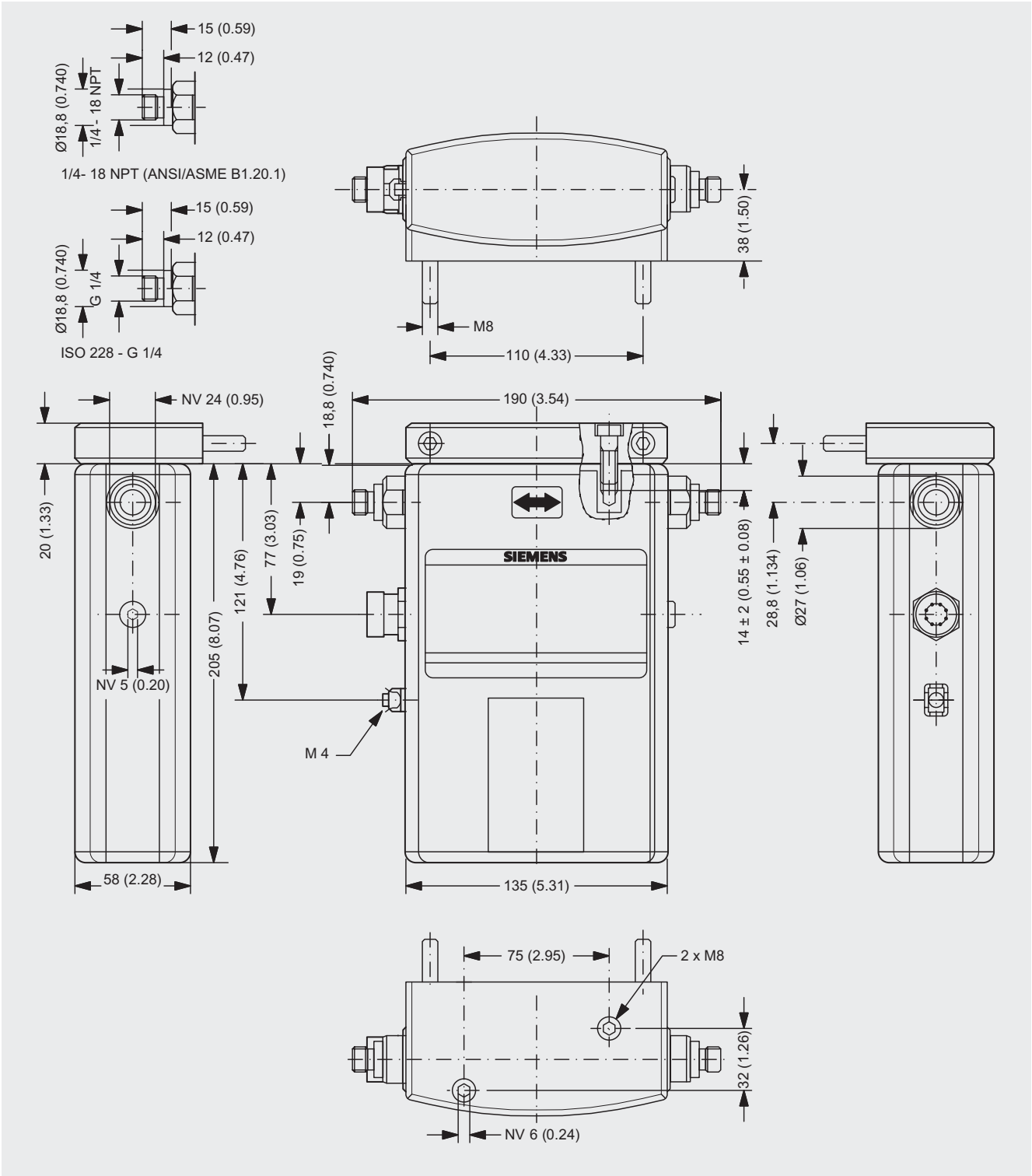
Description	Length	Order No.
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0,34 mm² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

Description	Order No.[F]
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

SITRANS FC300

Dimensional drawings



SITRANS FC300, dimensions in mm (inch)

Overview

MASS 2100 DI 1.5 is suitable for low flow measurement applications of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down range and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multiparameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1% of mass flow rate
- Large dynamic turn down range better than 500:1, from 65 kg/h to a few g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3 with a repeatability better than 0,0002 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food & beverage and pharmaceutical applications
- Market's biggest wall thickness, ensuring optimal lifetime and corrosion resistance and high pressure durability
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non ideal and unstable process conditions (pressure, temperature, density-changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector & SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 min.
- Intrinsically safe EEx ia design as standard
- Sensor pipe available in high quality AISI 316L stainless steel 1.4435 or Hastelloy C 22 2.4602 offering optimum corrosion resistance
- Dual-drive pick-up and driver construction facilitate ultra low-weight pipe construction giving the markets smallest and most stable zero point
- Rugged and space saving sensor design in stainless steel matching all environments
- High pressure program as standard
- The sensor calibration factor is also valid for gas measurement

Application

In many industries such as the food & beverage or pharamceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superiour performance in numerous applications and field trails relating to accuracy and turn down ratio. It is today the prefeered meter for research and development and mini-plant applications for liquid or gas measurement, where measuring small quantities is important.

The main applications for the MASS 2100 DI 1.5 sensor can be found in:	
Chemical industry	Liquid and gas measurement within Miniplant and R&D, dosing of additives and catalysts
Cosmetic industry	Dosing of essence & fragrances
Pharmaceutical industry	High speed dosing and coating of pills, filling of ampuls/injectors
Food & beverage industry	Dosing of flavourings, colours and additives, density measurement, in-line Measurement of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots, ABS testbeds

Design

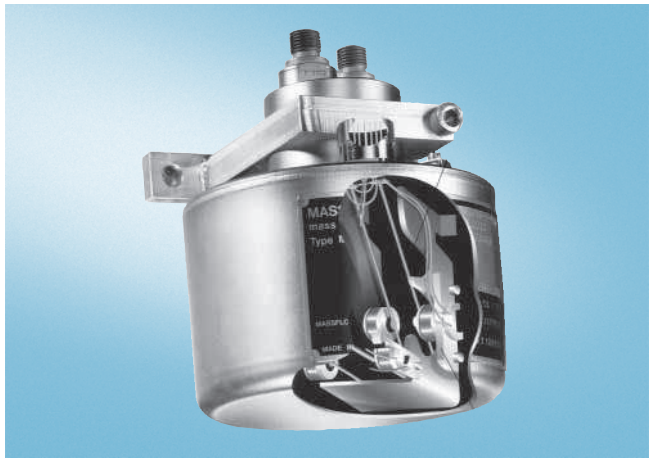
The MASS 2100 sensor consists of a single bent tube in a double omega pipe configuration, welded directly to the process connectors at each end.

The sensor is available in 2 material configurations, AISI 316L or Hastelloy C22 with ¼" NPT or ¼" ISO process connections.

The enclosure is made in stainless steel AISI 316L 1.4404 with a grade of encapsulation of IP65/NEMA 4.

The sensor is available in either a standard version with a maximum liquid temperature of 125 °C (257 °F) or a high temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The enclosed single quick release clamp fitting which, along with its compact design and single multi-plug electrical connector, will keep installation costs and time to a minimum as shown below.



MASSFLO MASS 2100 DI 1.5

Function

The measuring principle is based on coriolis force of movement, see “System information MASSFLO coriolis mass flowmeters”.

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

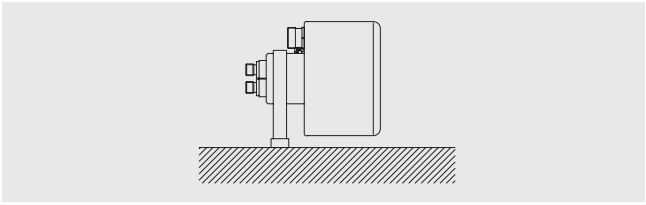
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines MASS 2100 DI 1.5 (1/16“)

Installation of MASS 2100 sensor

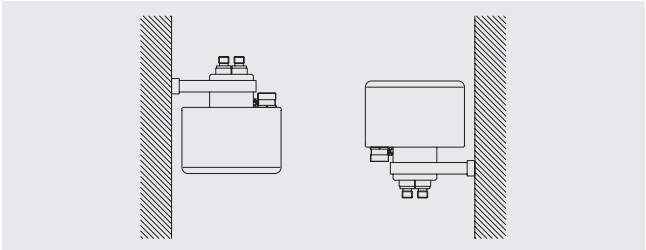
- The optimal installation is horizontal.
  If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s.
  If there are solid particles in the liquid, especially in connection with low flow, it is recommended that the sensor be mounted horizontally with inlet flange uppermost so that particles are more easily flushed out. To ensure that the sensor does not become partially empty, there must be sufficient counter-pressure on the unit min. 0.1 to 0.2 bar (1.45 to 2.9 psi).
- Mount the sensor on a vibration-free wall or steel frame.
- Locate the sensor low in the system in order to avoid an underpressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal



Liquid and gas application

Vertical



Liquid application (left), gas application (right)

Technical specifications

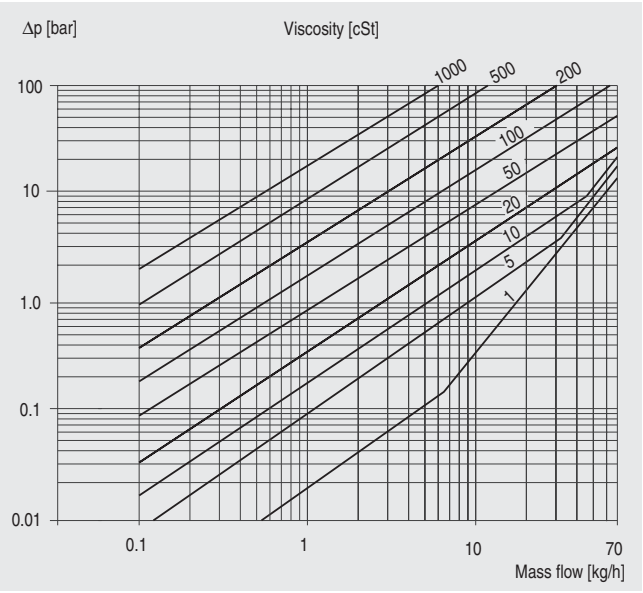
Versions	DI 1.5 (1/16“)
Inside pipe diameter (sensor consists of one continuous pipe)	1.5 mm (0.06”)
Pipe wall thickness	0.25 mm (0.010”)
Mass flow measuring range	0 ... 65 kg/h (0 ... 143 lb/h)
Density	0 ... 2.9 g/cm^3 (0 ... 0.10 lb/inch^3)
Fraction e.g.	0 ... 100 °Brix
Temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High temperature version	-50 ... +180 °C (-58 ... +356 °F)
Liquid pressure measuring pipe [1]	
Stainless steel	230 bar (3336 psi) at 20 °C (68 °F)
Hastelloy C-22	365 bar (5294 psi) at 20 °C (68 °F)
Materials	
Measuring pipe and connection	1.4435 (AISI 316L) (stainless steel) 2.4602 (Hastelloy C-22)
Enclosure and enclosure material [2]	IP66/NEMA 4 and 1.4404 (AISI 316L) (stainless steel)
Connection thread	
ISO 228/1	G¼” male
ANSI/ASME B1.20.1	¼” NPT male
Cable connection	Multiple plug connection to sensor 5 x 2 x 0.35 mm^2 twisted and screened in pairs, ext. Ø 12 mm
Ex-version	EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X
Weight approx.	2.6 kg (5.73 lb)

[1] According to DIN 2413, DIN 17457

[2] Housing is not rated for pressure containment.

For accuracy specifications see “System information MASSFLO”.

Pressure drop



MASS 2100 DI 1.5 (1/16“), pressure drop for density = 1000 kg/m^3

Selection and Ordering data	Order No.	Order code
SITRANS F C Flow sensors		
MASSFLO 2100 DI 1.5 (1/16“) sensor, without heating jacket [1]	F)	7ME4110-
Diameter		
Stainless steel 1.4435/316L		
DI 1.5, max. 125 °C (257 °F)		1A
DI 1.5, max. 180 °C (356 °F)		1B
2.4602/Hastelloy C22		
DI 1.5, max. 125 °C (257 °F)		2A
DI 1.5, max. 180 °C (356 °F)		2B
Pressure		
PN 100		D
PN 230 (316L)		L
PN 365 (C-22)		P
Process connection/flange		
Pipe thread		
G ¼“ male		10
¼“ NPT male		11
Configuration		
Standard		1
Density		2
Brix/Plato		3
Fraction (specification required)		9
Cable		
No cable		A
5 m (16 ft) cable		B
10 m (32 ft) cable		C
25 m (82 ft) cable		D
50 m (164 ft) cable		E
75 m (246 ft) cable		F
150 m (492 ft) cable		G
Calibration		
Standard calibration 3 flow x 2 points		1
Standard calibration matched pair 3 flow x 2 points		2
Accredited calibration matched pair 5 flow x 2 points (DANAK)		3
Extended calibration customer specified select Y60, Y61, Y62 or Y63 (see additional information)		8
		N0Y

[1] Not possible to order DI 1.5 sensor with heat jacket

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and Ordering data	Order code
Additional information	
Please add “-Z“ to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1B	**C12**
Welding certificate NDT-Penetrant: ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer specific transmitter setup	**Y20**
Customer specified, matched pair (5x2)	**Y60**
Customer specified calibration (5x2)	**Y61**
Customer specified, matched pair (10x1)	**Y62**
Customer specified calibration (10x1)	**Y63**
Special version	**Y99**

Spare parts

Description	Order No.[F]
Multiple plug for cable mounting	**FDK-083H5056**

Description	Length	Order No.
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0,34 mm² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

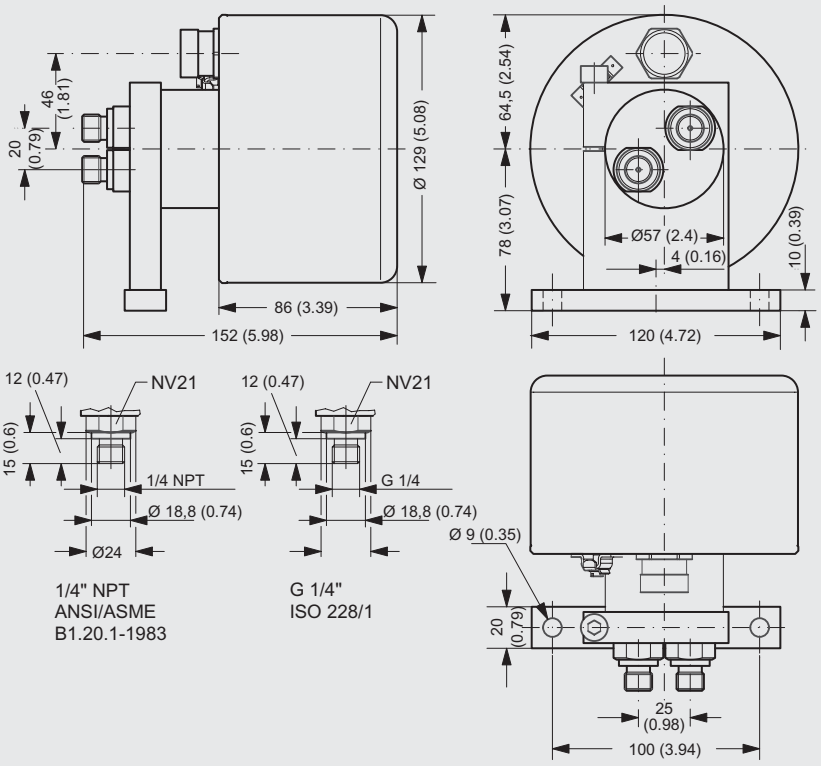
Description	Order No.[F]
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MASSFLO MASS 2100 DI 1.5

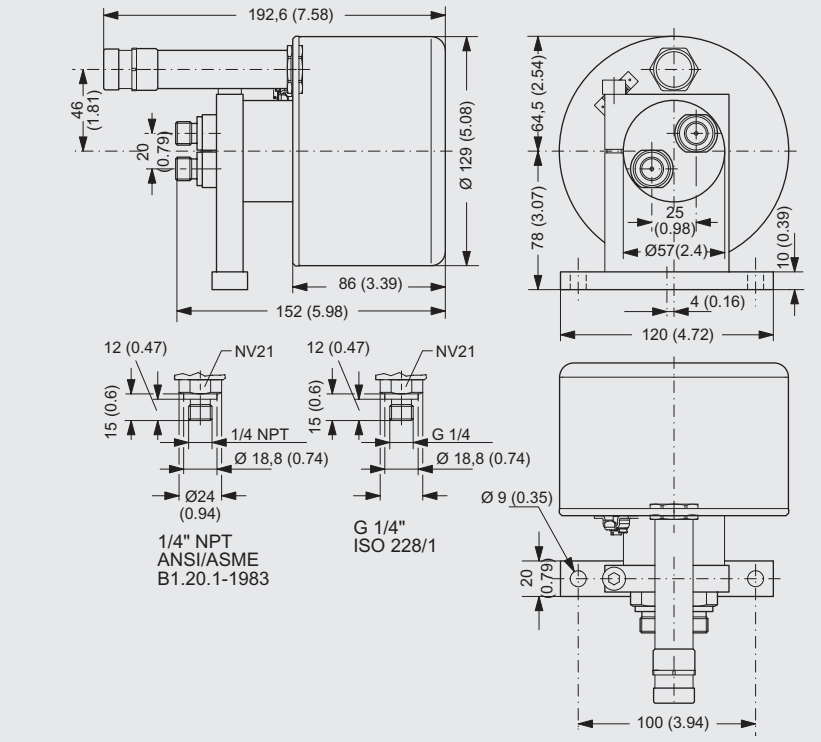
Dimensional drawings

MASS 2100 DI 1.5 (1/16“)



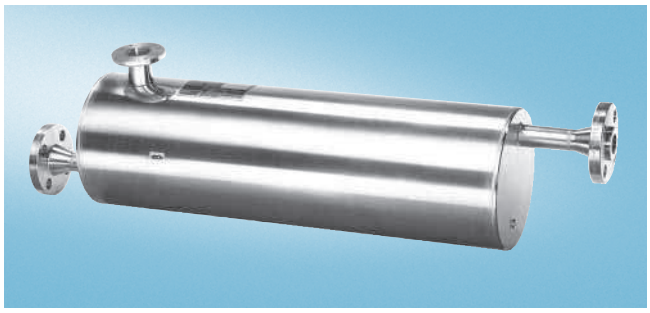
Dimensions in mm (inch)

MASS 2100 DI 1.5 High temperature version to 180 °C (356 °F)



Dimensions in mm (inch)

Overview



MASS 2100 DI 3 to DI 40 is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down range and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1% of mass flow rate
- Large dynamic turn down range better than 500:1
- Densitometer performance available through a density accuracy better than 0.0005 g/cm^3 with a repeatability better than 0.0001 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP clean-ability for food & beverage and pharmaceutical applications
- Markets biggest wall thickness, ensuring optimal lifetime and corrosion resistance and high pressure durability
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor.
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non ideal and unstable process conditions (pressure, temperature, density-changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector & SENSORPROM enables true plug&play. Installation and commissioning in less than 10 min.
- Intrinsically safe Ex-design ia IIC as standard, making service in hazardous area possible without having to demount the sensor if a compact Ex-d transmitter needs service
- Sensor pipe available in high quality AISI 316L stainless steel 1.4435 or Hastelloy C 22 2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space saving sensor design in stainless steel matching all environments
- High pressure program as standard
- The sensor calibration factor is also valid for gas measurement
- Uniform sensor interface matching all transmitter versions at the same time whether it is compact IP67/NEMA 4X, compact Ex-d or remote installation, one sensor fits all

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install and the coriolis flowmeter is recognized for its high accuracy in a wide turn down range which is a paramount in many applications.

The main applications of the coriolis flowmeter can be found in all industries, such as:	
Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Automotive	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots
Oil & gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG
Water & waste water	Dosing of chemicals for water treatment

The wide varity of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Design

The MASS 2100 sensor consists of a single bent tube in a double bent pipe configuration, welded directly to the process connectors at each end.
The centre-block is brazed onto the sensor pipes from the outside acting as a mechanical low pass filter.

The sensor is available in 2 material configurations, AISI 316L or Hastelloy C 22 with a wide variety of process connections.

The enclosure is made in stainless steel AISI 316L 1.4404 with a grade of encapsulation of IP66/NEMA 4.

The sensor is as standard EEx ia approved, intrinsically safe

The sensor can be installed in horizontal or vertical position. In horizontal position the sensor is self draining.

Heating Jacket: All the sensors MASS 2100, Di 3 to Di 40, can optionally be equipped with a heating coil to avoid solidification of sensitive fluids during down time or period between discontinuing processes. This feature gives the user an alternative to the costly electrical heating normally used, as gives the freedom to choose either hot water, superheated steam or hot oil, to maintain a constant temperature inside the sensor.

MASSFLO MASS 2100 DI 3 to DI 40

Function

The measuring principle is based on coriolis law of movement, see “System information MASSFLO coriolis mass flowmeters”.

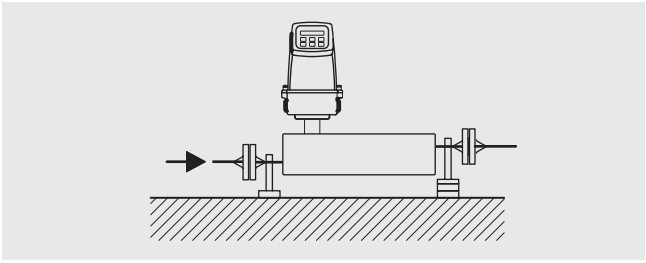
Integration

The sensor can be connected to all MASS 6000 transmitters for compact as well as remote installation.

All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

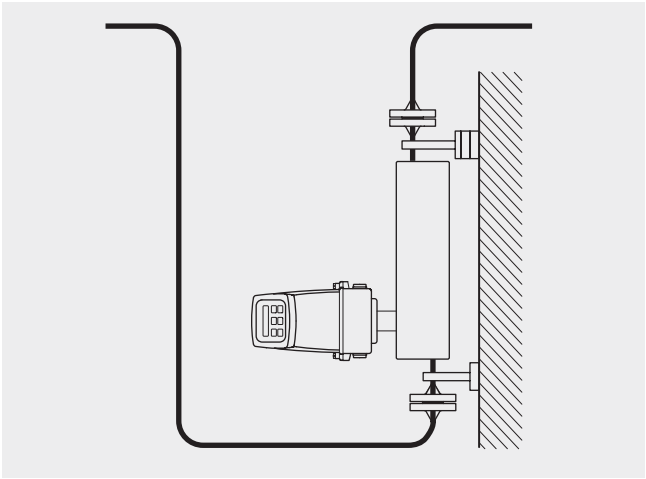
Installation guidelines MASS 2100 DI 3 ... DI 40 (1/8” ... 1½”)

Installation of sensor



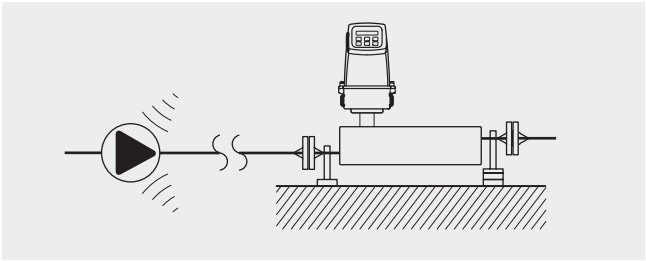
Horizontal (self-draining)

With low flow, horizontal mounting is recommended, as in this position air bubbles are easier to remove.



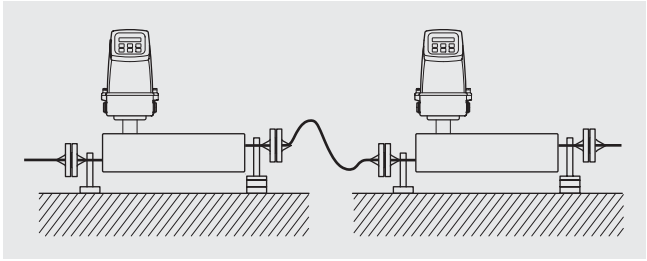
Vertical

If the liquid is volatile or contains solid particles, vertical mounting is not recommended.



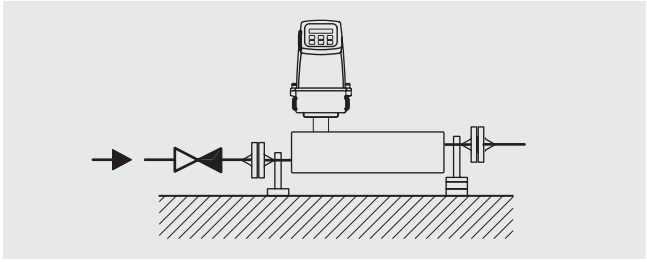
Vibration

Always locate the flowmeter as far away as possible from components that generate mechanical vibration in the piping.



Cross talk

Cross talk between sensors mounted close to each other may disturb the measurement. To avoid cross talk never mount more than one meter on each frame and mount flexible hose connections between the sensors as shown.



Zero point adjustment

To facilitiate zero point adjustment a shut-off valve should always be mounted in connection with the sensor as a proper zero point setting is essential for a good accuarcy.

Technical specifications

Versions	mm (inch)	DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)	DI 25 (1)	DI 40 (1½)
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)	29.7 (1.17)	43.1 (1.70)
Pipe wall thickness	mm (inch)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)	2.0 (0.08)	2.6 (0.10)
Mass flow measuring range	kg/h (lb/h)	0 ... 250 (0 ... 550)	0 ... 1,000 (0 ... 2,200)	0 ... 5,600 (0 ... 12,345)	0 ... 25,000 (0 ... 55,100)	0 ... 52,000 (0 ... 114,600)
Density	g/cm^3 (lb/inch^3)	0 ... 2.9 (0 ... 0.10)				
Fraction e.g.	°Brix	0 ... 100				
Temperature						
Standard	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)				
Liquid pressure measuring pipe [1]						
Stainless steel	bar (psi)	230 (3336)	265 (3844)	130 (1885)	110 (1595)	105 (1523)
Hastelloy C-22	bar (psi)	350 (5076)	410 (5946)	200 (2900)	185 (2683)	not available
Materials						
Measuring pipe, flange and thread connection		1.4435 (AISI 316L) (Stainless steel)				
		2.4602 (Hastelloy C-22)				not available
Enclosure and enclosure material		IP65 (NEMA 4) and 1.4404 (AISI 316L) (Stainless steel), **housing is not rated for pressure containment**				
Process connections [2]						
Flange						
EN 1092-1, PN 40			DN 10	DN 15	DN 25	DN 40
ANSI B16.5, Class 150			½"	½"	1"	1½"
ANSI B16.5, Class 600 (Class 300)			½"	½"	1"	1½"
Dairy screwed connection (PN 16/25/40) [3]						
DIN 11851			DN 10	DN 15	DN 32	DN 40
ISO 2853/BS 4825 part 4 (SS3351)			25 mm	25 mm	38 mm	51 mm
Dairy clamp connection (PN 16) [3]						
ISO 2852/BS 4825 part 3 (SMS3016)			25 mm	25 mm	38 mm	51 mm
Thread						
ISO 228/1, PN 100		G¼" female	G¼" male	G½" male	G1" male	G2" male
ANSI/ASME B1.20.1, PN 100		¼" NPT female	¼" NPT male	½" NPT male	1" NPT male	2" NPT male
Cable connection		Multiple plug connection to sensor 5 x 2 x 0.35 mm^2 twisted and screened in pairs, ext. Ø 12 mm				
Ex-version		EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X				
Weight approx.	kg (lb)	4 (8.8)	8 (17.6)	12 (26.5)	48 (105.8)	70 (154.5)

[1] Max. at 20 °C (68 °F), DIN 2413, DIN 17457

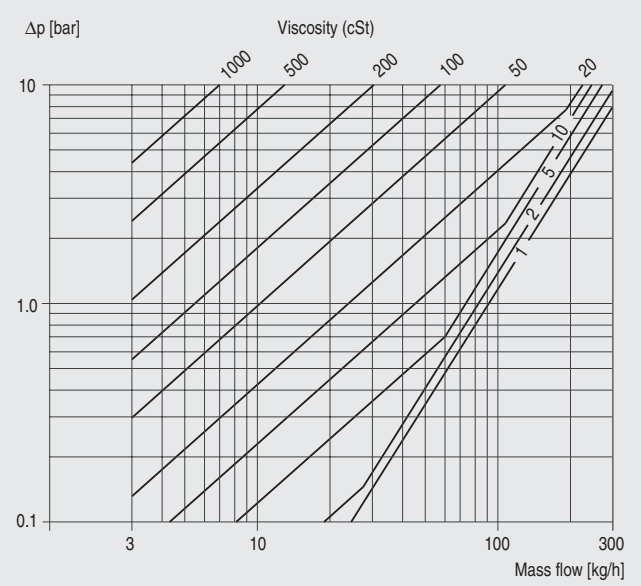
[2] Other connections to order, see "Selection and Ordering data"

[3] Material, 1.4401 or corresponding

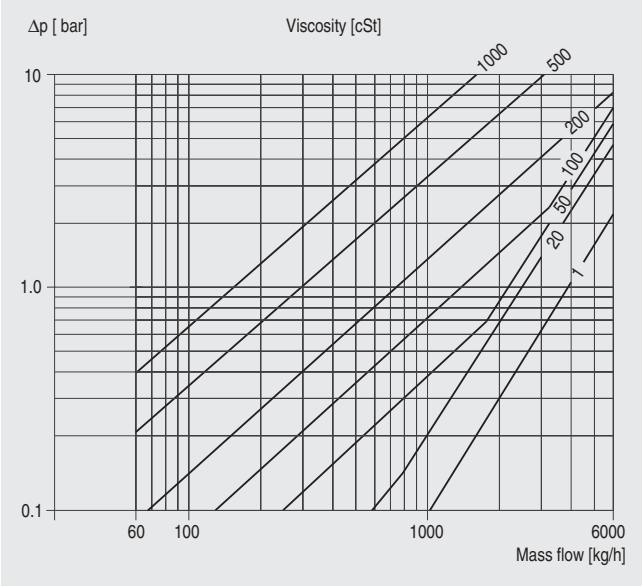
For accuracy specification see "System information MASSFLO".

MASSFLO MASS 2100 DI 3 to DI 40

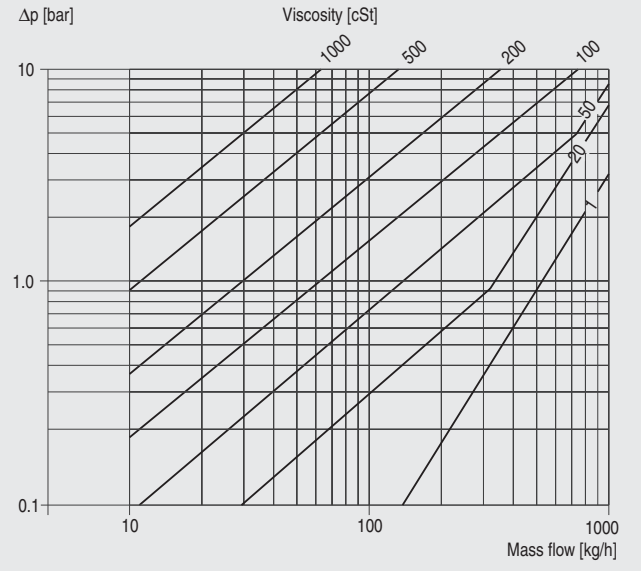
Pressure drop



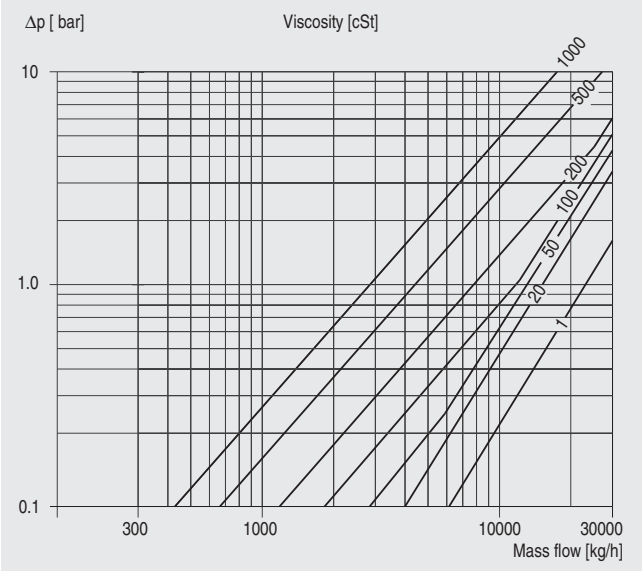
MASS 2100 DI 3 (1/8"), pressure drop for density = 1000 kg/m^3



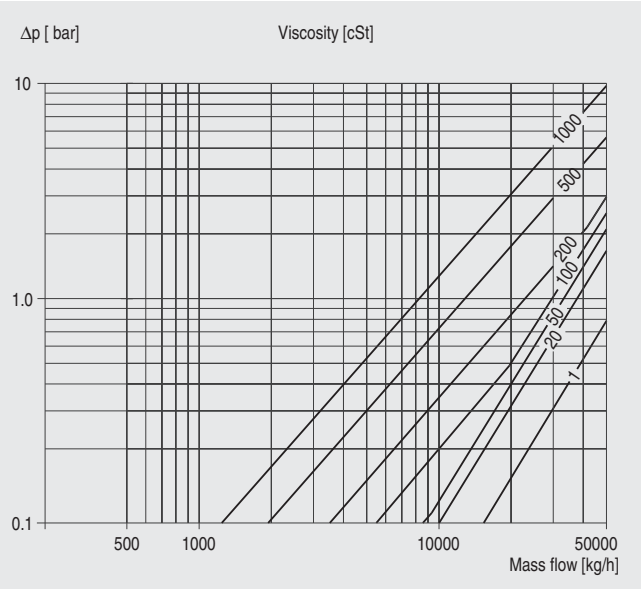
MASS 2100 DI 15 (½"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 6 (¼"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 25 (1"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 40 (1½"), pressure drop for density = 1000 kg/m^3

MASSFLO MASS 2100 DI 3 to DI 40

Selection and Ordering data		Order No.	Order code
SITRANS F C sensors			
MASS 2100 without heating jacket	F)	7ME4100 -	
MASS 2100 heated, DN 15 connection	F)	7ME4200 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	F)	7ME4210 -	
Diameter			
Stainless steel 1.4435/316L			
DI 3 (PN 100/PN 230)		1C	
DI 6		1D	
DI 15		1E	
DI 25		1F	
DI 40		1G	
2.4602/Hastelloy C22			
DI 3 (PN 100/PN 350)		2C	
DI 6		2D	
DI 15		2E	
DI 25		2F	
Pressure			
PN 16 (DI 6, DI 15, DI 25 and DI 40)		A	
PN 25 (DI 6, DI 15, DI 25 and DI 40)		B	
PN 40 (DI 6, DI 15, DI 25 and DI 40)		C	
PN 100 (DI 3, DI 6, DI 15, DI 25 and DI 40)		D	
PN 105 (DI 40, 2“, 316L)		E	
PN 110 (DI 25, 1“, 316L)		F	
PN 130 (DI 15, ½“, 316L)		G	
PN 185 (DI 25, 1“, Hastelly C-22)		J	
PN 200 (DI 15, ½“, Hastelly C-22)		K	
PN 230 (DI 3, ¼“, 316L)		L	
PN 265 (DI 6, ¼“, 316L)		M	
PN 350 (DI 3, ¼“, Hastelloy C-22)		N	
PN 410 (DI 6, ¼“, Hastelloy C-22)		Q	
Class 150 (DI 6, DI 15, DI 25 and DI 40)		R	
Class 600 (DI 6, DI 15, DI 25 and DI 40)		S	
Process connection/flange			
Pipe thread			
G ¼“		10	
¼“ NPT		11	
G ½“		12	
½“ NPT		13	
G 1		14	
1“ NPT		15	
G 2“		16	
2“ NPT		17	
Flange EN1092-1			
DN 10 (PN 40/PN 100)		20	
DN 15 (PN 40/PN 100)		21	
DN 25 (PN 40/PN 100)		22	
DN 40 (PN 40/PN 100)		23	
DN 50 (PN 40/PN 100)		24	
Flange ASME/ANSI B 16.5			
½“ (class 150/class 600)		30	
¾“ (class 150/class 600)		31	
1“ (class 150/class 600)		32	
1 ½“ (class 150/class 600)		33	
2 “ (class 150/class 600)		34	

Selection and Ordering data		Order No.	Order code
SITRANS F C sensors			
MASS 2100 without heating jacket	F)	7ME4100 -	
MASS 2100 heated, DN 15 connection	F)	7ME4200 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	F)	7ME4210 -	
Dairy screwed connection DIN 11851			
DN 10 (PN 40)		40	
DN 15 (PN 40)		41	
DN 25 (PN 40)		42	
DN 32 (PN 40)		43	
DN 40 (PN 25)		44	
DN 50 (PN 25)		45	
DN 65 (PN 25)		46	
Dairy clamp connection ISO 2852			
25 mm (PN 16)		50	
38 mm (PN 16)		51	
51 mm (PN 16)		52	
Dairy screwed connection ISO 2853			
25 mm (PN 16)		60	
38 mm (PN 16)		61	
51 mm (PN 16)		62	
Configuration			
Standard		1	
Density		2	
Brix/Plato		3	
Fraction (specification required)		9	N0Y
Transmitter compact mounted on sensor			
No transmitter, sensor only		A	
MASS 6000, Ex-d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with EEx-de [ia/ib] T3 -T6 Ex-approval.		B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC.		C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz		D	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC		E	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, ½" NPT		F	
Cable			
No cable		A	
5 m (16 ft) cable		B	
10 m (32 ft) cable		C	
25 m (82 ft) cable		D	
50 m (164 ft) cable		E	
75 m (246 ft) cable		F	
150 m (492 ft) cable		G	
Calibration			
Standard calibration 3 flow x 2 points		1	
Standard calibration matched pair 3 flow x 2 points		2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)		3	
Extended calibration customer specified select Y60, Y61, Y62 or Y63 (see additional information)		8	

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

Dairy MLFB example

MASS 2100 7ME4100-■■C■■ 1■A■

Stainless stell, DI 15 — 1E

Dairy screwed connection DIN 11851, DN 15 — 41

MASS 6000 IP67 compact mounted — D

Standard calibration — 1

Selection and Ordering data	Order code
Addtional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1B	**C12**
Welding certificate NDT X-ray: EN 25817/B DI 3 sensor only: NDT-Penetrant: ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer specific transmitter setup	**Y20**
Customer specified, matched pair (5x2)	**Y60**
Customer specified calibration (5x2)	**Y61**
Customer specified, matched pair (10x1)	**Y62**
Customer specified calibration (10x1)	**Y63**
Special version	**Y99**

Selection and Ordering data

Accessories

Description	Dimension	Order No.[F)]
Mating parts for hygienic fittings DIN 11851 Includes: • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets	DN 10	**FDK-085U1016**
	DN 15	**FDK-085U1017**
	DN 25	**FDK-085U1019**
	DN 32	**FDK-085U1020**
	DN 40	**FDK-085U1021**
	DN 50	**FDK-085U1022**
	DN 65	**FDK-085U1023**
Mating parts for hygienic clamp ISO 2852 Includes: • 2 clamps • 2 mating parts • 2 EPDM gaskets	25 mm	**FDK-085U1029**
	40 mm	**FDK-085U1031**
	50 mm	**FDK-085U1032**

Gaskets for MASS 2100

Description	Dimension	Order No.[F)]
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10	**FDK-085U1006**
	DN 15	**FDK-085U1007**
	DN 25	**FDK-085U1009**
	DN 32	**FDK-085U1010**
	DN 40	**FDK-085U1011**
	DN 50	**FDK-085U1012**
	DN 65	**FDK-085U1013**

Spare parts

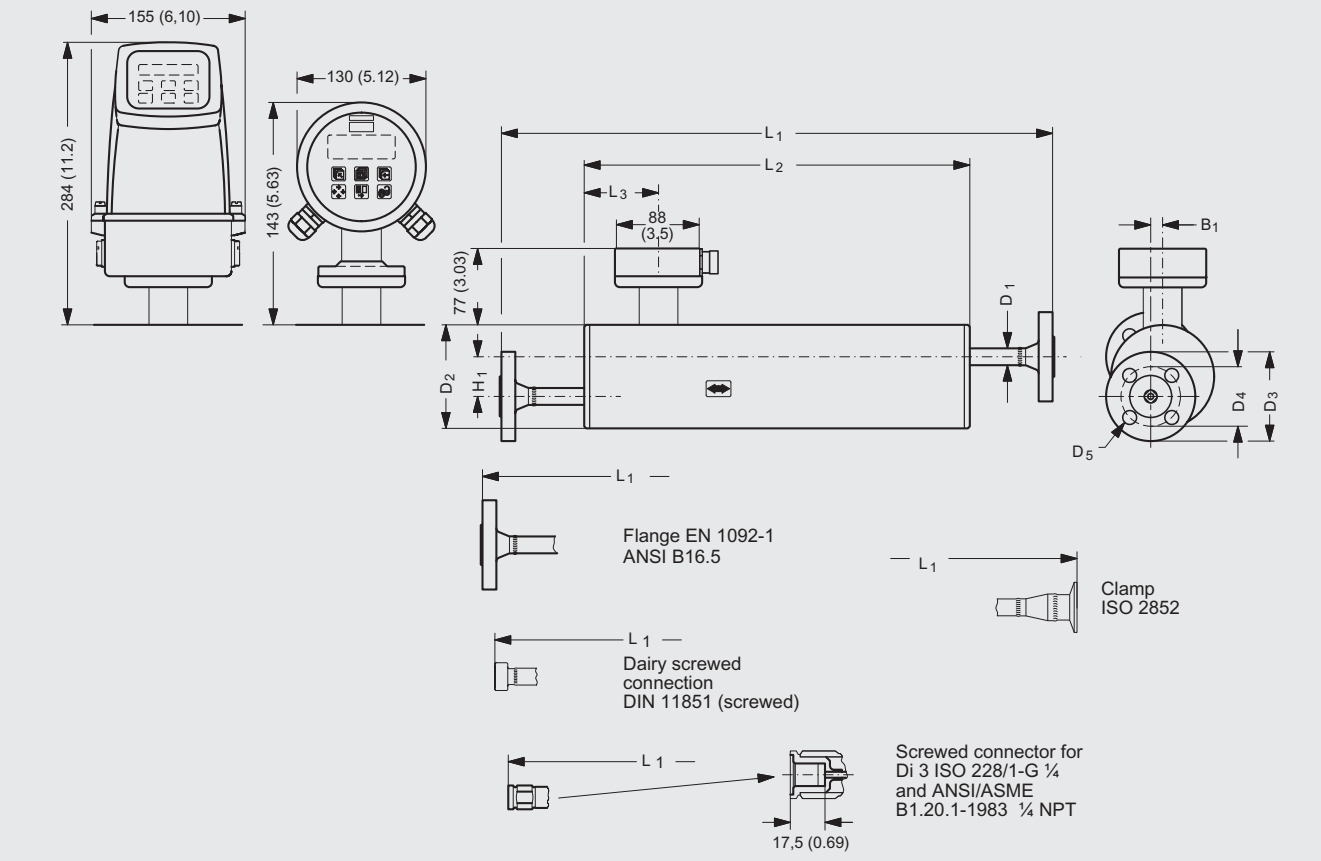
Description	Length	Order No.[F)]
Multiple plug for cable mounting		**FDK-083H5056**
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0,34 mm^2 twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**
Adapter for MASS 2100		**FDK-083L8889**
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)		**FDK-083H4410**

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MASSFLO MASS 2100 DI 3 to DI 40

Dimensional drawings

MASS 2100 sensor



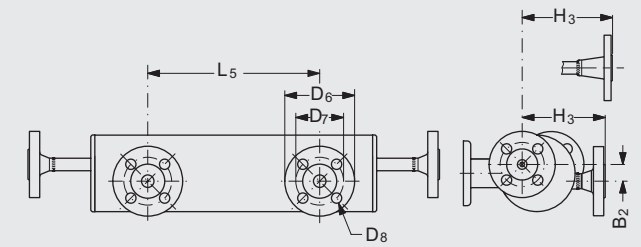
Dimension in mm (inch)

Sensor size	Connections			L1 mm	L2 mm	L3 mm	H1 mm	B1 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm
DN (inch)	Type	Pressure rating	Size										
DI 3 (1/8“)	Pipe thread ISO 228/1 - G¼	PN 100	¼”	400	280	75.0	60	0	21.3	104	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ¼” NPT	PN 100	¼”	400	280	75.0	60	0	21.3	104	-	-	-
DI 6 (¼“)	Flange EN 1092-1	PN 40	DN 10	560	390	62.0	40	12	17.0	104	90.0	60.0	14.0
	Flange ANSI B16.5	Class 150	½“	624	390	62.0	40	12	17.0	104	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	½“	608	390	62.0	40	12	17.0	104	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 10	532	390	62.0	40	12	17.0	104	-	-	-
	Clamp ISO 2852	PN 16	25 mm	570	390	62.0	40	12	17.0	104	-	-	-
DI 15 (½“)	Flange EN 1092-1	PN 40	DN 15	620	444	75.0	44	20	21.3	129	95.0	65.0	14.0
	Flange ANSI B16.5	Class 150	½“	639	444	75.0	44	20	21.3	129	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	½“	660	444	75.0	44	20	21.3	129	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 15	586	444	75.0	44	20	21.3	129	-	-	-
	Clamp ISO 2852	PN 16	25 mm	624	444	75.0	44	20	21.3	129	-	-	-
DI 25 (1“)	Flange EN 1092-1	PN 40	DN 25	934	700	74.5	126	25	33.7	219	115.0	85.0	14.0
	Flange ANSI B16.5	Class 150	1“	967	700	74.5	126	25	33.7	219	108.0	79.2	15.7
	Flange ANSI B16.5	Class 600	1“	992	700	74.5	126	25	33.7	219	124.0	88.9	19.1
	Screwed connection DIN 11851	PN 40	DN 32	922	700	74.5	126	25	33.7	219	-	-	-
	Clamp ISO 2852	PN 16	38 mm	940	700	74.5	126	25	33.7	219	-	-	-
DI 40 (1½“)	Flange EN 1092-1	PN 40	DN 40	1064	850	71.5	180	0	48.3	273	150.0	110.0	18.0
	Flange ANSI B16.5	Class 150	1½“	1100	850	71.5	180	0	48.3	273	127.0	98.6	15.7
	Flange ANSI B16.5	Class 600	1½“	1128	850	71.5	180	0	48.3	273	155.4	114.3	22.4
	Screwed connection DIN 11851	PN 25	DN 50	1090	850	71.5	180	0	48.3	273	-	-	-
	Clamp ISO 2852	PN 25	51 mm	1062	850	71.5	180	0	48.3	273	-	-	-

Sensor size	Connections			L1 inch	L2 inch	L3 inch	H1 inch	B1 inch	D1 inch	D2 inch	D3 inch	D4 inch	D5 inch
DN (inch)	Type	Pressure rating	Size										
DI 3 (1/8“)	Pipe thread ISO 228/1 - G¼	PN 100	¼”	15.75	11.02	2.95	2.36	0	0.84	4.09	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ¼” NPT	PN 100	¼”	15.75	11.02	2.95	2.36	0	0.84	4.09	-	-	-
DI 6 (¼“)	Flange EN 1092-1	PN 40	DN 10	22.05	15.35	2.44	1.57	0.47	0.67	4.09	3.54	2.36	0.55
	Flange ANSI B16.5	Class 150	½“	24.57	15.35	2.44	1.57	0.47	0.67	4.09	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½“	23.94	15.35	2.44	1.57	0.47	0.67	4.09	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 10	20.94	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
	Clamp ISO 2852	PN 16	25 mm	22.44	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
DI 15 (½“)	Flange EN 1092-1	PN 40	DN 15	24.41	17.48	2.95	1.73	0.79	0.84	5.08	3.74	2.56	0.55
	Flange ANSI B16.5	Class 150	½“	25.16	17.48	2.95	1.73	0.79	0.84	5.08	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½“	25.98	17.48	2.95	1.73	0.79	0.84	5.08	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 15	23.07	17.48	2.95	1.73	0.79	0.84	5.08	-	-	-
	Clamp ISO 2852	PN 16	25 mm	24.57	17.48	2.95	1.73	0.79	0.84	5.08	-	-	-
DI 25 (1“)	Flange EN 1092-1	PN 40	DN 25	36.77	27.56	2.93	4.96	0.98	1.33	8.62	4.53	3.35	0.55
	Flange ANSI B16.5	Class 150	1“	38.07	27.56	2.93	4.96	0.98	1.33	8.62	4.25	3.12	0.62
	Flange ANSI B16.5	Class 600	1“	39.06	27.56	2.93	4.96	0.98	1.33	8.62	4.88	3.50	0.75
	Screwed connection DIN 11851	PN 40	DN 32	36.30	27.56	2.93	4.96	0.98	1.33	8.62	-	-	-
	Clamp ISO 2852	PN 16	38 mm	37.01	27.56	2.93	4.96	0.98	1.33	8.62	-	-	-
DI 40 (1½“)	Flange EN 1092-1	PN 40	DN 40	41.89	33.46	2.81	7.09	0	1.9	10.75	5.91	4.33	0.71
	Flange ANSI B16.5	Class 150	1½“	43.31	33.46	2.81	7.09	0	1.9	10.75	5	3.88	0.62
	Flange ANSI B16.5	Class 600	1½“	44.41	33.46	2.81	7.09	0	1.9	10.75	6.12	4.50	0.88
	Screwed connection DIN 11851	PN 25	DN 50	42.91	33.46	2.81	7.09	0	1.9	10.75	-	-	-
	Clamp ISO 2852	PN 25	51 mm	41.81	33.46	2.81	7.09	0	1.9	10.75	-	-	-

MASSFLO MASS 2100 DI 3 to DI 40

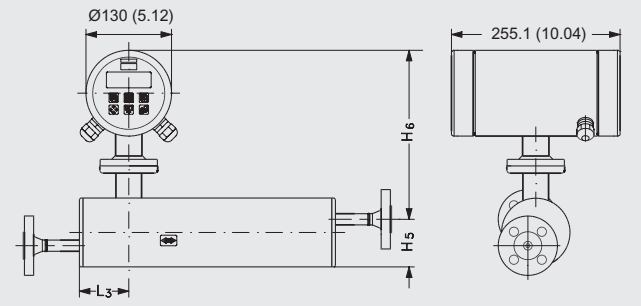
MASS 2100 sensor with “heating jacket”



Dimensions in mm (inch)

Sensor size	Connec-tions heated			L5	L3	H3	B2	D6	D7	D8
DN (inch)	Type	Pressure rating	Size	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
DI 3 (1/8“)	EN 1092-1	PN 40	DN 15	234 (9.21)	75 (.2.95)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	75 (2.95)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (¼“)	EN 1092-1	PN 40	DN 15	234 (9.21)	62 (2.44)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	62 (2.44)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (½“)	EN 1092-1	PN 40	DN 15	234 (9.21)	75 (2.95)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class150	½"	234 (9.21)	75 (2.95)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 25 (1“)	EN 1092-1	PN 40	DN 15	420 (16.54)	75 (2.93)	213.6 (8.41)	60 (2.36)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	420 (16.54)	75 (2.93)	223.2 (8.79)	60 (2.36)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 40 (1½“)	EN 1092-1	PN 40	DN 15	500 (19.68)	71 (2.81)	267.5 (10.53)	43 (1.69)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	500 (19.68)	71 (2.81)	277.1 (10.91)	43 (1.69)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

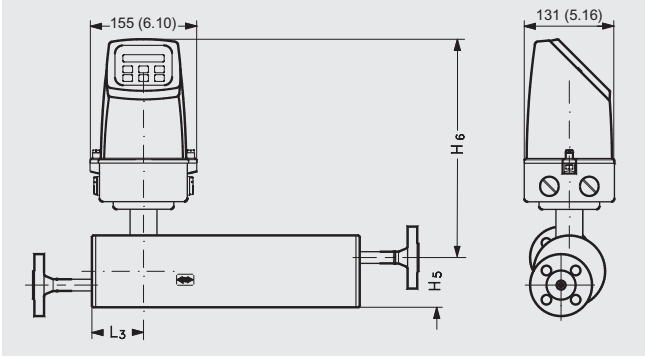
MASS 2100 and MASS 6000 Ex-d compact version



Dimensions in mm (inch)

Sensor size [DN (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	307 (12.1)	389 (15.32)
6 (¼)	62 (2.44)	72 (2.83)	317 (12.48)	389 (15.32)
15 (½)	75 (2.95)	87 (3.43)	328 (12.91)	414 (16.30)
25 (1)	75 (2.95)	173 (6.81)	332 (13.07)	504 (19.84)
40 (1½)	75 (2.95)	227 (8.94)	332 (13.07)	558 (21.97)

MASS 2100 and MASS 6000 IP67 compact version



Dimensions in mm (inch)

Sensor size [DN (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	246 (9.69)	328 (12.91)
6 (¼)	62 (2.44)	72 (2.83)	256 (10.08)	328 (12.91)
15 (½)	75 (2.95)	87 (3.43)	267 (10.51)	353 (13.90)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	443 (17.44)
40 (1½)	75 (2.95)	227 (8.94)	271 (10.67)	497 (19.57)

Overview

MASS 2100 MC2 DN 50 to DN 150 (2" to 6") and MC2 Hygienic (EHEDG certified) from DN 20 to DN 80 (¾" to 3") is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down range and density accuracy. The very compact sensor construction makes installation and commissioning of even the largest sizes very straight forward and easy.

The sensor delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction flow.

Benefits

- High accuracy better than 0.15% of mass flow rate
- Large dynamic turn down range
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3
- Space saving split-flow sensor design facilitating low pressure loss
- Parallel S-tube design and optimal oriented inductive sensors enhances accuracy and turn-down range
- Self draining in both horizontal and vertical position
- Rigid enclosure design reduces the influence from pipeline vibration and thermal stress
- 4-wire Pt100 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 min.
- Safe Ex-design EEx em [ib] IIC
- Sensor pipe available in high quality AISI 316L stainless steel 1.4571 or Hastelloy C 4 2.4610 offering optimum corrosion resistance
- The sensor calibration factor is also valid for gas measurement

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install and the coriolis flowmeter is recognized for its high accuracy in a wide turn-down range which is a paramount in many applications.

The main applications of the coriolis flowmeter can be found in all industries, such as:	
Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage EDEHG certified	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Oil & gas	Gas measurement, furnace control, test separators, LPG, oil bunkering
Water & waste water	Dosing of chemicals for water treatment

The wide varity of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Design

The MC2 sensor consists of 2 parallel measuring pipes, welded directly onto a flow-splitter at each end to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations.

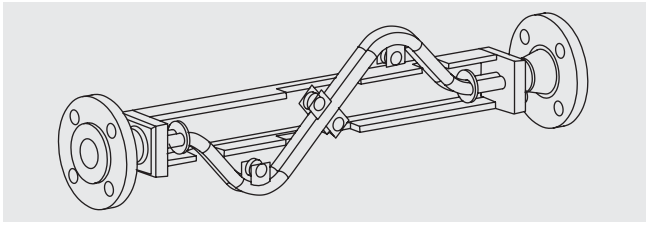
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low pass filter.

The sensor is available in 2 material configurations, AISI 316L or Hastelloy C4 with a wide variety of process connections.

The enclosure is made of stainless steel AISI 304 1.4301 with a grade of encapsulation of IP67/NEMA 4.

The sensor is Ex-approved EEx em [ib] IIC

The sensor can be installed in horizontal or vertical position, and is self draining in both positions.



Due to the increased safety concept used on the bigger sized sensors, the MASS 6000 19" or MASS 6000 IP67 standard versions can be connected but has to be remote mounted in the safe area. For all non hazardous applications the complete MASS 6000 transmitter program can be used.

Hazardous area
Zone 1 + 2

Safe area

MC2

Function

The measuring principle is based on coriolis law of movement, see “System information MASSFLO coriolis mass flowmeters”.

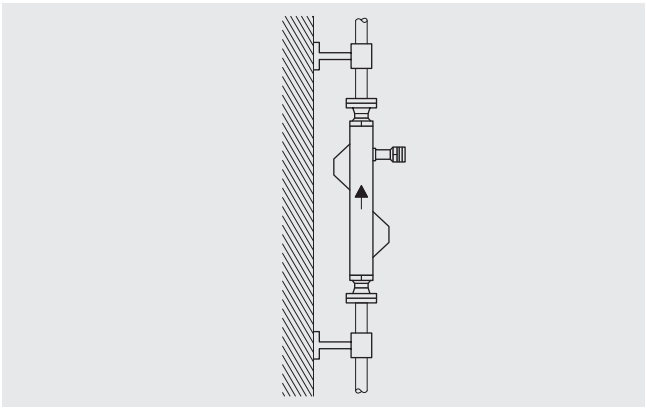
Integration

Installation guidelines MC2 DN 50 ... DN 150

Installation of sensor

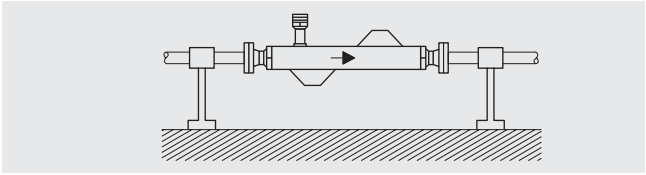
The optimal installation orientation is a vertical installation with an upward flow as shown in the following figure. This has the advantage that any solids contained in the fluid will settle downward and gas bubbles will move upward out of the meter tube when the flow rate is zero. Additionally, it is easy to drain the meter tube. Deposits can thereby be avoided.

Vertical orientation:



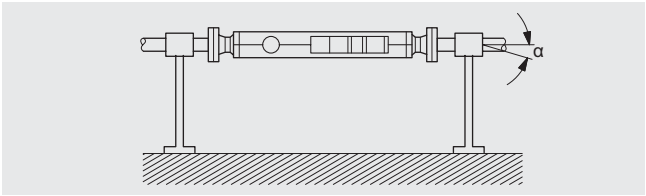
Vertical installation self-draining (upward flow)

Horizontal orientation



Horizontal installation

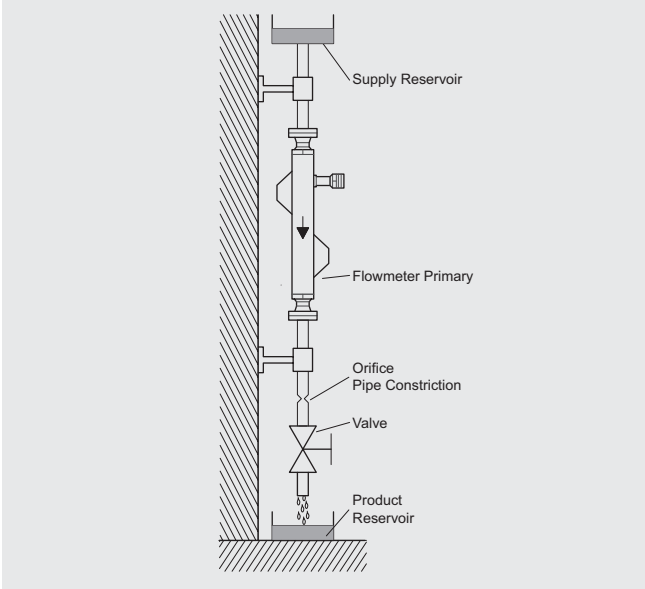
Horizontal orientation, self-draining



Horizontal orientation, self-draining, α 2° ... 4°

Installation in a drop line

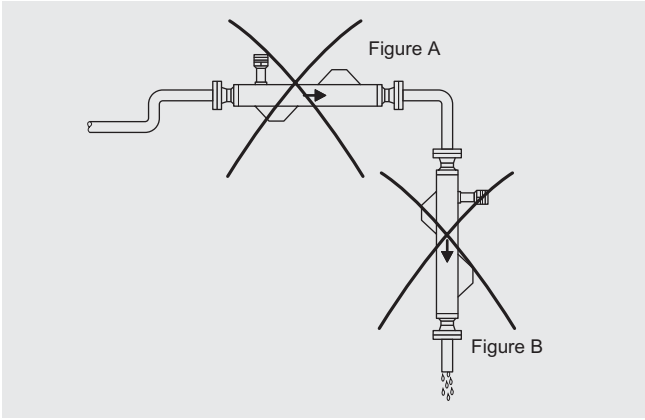
The installation recommendation shown in the following figure is only possible if a pipeline reduction or orifice with a smaller cross section can be installed to prevent the sensor from being partially drained during the measurements.



Installation in a drop line

Difficult installation locations

The accumulation of air or gas bubbles in the meter tube can lead to increased inaccuracies. Some difficult installations are shown in the following figure.
Installations at the highest point in the system (figure A) can result in the formation of air pockets which can lead to appreciable inaccuracies.
Another difficult installation condition is immediately upstream of a free discharge (figure B) in a drop line.



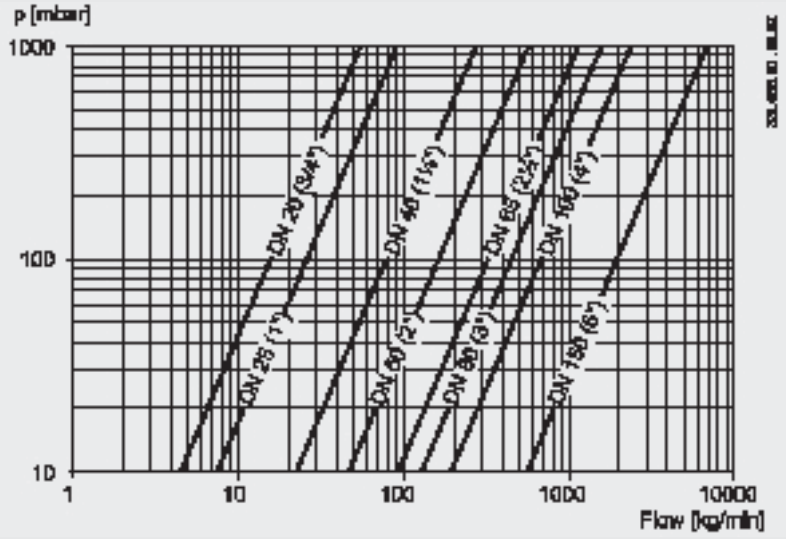
Difficult installation locations

Technical specifications

Versions	mm (inch)	20 (¾)	25 (1)	40 (1½)	50 (2)	65 (2½)	80 (3)	100 (4)	150 (6)
Inside pipe diameter	2 x mm (inch)	8.0 (0.31)	10.0 (0.39)	16.0 (0.63)	22.0 (0.87)	29.0 (1.14)	34.0 (1.34)	43.1 (1.69)	76.1 (2.99)
Pipe wall thickness	mm (inch)	1.0 (0.04)	1.0 (0.04)	1.0 (0.04)	1.5 (0.06)	1.5 (0.06)	2.0 (0.08)	2.6 (0.10)	3.2 (0.13)
Mass flow measuring range at pressure drop of 2 bar (29 psi) at 1 g/cm³ (0.036 lb/inch³)	kg/h (lb/h)	6 000 (13 227)	9 000 (19 841)	28 500 (62 831)	55 200 (121 695)	113 400 (250 000)	147 600 (325 401)	249 600 (550 273)	660 000 (1 455 049)
Density	g/cm³ (lb/inch³)	0.5 ... 3.5 (0.18 ... 0.126)							
Fraction e.g. Brix	°Brix	0 ... 100							Not possible
Temperature									
Standard-version	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)							
Ex-version	°C (°F)	-20 ... +180 °C (-4 ... +356 °F)							
Liquid pressure measuring pipe									
Stainless steel (DIN 2413, 20 °C (68 °F))	bar (psi)				100 (1 450)	100 (1 450)	100 (1 450)	40 (580)	40 (580)
Materials									
Measuring pipe		SS 1.4571 or Hastelloy C4							
Flange		SS 1.4571 or Hastelloy C4							
Enclosure		IP67							
Enclosure material/connection box		1.4301 / aluminium							
Process connections		See dimensional drawings							
Electrical connections		Screw terminals, M 20							
Cable length		5 x 2 x 0.35 mm² twisted and screened in pairs, ext. Ø 12 mm							
Ex-version									
ATEX 1388X		II 1/2 EEx em [ib] IIC T2-T6							
Weight approx.	kg (lb)	13 (28)	14 (31)	18 (40)	34 (75)	47 (104)	58 (128)	91 (201)	261 (573)

For accuracy specifications see „System information MASSFLO“.

Pressure drop



F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

MC2

Selection and Ordering data		Order No. Order code
SITRANS F C flow sensors MC2	F)	7ME4300-
Nominal diameter		
W 1.4571/316Ti		
DN 50		1A
DN 65		1B
DN 80		1C
DN 100		1D
DN 150		1E
Hastelloy C4		
DN 50		2A
DN 65		2B
DN 80		2C
DN 100		2D
DN 150		2E
Nominal pressure		
PN 40		A
PN 100		B
Class 150		C
Class 300		D
Class 600		E
Clamps/screwed-connections		F
Process connections		
Flange EN 1092-1		
DN 50 (PN 40/PN 100)		20
DN 65 (PN 40/PN 100)		21
DN 80 (PN 40/PN 100)		22
DN 100 (PN 40)		23
DN 150 (PN 40)		24
Flange ASME/ANSI		
2" (class 150/300/600)		30
2 ½" (class 150/300/600)		31
3" (class 150/300/600)		32
4" (class 150/300)		33
6" (class 150/300)		34
Dairy screwed connection to DIN 11851		
DN 50 (PN 25)		40
DN 65 (PN 25)		41
DN 80 (PN 25)		42
DN 100 (PN 25)		43
Dairy clamp connection DIN 32676 Tri-clamp		
50 mm clamp (PN 16)		50
66 mm clamp (PN 10)		51
81 mm clamp (PN 10)		52
100 mm clamp (PN 10)		53
Aseptic nut flange DIN 11864-2 form A for pipes dimensioned by DIN 11866		
DN 40 (1½")		60
DN 50 (2")		61
DN 65 (2½")		62
DN 80 (3")		63
DN 100 (4")		64
Configuration		
Flow and density (5 kg/m³)		1
Flow, Brix/Plato and density (1 kg/m³)[1]		2
Flow and density (1 kg/m³)[1]		5
Flow, fraction (specified by customer) and density (1 kg/m³)[1]		9 N0Y
Ex-approval		
Without explosion protection		A
With explosion protection		B

Selection and Ordering data		Order No. Order code
SITRANS F C flow sensors MC2	F)	7ME4300-
Cable		
No cable (see accessories)		A
Calibration		
Standard		1
Matched pair		2

[1] Extended density and fraction not possible with DN 150

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Dairy MLFB example

MC2 sensor — 7ME4300-**A**-1AA1

Stainless steel, DN 80 — **1C**

Dairy screwed connection DIN 11851, DN 80 — **42**

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-31B	**C12**
Welding certificate NDT X-ray: EN 25817/B	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer specific transmitter setup	**Y20**
Customer specified, matched pair (5x2)	**Y60**
Customer specified calibration (5x2)	**Y61**
Customer specified, matched pair (10x1)	**Y62**
Customer specified calibration (10x1)	**Y63**
Special version	**Y99**

Accessories

Description	Order No.[F)]
Cables from MC2 sensor to MASS 6000 transmitter	
10 m (32 ft)	**FDK-083H3001**
25 m (80 ft)	**FDK-083H3002**
75 m (240 ft)	**FDK-083H3003**
150 m (480 ft)	**FDK-083H3004**

Spare parts

Description	Order No.[F)]
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order No.	Order code
SITRANS F C flow sensors		
MC2 for Hygienic applications only	F) 7ME4310-	
Nominal diameter		
W 1.4435/316L		
DN 20	1A	
DN 25	1B	
DN 40	1C	
DN 50	1D	
DN 65	1E	
DN 80	1F	
Nominal pressure 40 bar, PN 25		
Clamps/screwed-connections	F	
Pressure and Process connections		
Dairy screwed connection to DIN 11851		
DN 20 (¾"), PN 25	40	
DN 25 (1") , PN 25	41	
DN 40 (1½") , PN 25	42	
DN 50 (2"), PN 25	43	
DN 65 (2½") , PN 25	44	
DN 80 (3") , PN 25	45	
Dairy clamp connectors for DIN 32676 Tri-clamp		
20 mm clamp	47	
26 mm clamp	48	
38 mm clamp	49	
50 mm clamp	50	
66 mm clamp	51	
81 mm clamp	52	
Aseptic connectors DIN 11864-2 Form A for DIN tubes		
DN 20	58	
DN 25	59	
DN 40	60	
DN 50	61	
DN 65	62	
DN 80	63	
Configuration		
Flow and density (5 kg/m³)	1	
Flow, Brix/Plato and density (5 kg/m³)[1]	2	
Flow and density (1 kg/m³)[1]	5	
Flow, fraction (customer specified application form the net)	9	N0Y
Ex-approval		
Standard	A	
Ex, ATEX, FM Class I, Div 1	B	
Cable		
No cable (see accessories)	A	
Calibration		
Standard	1	
Matched pair	2	

[1] Extended density and fraction not possible with DN 150

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-31B	C12
Welding certificate NDT X-ray: EN 25817/B	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer specific transmitter setup	Y20
Customer specified, matched pair (5x2)	Y60
Customer specified calibration (5x2)	Y61
Customer specified, matched pair (10x1)	Y62
Customer specified calibration (10x1)	Y63
Special version	Y99

Accessories

Description	Order No.[F]
Cables from MC2 sensor to MASS 6000 transmitter	
10 m (32 ft)	FDK-083H3001
25 m (80 ft)	FDK-083H3002
75 m (240 ft)	FDK-083H3003
150 m (480 ft)	FDK-083H3004

Spare parts

Description	Order No.[F]
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	FDK-083H4410

Dairy MLFB example

MC2 sensor — 7ME4310-1C**F**42-1AA1

Stainless steel, W 1.4435/316L

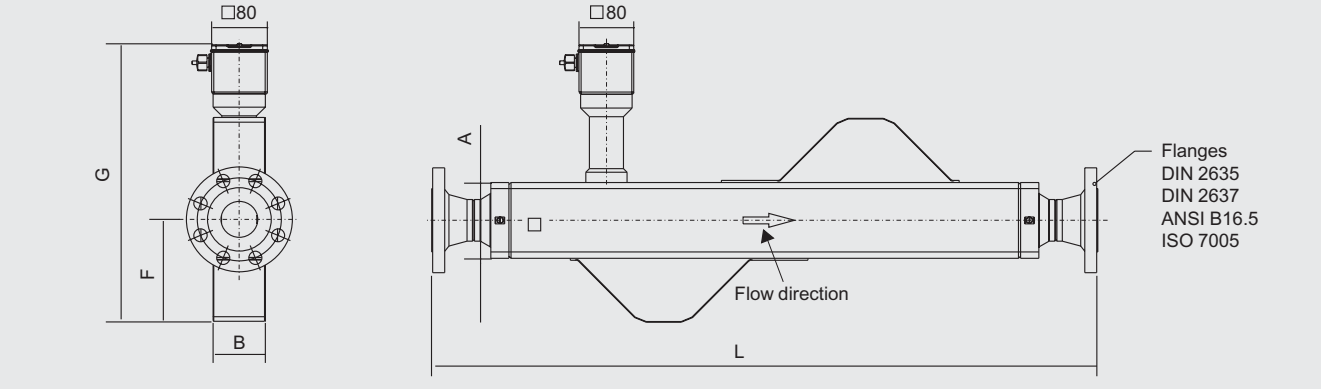
Dairy screwed connection DIN 11851, DN 40, PN25

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

4

Dimensional drawings

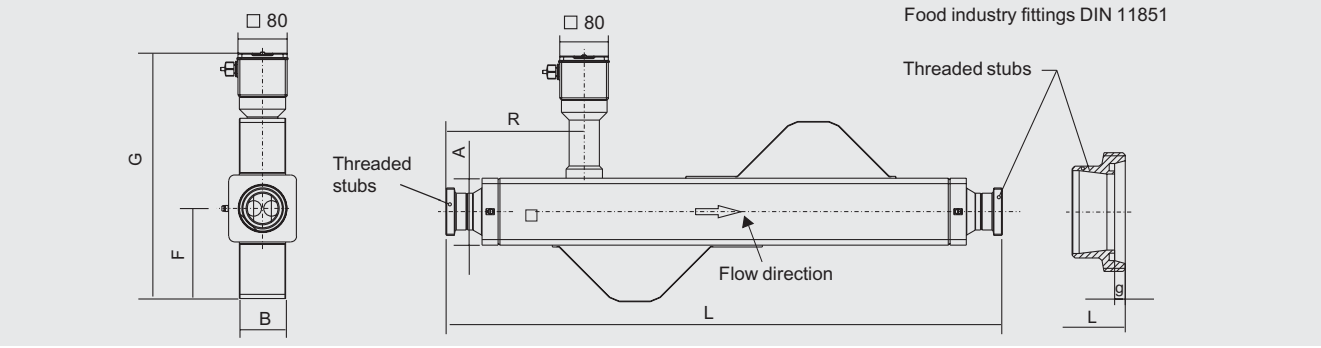
Remote design, flanged construction, DIN/ANSI



Meter size		Process connection size		L [mm (inch)]						G [1] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	Weight kg
Inch	DN	Inch	DN	DIN 11864-2 form A	DIN 2635 PN 40	DIN 2637 PN 100	ANSI CL 150	ANSI CL 300	ANSI CL 600					
2	50	2	50	918 (36.14)	940 (37.01)	979 (38.54)	970 (38.19)	980 (38.58)	1001 (39.41)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	34
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1248 (49.13)					38
2½	65	2	50	1197 (47.13)	1220 (48.03)	1259 (49.57)	1250 (49.21)	1260 (49.61)	1281 (50.43)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	43
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1249 (49.17)					47
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)					50
3	80	2½	65	1310 (51.57)	1330 (52.36)	1378 (54.25)	1365 (53.74)	1375 (54.13)	1396 (54.96)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	56
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)					58
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					69
4	100	3	80	1618 (63.70)	1640 (64.57)	1680 (66.14)	1660 (65.35)	1680 (66.14)	1702 (67.01)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	84
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					91
		6	150	N/A	1778 (69.92)	N/A	1806 (71.10)	1826 (71.89)	N/A					120
6	150	6	150	N/A	2040 (80.31)	N/A	2070 (81.50)	2090 (82.28)	N/A	613 (24.13)	285 (11.22)	190 (7.84)	260 (9.84)	260

[1] For EEx add 54 mm

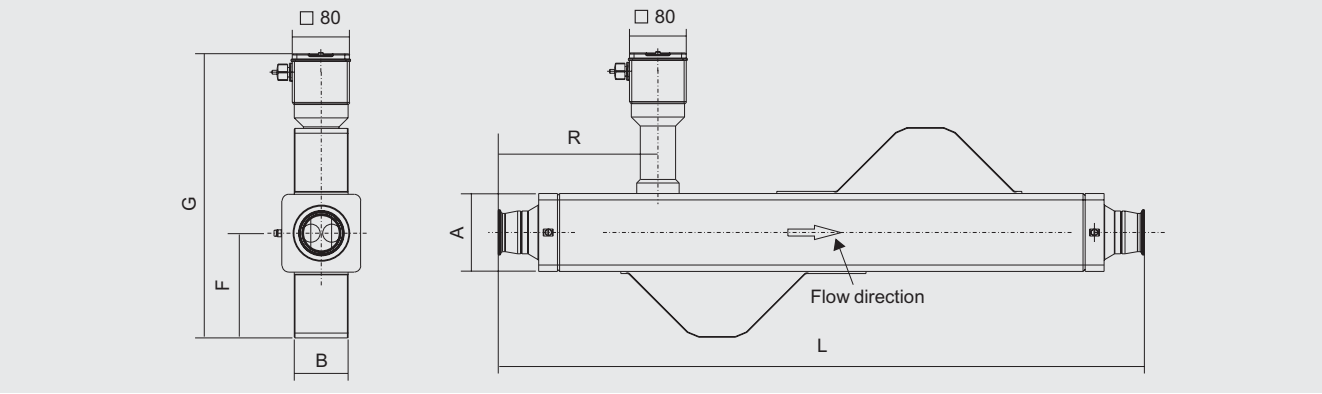
Remote design, food industry fittings, DIN 11851



Meter size		Process connection size			L [mm (inch)]	g [mm (inch)]	G [1] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight kg
Inch	DN	Inch	DN									
2	50	2	50	Rd 78 x 1/6	918 (36.14)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	177 (6.97)	30
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34
2½	65	2	50	Rd 78 x 1/6	1197 (47.13)	7 (0.28)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	291 (11.46)	40
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)					227 (10.91)	44
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					281 (11.06)	47
3	80	2½	65	Rd 95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					258 (10.16)	56
		4	100	Rd 110 x 1/6	1463 (57.60)	10 (0.39)					381 (15.00)	60
4	100	3	80	Rd 110 x 1/6	1618 (63.70)	8 (0.31)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82
		4	100	Rd 130 x ¼	1463 (57.60)	10 (0.39)					314 (12.36)	86

[1] For EEx add 54 mm

Remote design, Tri-clamp DIN 32676 (ISO 2852)



Dimensions in mm (inch)

Meter size		Process connection size		L [mm (inch)] ± 3	G [1] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg]
Inch	DN	Inch	DN							
2	50	2	50	913 (35.94)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	225 (8.86)	26
		2½	65	1073 (42.24)					305 (12.01)	27
2½	65	2	50	1192 (46.93)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	335 (13.19)	36
		2½	65	1073 (42.24)					275 (10.83)	37
		3	80	1180 (46.46)					328 (12.91)	38
3	80	2½	65	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45
		3	80	1180 (46.46)					296 (11.65)	44
		4	100	1448 (57.01)					430 (16.93)	46
4	100	3	80	1598 (62.91)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71
		4	100	1448 (57.01)					365 (14.37)	69

[1] For EEx add 54 mm

MC2

Process Connections

- Flanges DIN/ASME
- Tri-Clamp DIN 32676
  - DN 15 to DN 50: Series 3
  - DN 65 to DN 100: Series 1
- Food Industry fittings DIN 11851

The max. allowable operating pressure is a function of the process connection type, the fluid temperature, the bolts and the gaskets.

Pressure Rating

- PN 16, PN 40, PN 100 (to DN 80 (3"))
  Class 150, Class 300, Class 600 (to DN 80 (3"))

Housing as secondary containment

- max. 40 bar

Pressure Equipment Directive 97/23/EG

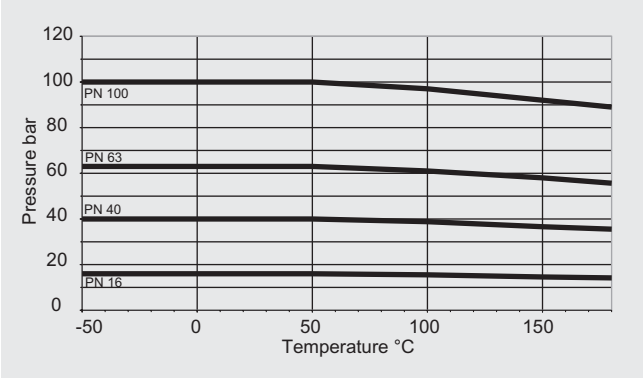
- Conformity evaluation category III, fluid group 1, gas, diagramme 6

Corrosion resistance of measuring pipe material to measuring medium has to be considered.

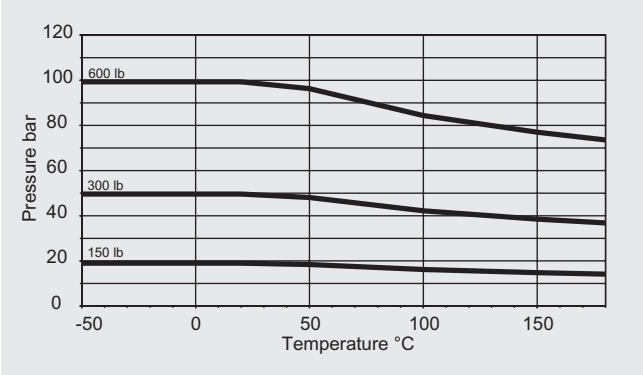
Material strength for process connections

Process connection	Size		$PS_{max.}$	$TS_{max.}$	$TS_{min.}$
	DN	Inch	bar (psi g)	°C (°F)	°C (°F)
Thread acc. DIN 11851	15 ... 40	½ ... 1½	40 (580)	140 (284)	-40 (-40)
	50 ... 100	2 ... 4	25 (363)	140 (284)	-40 (-40)
Tri-Clamp acc. DIN 32676	15 ... 50	½ ... 2	16 (232)	120 (248)	-40 (-40)
	65 ... 100	2½ ... 4	10 (145)	120 (248)	-40 (-40)

Material Loads Curves for Flanged Flowmeters



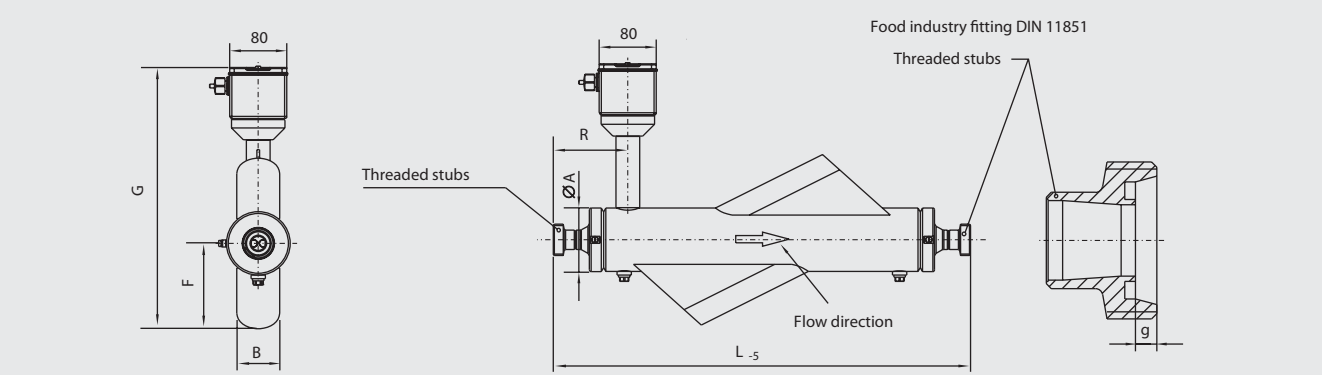
DIN-Flanges SS 1.4571/316Ti to DN 100 (4")



ASME-Flanges SS 1.4571/316Ti to DN 100 (4")

Dimensional drawings

Remote Design, Food Industry Fitting, DIN 11851



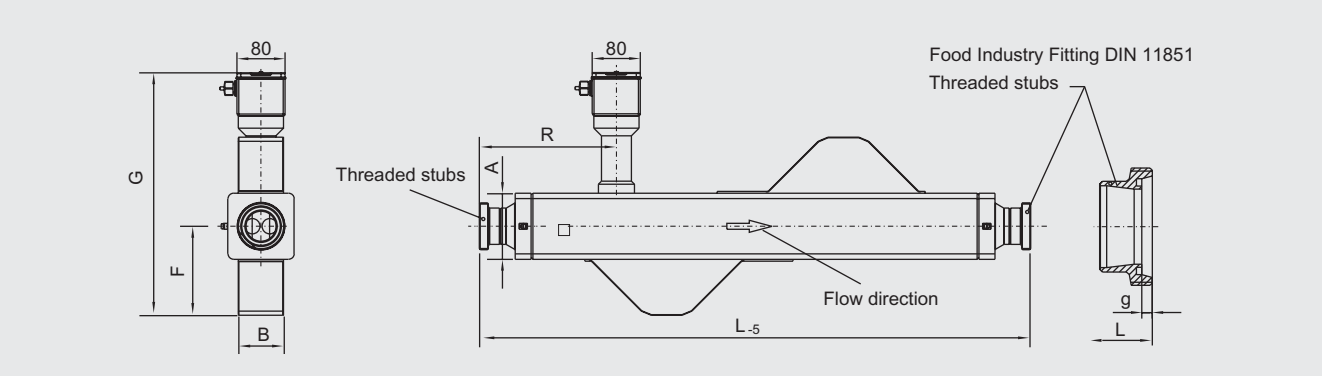
Dimensions in mm (inch)

DN (Size)		Process connections			L_{-5}	g	G	F	B	ØA	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
20	¾“	15	½	Rd34 x 1/8	672 (26.46)	4 (0.16)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13
		20	¾	Rd44 x 1/6	583 (22.95)	6 (0.24)					102 (4.02)	
		25	1“	Rd52 x 1/6	683 (26.89)	7 (0.28)					152 (5.98)	
25	1“	20	¾	Rd44 x 1/6	743 (29.25)	6 (0.24)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	162 (6.38)	14
		25	1“	Rd52 x 1/6	643 (25.31)	7 (0.28)					112 (4.11)	
		40	1½	Rd65 x 1/6	786 (30.94)	7 (0.28)					185 (7.28)	

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

MC2

Remote Design, Food Industry Fitting, DIN 11851

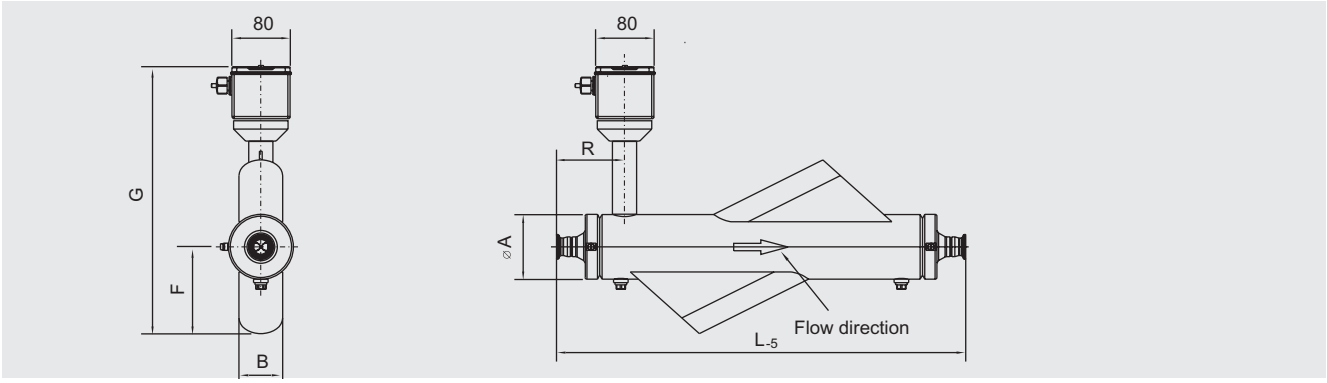


Dimensions in mm (inch)

DN (Size)		Process connections			L_{-5}	g	G	F	B	∅A	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
40	1½“	25	1	Rd52 x 1/6	864 (34.02)	7 (0.28)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	218 (8.58)	16
		40	1½	Rd65 x 1/6	761 (29.96)	7 (0.28)					164 (6.46)	18
		50	2“	Rd78 x 1/6	918 (36.14)	7 (0.28)					241 (9.49)	19
50	2“	40	1½	Rd65 x 1/6	1025 (40.35)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	233 (9.17)	28
		50	2“	Rd78 x 1/6	918 (36.14)	7 (0.28)					177 (6.97)	30
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34
65	2½“	50	2“	Rd78 x 1/6	1197 (47.13)	7 (0.28)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	291 (11.46)	40
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					227 (8.94)	44
		80	3“	Rd110 x 1/4	1200 (47.24)	8 (0.31)					281 (11.06)	47
80	3“	65	2½	Rd95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54
		80	3“	Rd110 x 1/4	1200 (47.24)	8 (0.31)					258 (10.16)	56
		100	4“	Rd130 x 1/4	1463 (57.60)	10 (0.39)					381 (15.00)	60
100	4“	80	3“	Rd110 x 1/4	1618 (63.70)	8 (0.31)	500 (19.68)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82
		100	4“	Rd130 x 1/4	1463 (57.60)	10 (0.39)					314 (12.36)	86

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

Remote Design, Tri-Clamp DIN 32676



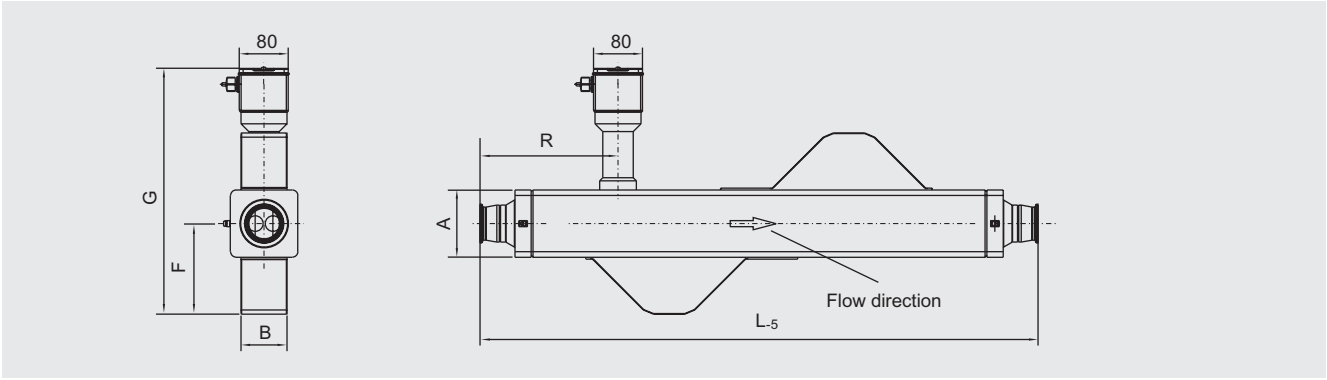
Dimensions in mm (inch)

DN (Size)		Process connections		L_{-5}	G	F	B	∅A	R	Weight
DN	inch	DN		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
20	¾“	15 (½“)	DIN 32676	656 (25.83)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	140 (5.51)	12
		20 (¾“)		561 (22.09)					92 (3.62)	
		25 (1“)		661 (26.02)					142 (5.59)	
25	1“	20 (¾“)	DIN 32676	721 (28.39)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13
		25 (1“)		621 (24.45)					102 (4.02)	
		40 (1½“)		773 (30.43)					180 (7.09)	

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

MC2

Remote Design, Tri-Clamp DIN 32676



Dimensions in mm (inch)

DN (Size)		Process connections		L-5	G	F	B	∅A	R	Weight
DN	inch	DN	inch	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
40	1½“	25	1	842 (33.15)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	242 (9.53)	17
		40	1½	748 (29.45)					195 (7.68)	17
		50	2“	913 (35.94)					278 (10.94)	18
50	2“	40	1½	1012 (39.84)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	275 (10.83)	27
		50	2“	913 (35.94)					225 (8.86)	26
		65	2½	1073 (42.24)					305 (12.01)	27
65	2½“	50	2“	1192 (46.93)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	335 (13.19)	36
		65	2½	1073 (42.24)					275 (10.83)	37
		80	3“	1180 (46.46)					328 (12.91)	38
80	3“	65	2½	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45
		80	3“	1180 (46.46)					296 (11.65)	44
		100	4“	1448 (57.01)					430 (16.93)	46
100	4“	80	3“	1598 (62.91)	500 (19.68)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71
		100	4“	1448 (57.01)					365 (14.37)	69

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

Overview

Siemens offers two types of ultrasonic flowmeters, in-line flowmeters and clamp-on flowmeters. This offers the end user the maximum flexibility to choose the technology that best fits his needs. The following chapter shows the in-line versions.

SITRANS F US in-line ultrasonic flowmeters measure flow of electrically conductive and non-conductive liquids.

Application

In-line ultrasonic flowmeters are suitable for measuring the flow of liquids with good acoustic permeability, independant of conductivity, viscosity, temperature, density and pressure.

- max. 3% solids
- max. 3% air and gas
- max. 350 cSt

The main applications can be found in the following sectors:

- Raw water intake for water treatment plants
- Treated waste water
- Power generation and utility
- Oil and gas industry and petrochemical industry
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX
- MODBUS

Benefits

The SITRANS F US ultrasonic in-line flowmeters are used to measure liquids with good acoustic permeability, independant of conductivity, viscosity, temperature, density and pressure.

- Sensor sizes from DN 50 to 1200 mm (2“ to 48“)
- Standard with calibration certificate
- In-line retrofit as 1 and 2 track up to DN 4000 (160“)
- Dedicated transmitter portfolio for HVAC, power generation, utility and general industry as well as more demanding applications
- Custody transfer approvals within district heating
- Compact and remote transmitter installation
- Comprehensive self-diagnostic for error indication and logging
- Exchange of the transducers without interrupting operation
- HART, PROFIBUS PA and MODBUS communication
- ATEX

System information and selection guide

							
		SONO 3300/ FUS060	**SONO 3100/ FUS060**	**SONOKIT/ FUS060**	**FUE380**	**FUS380**	**FUS880**
Industry							
Water, treated waste water		**XXX**	**XX**	**XXX**		**XXX**	**XX**
Irrigation		**XX**	**XX**	**XXX**		**XXX**	**XXX**
Utility, district heating water, cooling		**XXX**	**XX**	**XXX**	**XXX**	**XXX**	
Utillity, district heating, CT approvals required					**XXX**	**XXX**	
Oil		**XX**	**XXX**	**XX**		**X**	
Cryogenic fluids			**XXX**				
On- and Offshore applications		**XX**	**XXX**	**XX**		**X**	
Chemical		**XXX**	**XXX**	**X**			
Design							
Electronic compact mounted					●	●	
Electronic remote mounted		●	●	●	●	●	●
Replaceable transducers under pressure			●	●			
Retrofit on existing steel pipes/non-weldable					●		●
Transmitter enclosure							
Polyamid, IP67					●	●	●
Die-cast aluminium (painted), IP65		●	●	●			
Communication							
HART		●	●	●			
PROFIBUS PA		●	●	●			
MODBUS RTU / RS 232 and RS 485					●	●	●
Power supply							
Battery					●	●	●
AC 115 … 230 V		●	●	●	●	●	●
AC 115 … 230 V and battery backup					●	●	●
DC 24 V		●	●	●			
Accuracy							
0.25% (Fiscal approved 4 track flowmeter)[1)]			●				
0.50%		●	●	●	●	●	●
Sensor design							
1 track ultrasonic measurement				●			●
2 track ultrasonic measurement		●	●	●	●	●	●
4 track ultrasonic measurement			●	●			
Dimension							
DN 50	2"	●			●	●	
DN 65	2½"	●			●	●	
DN 80	3"	●			●	●	
DN 100	4"	●	●		●	●	
DN 125	5"	●	●		●	●	
DN 150	6"	●	●		●	●	
DN 200	8"	●	●	●	●	●	●
DN 225	9"	●	●	●	●	●	●
DN 250	10"	●	●	●	●	●	●
DN 300	12"	●	●	●	●	●	●
DN 350	14"		●	●	●	●	●
DN 400	16"		●	●	●	●	●
DN 500	20"		●	●	●	●	●
DN 600	24"		●	●	●	●	●
DN 700	28"		●	●	●	●	●
DN 800	32"		●	●	●	●	●
DN 900	36"		●	●	●	●	●
DN 1000	40"		●	●	●	●	●
DN 1200	48"		●	●	●	●	●
DN 4000 max.	160"			●			

X = can be used, **XX** = often used, **XXX** = most often used, ● = available

[1)] On preparation





		SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060	FUE380	FUS380	FUS880
Process connection							
Flanges		●	●		●	●	
Flangeless (for weld-in)			●				
Flanges Norm							
EN 1092-1		●	●		●	●	
EN 1759-1		●	●				
ANSI B16.5			●				
Pressure rating							
PN 6				●			●
PN 10		●	●	●	●	●	
PN 16		●	●	●	●	●	
PN 25			●	●	●	●	
PN 40		●	●	●	●	●	
Class 150			●				
Class 300			●				
PN 160			●	●			
Class 2500			●	●			
Pipe, flange and transducer material							
Carbon steel		●	●		●	●	
Stainless steel			●	●			
Bronze					●	●	
Other materials			on request	on request			●
Temperature range							
°C	°F						
-200	-328		●				
-20	-4		●	●			
-10	+14	●	●	●	●	●	
0	+32	●	●	●	●	●	●
+50	+122	●	●	●	●	●	●
+120	+248	●	●	●	●	●	
+160	+320	●	●	●	●	●	
+200	+392		●	●	●	●	
+250	+482		●				
Measuring principle							
Transit time principle		●	●	●	●	●	●
Approvals							
MID					●		
EN 1434 class 2 (Heat meter approval)					●		
OIML R 75 (Heat meter approval)					●		
PTB, Germany					●		
Country specific type approval available							
- Russia (GOSS/GOST)		●	●	●	●	●	
- Rumania		●	●	●	●	●	
- China		●	●	●	●	●	
Ex-d ATEX			●	●			
Ex ATEX (in preparation)			●	●			

● = available

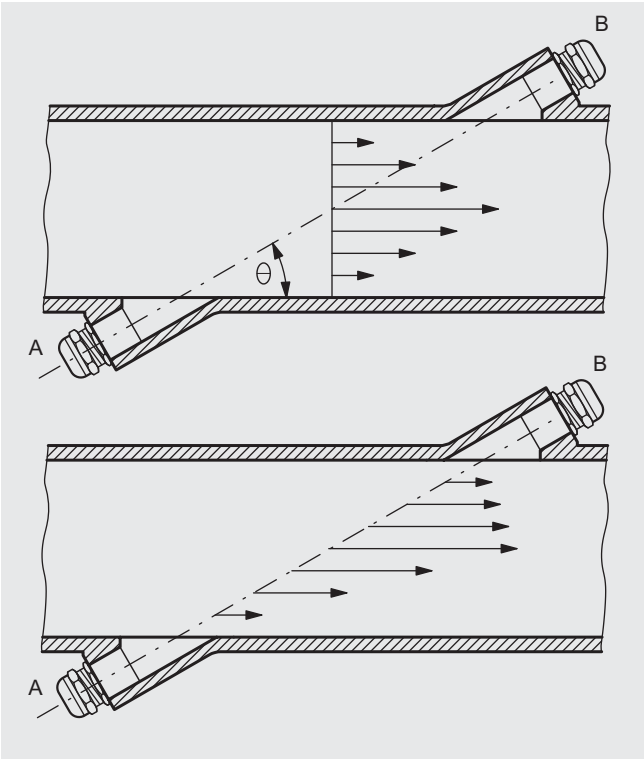
System information and selection guide

Function

Direct signal processing

In the SITRANS F US in-line ultrasonic flowmeter program the signal is sent directly and without deflection to the bore wall from the transmitter to the receiver. The advantage gained sending signals from point to point is an extremely good signal strength for the signal processing avoiding a suddenly flowmeter stop.

Physical principle



Velocity distribution along sound path

A sound wave traveling in the same direction as the liquid flow arrives at point B from point A in a shorter time than the sound wave traveling against the direction of flow (from point B to A). The difference in sound transit time indicates the flow velocity in the pipe.

Since delay time is measured at short intervals both in and against flow direction, viscosity and temperature have no influence on measurement accuracy.

Measuring principle

In SITRANS F US flowmeters the two ultrasonic transducers are placed at an angle θ in relation to the pipe axis. The transducers function as transmitters and receivers of the ultrasonic signals. Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$v = K \cdot (t_{B,A} - t_{A,B}) / (t_{A,B} \cdot t_{B,A}) = K \cdot \Delta t/t^2$

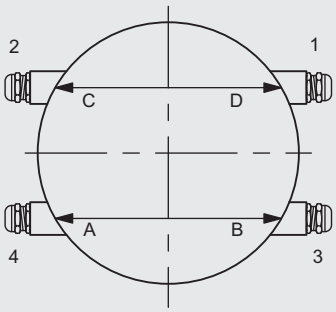
v = Average flow velocity
t = Transit time
K = Proportional flow factor

This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature. Proportional factor K is determined by wet calibration.

Ultrasonic flowmetering based on battery

Siemens offers a solution based on a 3.6 V lithium cell battery with a lifetime of up to 8 years. As the electronics is optimised to operate at extremely low power consumption, the electronics is limited in function and services. The battery powered ultrasonic flowmeter finds its application mainly in power generation, utility and irrigation where mains supply is out of reach.

Pipe geometry with 2-track solution



The accuracy of all flowmeters static or mechanical depends on the pipe geometry before and after the flowmeter and the number of ultrasonic measuring tracks.

When water flows through a pipe, it has a tendency to swirl and/or flow with different velocities inside the pipe, depending on the pipe design.

Therefore 2-tracks or more is the most reliable technology today.

2-track systems offer

- less sensitivity to upstream obstruction like bends, pumps or valves.
- high security in the measurements as the meter continues to measure even if, for some reason, one track stops working.

Typical straight inlet requirements are upstream 10 x D_i (D_i = diameter of the flowmeter) and downstream 3 x D_i.

Typical accuracy that can be reached with 2-track ultrasonic flowmetering is ± 0.5% with installations according to above demands.

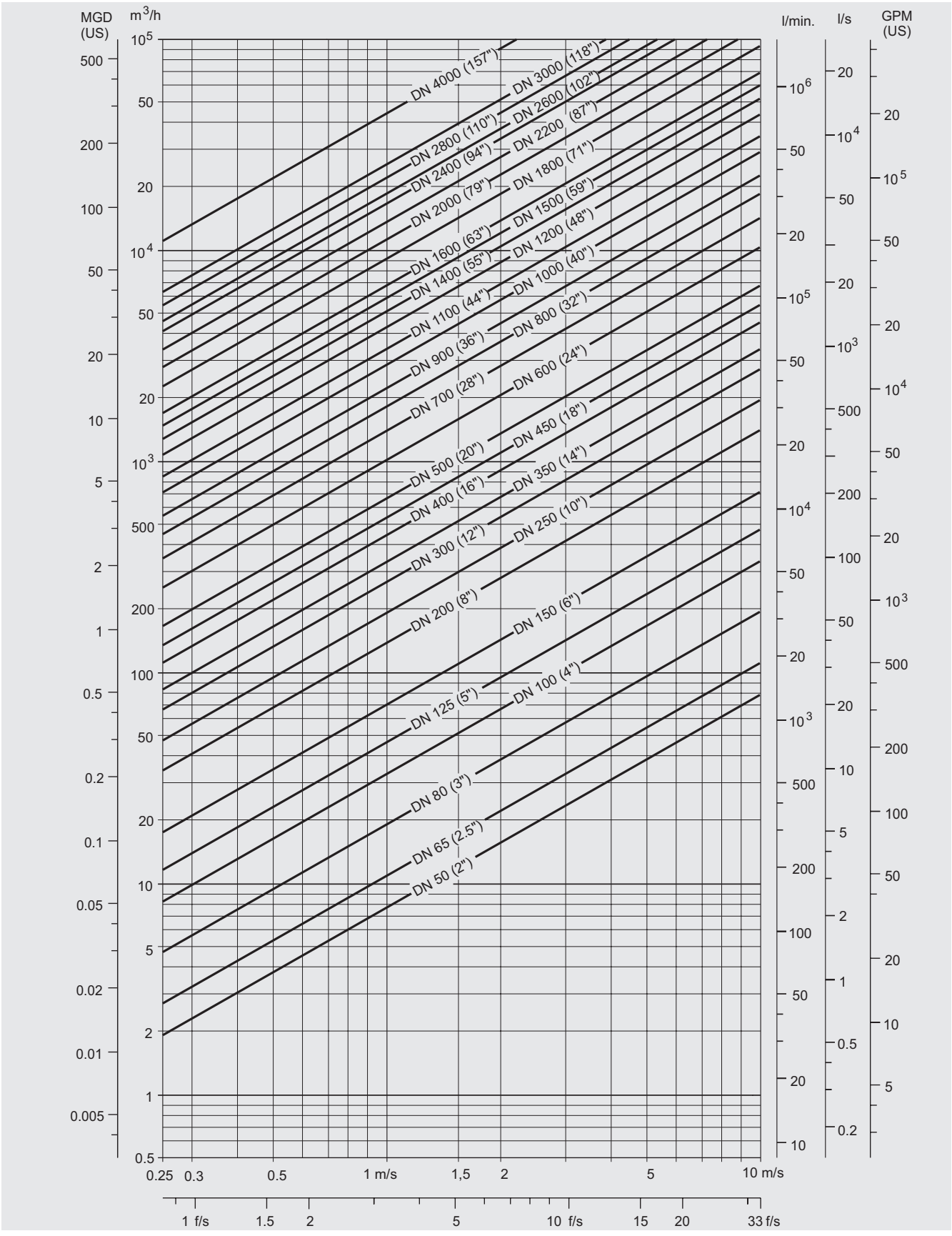
4-track ultrasonic flowmeters

Some applications require accuracy under extreme short inlet conditions and swirl that cannot be obtained with 2-track solutions.

For these applications we can offer a 4-track solution – customer specified – according to actual inlet conditions.

Please contact Siemens Flow Instruments for specific applications.

Technical specifications



Nominal size and flow

System information and selection guide

Guidelines for selection of sensor

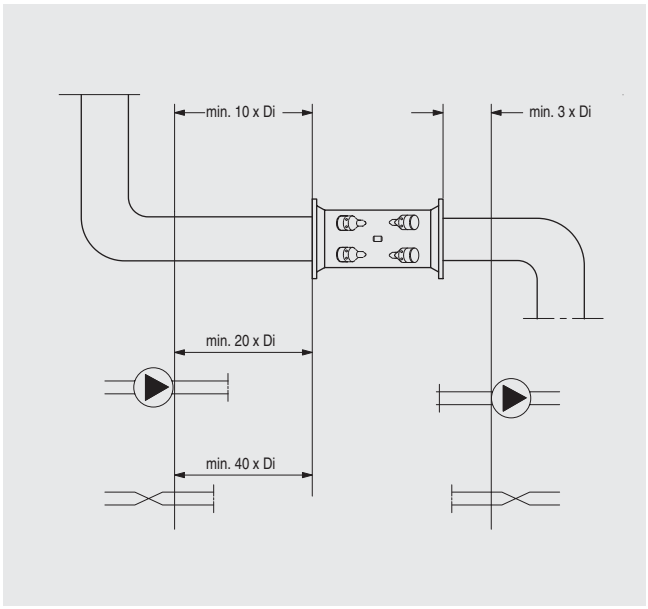
- Min. measuring range: 0 … 0.25 m/s
- Max. measuring range: 0 … 10 m/s

Normally the sensor is selected so that nominal flow velocity is within the measuring range 1 … 3 m/s.

Flow velocity calculation formula:

- $v = (4 \times Q_{max}) / (\pi \times D_i^2 \times 3600)$
- v in m/s, Q_{max} in m^3/h, D_i in m

Inlet and outlet conditions



Recommended inlets and outlets

To maximize performance inlet and outlet must be straight. There must be a certain distance between flowmeter and bends, pumps and valves. It is also important to centre the flowmeter in relation to pipe flanges and gaskets.

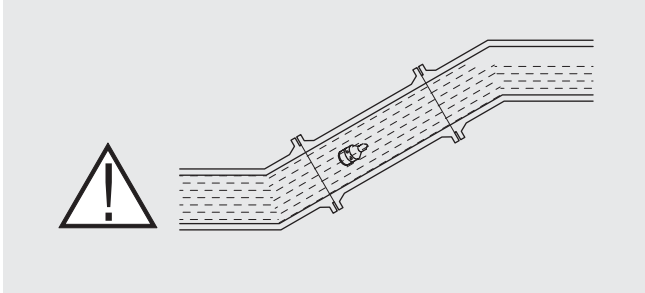
Valves must always be installed after the flowmeter. The only exception is installation of the sensor in a vertical pipe. In this case a valve below the sensor is necessary to allow zero point adjustment. It is important to select a valve which does not alter the flow when fully open.

Recommended inlet/outlet

	SONO 3300, SONO 3100, SONOKIT 2-track	FUS380/FUE380[1)]	SONOKIT 1-track
90° bend	10 x D_i	10 x D_i	20 x D_i
Fully opened valve	10 x D_i	10 x D_i	20 x D_i
Partially opened valve	40 x D_i	40 x D_i	40 x D_i
2 x 90° bends in same plane	15 x D_i	15 x D_i	25 x D_i
2 x 90° bends in two planes	20 x D_i	20 x D_i	40 x D_i
Outlet	3 x D_i	3 x D_i	3 x D_i

[1)] Inlet for FUE380 with MID approval should be for sizes > DN 80: 1.5 m or for sizes < DN 65: 10 x D_i.

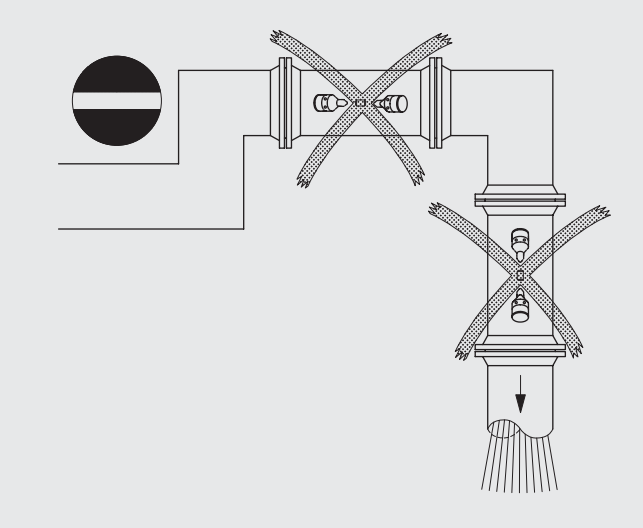
The sensor must always be completely filled with liquid.



Install in completely filled pipes

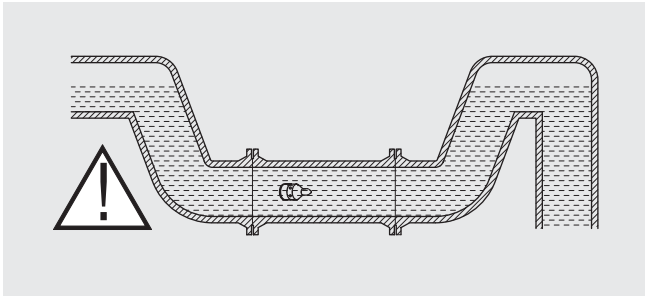
The following installations should be avoided:

- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet



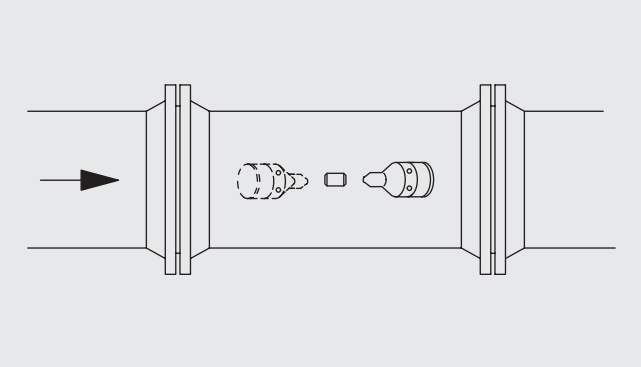
Do not install at the highest point or in vertical pipes with free outlet

With partially full pipes or pipes with free outlet the flowmeter should be located in a U-shaped tube.



Install in U-shaped tube if pipe is partially filled

Installing the transducers in horizontal position is recommended.



Install transducer in horizontal position

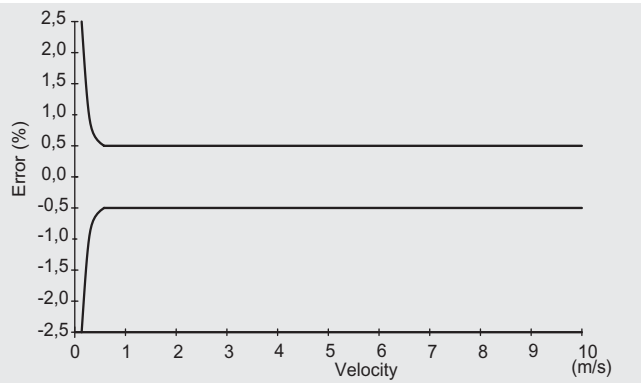
To ensure maximum accuracy sensor and transmitter must be calibrated together.

Flowmeter calibration data are stored in the internal EPROM of the transmitters FUS060 or FUS080.

The system accuracy refers to the following systems:

SONO 3300/FUS060 , SONO 3100/FUS060[1].

Reference conditions



Fluid	Water
Fluid temperature	22 ± 5 °C
Ambient temperature	22 ± 5 °C
Supply voltage	AC 115/230 V +10 … -15% DC 24 V +25 … -15%, AC 24 V ± 15%
Straight inlet length	20 x D_i
Rangeability	0 … 1 m/s to 0 … 10 m/s
Repeatabilty	Better than 0.25% in the range 0.5 … 10 m/s
Linearity	
• Reynolds number 1000 < Re < 5000	Better than 1%
• Reynolds number > 5000	Better than 0.5%

[1] Only systems with transmitter FUS060. For systems with transmitter FUS080 see chapter to FUS380 and FUE380.

Additional effects of deviations from reference conditions

- Current output: As frequency output ± (0.1% of actual flow +0.05% FSO)
- Effect of ambient temperature: Frequency/pulse output: < 0.005% SPAN/K
- Current output: < ± 0.0075% SPAN/K
- Effect of supply voltage: 0.005% of measuring value at 1% change

Transmitter FUS060

Overview

SITRANS FUS060 transmitter

SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering for any pipe in the FUS in-line series up to DN 4000. SITRANS FUS060 is engineered for high performance and suitable for 1-, 2- and 4-tracks flowmeters.

Benefits

- Superior signal resolution for optimum turn down ratio
- Simple menu-based local operation with two-line display and four optical input elements, for unlimited use in potentially explosive atmospheres
- Self-monitoring and diagnosis
- Operate up to 4-tracks
- ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3
- Remote transmitter up to 120 m away
- 1 analog output (4 to 20 mA) standard with HART-protocol, 1 digital frequency or pulse output, 1 relay output for limit, alarms, flow direction
- PROFIBUS PA Profile 2, 1 digital frequency or pulse output

Design

The transmitter type FUS060 is designed for remote installation in non-hazardous or hazardous areas.

The transmitter is designed for use in a flowmeter system together with sensors type SONOKIT, SONO 3300 and SONO 3100.

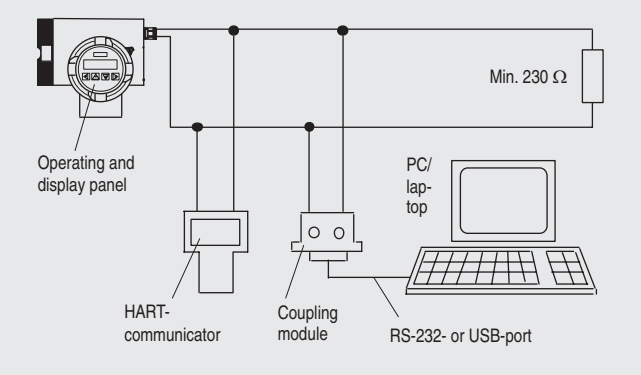
The FUS060 will be ordered with complete flowmeter systems. In spare part cases a FUS060 can be ordered separate and programmed with the sensor data manually.

Function

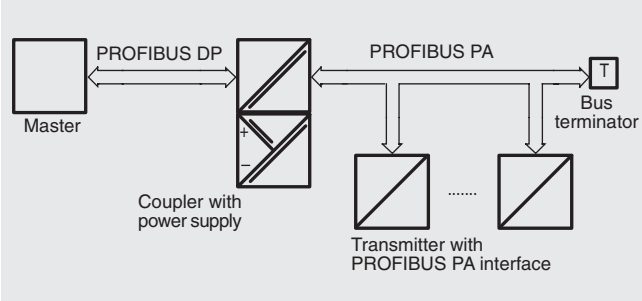
Displays and keypad

Operation of the SITRANS FUS060 transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication

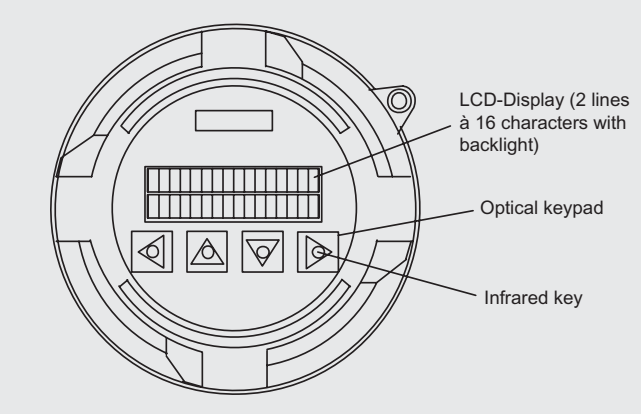


HART communication



PROFIBUS PA communication

The operating and display panel permits simple operation without supplementary equipment. It is not necessary to open the housing. All changes to a setting can therefore also be carried out in the potentially explosive atmosphere.



Operating and display panel

The individual functions and parameters are selected using a hierarchical, multi-language input menu and four infrared keys. The parameters can be specifically selected and modified using codes, e.g.:

- Operating parameters such as measuring range, physical dimensions, device information
- Limits for flow, totalizer, ultrasonic velocity or ultrasonic amplitude
- Noise suppression using damping, error stages and hysteresis
- Display parameters (freely-configurable display)
- Display in volume or mass dimensions
- Density as constant input value for conversion of volume into mass dimensions
- Forward/backward measurement
- Flow direction
- Diagnostics functions and control values
- Functions of the PROFIBUS PA output:
  flow, net quantity (volume or mass), ultrasonic velocity, ultrasonic amplitude, forward quantity (volume or mass), backward quantity (volume or mass)
- Functions of the analog output:
  flow, ultrasonic velocity or ultrasonic amplitude
- Functions of digital output 1:
  pulse output, frequency output, limit, flow direction or device status
- Functions of digital output 2:
  limit, flow direction or device status
- Simulation of output signal via analog output, digital output 1 and digital output 2

The HART protocol is implemented via the analog output (current output). Using this communication facility, the device can be parameterized with a PC/laptop and SIMATIC PDM software in addition to local operation.

In the SITRANS F version with PROFIBUS PA, the analog output is replaced by the digital PROFIBUS PA output. The device can then be parameterized via PROFIBUS communication and with SIMATIC PDM in addition to local operation.

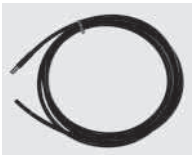
Technical specifications

Input	
Nominal diameters and measuring ranges	2-track DN 50 ... DN 4000 (optionally also for 1 and 4-track)
Max. cable length	120 m (395 ft) (screened coaxial cable) and for Ex-versions max. 3 m (9.84 ft)
Output	
Analog output	
• Signal range	4 ... 20 mA
• Upper limit	20 ... 22.5 mA, adjustable
• Signal on alarm	3.6 mA, 22 mA, or 24 mA
• Load	Max. 600 Ω; ≥ 230 Ω for HART communication
• Only PROFIBUS PA version:	Analog output omitted, is replaced by digital PROFIBUS PA interface
Digital output 1	
• Active or passive signal, can be configured with positive or negative logic	Active: 24 V DC, ≤ 24 mA, R_i = 300 Ω Passive: open collector, 30 V DC, ≤ 200 mA
• For explosion protection (ATEX version)	Passive: open collector 30 V DC, ≤ 100 mA
• Only PROFIBUS PA version:	Only passive signals for digital output 1
• Output function, configurable	Pulse output • Adjustable pulse significance ≤ 5,000 pulses/s • Adjustable pulse width ≥ 0.1 ms Frequency response • f_{END} selectable up to 10 kHz Limit for flow, totaliziers,ultrasonic velocity or ultrasonic amplitude device status, flow direction
Digital output 2	
• Relay, NC or NO contact	Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, R_i = 9 Ω
• For explosion protection (ATEX version)	Max. 30 V DC, max 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate)
• Output function, configurable	Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status
• Only PROFIBUS PA version:	Digital output 2 omitted
Communication via analog output 4 ... 20 mA	
• PC/laptop or HART communicator with SITRANS F flowmeter	
- Load with connection of coupling module	230 ... 500 Ω
- Load with connection of HART communicator	230 ... 600 Ω
- Cable	2-wire screened ≤ 3 km (≤ 1.86 miles) Multi-core screened ≤ 1.5 km (≤ 0.93 miles)
- Protocol	HART, version 5.1
Communication via PROFIBUS PA interface	Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS DP, EN 50170 standard
• Power supply	Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals
• Current consumption from bus	10 mA; ≤ 15 mA in event of error with electronic current limiting
Electrical isolation	Outputs electrically isolated from power supply and from one another
Accuracy	
Error in measurement (at reference conditions)	
• Pulse output	≤ ± 0.5% of measured value at 0.5 ... 10 m/s or ≤ ± 0.25/V[m/s]% of measured value at flow < 0.5 m/s
• Analog output	As pulse output plus ± 0.1% of measured value, ± 20 µA
• Repeatability	≤ ± 0.25% of measured value at 0.5 ... 10 m/s
Reference conditions	
• Process temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Warming-up time	30 min.
Installation conditions	Upstream section > 10x DN and downstream section > 5x DN

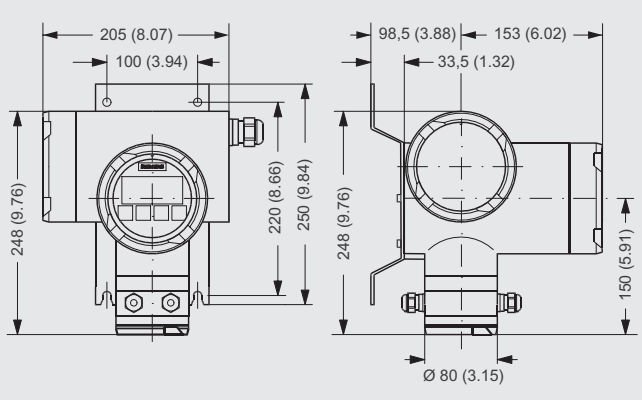
Transmitter FUS060

Rated operation conditions	
Ambient conditions	
Ambient temperature	
• Operation	• -20 ... +50 °C (-4 ... +122 °F)
• In potentially explosive atmospheres	Observe temperature classes
• Storage	-25 ... +80 °C (-13 ... +176 °F)
Enclosure rating	IP65 (NEMA 4)
Electromagnetic compatibility	For use in industrial environments
• Emitted interference	To EN 61000-6-3 (Light industry)
• Noise immunity	To EN 61000-6-2 (Industry)
Medium conditions	
• Process temperature	-200 ... +200 °C (-328 ... +392 °F)
• Gases/solids	Influence accuracy of measurement (approx. max. 3% gases or solids)
Design	
Separate version	Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable) For ATEX versions mounted in the Ex area only with 3 m long cables.
Enclosure material	Die-cast aluminum, painted
Weight of transmitter	4.4 kg (9.7 lb)
Electrical connection	Cable glands: 2 x M20 or 2 x ½"-NPT and transducers: 2/4 x M16 or 2/4 x ½" NPT
Displays and controls	
Display	LCD, two lines with 16 characters each
• Multi-display: 2 freely-selectable values are displayed simultaneously in two lines	Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information
Operation	4 infrared keys, hierarchical menu prompting with codes
Power supply	
Supply voltage	
• Standard version	120 ... 230 V AC ± 15% (50/60 Hz) or 19 ... 30 V DC/ 21 ... 26 V AC
• Ex version	19 ... 30 V DC / 21 ... 26 V AC
Power failure	No effect for at least 1 period (> 20 ms)
Power consumption	Approx. 8 VA / 6 W
Certificates and approvals	
Explosion protection	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3

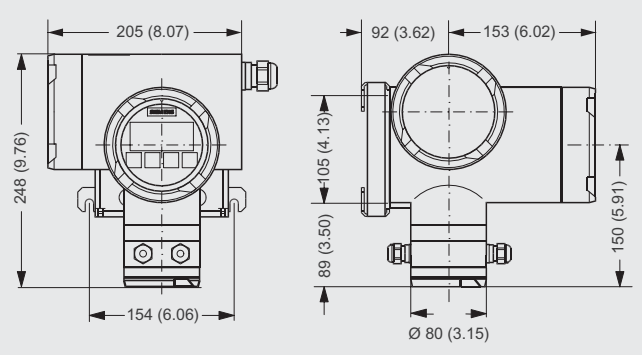
Coaxial cable	
Standard Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.8 mm
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
Material (outside jacket)	black PE
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)
High temperature Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max 3 m 9.84 ft) transducer cable length for Ex area mounted transmitters)
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)



Dimensional drawings

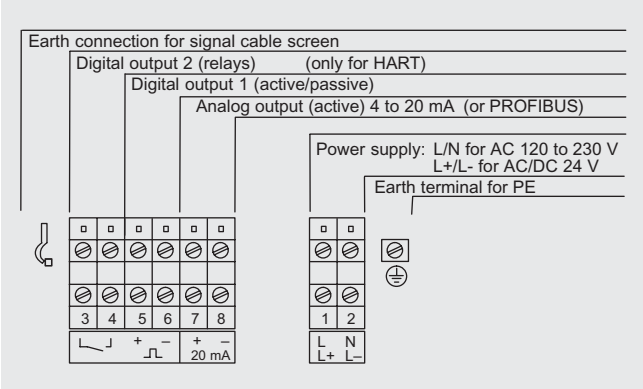


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



SITRANS FUS060 with optional special mounting bracket, dimensions in mm (inch)

Schematics



Electrical connection SITRANS FUS060

Transmitter FUS060 accessories and spare parts

SITRANS FUS060 transmitter, available standard versions

The configuration of the transmitters are done in the flowmeter order codes (together with the sensors). Here only for spare part ordering.

Description	Version	Enclosure	Supply	Order No.[F)]	Symbol
FUS060, 230 V, HART, Metric	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1BA1**	
FUS060, 230 V, HART, Imperial	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1BA2**	
FUS060, 230 V, PROFIBUS, Metric	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1DA1**	
FUS060, 230 V, PROFIBUS, Imperial	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1DA2**	
FUS060, 24 V, HART, Metric	Transmitter for remote connection	IP65 (NEMA 4)	18 ... 30 V DC	**7ME3050-2BA20-1BA1**	
FUS060, 24 V, HART, Imperial	Transmitter for remote connection	IP65 (NEMA 4)	18 ... 30 V DC	**7ME3050-2BA20-1BA2**	
FUS060, 24 V, PROFIBUS, Metric	Transmitter for remote connection	IP65 (NEMA 4)	18 ... 30 V DC	**7ME3050-2BA20-1DA1**	
FUS060, 24 V, PROFIBUS, Imperial	Transmitter for remote connection	IP65 (NEMA 4)	18 ... 30 V DC	**7ME3050-2BA20-1DA2**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Transmitter FUS060

SITRANS FUS060/SONO 3100

Type/description	Order No.[F)]	Symbol
Operating/Display module for FUS060	**7ME5933-0AC00**	
Electronics cover with glass plate	**7ME5933-0AC01**	
Cover for sensor cable + gasket	**7ME5933-0AC02**	
Cover for mains supply/communication	**7ME5933-0AC03**	
Standard wall mounting bracket for SITRANS FUS060 transmitter	**7ME5933-0AC04**	
Special wall-/pipe mounting bracket kit for SITRANS FUS060 transmitter	**7ME5933-0AC05**	
Safety clamp for 7ME5933-0AC01	**7ME5933-0AC06**	

Cables for FUS060

Type/description	Length m (ft)	Order No[F)]	Symbol
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F) ; (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Overview

The combination of sensor SONO 3300 sensor and FUS060 transmitter is ideal for applications within the general industry. Measurements are independent of liquid temperature, density, pressure and conductivity. Transducers cannot be changed.

Benefits

- Robust remote transmitter FUS060
- Robust design for industrial applications
- Measures all liquids less than 350 cSt, conductive or non conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long time stability

Application

The main application for SONO 3300/FUS060 ultrasonic flowmeter is measurement of volume.

SONO 3300/FUS060 can be used for water and treated waste water, oil and liquid gases, hot water / cooling systems.

Design

The SONO 3300/FUS060 consists of a casted sensor (DN 50 to 150 (2" to 6")), welded pipes (DN 200 to 300 (8" to 12")) and the transmitter FUS060.

The transmitter can only be separate mounted.

The internal signal cables from transducers to sensor connection box are highly protected from aggressive environment by protection of stainless steel pipes.

Sensor installation

See system information

Technical specifications

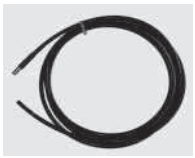
2-track sensor with flanges and integrated transducers

Error in measurement	
Error in measurement at reference conditions; % of measured value	v > 0.5...10 m/s, <± 0.5% of rate (v=flow speed)
	SONO 3300 DN 50 and DN 65: For Reynolds numbers 1000 < R_e < 5000: ± 1.5%
Max. flow velocity	10 m/s (32 ft/s)
Nominal size	DN 50, DN 65, DN 80, DN 100, DN 125, DN 150, DN 200 (2" … 8")
	DN 250, DN 300 (10" … 12")
Liquid temperature	Separate version: -10 … +160 °C (14 … 320 °F)
Ambient temperature (sensor)	Separate version: -40 … +160 °C (-40 … +320 °F)
	Storage: -40 … +85 °C (-40 … +185 °F)
Enclosure	Standard version: IP67 (NEMA 4X/NEMA 6)
Process connections	
PN designated EN 1092-1-type 11,B	• DN 50 ... 300 (2" … 12"), PN 40
	• DN 100 ... 300 (4" … 12"), PN 16
	• DN 200 ... 300 (8" … 12"), PN 10
Class designated EN 1759-1-type 11,B	• DN 125 ... 300 (5" ... 12"), class 150
	• DN 50 ... 300 (2" ... 12"), class 300
Transducer	Integrated version welded into pipe
Materials	
Pipe	• DN 50 ... 150 (2" … 6"): Steel EN 1.113145-16Mn5
	• DN 200 ... 300 (8" … 12"): Steel EN 1.0345-P235GH
Flange	• DN 50 ... 300 (2" … 12"): EN 1.0025-S235JRG2
Class	ASTM A105
Transducer	Stainless steel AISI 316 or similar
Certificates and approvals	
Material certificate	The sensor is supplied as standard with a Siemens Flow Instruments certificate of conformity. Extended material certificate optional available.
NDT examination report	Available on request
Ex approval	System ATEX approval for SONO 3300 together with remote transmitter FUS060-Ex (ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3) (on preparation).

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

Flowmeter SONO 3300/FUS060

Coaxial cable between sensor SONO 3300 and transmitter FUS060



Standard Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.8 mm
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
Material (outside jacket)	black PE
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)
High temperature Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max. 3 m (9.84 ft)) transducer cable length for Ex area mounted transmitters)
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)

Selection and Ordering data		Order No.	Order code
Sensor SONO 3300 with transmitter FUS060	F)	7ME3300 -	
		0 -	
Diameter	**Flow setting Qn [m^3/h]**		
DN 50 (2")	10	1A	
DN 50 (2")	26	1B	
DN 50 (2")	60	1D	
DN 65 (2½)"	15	1E	
DN 65 (2½)"	42	1F	
DN 65 (2½)"	100	1H	
DN 80 (3")	20	1J	
DN 80 (3")	60	1K	
DN 80 (3")	150	1M	
DN 100 (4")	36	1N	
DN 100 (4")	100	1P	
DN 100 (4")	230	1R	
DN 125 (5")	50	1S	
DN 125 (5")	150	1T	
DN 125 (5")	360	1V	
DN 150 (6")	80	2A	
DN 150 (6")	220	2B	
DN 150 (6")	500	2D	
DN 200 (8")	120	2E	
DN 200 (8")	380	2F	
DN 200 (8")	900	2H	
DN 250 (10")	200	2J	
DN 250 (10")	600	2K	
DN 250 (10")	1400	2M	
DN 300 (12")	300	2N	
DN 300 (12")	850	2P	
DN 300 (12")	2200	2R	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
System without sensor - only transmitter FUS060 as spare part - settings as defined with this Order No.		A [1]	
EN 1092-1			
PN 10 (DN 200 ... 300 (8" ... 12"))		B	
PN 16 (DN 80 ... 300 (3" ... 12"))		C	
PN 40 (DN 50 ... 300 (2" ... 12"))		E	
ANSI B16.5			
class 150 (DN 50 ... 300 (2" ... 12"))		H	
class 300 (DN 50 ... 300 (2" ... 12"))		J	
Sensor type (approval) and transmitter mounting			
IP67 standard, remote transmitter		1	
IP67 Ex-version (ATEX), remote transmitter (Ex-version)		3 [1]	
Cable gland entries in FUS060 and SONO 3300			
Cable glands M20 in sensor and in transmitter M25/20/16 x 1.5		1	
Cable glands ½" NPT in sensor and in transmitter ½" NPT		2	
Transmitter SITRANS FUS060			
Without transmitter (only sensor)		A	
IP65 (NEMA 4), 120/230 V AC		N	
IP65 (NEMA 4), 24 V AC/DC		P	
IP65 (NEMA 4), 24 V AC/DC, Ex-version (ATEX)		Q [1]	

Selection and Ordering data		Order No.	Order code
Sensor SONO 3300 with transmitter FUS060	F)	7ME3300 -	
		0 -	
FUS060 output module			
Without transmitter (only sensor)		A	
HART, 4 ... 20 mA, 1 pulse output, 1 relay		B	
HART, Ex version, 4 ... 20 mA,1 pulse output, 1 relay		C [1]	
PROFIBUS PA,1 pulse/frequency		D	
PROFIBUS PA, Ex version, 1 pulse/frequency		E [1]	
Transducer coax cable			
4 x 3 m, max. 70 °C (158 °F)		0	
4 x 15 m, max. 70 °C (158 °F)		1	
4 x 30 m, high temp. max.200 °C (392 °F)		2	
4 x 30 m, max. 70 °C (158 °F)		3	
4 x 60 m, max. 70 °C (158 °F)		4	
4 x 90 m, max. 70 °C (158 °F)m		5	
4 x 120 m, max. 70 °C (158 °F)		6	
4 x 3 m, high temp. max.200 °C (392 °F)		7	
4 x 15 m, high temp. max.200 °C (392 °F)		8	

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and Ordering data	Order code
Additional information	
Please add „-Z" to Order No. and specify Order code(s) and plain text.	
Calibration	
Sensor prepared for older SONO 3000 transmitters (on preparation)	**A30** [2]
Production calibration DN 50 ... DN 300 (with certificate)	**Included**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 36 ... 180 m^3/h depending on dimension (DN 50 ... DN 80)	**D20** [2]
Accredited Siemens ISO/IEC 17025 calibration Max. flow 36 ... 2200 m^3/h depending on dimension (DN 100 ... DN 300)	**D21** [2]
Material certificate	
EN 10204-3.1	**F10**
EN 10204-3.1 with 100% NDT on weldings	**F11** [2]
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	**Y18**

[1] On preparation.
[2] On request.

F) Subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONO 3300/FUS060

Sensor SONO 3300 accessories and spare parts

Potting kit

Type/description	Order No.[F)]	Symbol
Potting kit, IP68, 10 m (32.81 ft) w.g. rating	**FDK-085L2403**	

Cables for FUS060

(only for spare part case)

Type/description	Length m (ft)	Order No.[F)]	Symbol
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

Cable connection boxes

(For the connection of individually transducer cables with the FUS060 transducer cables.)

Type/description	Order No.[F)]	Symbol
Junction box for coax cable		
• IP68 metal box for 4 coax cables	**FDK-085B1361**	

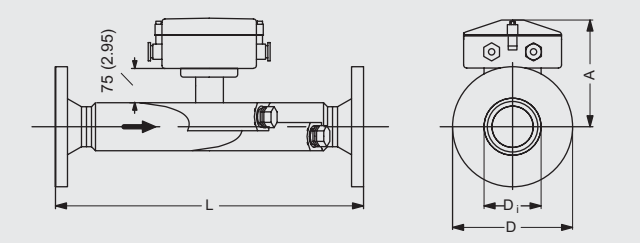
Cable glands (each 1 pc.)

(only for spare part case)

Type	Material	Temperature range [°C (°F)]	Order No.[F)]	Symbol
M20	Chrome plated brass	-20 ... +100 (-4 ... +212)	**on request**	
M20 (Ex type)	Stainless steel	-20 ... +195 (-4 ... +383)	**on request**	
½-NPT	Chrome plated brass	-20 ... +100 (-4 ... +212)	**on request**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings to sensor SONO 3300



Sensor SONO 3300

DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	$L^{1)}$		D		D_i		$L^{1)}$		D		D_i		$L^{1)}$		D		D_i	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50													475	18.70	165	6.50	52.60	2.07
65													475	18.70	185	7.28	62.70	2.47
80							380	14.96	200	7.87	78.00	3.07	400	15.75	200	7.87	78.00	3.07
100							355	14.72	220	8.66	102.40	4.00	400	15.75	235	9.25	102.40	4.00
125							375	14.72	250	9.84	128.30	5.05	400	15.75	270	10.63	128.30	5.05
150							360	14.17	285	11.22	154.20	6.07	400	15.75	300	11.81	154.20	6.07
200	400	15.75	340	13.39	207.30	8.16	400	15.75	340	13.39	207.30	8.16	450	17.72	375	14.76	206.50	8.13
250	400	15.75	395	15.55	260.40	10.25	400	15.75	405	15.94	260.40	10.25	500	19.69	450	17.72	258.80	10.19
300	400	15.75	445	17.52	309.70	12.19	420	16.54	460	18.11	309.70	12.19	500	19.69	515	20.28	307.90	12.12

DN	ANSI														Weight [2]			
	150 lb						300 lb								EN (PN 40)		ANSI CL 300	
	$L^{1)}$		D		D_i		$L^{1)}$		D		D_i		A					
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs	kg	lbs
50 mm / 2“	510	20.08	152	5.98	52.6	2.07	520	20.47	165	6.50	52.6	2.07	180	7.09	14	30.9	17	37.5
65 mm / 2½“	510	20.08	178	7.01	62.7	2.47	520	20.47	190	7.48	62.7	2.47	186	7.32	16	35.3	20	44
80 mm / 3“	420	16.54	191	7.52	78.0	3.07	440	17.32	210	8.27	78.0	3.07	193	7.60	19	42	23	51
100 mm / 4“	420	16.54	229	9.01	102.4	4.03	440	17.32	254	10	102.4	4.03	205	8.07	25	55	35	78
125 mm / 5“	440	17.32	254	10.00	128.3	5.05	460	18.11	279	10.98	128.3	5.05	218	8.58	29	64	40	89
150 mm / 6“	430	16.93	279	10.98	154.2	6.07	450	17.71	318	12.52	154.2	6.07	232	9.13	35	78	50	111
200 mm / 8“	480	18.90	343	13.50	202.7	7.98	500	19.69	381	15	202.7	7.98	256	10.08	54	119	72	160
250 mm / 10“	490	19.29	406	15.98	254.5	10.02	520	20.47	444	17.48	254.5	10.03	283	11.14	85	189	98	217
300 mm / 12“	550	21.65	483	19.02	306.3	12.06	580	22.83	521	20.51	306.3	12.06	309	12.17	115	256	142	322

[1)] Length tolerance (mm): DN50 ... DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 300 +4/-5.
[2)] Approximate weights without transmitter FUS060 - weight of FUS060 is 4.4 kg (9.7 lb)

Flowmeter SONO 3100/FUS060

Overview

The SONO 3100 sensor and the FUS060 transmitter is an ideal combination for applications where process shut down is impossible during service and where there is a need for extreme high/low temperatures and pressures.

Transducers can easily be changed without interrupting operation. SONO 3100 can be delivered as a option in 4-track solution for absolute best performance and accuracy.

Benefits

- Replaceable transducers under pressure
- Measure on all liquids less than 350 Cst, conductive or non conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long time stability
- On request:
  - Special sensor material, e.g. Duplex
  - High/low temperature sensor version: +250 °C (+482 °F) / -200 °C (-328 °F) sensors
  - Pressure rating 430 bar (6235 psi)
  - 4 track sensor technology

Application

The main application for SONO 3100 in combination with FUS060 ultrasonic flowmeter is to measure volume within:

- Petrochemical industry
- Power engineering
- Water and waste water
- Oil and liquid gases

SITRANS FUS060 holds ATEX for hazardous areas, HART and PROFIBUS PA. SONO 3100 holds ATEX Ex approval.

Design

The SONO 3100 in combination with FUS060 consists of a SONO 3100 sensor, transducers with O-rings or flanges depending on selection - and a FUS060 transmitter.

SONO 3100 is basically supplied in a 2-track solution with and without flanges in sizes from DN 100 to DN 1200.

4 track version is avaible on request.

SONO 3100 is as standard available in carbon/stainless steel from DN 100 to DN 1200.

FUS060 is designed for wall mounting only.

Technical specifications

2-track sensor fitted with four SONO 3200 transducers

Error in measurement	
Error in measurement at reference conditions; % of measured value	v > 0.5 ... 10 m/s, < ± 0.5% of rate (v=flow velocity)
Max flow velocity	10 m/s (32 ft)
Nominal size	DN 100 ... 1200 (4” ... 48”)
Liquid temperature	• Standard: -10 °C ... +200 °C (14 ... 392 °F) • ATEX: -20 ... +190 °C (-4 ... +374 °F)
Ambient temperature	• Standard: -20 °C ... +200 °C (-4 ... +392 °F) • ATEX: -20 ... +180 °C (-4 ... +356 °F)
Enclosure	IP68 (NEMA 6)/IP68 (NEMA 6X)
Process connections	
PN designated, EN 1092-1-type II, B	
Pipe material carbon steel	• DN 200 ... 1200 (8” ... 48”), PN 10 • DN 100 … 1200 (4” … 48”), PN 16 • DN 200 … 1000 (8” … 40”), PN 25 • DN 100 … 500 (4” … 20”), PN 40
Pipe material stainless steel	• DN 200 … 300 (8” … 12”), PN 10 and PN 25 • DN 100 … 300 (4” … 12”), PN 16 and PN 40
Class designated, EN 1759-1-type II, B	
Pipe material carbon steel	• DN 100 … 600 (4” … 24”) Class 150 • DN 100 … 300 (4” … 12”) Class 300
Pipe material stainless steel	• DN 100 … 300 (4” … 12”) Class 150 and Class 300
Without flanges, only in carbon steel	• DN 100 … 1200 (4” … 48”), PN 16 • DN 200 … 1000 (8” … 40”), PN 25 • DN 100 … 500 (4” … 20”), PN 40
Transducer SONO 3200	O-ring or flange versions
Materials	
Pipe	Steel EN 1.0345-P235GH or stainless steel EN 1.4404 - AISI 316L
Flange	
PN	EN 10025-S235JRG2, 1E1 or stainless steel EN 10222-5-1.4404, 13E0
Class	ASTM A105,1,1 or stainless steel ASTM F316L,2,3
Transducer body	Stainless steel AISI 316 or similar
Transducer terminal house	Stainless steel AISI 316 or plastic PA 6.6
Certificates and approvals	
System ATEX approval for SONO 3100 together with transmitter FUS060-Ex	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 or ATEX II 2C EEx d T3-T6 with SONO 3200 Exd transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	The sensor is supplied as standard with a Siemens Certificate of Conformity. Material certificate on in-line parts on request.
NDT examination report	Available on request

The sensor SONO 3100 with transmitter FUS060 conforms to Product Family Standard EN 61326/A3 appendix A (Title: Electrical Equipment for Measurement control and laboratory use – EMC requirements).

Selection and Ordering data		Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track	F)	7ME3100 -	
Diameter	**Qn [m^3/h]**		
DN 100 (4")	28	1N	
DN 100 (4")	100	1P	
DN 100 (4")	220	1R	
DN 125 (5")	44	1S	
DN 125 (5")	150	1T	
DN 125 (5")	350	1V	
DN 150 (6")	64	2A	
DN 150 (6")	220	2B	
DN 150 (6")	500	2D	
DN 200 (8")	110	2E	
DN 200 (8")	380	2F	
DN 200 (8")	900	2H	
DN 250 (10")	180	2J	
DN 250 (10")	600	2K	
DN 250 (10")	1300	2M	
DN 300 (12")	250	2N	
DN 300 (12")	850	2P	
DN 300 (12")	2000	2R	
DN 350 (14")	350	2S	
DN 350 (14")	1000	2T	
DN 350 (14")	2800	2V	
DN 400 (16")	450	3A	
DN 400 (16")	1300	3B	
DN 400 (16")	3600	3D	
DN 500 (20")	1300	3J	
DN 500 (20")	2200	3K	
DN 500 (20")	4200	3M	
DN 600 (24")	1300	3S	
DN 600 (24")	3200	3T	
DN 600 (24")	4200	3V	
DN 700 (28")	2000	4E	
DN 700 (28")	4200	4F	
DN 800 (32")	4200	4N	
DN 800 (32")	5500	4P	
DN 900 (36")	4200	5A	
DN 900 (36")	7500	5B	
DN 1000 (40")	4200	5J	
DN 1000 (40")	9000	5K	
DN 1200 (48")	4200	5S	
DN 1200 (48")	13200	5T	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
System without sensor - only transmitter FUS060 as spare part - settings as defined with this Order No.		A [1)]	
EN 1092-1			
PN 10 (DN 200 ... DN 1200)		B	
PN 16 (DN 100 ... DN 1200)		C	
PN 25 (DN 200 ... DN 1000)		D	
PN 40 (DN 100 ... DN 500)		E	
ANSI B16.5			
class 150 (DN 100 ... DN 600)		H	
class 300 (DN 100 ... DN 600)		J	
pipe without flanges			
PN 10 (DN 200 ... DN 1200)		P	
PN 16 (DN 100 ... DN 1200)		Q	
PN 25 (DN 200 ... DN 1200)		R	
PN 40 (DN 100 ... DN 500)		S	

Selection and Ordering data		Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track	F)	7ME3100 -	
Pipe and flange material			
Carbon steel (DN 100 ... 1200)		1	
Stainless steel (DN 100 ... 300)		2	
Transducer type and approval			
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 50 mm, 100 °C (212 °F) (DN 100 ... 1200; SS and CS sensors)		1	
IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C (392 °F) (DN 100 ... 1200; SS and CS sensors)		2	
IP68 SS housing, PN 40, O-ring, 50 mm, 190 °C (374 °F), Ex-d ATEX approval (only with standard FUS060) (DN 100 ... 1200; SS and CS sensors)		3	
IP67 (NEMA 4X/6) PA housing, PN 40, flange, 88 mm, 100 °C (212 °F) (DN 100 ... 300; SS sensors)		4	
IP68 SS housing, PN 40, flange, 88 mm, 200 °C (392 °F) (DN 100 ... 300; SS sensors)		5	
IP68 SS housing, PN 40, flange, 88 mm, 190 °C (374 °F), Ex-d ATEX approval (only with standard FUS060) (DN 100 ... 300; SS sensors)		6	
IP68 SS housing, PN 40, O-ring, 50 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version)) (DN 100 ... 1200; SS and CS sensors)		7	
IP68 SS housing, PN 40, flange, 88 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 300; SS sensors)		8	
Cable gland entires			
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5		1	
Cable glands ½" NPT in transducers and in transmitter		2	
Transmitter SITRANS FUS060			
Without transmitter (only sensor)		A	
IP65 (NEMA 4), 120/230 V AC		N	
IP65 (NEMA 4), 24 V AC/DC		P	
IP65 (NEMA 4), 24 V AC/DC ATEX Ex version		Q	
Module			
Without transmitter (only sensor)		A	
HART, 1 pulse output, 1 relay		B	
HART Ex, 1 pulse output, 1 relay		C	
PROFIBUS PA,1 pulse/frequency		D	
PROFIBUS PA, Ex, 1 pulse/frequency		E	
Transducer coax cable			
4 x 3 m, max. 70 °C (158 °F)			0
4 x 15 m, max. 70 °C (158 °F)			1
4 x 30 m, high temp. max. 200 °C (392 °F)			2
4 x 30 m, max. 70 °C (158 °F)			3
4 x 60 m, max. 70 °C (158 °F)			4
4 x 90 m, max. 70 °C (158 °F)			5
4 x 120 m, max. 70 °C (158 °F)			6
4 x 3 m, high temp. max. 200 °C (392 °F)			7
4 x 15 m, high temp. max. 200 °C (392 °F)			8

[1)] On preparation

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONO 3100/FUS060

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Order No. and specify Order code(s) and plain text.	
Calibration	
Production calibration DN 100 ... DN 1200 (with certificate)	**Included**
Theoritical calibration DN 500 ... DN 1200	**D03**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 250 ... 1300 m^3/h depending on dimension (DN 100 ... DN 500)	**D21**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 1400 ... 4200 m^3/h depending on dimension (DN 300 ... DN 700)	**D22**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 4200 m^3/h depending on dimension (DN 800 ... DN 1200)	**D23**
Accredited - Third party ISO/IEC 17025 calibration Max. flow 250 ... 1300 m^3/h depending on dimension (DN 100 ... DN 500)	**D31**
Accredited - Third party ISO/IEC 17025 calibration Max. flow 1400 ... 4200 m^3/h depending on dimension (DN 300 ... DN 700)	**D32**
Accredited - Third party ISO/IEC 17025 calibration Max. flow 4300 ... 7000 m^3/h depending on dimension (DN 800 ... DN 1200)	**D33**
Material certificate	
EN 10204-3.1	**F10**
EN 10204-3.1 and 100% NDT on weldings, DN 100 ... DN 400	**F11**
EN 10204-3.1 and 100% NDT on weldings, DN 500 ... DN 700	**F12**
EN 10204-3.1 and 100% NDT on weldings, DN 800 ... DN 1200	**F13**
Pressure certificate	
EN 10204-2.3	**F21**
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	**Y18**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Sensor SONO 3100 accessories and spare parts

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.[F)]	Symbol
Terminal housing (M20 cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	**FDK-085B5501**	
Terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**FDK-085B5504**	
Terminal housing (½" NPT cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	**A5E00839460**	
Terminal housing (½" NPT cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**A5E00839427**	
Ex d terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**FDK-085B5505**	
Ex i terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**A5E00835255**	
Gaskets for O-ring transducer	PN 40	70 FFKM	-20 ... +200 (-4 ... +392)	**FDK-085B1098**	
Gasket and 12 mm bolts and nuts for flange transducer	PN 40	Graphite 316 SS	-20 ... +200 (-4 ... +392)	**FDK-085B1083**	

Transducers SONO 3200 (spare part without terminal housing, including insert)

Type	Material	Gasket	Pressure rating	Temperature range [°C (°F)]	Length mm (inch)	Order No.	Symbol
O-ring	316 SS	O-ring	PN 40	-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK-085B1405**	
Flange	316 SS	Graphite	PN 40	-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK-085B1464**	

Transducer spare parts, complete unit

Type	Material	Gasket	Pressure rating	Terminal housing	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Order No.	Symbol
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	50 (1.97)	**FDK-085B5453**	
O-ring	316 SS	O-ring	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK-085B5450**	
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex-d	-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK-085B5451**	
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex i	-20 ... +200 (-4 ... +392)	50 (1.97)	**A5E00836448**	
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	50 (1.97)	**A5E00839472**	
O-ring	316 SS	O-ring	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	50 (1.97)	**A5E00839431**	
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	88 (3.47)	**FDK-085B5461**	
Flange	316 SS	Graphite	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK-085B5462**	
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex-d	-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK-085B5463**	
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex i	-20 ... +200 (-4 ... +392)	88 (3.47)	**A5E00836465**	
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	88 (3.47)	**A5E00839479**	
Flange	316 SS	Graphite	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	88 (3.47)	**A5E00839440**	
Flange	316 SS	Copper	PN 40	316 SS M20		-20 ... +100 (-4 ... +212)	88 (3.47)	**FDK-085B5471**	

Transducer SONO 3200 insert

Type	Temp. range [°C (°F)]	Length mm (inch)	Order No.	Symbol
Insert	-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK-085B1411**	
Insert	-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK-085B1459**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONO 3100/FUS060

Accessories and spare parts

Type/description	Order No.[F)]	Symbol
Submersible kit for transducers SONO 3200, IP68 10 m (32.81 ft) w.g. rating	**FDK-085L2403**	

Tools

Type/description	Transducer length	Order No.[F)]	Symbol
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap)	50 mm (1.97") transducers	**FDK-085B5331**	

Cables for SONO 3100 with FUS060 (each 1 pc.)

Type/description	Length m (ft)	Order No.[F)]	Symbol
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.7)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

Cable connection boxes

Type/description	Order No.[F)]	Symbol
Junction box for coax cable		
• IP68 metal box for 4 coax cables	**FDK-085B1361**	
• IP68 EEx-e plastic box for 4 coax cables, no ATEX apptoval	**FDK-085B1363**	

Cable glands

Type/description	Temperature range [°C (°F)]	Appr.	Order No.[F)]	Symbol
M20 Plastic	-40 ... +100 (-40 ... +212)		**FDK-085B1317**	
M20 Chrome plated brass	-20 ... +100 (-4 ... +212)		**FDK-085B1394**	
½" NPT plastic	-40 ... +100 (-40 ... +212)		**on request**	
M20 Stainless steel	-20 ... +200 (-4 ... +392)		**FDK-085B1399**	
M20 Stainless steel	-20 ... +195 (-4 ... +383)	Ex d	**FDK-085B1315**	

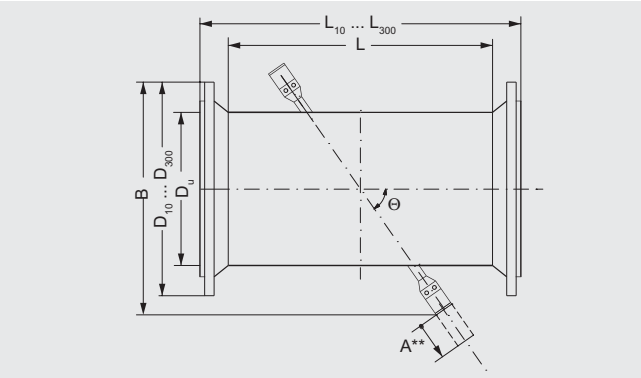
Transducer SONO 3200 gasket

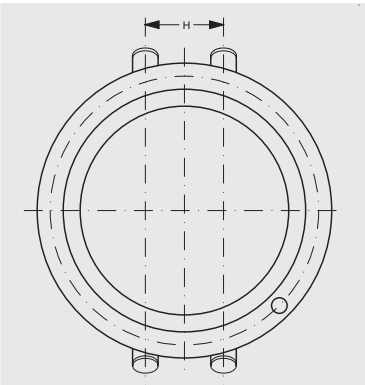
Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.[F)]	Symbol
Gasket O-ring (3 pcs. for complete transducer)	PN 40	FFKM[1)]/FKM	-20 … +200 (-4 ... +392)	**FDK-085B1089**	
Gasket flange	PN 40/160	Graphite	-20 … +200 (-4 ... +392)	**FDK-085B1080**	
Gasket and 12 mm (0.47") bolts and nuts for flange transducers	PN 40	Graphite, 316 SS	-20 … +200 (-4 ... +392)	**FDK-085B1083**	
Gasket and 16 mm (0.63") bolts and nuts for flange transducers	PN 160	Graphite, 316 SS	-20 … +200 (-4 ... +392)	**FDK-085B1084**	
Gasket cryogenics	PN 40	Copper, O-ring	-200 … +100 (-328 ... +212)	**FDK-085B1099**	

[1)] Chemical resistant O-ring

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings to sensor SONO 3100





Sensor SONO 3100 with EN norm

						PN 10			PN 16			PN 25			PN 40		
DN	D_U	$L^{1)}$	B	θ	H	$W_{10}{}^{2)}$	D_{10}	$L_{10}{}^{1)}$	$W_{16}{}^{2}$	D_{16}	$L_{16}{}^{1)}$	$W_{25}{}^{2)}$	D_{25}	$L_{25}{}^{1)}$	$W_{40}{}^{2)}$	D_{40}	$L_{40}{}^{1)}$
	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	114.3	860	305	45[3)]	42.8	-	-	-	3.6	220	960	-	-	-	3.6	235	990
125	139.7	862	325	45[3)]	64.5	-	-	-	4.0	250	970	-	-	-	4.0	270	990
150	168.3	862	350	45[3)]	78.1	-	-	-	4.5	285	970	-	-	-	4.5	300	1 010
200	219.1	668	430	45[3)]	102.1	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45[3)]	127.6	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45[3)]	151.8	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45[3)]	166.4	8.0	405	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45[3)]	191.3	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45[3)]	241.1	7.1	670	950	8.0	715	980	10.0	730	1 050	14.2	755	1 080
600	610.0	912	705	60	294.8	7.1	780	1 075	8.8	840	1 105	11.0	845	1 165	-	-	-
700	711.0	937	895	60	340.6	8.0	895	1 100	8.8	910	1 140	12.5	960	1 190	-	-	-
800	813.0	967	985	60	390.4	8.0	1 015	1 150	10.0	1 025	1 180	14.2	1 085	1 240	-	-	-
900	914.0	1 007	1 070	60	445.9	10.0	1 115	1 200	10.0	1 125	1 230	16.0	1 185	1 300	-	-	-
1000	1 016.0	1 060	1 160	60	490.0	10.0	1 230	1 250	10.0	1 255	1 300	17.5	1 320	1 370	-	-	-
1200	1 220.0	1 100	1 350	60	588.0	8.0	1 340	1 280	11.0	1 455	1 360	-	-	-	-	-	-

1) Length tolerance (mm): DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ...1200 +5/-6

2) Wall thickness for pressure rates PN 6 ... 40

3) For all sensors with flange transducers track angle are 60°

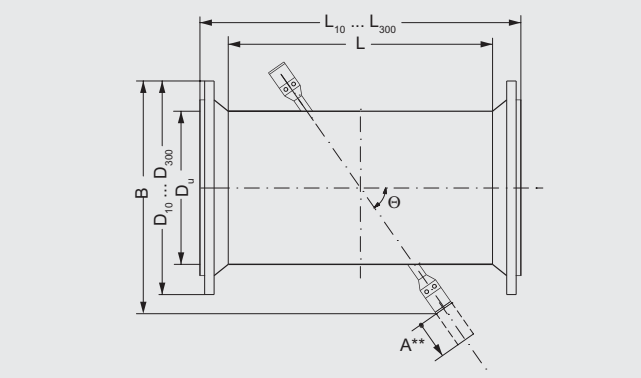
A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information in „Sensor SONO 3100 accessories and spare parts“ on page 4/185.

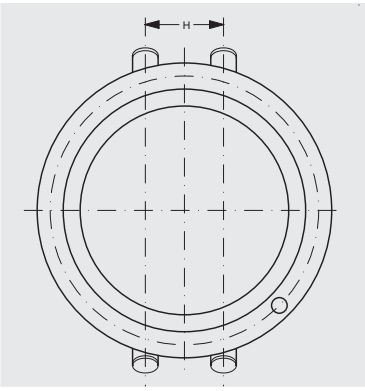
SONO 3100, 2-track				
Nominal diam.	Flange type - Weight [kg] ([lbs])			
DN	PN 10	PN 16	PN 25	PN 40
100 (4“)	-	32 (70.5)	-	35 (77.2)
125 (5“)	-	38 (83.8)	-	44 (97.0)
150 (6“)	-	45 (99.2)	-	52 (114.6)
200 (8“)	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10“)	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12“)	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14“)	98 (216.0)	113 (249.1)	145 (332.9)	191 (421.1)
400 (16“)	119 (262.4)	141 (310.9)	191 (421.1)	275 (606.3)
500 (20“)	153 (337.3)	207 (456.4)	284 (626.0)	379 (836.0)
600 (24“)	193 (425.5)	276 (608.5)	363 (800.3)	-
700 (28“)	262 (577.6)	303 (668.0)	480 (1 058)	-
800 (32“)	329 (725.3)	400 (881.8)	650 (1 433)	-
900 (36“)	428 (943.6)	475 (1 047)	835 (1 841)	-
1000 (40“)	500 (1 102)	594 (1 010)	1 078 (2 377)	-
1200 (48“)	680 (1 496)	860 (1 892)	-	-

Approximate weight of system incl. process flanges and transducers, without FUS060 (4.4 kg (9.7 lb))

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONO 3100/FUS060





Sensor SONO 3100 with ANSI norm

						Class 150			Class 300		
Size (DN)	**D_U**	**L[1)]**	**B**	**θ**	**H**	**W_{150}[2)]**	**D_{150}**	**L_{150}[1)]**	**W_{300}[2)]**	**D_{300}**	**L_{300}[1)]**
inch (mm)	**[inch]**	**[inch]**	**[inch]**	**[°]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**
4" (100)	4.50	33.86	12.01	45[3)]	1.69	0.14	9.00	39.86	0.25	10.00	40.62
5" (125)	5.50	33.94	12.80	45[3)]	2.54	0.15	10.00	40.94	0.27	11.00	41.70
6" (150)	6.63	33.94	13.78	45[3)]	3.07	0.16	11.00	40.94	0.30	12.50	41.70
8" (200)	8.63	26.30	16.93	45[3)]	4.02	0.16	13.50	34.30	0.29	15.00	35.06
10" (250)	10.75	28.11	18.90	45[3)]	5.02	0.18	16.00	36.11	0.34	17.50	37.35
12" (300)	12.75	23.90	20.67	45[3)]	5.98	0.20	19.00	32.90	0.39	20.50	34.14
14" (350)	14.00	25.16	21.65	45[3)]	6.55	0.21	21.00	35.16	-	-	-
16" (400)	16.00	27.68	23.62	45[3)]	7.53	0.22	23.50	33.74	-	-	-
20" (500)	20.00	31.38	27.17	45[3)]	9.49	0.26	27.50	42.76	-	-	-
24" (600)	24.00	35.91	27.76	60	11.61	0.30	32.00	47.91	-	-	-

1) Length tolerance (mm): 4" +0.08"/-0.12"(+2/-3mm), 5" to 8" +0.12"/-0.16"(+3/-4mm), 10" to 16" +0.16"/-0.20"(+4/-5mm), 20" to 24" +0.20"/-0.24"(+5/-6mm)

2) Minimum wall thickness for pressure rates CL150 or CL300.

3) For all sensors with flange transducers track angle are 60°

Approximate weights for SONO 3100 senor with ANSI B16.5 flanges

Nominal diam.	**Nominal diam.**	**Weight [kg] ([lbs])[1)]**			
DN	**DN**	**CL150**		**CL300**	
[inch]	**[mm]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**
4“	100	32	70.5	35	77.2
5“	125	38	83.8	44	97.0
6“	150	45	99.2	52	114.6
8“	200	58	127.9	79	174.2
10“	250	75	165.3	117	257.9
12“	300	92	202.8	151	332.9
14“	350	113	249.1	-	-
16“	400	141	310.9	-	-
20“	500	207	456.4	-	-
24“	600	276	608.5	-	-

1) Weight of system incl. process flanges and standard O-ring transducers.
For sensors with flange transducer please add approx. 10 kg (22.05 lbs).
For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

Overview

SONOKIT is a transit time based ultrasonic flowmeter for retrofitting on existing pipelines.

The kit includes all necessary parts and special tools to make the installation as 1- or 2-track flowmeter.

The set is made for installation on empty pipes or pipes under pressure without process shut-down (hot-tap).

Please contact Siemens for further information on hot-tap tools and instructions.

SONOKIT has in-line transducers (in contact with media) which assure superior accuracy and performance.

Benefits

- Cost-effective solution – contains all the necessary components for retrofitting
- SONOKIT is easy to install in pipeline sizes DN 200 to DN 4000 (8" to 160") 1-track DN 100 to DN 2400 (4" to 96") – without process shut-down or flow interruption
- No bypass installation necessary – withstands pressures up to 40 bar (580 psi) and media temperatures between -20 °C and +200 °C (-4 °F and +392 °F)
- High accuracy – the bigger the pipe, the more accurate the result
- Solid construction and no moving parts for a 100% maintenance and obstruction free flowmeter
- The SONOKIT comes with transducers in IP68 enclosure
- Available in a robust version that can be buried and withstands constant flooding
- In-line transducers assure superior accuracy and performance
- Automatic calculation of the calibration factor when pipe geometry data are entered in the transmitter
- Transmitter versions with HART or PROFIBUS PA

Application

- Raw water intake for water treatment plants
- Water distribution systems
- Irrigation systems
- Power generation (energy and water)
- District heating plants
- Cooling water plants within the industry and in power stations
- Systems within the oil and refinery business
- Sewage treatment plants
- Plants transporting non-conductive liquids

Design

The SONOKIT set contains all necessary parts to build a ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Papers to wrap around pipes for alignment of sensors
- Transducer alignment tools
- Mounting plates and SITRANS FUS060 transmitter type according to ordering
- Cables
- 4 track version is available on request
- Wall mounting

Technical specifications

Accuracy

Typical, depending on accuracy of measurements of installation	• 2-Track: ≤ ± (0.5 … 1.5%) • 1-Track: ≤ ± (1 … 3%)

Note:
Accuracy depends on the accuracy of the measurements taken at location. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy. Values measured are entered into the memory of the FUS060 transmitter.

Requirements for pipes

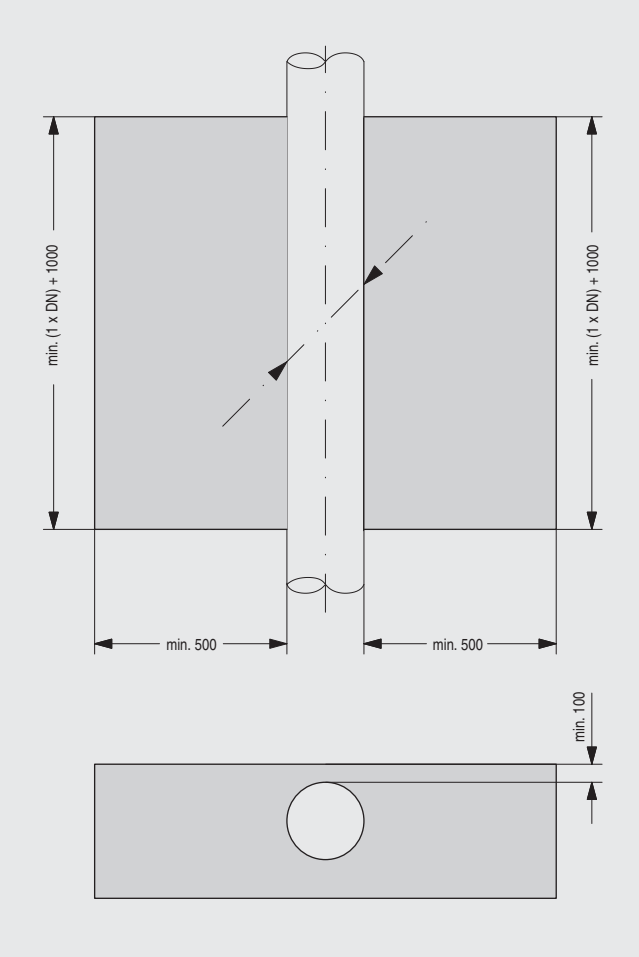
Requirements for pipes	
Size	DN 100 … DN 4000 (4" … 160")
Line pressure	max. 40 bar (580 psi)
Liquid temperature	• Standard version: -20 … +200 °C (-4 … +392 °F) • ATEX version: -20 ... +195 °C (-4 ... +383 °F)
Enclosure/approvals/certificates	
Standard version	IP67 (NEMA 6) / IP68 (NEMA 6X)
Ex approval	System ATEX approval for SONO 3200 Ex-i transducers together with transmitter FUS060-Ex: ATEX II 2G Ex dem [ia/Ib] IIC T6/T4/T3 or ATEX II 2C EEx d T3-T6 with SONO 3200 Ex-d transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	EN 10204-3.1 material certificate on transducer mounting parts
Materials	
Terminal box	Standard version: PA 6.6, 100 °C (212 °F) and AISI 316, 200 °C (392 °F)
Transducer element	Standard version: AISI 316, 200 °C (392 °F)
Materials of existing pipeline	
Steel	Transducer holder: EN 10273 or EN 10216 (P235GH) Mounting plates: EN 10273 or EN 10216 (P235GH)
Concrete	Transducer holder: AISI 316 or similar Mounting plates: (not included)
Stainless steel	Transducer holder: AISI 316 or similar Mounting plates: AISI 316 or similar

Flowmeter SONOKIT (with FUS060)

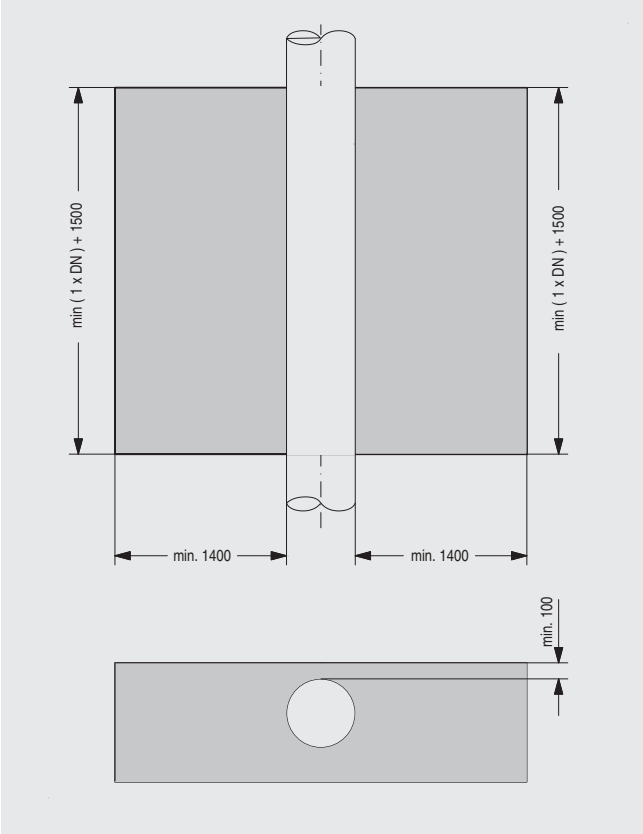
Pipe wall thickness	
Steel pipe (AISI 316 and St. 37.2 or corresponding material)	Transducer and holder available in length L = 160, allowing a pipe wall thickness up to 20 mm (0.79“)
Concrete pipe	Transducer and holder available in length L = 230, allowing a pipe wall thickness up to 200 mm (7.9“)
Dimension on the package box (L x W x H)	820 x 410 x 360 mm (32.3“ x 16.1“ x 14.2“)

Installation requirements

The space requirements (in mm) around the pipe for retrofitting a SITRANS F US ultrasonic flowmeter type SONOKIT are given below:



Empty pipe installation



Hot-tap installation

Flowmeter SONOKIT (with FUS060)

Selection and Ordering data		Order No.
SITRANS F US SONOKIT 1-track sensor	F)	**7ME3210 -**
Diameter	**Qn [m^3/h]**	
DN 100 (4")	100	**1P**
DN 125 (5")	150	**1T**
DN 150 (6")	220	**2B**
DN 200 (8")	380	**2F**
DN 250 (10")	600	**2K**
DN 300 (12")	850	**2P**
DN 350 (14")	1000	**2T**
DN 400 (16")	1300	**3B**
DN 450 (18")	1700	**3F**
DN 500 (20")	2200	**3K**
DN 550 (22")	2600	**3P**
DN 600 (24")	3200	**3T**
DN 650 (26")	3600	**4B**
DN 700 (28")	4200	**4F**
DN 750 (30")	4800	**4K**
DN 800 (32")	5500	**4P**
DN 900 (36")	7500	**5B**
DN 1000 (40")	9000	**5K**
DN 1100 (44")	10000	**5P**
DN 1200 (48")	13200	**5T**
DN 1300 (52")	14000	**6A**
DN 1400 (56")	16800	**6C**
DN 1500 (60")	19000	**6E**
DN 1600 (64")	22800	**6G**
DN 1700 (68")	25000	**6J**
DN 1800 (72")	27600	**6L**
DN 1900 (76")	31000	**6N**
DN 2000 (80")	36000	**6Q**
DN 2100 (84")	37000	**6S**
DN 2200 (88")	42000	**6U**
DN 2300 (92")	45000	**6W**
DN 2400 (96")	51000	**7A**
Installation method		
Empty pipe		**A**
Hot tap, mounting under pressure		**B**
Transducer holder		
Carbon steel, length = 160 mm, mounting plates in carbon steel		**1**
Stainless steel, length = 160 mm, mounting plates in stainless steel		**2**
Stainless steel, length = 230 mm, for concrete pipe		**3**
Transducer type and approval		
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval		**1**
IP68 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex d, ATEX approval (only with standard FUS060)		**2**
IP68 PA housing, Sylgard potting kit, PN 40, O-ring, 100 °C (212 °F), no approval		**3**
IP68 SS housing, Sylgard potting kit, PN 40, O-ring, 200 °C (392 °F), no approval		**4**
IP68 SS housing, PN 40, SS, O-ring, 190 °C (374 °F), Ex i type, ATEX approval (only with FUS060 Ex)		**5**

Selection and Ordering data		Order No.
SITRANS F US SONOKIT 1-track sensor	F)	**7ME3210 -**
Cable gland entires		
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5		**1**
Cable glands ½" NPT in transducers and in transmitter		**2**
Transmitter SITRANS FUS060		
IP65 (NEMA 4), 120/230 V AC		**N**
IP65 (NEMA 4), 24 V AC/DC		**P**
IP65 (NEMA 4), 24 V AC/DC Ex version		**Q**
Module		
HART, 1 pulse output, 1 relay		**B**
HART Ex version, 1 pulse output, 1 relay		**C**
PROFIBUS PA,1 pulse/frequency		**D**
PROFIBUS PA, Ex version, 1 pulse/frequency		**E**
Transducer coax cable		
4 x 3 m, max. 70 °C (158 °F)		**0**
4 x 15 m, max. 70 °C (158 °F)		**1**
4 x 30 m, high temp. max. 200 °C (392 °F)		**2**
4 x 30 m, max. 70 °C (158 °F)		**3**
4 x 60 m, max. 70 °C (158 °F)		**4**
4 x 90 m, max. 70 °C (158 °F)		**5**
4 x 120 m, max. 70 °C (158 °F)		**6**
4 x 3 m, high temp. max. 200 °C (392 °F)		**7**
4 x 15 m, high temp. max. 200 °C (392 °F		**8**

Selection and Ordering data	Order code
Additional information	
Please add „-Z" to Order No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	**F30**
EN 10204-3.1, transducer holder material	**F31**
EN 10204-3.1, mounting plate material	**F32**
Tag name plate	
Stainless steel tag with 12 mm characters (max. 15 characters) (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters (max. 15 characters) (add plain text)	**Y18**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONOKIT (with FUS060)

4

Selection and Ordering data			Order No.
SITRANS F US SONOKIT 2-track sensor		F)	7ME3220 - ■■■■ - ■■■■
Diameter	**Qn [m³/h]**		
DN 200 (8")	380		2F
DN 250 (10")	600		2K
DN 300 (12")	850		2P
DN 350 (14")	1000		2T
DN 400 (16")	1300		3B
DN 450 (18")	1700		3F
DN 500 (20")	2200		3K
DN 550 (22")	2600		3P
DN 600 (24")	3200		3T
DN 650 (26")	3600		4B
DN 700 (28")	4200		4F
DN 750 (30")	4800		4K
DN 800 (32")	5500		4P
DN 900 (36")	7500		5B
DN 1000 (40")	9000		5K
DN 1100 (44")	10000		5P
DN 1200 (48")	13200		5T
DN 1300 (52")	14000		6A
DN 1400 (56")	16800		6C
DN 1500 (60")	19000		6E
DN 1600 (64")	22800		6G
DN 1700 (68")	25000		6J
DN 1800 (72")	27600		6L
DN 1900 (76")	31000		6N
DN 2000 (80")	36000		6Q
DN 2100 (84")	37000		6S
DN 2200 (88")	42000		6U
DN 2300 (92")	45000		6W
DN 2400 (96")	51000		7A
DN 2500 (100")	53000		7C
DN 2600 (104")	60000		7E
DN 2700 (108")	62000		7G
DN 2800 (112")	72000		7J
DN 2900 (116")	71000		7L
DN 3000 (120")	78000		7N
DN 3100 (124")	82000		7Q
DN 3200 (128")	85000		7S
DN 3300 (132")	92000		7U
DN 3400 (136")	100000		7W
DN 3500 (140")	100000		8A
DN 3600 (144")	110000		8C
DN 3700 (148")	120000		8E
DN 3800 (152")	130000		8G
DN 3900 (156")	130000		8J
DN 4000 (160")	144000		8L
Installation method			
Empty pipe			A
Hot tap, mounting under pressure			B
Tapping band (to be ordered separately)			C
Transducer holder			
None (for tapping band)			0
Carbon steel, length = 160 mm, mounting plates in carbon steel			1
Stainless steel, length = 160 mm, mounting plates in stainless steel			2
Stainless steel, length = 230 mm, for concrete pipe			3

Selection and Ordering data		Order No.
SITRANS F US SONOKIT 2-track sensor	F)	7ME3220 - ■■■■ - ■■■■
Transducer type and approval		
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval		1
IP68 SS housing, PN 40, O-ring, 190 °C (374 °F), EEx d, ATEX approval (only with standard FUS060)		2
IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval		3
IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval		4
IP68 SS housing, PN 40, O-ring, 190 °C (374 °F), EEx i, ATEX approval (only with FUS060 Ex)		5
Cable gland entires		
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5		1
Cable glands ½" NPT in transducers and in transmitter		2
Transmitter SITRANS FUS060		
IP65 (NEMA 4), 120/230 V AC		N
IP65 (NEMA 4), 24 V AC/DC		P
IP65 (NEMA 4), 24 V AC/DC Ex version		Q
Module		
HART, 1 pulse output, 1 relay		B
HART Ex version, 1 pulse output, 1 relay		C
PROFIBUS PA,1 pulse/frequency		D
PROFIBUS PA, Ex version, 1 pulse/frequency		E
Transducer coax cable		
4 x 3 m, max. 70 °C (158 °F)		0
4 x 15 m, max. 70 °C (158 °F)		1
4 x 30 m, high temp. max. 200 °C (392 °F)		2
4 x 30 m, max. 70 °C (158 °F)		3
4 x 60 m, max. 70 °C (158 °F)		4
4 x 90 m, max. 70 °C (158 °F)		5
4 x 120 m, max. 70 °C (158 °F)		6
4 x 3 m, high temp. max. 200 °C (392 °F)		7
4 x 15 m, high temp. max. 200 °C (392 °F		8

Selection and Ordering data	Order code
Additional information	
Please add „-Z" to Order No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	**F30**
EN 10204-3.1, transducer holder material	**F31**
EN 10204-3.1, mounting plate material	**F32**
Tag name plate	
Stainless steel tag with 12 mm characters (max. 15 characters) (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters (max. 15 characters) (add plain text)	**Y18**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

F) Subject to export regulations AL: 9I999, ECCN: N.

SONO 3200 transducer complete unit with ½"-NPT cable glands

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.F)	Symbol
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	160 (6.3)	A5E00839476	
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[1] (-4 ... +392)	160 (6.3)	A5E00839435	
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	230 (9.41)	A5E00839477	
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[1] (-4 ... +392)	230 (9.41)	A5E00839437	

1) 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) but cable glands only for -20 ... +100 °C (-4 ... +212 °F)

SONO 3200 transducer complete unit with M20 cable glands

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.F)	Symbol
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	160 (6.3)	FDK-085B5454	
O-ring	316 SS	O-ring[1]	PN 40	316 SS		-20 … +200[2] (-4 ... +392)	160 (6.3)	FDK-085B5455	
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	230 (9.41)	FDK-085B5458	
O-ring	316 SS	O-ring[1]	PN 40	316 SS	Ex d[3]	-20 … +195 (-4 ... +383)	160 (6.3)	FDK-085B5452	
O-ring	316 SS	O-ring	PN 40	316 SS	Ex i	-20 … +195 (-4 ... +383)	160 (6.3)	A5E00836462	
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[2] (-4 ... +392)	230 (9.41)	FDK-085B5459	

1) Chemical resistant O-ring
2) 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) but cable glands only for -20 ... +100 °C (-4 ... +212 °F)
3) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

SONO 3200 transducer insert

Temperature range [°C (°F)]	Length [mm (inch)]	Order No.F)	Symbol
-20 … +200 (-4 ... +392)	160 (6.3)	FDK-085B1419	
-20 … +200 (-4 ... +392)	230 (9.41)	FDK-085B1420	

SONO 3200 transducer (Transducer body with insert)

Temperature range [°C (°F)]	Gasket	Length [mm (inch)]	Order No.F)	Symbol
-20 … +200 (-4 ... +392)	O-ring[1]	160 (6.3)	FDK-085B1406	
-20 … +200 (-4 ... +392)	O-ring	160 (6.3)	FDK-085B5510	
-20 … +200 (-4 ... +392)	O-ring	230 (9.41)	FDK-085B5511	

1) Chemical resistant O-ring

Terminal housing with M20 cable glands

Type	Order No.F)	Symbol
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	FDK-085B5501	
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	FDK-085B5504	
Material: AISI 316, Ex-d, Temperature range: -20 … +195 °C (-4 ... +383 °F)[1]	FDK-085B5505	
Material: AISI 316, Ex-i, Temperature range: -20 … +195 °C (-4 ... +383 °F)[2]	A5E00835255	

1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6
2) For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONOKIT (with FUS060)

Terminal housing with ½-NPT cable glands

Type	Order No.[F)]	Symbol
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	**A5E00839460**	
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	**A5E00839427**	

Transducer SONO 3200 gasket

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.[F)]	Symbol
Gasket O-ring (3 pcs. for complete transducer)	PN 40	FFKM[1)]/FKM	-20 … +200 (-4 ... +392)	**FDK-085B1089**	

[1)] Chemical resistant O-ring

Potting kit

Type/description	Order No.[F)]	Symbol
Potting kit, IP68, 10 m (32,81 ft) w.g. rating	**FDK-085L2403**	

Tools

Type/description	Order No.[F)]	Symbol
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap)		
Transducer length:		
• 160 mm (6.3“)	**FDK-085B5333**	
• 230 mm (9.1“)	**FDK-085B5335**	
Angle measurement tool for SONOKIT	**FDK-085B5330**	
Hot-tap drilling tool for SONOKIT	**FDK-085B5392**	
Alignment tool for SONOKIT	**FDK-085B5393**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Cables for SONO 3100 with FUS060 (each 1 pc.)

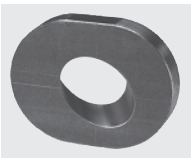
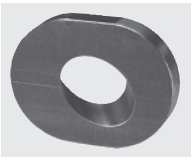
Type/description	Length m (ft)	Order No.[F)]	Symbol
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (1 pc.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (1 pc.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

Transducer holder for SONOKIT

Type/description	Order No.[F)]	Symbol
1-track		
• 230 mm (9.1“) for concrete pipe 60°, DN 100 … DN 2400 (4“ ... 96“)	**FDK-085L1656**	
• 160 mm (6.3“) stainless steel 60°, DN 100 … DN 2400 (4“ ... 96“)	**FDK-085L1105**	
• 160 mm (6.3“) carbon steel 60°, DN 100 … DN 2400 (4“ ... 96“)	**FDK-085L1104**	
2-track		
• 230 mm (9.1“) for concrete pipe 60°, DN 200 … DN 4000 (8“ ... 160“)	**FDK-085L1111**	
• 160 mm (6.3“) stainless steel 60°, DN 200 … DN 4000 (8“ ... 160“)	**FDK-085L1109**	
• 160 mm (6.3“) carbon steel 60°, DN 200 … DN 4000 (8“ ... 160“)	**FDK-085L1108**	

The part which is welded onto the pipe is either stainless steel or carbon steel.

Mounting plate for SONOKIT

Type/description	Order No.[F)]	
1-track		
• 160 mm (6.3“), stainless steel, 60°, DN 100 … DN 2400 (4“ ... 96“)	**FDK-085L1115**	
• 160 mm (6.3“), carbon steel, 60°, DN 100 … DN 2400 (4“ ... 96“)	**FDK-085L1114**	
2-track		
• 160 mm (6.3“), stainless steel, 60°, DN 200 … DN 4000 (8“ ... 160“)	**FDK-085L1119**	
• 160 mm (6.3“), carbon steel, 60°, DN 200 … DN 4000 (8“ ... 160“)	**FDK-085L1118**	

The mounting plates are either completely in stainless steel or carbon steel.

Cable connection boxes

Type/description	Order No.[F)]	Symbol
Junction box for coax cable		
• IP68 metal box for 2 coaxial cables	**FDK-085B1360**	
• IP68 metal box for 4 coaxial cables	**FDK-085B1361**	
• IP68 EEx-e plastic box for 2 coaxial cables, no ATEX approval	**FDK-085B1362**	
• IP68 EEx-e plastic box for 4 coaxial cables, no ATEX approval	**FDK-085B1363**	

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SONOKIT (with FUS060)

Cable glands (each 1 pc.)

Type	Material	Temperature range [°C (°F)]	Approval	Order No.[F)]	Symbol
M20	Plastic	-40 ... +100 (-40 .... +212)		**FDK-085B1317**	
M20	Chrome plated brass	-20 ... +100 (-4 .... +212)		**FDK-085B1394**	
M20	Stainless steel	-20 ... +200 (-4 .... +392)		**FDK-085B1399**	
M20	Stainless steel	-20 ... +195 (-4 .... +383)	Ex d[1)]	**FDK-085B1315**	
½-NPT	Chrome plated brass	-20 ... +100 (-4 .... +212)		**FDK-085B1319**	

1) ATEX approved

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Flowmeter SITRANS FUS380 standard

Overview

The 2-track flowmeter SITRANS FUS380 comes as battery or mains powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.
The type approved flowmeter version is named SITRANS FUE380 - see page 4/202.
Technically the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit.

Benefits

- Battery powered up to 6 years
- 115/230 V mains powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanic isolated digital outputs for easy connection to a calculator (potential free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_{min}:Q_{max} up to 1:400
- MODBUS RTU/RS 232, RS 485

Application

The main application for SITRANS FUS380 is measurement of water flow or water flow in heat meter systems in district heating networks or chilled water.

Design

The 2-track design of SITRANS FUS380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two digital output functions that can be individually selected, and optional MODBUS RTU communication modules.

Pulse output rate is defined when ordering.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except eventually local approvals on the flowmeter.

Flowmeter SITRANS FUS380 standard

Configuration SITRANS FUS380

Selection guide SITRANS FUS380, standard version

Flowmeter size nominal to EN 1092-1			DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300
Flow range[1]	Q_{max} (Q_s)	m^3/h	45	72	120	240	400	560	900	1400	2100
	Q_{min} (Q_i)	m^3/h	0.15	0.24	0.4	0.6	1.0	1.5	2.5	4.0	5.6
Dyn. range	Q_i:Q_s		300	300	300	1:400	1:400	1:373	1:360	1:350	1:375
	cut off	m^3/h	0.09	0.14	0.24	0.48	0.80	1.12	1.80	2.80	4.20
Pulse value[2]		l/pulse	1	1	2.5	2.5	2.5	2.5	10	10	50

Flowmeter size nominal to EN 1092-1			DN 350	DN 400	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000	DN 1200
Flow range[1]	Q_{max} (Q_s)	m^3/h	2800	3600	5500	8000	10800	14200	20000	24000	36000
	Q_{min} (Q_i)	m^3/h	7.0	9.5	14.75	21.50	29.0	38.0	100.0	120.0	180.0
Dyn. range	Q_i:Q_s		1:400	1:379	1:373	1:372	1:372	1:373	1:200	1:200	1:200
	cut off	m^3/h	5.60	7.20	11.00	16.00	21.60	28.40	40.00	48.00	72.00
Pulse value[2]		l/pulse	50	50	100	100	100	100	100	100	100

Low flow cut off: 0.2% of Q_s (Q_s: maximal flow rate)

In order to obtain best pulse output resolution in the range Q_{min} - Q_{max} of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. For the selection help, the ordering data table shows also Q_p (Q_n). This flow rate is between Qi (Q_{min}) and Q_s (Q_{max}) and means the normal or typical flow. Q_p and Q_s is shown on the system label of the FUS380.

[1] Other typical flow ranges - see Selection and Ordering data table.

[2] Typical pulse values for SITRANS FUS380. Other pulse values are possible - see Selection and Ordering data table.

Technical specifications SITRANS FUS380

Pipe design	2-track sensor with flanges and integrated transducers wet calibrated from factory
Nominal size welded version	DN 50. 65. 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	• DN 100 ... 1200: Carbon Steel EN 1.0345 / p235 GH, painted in light-gray. • DN 50 ... 80: Bronze brass G-CuSn10/W2.1050.01 (EN1982)
Transducer design	• DN 100 ... 1200: Integrated version and welded onto the pipe • DN 50 ... 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/ brass (CuZn36Pb2as)

Sensor operating conditions

Storage	-40 … +85 °C (-40 … +185 °F)
Liquid temperature	DN 100 ... 1200: • Remote: 2 … 200 °C (35.6 … 392 °F) DN 50 ... 80: • Remote: 2 … 150 °C (35.6 … 302 °F) DN 50 ... 1200: • Compact: 2 … 120 °C (35.6 … 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 … 1200: 8 m/s (26.2 ft/s)

Transmitter

Display	LCD, 8 digits, additional 2 digits and symbols for status information
Push button	One push button for display information
Communication	IrDA – optical communication interface with MODBUS RTU protocol Add-on modules: • RS 232 serial interface with MODBUS RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS 485 serial interface with MODBUS RTU (+/-/GND), multi-drop with up to 32 devices with max. 1000 m cable MODBUS RTU protocol is an open protocol (further information available on request) Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud
Enclosure	IP67/NEMA 4X/6 to EN 60529 and DIN 40050
Temperature ambient	0 … 60 °C (32 … 140 °F)
Temperature storage	-40 … +85 °C (-40 … +185 °F) (battery included)
Installation	Compact on sensor: max. 120 °C (248 °F), Separate: max. 30 m (98.4 ft) from transmitter
Mechanical vibration	2 g, 1 … 800 Hz sinusoidal in all directions to IEC 68-2-6
Design	Fibre-glass reinforced polyamide
Power supply	• Battery: replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride) battery pack 32 Ah • Mains: 87 … 265 V AC (50 … 60 Hz)

Flowmeter SITRANS FUS380 standard

Measuring rate	Battery mode: 0.5 Hz Mains supply: 20 Hz Back-up mode: 0.5 Hz (at mains supply drop)
Digital output	Two passive individual galvanically isolated MOS relay outputs, A and B, max. ± 35 V AC/DC, 50 mA
Max pulse frequency	100 Hz
Alarm indication	Track 1 (F1), track 2 (F2), Low battery indication (F5), Qs overflow (F6), pulse overflow (F7), totalizer warning from the internal data logger (F9)
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
EMC	• Emission EN 61000-6-4 • Immunity EN 61000-6-2

	FUS380
Flow value setting	Predefined settings according to dimension
Approval	No approval
Flow rate v_f	0.02 … 8 m/s (0.065 … 26.2 ft/s)
Output A	Pulse: forward, reverse, forward net, reverse net (Preset: forward)
Output B	Pulse (forward, reverse, forward net, reverse net) alarm, call-up (Preset: alarm)
Pulse value A & B (depending on DN value)	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m^3/p, 2.5 m^3/p, 5 m^3/p, 10 m^3/p, 25 m^3/p, 50 m^3/p, 100 m^3/p, 250 m^3/p, 500 m^3/p, 1000 m^3/p
Pulse width	5/10/20/50/100/200/ 500 ms
Flow unit setup	Preset: m^3/h
Volume unit setup	Preset: m^3

SITRANS FUS380 uncertainty

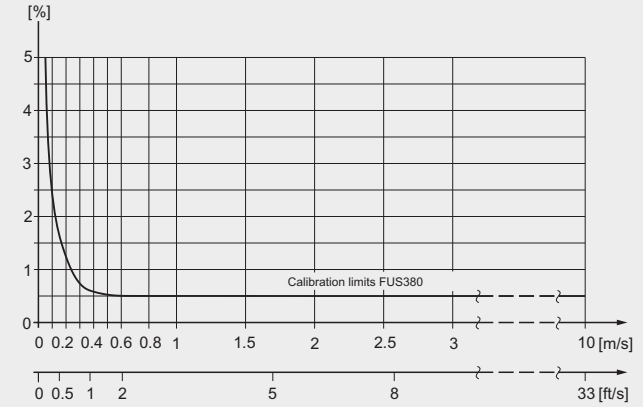
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including the US (NIST traceability).

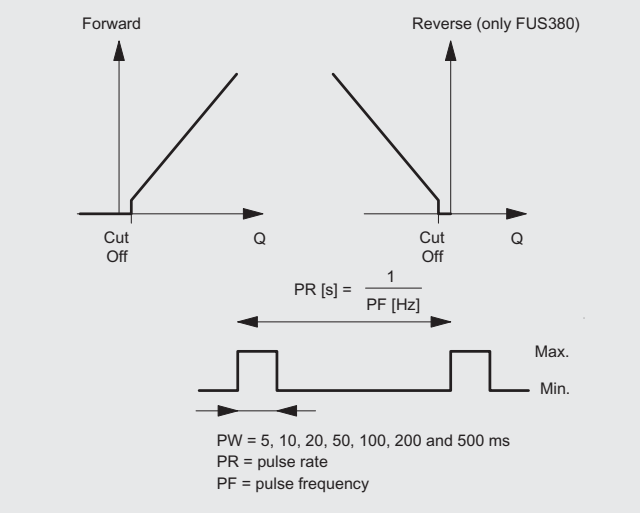
A standard calibration certificate is shipped with every SITRANS FUS380.

Accuracy SITRANS FUS380:

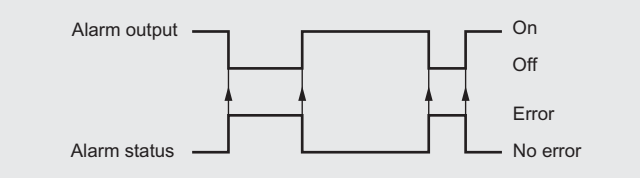
Standard calibration: Better than 0.5% of rate, 0.5 m/s < v < 8 m/s
v < 0.5 m/s, 0.5 + 0.25/v [%]



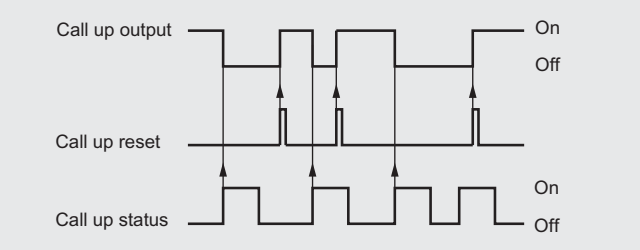
Output configuration SITRANS FUS380



Pulse volume: output A/B configured as volume per pulse, calculated on forward/reverse or net forward/reverse flow. The volume per pulse is free scaleable (via PDM software).



Pulse output B can be used as stated above or as alarm or call up function



Call up: the call up output is active until manually reset by use of PDM program. The callup function is activated when an alarm is activated.

Flowmeter SITRANS FUS380 standard

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUS380 (standard)		F)	7ME3400-	
			■■■■0-■■A■	■■■
Diameter	**Flow setting [m³/h] Qp (Qn)[1]**	**Qs (Qmax)**		
DN 50 (2")[2]	15	15	1A	
DN 50 (2")[2]	15	45	1C	
DN 50 (2")[2]	30	45	1D	
DN 65 (2½")[2]	25	25	1E	
DN 65 (2½")[2]	25	72	1G	
DN 65 (2½")[2]	50	72	1H	
DN 80 (3")[2]	40	40	1J	
DN 80 (3")[2]	40	120	1L	
DN 80 (3")[2]	80	120	1M	
DN 100 (4")	60	60	1N	
DN 100 (4")	60	180	1Q	
DN 100 (4")	120	240	1R	
DN 125 (5")	100	100	1S	
DN 125 (5")	100	280	1U	
DN 125 (5")	200	400	1V	
DN 150 (6")	150	150	2A	
DN 150 (6")	150	420	2C	
DN 150 (6")	300	560	2D	
DN 200 (8")	250	250	2E	
DN 200 (8")	250	700	2G	
DN 200 (8")	500	900	2H	
DN 250 (10")	400	400	2J	
DN 250 (10")	400	1120	2L	
DN 250 (10")	800	1400	2M	
DN 300 (12")	560	560	2N	
DN 300 (12")	560	1560	2Q	
DN 300 (12")	1120	2100	2R	
DN 350 (14")	750	750	2S	
DN 350 (14")	750	2100	2U	
DN 350 (14")	1500	2800	2V	
DN 400 (16")	950	950	3A	
DN 400 (16")	950	2660	3C	
DN 400 (16")	1900	3600	3D	
DN 500 (20")	1475	1475	3J	
DN 500 (20")	1475	4130	3L	
DN 500 (20")	2950	5500	3M	
DN 600 (24")	2150	2150	3S	
DN 600 (24")	2150	6020	3U	
DN 600 (24")	4300	8000	3V	
DN 700 (28")	2900	2900	4E	
DN 700 (28")	2900	8120	4G	
DN 700 (28")	5800	10800	4H	
DN 800 (32")	3800	3800	4N	
DN 800 (32")	3800	10640	4Q	
DN 800 (32")	7600	14200	4R	
DN 900 (36")	5000	5000	5A	
DN 900 (36")	5000	14000	5C	
DN 900 (36")	10000	20000	5D	
DN 1000 (40")	6000	6000	5J	
DN 1000 (40")	6000	16800	5L	
DN 1000 (40")	12000	24000	5M	
DN 1200 (48")	9000	9000	5S	
DN 1200 (48")	9000	25200	5U	
DN 1200 (48")	18000	36000	5V	

Selection and Ordering data		Order No.	Order code
Flowmeter SITRANS FUS380 (standard)	F)	7ME3400-	
		■■■■0-■■A■	■■■
Flange norm and pressure rating			
System without sensor - only a transmitter FUS080 as spare part -settings as defined with this order no.		A	
EN 1092-1 Flanges			
PN 16 (DN 100 ... 1200)		C	
PN 25 (DN 200 ... 1000)		D	
PN 40 (DN 50 ... 250)[3]		E	
Compact / remote connection			
Compact version, max. 120 °C (248 °F) up to DN 800		0	
Remote version, max. 150/200 °C (302/392 °F)			
5 m (16.4 ft)		2	
10 m (32.8 ft)		3	
20 m (65.6 ft)		4	
30 m (98.4 ft)		5	
Pulse output value setup			
0.1 l/p (option for DN 50 ... DN 65) with 5 ms		1	
1 l/p (typical for DN 50 ... DN 65) with 5 ms		2	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms		3	
10 l/p (typical for DN 150 ... DN 250) with 5 ms		4	
50 l/p (typical for DN 300 ... DN 400) with 5 ms		5	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms		6	
250 l/pulse		7	
1 m³/pulse		8	
0.25 l/pulse		9	N0A
0.5 l/pulse		9	N0B
5 l/pulse		9	N0C
25 l/pulse		9	N0D
500 l/pulse		9	N0E
2.5 m³/pulse		9	N0F
5 m³/pulse		9	N0G
10 m³/pulse		9	N0H
25 m³/pulse		9	N0J
50 m³/pulse		9	N0K
100 m³/pulse		9	N0L
250 m³/pulse		9	N0M
500 m³/pulse		9	N0N
1000 m³/pulse		9	N0P
Transmitter SITRANS FUS080			
IP67/NEMA 4X/6 115 ... 230 V AC		B	
IP67/NEMA 4X/6 (3.6 V battery supply)		D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V battery back up		E	
IP67/NEMA 4X/6 3.6 V battery version (no battery included)[4]		G	
Pulse width setup			
5 ms (standard)		2	
10 ms		3	
20 ms		4	
50 ms		5	
100 ms		6	
200 ms		7	
500 ms		8	

1) Q_p (Q_n) is the normal or typical flow. Q_p and Q_s is shown on the system label.
2) Pipe material bronze brass.
3) PN 40 standard for DN 50 ... 80 bronze brass pipes.
4) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Order No. and and following add-on code(s) with plain text.	
Calibration	
Production calibration DN 50 ... DN 1200 (with certificate)	**included**
Accredited Siemens ISO/IEC 17025 calibration. Max. flow 50 ... 250 m^3/h, depending on dimension (DN 50 ... 200)	**D20**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 250 ... 1300 m^3/h depending on dimension (DN 100 ... 500)	**D21**
Accredited Siemens ISO/IEC 17025 calibration Max. flow 1400 ... 4200 m^3/h depending on dimension (DN 300 ... 1200)	**D22**
Material certificate	
EN 10204-3.1	**F10**
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	**Y18**

For accessories and spare parts see end of following chapter to FUE380.

MLFB Ordering example

Customer requires a flowmeter:

- DN 250, PN 25, compact version (media temperature max. 120 °C (248 °F)), mains power version.
- Material certificate and metal tag name plate.
- Pulse output for for 10 L/ Pulse and min. 5 ms pulse width.

Ordering:

FUS380: **7ME3400-2LD00-4BA2-Z, F10, Y17**

Flowmeter FUE380 with approval

Overview

The 2-track flowmeter SITRANS FUE380 comes as battery or mains powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.
The flowmeter FUE380 is approved according to heat meter standards EN 1434 class 2 and OIML R75 MID class 2 and metrological parameters are protected against manipulation. The type approved flowmeter version is named SITRANS FUE380. For a standard flowmeter type FUS380 without a type approval see separate FUS380 chapter.
Technically the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval.

Benefits

- Battery powered up to 6 years
- 115/230 V mains powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanic isolated digital outputs for easy connection to a calculator (potential free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_{min}:Q_{max} up to 1:400
- MODBUS RTU/RS 232, RS 485

Application

The main application for SITRANS FUE380 is measurement of water flow or water flow in heat meter systems for custody transfer in district heating networks or chilled water.
Combined with an energy calculator and a pair of temperature sensors, SITRANS FUE380 can be used as part of an energy meter system. For this purpose Siemens offers energy calculator SITRANS FUE950.

Design

The 2-track design of SITRANS FUE380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.
SITRANS FUE380 has two digital output functions that can be individually selected, and optional MODBUS RTU communication modules.
Pulse output rate is defined when ordering.
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except eventually local approvals on the flowmeter.

Configuration SITRANS FUE380 type approved

Selection guide SITRANS FUE380, type approved flowmeter

Flowmeter values according to EN 1434 class 2 or MID

Flowmeter size nominal to EN 1092-1			**DN 50**	**DN 65**	**DN 80**	**DN 100**	**DN 125**	**DN 150**	**DN 200**	**DN 250**	**DN 300**
Flow range [1]	Q_{max} (Q_s)	m^3/h	15 or 45	25 or 72	40 or 120	120 or 180	200 or 280	300 or 420	500 or 700	800 or 1120	1120 or 1560
	Q_{nom} (Q_p)	m^3/h	15	25	40	60	100	150	250	400	560
- range 1:100	Q_{min} (Q_i)	m^3/h	0.15	0.25	0.4	0.6	1.0	1.5	2.5	4.0	5.6
- range 1:50	Q_{min} (Q_i)	m^3/h	0.3	0.5	0.8	1.2	2	3	5	8	11.2
Pulse value [2]		l/pulse	1	1	2.5	2.5	2.5	10	10	10	50

Flowmeter size nominal to EN 1092-1			**DN 350**	**DN 400**	**DN 500**	**DN 600**	**DN 700**	**DN 800**	**DN 900**	**DN 1000**	**DN 1200**
Flow range [1]	Q_{max} (Q_s)	m^3/h	1500 or 2100	1900 or 2660	2950 or 4130	4300 or 6020	5800 or 8120	7600 or 10640	10000 or 14000	12000 or 16800	18000 or 25200
	Q_{nom} (Q_p)	m^3/h	750	950	1475	2150	2900	3800	5000	6000	9000
- range 1:100	Q_{min} (Q_i)	m^3/h	7.5	9.5	14.75	21.5	29.0	38.0	50	60	90
- range 1:50	Q_{min} (Q_i)	m^3/h	15	19	29.5	43	58	76	100	120	180
Pulse value [2]		l/pulse	50	50	100	100	100	100	100	100	100

Flowmeter values according to OIML R75, class 2 or MID

Flowmeter size nominal to EN 1092-1			**DN 50**	**DN 65**	**DN 80**	**DN 100**	**DN 125**	**DN 150**	**DN 200**	**DN 250**	**DN 300**
Flow range [1]	Q_{max} (Q_s)	m^3/h	45	72	120	180	280	420	700	1120	1560
	Q_{nom} (Q_p)	m^3/h	30	50	80	120	200	300	500	800	1120
	Q_{min} (Q_i)	m^3/h	0.3	0.5	0.8	1.2	2.0	3.0	5.0	8.0	11.2
	cut off	m^3/h	0.06	0.1	0.16	0.24	0.4	0.6	1	1.6	2.24
Pulse value [2]		l/pulse				2.5	2.5	10	10	10	50

Flowmeter size nominal to EN 1092-1			**DN 350**	**DN 400**	**DN 500**	**DN 600**	**DN 700**	**DN 800**	**DN 900**	**DN 1000**	**DN 1200**
Flow range [1]	Q_{max} (Q_s)	m^3/h	2100	2660	4160	6020	8120	10640	14000	16800	25200
	Q_{nom} (Q_p)	m^3/h	1500	1900	2950	4300	5800	7600	10000	12000	18000
	Q_{min} (Q_i)	m^3/h	15.0	19.5	29.5	43.0	58.0	76.0	100	120	180
	cut off	m^3/h	3	3.8	5.9	8.6	11.6	15.2	20	24	36
Pulse value [2]		l/pulse	50	50	100	100	100	100	100	100	100

Dynamic range Q_i:Q_p: better than 1:100 or 1:50 according to EN 1434, OIML R75 class 2 and MID.

Low flow cut off: 0.2% of Q_p (Q_p: nominal flow rate)

In order to obtain best pulse output resolution in the range Q_{min} - Q_{max} of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s (Q_{max}) and means the normal flow according to the approval requirements. Q_p and Q_s is shown on the system label of the FUS380.

[1] Other typical flow ranges - see Selection and Ordering data table.

[2] In connection with SITRANS FUE950 - other pulse values - see Selection and Ordering data table

Technical specifications SITRANS FUE380

Pipe design	2-track sensor with flanges and integrated transducers wet calibrated from factory
Nominal size welded version	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	• DN 100 ... 1200: Carbon Steel EN 1.0345 / p235 GH, painted in light-gray. • DN 50 ... 80: Bronze brass G-CuSn10/W2.1050.01 (EN1982)
Transducer design	• DN 100 ... 1200: Integrated version and welded onto the pipe • DN 50 ... 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/ brass (CuZn36Pb2as)

Sensor operating conditions

Storage	-40 … +85 °C (-40 … +185 °F)
Liquid temperature	DN 100 ... 1200: • Remote: 2 … 200 °C (35.6 … 392 °F) DN 50 ... 80: • Remote: 2 … 150 °C (35.6 … 302 °F) DN 50 ... 1200: • Compact: 2 … 120 °C (35.6 … 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 … 1200: 6 m/s (19.7 ft/s)

Flowmeter FUE380 with approval

Transmitter

Display	LCD, 8 digits, additional 2 digits and symbols for status information
Push button	One push button for display information
Communication	IrDA – optical communication interface with MODBUS RTU protocol Add-on modules: • RS 232 serial interface with MODBUS RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS 485 serial interface with MODBUS RTU (+/-/GND), multi-drop with up to 32 devices with max. 1000 m cable MODBUS RTU protocol is an open protocol (further information available on request) Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud
Enclosure	IP67/NEMA 4X/6 to EN 60529 and DIN 40050
Temperature ambient	0 … 60 °C (32 … 140 °F)
Temperature storage	-40 … +85 °C (-40 … +185 °F) (battery included)
Installation	Compact on sensor: max. 120 °C (248 °F), Separate: max. 30 m (98.4 ft) from transmitter
Mechanical vibration	2 g, 1 … 800 Hz sinusoidal in all directions to IEC 68-2-6
Design	Fibre-glass reinforced polyamide
Power supply	• Battery: replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride) battery pack 32 Ah • Mains: 87 … 265 V AC (50 … 60 Hz)
Measuring rate	Battery mode: 0.5 Hz Mains supply: 20 Hz Back-up mode: 0.5 Hz (at mains supply drop)
Digital output	Two passive individual galvanically isolated MOS relay outputs, A and B, max. ± 35 V AC/DC, 50 mA
Max pulse frequency	100 Hz
Alarm indication	Track 1 (F1), track 2 (F2), Low battery indication (F5), Q_s overflow (F6), pulse overflow (F7)
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
EMC	• Emission EN 61000-6-4 • Immunity EN 61000-6-2
Approvals	• EN 1434 and OIML R75 Class 2 (PTB approval based on EN1434) • MID approval and certification

Type dependent settings

	FUE380
Flow value	Predefined according to EN 1434 / OIML R75 / MID
Approval	Country specific
Flow rate v_f	0.02 … 6 m/s (0.065 … 19.7 ft/s)
Output A	Preset: Forward pulses
Output B	Preset: Alarm
Pulse value A & B (depending on DN value)	Preset: See scheme - previous page Preset for SITRANS FUE950 or free selectable depending on flow rate (Q_s)
Pulse width	Preset: 5 ms
Flow unit setup	Preset: m^3/h
Volume unit setup	Preset: m^3

SITRANS FUE380 uncertainty

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

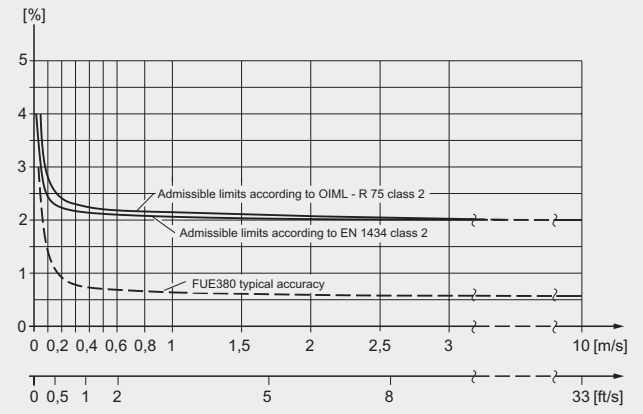
The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including the US (NIST traceability).

A standard calibration certificate is shipped with every SITRANS FUE380.

Typical accuracy SITRANS FUE380:

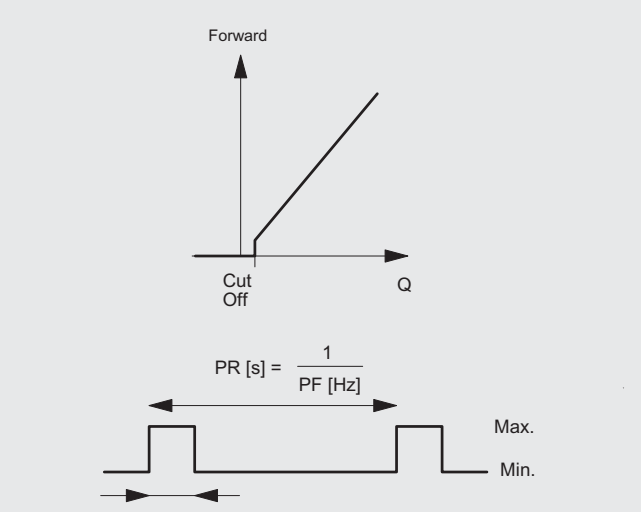
0.5 + 0.02 Q_p/Q [%]
Q_p according to EN 1434/OIML requirements.

Example: DN 100, Q_p = 60 m^3/h at Q = 1.2 m^3/h:
Accuracy = typical 1.5 %

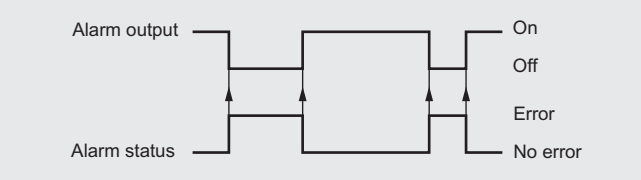


SITRANS FUE380 fulfils the requirements
$E_f = \pm (2 + 0.02\ Q_p/Q_i)$ max. ± 5%, according to EN 1434 and OIML R75, class 2 or MID requirements.

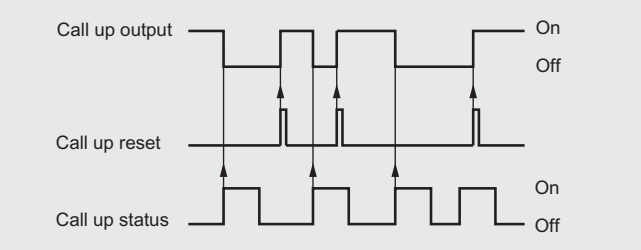
Output configuration SITRANS FUE380



Pulse volume: output A/B configured as volume per pulse, calculated on forward/reverse or net forward/reverse flow. The volume per pulse is free scaleable (via PDM software) if the sealing is open.



Pulse output B can be used as stated above or as alarm or call up function



Call up: the call up output is active until manually reset by use of PDM program. The callup function is activated when an alarm is activated.

Flowmeter FUE380 with approval

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUE380 (type approved)		F)	7ME3410 -	
Diameter	**Flow setting [m³/h] Qp[m³/h]1)**	**Qs [m³/h]**		
DN 50 (2")2)	15 3)	30	1B	
DN 50 (2")2)	15 3)	45	1C	
DN 50 (2")2)	30 4)	45	1D	
DN 60 (2½")2)	25 3)	50	1F	
DN 60 (2½")2)	25 3)	72	1G	
DN 60 (2½")2)	50 4)	72	1H	
DN 80 (3")2)	40 3)	80	1K	
DN 80 (3")2)	40 3)	120	1L	
DN 80 (3")2)	80 4)	120	1M	
DN 100 (4")	60 3)	120	1P	
DN 100 (4")	60 3)	180	1Q	
DN 100 (4")	120 4)	180	1R	
DN 125 (5")	100 3)	200	1T	
DN 125 (5")	100 3)	280	1U	
DN 125 (5")	200 4)	280	1V	
DN 150 (6")	150 3)	300	2B	
DN 150 (6")	150 3)	420	2C	
DN 150 (6")	300 4)	420	2D	
DN 200 (8")	250 3)	500	2F	
DN 200 (8")	250 3)	700	2G	
DN 200 (8")	500 4)	700	2H	
DN 250 (10")	400 3)	800	2K	
DN 250 (10")	400 3)	1120	2L	
DN 250 (10")	800 4)	1120	2M	
DN 300 (12")	560 3)	1120	2P	
DN 300 (12")	560 3)	1560	2Q	
DN 300 (12")	1120 4)	1560	2R	
DN 350 (14")	750 3)	1500	2T	
DN 350 (14")	750 3)	2100	2U	
DN 350 (14")	1500 4)	2100	2V	
DN 400 (16")	950 3)	1900	3B	
DN 400 (16")	950 3)	2660	3C	
DN 400 (16")	1900 4)	2660	3D	
DN 500 (20")	1475 3)	2950	3K	
DN 500 (20")	1475 3)	4130	3L	
DN 500 (20")	2950 4)	4130	3M	
DN 600 (24")	2150 3)	4300	3T	
DN 600 (24")	2150 3)	6020	3U	
DN 600 (24")	4300 4)	6020	3V	
DN 700 (28")	2900 3)	5800	4F	
DN 700 (28")	2900 3)	8120	4G	
DN 700 (28")	5800 4)	8120	4H	
DN 800 (32")	3800 3)	7600	4P	
DN 800 (32")	3800 3)	10640	4Q	
DN 800 (32")	7600 4)	10640	4R	
DN 900 (36")	5000 3)	10000	5B	
DN 900 (36")	5000 3)	14000	5C	
DN 900 (36")	10000 4)	14000	5D	
DN 1000 (40")	6000 3)	12000	5K	
DN 1000 (40")	6000 3)	16800	5L	
DN 1000 (40")	12000 4)	16800	5M	
DN 1200 (48")	9000 3)	18000	5T	
DN 1200 (48")	9000 3)	25200	5U	
DN 1200 (48")	18000 4)	25200	5V	

Selection and Ordering data	Order No.	Order code
Flowmeter SITRANS FUE380 (type approved) F)	7ME3410 -	
Flange norm and pressure rating		
System without sensor - only a transmitter		
EN 1092-1		
PN 16 (DN 100 ... 1200)	C	
PN 25 (DN 200 ... 1000)	D	
PN 40 (DN 50 ... 250)5)	E	
Compact / remote connection		
Compact version, max. 120 °C (248 °F)	0	
Remote version, max. 200 °C (392 °F)		
5 m (16.4 ft)	2	
10 m (32.8 ft)	3	
20 m (65.6 ft)	4	
30 m (98.4 ft)	5	
Approvals / pulse output		
Without approval (neutral) Selectable pulse output (following code can be 1 ... 9)	0	
With approval marks Selectable pulse output (following code can be 1 ... 9)	1	
With approval marks and seal Selectable pulse output (following code can be 1 ... 9)	2	
Without approval (neutral) Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)	3	
With approval marks Preset pulse output for FUE950 energy meter (following code must be 2 ... 6, dimension depending)	4	
With approval marks and seal Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)	5	
Pulse output value setup		
0.1 l/p (option for DN 50 ... DN 65) with 5 ms	1	
1 l/p (typical for DN 50 ... DN 65) with 5 ms	2	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms	3	
10 l/p (typical for DN 150 ... DN 250) with 5 ms	4	
50 l/p (typical for DN 300 ... DN 400) with 5 ms	5	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms	6	
Optional pulse values		
250 l/pulse	7	
1 m³/pulse	8	
0.25 l/pulse	9	N0A
0.5 l/pulse	9	N0B
5 l/pulse	9	N0C
25 l/pulse	9	N0D
500 l/pulse	9	N0E
2.5 m³/pulse	9	N0F
5 m³/pulse	9	N0G
10 m³/pulse	9	N0H
25 m³/pulse	9	N0J
50 m³/pulse	9	N0K
100 m³/pulse	9	N0L
250 m³/pulse	9	N0M
500 m³/pulse	9	N0N
1000 m³/pulse	9	N0P

For notes 1) to 7) see next page

F) Subject to export regulations AL: 9I999, ECCN: N.

Flowmeter FUE380 with approval

Selection and Ordering data		Order No.	Order code
Flowmeter SITRANS FUE380 (type approved)	F)	7ME3410 -	
Transmitter SITRANS FUE080			
IP67/NEMA 4X/6 115 ... 230 V AC			B
IP67/NEMA 4X/6 (3.6 V battery supply)			D
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V battery back up			E
IP67/NEMA 4X/6 3.6 V battery version (no battery included)[6]			G
Country / approval type [7]			
Neutral, no approval mark			A
Denmark, EN 1434/OIML R75			E
Finland, EN 1434/OIML R75			F
Germany, EN 1434 (PTB approval, DN 80 ... 1200)			G
Russia, EN 1434/OIML R75			M
Ukraine, EN1434/OIML R75			P
China			Z Q0C
MID-Approval, (EN 1434/OIML R75), English			R
MID-Approval, (EN 1434/OIML R75), German			S
MID-Approval, (EN 1434/OIML R75), Polish			T
MID-Approval, (EN 1434/OIML R75), French			U
Pulse width setup			
5 ms (standard)			2
10 ms			3
20 ms			4
50 ms			5
100 ms			6
200 ms			7
500 ms			8

1) Q_p (Q_n) is the normal flow according to the approval requirements. Q_p and Q_s is shown on the system label.
2) Pipe material bronze brass
3) EN 1434 flow values
4) OIML R75 flow values
5) PN 40 standard for DN 50 ... 80 bronze brass pipes
6) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.
7) Other countries in progress

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering.

Selection and Ordering data	Order code
Additional information	
Please add „-Z" to Order No. and following add-on code(s) with plain text.	
Calibration / certificate FUE380	
Approval, verification and sealing as defined with the order number. See order code	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter Calibration protocol: 2 x 3 points, Q_i, 10% Q_p and Q_p (max. 4200 m^3/h).	**Included**
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10% Q_p and Q_p (max. 250 m^3/h).	**D20**
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10% Q_p and Q_p (max. 1300 m^3/h).	**D21**
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10% Q_p and Q_p (max. 4200 m^3/h).	**D22**
Material certificate	
EN 10204-3.1	**F10**
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	**Y17**
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	**Y18**

MLFB Ordering example

Customer requires a flowmeter for custody transfer:

- DN 250, PN 25, compact version (media temperature max. 120 °C), battery version.
- Type approved according to EN 1434, verified and sealed for Germany.
- Material certificate and metal tag name plate.
- Pulse output for energymeter SITRANS FUE950.

Ordering:

FUE380: **7ME3410-2LD05-4DG2-Z, F10, Y17**

Example of appropriate energy meter:

Energy meter type: **FUE950-03110-0R1CB-10300-DK2-00012**

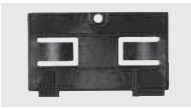
Please use online Product selector to get latest updates.
Product selector link:
www.pia-selector.automation.siemens.com

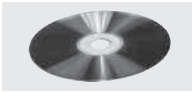
F) Subject to export regulations AL: 9I999, ECCN: N.

Flowmeter FUS380 and FUE380

Accessories / Spare parts to Flowmeter FUS380 and FUE380

SITRANS FUS380/FUE380 - Spare parts

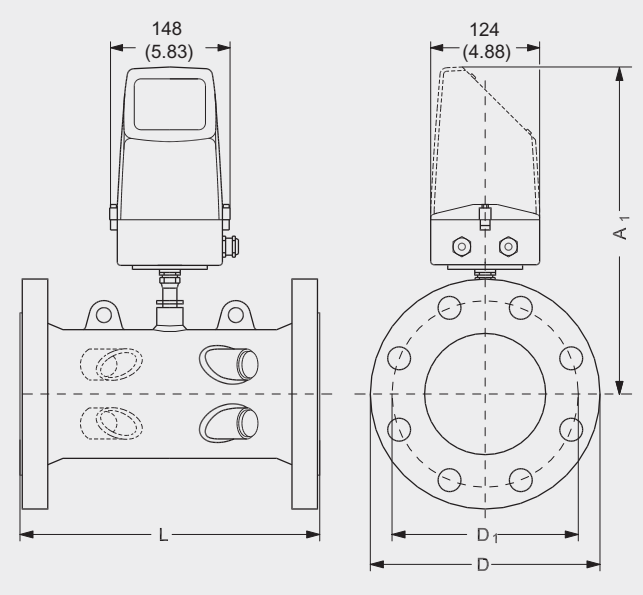
Type/description	Order No.[F)]	Symbol
Dual battery pack (6 year lifetime) 33 Ah	**FDK-087H2255**	
Single battery back-up to main supply 13.5 Ah	**FDK-087L4201**	
Battery cover for transmitter FUS080	**A5E00694468**	
PG 13.5 set (2 pcs.) for main cable/pulse cable	**FDK-083G0228**	
PG 13.5 set (2 pcs.) for dual coax cable (6 mm)	**A5E00694500**	
SITRANS FUS/FUE380 wall mounting kit for remote transmitter mounting, including connection plate (DN 50 ... 1200/2" ... 48")	**A5E00694509**	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (bronze sensors only, DN 50 ... 80/2" ... 3")	**A5E01208138**	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (steel sensors only, DN 100 ... 1200/4" ... 48")	**A5E00694660**	
Brace (holder) for optical IrDA eye	**A5E00695277**	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	**FDK-087L4163**	
RS 232 add-on module, point to point communication interface with MODBUS RTU protocol	**FDK-087L4212**	
RS 485 add-on module, multidrop communication interface with MODBUS RTU protocol	**FDK-087L4213**	

Type/description	Order No.[F)]	Symbol
5 m (16.4 ft) cable set (4 pcs.) for DN 50 ... 80 (2" ... 3") remote mounting	**A5E01208092**	
10 m (32.8 ft) cable set (4 pcs.) for DN 50 ... 80 (2" ... 3") remote mounting	**A5E01208114**	
20 m (65.6 ft) cable set (4 pcs.) for DN 50 ... 80 (2" ... 3") remote mounting	**A5E01208117**	
30 m (98.4 ft) cable set (4 pcs.) for DN 50 ... 80 (2" ... 3") remote mounting	**A5E01208121**	
1 m (3.28 ft) cable set (4 pcs.) for DN 50 ... 80 (2" ... 3") for compact version	**A5E01208126**	
5 m (16.4 ft) cable set (4 pcs.) for DN 100 ... 1200 (4" ... 48") remote mounting	**A5E00695476**	
10 m (32.8 ft) cable set (4 pcs.) for DN 100 ... 1200 (4" ... 48") remote mounting	**A5E00695479**	
20 m (65.6 ft) cable set (4 pcs.) for DN 100 ... 1200 (4" ... 48") remote mounting	**A5E00695480**	
30 m (98.4 ft) cable set (4 pcs.) for DN 100 ... 1200 (4" ... 48") remote mounting	**A5E00695483**	
1 m (3.28 ft) cable set (4 pcs.) for DN 100 ... 1200 (4" ... 48") for compact version	**A5E00695486**	
Process Device Manager SIMATIC PDM		
SIMATIC PDM Single Point V6.0 For operation and parameterization of one field device, communication using PROFIBUS DP/PA or HART modem, incl. 1 TAG **Cannot** be expanded by further functions or TAG option/power-pack 5 languages (German, English, French, Spanish, Italian) executes with Windows 2000 Professional or Windows XP Professional	**6ES7658-3HX06-0YA5**	

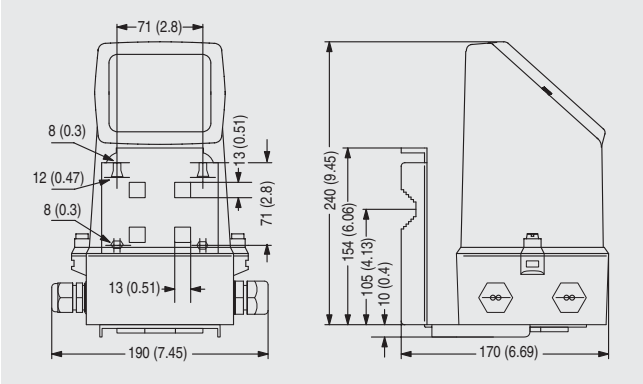
Downloads for DEVICE description FUE380
http:/support.automation.siemens.com/WW/view/en/17320235

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



Pipe Dimensions for FUS380 and FUE380

Size	PN 16		PN 25		PN 40					
	L	Weight	L	Weight	L	Weight	A1	D	D_1	Lift hug
DN	mm	kg	mm	kg	mm	kg	mm	mm	mm	
50	-	-	-	-	300 +0/-2	10	350	165	125	No
65	-	-	-	-	300 +0/-2	15	360	185	145	No
80	-	-	-	-	350 +0/-3	18	370	200	160	No
100	350 +0/-2	15	-	-	350 +0/-3	18	375	220	180	No
125	350 +0/-2	18	-	-	350 +0/-3	24	380	250	210	No
150	500 +0/-3	28	-	-	500 +0/-3	34	390	285	240	Yes
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	414	340	295	Yes
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	440	405	355	Yes
300	500 +0/-3	66	500 +0/-3	81	-	-	466	460	410	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	520	470	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	507	580	525	Yes
500	625 +0/-3	176	625 +0/-3	235	-	-	558	715	650	Yes
600	750 +0/-3	244	750 +0/-3	292	-	-	609	840	770	Yes
700	875 +0/-3	258	875 +0/-3	416	-	-	660	910	840	Yes
800	1 000 +0/-3	338	1 000 +0/-3	562	-	-	710	1 025	950	Yes
900	1 230 +6/-6	475	1 300 +6/-6	835	-	-	810	1 125	1 050	No
1000	1 300 +6/-6	594	1 370 +6/-6	1 078	-	-	910	1 255	1 170	No
1200	1 360 +6/-6	860	-	-	-	-	1 110	1 485	1 390	No

Notes:
- Weight for transmitter/electronics 1.5 kg (3.3 lb)
- D and D1 are values for standard versions (with standard flanges).
  For versions with higher pressure ratings - see EN 1092-1.
- - Means not available
- All weigths are **approximately**

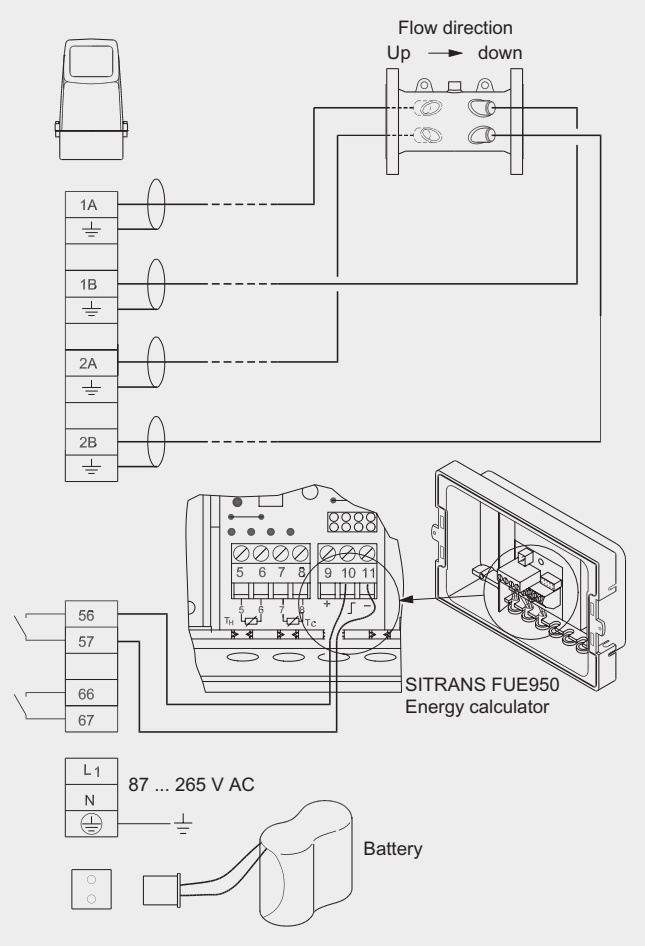
Flowmeter FUS380 and FUE380

Size	PN 16		PN 25		PN 40					
	L	Weight	L	Weight	L	Weight	A1	D	D_1	Lift hug
inch	inch	lb	inch	lb	inch	lb	inch	inch	inch	
2	-	-	-	-	12 +0/-0.08	22	14	6.6	5	No
2½	-	-	-	-	12 +0/-0.08	33	14.4	7.4	5.8	No
3	-	-	-	-	14 +0/-0.08	40	14.8	8	6.4	No
4	13.77 +0/-0.08	33	-	-	13.77 +0/-0.12	40	15	8.66	7.09	No
5	13.77 +0/-0.08	40	-	-	13.77 +0/-0.12	53	15.2	9.84	8.27	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.6	11.22	9.45	Yes
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	13.39	11.61	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	15.94	13.98	Yes
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.35	18.11	16.14	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	19.8	20.8	18.8	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	22.83	20.67	Yes
20	24.61 +0/-3	419	24.61 +0/-0.12	538	-	-	21.97	28.15	25.59	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	23.98	33.07	30.31	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1 217	-	-	25.98	35.83	33.07	Yes
32	39.37 +0/-0.12	1 089	39.37 +0/-0.12	1 698	-	-	27.95	40.35	37.40	Yes
36	39.2 +0/-0.24	1 047	52.00 +0/-0.24	1 841	-	-	32.4	45	42	No
40	52 +0/-0.24	1 310	54.80 +0/-0.12	2 376	-	-	36.4	50.2	46.8	No
48	54.4 +0/-0.24	1 892	-	-	-	-	44.4	59.4	55.6	No

Notes:
- Weight for transmitter/electronics 1.5 kg (3.3 lb)
- D and D1 are values for standard versions (with standard flanges). For versions with higher pressure ratings - see EN 1092-1.
- - Means not available
- All weigths are **approximately**

Schematics

Electrical connection FUS380 and FUE380



The scheme shows the transducer cable connections between transmitter terminals and respective transducer and the electrical connection of the energy calculator SITRANS FUE950.

SITRANS FUE950 energy calculator

Overview

SITRANS FUE950 is a universal thermal energy calculator, which meets the requirements of OIML R75 class 4 and EN 1434. SITRANS FUE950 has been developed for the SITRANS F US SONOCAL 3000 flow part, SITRANS FUS380/FUE380 and alternative MAG 5000/6000.

SITRANS FUE950 is modular in construction and can by order be fitted with optional modules depending on the application.

SITRANS FUE950 can be used for up to 25 000 m^3/h.

Benefits

Basic functions

- High accuracy thermal energy metering
- Optical data reading in accordance with EN 1434
- Choice of battery, 230 V AC or 24 V AC
- Instantaneous values for energy/volume flow
- 24 months memory
- Error logging with date and time

Additional functions

- Battery back up of real time clock in the event of power failure
- Tariff functions
- Read-out of account date

Add-on modules

- Plug-in module with data output, pulse output for accumulated energy and water or output signal for failure
- Plug-in module with data output and 2 extra pulse inputs
- Plug-in module for M-bus communication and 2 extra pulse inputs

Advanced functions for cooling/heating applications

- Separate totalizer registers for cooling/heating applications
- Zero point calibration of $\Delta\theta$ for cooling systems

Application

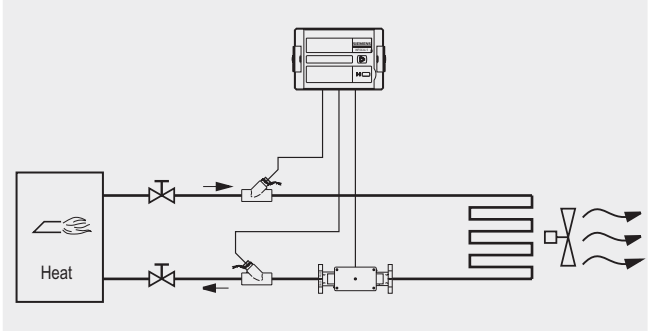
Energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

Application

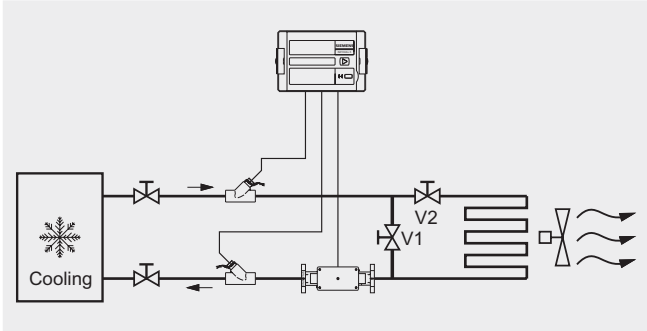
SITRANS FUE950 is able to handle 3 types of applications:

Type: OF/OR:



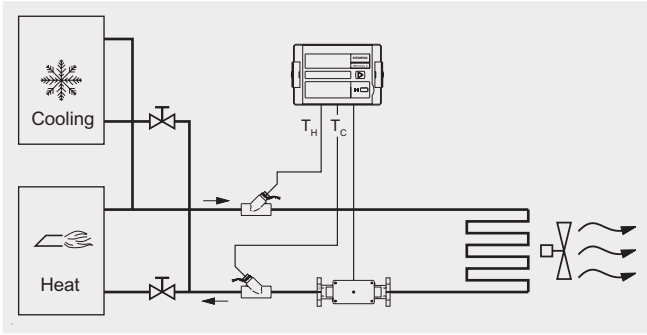
Hot water applications

Type: CF/CR:



Chilled water applications

Type: SF/SR:

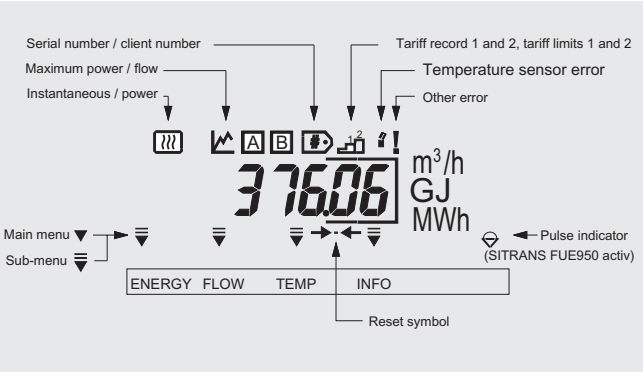


Combined cooling/heating applications

Design

SITRANS FUE950 has an easy-read 8-digit LCD display with associated pictograms for the various functions. As the display has been made for several applications, there will be figures/ symbols which are not used for normal district heating applications.

SITRANS FUE950 has only one operating button. The display will always be configured for the application chosen, and for the selected display settings. In normal operation, the display will show cumulative energy values.



Displays and output pulses

Units: kWh (only DN50, Q_p=15, 30), MWh, GJ; all decimal points are statically.

The places after the decimal point of displayed values are indicated by the selected size and flow rate. The last decimal point are used as the pulse value and unit for the optional output modules.

Function

Technical

Calculation of energy is based on the following formula:

Energy = Volume x (T_{Hot} - T_{Cold}) x K_{factor} (T_i)

Volume: Volume [m^3] of a given amount of water

T_{Hot}: Measured temperature in the flow

T_{Cold}: Measured temperature in the return

K_{factor} (T_i): Thermal coefficient of enthalpy and heat content

The energy calculation is made by a counter and depends on flowmeter size, pulse frequency and legal requirements.

The calculator always carries out at least one energy calculation every 10 minutes if the flowmeter has not sent enough pulses to prompt an energy calculation.

Permanent memory/account date reading

The LOG of the calculator is read every 10 minutes with all cumulative values: Date, Σ energy, Σ water, Σ records 1 and 2, peak values of energy or flow, counter records A and B, date/time and info code.

Energy/volume

Maximum

Energy and volume can be outputted for the previous three months with associated dates when the maximum power occurred. Integration time can be set to 15, 30 or 60 minutes.

Standard factory setting: peak volume: 15 minutes.; peak energy: 60 minutes.

Error handling

If SITRANS FUE950 records an error, this will be indicated by a "!".

The following errors can be detected:

- F1 Forward temperature sensor is interrupted or short-circuited.
- F2 Return temperature sensor is interrupted or short-circuited.
- F3 Internal equipment error.
- F4 Differential temperature high and no flow for 48 hours.
- F5 Water flow exceeds preset Q_s.

Zero point calibration of differential temperature (only types CF/CR)

Cooling systems always operate with a small Δt and a relatively high flow rate. For technical reasons no sensor pair provides completely accurate temperature difference measurements when the sensor temperature difference between forward and return flow is close to zero.

SITRANS FUE950 type CF/CR contains a special zero point calibration routine that can be activated in order to minimize the temperature difference measuring failure.

Normally the zero point calibration is not needed, but can be activated out in order to obtain maximum accuracy in the energy calculation.

The zero point calibration function requires a short circuit between forward and return sensor in the cooling system – e.g. by installing a valve V1 (See application drawing).

Optical output

SITRANS FUE950 is fitted with an optical infra-red send/receive port in accordance with IEC 61107.

Protocol standard, EN 60870-3 (M-bus protocol).

A reader head with a permanent magnet in accordance with EN 1434 can be used for programming/altering programming of readout data, configuration data, etc. The reader head can also be used to change measuring data.

Add-on modules

BUS communication

SITRANS FUE950 needs a special adapter cable to communicate with a PC. To access the terminals, it is necessary to use one of the supplementary modules – pulse output or input module, which, in addition to specific terminals - both have 3 terminals for connection to a PC.

Pulse output module

Module contains 3 terminals for DATA, REQUEST and GND. There are also 2 x 2 terminals for CE, CV/Alarm. Both outputs are galvanically separated.

Pulse sequence CE: 1 pulse per change in the least significant digit in the energy unit and resolution selected.

Pulse sequence CV: 1 pulse per change in the least significant digit in the volume unit and resolution selected.

Pulse input module/flow 2

If flowmeter 2 is used in a heating system, flowmeter 1 must always be placed in the flow and flowmeter 2 in the return.

The module contains 3 terminals for flowmeter 2. 3 terminals for DATA, REQUEST and GND.
2 x 2 terminals for counters A and B, and 3 terminals for flow 2 input.

M-bus module

The M-bus protocol is in accordance with EN 1434-3 and EN 60870-5.

For communication with an M-bus, it is necessary to fit SITRANS FUE950 with an add-on module.

The M-bus module contains, in addition to terminals for BUS connection, terminals for counter inputs A and B.

Fitting /Installation

SITRANS FUE950 can only be wall mounted or panel mounted.

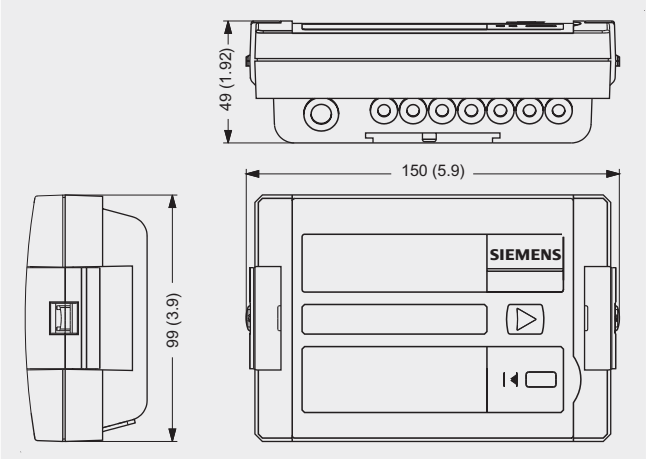
SITRANS FUE950 energy calculator

Integration

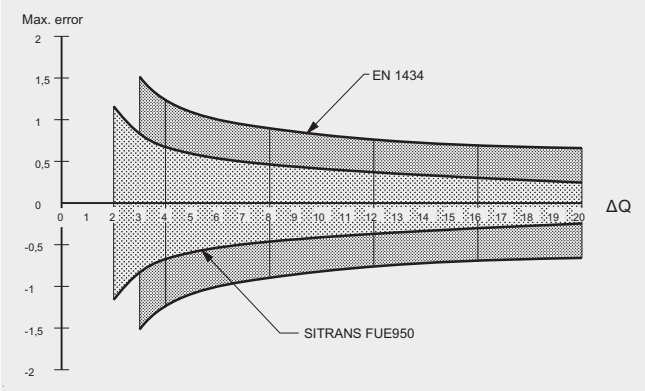
SITRANS FUE950 is a multi-purpose energy calculator which meets the requirements of EN 1434. Further, the energy calculator has been specially developed to receive volume pulses from SONOCAL 3000 flow part and SITRANS FUS380/FUE380, alternative MAG 5000/6000.

Technical specifications

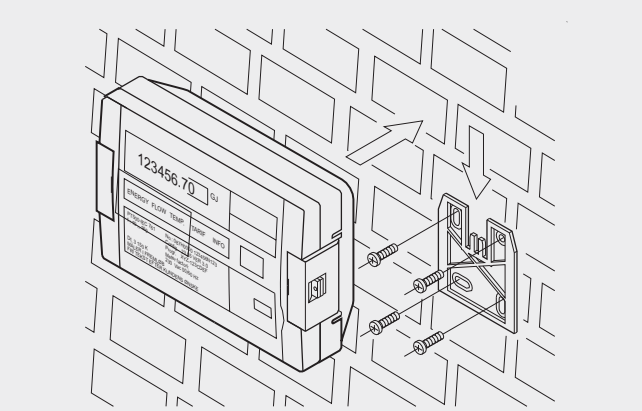
Approved in accordance with	Heat meter EN 1434	Chilled water EN 1434 pr. A1
Temperature range	θ: 0 ... 170 °C	Δθ: 2 ... 20 K
Differential temperature	θ: 3 ... 150 K	Δθ: 2 ... 20 K
Accuracy	Max. ± (0.5 + 3K/Δθ) [%]	
Flow range	Q_n (Q_p) ≤ 25,000 m^3/h	
Environment class	A	
Temperature input		
Measuring range	0 ... 170 °C (32 … 338 °F)	
Differential temperature	1 ... 170 K (1.8 … 306 °F)	
Sensor type	Pt500	
Sensor connection	2 wire	
Measurement resolution	0.01 °C (0.018 °F)	
Flow input 1		
Pulse/frequency	≤ 400 Hz (The combined pulse frequency at flow 1, in A and B may not exceed 400 Hz, whether they are used one at a time or simultaneously.)	
Pulse ON time	≤ 0.5 ms	
Pulse OFF time	≤ 1.5 ms	
Bus output		
Protocol	EN 60870-5	
Connection	Open collector, 2400/300 baud, 3.6 V	
Optical connection		
Protocol	EN 60870-5	
Connection	Optical eye, 600 baud, EN 61107	
Pulse output CE and CV/Alarm		
ON time	> 30 ms	
ON Current	≤ 10 mA	
External supply	≤ 24 V DC	
OFF time with alarm	Approx. 1 hour	
Supply data		
Internal voltage	3.6 +0.1/-0.4 V DC	
Current consumption	Typically 45 µA	
Battery	3.6 V lithium D cell	
Battery lifetime	Typically 8 years, 10 years with independently powered flowmeter	
Power supply	230 V AC +15/-30% 50/60 Hz 24 V AC	
Battery backup	3.0 V CR 2032 cell (only in calculators with extra functions - MM = 0A,T0,TA)	
Environment/safety		
Generally	EN 1434	
Ambient temperature	5 ... 55 °C (41 °F … 131 °F)	
Storage temperature	-25 ... +70 °C (-13 … +158 °F)	
Enclosure	IP54 in accordance with IEC 529	
Vibrations	1g, 1 & 1000 Hz in accordance with IEC 68-2-34	
Free fall	IEC 68-2-34	
EMC	EN 1434 (EN 50081-1 / 50082-1)	
Personal safety	EN 60730	
Materials		
Top	PC Lexan 141R Transparent 111	
Pipe/wall fitting	PA 6,6 GF25	
Other plastic parts	ABS Cycolac GPM500	
Gaskets	Neopren	
Rubber bushing	EPDM 50	



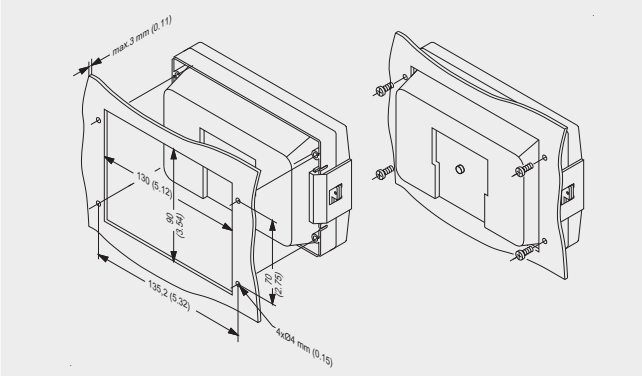
Dimensions



Accuracy curves



Wall mounting



Panel mounting

Selection and Ordering data

Note:

SITRANS FUE950 is not listed in the standard SIEMENS ordering set-up. Therefore, when placing an order for SITRANS FUE950, the **build-up code** mentioned below must be used and sent to order management at Siemens Flow Instruments (SFI). SFI generates an FDK or No. that holds the required data for the order and for the logistics treatment via the order handling system.

Selection and Ordering data			Build-up code
Calculator		F)	**SITRANS FUE950 -**
Calculator for SITRANS FUE380/FUS380 [1]			
Size	**Q_s: m^3/h**	**l/pulse**	
DN 50	15 ... 45	1	0 3 0 0 0
DN 65	25 ... 72	1	0 3 0 1 0
DN 80	40 ... 120	2.5	0 3 0 3 0
DN 100	60 ... 180	2.5	0 3 0 6 0
DN 125	100 ... 280	2.5	0 3 0 7 0
DN 150	150 ... 420	10	0 3 0 9 0
DN 200	250 ... 700	10	0 3 1 1 0
DN 250	400 ... 1 120	10	0 3 1 2 0
DN 300	560 ... 1 560	50	0 3 1 3 0
DN 350	750 ... 2 100	50	0 3 1 4 0
DN 400	950 ... 2 660	50	0 3 1 5 0
DN 500	1 475 ... 4 130	100	0 3 1 7 0
DN 600	2 150 ... 6 020	100	0 3 1 8 0
DN 700 to DN 1000	2 900 ... 16 800	100	0 3 2 0 0
DN 1200	6 000 ... 36 000	100	0 3 2 1 0
Calculator for MAGFLO [1]			
Size		**l/pulse**	
DN 6 ... DN 15		1	0 0 0 1 0 0 0 0
DN 25 ... DN 50		10	0 0 1 0 0 0 0 0
DN 65 ... DN 150		100	0 0 2 6 0 0 0 0
DN 200 ... DN 500		1000	0 0 3 1 0 0 0 0
Calculator setting			
For district heating, flowmeter in forward pipe			O F
For district heating, flowmeter in return pipe			O R
For chilled water, flowmeter in forward pipe (cold pipe) [2]			C F
For chilled water, flowmeter in return pipe (hot pipe) [2]			C R
For combined cooling/heating, flowmeter in forward pipe (hot pipe in winter) [2]			S F
For combined cooling/heating, flowmeter in return pipe (cold pipe in winter) [2]			S R
Temperature sensor type			
Pt500, no sensor included			1 0
Pt100, no sensor included			3 0
Pt500, 2-wire, pocket sensor, 6 mm:			
• 1.5 m cable			1 C
• 3 m cable			1 D
• 5 m cable			1 E
• 10 m cable			1 F
• 20 m cable			1 G
Temperature sensor pocket sets			
No pockets			0
Brass pocket 40 mm			A
Brass pocket 85 mm			B
Brass pocket 120 mm			C
Steel pocket 85 mm			K
Steel pocket 120 mm			L
Steel pocket 155 mm			M
Steel pocket 210 mm			N

Selection and Ordering data	F)	Build-up code
Calculator	F)	**SITRANS FUE950 -**
Voltage supply		
No power supply included		0
3.6 V battery supply		1
230 V AC supply		2
24 V AC supply		3
Optional modules		
No modules		0
Data input, input A & B		1
Data output, 2 pulse output		2
M-bus module and input A & B		3
Display units		
GJ		1
KWh (only DN 50)		2
MWh		3
Gcal		4
Extra functions		
Standard (no extra functions)		0 0
Accounting date		0 A
Tariff function		T 0
Tariff and accounting date		T A
Country code		
Neutral (no approval marks)		0 0
country code [1]		X X
Verification		
Without type approval mark		0
With type approval mark (country specific)		1
With approval mark and verification		2

[1] Available approvals for SITRANS FUE950 energy calculator: DK (Denmark), DE (Germany), HR (Croatia)

[2] Only in neutral version - not available with approval marks

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering.

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUE950 energy calculator

Ordering example

Example:

Calculator for a DN 1000 Qn = 6000 m^3/h FUE380 flow meter.

- DN 1000, with 100 l/pulse output setting
- District heating, flowmeters in forward
- PT 500, 2 wire, pocket sensor with 1.5 m cable
- 210 mm stainless steel
- 230 V AC supply
- Data output and 2 pcs. pulse output
- MWh as unit in the display
- No extra functions
- DE (Germany) as country code
- With approval mark and verification

Please note that SITRANS FUE950 is not a part of the order number structure.

The **build-up code** has to be mailed to our customer service in Nordborg and you will get a FDK- numberback which can be used to place the order.

Build up code: **SITRANS FUE950-03200-0F1CN-22300-DE2**

SITRANS FUE950 accessories and spare parts

Calculator SITRANS FUE950

Type/description	Order No.[F)]
Accessories for calculator	
Data/pulse input module	**FDK-087H0111**
Data/pulse output module	**FDK-087H0110**
M-bus slave module/input module	**FDK-087H0109**
Infrared optical head for data acquisition	**FDK-087H0108**
Bracket for SITRANS FUE950 wall mounting (12 pcs)	**FDK-087H0117**
Cable for data aquisition PC/D-sub 9F/3 wire	**FDK-087H0121**
Verification equipment for calculator	**FDK-087H0122**
3.6 V DC-cell for SITRANS FUE950	**FDK-087H0113**
230 V AC supply module for SITRANS FUE950	**FDK-087H0114**
24 V AC supply module for SITRANS FUE950	**FDK-087H0115**
3.0 V battery CR 2032 for SITRANS FUE950 (10 pcs.)	**FDK-087H0116**
Re-programming tool (complete set)	**FDK-087H0134**
Pocket for temperature sensor Pt500 (2 pcs.)	
Brass pocket G½B x 40 mm (PN 16)	**FDK-087H0104**
Brass pocket G½B x 85 mm (PN 16)	**FDK-087H0105**
Brass pocket G½B x 120 mm (PN 16)	**FDK-087H0106**
Stainless steel pocket G½B x 85 mm (PN 25)	**FDK-087H0100**
Stainless steel pocket G½B x 120 mm (PN 25)	**FDK-087H0101**
Stainless steel pocket G½B x 155 mm (PN 25)	**FDK-087H0102**
Stainless steel pocket G½B x 210 mm (PN 25)	**FDK-087H0103**

Please also see www.siemens.com/SITRANSFordering fo practical examples of ordering.

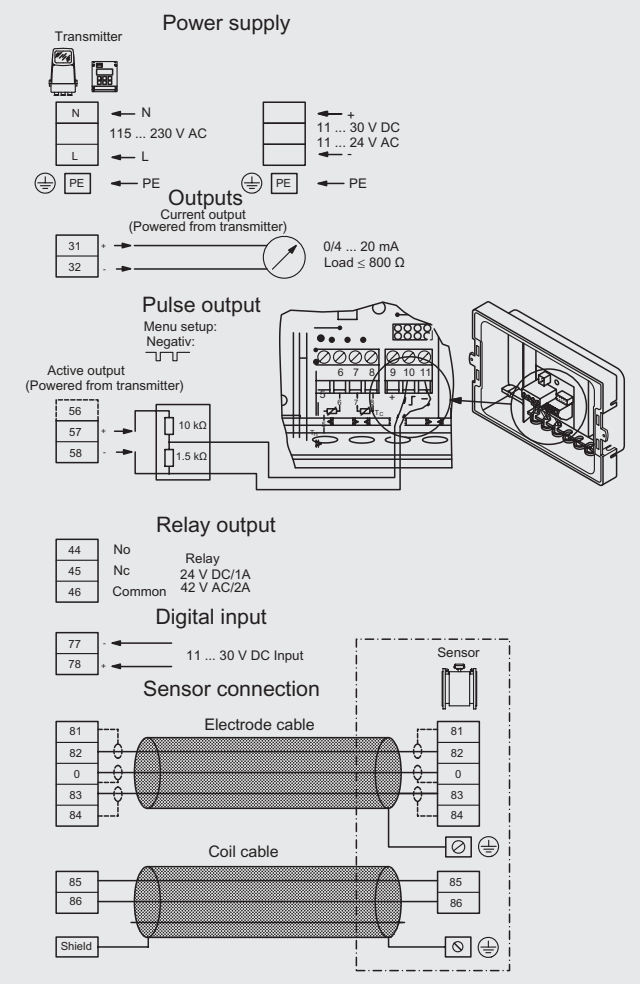
F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Schematics

Electrical connection for SITRANS FM MAGFLO electromagnetic flowmeters MAG 5000/6000 and SITRANS FUE950 in combination

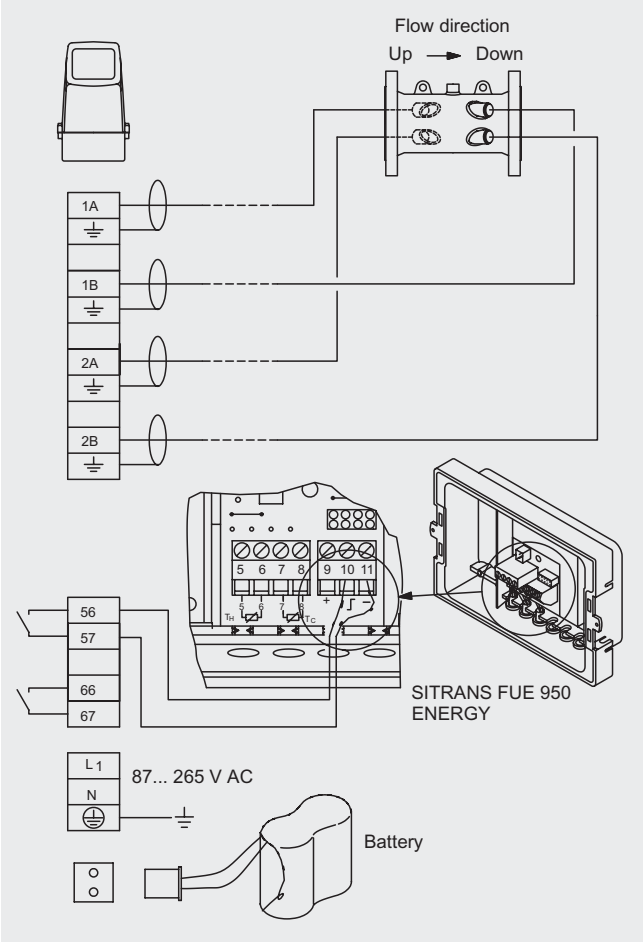
2 resistors are required to obtain a correct transmission of pulses, when MAG 5000/6000 is connected together with a SITRANS FUE950 as a heat meter.

The 2 resistors are to be mounted between terminals 57 and 58 in the MAG terminal socket. Moreover, the resistors used are respectively 10 kΩ and 1.5 kΩ.
Resistors are not part of our accessories list.



The diagram shows the correct connection between SITRANS FUE950 and MAG 5000/6000.

Electrical connection for SITRANS FUS380/FUE950



SITRANS FUS880 (retrofit kit)

Overview

The SITRANS FUS880 is a battery-powered irrigation flowmeter, designed for pipes measuring from DN 200 up to DN 1200 (8" up to 48") in diameter. The SITRANS FUS880 gives you the ability to install the flowmeter underground retrofitting onto existing pipelines. This ultrasonic transient time irrigation flowmeter is used for full pipe flow measurements. Pipe material may be PVC or concrete and pipe construction may be single wall or double wall, smooth or corrugated.

The flowmeter produces a signal proportional to the velocity of the flow (flow rate) as the liquid flows past the ultrasonic sensors.

SITRANS FUS880 has transducers in the flow (in-line) which assures superior aides in accuracy and superior performance when compared to doppler or many other types of flow measurement systems.

Benefits

- Cost-effective solution - contains all the necessary components for retrofitting onto existing pipe
- Battery operated - Maintenance free up to 6 years
- SITRANS FUS880 is easy to install in pipeline sizes from DN 200 up to DN 1200 (8" up to 48") in diameter
- The transmitter display shows both accumulated volume and instantaneous flow rate
- The flowmeter provides a digital signal that can be sent directly to a PLC/RTU/DCS
- Solid construction with no moving parts for a 100% maintenance and obstruction free flowmeter
- The SITRANS FUS880 transmitter comes within an IP67 enclosure
- Sensor can easily be buried and withstand constant flooding
- Automatic calculation of the calibration factor when pipe geometry data are entered in the signal transmitter
- Pipe material may be polyvinylchloride (PVC) or concrete
- Pipe construction may be single wall or double wall, smooth or corrugated

Application

- Irrigation systems
- Irrigation distribution systems
- Pumping stations
- Canal laterals
- On-farm outlets
- Water well production
- Drip and sprinkler irrigation
- Center pivot systems
- Potable water

Design

The SITRANS FUS880 set contains all necessary parts to build up an ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Templates to wrap around pipes for alignment of sensors
- Transducer threading tool
- Thread adapters
- Transducer alignment tools
- Mounting plugs or saddles as well as FUS880 transmitter dependant upon the specifics at time of ordering and required mounting hardware
- Cables

Technical specifications

SITRANS FUS880

Accuracy

Typical ≤ ± 2.0%, dependant upon the accuracy of measurements of tube diameter and during installation

Note:

Flow system measurement performance depends on the accuracy of the measurements taken at time of installation. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy as these values measured are entered into the memory of the FUS880 transmitter and used in part of the calculation of flow rate.

Requirements for pipes

Size	DN 200 ... DN 1200 (8" ... 48")
Transmitter Enclosure	
Rating	IP67 rated enclosure
Material	Fiberglass reinforced polyamide
Terminal box	PA 6.6, 100 °C (212 °F)
Transducer element	AISI 316 Stainless Steel 200 °C (392 °F)
2000 Corrugated PVC	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
Pro21 Corrugated PVC	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))

PVC Solid PIP 80	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
Concrete	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F)) Structural Epoxy joint meets spec. ASTM D1002 (118 bar or 1710 psi)

Pipe wall thickness	
A2000 Corrugated PVC	25 ... 50 mm (1" ... 2")
Pro21 Corrugated PVC	25 ... 50 mm (1" ... 2")
PVC Solid PIP 80	Less than 25 mm (1")
Concrete	• 51 ... 57 mm (2“ ... 2.25“) • 57 ... 64 mm (2.25“ ... 2.5“) • 70 ... 76 mm (2.75“ ... 3“) • 76 ... 83 mm (3“ ... 3.25“) • 89 ... 95 mm (3.5“ ... 3.75“) • 95 ... 100 mm (3.75“ ... 4“) • 108 ... 114 mm (4.25“ ... 4.50“)

More information

Installation requirement

The space requirements around the pipe for retrofitting an ultrasonic flowmeter type SITRANS FUS880 are given below:

It is important to prepare excavation site for a safe and efficient installation. An underground pipe needs to be exposed so that there is a minimum of 1.52 m (5 ft) or more of working space on either side of the pipe. The length of the trench should exceed the template length by 1.83 m (6 ft) or more.

Pipe support:

Ensure that an unearthed pipe has sufficient support beneath it to prevent deformation or breakage.

Cave-in:

Always brace trench walls. Follow all applicable (e.g. municipal, company, customer, site, union) construction guidelines.

Epoxy:

Follow all safety recommendations listed by the epoxy manufacturer. Use proper protection equipment, such as gloves, safety glasses, clothing, etc. Read the labels on the epoxy cans before mixing. Note all safety related statements and temperature recommendations in particular. For additional information, see the epoxy manufacturer's internet site.

Pipe template:

Templates are printed on a durable material, such as Mylar, and are resistant to normal contaminants. Do not expose the template to excessive moisture or excessive periods of sunlight, heat and cold temperatures. Always roll and store the template in its' shipping tube. Do not stretch or fold as this could permanently damage the template.

Installation overview:

Installation steps

Installation of the SITRANS FUS880 is accomplished with the following steps.

1. Expose and clean the pipe.
2. Mark a centerline on the pipe.
3. Place the template on the pipe and tape it securely to the pipe.
4. Mark the locations of the sensor mounting holes on the pipe.
5. Drill the sensor mounting holes in the pipe.
6. Clean and de-burr the sensor mounting area.
7. Measure up the pipe circumference C, the wall thickness WT and calculate OD and ID.
8. Epoxy and screw the saddle sensor holder to the pipe.
9. Assemble and install the sensors-holders.
10. Measure up the actual sensor-location to see if re-calibration is needed.
11. Assemble and install the sensors.
12. Install sensor wiring and conduit.
13. Install the transmitter and connect the sensor wiring.
14. Check the transmitter configuration.
15. Test the installation thoroughly and run a flow test.
16. Fill in the "Site Acceptance Form".
17. Cover the pipe.

For detailed instruction in installation please refer to User Manual Order no.: FDK:521HAP0553.

SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US SONOFLO **Ultrasonic flowmeters** **SITRANS FUS880 PVC (Solid) (PIP80)** **SONOKIT** **Battery powered**	F) 7ME3440-
Pipe diameter	
DN 200 (8")	2F
DN 250 (10")	2K
DN 300 (12")	2P
DN 380 (15")	2M
DN 450 (18")	3F
DN 530 (21")	3M
DN 600 (24")	3T
DN 680 (27")	4D
Wall thickness	
Less than 25 mm (1“)	B
Pipe material	
PVC (Solid) (PIP80)	1
Track configuration	
1-track	1
2-track X-configuration	3
Region version	
EU, US	2
Transmitters	
SITRANS FUS080, IP67, Battery powered	D
Template	
Standard	A
Cable length	
20 m (65.6 ft) with gland	4

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre Inch)	**L51**

Selection and Ordering data	Order No.
SITRANS F US SONOFLO **Ultrasonic flowmeters** **SITRANS FUS880 A2000 Corrugated PVC** **SONOKIT 1-track** **Battery powered**	F) 7ME3440-
Pipe diameter	
DN 380 (15")	2V
DN 450 (18")	3F
DN 530 (21")	3M
DN 600 (24")	3T
DN 750 (30")	4K
DN 900 (36")	5B
Wall thickness	
25 ... 50 mm (1“ ... 2“)	C
Pipe material	
PVC Corrugated A2000	3
Track configuration	
1-track	1
Region version	
EU, US	2
Transmitter	
SITRANS FUS080, IP67, Battery powered	D
Template	
Standard	A
Cable length	
20 m (65.6 ft) with gland	4

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre Inch)	**L51**

Note: The FUS880 MLFB system is on preparation

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US SONOFLO Ultrasonic flowmetersF)	**7 ME 3 4 4 0 -**
SITRANS FUS880 Pro21 Corrugated PVC SONOKIT 1-track Battery powered	■■■■■ - ■■■■
Pipe diameter	
DN 750 (30")	**4 K**
DN 840 (33")	**4 P**
DN 900 (36")	**5 B**
DN 1050 (42")	**5 M**
DN 1200 (48")	**5 T**
Wall thickness	
25 ... 50 mm (1" ... 2")	**C**
Pipe material	
PVC Pro21 Corrugated	**2**
Track configuration	
1-track	**1**
Region version	
EU, US	**2**
Transmitter	
SITRANS FUS080, IP67, battery powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „-Z" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre Inch)	**L51**

Selection and Ordering data	Order No.
SITRANS F US SONOFLO Ultrasonic flowmetersF)	**7 ME 3 4 4 0 -**
SITRANS FUS880 Concrete SONOKIT 1-track Battery powered	■■■■■ - ■■■■
Pipe diameter	
DN 300 (12")	**2 P**
DN 380 (15")	**2 V**
DN 450 (18")	**3 F**
DN 530 (21")	**3 M**
DN 600 (24")	**3 T**
DN 680 (27")	**4 D**
DN 750 (30")	**4 K**
DN 900 (36")	**5 B**
DN 1050 (42")	**5 M**
Wall thickness	
51 ... 57 mm (2" ... 2.25")	**D**
57 ... 64 mm (2.25" ... 2.5")	**E**
70 ... 76 mm (2.75" ... 3")	**F**
76 ... 83 mm (3" ... 3.25")	**G**
89 ... 95 mm (3.5" ... 3.75")	**H**
95 ... 100 mm (3.75" ... 4")	**J**
108 ... 114 mm (4.25" ... 4.5")	**K**
Pipe material	
Concrete	**4**
Track configuration	
1-track	**1**
Region version	
EU, US	**2**
Transmitter	
SITRANS FUS080, IP67, battery powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „-Z" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre Inch)	**L51**

Note: The FUS880 MLFB system is on preparation

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.[F)]
Accessories and Spare parts	
SITRANS F US SONOFLO Ultrasonic flowmeters	
FUS880 transmitter includes 2 transducers and 20 m (65.6 ft) of cable	**7ME3440-0AA01-2DA4**
FUS880 Installation pipe template	
Template, PCV. PIP 80	
DN 250 (10“)	**TGX:16347-80**
DN 300 (12“)	**TGX:16347-81**
DN 380 (15“)	**TGX:16347-82**
DN 450 (18“)	**TGX:16347-83**
DN 530 (21“)	**TGX:16347-84**
DN 600 (24“)	**TGX:16347-85**
DN 680 (27“)	**TGX:16347-86**
Template, Concrete	
DN 300 (12“)	**TGX:16347-90**
DN 380 (15“)	**TGX:16347-91**
DN 400 (16“)	**TGX:16347-89**
DN 450 (18“)	**TGX:16347-92**
DN 530 (21“)	**TGX:16347-93**
DN 600 (24“)	**TGX:16347-94**
DN 680 (27“)	**TGX:16347-95**
DN 750 (30“)	**TGX:16347-96**
DN 900 (36“)	**TGX:16347-97**
DN 1050 (42“)	**TGX:16347-98**
Template, pipe DN 900 (36“) PVC, A2000 corrugated	**TGX:16347-100**
Template, pipe DN 1050 (42“) Pro21 corrugated	**TGX:16347-101**
FUS880 Installation spare kit	
Concrete kit, Sensor mounting	
51 ... 57 mm (2“ ... 2.25“)	**TGX:16347-213K**
57 ... 64 mm (2.25“ ... 2.5“)	**TGX:16347-214K**
70 ... 76 mm (2.75“ ... 3“)	**TGX:16347-215K**
76 ... 83 mm (3“ ... 3.25“)	**TGX:16347-216K**
89 ... 95 mm (3.5“ ... 3.75“)	**TGX:16347-217K**
95 ... 100 mm (3.75“ ... 4“)	**TGX:16347-218K**
108 ... 114 mm (4.25“ ... 4.5“)	**TGX:16347-212K**
PVC kit, Sensor Mounting	
DN 300 (12“)	**TGX:16347-219K**
DN 380 (15“)	**TGX:16347-220K**
DN 450 (18“)	**TGX:16347-221K**
DN 530 (21“)	**TGX:16347-222K**
DN 600 (24“)	**TGX:16347-223K**
DN 680 (27“)	**TGX:16347-224K**
Corrugated PVC kit, DN 900 (36“) A2000	**TGX:16347-225K**
Corrugated PVC kit, DN 1050 (42“') Pro21	**TGX:16347-226K**
FUS880 spares	
Holder - Saddle	
DN 250 (10“) PIP 80 PVC Saddle	**TGX:16347-165**
DN 300 (12“) PIP 80 PVC Saddle	**TGX:16347-166**
DN 380 (15“) PIP 80 PVC Saddle	**TGX:16347-168**
DN 450 (18“) PIP 80 PVC Saddle	**TGX:16347-170**
DN 530 (21“) PIP 80 PVC Saddle	**TGX:16347-174**
DN 600 (24“) PIP 80 PVC Saddle	**TGX:16347-175**
DN 680 (27“) PIP 80 PVC Saddle	**TGX:16347-177**

Selection and Ordering data	Order No.[F)]
Holder - Plug	
51 ... 57 mm (2“ ... 2.25“) Cement sensor holder, PVC	**TGX:16347-120**
57 ... 64 mm (2.25“ ... 2.5“) Cement sensor holder, PVC	**TGX:16347-121**
70 ... 76 mm (2.75“ ... 3“) Cement sensor holder, PVC	**TGX:16347-122**
76 ... 83 mm (3“ ... 3.25“) Cement sensor holder, PVC	**TGX:16347-123**
89 ... 95 mm (3.5“ ... 3.75“) Cement sensor holder, PVC	**TGX:16347-124**
102 ... 108 (4“ ... 4.25“) Cement sensor holder, PVC	**TGX:16347-125**
108 ... 114 mm (4.25“ ... 4.5“) Cement sensor holder, PVC	**TGX:16347-127**
A2000 - DN 900 (36“) ID	**TGX:16347-134**
PRO-21 - DN 1050 (42“) ID	**TGX:16347-135**
Straps -Kits	
Strap kit for -134 & -135 plugs	**TGX:16347-235**
Strap kit for -120, -121, -122, -123 plugs	**TGX:16347-236**
Strap kit for -124 & -125 plugs	**TGX:16347-237**
Strap kit for -127 plug	**TGX:16347-238**
Adhesive	
1 lb epoxy	**A6X30004048**
Adapter	
Conduit adapter	**A6X30003981**
Tools	
Sensor Wrench	**TGX:16347-111**
Alignment Tool	**TGX:16347-137**
Documentation	
Manual	**FDK:521HAP0553**
Converter	
FUS880 converter kit for 2 track SYS	**7ME3440-0AA03-2DA4**

Note:
Installation spares kit include:

Concrete kit:
2 transducer mounting plugs, 2 straps, mounting hardware, epoxy, conduit adapter, installation guide

PVC kit:
2 transducer mounting saddles, mounting hardware, epoxy, conduit adapter, installation guide

Note: The FUS880 MLFB system is on preparation

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

Accessories or spare parts for older flowmeter systems type SITRANS F US SONOFLO

Accessories/Spare parts for SITRANS F US SONOFLO

Accessories for transmitter SONO 3000

Description	Order No.[F)]	Symbol
Wall mounting kit for 7ME3150-1AA10-1AA0 and 7ME3150-1AA20-1AA0, using 4 x coaxial sensor cables, wall brackets, PG 13.5 cable glands.	**FDK-085F5027**	

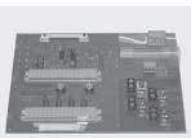
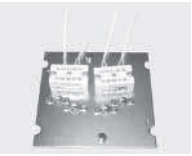
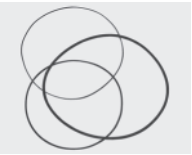
SENSORPROM memory unit for SONO 3000 transmitters

Description	Order No.[F)]	Symbol
SENSORPROM memory unit for SITRANS F US systems with transmitter type SONO 3000 When ordering: Inform on sensor Order No. and Serial No.	**FDK-085B5329**	

Terminal housing with PG 13.5 cable glands

Type	Order No.[F)]	Symbol
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	**FDK-085B1403**	
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	**FDK-085B1402**	

Spare parts for transmitter SONO 3000

Description	Order No.[F)]	Symbol
SONO 3000 19" back print for IP65 (NEMA 4) wall mounting 230 V version	**FDK-085F5327**	
SONO 3000 assembly plate for coaxial connection in the SONO 3300 sensor and wall mounting connection box	**FDK-085L1023**	
SONO 3000 assembly base plate	**FDK-085L1015**	
SONO 3000 EEx-d, front glas incl. frame	**FDK-085U2109**	
SONO 3000 EEx-d, gaskets for transmitter housing	**FDK-085U2002**	
SONO 3300 / FUS060 connection kit	**On request**	

Note: The FUS880 MLFB system is on preparation

Spare parts/accessories SONOCAL 3000 and SONO 3000/3300 CT

Description	Order No.[F)]
Coaxial cable with transducer connection	
1 x 10 m (32.8 ft)	**FDK-085L2400**
1 x 20 m (65.6 ft)	**FDK-085L2401**
1 x 30 m (98.4 ft)	**FDK-085L2402**

Cable glands (each 1 pc.)

Type	Material	Temperature range [°C (°F)]	Approval	Order No.[F)]
PG 13.5	Chrome plated brass	-20 ... +100 (-4 ... +212)		**FDK-085B1381**
PG 13.5	Stainless steel	-20 ... +200 (-4 ... +392)		**FDK-085B1385**
PG 13.5	Stainless steel	-20 ... +200 (-4 ... +392)	Ex d[1)]	**FDK-085B1387**

[1)] No ATEX

F) All products on this page subject to export regulations AL: 9I999, ECCN: N.

SITRANS F US

Clamp-on ultrasonic flowmeters
System information and selection guide

Overview

SITRANS F US clamp-on ultrasonic flowmeters provide highly accurate measurement while minimizing installation time and maintenance expense.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single, dual or multiple channel versions and a variety of enclosures - to suit your operating conditions and requirements

Application

SITRANS F US clamp-on ultrasonic flowmeters have six product families, each targeting specific applications:

FUS1010 and FUP1010 General purpose flowmeters are suitable for a wide variety of liquid applications, including the following:

- Water industry
  Raw water
  Potable water
  Sludges
  Chemicals
- Wastewater industry
  Raw sewage
  Effluent
  Sludges
  Mixed liquor
  Chemicals
- HVAC industry
  Chillers
  Condensers
  Hot & cold water systems
- Power industry
  Nuclear
  Fossil
  Hydroelectric
- Processing industry
  Process control
  Batching
  Rate indication
  Volumetric and mass measurement

FUE1010 Energy flowmeters are ideally suited to thermal energy / power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

FUH1010 Oil flowmeters are ideal for applications carrying crude oil, refined petroleum or liquefied gas. There are three application areas: Interface detectors, volumetric flowmeters and mass or standard volume flowmeters

Interface detectors / density meters

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Viscosity compensated volumetric flowmeters

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume (net) mass flowmeters

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- Scraper („pig“) detection
- Chemical and petrochemical processing

FUG1010 Gas flowmeters are ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) analysis
- Production
- Storage

FUS1020 General purpose flowmeters are suitable for most clean liquid applications, including the following:

- Water & wastewater industry
  Potable water
  Wastewater, influent & effluent
  Processed sewage, sludge
- Chemical feed industry
  Sodium hypochlorite
  Sodium hydroxide
- HVAC & power industries
  Coolant flow
  Fuel flow
- Process control
  Chemicals
  Pharmaceuticals

System information and selection guide

SITRANS F US Clamp-on meters	FUS1010 (Standard)	FUS1020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)
Industry/Applications						
Water and aqueous solutions	X	X	X			
Utility district heating, cooling	X		X	X		
Chemical	X[4]	X[4]	X[4]			
Hydrocarbons/Petrochemical, multiple products or varying viscosity, liquefied gases, net and gross volume					X	
Hydrocarbons (Single product with limited viscosity range) gross volume	X				X	
Very low flow (<10 lpm) in small pipes	X[4]	X[4]	X[4]			
Natural gas						X
Process gas						X
Slurries or liquids with high percentage of undissolved gases	X		X			
High temperature liquids > 120 °C (248 °F)	X[1]	X[1]	X[1]	X[1]	X[1]	
Aerospace or hydraulic test	X[2]		X[2]			
Refrigeration liquids	X	X	X	X		
Food products	X	X	X			
Flare gas						X[3]
Design						
Field clamp-on (non-intrusive)	X	X	X	X	X	X
Doppler (Reflexor) hybrid capability	X		X	X		
Wall thickness gauge (accessory)			X	X[5]		
Standard volume or mass flow; per API 2540					X	
Interface detection					X	
Density output					X	
Standard volume or mass flow; per AGA 8						X
Mass flow capability (UniMass)	X		X			
Differential temperature w/ energy calculation				X		
Temperature measurement	X		X	X	X	X
Analog input	X		X	X	X	X
Large graphics display (optional)	X		X	X	X	X
Diagnostic PC software (DataView)	X	X	X	X	X	X
Number of acoustic beams and channels						
1-channel	X	X	X	X	X	X
2-path	X	X	X	X	X	X
2-channel w/ arithmetic function	X	X	X	X		
4-path / (special order)	X				X	X
4-channel w/ sum of active channels	X					
Transmitter enclosure						
IP65 (NEMA 4)		X				
IP65 (NEMA 4X)	X			X	X	X
IP67			X			
IP40 (NEMA 1)			X	X		
IP65 (NEMA 7) Compact	X				X	X
IP66 (NEMA 7) Wall mount	X				X	X

[1] Special order high temperature clamp-on transducer
[2] Special order Aerospace clip-on transducer recommended
[3] Special order insertion style gas transducer required
[4] May require special order FlowTube in-line transducer for very low flow rates
[5] Available with portable energy systems

Clamp-on ultrasonic flowmeters
System information and selection guide

SITRANS F US Clamp-on meters	FUS1010 (Standard)	FUS1020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)
Power Supply						
Internal battery operation			X	X[1)]		
Battery charger (100 ... 240 V AC 50 ... 60 Hz) with country specific line cord			X	X[1)]		
90 ... 240 V AC, 50 ... 60 Hz	X	X		X	X	X
9 ... 36 V DC	X	X		X	X	X
Size (larger sizes are available as special order)						
6.5 ... 1220 mm (0.25“ ... 48“)	X	X	X			
38 ... 1220 mm (1.5“ ... 48“)				X	X	X
Approvals						
FM / CSA CLASS I DIV 1[2)]	X			X	X	X
ATEX	X				X	X
UL / ULc / CE[3)]		X	X			

1) Available with portable energy systems
2) NEMA 4X associated equipment in DIV 2 connected to DIV 1 transducers, NEMA 7 explosionproof equipment in DIV 1 connected to DIV 1 transducers.
3) Ordinary, unclassified locations only

Transducer type selection guide

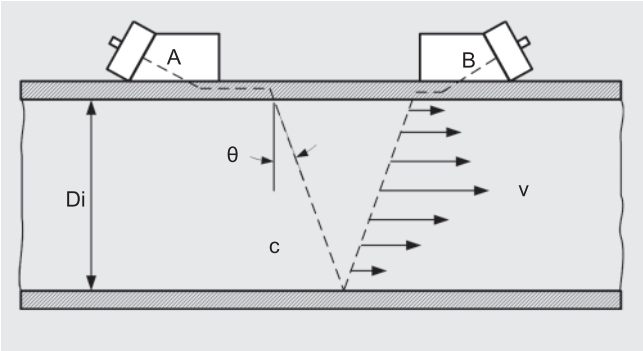
	Standard transducers supported in MLFB			
Application condition. Note all that apply before making selection	Standard clamp-on **High precision**	Standard clamp-on **Universal**	Standard Doppler **(Reflexor)**	Notes
Media				
General survey (clean liquids) on steel and non-steel pipes		X	O	
General survey (clean liquids) on a limited range of steel pipes	X		O	
Moderately aerated liquid or slurry	X			
Highly aerated liquid or slurry	O	O	X	High temperature Doppler transducers also available as special order
Permanent installation on steel pipe (clean liquids)	X		O	
Installation in offshore or corrosive environment	O	O	O	Transducers available with corrosion resistance as special order
Very low flow rates in pipes less than DN 25 (1“). See accuracy graph	O	O	O	Flow tubes available as special order
Liquid temperature greater than 120 °C (248 °F)	O	O	O	High temp metal block transducers available as special order (to 230 °C (446 °F))
Operation on single pipeline flowing multiple products	X	O		
Natural gas or process gas	X	O	O	Consult sales specialist for all gas applications
Pipe material				
Steel pipe with liquid temperature > 60 °C (140 °F)	O	X		Special order high precision transducers can be request for temps > 60 °C but < 120 °C (248 °F)
Steel	X		O	
Steel pipe with diameter/wall thickness ratio <10	O	X		
Non-steel pipe material (copper, ductile iron, cast iron, etc.)	O	X		High precision transducers can also be used on plastic and aluminum pipes
Wall thickness > 25.4 mm (1“)	O	X		

O = not suitable X = preferred choice

Function

Operating Principle

The SITRANS FUS1010 system is a transit-time ultrasonic meter that provides exceptional performance using a non-invasive clamp-on approach. Ultrasonic transducers transmit and receive acoustic signals directly though the existing pipe wall, where the fluid refraction angle is governed by Snell's law of refraction.



Clamp-on transducer mounted in a reflect configuration

The beam refraction angle is calculated as follows:

$\sin\theta = c / V_\phi$

c = Velocity of sound in fluid

V_φ = Phase velocity (a constant in the pipe wall)

The flowmeter automatically compensates for any change in fluid sound velocity (or beam angle) in response to variations in the average transit-time between transducers A and B. By subtracting the computed fixed times (within the transducers and pipe wall) from the measured average transit-time, the meter can then infer the required transit-time in the fluid (T_{Fluid}).

The Sound waves traveling in the same direction as flow ($T_{A,B}$) arrive earlier than sound waves traveling against the direction of flow ($T_{B,A}$). This time difference (Δt) is used to compute the line integrated flow velocity (v) as shown in the equation below:

$v = V_\varphi / 2 \cdot \Delta t / T_{Fluid}$

Once the raw flow velocity is determined, the fluid Reynolds number (Re) must be determined to properly correct for fully developed flow profile. This requires the entry of the fluid's kinematic viscosity (visc) as shown in the equations below, where Q represents the final flow profile compensated volumetric flow rate.

$Re = Di \cdot v / visc \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$

v = Flow velocity

visc = μ / ρ = (dynamic viscosity / density)

K(Re) = Reynolds flow profile compensation

In all wetted type ultrasonic flowmeters the meter constants are configured prior to leaving the factory. As this is not possible with clamp-on meters, the settings must be made by the customer at the time of installation. These settings include pipe diameter, wall thickness, liquid viscosity, etc.

SITRANS Clamp-On meters that include temperature sensing can be configured to dynamically infer changes in fluid viscosity for the purpose of computing the most accurate flow profile compensation (K_{Re}).

Ultrasonic Transducer Types

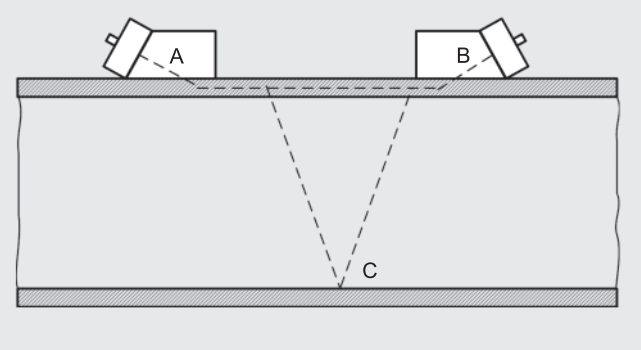
Two basic types of Clamp-On transducers can be selected for use with the SITRANS FUS1010 flowmeter. The lower cost "universal" transducer is the most common type in the industry and is suitable for most single liquid application where the sound velocity does not vary much. This transducer type can be used on any sonically conductive pipe material (including steel) making it well suited for portable survey applications. Universal transducers are selected based on the pipe diameter range alone, so wall thickness is not important to the selection process.

The second transducer type is the patented WideBeam transducer (called high precision), which utilizes the pipe wall as a kind of loudspeaker to optimize the signal to noise ratio and provide a wider area of vibration. This makes this kind of transducer less sensitive to any change in the fluid medium.

The WideBeam transducer is designed for steel pipes, but can also be used with aluminum, titanium and plastic pipe. It is the preferred transducer for HPI and gas applications. Note that unlike the universal type, this transducer selection is dependent only on the pipe's wall thickness.

Automatic Zero Drift Correction (ZeroMatic Path™)

When WideBeam transducers are installed in the "Reflect" mode configuration shown below, the acoustic signal travels in two different paths between transducers A and B. One path "ACB" travels through the pipe wall and fluid, while the other path "AB" never enters the fluid medium.

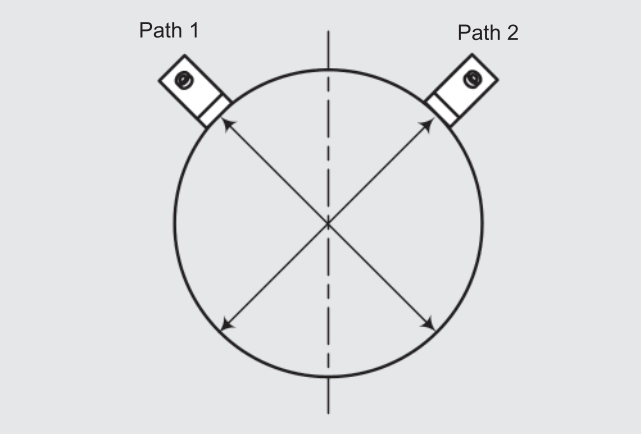


This later path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of transducer "mis-match". By continually analyzing this pipe wall signal the FUS1010 meter can dynamically correct for flow errors caused by zero drift.

Multi-Channel Flowmeters

For improved flow profile averaging, redundancy, or better cost per measurement, Clamp-On meters can be supplied with 1 or 2 measurement channel, with 4 channel meters supplied as special order.

In the standard FUS, FUP, FUE systems, these channels can be installed on separate independent lines or in a multi-beam installation as shown below. This choice is made during meter setup, where either a multi-beam (two beams on same pipe) or multi-channel installation can be selected.

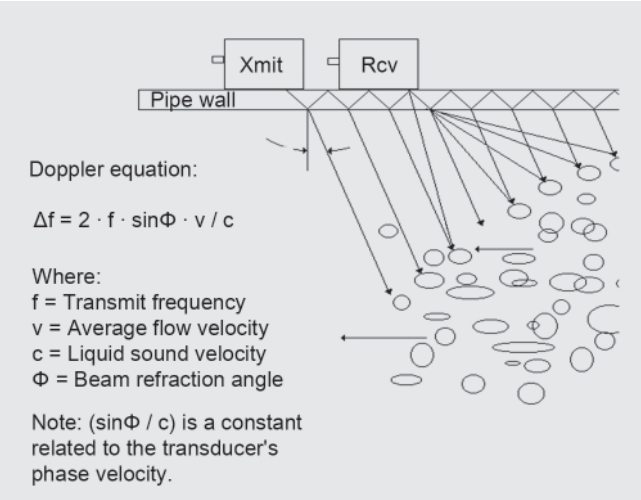


Dual Beam installation example

Clamp-on ultrasonic flowmeters
System information and selection guide

Doppler (Reflexor®) Operation

The Doppler measurement technique relies on the reflection of sound energy off tiny gas bubbles or suspended particles to create a doppler shift in the fixed frequency acoustic transmit signal, as shown below.



When de-demodulated using FFT signal processing, this doppler shifted frequency (Δf) can be used to measure the flow rate as described in the associated doppler equations below.

Although the standard transit-time measurement system is very tolerant of high levels of liquid aeration and high solids content, there will be cases where insufficient signal will be available for operation with transit-time mode. For these cases the FUS, FUP and FUE meters can be ordered with this optional doppler capability, which requires an additional doppler transducer.

SITRANS meter family description

SITRANS FUS1010 flowmeters

The FUS1010 system is a basic function permanent (or dedicated) clamp-on meter that is available with a full range of safety approvals, I/Os and enclosure types. This meter can be used in a wide range of applications but does not include the special functions found in the hydrocarbon FUH and energy FUE flowmeters.

The FUS1010 meter is typically programmed with a fixed viscosity and specific gravity entry, which can limit the mass flow and volumetric flow accuracy when highly variable (multi-product) liquid properties flow through the same pipeline.

If this meter is ordered with the Type 3 hardware and program configuration, it will have the ability to accommodate clamp-on RTDs, or an analog input from a temperature transmitter. With an active measurement of liquid temperature the meter can then be programmed to compensate for changes in liquid density and viscosity by mean of a “UniMass” table (for advanced users).

SITRANS FUS1020 flowmeters

The FUS1020 system has the same basic function of the FUS1010 system, but does not include the same I/O capability or safety approval rating of the FUS1010. This basic meter is intended for single liquid applications that do not require these additional features. Note that the FUS1020 is not available with hazardous area approvals.

SITRANS FUP1010 Portable meters

The FUP1010 meter has all the capabilities of the FUS1010 meter, but in a battery powered portable configuration. This meter is ideal for general flow survey work where high accuracy is required. Note that the FUP meter is not available with hazardous areas approvals.

SITRANS FUE1010 Energy meters

By combining clamp-on transit-time flow measurement with accurate temperature differential measurement, the FUE1010 system provides a solution to thermal energy metering with no interruption of service. Energy measurement can be provided for water, ethylene glycol and brine solutions or steam condensate.

Absolute and differential temperature measurement is accomplished with the use of 2 matched 1 kΩ RTD elements installed on the supply and return side of the heating or cooling system. Efficiency calculation (kW/ton, EER or COP) is also available in systems with the optional analog input capability, which allow the meter to accept a power meter output.

The FUE1010 system is available in both dedicated (IP65 (NEMA 4X)) and portable configurations.

SITRANS FUG1010 Gas meters

This unique Clamp-On gas meter uses the same WideBeam transit-time operating principle described above. However, due to the very low density and sound velocity characteristics of gases, this meter requires a high gain signal amplifier and the installation of a pipe damping material.

The pipe damping material consists of an adhesive backed viscoelastic film that is designed to attenuate any stray acoustic transmit energy that may otherwise interfere with the transit-time gas signal. Damping material installation requires a clean (grease free) pipe surface with well bonded paint.

The Clamp-On gas meter is capable of operation on most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc) with a typical minimum operating pressure of 10 barg (145 psig). Low molecular weight gases such as helium or hydrogen can also be measured, but at a higher minimum pressure. **Be sure to contact a Siemens clamp-on specialist before placing a gas system order.**

Standard volume computation: The FUG1010 gas meter is not designed with the same capabilities of a volume compensating flow computer but it can provide a standard volume or mass flow output for fixed gas compositions. All FUG1010 Gas meters include analog input capability that can be used for pressure and temperature compensation. With the installation of an AGA8 lookup table this meter can dynamically adjust the compressibility factor (Z_{act}) in response to changes in gas pressure and temperature, as indicate below:

Std. Rate = $Q_{act} * P_{act}/P_{base} * T_{base}/T_{act} * Z_{base}/Z_{act}$

SITRANS FUH1010 Hydrocarbon meters

There are two models of flowmeters included in the FUH1010 family, a viscosity compensated model, used for applications that will flow a wide range of viscosity, and a standard volume (Mass) model. Both models rely on a variable referred to as “liquident”, which is used to infer the liquid’s viscosity and optionally the liquid’s density. This variable represents the measured liquid sonic velocity compensated by the operating temperature and pressure, so for a given liquid product the measured liquident output will remain constant over a wide range of pressure or temperature.

PV (Viscosity Compensation) Option:

This is the lower cost FUH meter option that uses the liquident variable to infer only the actual liquid viscosity. This meter does NOT provide the standard volume, mass flow, liquid identification or density output available in the DV meter option described below. The PV meter is suitable for any petroleum application where actual volume required as the input to an external RTU or flow computer.

DV (Standard Volume) Option:

This Liquident variable can also be used to identify the liquid's name (gasoline, fuel oil, crude oil, etc) as well as it's physical properties (specify gravity, API, viscosity and compressibility) at base conditions. With this information the meter can be configured to output a temperature and pressure compensated (Standard) volume flow rate using the API 2540 and API MPMS chapter 11.2.1 methods as shown below.

Correction for Temperature:

Compute Thermal Expansion Coefficient (α_b):

$\alpha_b = KO / \rho_b^2 + K1 / \rho_b$

where: KO and K1 are constants dependent on type of liquid and ρb is the liquid density at base conditions

Compute temperature correction factor (K_T):

$K_T = \rho_b * EXP (- \alpha_b \Delta T (1 + 0.8 \alpha_b \Delta T))$

where: ΔT = (T – base temperature)

Correction for Pressure:

Compute Compressibility Factor (F):

$F = EXP(A + B T + (C + D T) / \rho_b^2$

where: A, B, C and D are constants, and "T" is liquid temperature

Compute pressure correction factor (K_p):

$K_p = 1 / (1 – F (P_{act} – P_{base}) * 10^{-4})$

Final Volume Correction: $Q_{std} = Q_{act} * K_t * K_p$

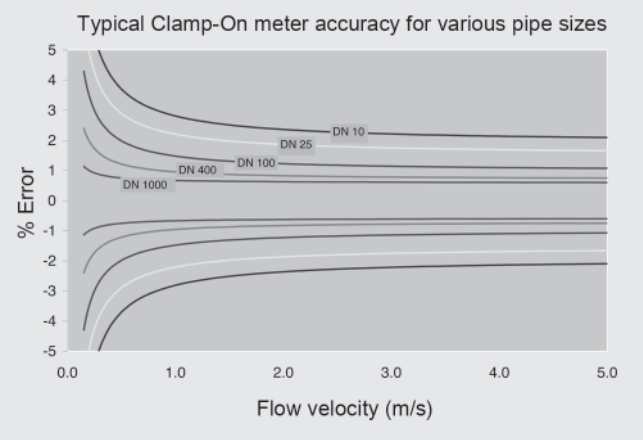
Available outputs from this meter include: API, Density, Mass Flowrate, Standard Volume Flowrate and Liquid Identification.

B (Interface Detection) Option:

This meter option is designed to provide all the Non-Flow capabilities of a DV meter, making it an ideal non-intrusive alternative to a densitometer, interface detector or pig detector. Be aware that this meter does NOT measure flow rate.

General Installation Guidelines for transit-time Clamp-On Transducers

- Minimum measuring range: 0 to ± 0.3 m/s velocity (see meter accuracy graph below for more detail)
- Maximum measuring range: 0 to ± 12 m/s (± 30 m/s for high precision transducers). Final flow range determination requires application review
- For very low flow rates on small diameter lines (< DN 25 or 1 inch) a special order inline FlowTube may be recommended. Consult sales specialist for details

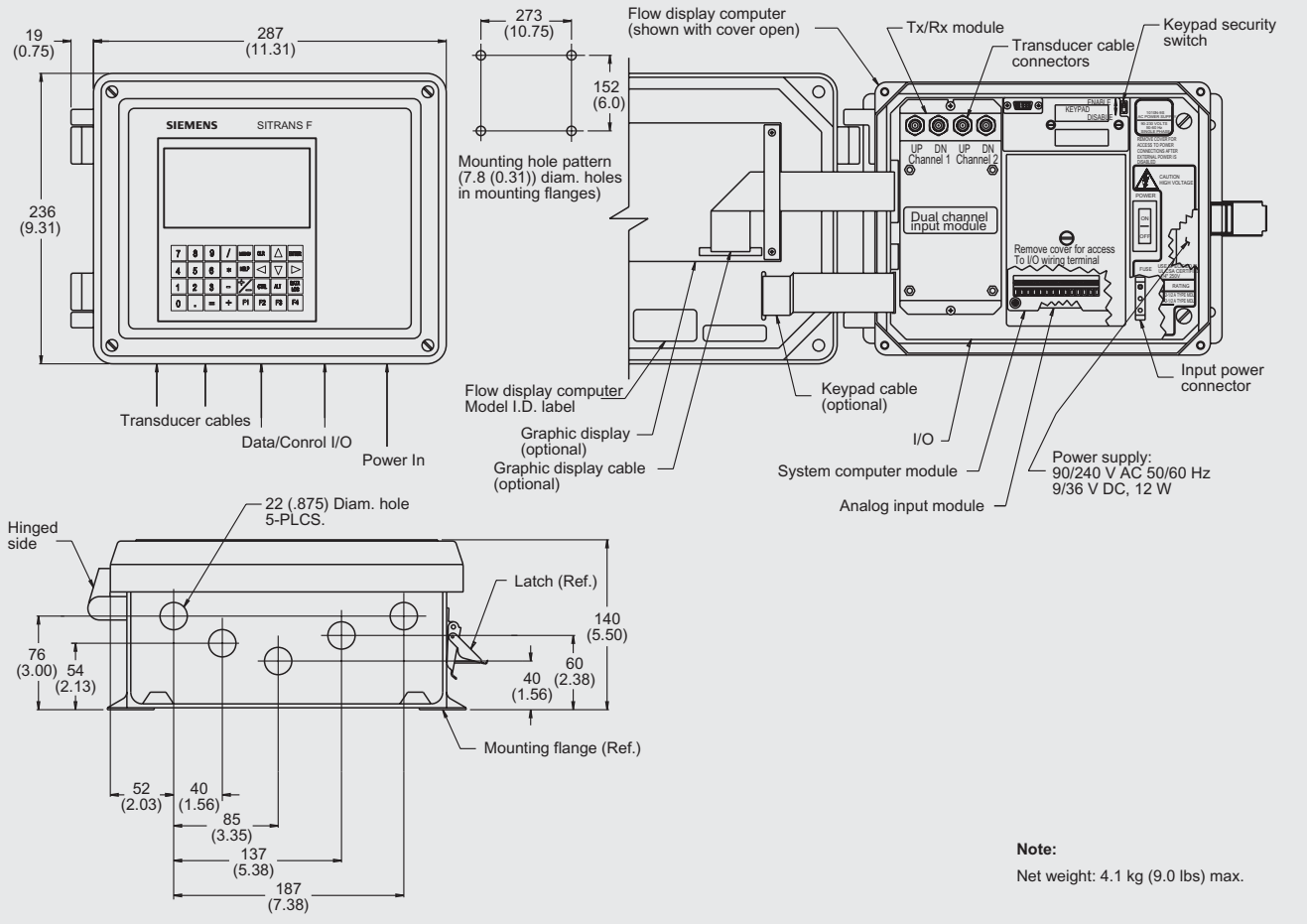


- Pipe must be completely full within the transducer installation volume for accurate flow measurement!
- Typical MINIMUM straight pipe requirements are: 10 Diameters upstream / 5 Diameters downstream. Additional straight run is required for double out-of-plane elbows and partially open valves. A minimum of 20 upstream diameters is recommended for clamp-on gas systems
- Transducers should be installed at least 20° off vertical for horizontal pipes. This reduces the chance of beam interference from gas buildup at the top of the pipe
- Operation inside the Reynolds transition region, between 1000 < Re < 5000 should be avoided for best accuracy
- Submersible and direct burial installations can be accommodated. Consult sales representative for details
- Ultrasonic coupling compound is provided with all transducer orders. Insure that a permanent coupling compound is used for long term installations
- Refer to the "Transducer type selection guide" to insure proper application of the equipment

4

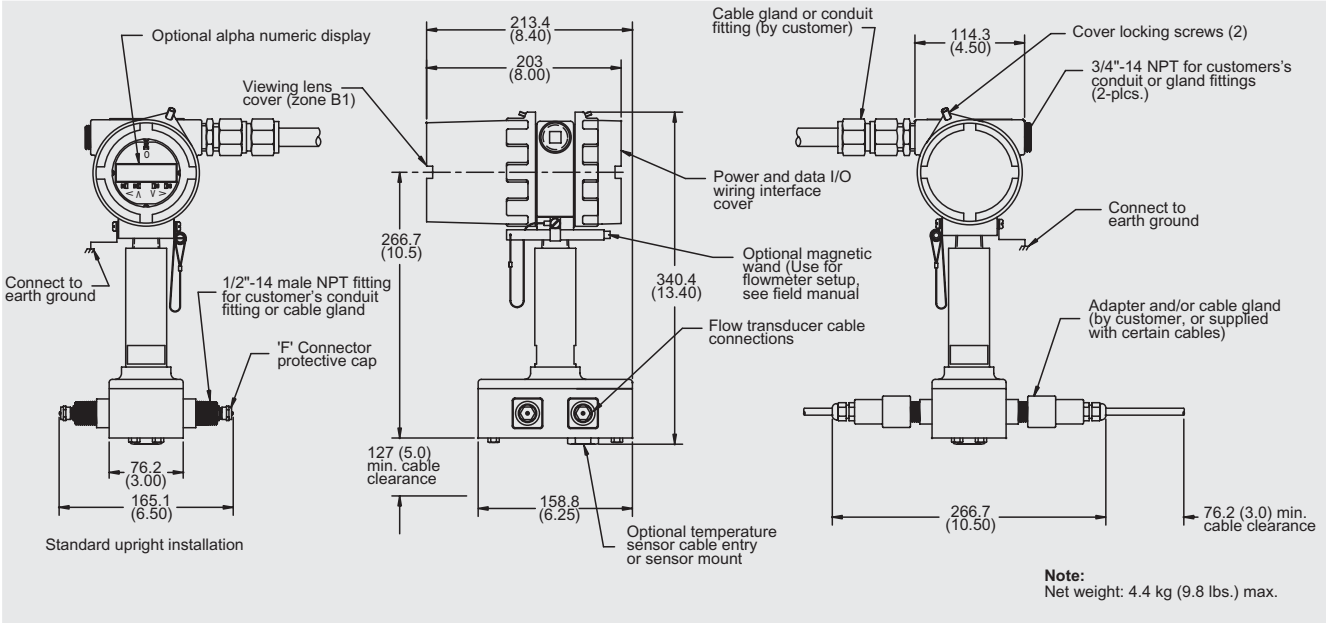
Dimensional drawings

FUS1010, FUE1010, FUH1010 and FUG1010 IP65 (NEMA 4X) Enclosure



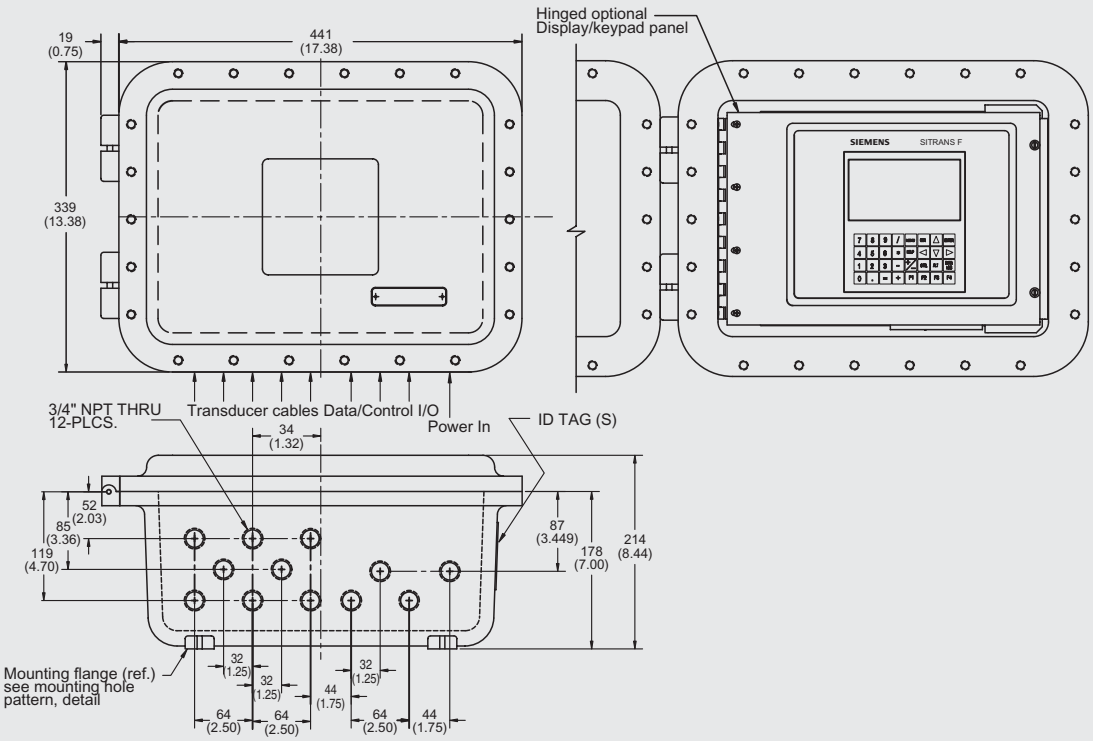
Note:
Net weight: 4.1 kg (9.0 lbs) max.

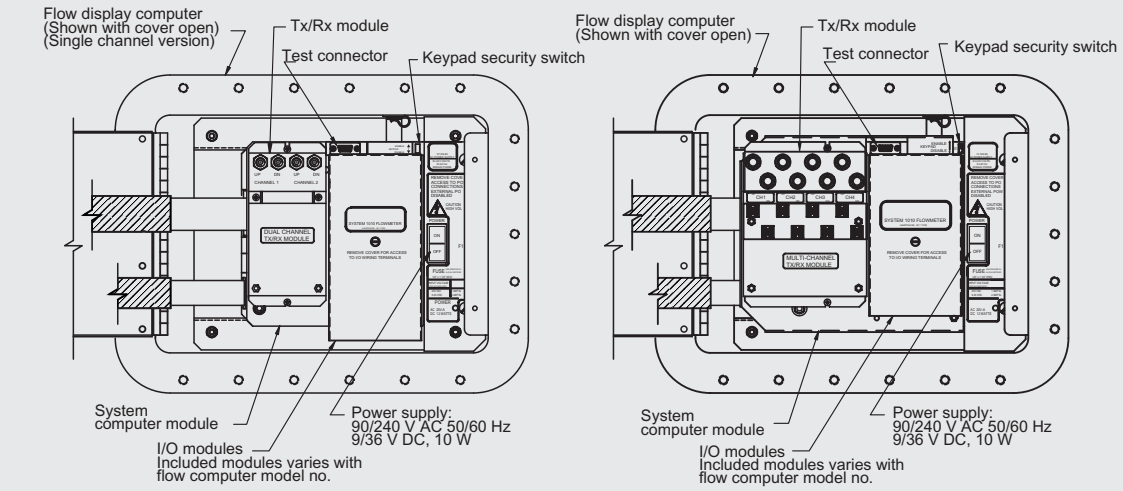
FUS1010, FUH1010 and FUG1010 IP65 (NEMA 7) Compact explosionproof enclosure



Note:
Net weight: 4.4 kg (9.8 lbs.) max.

FUS1010 and FUH1010 IP66 (NEMA 7) Wall mount explosionproof enclosure





Single / Dual channel flowmeter

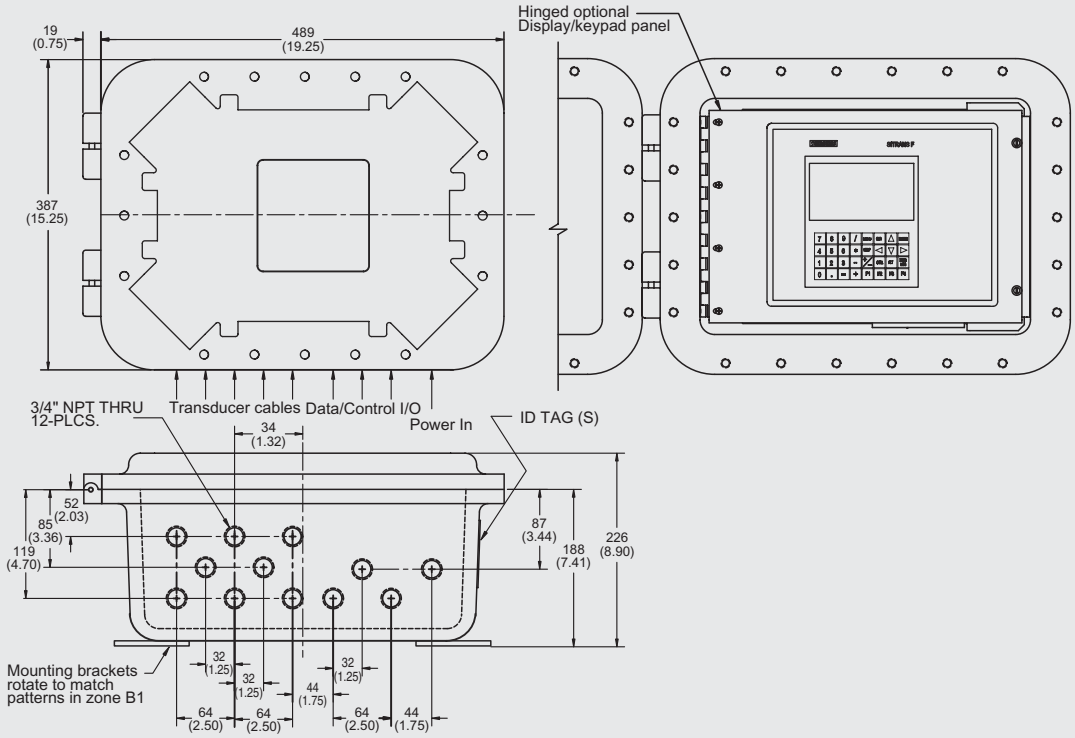
Multi-channel flowmeter

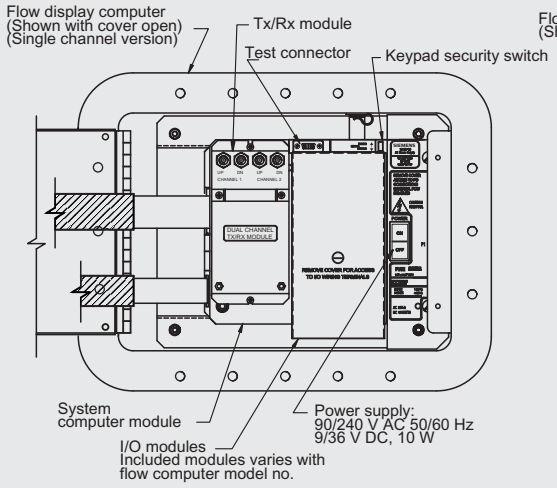
Note:

Net weight: 29 kg (64.0 lbs) max.

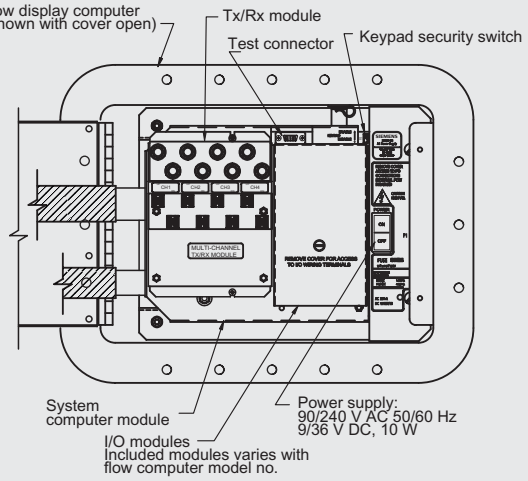
Clamp-on ultrasonic flowmeters
System information and selection guide

FUG1010 IP66 (NEMA 7) wall mount explosionproof enclosure





Single / Dual channel flowmeter

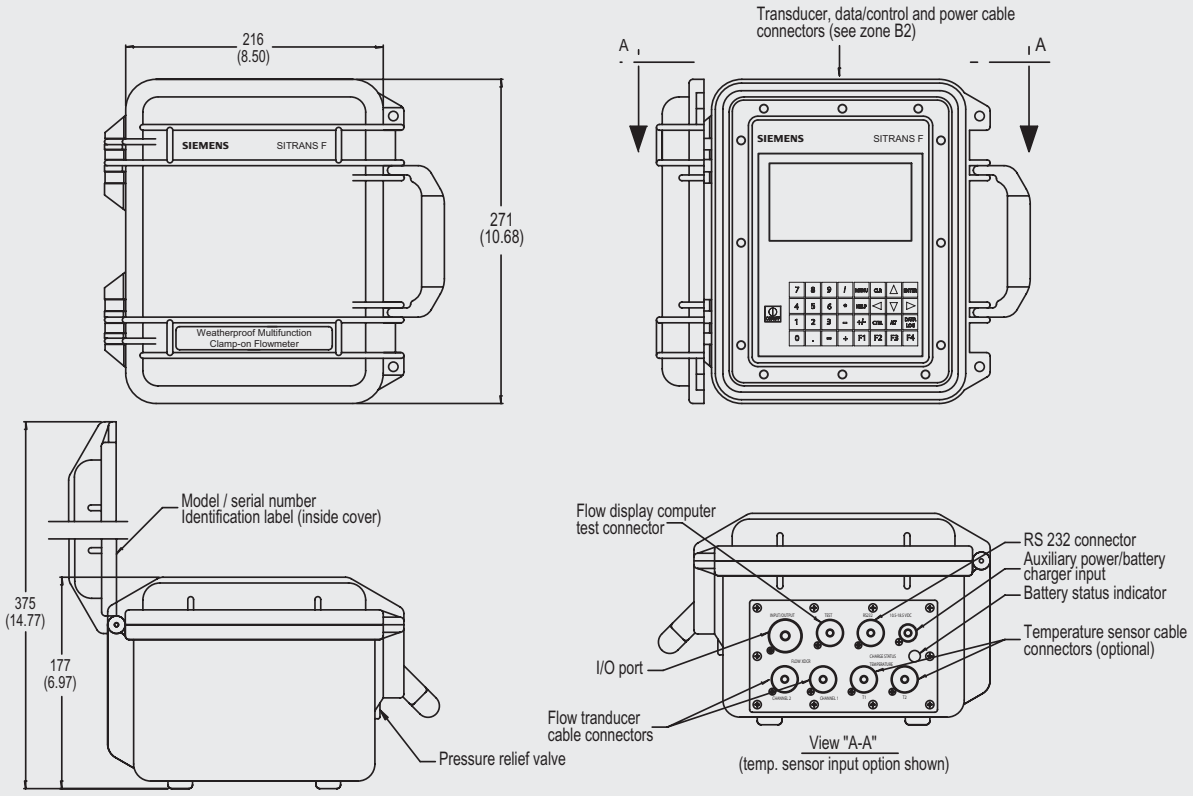


Multi-channel flowmeter

Note:

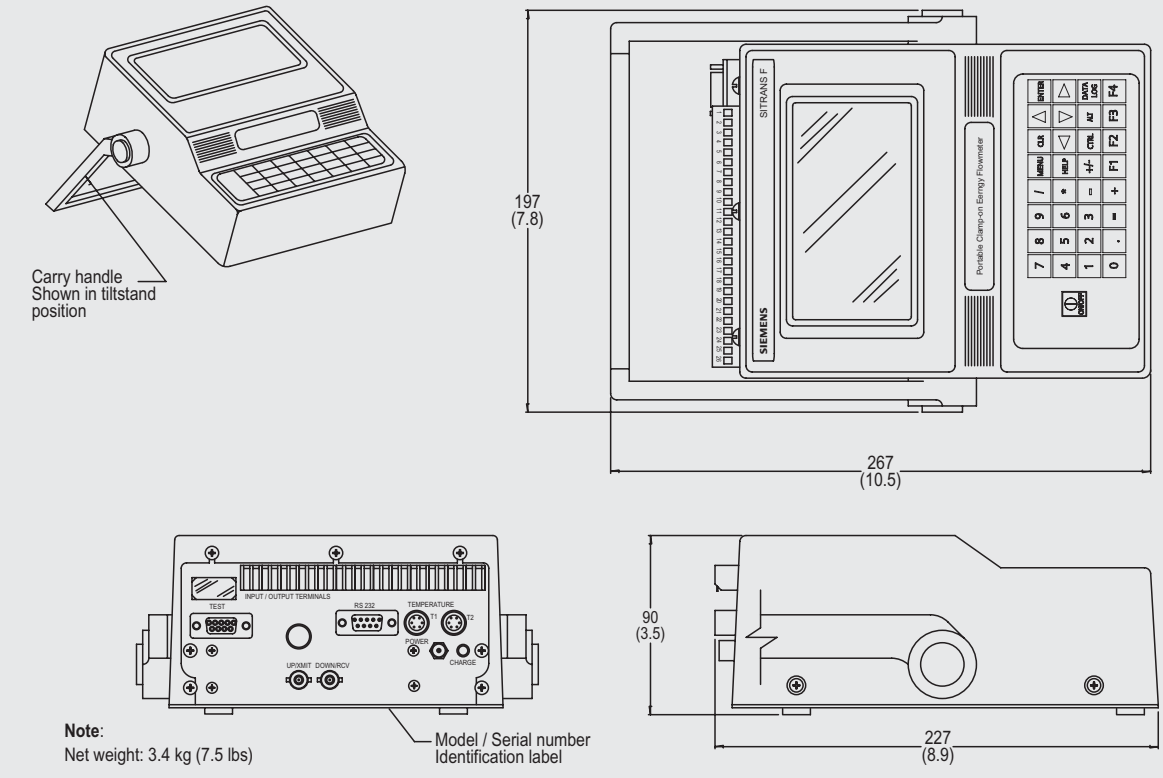
Net weight: 45 kg (99.0 lbs) max.

FUP1010 IP67 Weatherproof impact resistant enclosure



Note:
Net weight: 3.64 kg (8.0 lbs.)

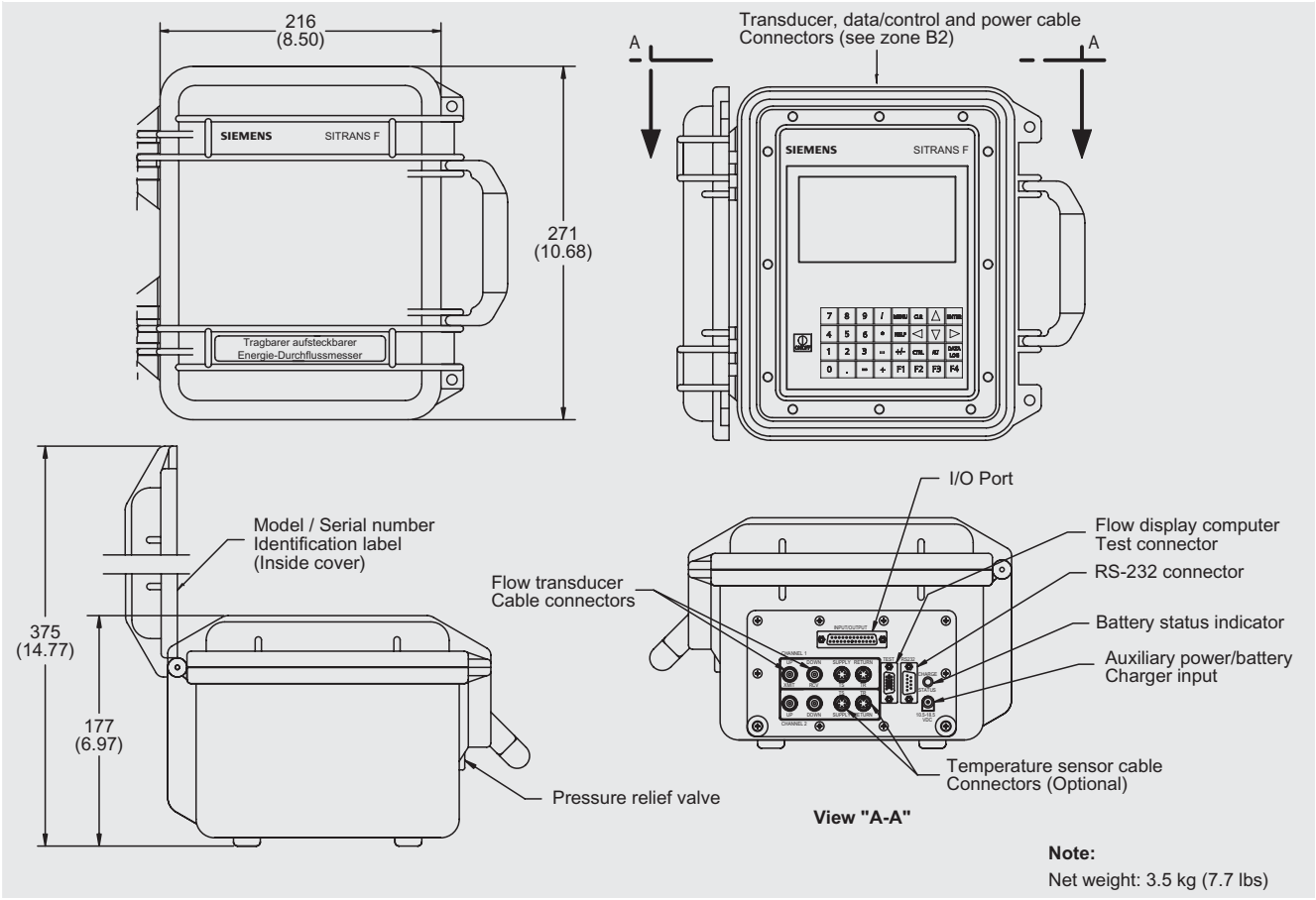
FUP1010 IP40 (NEMA 1) Standard portable enclosure



Note:
Net weight: 3.4 kg (7.5 lbs)

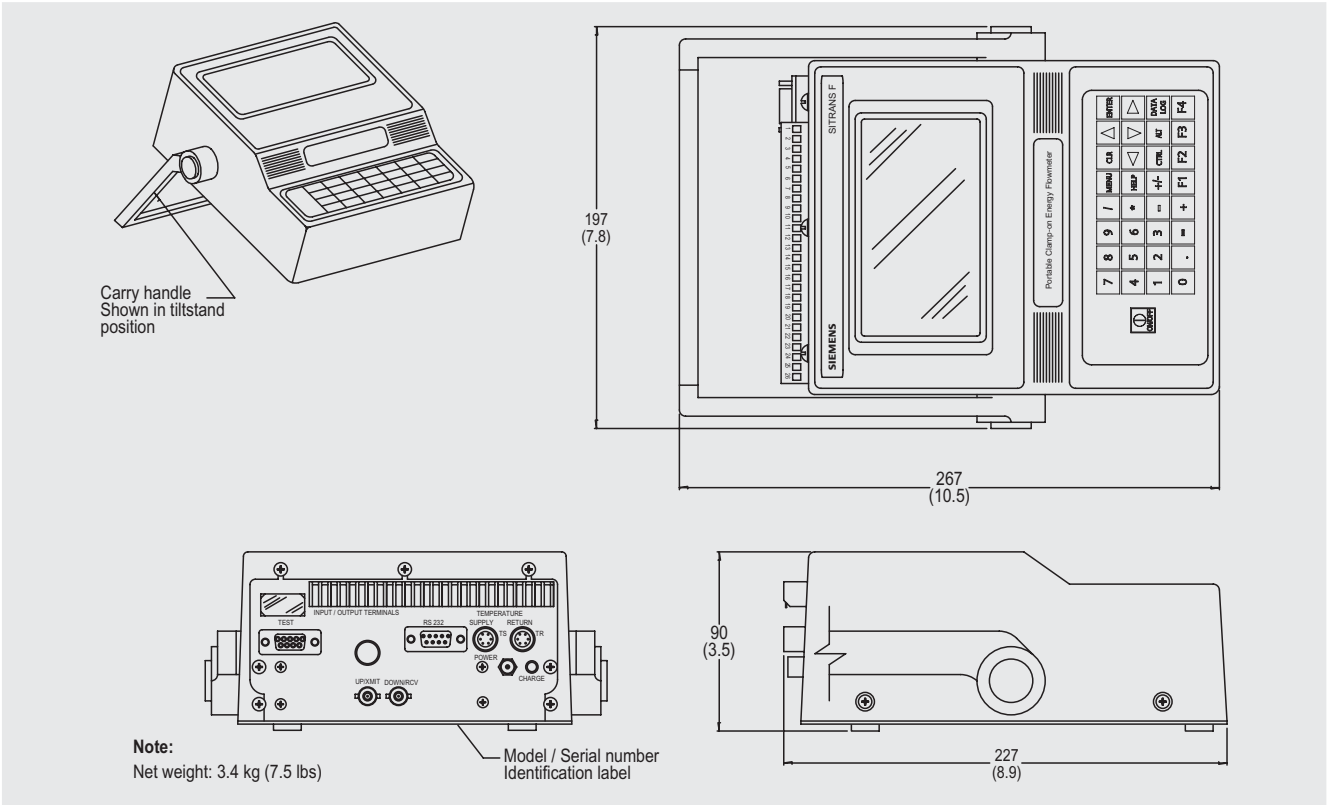
Clamp-on ultrasonic flowmeters
System information and selection guide

FUE1010 IP67 Portable impact resistant enclosure



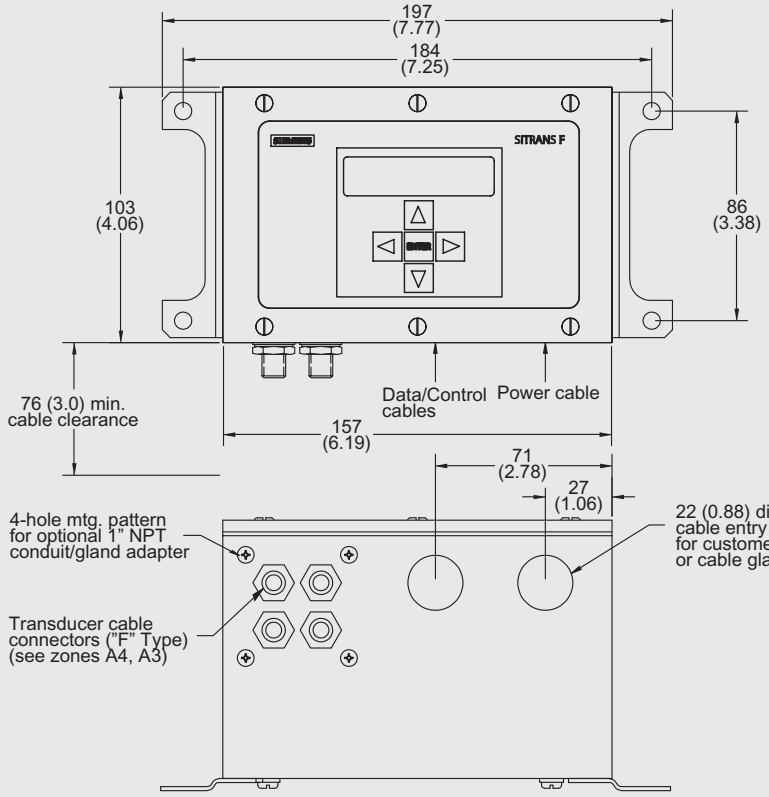
Note:
Net weight: 3.5 kg (7.7 lbs)

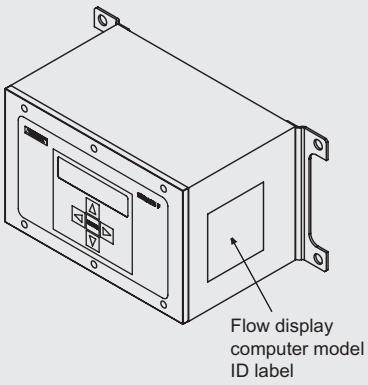
FUE1010 IP40 (NEMA 1) Portable enclosure

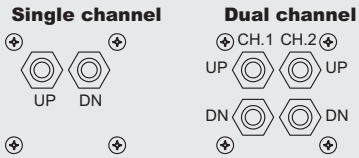


Note:
Net weight: 3.4 kg (7.5 lbs)

FUS1020 IP65 (NEMA 4) Wall mount enclosure





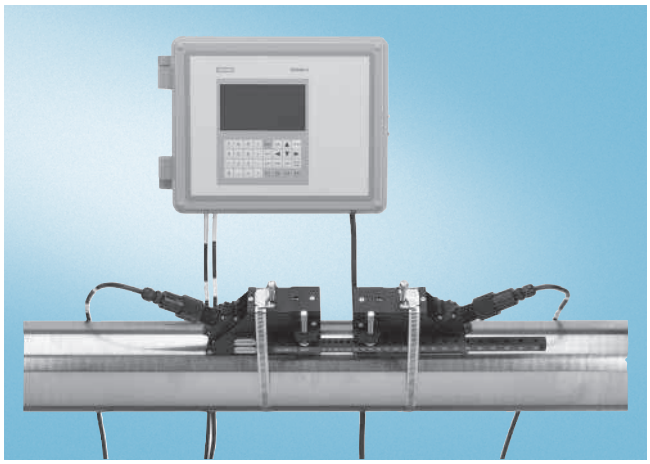


Notes:

1. Net weight 1.4 kg (3.0 lbs)
2. Use conduit fittings or cable glands at all cable entries. Install weather tight seals at all unused holes.

SITRANS FUS1010 Standard clamp-on

Overview



SITRANS FUS1010 is the most versatile clamp-on ultrasonic flow display computer available today. It can operate in either Wide-Beam Transit-Time or Reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUS1010 is available in single, dual and optional four beam configurations, with your choice of IP65 (NEMA 4X) or IP65 (NEMA 7) and IP66 (NEMA 7) explosionproof enclosures.

Benefits

- Versatility; there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single channel or dual channel/dual path, with doppler capability. Four channel/four beam optional.
  - Optional four channels allow measurement of four independent pipes at the same time, reducing overall ownership costs
  - Dual mode allows for transit time and reflexor operation at the same time on the same pipe
  - Dual path allows for two sets of transducers to be set up on one pipe and averaged for higher accuracy
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUS1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
  - Raw water
  - Potable water
  - Sludges
  - Chemicals
- Wastewater industry
  - Raw sewage
  - Effluent
  - Sludges
  - Mixed liquor
  - Chemicals
- HVAC industry
  - Chillers
  - Condensers
  - Hot and cold water systems
- Power industry
  - Nuclear
  - Fossil
  - Hydroelectric
- Processing industry
  - Process control
  - Batching
  - Rate indication
  - Volumetric and mass measurement

Design

FUS1010 is available in three configurations:

- IP65 (NEMA 4X) enclosure
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)
- IP65 (NEMA 7) Compact explosionproof enclosure
  - Single channel
  - Dual channel / dual path
- IP66 (NEMA 7) Wall mount explosionproof enclosure
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display computers have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display computer has a 2 x 16 Alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

SITRANS FUS1010 Standard clamp-on

Technical specifications

SITRANS FUS1010, IP65 (NEMA 4X) Flow display computer

Enclosure IP65 (NEMA 4X)	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional inputs Single channel	• Current: 2x 4 … 20 mA DC • Voltage: 2x 0 … 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD
Output	
Outputs Single channel	• Current: 2x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2x 0 … 10 V DC (5 kΩ min.) • Status Alarm: 4x SPDT relays • Frequency: 2x 0 … 5 kHz • RS232
Accuracy	
Accuracy	± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP65 (NEMA 4X)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W

Indication and operation	
Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5
• Transducers	Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)
CCOE rating (India)	EEx (ia)
INMETRO ratings (Brazil)	
• Flow display computer	[BR-Ex ia] IIC T6 BR-Ex nC [ia] IIC T6
• Transducers	BR-Ex ia IIC T6 IP65
GoST ratings (Russia)	
• Flow display computer	[Exia]IIC
• Transducers	ExiaIICT5

SITRANS FUS1010 Standard clamp-on

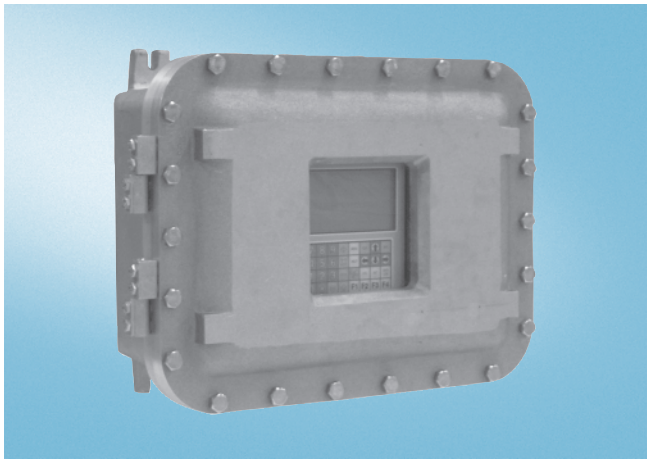
SITRANS FUS1010, IP65 (NEMA 7) Compact explosionproof

Enclosure IP65 (NEMA 7)	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional inputs single channel	• Current: 1x 4 … 20 mA DC • Temperature: 2x 4 wire 1 kΩ RTD
Output	
Outputs single channel	• Current (externally powered): 1x 4 … 20 mA DC (1 kΩ at 30 V DC) • Status Alarm: 1x Isolated open collector • Frequency: 2x 0 … 5 kHz • RS232
Accuracy	
Calibratable accuracy	0.1% (API proving method)
Intrinsic accuracy	± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP65 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W

Indication and operation	
Data logger memory	1 MByte
Display	2 x 16 alphanumeric LCD display
Keypad	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX ratings	
• Flow display computer	Ex II 2 (1) G EEx d [ia] IIC T5
• Transducers	Ex II 1 G EEx ia IIC T5
CCOE rating (India)	EEx d
INMETRO ratings (Brazil)	
• Flow display computer	BR-Ex d [ia] IIC T6
• Transducers	BR-Ex ia IIC T6 IP65

SITRANS FUS1010 Standard clamp-on

SITRANS FUS1010, IP66 (NEMA 7) Wall mount explosionproof enclosure



Enclosure IP66 (NEMA 7)	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional Inputs single channel	• Current: 2x 4 … 20 mA DC • Voltage: 2x 0 … 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD
Output	
Outputs single channel	• Current: 2x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2x 0 … 10 V DC (5 kΩ min.) • Status Alarm: 4x SPDT Relays • Frequency: 2x 0 … 5 kHz • RS232
Accuracy	
Accuracy	± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W

Indication and operation	
Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB T5
• Transducers	Ex II 1 G EEx ia IIC T5
INMETRO ratings (Brazil)	
• Flow display computer	[BR-Ex ia] IIC T6 BR-Ex nC [ia] IIC T6 BR-Ex d [ia] IIC T6
• Transducers	BR-Ex ia IIC T6 IP65

SITRANS FUS1010 Standard clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on			
• IP65 (NEMA 4X)	F) ◆	**7ME3530-**	
• IP65 (NEMA 7) compact	F)	**7ME3531-**	
• IP66 (NEMA 7) wall mounted	F)	**7ME3532-**	
• IP66 (NEMA 7) with display window	F)	**7ME3533-**	
		0 -	
Number of channels/ultrasonic beams			
Single channel	◆	**1**	
Dual channel / Dual beam		**2**	
Special: Four channel / Four Beam (NEMA 4X and NEMA 7 wall mount only)		**9**	**H 1 A**
Flowmeter functions and I/O configurations includes graphic or digital display and Reflexor capability for all except IP65 (NEMA 7) compact units			
IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units			
• Type 1 Standard - 2x 0 ... 10 V - 2x 4 ... 20 mA - 2x pulse output - 4x relay C type	◆	**A**	
• Type 3 option adder - UniMass capability with 2x RTD input and - 4x 4 ... 20 mA analog input		**C**	
IP65 (NEMA 7) compact units			
• Type 1 Standard - 1x 4 ... 20 mA (Loop) and 1x status (open collector) **per channel** - 1x pulse output for single channel units only		**D**	
• Type 3 option adder - UniMass capability with 1 RTD input and - 1x analog input **per channel**		**F**	
• Other version (Expanded I/O and/or Mercury wetted relays) Add order code and plain text.		**Z**	**J 1 Y**
• Type 3 with Mercury wetted relays		**Z**	**J 1 A**
• Type 3 with expanded I/Os (4 additional 4 ... 20 mA outputs) and form C relay		**Z**	**J 1 B**
• Type 3 with expanded I/Os and Mercury wetted relays		**Z**	**J 1 C**
Meter power options			
90 ... 240 V AC	◆	**A**	
9 ... 36 V DC (except compact NEMA 7)		**B**	
9 ... 36 V DC negative GND (compact only)		**J**	
9 ... 36 V DC positive GND (compact only)		**K**	
Communication options			
RS232 (standard)		**0**	
MODBUS (dedicated only, excludes NEMA 7 compact)		**1**	
Special: Dial up Modem (dedicated only, excludes compact NEMA 7), max. 9600 Baud Dial up Modem		**9**	**L 1 Y**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on			
• IP65 (NEMA 4X)	F) ◆	**7ME3530-**	
• IP65 (NEMA 7) compact	F)	**7ME3531-**	
• IP66 (NEMA 7) wall mounted	F)	**7ME3532-**	
• IP66 (NEMA 7) with display window	F)	**7ME3533-**	
		0 -	
RTD temperature sensor (includes mounting hardware for pipes between 1.5" and 24" outer diameter)			
No RTDs	◆	**0**	
1x standard clamp-on RTD		**1**	
2x standard clamp-on RTD		**2**	
1x submersible clamp-on RTD		**3**	
2x submersible clamp-on RTD		**4**	
Special (for insert style RTDs), describe RTD length, thermowell and lagging		**9**	**N 1 Y**
1x Insertion style RTD with thermowell and lagging		**9**	**N 1 A**
2x Insertion style RTD with thermowell and lagging		**9**	**N 1 B**
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See „Transducer selection charts" for specifications.			
no transducer			**A**
A2 universal	to 3"/track mount		**B**
B3 universal	to 5"/track mount	◆	**C**
C3 universal	to 13"/mounting frame	◆	**D**
D3 universal	to 24"/mounting frame	◆	**E**
E2 universal	to 48"/mounting frame	◆	**F**
A1H (high precision)	to 3"/track mount		**G**
A2H (high precision)	to 3"/track mount		**H**
A3H (high precision)	to 3"/track mount		**J**
B1H (high precision)	to 5"/track mount		**K**
B2H (high precision)	to 5"/track mount	◆	**L**
C1H (high precision)	to 24"/mounting frame		**M**
C2H (high precision)	to 24"/mounting frame	◆	**N**
D1H (high precision)	to 48"/mounting frame	◆	**P**
D2H (high precision)	to 48"/mounting frame		**Q**
D4H (high precision)	to 48"/mounting frame		**R**
Doppler	to 12" with strap kit (not for IP65 (NEMA 7))	◆	**S**
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.			**Z** **P 1 Y**
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			**Z** **P 1 A**
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			**Z** **P 1 B**
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			**Z** **P 1 C**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			**Z** **P 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			**Z** **P 1 L**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			**Z** **P 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			**Z** **P 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			**Z** **P 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			**Z** **P 1 Q**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			**Z** **P 1 R**

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data			Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on				
• IP65 (NEMA 4X)	F)	◆	**7ME3530-**	
• IP65 (NEMA 7) compact	F)		**7ME3531-**	
• IP66 (NEMA 7) wall mounted	F)		**7ME3532-**	
• IP66 (NEMA 7) with display window	F)		**7ME3533-**	
			0 -	
Transducer for channel 2 (includes pipe mounting kit for indicated max. OD listed) See „Transducer selection charts“ for specifications.				
no transducer				**A**
A2 universal	to 3“/track mount			**B**
B3 universal	to 5“/track mount	◆		**C**
C3 universal	to 13“/mounting frame	◆		**D**
D3 universal	to 24“/mounting frame	◆		**E**
E2 universal	to 48“/mounting frame	◆		**F**
A1H (high precision)	to 3“/track mount			**G**
A2H (high precision)	to 3“/track mount			**H**
A3H (high precision)	to 3“/track mount			**J**
B1H (high precision)	to 5“/track mount			**K**
B2H (high precision)	to 5“/track mount	◆		**L**
C1H (high precision)	to 24“/mounting frame			**M**
C2H (high precision)	to 24“/mounting frame	◆		**N**
D1H (high precision)	to 48“/mounting frame	◆		**P**
D2H (high precision)	to 48“/mounting frame			**Q**
D4H (high precision)	to 48“/mounting frame			**R**
Doppler	to 12“ with chain or strap kit (not for IP65 (NEMA 7))	◆		**S**
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order code and plain text.				**Z Q 1 Y**
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))				**Z Q 1 A**
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))				**Z Q 1 B**
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))				**Z Q 1 C**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)				**Z Q 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)				**Z Q 1 L**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)				**Z Q 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)				**Z Q 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)				**Z Q 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)				**Z Q 1 Q**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)				**Z Q 1 R**
Approvals				
FM/CSA		◆		**1**
ATEX				**2**
INMETRO (Brazil)				**3**
Special ATEX EEx m add Order code and plain text: Length of integral cable:				**9 R 1 Y**

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for No. of channels) See „Transducer cable selection chart“	**K..**
Cable assembly for RTDs (add for No. of RTDs) See „RTD cable selection chart“	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored transducer cable	**T01**
• Termination for submersible transducer cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Languages (Meter, Labels and Documentation), English (default)	
• German ◆	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Wet flow transfer calibration (priced for 1 pipe calibration)	
• 6 point up to 4 inch (DN 100)	**D10**
• 6 point up to 5 to 8 inch (DN 125 to DN 200)	**D11**
• 6 point up to 10 to 12 inch (DN 250 to DN 300)	**D12**
• 6 point up to 14 to 16 inch (DN 350 to DN 400)	**D13**
• 6 point up to 18 to 20 inch (DN 450 to DN 500)	**D14**
• 6 point up to 22 to 24 inch (DN 550 to DN 600)	**D15**
• 6 point up to 26 to 30 inch (DN 650 to DN 750)	**D16**
• 6 point up to 32 to 36 inch (DN 800 to DN 900)	**D17**
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)	**Y17**
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUS1010 Standard clamp-on

MLFB example

Application example

A clamp-on meter is required for a 12“ carbon steel jet fuel line, with a wall thickness of 12.7 mm (0.5“). Meter electronics is to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement.

MLFB Order No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

4

Selection and Ordering data	Order No.	Ord. code
FUS1010 meter family	**7 M E 3 5 3 -**	**0 -**
IP65 (NEMA 4X) enclosure	**0**	
Dual Beam	**2**	
Standard I/O option	**A**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
No RTD required		**0**
Transducer code for path 1		**Q**
Transducer code for path 2		**Q**
FM approval required		**1**
30 m (100 ft) transducer cable for path 1		**K 0 3**
30 m (100 ft) transducer cable for path 2		**K 0 3**

Transducer selection charts

Universal transducers for any pipe material

Transducer Size code	Order Code	Outer diameter range (mm) min.	Outer diameter range (mm) max.	Outer diameter range (inches) min.	Outer diameter range (inches) max.
A2	**B**	12.7	50.8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6 096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Transducer Size code	Order Code	Pipe wall (mm) min.	Pipe wall (mm) max.	Pipe wall (inches) min.	Pipe wall (inches) max.
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25

Transducer cable selection chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40…+80 °C (-40…+176 °F)	Submersible (polyethylene jacket) -40…+80 °C (-40…+176 °F)	Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**	**K22**	**K32**
30 (100)	**K03**	**K13**	**K23**	**K33**
46 (150)	**K04**	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

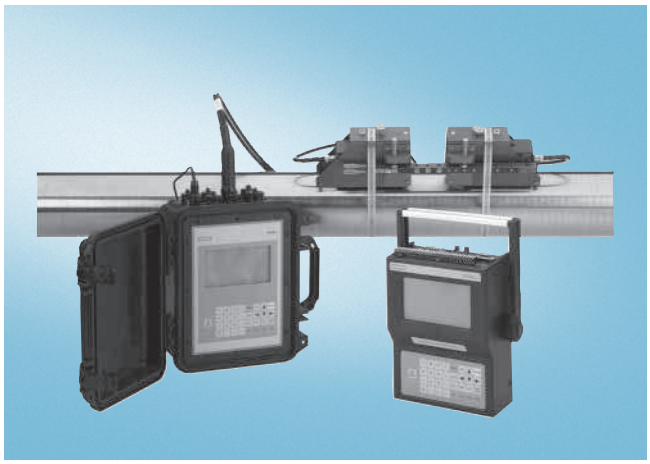
RTD cable selection chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 … +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 … +392 °F)
	Order code	
6 (20)	**R01**	**R11**
15 (50)	**R02**	**R12**
30 (100)	**R03**	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

SITRANS FUP1010 Portable clamp-on

Overview



SITRANS FUP1010 clamp-on non-intrusive ultrasonic flow display computer offers maximum versatility plus battery power for portable field use. It can operate in either WideBeam Transit-Time or reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUP1010 is available in single and dual channel or dual path configurations, with your choice of IP67 waterproof or IP40 (NEMA 1) enclosures.

Benefits

- Battery power facilitates field use; the meter is easily transported from one installation to another – saving time for surveys, monitoring and temporary installations
- Weatherproof model can be used outdoors and left in place without concern for rain damage
- Weatherproof model's rugged plastic case enables it to withstand rough treatment that would destroy most other meters
- Versatility - there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel models minimizes total cost
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Note that the FUP1010 flow display computer is not available with hazardous area approvals

Application

FUP1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
  - Raw water
  - Potable water
  - Sludges
  - Chemicals
- Wastewater industry
  - Raw sewage
  - Effluent
  - Sludges
  - Mixed liquor
  - Chemicals
- HVAC industry
  - Chillers
  - Condensers
  - Hot and cold water systems
  - Thermal energy rate and total
- Power industry
  - Nuclear
  - Fossil
  - Hydroelectric
- Processing industry
  - Process control
  - Batching
  - Rate indication
  - Volumetric and mass measurement

Design

FUP1010 is available in two configurations:

- IP40 (NEMA 1) Enclosure
  - Single channel
  - Dual channel / dual path
- IP67 Weatherproof / Impact resistant enclosure
  - Single channel
  - Dual channel / dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options
- Optional pipe wall thickness gauge

SITRANS FUP1010 Portable clamp-on

Technical specifications

SITRANS FUP1010	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm … 9.14 m (0.25“ … 360“)
Optional inputs, single channel	• Current: 2x 4 … 20 mA DC • Voltage: 2x 0 … 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD
Output	
Outputs, single channel	• Current: 2x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2x 0 … 10 V DC (5 kΩ minimum) • Status Alarm: 4x SPDT Relays • Frequency: 2x 0 … 5000 Hz • RS232
Accuracy	
Accuracy	± 0.5% … 2% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 … 0.006 m/s (± 0.005 … 0.02 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	
• Standard portable enclosure	• IP40 (NEMA 1)
• Weatherproof/impact resistant	• IP67
Liquid temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-40 … +230 °C (-40 … +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	
Power	Internal NiCd battery
Battery operation	4 hours
Indication and operation	
Data logger memory	1 MByte
Site storage memory	50 sites minimum
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
Unclassified locations only	UL ULc CE: • LVD IEC 61010-1; CB Test Certificate • EMC EN61000-6-2, -4

SITRANS FUP1010 Portable clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on			
• IP67 weather proof battery powered	F) ◆	**7ME3510-**	
• IP40 (NEMA 1) battery powered	F) ◆	**7ME3511-**	
		- 0	0
Number of channels/ultrasonic beams			
Single channel	◆	1	
Dual channel / Dual beam		2	
Standard flowmeter types and I/O configurations			
• Type 1 Standard - Reflexor capable - Graphic display - 2x 0 ... 10 V - 2x 4 ... 20 mA - 2x pulse outputs - 4x status logic	◆	A	
• Type 3 option adder - 2x 4 ... 20 mA analog in - 2x RTD		C	
Transducer cables (select proper quantity for active channels)			
no transducer cable		A	
1x Plenum rated, length 6 m (20 ft) (for NEMA 6)[1]		B	
2x Plenum rated, length 6 m (20 ft) (for NEMA 6)[1]		C	
1x Plenum rated, length 15 m (50 ft) (for NEMA 6)[1]		D	
2x Plenum rated, length 15 m (50 ft) (for NEMA 6)[1]		E	
1x PVC jacket, length 6 m (20 ft) (for NEMA 12)[2]	◆	F	
2x PVC jacket, length 6 m (20 ft) (for NEMA 12)[2]		G	
1x PVC jacket, length 15 m (50 ft) (for NEMA 12)[2]	◆	H	
2x PVC jacket, length 15 m (50 ft) (for NEMA 12)[2]		J	
Other versions add Order code and plain text.		Z	K 1 Y
RTD temperature sensor (for type 3 meter only, mounting hardware and cable included)			
No RTDs		0	
1x standard clamp-on RTD (NEMA 12) with 6 m (20 ft) cable[1]		1	
2x standard clamp-on RTD (NEMA 12) with 6 m (20 ft) cable[1]		2	
1x standard clamp-on RTD (NEMA 12) with 15 m (50 ft) cable[1]		3	
2x standard clamp-on RTD (NEMA 12) with 15 m (50 ft) cable[1]		4	
1x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable[1]		5	
2x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable[1]		6	
1x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable[1]		7	
2x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable[1]		8	
Other versions add Order code and plain text.		9	L 1 Y

Approvals: No options (UL, ULc, CE by default)

1) -40 ... +200 °C (-40 ... +392 °F)

2) -40 ... +80 °C (-40 ... +176 °F)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on			
• IP67 weather proof battery powered	F) ◆	**7ME3510-**	
• IP40 (NEMA 1) battery powered	F) ◆	**7ME3511-**	
		- 0	0
Battery charger options			
no battery charger		0	
Charger Type A for Europe (CEE7/7)	◆	1	
Charger Type C for Australia (AS3112)		2	
Charger Type D for U.K. (BS1363)		3	
Charger Type J for Japan (JIS8303)		4	
Charger Type K for U.S. (NEMA 5-15P)	◆	5	
Charger Type L for Switzerland (SEV1011)		6	
Special: External battery for extended service, add Order code and plain text.		9	M 1 Y
External 4 hours battery with US plug for IP40 (NEMA 12) Portable		9	M 1 A
External 4 hours battery with US plug for IP67 (NEMA 6) Portable		9	M 1 B
External 4 hours battery with European plug for IP40 (NEMA 1) Portable		9	M 1 C
External 4 hours battery with European plug for IP67 Portable		9	M 1 D
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.			
no transducer			A
A2 universal	to 3“/track mount		B
B3 universal	to 5“/track mount ◆		C
C3 universal	to 13“/mounting frame		D
D3 universal	to 24“/mounting frame ◆		E
E2 universal	to 48“/mounting frame ◆		F
A1H (high precision)	to 3“/track mount		G
A2H (high precision)	to 3“/track mount		H
A3H (high precision)	to 3“/track mount		J
B1H (high precision)	to 5“/track mount ◆		K
B2H (high precision)	to 5“/track mount		L
C1H (high precision)	to 24“/mounting frame		M
C2H (high precision)	to 24“/mounting frame ◆		N
D1H (high precision)	to 48“/mounting frame ◆		P
D2H (high precision)	to 48“/mounting frame		Q
D4H (high precision)	to 48“/mounting frame		R
Doppler	to 12“ with chain kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order code and plain text.			Z P 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z P 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z P 1 C
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			Z P 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			Z P 1 L
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			Z P 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			Z P 1 N

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUP1010 Portable clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on			
• IP67 weather proof battery powered	F) ◆	**7ME3510-**	
• IP40 (NEMA 1) battery powered	F) ◆	**7ME3511-**	
		■■■■■ - 0 ■■ 0	■■■
Transducer for channel 1 (continued)			
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			Z P 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			Z P 1 Q
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			Z P 1 R
Transducer for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.			
no transducer			A
A2 universal	to 3“/track mount		B
B3 universal	to 5“/track mount ◆		C
C3 universal	to 13“/mounting frame ◆		D
D3 universal	to 24“/mounting frame ◆		E
E2 universal	to 48“/mounting frame ◆		F
A1H (high precision)	to 3“/track mount		G
A2H (high precision)	to 3“/track mount		H
A3H (high precision)	to 3“/track mount		J
B1H (high precision)	to 5“/track mount ◆		K
B2H (high precision)	to 5“/track mount		L
C1H (high precision)	to 24“/mounting frame		M
C2H (high precision)	to 24“/mounting frame ◆		N
D1H (high precision)	to 48“/mounting frame ◆		P
D2H (high precision)	to 48“/mounting frame		Q
D4H (high precision)	to 48“/mounting frame		R
Doppler	to 12“ with chain kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order code and plain text.			Z Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z Q 1 C
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			Z Q 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			Z Q 1 L
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			Z Q 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			Z Q 1 N
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			Z Q 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			Z Q 1 Q
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			Z Q 1 R

Selection and Ordering data		Order code
Further designs		
Please add „-Z“ to Order No. and specify Order code(s).		
Languages (Meter, Labels and Documentation), English (default)		
• German	◆	**B10**
• French		**B12**
• Spanish		**B13**
• Italian		**B14**
Wet flow transfer calibration		
• Standard In-house 6-point calibration (up to DN 150 or 6“)		**D10**
Tag name plate		
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)		**Y17**
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)		**Y19**

◆ Mainstream products (delivery time 4 to 6 weeks)

MLFB example

Application example

A general survey portable flowmeter is required for pipes sizes ranging from 76 ... 500 mm (3“ ... 20“) with both cast iron and steel material. Doppler may be required as liquid may be moderately aerated.

Requires language support for German.

MLFB Order No.: **7ME3510-2AB01-0DE0-Z**
B10

Selection and Ordering data	Order No.	Ord. code
FUP1010 meter family	7 ME 3 5 1 ■ - ■■■■■ - 0 ■■ 0	■■■
IP67 weather proof	0	
Dual channel	2	
Portable Type 1 I/O with Doppler capable	A	
2 Plenum rated transducer cables 20 ft	B	
No RTDs required	0	
Charger Type A for Europe (CEE7/7)	1	
Transducer for DN 50 ... DN 300 (2“ ... 12“) pipes	D	
Transducer for DN 200 ... DN 600 (8“ ... 24“) pipes	E	
German language support		B 1 0

F) Subject to export regulations AL: 9I999, ECCN: N.

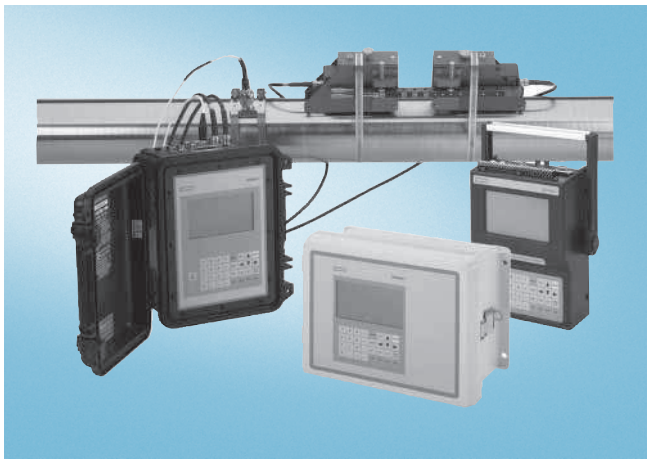
Transducer Selection Charts

Universal transducers for any pipe material					
Trans-ducer Size Code	Order Code	Outer diameter range (mm)		Outer diameter range (inches)	
		min	max	min	max
A2	**B**	12.7	50.8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio > 10					
Trans-ducer Size Code	Order Code	Pipe wall (mm)		Pipe wall (inches)	
		min	max	min	max
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.17	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25

SITRANS FUE1010 Energy clamp-on

Overview



SITRANS FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems.

SITRANS FUE1010 is available in single and dual channel or dual path configurations, with your choice of IP65 (NEMA 4X) dedicated wall mount or IP40 (NEMA 1) portable enclosures.

Benefits

- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel / dual path or dual mode operation:
  - Dual channel operation reduces the cost for the system on a per channel measurement basis and permits measuring hot and chilled water lines at the same time
  - Dual path capability insures high flow measurement accuracy on installations with less than desirable piping runs
- Ability to operate in either Wide-Beam Transit-time or reflexor (Doppler) mode for applications with high aeration
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUE1010 is ideally suited to thermal energy / power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

Design

FUE1010 is available in three configurations:

- IP65 (NEMA 4X) Enclosure
  - Single channel
  - Dual channel / dual path
- IP40 (NEMA 1) Portable Enclosure
  - Single channel
- IP40 (NEMA 1) Portable Impact Resistant Enclosure
  - Dual channel / dual path

Function

- Flow display computer has an integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Reverse flow and empty pipe detection
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
  - Cooling load (kW/ton)
  - Coefficient of performance (COP)
  - Energy efficiency ratio (EER)
- Optional current inputs
- Digital communication options:
  - MODBUS / Metasys N2 (IP65 (NEMA 4X) only)
  - Dial-up modem (IP65 (NEMA 4X) only)
  - RS232 Serial digital port (standard)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

SITRANS FUE1010 Energy clamp-on

Technical specifications

SITRANS FUE1010

Input	
Flow range	0 … 12 m/s (0 … 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s)
Pipe size	6.4 mm … 9.14 m (0.25“ … 360“)
Optional Inputs, single channel	• Current: 2x 4 … 20 mA • Voltage: 2x 0 … 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD • Totalizer commands (clear/hold)
Output	
Outputs, single channel	• Current: 2x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2x 0 … 10 V DC (5 kΩ minimum) • Status Alarm: 4x SPDT Relays • Frequency: 2x 0 … 5000 Hz • RS232
Accuracy	
Accuracy	± 0.5% ... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	Dedicated wall mount enclosure: IP65 (NEMA 4X) Portable enclosures: IP40 (NEMA 1)
Liquid Temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-40 … +230 °C (-40 … +450 °F)
Transducer temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-62 … +232 °C (-80 … +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	90 … 240 V AC, 50-60 Hz, 30 VA or 9 … 36 V DC, 12 W
Indication and operation	
Data logger memory	1 Mbyte of storage
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French

Certificates and approvals

• Dedicated wall mount enclosure	FM CSA CE • LVD IEC 61010-1 • EMC EN61000-6-2, -4
• Portable enclosures	UL ULc CE • LVD IEC 61010-1; CB Test Certificate • EMC EN61000-6-2, -4

4

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on			
• Dedicated IP65 (NEMA 4X)	F) ◆	**7ME3500-**	
• Portables IP40 (NEMA 1) battery powered	F) ◆	**7ME3502-**	
		■■■■■ - 0 ■■■	■■■
Number of channels/ultrasonic beams Dedicated meter			
Dedicated meter			
Single channel	◆	1	
Dual channel / Dual beam		2	
Portables			
Single channel	◆	3	
Dual channel / Dual beam		4	
Flowmeter functions and I/O configurations			
• Portable Type 1 Standard - Reflexor capability - Graphic display - 2x 0 ... 10 V - 2x 4 ... 20 mA - 2x pulse output - 4x status logic	◆	A	
• Portable Type 3 option adder - Energy efficiency COP/EER output - 2x 4 ... 20 mA analog input		C	
• Dedicated Type 1 Standard - Reflexor capability - Graphic display - 2x 0 ... 10 V - 2x 4 ... 20 mA - 2x pulse output - 4x relay C type		D	
• Dedicated Type 3 option adder - Reflexor capability - Energy efficiency COP/EER output - 2x 4 ... 20 mA analog input		F	
• Specials (Expanded I/O and or Mercury wetted relays for dedicated only) Add Order code and plain text.		Z	J 1 Y
• Type 3 with Mercury wetted relays		Z	J 1 A
• Type 3 with expanded I/Os (4 additional 4 ... 20 mA outputs) and form C relay		Z	J 1 B
• Type 3 with expanded I/Os and Mercury wetted relays		Z	J 1 C
Meter power options			
90 ... 230 V AC (Dedicated only)	◆	A	
9 ... 36 V DC (Dedicated only)		B	
Charger Type A for Europe (CEE7/7)		C	
Charger Type C for Australia (AS3112)		D	
Charger Type D for U.K. (BS1363)		E	
Charger Type J for Japan (JIS8303)		F	
Charger Type K for U.S. (NEMA 5-15P)		G	
Charger Type L for Switzerland (SEV1011)		H	
No Charger		J	
Other versions (External battery for extended service with portable meter) Add Order code and plain text.		Z	K 1 Y
External 4 hours battery with US plug for Portable		Z	K 1 A
External 4 hours battery with European plug for Portable		Z	K 1 B

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on			
• Dedicated IP65 (NEMA 4X)	F) ◆	**7ME3500-**	
• Portables IP40 (NEMA 1) battery powered	F) ◆	**7ME3502-**	
		■■■■■ - 0 ■■■	■■■
Communication options			
RS232 (standard)	◆	0	
MODBUS (dedicated only)		1	
Ethernet (dedicated only)		2	
Other versions (Dial up Modem (dedicated only)), max. 9600 Baud Dial up Modem Add Order code and plain text.		9	L 1 Y
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ outer diameter)			
No RTDs (Note: temperature input is required for energy system)		0	
1x pair standard clamp-on RTD (NEMA 4X only)	◆	1	
2x pair standard clamp-on RTD (for dual channel NEMA 4X only)		2	
1x pair standard clamp-on RTD (NEMA 1 portable)		3	
2x pair standard clamp-on RTD (for dual channel NEMA 1 portable)		4	
1x pair submersible clamp-on RTD (NEMA 4X only)		5	
2x pair submersible clamp-on RTD (for dual channel NEMA 4X only)		6	
Special (for insert style RTDs), dedicated only		9	M 1 Y
1x Insertion style RTD with thermowell and lagging		9	M 1 A
2x Insertion style RTD with thermowell and lagging		9	M 1 B
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.			
No transducer			A
A2 universal	to 3“/track mount		B
B3 universal	to 5“/track mount	◆	C
C3 universal	to 13“/mounting frame	◆	D
D3 universal	to 24“/mounting frame	◆	E
E2 universal	to 48“/mounting frame	◆	F
A1H (high precision)	to 3“/track mount		G
A2H (high precision)	to 3“/track mount		H
A3H (high precision)	to 3“/track mount		J
B1H (high precision)	to 5“/track mount	◆	K
B2H (high precision)	to 5“/track mount		L
C1H (high precision)	to 24“/mounting frame		M
C2H (high precision)	to 24“/mounting frame	◆	N
D1H (high precision)	to 48“/mounting frame	◆	P
D2H (high precision)	to 48“/mounting frame		Q
D4H (high precision)	to 48“/mounting frame		R
Doppler	to 12“ with chain or strap kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order code and plain text.			Z P 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z P 1 A

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on			
• Dedicated IP65 (NEMA 4X)	F) ◆	**7ME3500-**	
• Portables IP40 (NEMA 1) battery powered	F) ◆	**7ME3502-**	
		■■■■■ - 0	■■■ ■■■
Transducer for channel 1 (continued)			
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z P 1 C
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			Z P 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			Z P 1 L
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			Z P 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			Z P 1 N
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			Z P 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			Z P 1 Q
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			Z P 1 R
Transducer for channel 2 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.			
no transducer			A
A2 universal	to 3“/track mount		B
B3 universal	to 5“/track mount ◆		C
C3 universal	to 13“/mounting frame ◆		D
D3 universal	to 24“/mounting frame ◆		E
E2 universal	to 48“/mounting frame ◆		F
A1H (high precision)	to 3“/track mount		G
A2H (high precision)	to 3“/track mount		H
A3H (high precision)	to 3“/track mount		J
B1H (high precision)	to 5“/track mount		K
B2H (high precision)	to 5“/track mount ◆		L
C1H (high precision)	to 24“/mounting frame		M
C2H (high precision)	to 24“/mounting frame ◆		N
D1H (high precision)	to 48“/mounting frame ◆		P
D2H (high precision)	to 48“/mounting frame		Q
D4H (high precision)	to 48“/mounting frame		R
Doppler	to 12“ with chain or strap kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order code and plain text.			Z Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z Q 1 C
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			Z Q 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			Z Q 1 L

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on			
• Dedicated IP65 (NEMA 4X)	F) ◆	**7ME3500-**	
• Portables IP40 (NEMA 1) battery powered	F) ◆	**7ME3502-**	
		■■■■■ - 0	■■■ ■■■
Transducer for channel 2 (continued)			
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			Z Q 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			Z Q 1 N
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			Z Q 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			Z Q 1 Q
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			Z Q 1 R
Approvals			
FM/CSA/CE Dedicated			1
UL/ULc/CE Portable			2

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for # of channels) See „Transducer cable selection chart“	**K..**
Cable assembly for RTDs (add for # of RTDs) See „RTD cable selection chart“	**R..**
Cable termination kit (for one cable pair) dedicated only	
• Termination for standard, plenum and armored transducer cable	**T01**
• Termination for submersible transducer cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Languages (Meter, Labels and Documentation), English (default)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Wet flow transfer calibration (priced for 1 pipe calibration)	
• 6 point up to 4 inch (DN 100)	**D10**
• 6 point up to 5 to 8 inch (DN 125 to DN 200)	**D11**
• 6 point up to 10 to 12 inch (DN 250 to DN 300)	**D12**
• 6 point up to 14 to 16 inch (DN 350 to DN 400)	**D13**
• 6 point up to 18 to 20 inch (DN 450 to DN 500)	**D14**
• 6 point up to 22 to 24 inch (DN 550 to DN 600)	**D15**
• 6 point up to 26 to 30 inch (DN 650 to DN 750)	**D16**
• 6 point up to 32 to 36 inch (DN 800 to DN 900)	**D17**
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)	**Y17**
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

MLFB example

Application example

A dedicated clamp-on energy meter is required for two separate return lines. Both will use clamp-on RTDs for the supply and return lines. AC power is available and data access will be via MODBUS communication.

Pipe 1 is a DN150 (6“) schedule 40 carbon steel line
Pipe 2 is a DN 300 (12“) ductile iron line

MLFB Order No.: **7ME3500-2DA10-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data	Order No.	Ord. code
FUE1010 meter family	**7 ME 3 5 0** -	**0 -**
IP65 (NEMA 4X) enclosure	**0**	
Dual channel	**2**	
Dedicated Type 1 I/O option	**D**	
90 ... 230 V AC power option	**A**	
MODBUS option	**1**	
2 pairs of clamp-on RTDs	**2**	
Transducer code for 6“ pipe	**N**	
Transducer code for 12“ pipe	**E**	
No approval required	**0**	
30 m (100 ft) transducer cable for channel 1		**K 0 3**
61 m (200 ft) transducer cable for channel 1		**K 0 5**
30 m (100 ft) cable for RTD 1		**R 0 3**
61 m (200 ft) cable for RTD 2		**R 0 5**
15 m (50 ft) cable for RTD 3		**R 0 2**
30 m (100 ft) cable for RTD 4		**R 0 3**

Transducer selection charts

Universal transducers for any pipe material					
Trans-ducer	Order code	Outer diameter range (mm)		Outer diameter range (inches)	
Size code		min	max	min	max
A2	**B**	12.7	50.8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio > 10					
Trans-ducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
Size code		min	max	min	max
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25

Transducer cable selection chart

Transducer cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket) -40…+80 °C (-40…+176 °F)	Submersible[1] (polyethylene jacket) -40…+80 °C (-40…+176 °F)	Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)	Armored[1] -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**	**K22**	**K32**
30 (100)	**K03**	**K13**	**K23**	**K33**
46 (150)	**K04**	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

[1] Submersible and armored transducer cable is not available for portable versions.

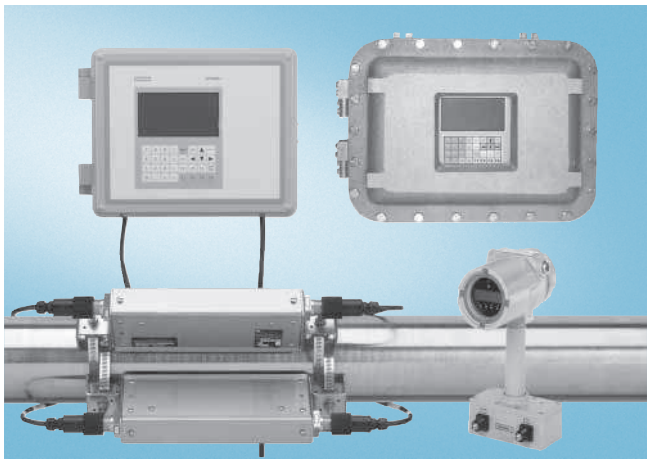
RTD cable selection chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 … +392 °F)	Submersible[1] (extruded jacket) -40 ... +200 °C (-40 … +392 °F)
	Order code	
6 (20)	**R01**	**R11**
15 (50)	**R02**	**R12**
30 (100)	**R03**	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

[1] Submersible RTD cable is not available for portable versions.

SITRANS FUH1010 Oil clamp-on

Overview



SITRANS FUH1010 clamp-on non-intrusive ultrasonic flowmeter is ideal for applications carrying crude oil, refined petroleum or liquefied gas.

SITRANS FUH1010 has three application areas: Interface detectors, volumetric flowmeters and mass or standard volume flowmeters.

Benefits

For all FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio, 30:1
- Choice of single, dual, or optional, three or four beam versions.
  - Single beam version reduces initial investment
  - Two or optional three and four beam versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- Wide-Beam technology
  - Helps provide improved accuracy over a wide range of liquid conditions and flow rates
  - Accommodates pipelines transporting multiple liquid products
- Zeromatic Path automatically corrects for zero drift without stopping flow

Interface detectors / Density meters ("interface detector")

- Outputs liquid density and API as a direct replacement for intrusive densitometers
- Exceptional repeatability is maintained, independent of changes in temperature, pressure or viscosity
- No need for straight run

Viscosity compensated volumetric flowmeters ("precision volume")

- Moderate cost
- Precise measurement is maintained with automatic „Reynolds Number" compensation for temperature and viscosity changes

Standard volume (net) mass flowmeters ("standard volume / mass")

- Exceptional repeatability is maintained, independent of changes in temperature, density or viscosity
- Batch interface and product quality diagnostics provided
- Density and API outputs provided
- Scraper („pig") detection provided

Application

Interface detectors / Density meters

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Viscosity compensated volumetric flowmeters

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume (net) mass flowmeters

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- „Pig" detection
- Chemical and petrochemical processing

Design

FUH1010 is available in three enclosures:

- IP65 (NEMA 4X) Enclosure
  - Single beam
  - Dual beam
  - Optional four beam
- IP65 (NEMA 7) Compact explosionproof enclosure
  - Single beam
  - Dual beam (option)
- IP66 (NEMA 7) Wall mount explosionproof enclosure
  - Single beam
  - Dual beam
  - Four beam (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow meters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow meters has a 2 x 16 alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Analog inputs (see specification section for details)
- Zeromatic Path automatically corrects for zero drift
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

SITRANS FUH1010 Oil clamp-on

Technical specifications

SITRANS FUH1010

Specifications for interface detectors

Accuracy	
Accuracy	± 0.05 of API No.
Repeatability	± 0.01 of API No.

Specifications for volumetric and mass flowmeters

Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Accuracy	
Calibratable accuracy	± 0.15% … 0.3% of flow, depending on version
Batch repeatability	± 0.05% of flow, maximum

Specifications for all FUH1010 products

Input	
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Analog inputs	• Current: 4x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))
Output	
Outputs	• Current: 2x 4 … 20 mA (1 kΩ at 30 VDC) • Voltage: 2x 0 … 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure) • 1x 0 ... 5 kHz Pulse Rate, Digital Quad. (None for IP65 (NEMA 7) enclosure) • RS232 Serial Port
Optional outputs	• MODBUS (not for IP65 (NEMA 7) enclosure) • RS232 standard • Up to 4x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) • 4x Mercury wetted relays (not for IP65 (NEMA 7) enclosure) • Up to 4x digital pulse (not for IP65 (NEMA 7) enclosure)
Status/Alarm I/O	• 4x Programmable relays (not for IP65 (NEMA 7) enclosure) • 2x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) • 1x Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)[1)] • 1x Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)[1)] • 1x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)[1)] • 1x Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)[1)]
Accuracy	
Zero Drift	0.0003 m/s (0.001 ft/s), with Zero-Matic Path active (not provided for interface detector)
Data refresh rate	5 Hz (80 Hz output for flow rate available on special order)
Rated operation conditions	
Degree of protection	
• Wall mount enclosure	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Wall Mount	90 ... 240 V AC, 50 … 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
• IP65 (NEMA 7) Compact	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W
Indication and operation	
Data logger memory	1 MByte
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) Enclosure	2 x 16 Alphanumeric LCD Display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

[1)] Totalizer switch inputs are not provided for the interface detector

SITRANS FUH1010 Oil clamp-on

Certificates and approvals

IP65 (NEMA 4X) flow display computer ratings

FM and CSA	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II (1) G [EEx ia] IIC EX II 3 (1) G EEx nC [ia] IIC T5 • Transducers: Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 for use with flowmeter in safe area only
CCOE (India)	EEx (ia)
INMETRO (Brazil)	• Flowmeter: [BR-Ex ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65
GoST Ratings (Russia)	Flowmeter: [Exia] IIC Transducers: Exia IIC T5

IP65 (NEMA 7) compact explosionproof enclosure ratings

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II 2 (1) G EEx d [ia] IIC T5 • Transducers: Ex II 1 G EEx ia IIC T5
CCOE (India)	EEx d
INMETRO (Brazil)	• Flowmeter: BR-Ex d [ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB T5 • Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	• Flowmeter: [BR-Ex ia] IIC T6 BR-Ex nC [ia] IIC T6 BR-Ex d [ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 Oil clamp-on			
• IP65 (NEMA 4X)	F) ◆	**7ME3600-**	
• IP65 (NEMA 7) compact	F)	**7ME3601-**	
• IP66 (NEMA 7) wall mounted (no display window)	F)	**7ME3602-**	
• IP66 (NEMA 7) wall mounted (with display window)	F)	**7ME3603-**	
		0 -	
Number of ultrasonic beams / meter type			
Single beam (precision volume)		**0**	
Single beam (interface detector)		**1**	
Dual channel/Dual beam (interface detector)		**2**	
Dual beam (precision volume)	◆	**3**	
Dual beam (standard volume / mass)		**4**	
Special: Four beam (standard volume/mass) only		**9**	**H 1 A**
Flowmeter functions and I/O configurations			
Includes graphic or digital display			
IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units			
• Standard - Graphic display - 4x 4 ... 20 mA analog input - 2x 0 ... 10 V - 2x 4 ... 20 mA analog output - 2x pulse output - 4x Mercury wetted relays (form C for interface detector) - 2x RTD input	◆	**A**	
• Enhanced I/O option - additional 2x 4 ... 20 mA outputs - Form C relays - 4x digital pulse outputs (2x open collector and 2x 0 ... 5 V TTL)		**C**	
IP65 (NEMA 7) compact units			
• Standard - Digital display - 2x 4 ... 20 mA (Loop) - 2x 4 ... 20 mA analog input - 2x status (open collector) - 1x RTD input		**D**	
• Digital pulse option - 1x digital pulse open collector output - 2x 4 ... 20 mA (Loop) - 2x 4 ... 20 mA analog input - 1x status (open collector) - 1x RTD input		**F**	
• Other version (Expanded I/O for non-custody meters or dry contact relays for custody) Add order code and plain text.		**Z**	**J 1 Y**
• Other version (Mercury wetted or dry contact relays) Add order code and plain text.			
- Dry contact form C relays for standard meter		**Z**	**J 1 A**
- Mercury wetted relays for enhanced I/O meters		**Z**	**J 1 D**
Meter power options			
90 ... 240 V AC	◆	**A**	
9 ... 36 V DC (except compact NEMA 7)		**B**	
9 ... 36 V DC negative GND (compact only)		**J**	
9 ... 36 V DC positive GND (compact only)		**K**	
Communication options			
RS232 (standard)	◆	**0**	
MODBUS (excludes NEMA 7 compact)		**1**	

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 Oil clamp-on			
• IP65 (NEMA 4X)	F) ◆	**7ME3600-**	
• IP65 (NEMA 7) compact	F)	**7ME3601-**	
• IP66 (NEMA 7) wall mounted (no display window)	F)	**7ME3602-**	
• IP66 (NEMA 7) wall mounted (with display window)	F)	**7ME3603-**	
		0 -	
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ OD)			
No RTDs (Note: temperature input is required for FUH systems)	◆	**0**	
1x standard clamp-on RTD	◆	**1**	
2x standard clamp-on RTD		**2**	
1x submersible clamp-on RTD	◆	**3**	
2x submersible clamp-on RTD		**4**	
Special (for insert style RTDs)		**9**	**N 1 Y**
Transducer for channel/beam 1 (includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications			
no transducer	◆	**A**	
A1H (high precision) to 3“/track mount		**G**	
A2H (high precision) to 3“/track mount		**H**	
A3H (high precision) to 3“/track mount		**J**	
B1H (high precision) to 5“/track mount		**K**	
B2H (high precision) to 5“/track mount		**L**	
B3H (high precision) to 5“/track mount		**T**	
C1H (high precision) to 24“/mounting frame	◆	**M**	
C2H (high precision) to 24“/mounting frame	◆	**N**	
D1H (high precision) to 48“/mounting frame	◆	**P**	
D2H (high precision) to 48“/mounting frame	◆	**Q**	
D3H (high precision) to 48“/mounting frame		**U**	
D4H (high precision) to 48“/mounting frame		**R**	
Other versions (different size, mount, type or pipe larger than DN 1200 (48“) or corrosion resistant), add Order code and plain text.		**Z**	**P 1 Y**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 L**
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 T**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 Q**
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 U**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 R**

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUH1010 Oil clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 Oil clamp-on			
• IP65 (NEMA 4X)	F) ◆	**7ME3600-**	
• IP65 (NEMA 7) compact	F)	**7ME3601-**	
• IP66 (NEMA 7) wall mounted (no display window)	F)	**7ME3602-**	
• IP66 (NEMA 7) wall mounted (with display window)	F)	**7ME3603-**	
		0 -	
Transducer for channel/beam 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications			
no transducer	◆		**A**
A1H (high precision) to 3“/track mount			**G**
A2H (high precision) to 3“/track mount			**H**
A3H (high precision) to 3“/track mount			**J**
B1H (high precision) to 5“/track mount			**K**
B2H (high precision) to 5“/track mount			**L**
B3H (high precision) to 5“/track mount			**T**
C1H (high precision) to 24“/mounting frame	◆		**M**
C2H (high precision) to 24“/mounting frame	◆		**N**
D1H (high precision) to 48“/mounting frame	◆		**P**
D2H (high precision) to 48“/mounting frame	◆		**Q**
D3H (high precision) to 48“/mounting frame			**U**
D4H (high precision) to 48“/mounting frame			**R**
Other versions (different size, mount, type or pipe larger than DN 1200 (48“) or corrosion resistant), add Order code and plain text.			**Z** **Q 1 Y**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 L**
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 T**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 Q**
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 U**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			**Z** **Q 1 R**
Approvals			
FM/CSA (default), also for non hazardous area	◆		**1**
ATEX			**2**
INMETRO (Brazil)			**3**
Special ATEX EEx m add Order code and plain text: Length of integral cable:			**9** **R 1 Y**

◆ Mainstream products (delivery time 4 to 6 weeks)

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for # of beams) See „Transducer cable selection chart“	**K..**
Cable assembly for RTDs (add for # of RTDs) See „RTD cable selection chart“	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored transducer cable	**T01**
• Termination for submersible cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
Languages (Meter, Labels and Documentation), English (default)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (26 characters max.)	**Y17**
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	**Y19**

MLFB example

Application example

A clamp-on meter is required for a 12“ carbon steel hydrocarbon line flowing multiple products, with a wall thickness of 12.7 mm (0.5“). Meter electronics is to be located in a Class I Div 2 area only 60 ft from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3600-3CB00-3QQ1-Z**
K03 + K03 + R03

Selection and Ordering data	Order No.	Ord. code
FUH1010 meter family	**7 ME 3 6 0** **-**	**0 -**
IP65 (NEMA 4X) enclosure	**0**	
Dual beam precision volume	**3**	
Custody Transfer option with digital pulse	**C**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
RTD required for viscosity comp		**3**
Transducer code for path 1		**Q**
Transducer code for path 2		**Q**
FM approval required		**1**
30 m (100 ft) transducer cable for path 1		**K 0 3**
30 m (100 ft) transducer cable for path 2		**K 0 3**
30 m (100 ft) cable for RTD		**R 0 3**

F) Subject to export regulations AL: 9I999, ECCN: N.

Transducer Selection Chart

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Trans-ducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
Size code		**min.**	**max.**	**min.**	**max.**
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25
B3H	**T**	2.7	3.3	0.106	0.128
D3H	**U**	7.4	9.0	0.293	0.354

Transducer Cable Selection Chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40…+80 °C (-40…+176 °F)	Submersible (polyethylene jacket) -40…+80 °C (-40…+176 °F)	Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**	**K22**	**K32**
30 (100)	**K03**	**K13**	**K23**	**K33**
46 (150)	**K04**	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

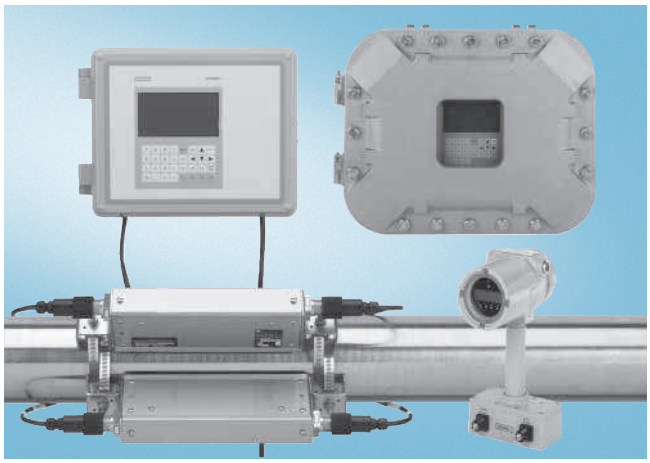
RTD Cable Selection Chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 … +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 … +392 °F)
	Order code	
6 (20)	**R01**	**R11**
15 (50)	**R02**	**R12**
30 (100)	**R03**	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

SITRANS FUG1010 Gas clamp-on

Overview



SITRANS FUG1010 clamp-on non-intrusive ultrasonic flow display computer is ideal for natural and process gas applications, including checkmetering, allocation, production, storage and gas fired power station applications.

SITRANS FUG1010 is available in single, dual and optional four beam configurations, with your choice of IP65 (NEMA 4X) or IP65 (NEMA 7) and IP66 (NEMA 7) explosionproof enclosures.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear as found in turbine and PD meters
- Eliminates the pressure drop or energy loss in orifice metering
- Wide turn-down ratio
- Choice of single, dual or optional four beam versions
  - Single beam version reduces initial investment
  - Multiple beam versions provide higher accuracy, especially with limited straight run and poor flow profile conditions
  - In diametric reflect mode configuration, the meter is less sensitive to crossflow and swirl
- Wide-Beam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Optional rugged stainless steel transducer enclosure permits permanent and direct burial installations
- Easy to use “DataView” diagnostic software

Application

SITRANS FUG1010 is ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

FUG1010 is available in three enclosures:

- IP65 (NEMA 4X) enclosure
  - Single beam
  - Dual beam
  - Four beam (optional)
- IP65 (NEMA 7) Compact explosionproof enclosure
  - Single beam
  - Dual beam
- IP66 (NEMA 7) Wall mount explosionproof enclosure
  - Single beam
  - Dual beam
  - Four beam (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display computers have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display computer has a 2x 16 alphanumeric LCD display
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Analog inputs for pressure and temperature
- Zeromatic Path automatically compensates for zero flow drift
- Bidirectional flow operation
- 1 Mbyte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
- Internal AGA-8 table for fixed gas composition is available for standard volume computation
- Complete application and operation diagnostics, to assure calibration and operational integrity
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice

SITRANS FUG1010 Gas clamp-on

Technical specifications

SITRANS FUG1010

Input	
Flow range	± 30 m/s (± 100 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Minimum pressure	7 … 10 bar (100 … 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)
Pipe size	25 mm … 1.52 m (1“ … 60“) (for other sizes, consult factory)
Analog inputs	Current: 4x 4 … 20 mA, programmable (IP65 (NEMA 7) enclosure has 2x 4 ... 20 mA, programmable)
Output	
Outputs	• Current: 2x 4 … 20 mA, a programmable, standard Additional 2x optional, except IP65 (NEMA 7) • Voltage: 2x 0 … 10 V DC, menu programmable (None for IP65 (NEMA 7) enclosure) • 2x Open collector digital pulses (quadrature) (None for IP65 (NEMA 7) enclosure) • 2x 0 … 5 kHz, TTL pulse square wave + (None for IP65 (NEMA 7) enclosure) • 1x Optically isolated digital pulse & source, IP65 (NEMA 7) enclosure only • RS232 Serial Port
Optional outputs	• MODBUS (RS485/422/232) (not for IP65 (NEMA 7)
Status/Alarm I/O	• 4x programmable form C relays (not for IP65 (NEMA 7) enclosure) • 4x programmable N.O. Mer. Wet. Relays optional (not for IP65 (NEMA 7) enclosure) • 2x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) • 1 Totalizer clear switch input (not for IP65 (NEMA 7)) • 1 Totalizer hold switch input (not for IP65 (NEMA 7) enclosure) • 1x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only) • 1x Opto iso. totalizer hold switch input (for IP 65 (NEMA 7) enclosure, only)

Accuracy	
Typical accuracy	1% … 2% of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Repeatability	0.05% … 0.1%, of actual volume reading, for 1.5 … 30 m/s (5 … 100 ft/s) velocities (pipe condition dependent)
Zero drift	0.0003 m/s (0.001 ft/s), with Zero-Matic Path active
Data refresh rate	5 Hz (80 Hz optional)
Rated operation conditions	
Degree of protection	
• Wall mount enclosure	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• wall mount explosionproof	IP66 (NEMA 7)
Gas temperature	-40 … +60 °C (-40 … +140 °F) (for higher temperatures consult factory)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams
Power supply	
• For IP65 (NEMA 4X) and IP66 (NEMA 7)	• 90 … 240 V AC, 50 … 60 Hz (30 VA) or 9 … 36 V DC (12 W)
• For IP65 (NEMA 7):	• 90 … 240 V AC, 50 … 60 Hz (15 VA) or 9 … 36 V DC (10 W)
Indication and operation	
Data logger memory	1 Mbyte, programmable for 17 data functions
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) enclosure	2 x 16 alphanumeric LCD display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

SITRANS FUG1010 Gas clamp-on

Certificates and approvals

IP65 (NEMA 4X) flow display computer ratings

FM and CSA	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 • Transducers: Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)
CCOE (India)	EEx (ia)
INMETRO (Brazil)	• Flowmeter: [BR-Ex ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65
GoST	• Flowmeter: [Exia] IIC • Transducers: Exia IIC T5

IP65 (NEMA 7) compact explosionproof enclosure ratings

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II 2 (1) G EEx d [ia] IIC T5 • Transducers: Ex II 1 G EEx ia IIC T5
CCOE (India)	EEx d
INMETRO (Brazil)	• Flowmeter: BR-Ex d [ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	• Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB T5 Ex II 2 (1) G EEx d [ia IIC] IIB+H2 T5 • Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	• Flowmeter: [BR-Ex ia] IIC T6 BR-Ex nC [ia] IIC T6 BR-Ex d [ia] IIC T6 • Transducers: BR-Ex ia IIC T6 IP65

SITRANS FUG1010 Gas clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on			
• IP65 (NEMA 4X)	F)	**7ME3610-**	
• IP65 (NEMA 7) compact	F)	**7ME3611-**	
• IP66 (NEMA 7) wall mounted	F)	**7ME3612-**	
• IP66 (NEMA 7) wall mounted with display window	F)	**7ME3613-**	
		0 -	
Number of channels/ultrasonic beams			
Single beam		**1**	
Dual beam	◆	**2**	
Special: Four beam (NEMA 4X and NEMA 7 wall mount only)		**9**	**H 1 A**
Flowmeter functions and I/O configurations (includes graphic or digital display)			
IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units			
• Standard (all but Compact NEMA 7) - Graphic display - 4x 4 ... 20 mA analog input - 2x 0 ... 10 V - 2x 4 ... 20 mA analog output - 2x pulse output - 4x relay C type - 2x RTD input		**A**	
• Enhanced I/O option - additional 2x 4 ... 20 mA - Mercury wetted relays - 4x digital pulse outputs (2x open collector and 2x 0 ... 5 V TTL)	◆	**B**	
IP65 (NEMA 7) compact units			
• Standard - Digital display - 2x 4 ... 20 mA (loop) - 2x 4 ... 20 mA analog input - 2x status (open collector) - 1x RTD input		**D**	
• Digital pulse option 1x digital pulse open collector output		**E**	
• Mercury wetted relays for standard meter		**Z**	**J 1 A**
• Dry contact form C relays for enhanced I/O meter		**Z**	**J 1 D**
Meter power options			
90 ... 240 V AC		**A**	
9 ... 36 V DC (except compact NEMA 7)		**B**	
9 ... 36 V DC negative GND (Compact only)		**J**	
9 ... 36 V DC positive GND (Compact only)		**K**	
Communication options			
RS232 (standard)	◆	**0**	
MODBUS (excludes NEMA 7 Compact)		**1**	
Ethernet (excludes NEMA 7 Compact)		**2**	
Special: Dial up Modem (excludes compact NEMA 7), specify text		**9**	**L 1 Y**
Max 9600 Baud dial up modem		**9**	**L 1 A**
RTD temperature sensor (includes mounting hardware for pipes above 1.5" outer diameter)			
No RTDs		**0**	
1x standard clamp-on RTD	◆	**1**	
2x standard clamp-on RTD		**2**	
1x submersible clamp-on RTD	◆	**3**	
2x submersible clamp-on RTD		**4**	
Special (for insert style RTDs)		**9**	**N 1 Y**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on			
• IP65 (NEMA 4X)	F)	**7ME3610-**	
• IP65 (NEMA 7) compact	F)	**7ME3611-**	
• IP66 (NEMA 7) wall mounted	F)	**7ME3612-**	
• IP66 (NEMA 7) wall mounted with display window	F)	**7ME3613-**	
		0 -	
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection chart" for specifications.			
no transducer		**A**	
B1H (high precision) to 5"/track mount		**K**	
B2H (high precision) to 5"/track mount		**L**	
B3H (high precision) to 5"/track mount		**T**	
C1H (high precision) to 24"/mounting frame		**M**	
C2H (high precision) to 24"/mounting frame	◆	**N**	
D1H (high precision) to 48"/mounting frame	◆	**P**	
D2H (high precision) to 48"/mounting frame	◆	**Q**	
D3H (high precision) to 48"/mounting frame		**U**	
D4H (high precision) to 48"/mounting frame	◆	**R**	
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.		**Z**	**P 1 Y**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 L**
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 T**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 Q**
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 U**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)		**Z**	**P 1 R**
Transducer for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection chart" for specifications.			
no transducer		**A**	
B1H (high precision) to 5"/track mount		**K**	
B2H (high precision) to 5"/track mount		**L**	
B3H (high precision) to 5"/track mount		**T**	
C1H (high precision) to 24"/mounting frame		**M**	
C2H (high precision) to 24"/mounting frame	◆	**N**	
D1H (high precision) to 48"/mounting frame	◆	**P**	
D2H (high precision) to 48"/mounting frame	◆	**Q**	
D3H (high precision) to 48"/mounting frame		**U**	
D4H (high precision) to 48"/mounting frame	◆	**R**	

◆ Mainstream products (delivery time 4 to 6 weeks)

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FUG1010 Gas clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on			
• IP65 (NEMA 4X)	F)	**7ME3610-**	
• IP65 (NEMA 7) compact	F)	**7ME3611-**	
• IP66 (NEMA 7) wall mounted	F)	**7ME3612-**	
• IP66 (NEMA 7) wall mounted with display window	F)	**7ME3613-**	
		0 -	
Transducer for channel 2 (continued)			
Other versions (different size, mount, type or pipe larger than DN 1200 (48“) or corrosion resistant), add Order code and plain text.			**Z Q 1 Y**
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)			**Z Q 1 K**
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)			**Z Q 1 L**
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)			**Z Q 1 T**
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)			**Z Q 1 M**
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)			**Z Q 1 N**
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)			**Z Q 1 P**
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)			**Z Q 1 Q**
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)			**Z Q 1 U**
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)			**Z Q 1 R**
Approvals			
FM/CSA (default)	◆		**1**
ATEX			**2**
INMETRO (Brazil)			**3**
Special ATEX EEx m Add Order code and plain text: Length of integral cable:			**9 R 1 Y**

◆ Mainstream products (delivery time 4 to 6 weeks)

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for # of beams) See „Transducer cable selection chart“	**K..**
Cable assembly for RTDs (add for # of RTDs) See „RTD cable selection chart“	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored transducer cable	**T01**
• Termination for submersible transducer cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Languages (Meter, Labels and Documentation)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (26 characters max.)	**Y17**
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	**Y19**

MLFB example

Application example

A clamp-on meter is required for a 300 mm (12“) carbon steel gas line with a wall thickness of 12.7 mm (0.5“). Meter electronics is to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3610-2BB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Order No.	Ord. code
FUG1010 meter family	**7 M E 3 6 1 - 0 -**	
IP65 (NEMA 4X) enclosure	**0**	
Dual beam	**2**	
Custody Transfer option with digital pulse	**B**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
No RTD required	**0**	
Transducer code for path 1	**Q**	
Transducer code for path 2	**Q**	
FM approval required	**1**	
30 m (100 ft) transducer cable for path 1		**K 0 3**
30 m (100 ft) transducer cable for path 2		**K 0 3**

F) Subject to export regulations AL: 9I999, ECCN: N.

Transducer Selection Chart

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Trans-ducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
Size code		min.	max.	min.	max.
B1H	**K**	2.0	3.0	0.08	0.12
B2H	**L**	3.0	4.1	0.12	0.16
B3H	**T**	2.7	3.3	0.106	0.128
C1H	**M**	4.1	5.8	0.16	0.23
C2H	**N**	5.8	8.1	0.23	0.32
D1H	**P**	8.1	11.2	0.32	0.44
D2H	**Q**	11.2	15.7	0.44	0.62
D3H	**U**	7.4	9.0	0.293	0.354
D4H	**R**	15.7	31.8	0.62	1.25

Transducer Cable Selection Chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40…+80 °C (-40…+176 °F)	Submersible (polyethylene jacket) -40…+80 °C (-40…+176 °F)	Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**	**K22**	**K32**
30 (100)	**K03**	**K13**	**K23**	**K33**
46 (150)	**K04**	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

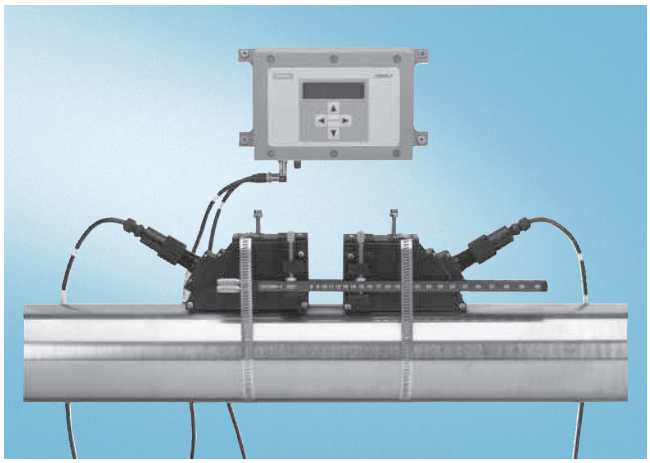
RTD Cable Selection Chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 … +200 °C (-40 … +392 °F)	Submersible (extruded jacket) -40 … +200 °C (-40 … +392 °F)
	Order code	
6 (20)	**R01**	**R11**
15 (50)	**R02**	**R12**
30 (100)	**R03**	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

SITRANS FUS1020 Basic clamp-on

Overview



SITRANS FUS1020 offers reliable flow measurement at a much lower cost than other clamp-on ultrasonic flowmeters, with flow rate accuracy of 1% or better for most applications.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Compact, integral design reduces installation cost
- Wide turn-down ratio
- Choice of single or dual channel operation
- Transducers are matched to the pipe material and have menu-driven location
- Wide-Beam technology ensures high performance
- Zeromatic Path automatically sets zero without stopping flow and eliminates zero drift

Application

FUS1020 is suitable for most clean liquid applications, including the following:

- Water & wastewater industry
  Potable water
  Wastewater, influent & effluent
  Processed sewage, sludge
- Chemical feed industry
  Sodium hypochlorite
  Sodium hydroxide
- HVAC & power industries
  Coolant flow
  Fuel flow
- Process control
  Chemicals
  Pharmaceuticals
- The FUS1020 flowmeter is not available with hazardous areas approval

Design

- IP65 (NEMA 4) wall mount flow display computer with separate transducers and cables
- Single and dual channel versions are available

Function

- 2x16 integral alphanumeric display and 5 key keypad for installation menu and data display
- Assignable 4 ... 20 mA isolated loop-powered output
- TTL flow pulse rate output
- RS232 digital communication port
- DB9 connector for PC communication
- Assignable open collector alarm output (40 V DC max)
- Batch totalizer start-stop control line
- Internal calibration security switch
- Remote PC installation menu
- Zeromatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site & data logger storage

Technical specifications

SITRANS FUS1020

Input	
Flow Range	± 12 m/s (± 40 ft/s), bi-directional
Flow Sensitivity	0.0003 m/s (0.001 ft/s) flow rate independent
Outputs	
Outputs	• Current: 4 ... 20 mA 1x for single channel 2x for dual channel • 1x 0 ... 5 kHz pulse rate, digital isolated, single channel only • RS232 serial port
Optional output	• Current: 1x 4 ... 20 mA, programmable, single channel only
Status/Alarm I/O	• Programmable form a relays (optional) 1x for single channel 2x for dual channel • Optically coupled totalizer hold switch inputs 1x for single channel 2x for dual channel • Optically isolated totalizer reset switch, single channel only
Accuracy	
Accuracy	± 0.5% ... 1.0% of flow
Batch repeatability	± 0.15%
Zero Drift	0.1% of rate; 0.0003 m/s (0.001 ft/s), with zeromatic path active
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP65 (NEMA 4)
Design	
Weight	1.4 kg (3.0 lbs)
Dimensions (W x H x D)	197 x 103 x 109 mm (7.77 x 4.06 x 4.3 inches)
Power supply	100 ... 240 V AC @ 15 VA or 9 ... 36 V DC @ 10 W
Certificates and approvals	
Unclassified locations only	UL Listing ULc Listing CE: • LVD IEC 61010-1 • EMC EN 61000-6-2, -4

SITRANS FUS1020 Basic clamp-on

Selection and Ordering data		Order No. / Ord. code
SITRANS FUS1020 Basic clamp-on, IP65 (NEMA 4)	A)	**7ME3570-** ■■■ 0 0 - 0 ■■■ ■■■
Number of channels/ultrasonic beams		
Single channel	◆	1
Dual channel / Dual beam		2
Flowmeter functions and I/O configurations		
• Blind system - 1x 4 ... 20 mA **per channel** - 1x pulse out (for single channel only)		A
• With display	◆	E
• With display and 1x additional analog output (single channel only)		F
• With display and with SPST relay		G
• With display and 1x additional analog output and SPST relay (single channel only)		H
Meter power options		
90 ... 240 V AC		A
9 ... 36 V DC		B
Transducer for channel 1 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 3“/track mounting		B
B3 universal to 5“/track mounting	◆	C
C3 universal to 13“/mounting frame	◆	D
D3 universal to 24“/mounting frame	◆	E
E2 universal to 48“/mounting frame	◆	F
A1H (high precision) to 3“/trackless mount.		G
A2H (high precision) to 3“/trackless mount.		H
A3H (high precision) to 3“/trackless mount.		J
B1H (high precision) to 5“/trackless mount.		K
B2H (high precision) to 5“/trackless mount.	◆	L
C1H (high precision) to 24“/trackless mount.		M
C2H (high precision) to 24“/trackless mount.	◆	N
D1H (high precision) to 48“/trackless mount.	◆	P
D2H (high precision) to 48“/trackless mount.		Q
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order Code and plain text.		Z P 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))		Z P 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))		Z P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))		Z P 1 C

Selection and Ordering data		Order No. / Ord. code
SITRANS FUS1020 Basic clamp-on, IP65 (NEMA 4)	A)	**7ME3570-** ■■■ 0 0 - 0 ■■■ ■■■
Transducer for channel 2 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 3“/track mounting		B
B3 universal to 5“/track mounting	◆	C
C3 universal to 13“/mounting frame	◆	D
D3 universal to 24“/mounting frame	◆	E
E2 universal to 48“/mounting frame	◆	F
A1H (high precision) to 3“/trackless mount.		G
A2H (high precision) to 3“/trackless mount.		H
A3H (high precision) to 3“/trackless mount.		J
B1H (high precision) to 5“/trackless mount.		K
B2H (high precision) to 5“/trackless mount.	◆	L
C1H (high precision) to 24“/trackless mount.		M
C2H (high precision) to 24“/trackless mount.	◆	N
D1H (high precision) to 48“/trackless mount.	◆	P
D2H (high precision) to 48“/trackless mount.		Q
Other versions (different size, mount, type or pipe larger than DN 1200 (48“), or corrosion resistant), add Order Code and plain text.		Z Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))		Z Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))		Z Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))		Z Q 1 C
Approvals		
no approval options (UL, ULc, CE by default)		0

Selection and Ordering data		Order code
Further designs Please add „-Z“ to Order No. and specify Order code(s).		
Cable assembly for transducers (add for # of channels) See „Transducer cable selection chart“		**K..**
Cable termination kit (for one cable pair) • Transducer cable termination for standard and plenum cable		**T01**
Languages (Meter, Labels and Documentation), English (default)		
• German	▶	**B10**
• French		**B12**
• Spanish		**B13**
• Italian		**B14**
Wet flow transfer calibration • Standard In-house 6 point calibration (up to DN 150 (6“)) available		**D10**
Tag name plate		
• Stainless steel tags with 3.2 mm (0.13 inch) character size (26 characters max.)		**Y17**
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)		**Y19**

◆ Mainstream products (delivery time 4 to 6 weeks)

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.

SITRANS FUS1020 Basic clamp-on

MLFB example

Application example

A basic clamp-on meter is required for a DN 150 (6“ schedule 40) carbon steel waste water line, with a pipe wall thickness of 7.1 mm (0.28“). Meter electronics are to be located in an instrumentation shed with available AC power. 36 m (120 ft) of transducer cable is needed to reach pipe location.

Single beam is sufficient for 3% accuracy requirement and a local display with only one 4 ... 20 mA analog output is specified.

MLFB Order No.: **7ME3570-1EA00-0NA0-Z**
K04

Selection and Ordering data	Order No.	Ord. code
FUS1020 meter family	7 M E 3 5 7 ■ - ■ ■ ■ 0 0 - 0 ■ ■ 0	■ ■ ■
IP65 (NEMA 4) enclosure	0	
Single channel	1	
Standard I/O option	E	
90 ... 240 V AC power option	A	
Transducer code for channel 1		N
Second transducer not required		A
46 m (150 ft) transducer cable		K 0 4

Transducer selection charts

Universal transducers for any pipe material

Transducer type (universal)	Order Code	Outer diameter range (mm)		Outer diameter range (inches)	
		min.	max.	min.	max.
A2	**B**	12.7	50.8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	249

High precision transducers for steel pipe with outer diameter/wall thickness ratio > 10

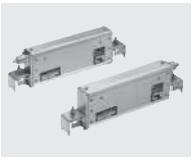
Transducer type (high precision)	Order Code	Pipe Wall (mm)		Pipe Wall (inches)	
		min.	max.	min.	max.
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62

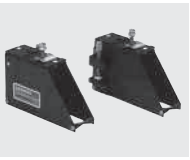
Transducer cable selection chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40 ... + 80 °C (-40 ... +176 °F)	Plenum rated (Teflon jacket) -40 ... + 200 °C (-40 ... +392 °F)
	Order Code	
6 (20)	**K01**	**K21**
15 (50)	**K02**	**K22**
30 (100)	**K03**	**K23**
46 (150)	**K04**	**K24**
61 (200)	**K05**	**K25**
91 (300)	**K06**	**K26**

Accessories/Spare parts for Clamp-on ultrasonic flowmeters

Description		Order No.	Symbol
Universal Portable Transducers Selected generally for portable systems where a wide variety of pipes are to be measured. Since they are selected based on diameter only, a wide range of pipe sizes and materials can be covered with a minimum number of transducers. These can also be selected as a cost savings on applications where accuracy standard accuracy is sufficient.	A)	**7ME3951-...**	
High Precision Transducers Selected generally for dedicated meters since the need to cover a range of pipes is not a requirement. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy/repeatability is required. They are only applicable to steel pipes but no other metals, and are selected solely by wall thickness.	A)	**7ME3950-...**	
High Temperature transducers Are selected whenever pipe temperature will exceed 250 °F (120 °C) up to a maximum of 450 °F (232 °C). They are universal type and can therefore be used on any pipe material and are selected by pipe diameter.	A)	**7ME3950-...**	
Weld Seal Mount These provide the most secure and strongest mounting of the flow transducers. They are generally selected for "High End" meter types where maximum performance criteria applies. They accommodate high precision transducers designed to mount inside these enclosures. May be welded to the pipe if so desired by the customer. They come in 2-piece or 1-piece configurations depending upon the application pipe size and type (Liquid/Gas).	A)	**7ME3960-...**	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting for dedicated universal style transducer size A or B, also available for dedicated high precision transducer size A or B.	A)	**7ME3960-...**	

Description		Order No.	Symbol
Mounting Frames These items are useful in simplifying transducer installation. They are strapped to the pipe first then the transducers are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the transducers assuring conformation to the original transducer positioning. They may be left in place at each measurement location where periodic flow surveys are conducted to simplify subsequent installations and ensure repeatable results.	A)	**7ME3960-...**	
Spacer Bars Transducers are required to be mounted at a set distance from each other as determined by pipe size and medium being measured. The spacer bar simplifies this requirement by eliminating the need to undertake a precise dimensional measurement. The flowmeter will specify a specific spacing index which is easily accommodated with the marked indices on the bar.	A)	**7ME3960-...**	
Clamp-On RTD's 1000 Ω platinum RTD's for use where temperature is required. Used with Energy Meters to record supply/return temperature. For this purpose precision matched pairs (to 0.02 °C) are supplied. Single RTD's are also used with FUH and FUG meters to enable live calculations of "Liquident" and Standard Volume Correction.	A)	**7ME3950-...**	
Insert RTD's Are identical to clamp-on RTD's as described above except that they are inserted into the pipe (In a Thermowell). They provide more precise and quicker responding temperature measurement. They are selected when precise temperature measurement of the actual liquid or gas is required as opposed to pipe "skin temperature". Since they project into the pipe they cannot be used in pipeline that undergo periodic "pigging".	A)	**7ME3950-...**	
Thickness gauge Used to measure the wall thickness of the pipe to be measured. Uses Transit-Time technology to measure R/T travel time and compute wall thickness. This parameter is an essential part of the meter programming to ensure accurate flow measurement, but is often not known specifically or accurately.	A)	**7ME3950-...**	

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.

Accessories/Spare parts for clamp-on

Description		Order No.	Symbol
Portable Meter Carry Case A soft sided carry bag that provides an easy method of transporting the portable flowmeter and all required hardware into the field for survey measurements.	A)	**7ME3960-...**	
Standard Cable (Flow Transducer or RTD) Selected for general purpose installations where no special application requirements exist.	A)	**7ME3960-...**	
Submersible Cable (Flow Transducer) Polyethylene jacketed, for locations that experience periodical or continual submersion of the flow transducers.	A)	**7ME3960-...**	
Plenum Cable (Flow Transducer or RTD) For temperatures above 180 °F. Teflon jacketed to withstand high temperatures, is used when high temp transducers are specified.	A)	**7ME3960-...**	
Armored Cable (Flow Transducer) Double shielded cable, selected when cable will not be installed in conduit between meter and transducers.	A)	**7ME3960-...**	
Temperature sensor cable Cable to connect field installed RTD to flow meter, available in Teflon wrapped, plenum or submersible grade. Typically used for FUE, FUH and FUG series meters where a temperature sensor is employed.	A)	**7ME3960-...**	
Straps Used to fasten transducers or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	A)	**7ME3960-...**	
Chains (EZ clamps) Used to fasten portable transducers or mounting frames to pipe. Thumbscrews eliminate need for hand tools when mounting transducers, and allow for easy on/off operations.	A)	**7ME3960-...**	
Ultrasonic Couplant Fills any voids between transducer emitting surface and pipe wall to allow maximum energy transfer between transducer and pipe. Several different types of couplants are employed as determined by the application conditions and type of installation (Temporary or permanent).	A)	**7ME3960-...**	

Description		Order No.	Symbol
Damping Material Used with gas meters, and required as part of their transducer installation. This material absorbs excess ultrasonic energy from the pipe wall to enable the meter to detect and operate with low amplitude transducer signals normally associated with Clamp-on Gas applications.	A)	**7ME3960-...**	
Test Block Used for checking operation of a meter and transducers prior to a field installation, or as a troubleshooting tool. Selected by transducer size, each block accommodates 2 transducer sizes. Available only for universal transducers.	A)	**7ME3960-...**	
Termination Kit (Flow Transducer or RTD) Provides the connectors, labels and shrink tubing or other associated hardware to complete the termination of a specific cable type. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at their site, or when existing cable length is to be altered. Selected by cable type.	A)	**7ME3960-...**	

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.

Selection and Ordering data — Order No.

Spare parts (System)

SITRANS FUS clamp-on — A) **7ME3940-**■■■■■

Power supplies, batteries and chargers

Power supply 110 ... 230 V AC		
• for IP65 (NEMA 4X) or IP66 (NEMA7 Wall mount)		0PA00
• for FUS1020		1PA00
• for IP65 (NEMA 7) Compact		2PA00
Power supply 9 ... 36 V DC		
• for IP65 (NEMA 4X) or IP66 (NEMA7 Wall mount)		0PB00
• for FUS1020		1PB00
• negative ground for NEMA 7 Compact		2PJ00
• positive ground for NEMA 7 Compact		2PK00
Portable meter batteries and accessories		
• Internal battery (Portable meters only)		3PP00
• External 4-hour battery for portable meters		3BB00
• Charger for external 4-hour battery (for US)		3BC10
• Charger for external 4-hour battery (for Europe)		3BC20
• 4-hour battery charger adapter for NEMA 6, weatherproof portable		3BA00
IP67 Portable meter charger		
• Type A for Europe (CEE7/7)		3PC00
• Type C for Australia (AS3112)		3PD00
• Type D for UK (BS1363)		3PE00
• Type J for Japan (JIS8303)		3PF00
• Type K for US (NEMA 5-15P)		3PG00
• Type L for Switzerland (SEV1011)		3PH00
IP40 Portable meter charger		
• Type A for Europe (CEE7/7)		4PC00
• Type C for Australia (AS3112)		4PD00
• Type D for UK (BS1363)		4PE00
• Type J for Japan (JIS8303)		4PF00
• Type K for US (NEMA 5-15P)		4PG00
• Type L for Switzerland (SEV1011)		4PH00

System computer modules

Modbus converter module	◆ D)	**CQO-1015N-5M**
Mounting kit (type 1) for Modbus converter module	D)	**CQO-1015N-5M-MK1**
Mounting kit (type 2) for Modbus converter module	D)	**CQO-1015N-5M-MK2**
Mounting kit (type 3) for Modbus converter module	D)	**CQO-1015N-5M-MK3**
Field configuration kit with manual, for Modbus converter module	D)	**CQO-1015N-5M-FK1**

Pipe mounting brackets

2 inch pipe mounting bracket for IP65 (NEMA 7)	D)	**CQO-1012XMB-1**
2 inch pipe mounting bracket for IP65 (NEMA 4X)	D)	**CQO-1012NMB-1**

Selection and Ordering data — Order No.

Spare parts (Transducers)

SITRANS FUS clamp-on

Meter type

Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	A)	**7ME3950-**■■■■■
Portable (FUP1010 or FUE1010)	A)	**7ME3951-0**■■■■

Approvals

UL, ULc, CE (FUS1020 and Portable only)	0
FM /CSA hazardous (classified) locations	1
ATEX Ex II 1G EExiaIICT5 (not for RTDs)	2
INMETRO (not for (RTDs)	3

Spare transducer code

For liquid flow transducers pipe ranges please refer to transducer selection chart in the FUS1010 section		
Liquid flow transducers for use with mounting frames or tracks (including portable)		
A2 universal		LB00
B3 universal	◆	LC00
C3 universal	◆	LD00
D3 universal	◆	LE00
E2 universal	◆	LF00
A1H (high precision)		LG00
A2H (high precision)		LH00
A3H (high precision)		LJ00
B1H (high precision)		LK00
B2H (high precision)		LL00
B3H (high precision)		LT00
C1H (high precision)	◆	LM00
C2H (high precision)	◆	LN00
D1H (high precision)	◆	LP00
D2H (high precision)	◆	LQ00
D3H (high precision)		LU00
D4H (high precision)		LR00
Doppler		LS00
High precision liquid transducer for weld seal enclosures		
B1H (high precision, weld seal)		SK00
B2H (high precision, weld seal)		SL00
B3H (high precision, weld seal)		ST00
C1H (high precision, weld seal)		SM00
C2H (high precision, weld seal)		SN00
D1H (high precision, weld seal)		SP00
D2H (high precision, weld seal)		SQ00
D2H (high precision, weld seal)		SU00
D4H (high precision, weld seal)		SR00
High temperature universal liquid transducers		
Note: not available with INMETRO approval		
High temp. transducer size 1 for up to 230 °C (12.7 to 100 mm diam.)		LA10
High temp. transducer size 2 for up to 230 °C (30 to 200 mm diam.)		LA20
High temp. transducer size 3 for up to 230 °C (150 to 600 diam.)		LA30
High temp. transducer size 4 for up to 230 °C (400 to 1200 diam.)		LA40

◆ Mainstream products (delivery time 4 to 6 weeks)

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.
D) Subject to export regulations AL: N, ECCN: EAR99H.

Accessories/Spare parts for clamp-on

Selection and Ordering data		Order No.
Spare parts (Transducers)		
SITRANS FUS clamp-on		
Meter type		
Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	A)	**7ME3950-** ■■■■■
Portable (FUP1010 or FUE1010)	A)	**7ME3951-0** ■■■■
FUS1020 High precision liquid flow transducer		
A1H (high precision FUS 1020)		**0LG10**
A2H (high precision FUS 1020)		**0LH10**
A3H (high precision FUS 1020)		**0LJ10**
B1H (high precision FUS 1020)		**0LK10**
B2H (high precision FUS 1020)		**0LL10**
C1H (high precision FUS 1020)		**0LM10**
C2H (high precision FUS 1020)		**0LN10**
D1H (high precision FUS 1020)		**0LP10**
D2H (high precision FUS 1020)		**0LQ10**
For gas flow transducers pipe ranges please refer to transducer selection chart in the FUG1010 section		
High precision gas flow transducers for use with mounting frames or tracks		
B1H (high precision)		**GK00**
B2H (high precision)		**GL00**
B3H (high precision)		**GT00**
C1H (high precision)		**GM00**
C2H (high precision)	◆	**GN00**
D1H (high precision)	◆	**GP00**
D2H (high precision)	◆	**GQ00**
D3H (high precision)		**GU00**
D4H (high precision)	◆	**GR00**
High precision gas transducer for weld seal enclosures		
B1H (high precision, weld seal)		**HK00**
B2H (high precision, weld seal)		**HL00**
B3H (high precision, weld seal)		**HT00**
C1H (high precision, weld seal)		**HM00**
C2H (high precision, weld seal)		**HN00**
D1H (high precision, weld seal)		**HP00**
D2H (high precision, weld seal)		**HQ00**
D3H (high precision, weld seal)		**HU00**
D4H (high precision, weld seal)		**HR00**
Standard RTD transducers (not for energy systems)		
Standard clamp-on RTD	◆	**1TA00**
Submersible clamp-on RTD (not for portable)	◆	**1TB00**
Insertion style RTD pair (size 1), 140 mm (5.5 inch)		**1TJ00**
Insertion style RTD pair (size 2), 216 mm (8.5 inch)		**1TJ01**
Insertion style RTD pair (size 3), 292 mm (11.5 inch)		**1TJ02**
Insertion style RTD pair (size 4), 368 mm (14.5 inch)		**1TJ03**
Standard for energy system (matched pair)		
Standard clamp-on RTD	◆	**1TA10**
Insertion style RTD pair (size 1) for Energy system FUE1010, 140 mm (5.5 inch)		**1TJ10**
Insertion style RTD pair (size 2) for Energy system FUE1010, 216 mm (8.5 inch)		**1TJ11**
Insertion style RTD pair (size 3) for Energy system FUE1010, 292 mm (11.5 inch)		**1TJ12**
Insertion style RTD pair (size 4) for Energy system FUE1010, 368 mm (14.5 inch)		**1TJ13**

Selection and Ordering data		Order No.
Spare parts (Transducers)		
SITRANS FUS clamp-on		
Meter type		
Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	A)	**7ME3950-** ■■■■■
Portable (FUP1010 or FUE1010)	A)	**7ME3951-0** ■■■■
Thickness gauge transducers		
Thickness gauge transducer with adapter (for IP67 portable)		**0TG00**
Thickness gauge transducer (for IP40 portable)		**0TG10**

◆ Mainstream products (delivery time 4 to 6 weeks)

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS FUS clamp-on	A)	**7ME3960-** ■■■■■
Meter design		
IP65 (NEMA 4X) or IP66 (NEMA 7 wall mount)		0
IP65 (NEMA 4) FUS1020		1
IP65 (NEMA 7) Compact		2
IP67 Weather proof portable		3
IP40 (NEMA 1) Portable		4
Dedicated transducer mounting hardware		
Transducer mounting frames for		
• Universal transducer size B (for pipes >125 mm (5 inch))	D)	**CQO-1012FN-PB**
• Universal transducer size C	◆	0MC00
• Universal transducer size D	◆	0MC01
• Universal transducer size E		0MC02
• High precision transducer size B (for pipes > 125 mm (5 inch))	D)	**CQO-1012FNH-PB**
• High precision transducer size C		0MD00
• High precision transducer size D		0MD01
Spacer bars (for indexing transducers on pipe)		
• Spacer bars for pipes to 200 mm/8 inch (liquid), 600 mm / 24 inch (gas)		0MS10
• Spacer bars for pipes to 500 mm/20 inch (liquid), DN 1200 / 48 inch (gas)		0MS20
• Spacer bars for pipes to 800 mm/32 inch (liquid)		0MS30
• Spacer bars for pipes to 1200 mm/48 inch (liquid)		0MS40
Mounting straps for mounting frames (slotted stainless steel)		
• For pipes from DN 50 to DN 150		0SM00
• For pipes from DN 50 to DN 300		0SM10
• For pipes from DN 300 to DN 600		0SM20
• For pipes from DN 600 to DN 1200		0SM30
• For pipes from DN 1200 to DN 1500		0SM40
• For pipes from DN 1500 to DN 2100		0SM50
• For pipes from DN 2100 to DN 3000		0SM60
Weld seal mounting enclosures for liquid and gas transducers		
• Single enclosure for size B high precision		0WS10
• Single enclosure for size C high precision		0WS20
• Single enclosure for size D high precision		0WS30
• Single enclosure for size E universal		0WS40
• Dual enclosure for size C high precision		0WD20
• Dual enclosure for size D high precision		0WD30
• Dual enclosure for size E universal		0WD40
Stainless steel bands for weld seal enclosure mounting		
• Mounting strap for pipe diameter to 300 mm (13 inch)		0SM01
• Mounting strap for pipe diameter to 600 mm (24 inch)		0SM11
• Mounting strap for pipe diameter to 1200 mm (48 inch)		0SM21
• Mounting strap for pipe diameter to 1500 mm (60 inch)		0SM31
• Mounting strap for pipe diameter to 2130 mm (84 inch)		0SM41
• Mounting strap for pipe diameter to 3050 mm (120 inch)		0SM51

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS FUS clamp-on	A)	**7ME3960-** ■■■■■
Transducer mounting tracks (aluminium with mounting straps) for pipes < 125 mm (5 inch)		
• Universal transducer size A or B	◆	0MA00
• High precision transducer size A or B		0MB00
Stainless mounting tracks for high temp 991 transducers		
• Size 1 high temp transducer pair	A)	**CQO-992MTNHMSH-1**
• Size 2 high temp transducer pair	A)	**CQO-992MTNHMSH-2**
• Size 3 high temp transducer pair	A)	**CQO-992MTNHMSH-3**
• Size 4 high temp transducer pair	A)	**CQO-992MTNHMSH-4**
Clamp-on RTD mounting hardware for dedicated systems		
• RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch)		0MR00
• RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch)		0MR01
• RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch)	◆	0MR02
• RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch)		0MR04
• Junction box for clamp on RTD's	◆ D)	**CQO-992ECJ**
Portable transducer mounting hardware		
Transducer mounting frames		
• Universal transducer size B (for pipes >125 mm (5 inch))	D)	**CQO-1012FP-PB**
• Universal transducer size C	◆	3MC00
• Universal transducer size D	◆	3MC01
• Universal transducer size E	◆	3MC02
• High precision transducer size B (for pipes > 125 mm (5 inch))	D)	**CQO-1012FPH-PB**
• High precision transducer size C	◆	3MD00
• High precision transducer size D	◆	3MD01
Spacer bar (for indexing portable transducers		3MS00
Mounting chain and EZ clamp hardware		
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch); handles all transducers except "D" size HP and "E" size univ.	◆ D)	**CQO-1012Z-1**
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal	D)	**CQO-1012Z-2**
• Mounting chain for portable transducers: 4 x 760 mm lengths		3CM10
• Mounting chain for portable transducers: 2 x 760 mm and 2 x 1500 mm lengths		3CM20
Transducer mounting tracks for portable transducers (aluminum with mounting straps) for pipes < 125 mm (5 inch) for		
• Universal transducer size A or B	◆	3MA00
• High precision transducer size A or B		3MB00
RTD mounting hardware for portable system		3MR00
Transducer connector adaptors		
• "F" connector to BNC adapter (order 2 per transducer set)	D)	**CQO-1012NFPA**

◆ Mainstream products (delivery time 4 to 6 weeks)

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.
D) Subject to export regulations AL: N, ECCN: EAR99H.

Accessories/Spare parts for clamp-on

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS FUS clamp-on	A)	**7ME3960-■■■■■**
Insert RTD Thermowells		
• Thermowell std. duty uninsulated pipe 140 mm (5.5 inch)	D)	**CQO-1012TW-1**
• Thermowell std. duty uninsulated pipe 216 mm (8.5 inch)	D)	**CQO-1012TW-2**
• Thermowell std. duty uninsulated pipe 292 mm (11.5 inch)	D)	**CQO-1012TW-3**
• Thermowell heavy duty uninsulated pipe 140 mm (5.5 inch)	D)	**CQO-1012TW-1HD**
• Thermowell heavy duty uninsulated pipe 216 mm (8.5 inch)	D)	**CQO-1012TW-2HD**
• Thermowell heavy duty uninsulated pipe 292 mm (11.5 inch)	D)	**CQO-1012TW-3HD**
• Thermowell std. duty with lagging 140 mm (5.5 inch)	A)	**CQO-1012TW-1L**
• Thermowell std. duty with lagging 216 mm (8.5 inch)	A)	**CQO-1012TW-2L**
• Thermowell std. duty with lagging 292 mm (11.5 inch)	A)	**CQO-1012TW-3L**
• Thermowell tapered heavy duty with lagging 140 mm (5.5 inch)	A)	**CQO-1012TW-1HDL**
• Thermowell tapered heavy duty with lagging 216 mm (8.5 inch)	A)	**CQO-1012TW-2HDL**
• Thermowell tapered heavy duty with lagging 292 mm (11.5 inch)	A)	**CQO-1012TW-3HDL**
Transducer cables for (Use „Transducer cable selection chart“ to complete Order No. with ##)		
• IP65 (NEMA 4X) or IP 66 (NEMA 7 wall mount)		**0CK##**
• IP65 (NEMA 4) FUS 1020		**1CK##**
• IP65 (NEMA 7) Compact		**2CK##**
• IP67 Weather proof portable		**3CK##**
• IP40 (NEMA 1) Portable		**4CK##**
RTD cables for (Use „Transducer cable selection chart“ to complete Order No. with ##)		
• All dedicated systems (except FUS 1020)		**0CR##**
• IP67 Weather proof portable		**3CR##**
• IP40 (NEMA 1) Portable		**4CR##**
Dedicated cable termination kits		
• Standard, plenum and armored transducer cable (NEMA 4X and NEMA 7 wall)		**0CT01**
• Submersible transducer cable (NEMA 4X and NEMA 7 wall)		**0CT11**
• Standard and plenum transducer cable (FUS1020)		**1CT01**
• Standard, plenum and armored transducer cable (compact NEMA 7)		**2CT01**
• Submersible transducer cable (compact NEMA 7)		**2CT11**
• Clamp-on RTD cable termination kit for standard RTD		**0CT21**
• Clamp-on RTD cable termination kit for submersible RTD		**0CT31**
• Insert RTD cable termination kit		**0CT41**

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS FUS clamp-on	A)	**7ME3960-■■■■■**
Ultrasonic couplants		
• Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F)		**0UC10**
• Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F)		**0UC20**
• Permanent high temp fluoroether: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)		**0UC30**
• Permanent high temp fluoroether: 163 ml (5.5 oz): -40 ... +230 °C (-40 ... +450 °F)		**0UC31**
• Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 …+120 °C (-40 …+250 °F)	D)	**CQO-CC112**
• Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	D)	**CQO-CC117**
• Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	D)	**CQO-CC117A**
• Couplant for submersible transducer applications	D)	**CQO-CC120**
Pipe damping films for FUG gas systems		
• B1, B2, B3, C1 and C2 transducers		**0DM10**
• D1 and D3 transducers		**0DM20**
• D2 transducer		**0DM30**
• D4 transducer		**0DM40**
Serial RS232 Cables and I/O Adapters		
• RS232 Cable for all dedicated meters		**0CS00**
• RS232 Cable for IP66 Weather proof portabled meter		**3CS00**
• RS232 Cable for IP40 Portable meter		**4CS00**
• I/O adapter for IP66 Weather proof portable meter		**3AD00**
Portable (battery powered) Printers and Printer Cables		
• Portable printer with 115 V AC charger		**3PP00**
• Portable printer with 230 V AC charger		**3PP10**
• Serial printer pable for IP66 weather proof portable meter		**3PC00**
• Serial printer cable for IP40 Portable meter		**4PC00**
• Thermal printer paper (4 rolls)		**0PR00**
Portable Meter Carrying Case		**3CC00**
Universal Transducer Test Blocks		
• Test block for size A and B universal transducers		**0TB10**
• Test block for size C and D universal transducers		**0TB20**
Field Manuals		
• CD with documentation for SITRANS F US Clamp-on ultrasonic flowmeters (English)	A)	**CQO-CDM0001**

A) Subject to export regulations AL: 9I999, ECCN: EAR99H.
D) Subject to export regulations AL: N, ECCN: EAR99H.

Transducer cable selection chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard -40…+80 °C (-40…+176 °F)	Submersible -40…+80 °C (-40…+176 °F)	Plenum -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**[1)]	**K21**	**K31**[1)]
15 (50)	**K02**	**K12**[1)]	**K22**	**K32**[1)]
30 (100)	**K03**	**K13**[1)]	**K23**	**K33**[1)]
46 (150)	**K04**[2)]	**K14**[1) 2)]	**K24**[2)]	**K34**[1) 2)]
61 (200)	**K05**[2)]	**K15**[1) 2)]	**K25**[2)]	**K35**[1) 2)]
91 (300)	**K06**[2)]	**K16**[1) 2)]	**K26**[2)]	**K36**[1) 2)]

1) Armored or submersible transducer cable is not available for FUP1010, FUE1010 portable systems or FUS1020 systems.
2) Length not available for portable meters.

RTD cable selection chart

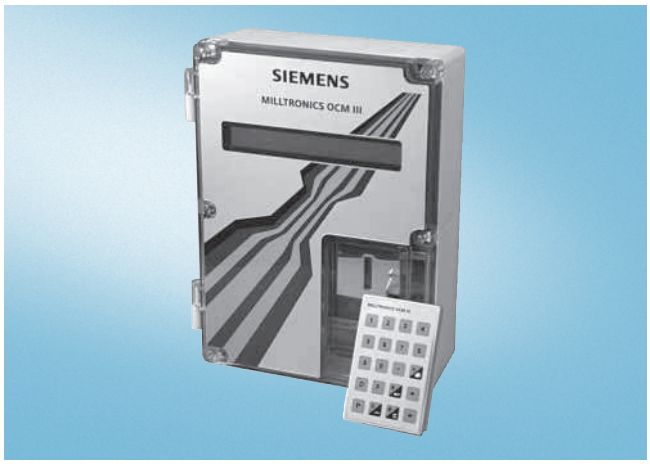
RTD cable codes for length and type

Cable length m (ft)	Standard -40 … +200 °C (-40 … +392 °F)	Submersible -40 … +200 °C (-40 … +392 °F)	for insert RTD -40 ... +200 °C (-40 ... 392 °F)	for submersible insert RTD -40 ... +200 °C (-40 ... 392 °F)
	Order code			
6 (20)	**R01**	**R11**[1)]	**R21**	**R31**[1)]
15 (50)	**R02**	**R12**[1)]	**R22**	**R32**[1)]
30 (100)	**R03**	**R13**[1)]	**R23**	**R33**[1)]
46 (150)	**R04**[2)]	**R14**[1) 2)]	**R24**	**R34**[1) 2)]
61 (200)	**R05**[2)]	**R15**[1) 2)]	**R25**	**R35**[1) 2)]
91 (300)	**R06**[2)]	**R16**[1) 2)]	**R26**	**R36**[1) 2)]

1) Submersible RTD cable is not available for FUP1010, FUE1010 portable systems or FUS1020 systems.
2) Length not available for portable meters.

OCM III

Overview



The OCM III is a high accuracy ultrasonic flow monitor for open channels.

Benefits

- Influent and effluent monitor
- BS 3680 calculations provide exceptional accuracy in measuring flow
- 1 to 24 months data log, subject to logging rate
- RS-232 serial communication
- High accuracy on unique or non-standard weirs and flumes
- AC and DC operation. Automatically switches to battery operation for uninterrupted power
- Dual power input
- Low power remote monitoring
- Flow Reporter software available for remote monitoring, configuration and data retrieval

Application

In addition to monitoring flowrate in sewage works, OCM III can monitor industrial discharge, rainfall/storm water studies, inflow/infiltration studies and sewer system evaluations. As well as being compatible with many standard weirs and flumes, the programmable head versus flow curve (up to 16 points) accurately defines flow rate on unique or non-standard weirs and flumes.

The OCM III has data logging and is adjustable from once per minute to once a day. It records the average flow rate for that time period. Daily, it records minimum/maximum of temperature and flow rates, and the time they occurred, as well as the daily total. Advanced functions include variable rate logging. It can be pre-programmed to log at a higher rate when needed. Under steady conditions, the OCM III automatically logs less frequently to conserve data log space.

The OCM III has two-way communication via RS-232 with a modem or a bi-polar current loop with a current-to-voltage communication converter. Data logs can be downloaded to a file that can be manipulated into a spreadsheet or ASCII format.

Technical specifications

Mode of Operation	
Measuring range[1)]	0.3 ... 1.2 m (1 ... 4 ft) or 0.6 ... 3 m (2 ... 10 ft)
Output	
Transducer	Echomax® XRS-5, 44 kHz
Relays	3 alarm/control relays, 1 SPDT Form C contact per relay, rated 5 A at 250 V AC non-inductive or 30 V DC
mA output	0/4 ... 20 mA, isolated
• Max. load	1 KΩ max. load
• Resolution	5 uA
• Isolation	300 V AC continuous
• DC output	+24 V DC, 20 mA average to 200 mA at 1/10 duty cycle max.0 ... 20
Accuracy	
Error in measurement	±1 mm/m, calculated error less than 0.02%
Resolution	0.2 mm (0.007")
Rated operating conditions	
Installation conditions	
Location	Indoor/outdoor
Installation category	II
Pollution degree	4
Ambient conditions	
Ambient temperature (enclosure)	-20 ... +50 °C (-5 ... +122 °F)
Design	
Weight	2.3 kg (5.1 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	IP65/Type 4X/NEMA 4X
Cable	
Transducer and mA output signal	• Transducer: co-axial to be RG62-A/U low capacity • mA output signal to be 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm² (22 ... 18 AWG) • Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating
Max. separation between transducer and transceiver	183 m (600 ft)
Displays and controls	LCD 5 x 7 dot matrix display with 2 lines of 40 characters each
Programming	Via removable programmer and communication link
Memory	3 V battery (NEDA 5003LC or equivalent), operating life 1 year, SuperCap capacitor for back-up during battery replacement
Power supply	
AC version	100/115/200/230 V AC ± 15%, 50/60 Hz, 20 VA max.
DC version	9 ... 30 V DC, 8 W max.
Certificates and approvals	CE[2)], FM, $CSA_{NRTL/C}$, MCERTS
Communication	RS-232 or ± 20 mA bipolar current loop, 300, 600, 1200, 2400, 4800, 9600, 19200 baud
Options	
Temperature Sensor	TS-2
Remote Monitoring	Flow Reporter, a Windows®-based configuration software and data extractor
Velocity Sensor	Consult with factory.

1) Program range is defined as the empty distance to the face of the transducer plus any range extension.

2) EMC performance available upon request.

Windows® is a registered trademark of Microsoft Corporation.

Selection and Ordering data

		Order No.
OCM III High accuracy ultrasonic flow monitor for open channels.	C)	**7ML1002-■A■0■**
Input voltage		
AC, voltage selector switch		**0**
Enclosure		
Wall mount, standard enclosure		**A**
Wall mount, 6 entries, M20 holes[1]		**B**
Approvals		
CSA$_{NRTL/C}$, FM, CE (EN61326)		**5**
CE[2]		**6**
Instruction manual		
English	C)	**7ML1998-5AB01**
French	C)	**7ML1998-1AB11**
Spanish	C)	**7ML1998-1AB21**
German	C)	**7ML1998-1AB31**
Note: The instruction manual should be ordered as a separate line on the order.		
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.		
Required equipment		
TS-2 Temperature Sensor		
TS-2, 1 m cable	C)	**7ML1812-1AA1**
TS-2, 5 m cable	C)	**7ML1812-2AA1**
TS-2, 10 m cable	C)	**7ML1812-3AA1**
TS-2, 30 m cable	C)	**7ML1812-4AA1**
TS-2, 50 m cable	C)	**7ML1812-5AA1**
TS-2, 70 m cable	C)	**7ML1812-6AA1**
TS-2, 90 m cable	C)	**7ML1812-7AA1**
TS-2 Instruction manual Note: The TS-2 instruction manual should be ordered as a separate line item on the order.	C)	**7ML1998-1EW01**
Accessories		
Handheld programmer		**7ML1830-2AA**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**7ML1930-1AC**
M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)		**7ML1830-1GM**
Flow Reporter software license	B)	**7ML1930-1AK**
Flow Reporter Kit (includes disk, authorization code and cable)	B)	**7ML1930-1AL**
Spare parts		
Card, Mother, main		**7ML1830-1MG**
Card, daughter/display	C)	**7ML1830-1LT**
Card, LCD		**7ML1830-1KY**
Eprom	C)	**7ML1830-1KW**
Battery	C)	**7ML1830-1JV**
OCM III Lid overlay		**7ML1830-1KV**

1) Available with approval option 6 only

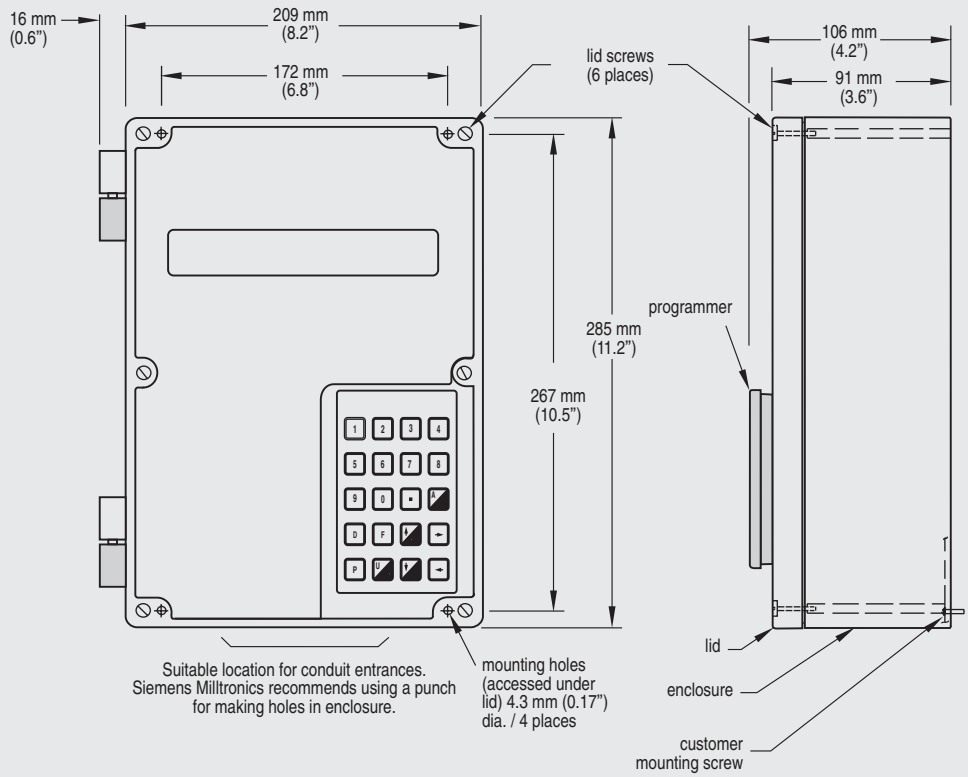
2) Available with enclosure option B only

B) Subject to export regulations AL: N, ECCN: EAR99S

C) Subject to export regulations AL: N, ECCN: EAR99

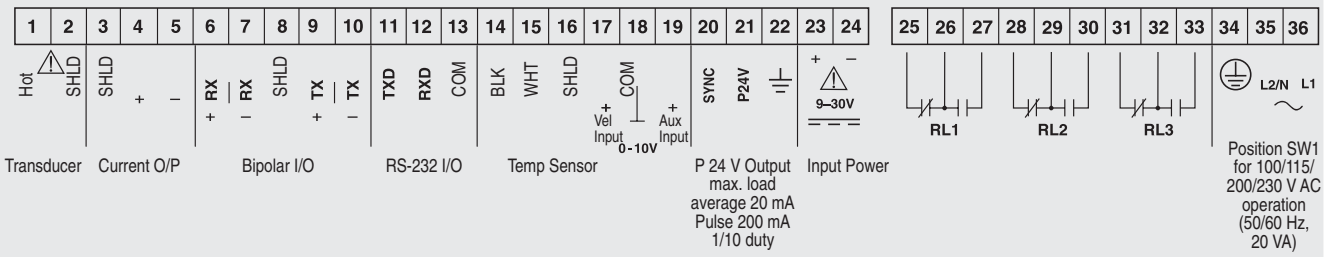
OCM III

Dimensional drawings



OCM III dimensions

Schematics



Notes:
1. Use RG62-A/U Coaxial (or equivalent) for extensions up to 183 m (600 ft). Run in grounded metal conduit, separate from other wiring.
2. Each relay has 1 set of form 'C' (SPDT) contacts, relay rated at 5A, 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed. Relay de-energized when in alarm conditions and energized for pump control.

OCM III connections

SITRANS FX300

Overview

SITRANS F X vortex flow meters provide accurate standard volumetric and mass flow measurement of steam, gases and liquids as an all in one solution with integrated temperature and pressure compensation.

Benefits

- All devices have 2-wire technology and HART communication
- Temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure compensation enabling direct compensation of density.
- Pressure, temperature and flow can be read at a single point. No additional installation of pressure and temperature sensors.
- Direct measurement of energy
- Optimum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external perturbations
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free sensor design
- Ready to use due to plug & play feature. No additional cabling work
- Minimal pressure drop

Application

The SITRANS FX300 is a compact flow meter in a single or dual transmitter version, suitable for measuring industrial steam, gases, as well as conductive and non-conductive liquids. E.g. steam (saturated steam, superheated steam), industrial gases (compressed air, nitrogen, liquefied gases, flue gases), and conductive and non conductive liquids (demineralized water, boiler feed water, solvents, heat transfer oil)

The main applications of SITRANS FX300 can be found in the following sectors:

- Chemical
- Petrochemical
- Oil & Gas
- Power plants
  - Air
  - Heating
  - Cooling
  - Chilling
- Food & beverage
  - Pharmaceutical
  - Sugar refineries
  - Dairies
  - Breweries
  - Producers of soft drinks
- Refining
- Water & waste water

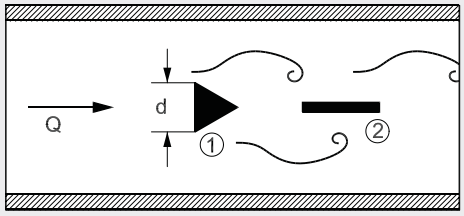
System Overview

Version	Single transmitter			Dual transmitter
Options	Vortex Volumetric Flow Meter	Vortex Mass Flow Meter	Vortex Mass Flow Meter with shut off valve	Vortex volumetric Flow Meter
Flange				
Sandwich				

Function

Operating Principle

SITRANS F X vortex flow meters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is known as Von Karman's vortex street principle: alternating vortices form behind an object in a stream. The frequency of the alternating vortices is proportional to the flow rate. The Passage of a vortex causes a slight stress on a wing placed downstream of the bluff body. The stress is picked up and counted as pressure surges by a dual Piezo crystal placed inside the wing.



① = Bluff Body, ② = Wing

The flow meter calculates the flow velocity using the following equation:

$Q = A \cdot V = A \cdot d / St \cdot f = 101{,}93 \cdot f / K\ [m^3/h]$

Where:

Q = flow rate [m^3/h]
f = vortex shedding frequency [Hz]
K = calibration constant [pulses/ft^3]
d = diameter of the bluff body [m]
St = Strouhal Number
A = cross-section area [m^2]
V = flow velocity [m/s]

SITRANS FX300

Requirements

In order to generate the vortex streets, the medium must have a minimum of velocity:

- for steam and gases, the flow rate must be between 2 to 80 m/s (6.6 to 262 ft/s)
- for liquids the flow rate must be between 0.4 to 10 m/s (1.3 to 32.8 ft/s).

Design

SITRANS FX300 is available in the following configurations:

SITRANS FX300 single transmitter

The single converter is available in a flange or sandwich version volumetric flow meter (standard) and as a mass flow meter (optional):

- Vortex volumetric flow meter
  Measurement with integrated temperature sensor for saturated steam compensation as standard feature
- Vortex mass flow meter
  Measurement with integrated temperature and pressure sensors for compensation of gases, wet gases, gas mixtures or steam (for engergy measurement).
  The SITRANS FX300 mass flow meter is optionally available with:
  - Shut-off valves
    Allowing the pressure sensor to be shut off for the purpose of pressure or leak testing of the pipeline or for being exchanged without interrupting the process. Using the built-in two-way valve, the pressure sensor can also be calibrated and tested at a later time.

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and two converters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi product pipelines, where different products are moved through one after the other. Here one converter can be programmed for one product, and the other converter for the other.

The dual converter is available as:

- Vortex volumetric flow meter
  Measurement with temperature sensor for saturated steam compensation as standard feature

Technical specifications

Input	
Measuring range limits	See „Dimensional Drawings“
Media pressure	1 ... 100 bar (Higher pressures on request)
Output	
Current output	
• Measuring range	4 … 20 mA
• Over range	20.8 mA ± 1 % (105 % ± 1 %)
• Load	Min. 100 Ω; max. R_{ges} = (U_B - 14 V) / 22 mA
• Error signal	NAMUR NE 43
• Maximum output	22 mA (112.5 %)
• Multidrop mode	4 mA
Digital output	
• Communication	HART
• Physical layer	FSK
• Device category	Transmitter
Pulse Output	
• Pulse frequency	Max. 0.5 Hz
Power supply	
• Standard version	24 V DC as NAMUR or open < 1 mA, max. 36 V, closed 100 mA, U < 2 V
• Ex version	24 V DC as NAMUR or open < 1 mA, max. 30 V, closed 100 mA, U < 2 V
Accuracy	
Standard version	
• For liquids	
- Re ≥ 20 000	± 0.75 %
• For steam and gases	
- Re ≥ 20 000	± 1 %
• For steam, gases and liquids	
- 10 000 < Re < 20 000	± 2 %
Pressure and temperature compensated version	
• For liquids	
- 10 000 < Re < 20 000	± 2 %
- Re ≥ 20 000	± 0.75 %
• For gases and steam	
- 10 000 < Re < 20 000	± 2.5 %
- Re ≥ 20 000	± 1.5 %
Installation conditions	
• Inlet run	≥ 20 x DN
• Outlet run	≥ 5 x DN
Rated operation conditions	
Ambient temperature	
• Standard version	-40 … +85 °C (-40 … +185 °F)
• Ex version	-20 … +65 °C (-4 … +149 °F)
Storage temperature	-50 … +85 °C (-58 … +185 °F)
Media temperature	-40 … +240 °C (-40 … +464 °F)
Density	Taken into consideration when rating
Viscosity	< 10 cP
Reynolds number	10 000 … 2 300 000
Media pressure limit	Max. 100 bar (Higher pressure on request)
Design	
Material	
• Sensor	1.4404/316L Hastelloy C22 (on request)
• Housing	Aluminium Aluminium seawater resistant
• Sensor gasket	1.4435/316L/FPM Hastelloy C22/FFKM (on request)
Process connections	EN or ASME flanges
• Flange version	DN 15 … 300 (½ … 12")
• Sandwich version	DN 15 … 100 (½ … 4")
Degree of protection	IP66/IP67 (NEMA 6)
Dimensions and weights	See „Dimensional Drawings“
Display and operating interface	
Local display	2 lines, 10 characters per line
Languages	German, English, French
Power supply	
• Standard version	14 … 36 V DC
• Ex version	14 … 30 V DC
Certificates and approvals	
Explosion protection	
• ATEX	II 2G EEx d ia [ia] IIC T6
• FM	Class I, Div 1

Selection and Ordering data		Order No.								
SITRANS FX300 Flanged **Single transmitter and T_{max} = 240 °C (464 °F)**		7ME2600	-							
Connection size	**Sensor size**									
DN 15 (½")	DN 15	1	A							
DN 25 (1")	DN 25	2	B							
DN 40 (1½")	DN 40	2	K							
DN 50 (2")	DN 50	2	R							
DN 80 (3")	DN 80	3	L							
DN 100 (4")	DN 100	3	S							
DN 150 (6")	DN 150	4	M							
DN 200 (8")	DN 200	4	T							
DN 250 (10")	DN 250	4	W							
DN 300 (12")	DN 300	5	E							
Flange norm and nominal pressure										
Form B1/B2	**EN 1092-1**									
PN 10	DN 200 ... 300			A						
PN 16	DN 50 ... 300			B						
PN 25	DN 200 ... 300			C						
PN 40	DN 15 ... 300			D						
PN 63	DN 50 ... 150			E						
PN 100	DN 15 ... 150			F						
RF	**ASME B16.5**									
150 lb	1½ ... 12"			J						
300 lb	1½ ... 12"			K						
600 lb	1½ ... 6"			L						
Sensor material/Gasket										
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM					1					
Hastelloy C22/C276/FPM					3					
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM					5					
Hastelloy C22/C276/FFKM					7					
Transducer design and coax cable										
Compact, none cable						1				
Approval and cable gland										
Non Ex, M20x1,5							1			
ATEX EEx Zone 1 -Ex II 2G EEx d ia[ia] IIC T6, M20x1,5							4			
FM Class I DIV 1, M20x1.5							6			
FM Class I DIV 1, ½" NPT							7			
Transmitter, display and communication										
With display, HART								A		
Pressure sensor										
Without									A	
4 bar									B	
6 bar									D	
10 bar									E	
16 bar									G	
25 bar									H	
40 bar									K	
60 bar									L	
100 bar									N	

Selection and Ordering data	Order No.									
SITRANS FX300 Flanged **Single transmitter and T_{max} = 240 °C (464 °F)**	7ME2600	-								
With iso valve										
4 bar								P		
6 bar								Q		
10 bar								R		
16 bar								S		
25 bar								U		
40 bar								V		
60 bar								W		
100 bar								Y		
Software										
Uncompensated									1	
Density compensation for superheated steam (option only with pressure sensor)									4	
Density compensation for gas-wet-mix (option only with pressure sensor)									7	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Accredited Siemens calibration FX300	
Calibration certificate (5 point)	**D11**
Material certificate	
Certificate of compliance EN 10204-2.1	**F10**
Pressure test + 3.1 accordance EN 10204	**F11**
Material certificate pressure parts + certificate 3.1	**F12**
Material in accordance of NACE MR 0175-01	**F13**
PMI of pressure bearing metal parts + certificate 3.1	**F14**
Material certificate pressure parts + PMI/certificate 3.1	**F15**
Hardness test	
Hardness test on pressure bearing parts + 3.1	**H30**
Cleaning	
Class 2	**K40**
Class 2 and 3.1 (EN 10204)	**K42**
Class 1	**K46**
Class 1 and 3.1 (EN 10204)	**K48**
Certificates	
Option	
1 = General Arrangement Drawings	**M50**
2 = Opt. 1 + Inspection and Test plan ITP	**M52**
3 = Opt. 2 + Welding procedure, -plan, welder-qualification	**M54**
4 = Opt. 3 + X-ray test on pressurized weldings	**M56**
5 = Opt. 4 + Dye penetration test on pressure bearing weldings	**M58**
6 = Opt. 5 + Stress calculation	**M59**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y 17**
Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**
Converter housing material	
Aluminium seawater resistant	**Y40**

SITRANS FX300

Selection and Ordering data		Order No.
SITRANS FX300 Sandwich **Single transmitter and T_{max} = 240 °C (464 °F)**		**7ME2700 -**
Connection size	**Sensor size**	
DN 15 (½")	DN 15	1 A
DN 25 (1")	DN 25	2 B
DN 40 (1½")	DN 40	2 K
DN 50 (2")	DN 50	2 R
DN 80 (3")	DN 80	3 L
DN 100 (4")	DN 100	3 S
Nominal pressure		
EN		
PN 100	DN 40 ... 100	R
ASME		
150 lb	1½ ... 4"	S
300 lb	1½ ... 4"	T
600 lb	1½ ... 4"	U
Sensor material/Gasket		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		1
Hastelloy C22/C276/FPM		3
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		5
Hastelloy C22/C276/FFKM		7
Transducer design and coax cable		
Compact, none cable		1
Approval and cable gland		
Non Ex, M20x1,5		1
ATEX EEx Zone 1 -Ex II 2G EEx d ia[ia] IIC T6, M20x1,5		4
FM Class I DIV 1, M20x1.5		6
FM Class I DIV 1, ½" NPT		7
Transmitter, display and communication		
With display, HART		A
Pressure sensor		
Without		A
4 bar		B
6 bar		D
10 bar		E
16 bar		G
25 bar		H
40 bar		K
60 bar		L
100 bar		N

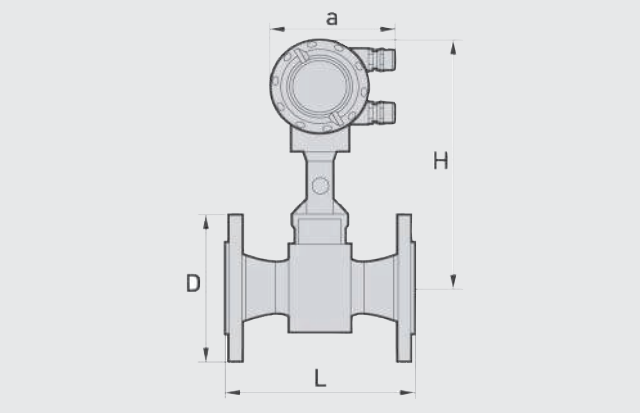
Selection and Ordering data	Order No.
SITRANS FX300 Sandwich **Single transmitter and T_{max} = 240 °C (464 °F)**	**7ME2700 -**
With iso valve	
4 bar	P
6 bar	Q
10 bar	R
16 bar	S
25 bar	U
40 bar	V
60 bar	W
100 bar	Y
Software	
Uncompensated	1
Density compensation for superheated steam (option only with pressure sensor)	4
Density compensation for gas-wet-mix (option only with pressure sensor)	7

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Accredited Siemens calibration FX300	
Calibration certificate (5 point)	**D11**
Material certificate	
Certificate of compliance EN 10204-2.1	**F10**
Pressure test + 3.1 accordance EN 10204	**F11**
Material certificate pressure parts + certificate 3.1	**F12**
Material in accordance of NACE MR 0175-01	**F13**
PMI of pressure bearing metal parts + certificate 3.1	**F14**
Material certificate pressure parts + PMI/certificate 3.1	**F15**
Hardness test	
Hardness test on pressure bearing parts + 3.1	**H30**
Cleaning	
Class 2	**K40**
Class 2 and 3.1 (EN 10204)	**K42**
Class 1	**K46**
Class 1 and 3.1 (EN 10204)	**K48**
Certificates	
Option	
1 = General Arrangement Drawings	**M50**
2 = Opt. 1 + Inspection and Test plan ITP	**M52**
3 = Opt. 2 + Welding procedure, -plan, welder-qualification	**M54**
4 = Opt. 3 + X-ray test on pressurized weldings	**M56**
5 = Opt. 4 + Dye penetration test on pressure bearing weldings	**M58**
6 = Opt. 5 + Stress calculation	**M59**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y 17**
Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**
Converter housing material	
Aluminium seawater resistant	**Y40**

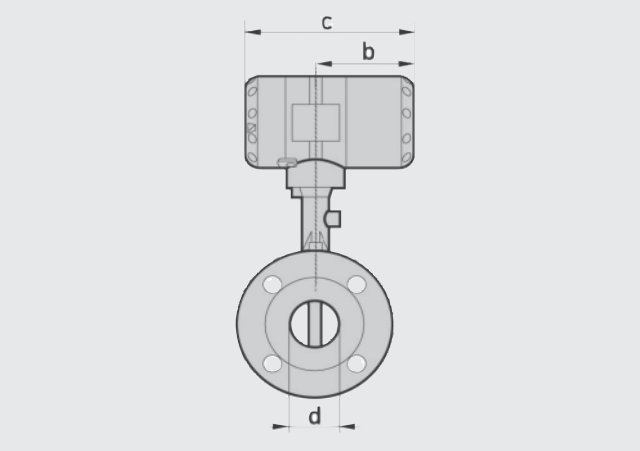
Selection and Ordering data		Order No.
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		**7ME2800 -**
Connection size	**Sensor size**	
DN 40 (1½")	DN 40	**2K**
DN 50 (2")	DN 50	**2R**
DN 80 (3")	DN 80	**3L**
DN 100 (4")	DN 100	**3S**
DN 150 (6")	DN 150	**4M**
DN 200 (8")	DN 200	**4T**
DN 250 (10")	DN 250	**4W**
DN 300 (12")	DN 300	**5E**
Flange norm and nominal pressure		
Form B1/B2	**EN 1092-1**	
PN 10	DN 200 ... 300	**A**
PN 16	DN 50 ... 300	**B**
PN 25	DN 200 ... 300	**C**
PN 40	DN 40 ... 300	**D**
PN 63	DN 50 ... 150	**E**
PN 100	DN 40 ... 150	**F**
RF	**ASME B16.5**	
150 lb	1½ ... 12"	**J**
300 lb	1½ ... 12"	**K**
600 lb	1½ ... 6"	**L**
Sensor material/Gasket		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		**1**
Hastelloy C22/C276/FPM		**3**
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		**5**
Hastelloy C22/C276/FFKM		**7**
Transducer design and coax cable		
Compact, none cable		**1**
Approval and cabel gland		
Non Ex, M20x1,5		**1**
ATEX EEx Zone 1 -Ex II 2G EEx d ia[ia] IIC T6, M20x1,5		**4**
FM Class I DIV 1, M20x1.5		**6**
FM Class I DIV 1, ½" NPT		**7**
Transmitter, display and communication		
With display, HART		**A**
Pressure sensor		
Without		**A**
Software		
Uncompensated		**1**

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Accredited Siemens calibration FX300	
Calibration certificate (5 point)	**D11**
Material certificate	
Certificate of compliance EN 10204-2.1	**F10**
Pressure test + 3.1 accordance EN 10204	**F11**
Material certificate pressure parts + certificate 3.1	**F12**
Material in accordance of NACE MR 0175-01	**F13**
PMI of pressure bearing metal parts + certificate 3.1	**F14**
Material certificate pressure parts + PMI/certificate 3.1	**F15**
Hardness test	
Hardness test on pressure bearing parts + 3.1	**H30**
Cleaning	
Class 2	**K40**
Class 2 and 3.1 (EN 10204)	**K42**
Class 1	**K46**
Class 1 and 3.1 (EN 10204)	**K48**
Certificates	
Option	
1 = General Arrangement Drawings	**M50**
2 = Opt. 1 + Inspection and Test plan ITP	**M52**
3 = Opt. 2 + Welding procedure, -plan, welder-qualification	**M54**
4 = Opt. 3 + X-ray test on pressurized weldings	**M56**
5 = Opt. 4 + Dye penetration test on pressure bearing weldings	**M58**
6 = Opt. 5 + Stress calculation	**M59**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y 17**
Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**
Converter housing material	
Aluminium seawater resistant	**Y40**

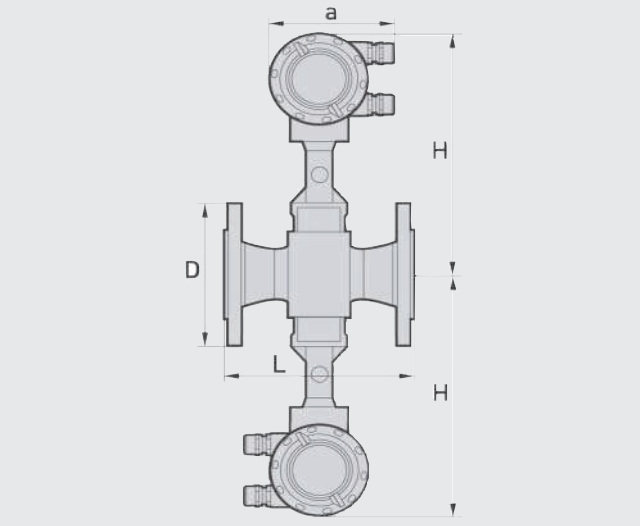
Dimensional drawings



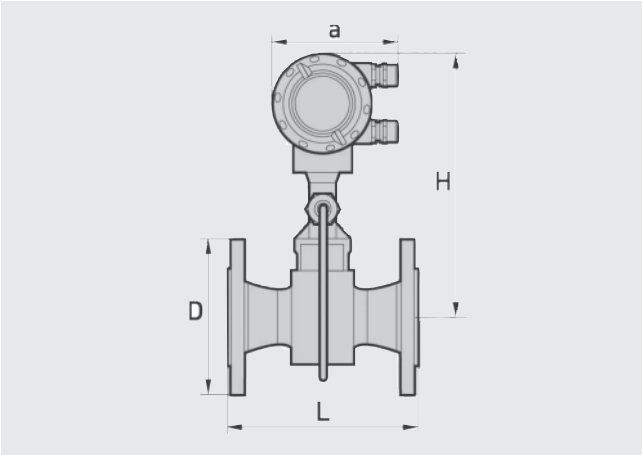
Flange version, frontal view, a = 133 mm (5.24 inches)



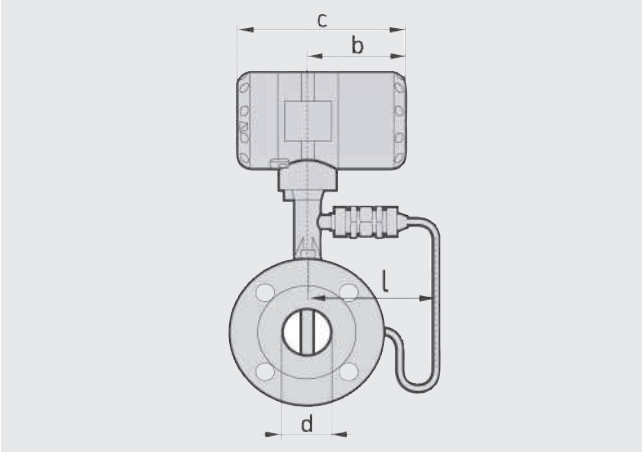
Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)



Flange version, dual converter, specified weight + 2.80 kg (6.17 lb)



Flange version, frontal view, a = 133 mm (5.24 inches)



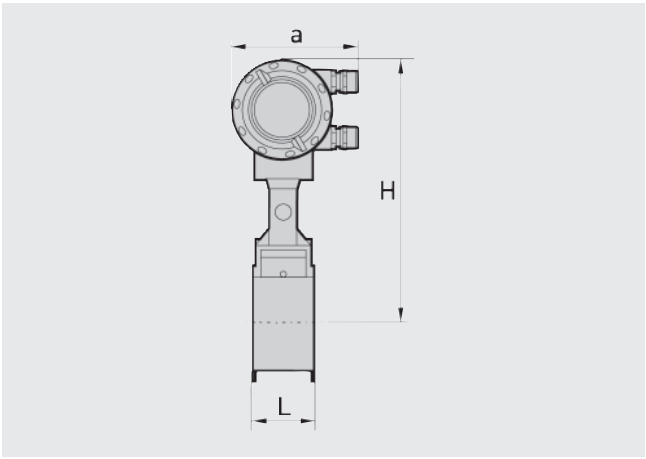
Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)

Flange version EN1092-1

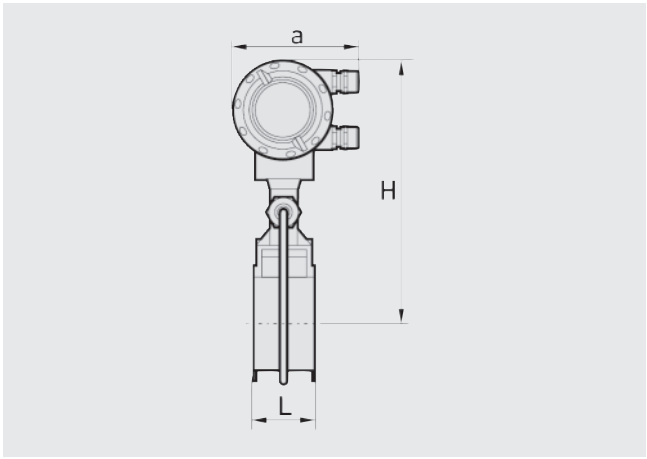
Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Mass meter (with pressure sensor)	Volumetric meter (without pressure sensor)
15	40	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	6.1 (13.45)	5.5 (12.13)
15	100	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	7.1 (15.65)	6.5 (14.33)
25	40	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.9 (17.42)	7.3 (16.09)
25	100	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.9 (21.83)	9.3 (20.50)
40	40	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.8 (23.81)	10.2 (22.49)
40	100	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.8 (32.63)	14.2 (31.31)
50	16	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.7 (28.00)	12.1 (26.68)
50	40	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.9 (28.44)	12.3 (27.12)
50	63	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.9 (37.26)	16.3 (35.94)
50	100	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	18.4 (40.57)	17.8 (39.24)
80	16	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	17.4 (38.36)	16.8 (37.04)
80	40	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	19.4 (42.77)	18.8 (41.45)
80	63	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
80	100	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	27.4 (60.41)	26.8 (59.08)
100	16	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	22 (48.50)	21.4 (47.18)
100	40	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	25 (55.12)	24.4 (53.79)
100	63	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	30 (66.14)	29.4 (64.82)
100	100	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	36 (79.37)	35.4 (78.04)
150	16	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.8 (78.93)	35.2 (77.60)
150	40	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.8 (92.15)	41.2 (90.83)
150	63	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.8 (131.84)	59.2 (130.51)
150	100	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.8 (149.47)	67.2 (148.15)
200	10	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	16	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	25	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	47.4 (104.50)	46.8 (103.18)
200	40	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	55.4 (122.14)	54.8 (120.81)
250	10	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	58.0 (127.87)	57.4 (126.55)
250	16	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	59.0 (130.07)	58.4 (128.75)
250	25	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
250	40	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	93.0 (205.03)	92.4 (203.71)
300	10	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	76.3 (168.21)	75.7 (166.89)
300	16	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.8 (182.54)	82.2 (181.22)
300	25	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	99.3 (218.92)	98.7 (217.60)
300	40	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	128.1 (282.41)	127.5 (281.09)

Flange version ASME B16.5

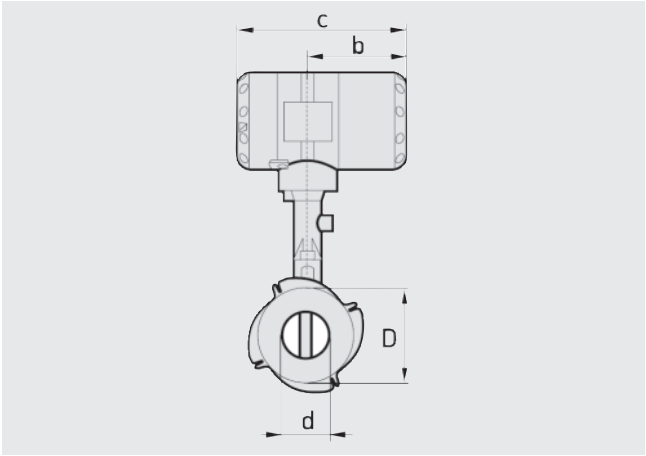
Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	class	d	D	L	H	I	Mass meter (with pressure sensor)	Volumetric meter (without pressure sensor)
½	150	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	5.1 (11.24)	4.5 (9.92)
½	300	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
½	600	13.9 (0.55)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.7 (12.57)	5.1 (11.24)
1	150	26.6 (1.05)	110 (4.33)	200 (7.87)	265 (10.43)	144 (5.67)	6.8 (14.99)	6.2 (13.67)
1	300	26.6 (1.05)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.8 (17.20)	7.2 (15.87)
1	600	24.3 (0.96)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	8.1 (17.86)	7.5 (16.53)
1½	150	40.9 (1.61)	125 (4.92)	200 (7.87)	270 (10.63)	144 (5.67)	8.9 (19.62)	8.3 (18.30)
1½	300	40.9 (1.61)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	11 (24.25)	10.4 (22.93)
1½	600	38.1 (1.50)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	12 (26.46)	11.4 (25.13)
2	150	52.6 (2.07)	150 (5.91)	200 (7.87)	275 (10.83)	144 (5.67)	11.6 (25.57)	11 (24.25)
2	300	52.6 (2.07)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	13 (28.66)	12.4 (27.34)
2	600	49.3 (1.94)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	14.5 (31.97)	13.9 (30.64)
3	150	78 (3.07)	190 (7.48)	200 (7.87)	290 (11.42)	154 (6.06)	20.4 (44.97)	19.8 (43.65)
3	300	78 (3.07)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
3	600	73.7 (2.90)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	24.4 (53.79)	23.8 (52.47)
4	150	102.4 (4.03)	230 (9.06)	250 (9.84)	310 (12.20)	164 (6.46)	24 (52.91)	23.4 (51.59)
4	300	102.4 (4.03)	255 (10.04)	250 (9.84)	310 (12.20)	164 (6.46)	32 (70.55)	31.4 (69.23)
4	600	97.2 (3.83)	275 (10.83)	250 (9.84)	310 (12.20)	164 (6.46)	41 (90.39)	40.4 (89.07)
6	150	154.2 (6.07)	280 (11.02)	300 (11.81)	325 (12.80)	174 (6.85)	36.8 (81.13)	36.2 (79.81)
6	300	154.2 (6.07)	320 (12.60)	300 (11.81)	325 (12.80)	174 (6.85)	51.8 (114.20)	51.2 (112.88)
6	600	146.3 (5.76)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	76.8 (169.31)	46.2 (101.85)
8	150	202.7 (7.98)	345 (13.58)	300 (11.81)	350 (13.78)	194 (7.64)	50.6 (111.55)	50.0 (110.23)
8	300	202.7 (7.98)	380 (14.96)	300 (11.81)	350 (13.78)	194 (7.64)	75.4 (166.23)	74.8 (164.91)
10	150	254.5 (10.02)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
10	300	254.5 (10.02)	455 (17.91)	380 (14.96)	370 (14.57)	224 (8.82)	107.0 (235.89)	106.4 (234.57)
12	150	304.8 (12.00)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	106.9 (235.67)	106.3 (234.35)
12	300	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.9 (334.88)	151.3 (333.56)



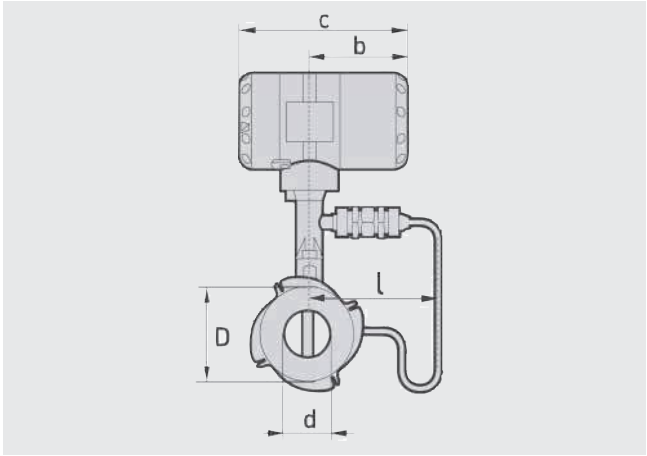
Sandwich version, front view, a = 133 mm (5.24 inches)



Sandwich version, front view, a = 133 mm (5.25 inches)



Sandwich version, side view, b = 105 mm (4.13 inches), c = 179 mm (7,05 inches)



Sandwich version, side view, b = 105 mm (4.13 inches), c = 179 mm (7.05 inches)

SITRANS FX300

Sandwich version EN

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Mass meter (with pressure sensor)	Volumetric meter (without pressure sensor)
15	100	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
25	100	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.9 (10.80)	4.3 (9.48)
40	100	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
50	100	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6.6 (14.55)	6 (13.23)
80	100	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.8 (19.40)	8.2 (18.08)
100	100	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	10.1 (22.27)	9.5 (20.94)

Sandwich version ASME

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	class	d	D	L	H	I	Mass meter (with pressure sensor)	Volumetric meter (without pressure sensor)
½"	150, 300	0.63	1.77	2.56	10.43	5.67	9.04	7.72
½"	600	0.55	1.77	2.56	10.43	5.67	9.04	7.72
1"	150, 300, 600	0.94	2.56	2.56	10.43	5.67	10.08	9.48
1½"	150, 300, 600	1.5	3.23	2.56	10.43	5.67	12.13	10.8
2"	150, 300, 600	1.97	4.02	2.56	10.43	5.67	14.55	13.23
3"	150, 300, 600	2.91	5.31	2.56	10.43	6.1	19.4	18.08
4"	150, 300, 600	3.82	6.22	2.56	10.43	6.46	22.27	20.94

Flow tables

Measuring Range Limits

Size		Q_{min}	Q_{max}	Q_{min}	Q_{max}
DN to EN 1092-1	DN to ASME B16.5	EN 1092-1 [m^3/h]	EN 1092-1 [m^3/h]	ASME B16.5 [m^3/h]	ASME B16.5 [m^3/h]
Water					
15	½"	0.45	5.07	0.44	4.94
25	1"	0.81	11.40	0.81	11.40
40	1½"	2.04	28.58	2.04	28.58
50	2"	3.53	49.48	3.53	49.48
80	3"	7.74	108.37	7.74	108.37
100	4"	13.30	186.22	13.30	186.21
150	6"	30.13	421.86	30.13	421.86
200	8"	52.66	737.18	52.66	737.18
250	10"	81.43	1 140.02	81.43	1 140.02
300	12"	114.83	1 607.61	114.83	1 607.61
Values based on water at 20 °C (68 °F)					
Air					
15	½"	6.72	57.91	6.72	56.46
25	1"	10.20	130.29	10.20	130.29
40	1½"	25.35	326.63	25.35	326.63
50	2"	43.89	565.49	43.89	565.49
80	3"	96.14	1 238.64	96.14	1 238.60
100	4"	165.14	2 128.27	165.19	2 128.27
150	6"	374.23	4 821.60	374.23	4 821.60
200	8"	653.95	8 425.53	633.95	8 425.50
250	10"	977.16	13 028.81	977.16	13 028.14
300	12"	1 377.95	18 372.66	1 377.95	18 372.66
Values based on air at 20 °C (68 °F) and 1.013 bar_{abs} (14.7 psi_{abs})					

Flow rate limits

Product	Nominal diameters		Minimum flow rates	Maximum flow rates
	to EN	to ASME	[m/s]	[m/s]
Liquids	DN 15 … DN 300	DN ½"…DN 12"	$0.5 \times (998/\rho)^{0.5}$ 1)	$7 \times (998/\rho)^{0.47}$ 1)
Gas, vapor	DN 15 … DN 300	DN ½"…DN 12"	$6 \times (1.29/\rho)^{0.5}$ 2)	$7 \times (998/\rho)^{0.47}$ 3)

ρ = operating density [kg/m^3]

1) Minimum flow rates 0.4 m/s (1.3 ft/s), maximum flow rates 10 m/s (32.8 ft/s)
2) Minimum flow rates 2 m/s (6.6 ft/s), maximum flow rates 80 m/s (262 ft/s)
3) Minimum flow rates 2 m/s (6.6 ft/s), maximum flow rates 80 m/s (262 ft/s); DN 15: 45 m/s (148 ft/s) and DN 25: 70 m/s (230 ft/s)

SITRANS FX300

Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		1		3.5		5.2		7	
Density [kg/m³]		1.13498		2.4258		3.27653		4.16732	
Temperature [°C]		120.6		148.2		160.4		170.6	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	5.25	65.72	7.68	140.47	8.93	189.73	10.06	241.31
25	1"	11.82	147.87	17.28	316.05	20.09	426.89	22.66	542.95
40	1½"	29.64	370.71	43.33	792.33	50.63	1 070.2	56.8	1 361.2
50	2"	51.31	641.82	75.02	1 371.8	87.19	1 852.8	98.33	2 356.6
80	3"	112.41	1 405.8	164.33	3 004.7	191	4 058.4	215.39	5 161.8
100	4"	193.14	2 415.5	282.36	5 162.7	328.16	6 973.3	370.09	8 869.2
150	6"	437.56	5 472.4	639.69	11 696	743.45	15 798	838.44	20 093
200	8"	764.62	9 562.8	1 117.8	20 439	1 299.2	27 606	1 465.1	35 112
250	10"	1 177.07	14 655.07	1 716.4	31 161.66	1 993.6	42 039.68	2 247.44	53 426.86
300	12"	1 659.85	20 665.94	2 420.39	43 942.81	2 811.29	58 282.52	3 169.24	75 340.22

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		10.5		14		17.5		20	
Density [kg/m³]		5.88803		7.60297		9.31702		10.5442	
Temperature [°C]		186.2		198.5		208.5		215	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	12.78	332.97	16.51	381.28	20.23	424.66	22.89	453.44
25	1"	26.93	749.18	30.6	857.88	33.87	955.48	36.04	1 020.2
40	1½"	67.51	1 878.2	76.72	2 150.7	84.93	2 395.3	90.35	2 557.7
50	2"	116.89	3 251.7	132.82	3 723.4	147.03	4 147	156.42	4 428.1
80	3"	256.03	7 122.4	290.93	8 155.8	322.06	9 083.7	342.62	9 699.3
100	4"	439.91	12 238	499.9	14 013	553.38	15 608	588.69	16 666
150	6"	996.62	27 725	1 132.5	31 747	1 253.7	35 359	1 333.7	37 756
200	8"	1 741.6	48 449	1 979	55 478	2 190.7	61 789	2 330.6	65 977
250	10"	2 670.28	66 065.16	3 033.45	75 626.77	3 357.4	84 214.04	3 571	89 910.45
300	12"	3 765.52	93 162.2	4 277.65	106 645.56	4 737.45	118 754	5 036.01	126 787.78

Measuring range saturated steam: 15 to 100 psig

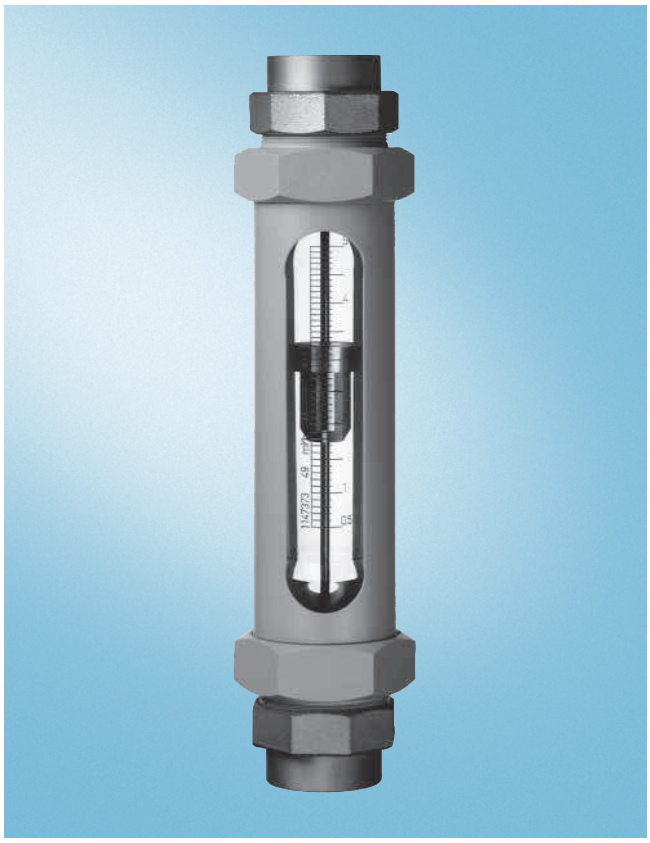
Overpressure [psig]		15		50		75		100	
Density [lbs/ft³]		0.0719		0.1497		0.2036		0.2569	
Temperature [°F]		249.98		297.86		320.36		338.184	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	11.6	147.08	16.83	306	19.62	416.04	22.04	524.86
25	1"	26.25	330.92	37.86	688.48	44.15	936.09	49.59	1 180.9
40	1½"	65.81	829.61	94.92	1 726	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360	6 545.3	419.74	8 899.4	471.45	11 227
100	4"	428.81	5 405.7	618.51	11 246	721.21	15 291	810.06	19 291
150	6"	971.47	12 246	1 401.2	25 478	1 633.9	34 642	1 835.2	43 703
200	8"	1 697.6	21 400	2 448.6	44 523	2 855.2	60 536	3 206.9	76 369
250	10"	2 562.72	32 308.86	3 777.85	68 699.63	4 371.7	92 681.52	4 946.03	117 785.23
300	12"	3 613.84	45 560.54	5 327.61	96 877.61	6 164.78	130 695.42	6 974.68	166 096.57

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		150		200		250		300	
Density [lbs/ft³]		0.3627		0.4681		0.5735		0.6792	
Temperature [°F]		366.08		388.04		406.22		422.06	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	27.79	728.25	35.86	833.73	43.94	928.44	52.04	1 015.5
25	1"	58.93	1 638.6	66.94	1 875.9	74.1	2 089	80.63	2 284.9
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237	202.15	5 728
50	2"	255.75	7 111.9	290.56	8 141.9	321.6	9 066.8	350	9 917
80	3"	560.19	15 578	636.44	17 834	704.43	19 860	766.6	21 722
100	4"	962.54	26 766	1 093.5	30 643	1 210.4	34 124	1 317.2	37 324
150	6"	2 180.6	60 639)	2 477.4	69 421	2 742.1	77 307	2 984	84 556
200	8"	3 810.6	105 96054	4 329.2	121 310	4 791.7	135 090	5 214.5	147 760
250	10"	5 876.29	145 648.57	6 674.55	166 728.29	7 386.91	185 659.96	7 680.16	198 218.37
300	12"	8 286.49	205 387.25	9 412.15	235 112.94	10 416.7	261 809.55	10 830.22	279 518.87

Tubux variable area meter

Overview



SITRANS F VA Tubux variable area meter

Application

The SITRANS F VA Tubux variable area meters are used to measure the volume of transparent liquids and gases passing through closed piping. The variable area meters can also be used for flow monitoring if they are equipped with one or more switching contacts. Standard scales are available for liquids with a density of 1 kg/l (62.43 lb/cu.ft). The scales must be recalculated for all other media depending on the physical characteristics.

The flow tube is also optionally available with a percentage or 2 mm (0.078 inch) scale.

Design and operation

The main components of the SITRANS F VA Tubux variable area meters are the glass variable-area flow tube with float, the fitting and the connection parts. The flow is displayed directly on the scale present on the flow tube (e.g. in l/h) and is read at the position of the float's widest diameter.

Benefits

- Product scales for liquids and gases
- Rugged versions with various materials
- Can be used for high pressures and temperature
- Short delivery times for standard versions.

Connection and mode of operation

For certain variable area meter sizes, the float is packed in a plastic net for transport purposes. Prior to fitting, this must be removed out of the variable area meter from the top.

The locking rod must be pulled upwards out of the variable area meter.

In versions with a float guide rod, the float is usually held in place at the top by a rubber buffer. Push this buffer down to the bottom limit by pressing on the float.

The variable area meter must be fitted vertically and without tension. Control elements or reductions/extensions in the pipe diameter upstream or downstream of the variable area meter have no influence on the accuracy when measuring liquids. However, when measuring gases, the variable area meter should be installed upstream of valves to prevent pulsations resulting from compression. Since variable area meters respond extremely sensitively to changes in flow, control elements should always be adjusted slowly.

The calibration has been carried out for defined media conditions. Deviations in the density, pressure or temperature of gases, or in the density or viscosity of liquids, result in measurement errors. It is essential to observe the calibration conditions. When ordering, it is therefore essential to provide data on the medium, density and viscosity at the operating temperature and pressure. With gases, it is additionally necessary to specify the exact reference point for the pressure (pressure above atmospheric, or absolute pressure).

Retrofitting of switching contacts is only possible if variable area meters with magnets are used and if the fitting is made of stainless steel (see Table on page 4/296). When using for the first time, move the float completely past the contact to permit polarization.

Float guide rod

(see tables on page 4/294 and 4/295)

The float guide rod prevents the float from making contact with the glass flow tube.

The option is recommended to increase the operational safety and to protect against glass breakages in the case of operating conditions such as solenoid valve control. The option is not possible in conjunction with floats with magnets and weighted PVC/PVDF floats.

Liquids
Standard: flow tube E 4000 to H 25000
Option: flow tube C 125 and upwards

Gases
Standard: flow tube D 2500 to H 25000
Option: flow tube C 125 and upwards

Technical specifications

Application	See page 4/292
Mode of operation	See page 4/292
Measuring principle	Float
Input	
Flow	Vertically upwards
Pressure limit with threaded connection	
• A 1 to D 3000	Max. 10 bar (145 psi)
• E 4000 to F 10000	Max. 8 bar (116 psi)
• G 12500 to H 25000	Max. 5 bar (73 psi)
Rated operating conditions	
Temperature limits	
• With float made of mat. No. 1.4305 / 303 , 1.4571 / 316Ti or aluminium	-10 to +150 °C (14 to 302 °F)
• With float made of PVDF	-10 to +100 °C (14 to 212 °F)
• With float made of PVC	-10 to +50 °C (14 to 122 °F)
• With fitting made of PVC	-10 to +50 °C (14 to 122 °F)
	Engraved scale is necessary with medium temperature > 90 °C (194 °F)
Medium conditions	
• Accuracy	Class 1.6 (according to VDE/VDI 3513, sheet 2)
• Measuring range	Dependent on flow tube, see Tables on pages 4/294 and 4/295
- For liquids	0.1 l/h to 25 m^3/h (0.00044 to 110 USgpm)
- For gases	1.6 l/h to 400 m^3/h (0.0009 to 235 scfm)
	A special scale must be provided for liquids with a density other than 1 kg/l (62.43 lb/cu.ft)and all gases
• Dimensions for measured variable	l/h (up to flow tube D2500) m^3/h (flow tube D3000 and above)
Design	
Connections	Screwed gland G¼ to G3
Material	
• Flow tube	Borosilicate glass (length 300 mm (11.8 inch))
• Connection	Cast iron, stainless steel, mat. No. 4571/316Ti, steel, PVC
• Float	Stainless steel, mat. No. 1.4305/303, mat. No. 1.4571/316Ti, PVC and PVDF, aluminium
• Float guide rod	Stainless steel, mat. No. 1.4571 / 316Ti
• Gasket	Buna N up to 90 °C (194 °F), Viton up to 150 °C (302 °F), EPDM (for potable water plants) up to 150 °C (302 °F)
• Limit	Springs made of stainless steel for non-guided floats, otherwise rubber buffers for guided floats
Weight	
• With threaded connection G½	2.5 kg (5.51 lb)
• With threaded connection G1	5.5 kg (12.12 lb)
• With threaded connection G2	9 kg (19.8 lb)
• With threaded connection G3	24 kg (52.9 lb)

Classification according to PED 97/23/EC

	Order No. 7ME5810-	Permissible media	Category
G¼ to G3	xxxax-xxxx; a ≠ 2	Gases of fluid group 2 and liquids of fluid group 1	Article 3.3
≤ DN 25 (G¼ to G1)	xxxax-xxxx; a = 2	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
> DN 25 (G1¼ to G3)	xxxax-xxxx; a = 2	Gases of fluid group 1 and liquids of fluid group 1	I

Technical specifications of contacts

Switching principle	Magnetic contact unit, bistable
Designation	
• Flow tube size C 125 to H 25000	K 17 A, K17 B
• Flow tube size D 650 to H 25000	K 23
Housing/plug	PP/PA 6
Contact material	Rhodium
Degree of protection	IP 65
Ambient temperature	-20 to +80 °C (-4 to +176 °F)
Max. switching frequency	5/min
Max. rating	
• K 17	AC 250 V/0.5 A/10 VA DC 250 V/0.5 A/5 W
• K 23	AC 250 V/1 A/150 VA DC 250 V/1 A/100 W Rating data apply to resistive loads; a suppressor circuit is required for inductive loads

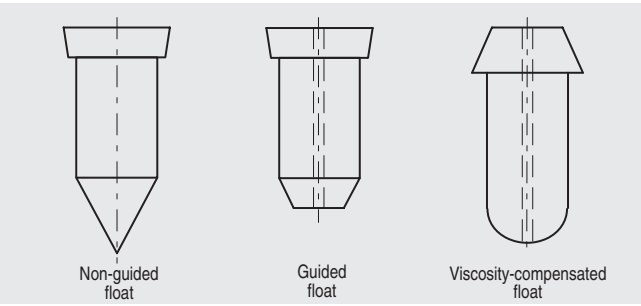
Selection of float

There are three versions of floats:

- Non-guided float
- Guided float
- Viscosity-compensated float.

Use of the viscosity-compensated float is necessary above the following viscosities:

Flow tube	mPa·s
C 125 to C 500	≥ 3
D 650 to D 3000	≥ 5
E 4000 to F 10000	≥ 8
G 12500 to H 25000	≥ 10



Float versions

Tubux variable area meter

Measuring ranges for liquids

Connection		Flow tube	Pressure loss		Max. measuring range for the selected floats							
Female thread G, NPT	PVC adhesive bushing				Up to flow tube B100, mat. No.		Viscosity-compensated, mat. No.		With magnet, mat. No.		PVC weighted	
					1.4305, 1.4571	303, 316Ti	1.4571	316Ti	1.4571	316Ti		
	mm (inch)		mbar	(psi)	l/h	(USgpm)	l/h	(USgpm)	l/h	(USgpm)	l/h	(USgpm)
(G¼), (G⅜), G½	20 (0.79)	A 1	10	(0.145)	**1**	**(0.0044)**	-	-	-	-	-	-
		A 3			**3**	**(0.013)**	-	-	-	-	-	-
		A 5			**5**	**(0.022)**	-	-	-	-	-	-
		A 10			**10**	**(0.044)**	-	-	-	-	-	-
		A 25			**25**	**(0.110)**	-	-	-	-	-	-
		B 30			**30**	**(0.132)**	-	-	-	-	11	(0.048)
		B 40			**40**	**(0.176)**	-	-	-	-	15	(0.066)
		B 50			**50**	**(0.22)**	-	-	-	-	20	(0.088)
		B 65			**65**	**(0.29)**	-	-	-	-	25	(0.110)
		B 80			**80**	**(0.35)**	-	-	-	-	32	(0.140)
		B 100			**100**	**(0.44)**	-	-	-	-	40	(0.176)
		C 125	20	(0.290)	**125**	**(0.55)**	100 *	(0.44) *	**120**	**(0.53)**	65	(0.29)
		C 160			**160**	**(0.70)**	125 *	(0.55) *	**150**	**(0.66)**	90	(0.40)
		C 200			**200**	**(0.88)**	160 *	(0.70) *	**180**	**(0.79)**	110	(0.48)
		C 250			**250**	**(1.10)**	200 *	(0.88) *	**240**	**(1.06)**	140	(0.62)
		C 315	40	(0.58)	**315**	**(1.39)**	240 *	(1.06) *	**300**	**(1.32)**	175	(0.77)
		C 400			**400**	**(1.76)**	300 *	(1.32) *	**360**	**(1.59)**	220	(0.97)
		C 500			**500**	**(2.20)**	360 *	(1.59) *	**480**	**(2.11)**	250	(1.10)
(G½), (G¾), G1	32 (1.26)	D 650	19	(0.28)	**650**	**(2.86)**	400 *	(1.76) *	**600**	**(2.64)**	500	(2.20)
		D 800			**800**	**(3.52)**	500 *	(2.20) *	**750**	**(3.30)**	600	(2.64)
		D 1000			**1000**	**(4.4)**	600 *	(2.64) *	**950**	**(4.18)**	750	(3.30)
		D 1250			**1250**	**(5.5)**	750 *	(3.30) *	**1200**	**(5.3)**	1000	(4.40)
		D 1600	24	(0.35)	**1600**	**(7.0)**	1000 *	(4.40) *	**1500**	**(6.6)**	1250	(5.50)
		D 2000			**2000**	**(8.8)**	1200 *	(5.30) *	**1800**	**(7.9)**	1600	(7.0)
		D 2500	33	(0.48)	**2500**	**(11.0)**	1400 *	(6.20) *	**2400**	**(10.6)**	2000	(8.8)
		D 3000			**3000**	**(13.2)**	1800 *	(7.9)*	**2800**	**(12.3)**	2400	(10.6)
(G1¼), (G1½), G2	63 (2.48)	E 4000	25	(0.36)	**4000 ***	**(17.6)***	2500 *	(11.0)*	**3800 ***	**(16.7)***	3200	(14.0)
		E 5000			**5000 ***	**(22.0)***	3000 *	(13.2)*	**4800 ***	**(21.1)***	3800	(16.7)
		E 6500			**6500 ***	**(28.6)***	4000 *	(17.6)*	**6400 ***	**(28.2)***	5000	(22.0)
		F 8000			**8000 ***	**(35.2)***	4500 *	(19.8)*	**7500 ***	**(33.0)***	6400	(28.0)
		F 10000			**10000 ***	**(44.0)***	5500 *	(24.2)*	**9500 ***	**(41.8)***	7500	(33.0)
(G2), (G2½), G3	-	G 12500	34	(0.49)	**12500 ***	**(55.0)***	7000 *	(30.8)*	**12000 ***	**(52.8)***	-	-
		G 16000			**16000 ***	**(70.4)***	9000 *	(39.6)*	**16000 ***	**(70.4)***	-	-
		H 20000	38	(0.55)	**20000 ***	**(88.0)***	11000 *	(48.4)*	**18000 ***	**(79.2)***	-	-
		H 25000			**25000 ***	**(110.0)***	14000 *	(61.6)*	**24000 ***	**(105.6)***	-	-

Standard measuring range for liquid (ρ = 1 kg/l (62.43 lb/cu.ft), viscosity 1 mPa·s (1 cp)) (dynamic range 1:10)

Remarks

* Guided float.

Non-standard sizes for the thread are listed in brackets.

Standard versions are bold printed.

Measuring ranges for air

Connection		Flow tube	Pressure loss		Max. measuring range for the selected floats									
Female thread G, NPT	PVC adhesive bushing mm (inch)		mbar	(psi)	Aluminium, mat. No. 3.1645 l/h	(scfm)	Aluminium, mat. No. 3.1645 with magnet l/h	(scfm)	PVC l/h	(scfm)	PVDF l/h	(scfm)	PVC with magnet l/h	(scfm)
(G¼), (G$^3/_8$), G½	20 (0.79)	A 1	4	(0.058)	**16**	**(0.009)**	-	-	10	(0.006)	10	(0.006)	-	-
		A 3			**50**	**(0.029)**	-	-	25	(0.015)	25	(0.015)	-	-
		A 5			**80**	**(0.047)**	-	-	50	(0.029)	50	(0.029)	-	-
		A 10			**160**	**(0.094)**	-	-	80	(0.047)	80	(0.047)	-	-
		A 25			**400**	**(0.235)**	-	-	250	(0.147)	250	(0.147)	-	-
		B 30			**500**	**(0.294)**	-	-	320	(0.188)	360	(0.212)	-	-
		B 40			**650**	**(0.383)**	-	-	450	(0.265)	500	(0.294)	-	-
		B 50			**800**	**(0.471)**	-	-	550	(0.324)	650	(0.383)	-	-
		B 65			**1100**	**(0.647)**	-	-	750	(0.441)	800	(0.471)	-	-
		B 80			**1400**	**(0.824)**	-	-	900	(0.530)	1000	(0.589)	-	-
		B 100			**1600**	**(0.942)**	-	-	1100	(0.647)	1250	(0.736)	-	-
		C 125	6.5	(0.094)	**2000**	**(1.18)**	**2500**	**(1.47)**	1400	(0.824)	1500	(0.883)	2200	(1.29)
		C 160			**3000**	**(1.77)**	**3200**	**(1.88)**	1800	(1.06)	2000	(1.18)	3000	(1.77)
		C 200			**3600**	**(2.12)**	**4000**	**(2.35)**	2200	(1.29)	2500	(1.47)	3600	(2.12)
		C 250			**4000**	**(2.35)**	**5000**	**(2.94)**	2800	(1.65)	3000	(1.77)	4500	(2.65)
		C 315	15	(0.218)	**5000**	**(2.94)**	**6400**	**(3.77)**	3400	(2.00)	3600	(2.12)	6000	(3.53)
		C 400			**6400**	**(3.77)**	**8000**	**(4.71)**	4000	(2.35)	5000	(2.94)	7000	(4.12)
		C 500			**8000 ***	**(4.71)***	**-**	**-**	5000 *	(2.94)*	5500 *	(3.24)*	-	-
(G½), (G$^3/_4$), G1	32 (1.26)	D 650	7	(0.102)	**10000**	**(5.89)**	**12000**	**(7.06)**	7000	(4.12)	8000	(4.71)	10000	(5.89)
		D 800			**13000**	**(7.65)**	**15000**	**(8.83)**	9000	(5.30)	9000	(5.30)	12000	(7.06)
		D 1000			**16000**	**(9.42)**	**20000**	**(11.77)**	11000	(6.47)	12000	(7.06)	16000	(9.42)
		D 1250			**20000**	**(11.77)**	**24000**	**(14.13)**	14000	(8.24)	15000	(8.83)	20000	(11.77)
		D 1600	9	(0.131)	**28000**	**(16.48)**	**32000**	**(18.83)**	18000	(10.59)	20000	(11.77)	25000	(14.71)
		D 2000			**36000**	**(21.19)**	**40000**	**(23.54)**	22000	(12.95)	25000	(14.71)	32000	(18.83)
		D 2500	12	(0.174)	**40000 ***	**(23.54)***	**-**	**-**	28000 *	(16.48)*	30000 *	(17.66)*	-	-
		D 3000			**50000 ***	**(29.43)***	**-**	**-**	32000 *	(18.83)*	36000 *	(21.19)*	-	-
(G1¼), (G1½), G2	63 (2.48)	E 4000	10	(0.145)	**64000 ***	**(37.67)***	**75000 ***	**(44.14)***	45000	(26.49)	50000	(29.43)	60000	(35.31)
		E 5000			**80000 ***	**(47.09)***	**100000 ***	**(58.86)***	55000	(32.37)	65000	(38.26)	80000	(47.09)
		E 6500			**100000 ***	**(58.86)***	**125000 ***	**(73.57)***	75000	(44.14)	80000	(47.09)	100000	(58.86)
		F 8000			**140000 ***	**(82.40)***	**150000 ***	**(88.29)***	90000	(52.97)	100000	(58.86)	125000	(73.57)
		F 10000			**160000 ***	**(94.17)***	**180000 ***	**(105.9)***	120000	(70.63)	125000	(73.57)	160000	(94.17)
(G2), (G2½), G3	-	G 12500	13	(0.189)	**200000 ***	**(117.7)***	**220000 ***	**(129.5)***	130000 *	(76.52)*	150000 *	(88.29)*	175000 *	(103.0)*
		G 16000			**280000 ***	**(164.8)***	**300000 ***	**(176.6)***	180000 *	(105.9)*	200000 *	(117.7)*	240000 *	(141.3)*
		H 20000	14	(0.203)	**320000 ***	**(188.3)***	**360000 ***	**(211.9)***	220000 *	(129.5)*	250000 *	(147.1)*	300000 *	(176.6)*
		H 25000			**400000 ***	**(235.4)***	**450000 ***	**(264.9)***	280000 *	(164.8)*	300000 *	(176.6)*	360000 *	(211.9)*

Standard measuring range for air (p_{abs} = 1.013 bar (14.69 psi) at T = 20 °C (68 °F)) (dynamic range 1:10)

Remarks

* Guided float.

Non-standard sizes for the thread are listed in brackets.

Standard versions are bold printed.

Tubux variable area meter

Versions

Eight standard versions are defined in the price list using different combinations of fittings, connection materials and floats (the type number corresponds to the 4th digit of the second block of the order number).

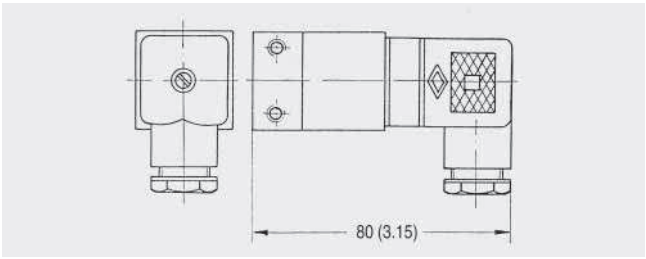
Version		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8
Can be used for		**liquids**					**gases**		
Fitting		Steel	Mat. No. 1.4571/316Ti	Steel	PVC	Mat. No. 1.4571/316Ti/steel	Steel	Steel	Mat. No. 1.4571/316Ti/steel
Connection		Steel (cast iron)	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti	PVC	Steel	Steel (cast iron)	Mat. No. 1.4571/316Ti	Steel (cast iron)
Float		Mat. No. 1.4571/316Ti/1.4305/303	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti	PVC weighted	Mat. No. 1.4571/316Ti	Aluminium (PVC and PVDF as special version)		Aluminium (PVC as special version)
Magnet		-	-	-	-	X	-	-	X
Flow tube, size	**A and B**	X	X	X	X	-	X	X	-
	C to F	X	X	X	X	X	X	X	X
	G and H	X	-	X	-	X	X	X	X

Standard variable area meter versions

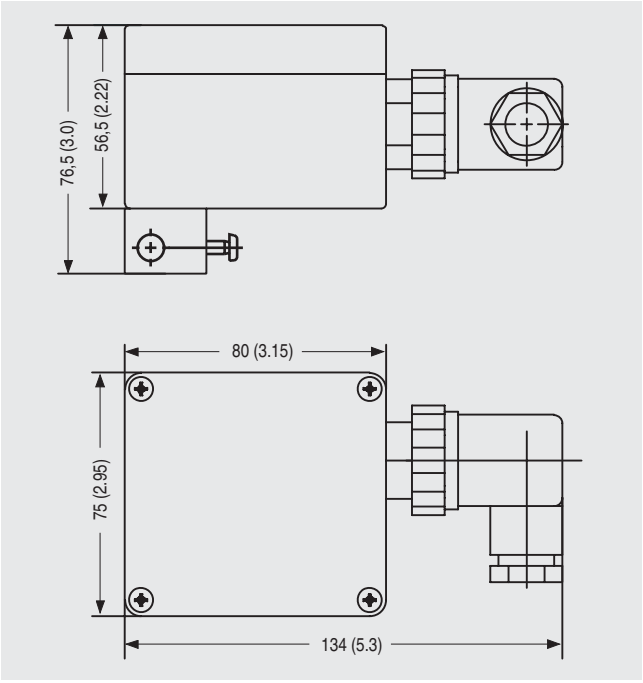
Contact assembly

The bistable contact assembly consists of a contact spring set sealed in a glass tube filled with protective gas.

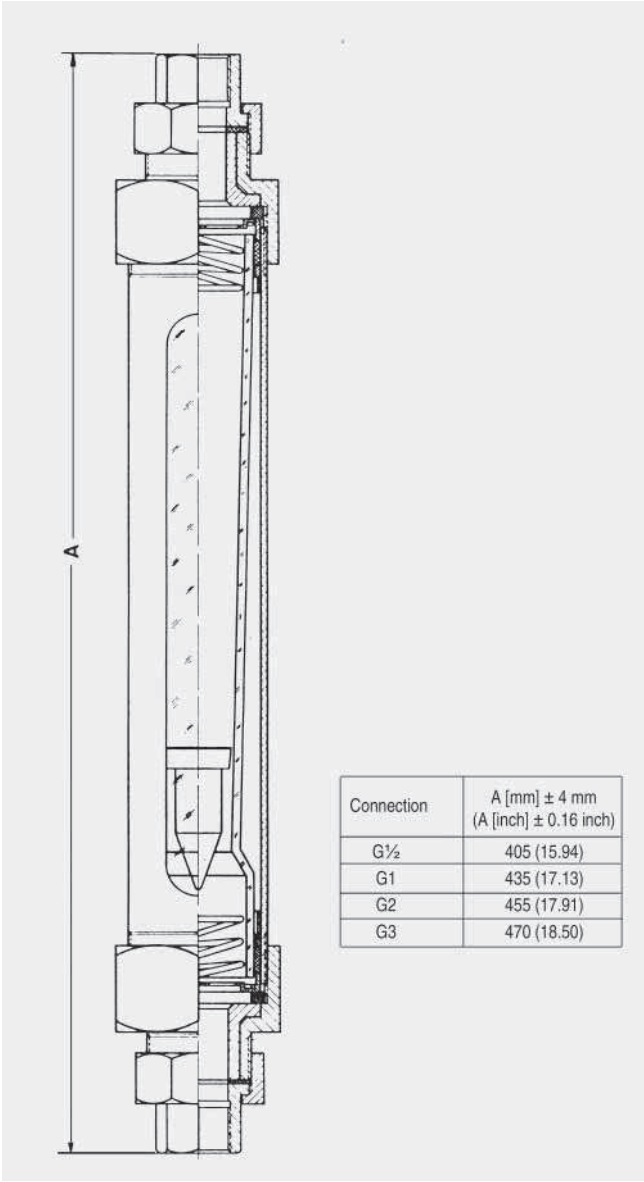
Three contacts can be selected:
- K 17 A: contact closes when the limit is fallen below
- K 17 B: contact closes when the limit is exceeded
- K 23: changeover contact.



Contact K17, dimensions in mm (inches)



Changeover contact K 23, dimensions in mm (inches)



Connection	A [mm] ± 4 mm (A [inch] ± 0.16 inch)
G½	405 (15.94)
G1	435 (17.13)
G2	455 (17.91)
G3	470 (18.50)

SITRANS F VA Tubux, dimensions in mm (inch)

Selection and Ordering data		Order No.	Order code
SITRANS F VA variable area meter	F)	**7ME5810-**	
Type Tubux		■■■■■ - ■■■■	■■■
Glass flow tube			
Flow tube size			
A 1		1 A	
A 3		2 A	
A 5		3 A	
A 10		4 A	
A 25		5 A	
B 30		1 B	
B 40		2 B	
B 50		3 B	
B 65		4 B	
B 80		5 B	
B 100		6 B	
C 125		1 C	
C 160		2 C	
C 200		3 C	
C 250		4 C	
C 315		5 C	

Selection and Ordering data		Order No.	Order code
SITRANS F VA variable area meter	F)	**7ME5810-**	
Type Tubux		■■■■■ - ■■■■	■■■
Glass flow tube			
C 400		6 C	
C 500		7 C	
D 650		1 D	
D 800		2 D	
D 1000		3 D	
D 1250		4 D	
D 1600		5 D	
D 2000		6 D	
D 2500		7 D	
D 3000		8 D	
E 4000		1 E	
E 5000		2 E	
E 6500		3 E	
F 8000		1 F	
F 10000		2 F	
G 12500		1 G	
G 16000		2 G	
H 20000		1 H	
H 25000		2 H	
Standard versions according to Table page 4/296			
Flow tube			
• Size A, B [1]		A	
• Size C		C	
• Size D		D	
• Size E, F		E	
• Size G, H [2] [4]		G	
Version			
• Type 1 Fitting: steel Connection: steel (cast iron) Float: 1.4571/316Ti, 1.4305/303		1	
• Type 2 Fitting, connection, float: 1.4571/316Ti		2	
• Type 3 Fitting: steel Connection, float: 1.4571/316Ti		3	
• Type 4 Fitting, connection: PVC Float: PVC, weighted		4	
• Type 5 Fitting: 1.4571/steel, 316Ti Connection: steel (cast iron) Float: 1.4571/316Ti with magnet		5	
• Type 6 Fitting: steel Connection: steel (cast iron) Float: aluminium, PVC [3]) or PVDF [3]		6	
• Type 7 Fitting: steel Connection: 1.4571/316Ti Float: aluminium, PVC [3] or PVDF [3]		7	
• Type 8 Fitting: 1.4571/steel, 316Ti Connection: steel (cast iron) Float: aluminium or PVC [3] with magnet		8	
Special version Specify Order code and plain text: Flow tube: ...; Version: ...		Z 9	K 1 Y
Gasket material			
• Buna N (standard)		1	
• Viton		4	
• EPDM		8	

F) Subject to export regulations AL: 9I999, ECCN: N.

Tubux variable area meter

Selection and Ordering data	Order No. / Order code
SITRANS F VA variable area meter F) **7ME5810-**	■■■■■ - ■■■■ ■■■
Type Tubux	
Glass flow tube	
Contacts (only with magnetic float)	
• Without contact	0
• Contact K17/A (closes when limit is fallen below)	1
• Contact K17/B (opens when limit is fallen below)	2
• 2 contacts K17/A	3
• 2 contacts K17/B	4
• Changeover contact K 23	5
• 1 per contact K17/A and K17/B	6
Connection size (see Tables on pages 4/294 and 4/295)	
• PVC adhesive bushing (for plastic pipe only)	A
• Female thread G1/4	B
• Female thread G3/8	C
• Female thread G1/2	D
• Female thread G3/4	E
• Female thread G1	F
• Female thread G1 1/4	G
• Female thread G1 1/2	H
• Female thread G2	J
• Female thread G2 1/2	K
• Female thread G3	L
Connection type	
• Female thread DIN ISO 228 5)	A
• Adhesive bushing (only for type 4)	B
• Female thread (NPT) 5)	C
Float version	
• Standard	0
• Guided	2
• Float viscosity-compensated for liquids (SV)	3
• PVC for gases	4
• PVC with magnet for gases	5
• PVDF for gases	6
• PVC guided	7
• PVDF guided	8
• Special versions Specify Order code and plain text: Float: ...	9 R 1 Y

1) Not available for the types 5 and 8.
2) Not available for the type 4.
3) Available as special version.
4) Not available for the type 2.
5) With type 4: material PVC

Selection and Ordering data	Order code
Further designs Please add „-Z“ to Order No. and specify Order code(s).	
Measured medium Always required, specify in plain text: Medium, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure	**Y01**
With engraved scale (>90 °C (194 °F))	**Y02**
Silicone-free version	**Y04**
Medium: water Viscosity: 1 mPa·s (1 cp) Density: 1 kg/l (62.43 lb/cu.ft)	**Y05**
Special version: specify in plain text	**Y99**

Selection and Ordering data	Order No.
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux F) **7ME5890-**	■■■■■ - ■■■ 0
Flow tube	
Without flow tube	0 A
A 1	1 A
A 3	2 A
A 5	3 A
A 10	4 A
A 25	5 A
A 35	6 A
B 30	1 B
B 40	2 B
B 50	3 B
B 65	4 B
B 80	5 B
B 100	6 B
C 125	1 C
C 160	2 C
C 200	3 C
C 250	4 C
C 315	5 C
C 400	6 C
C 500	7 C
D 650	1 D
D 800	2 D
D 1000	3 D
D 1250	4 D
D 1600	5 D
D 2000	6 D
D 2500	7 D
D 3000	8 D
E 4000	1 E
E 5000	2 E
E 6500	3 E
F 8000	1 F
F 10000	2 F
G 12500	1 G
G 16000	2 G
H 20000	1 H
H 25000	2 H
Float material	
Without float	A 0 8
Flow tube: size/material	
A / mat. No. 1.4571/316Ti	A 1
A / aluminium	A 3
A / PVDF, not weighted	A 7
A / PVC, not weighted	A 8
B / mat. No. 1.4571/316Ti	B 1
B / aluminium	B 3
B / PVC, weighted	B 7
B / PVC, not weighted	B 8
C / mat. No. 1.4305/303	C 1
C / mat. No. 1.4571/316Ti	C 2
C / aluminium	C 3
C / PVC, weighted	C 7
C / PVC, not weighted	C 8
D / mat. No. 1.4305/303	D 1
D / mat. No. 1.4571/316Ti	D 2
D / aluminium	D 3
D / PVC, weighted	D 7
D / PVC, not weighted	D 8

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data		Order No.								
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux	F)	**7ME5890-**	■	■	■	■	-	■	■	■	0
E, F / mat. No. 1.4305/303			**E**	**1**							
E, F / mat. No. 1.4571/316Ti			**E**	**2**							
E, F / aluminium			**E**	**3**							
E, F / PVC, weighted			**E**	**7**							
E, F / PVC, not weighted			**E**	**8**							
G, H / mat. No. 1.4571/316Ti			**F**	**2**							
G, H / aluminium			**F**	**3**							
G, H / PVC, weighted			**F**	**4**							
G, H / PVC, not weighted			**F**	**5**							
Float design											
• Standard					**0**						
• With magnet					**1**						
• Guided					**2**						
• With magnet and guided (only for flow tube sizes E, F, G, H)					**3**						
• Version without float					**8**						
Gasket material (only together with declaration of flow tube)											
Without gaskets						**0**	**A**				
For Tubux Flow tube: size / material											
A, B / buna N						**1**	**A**				
C / buna N						**2**	**A**				
D / buna N						**3**	**A**				
E, F / buna N						**5**	**A**				
G, H / buna N						**7**	**A**				
For Unox Flow tube: size / material											
A, B, C / buna N						**1**	**B**				
D up to D1000 / buna N						**3**	**B**				
D for D1250 and above / buna N						**4**	**B**				
E / buna N						**5**	**B**				
F / buna N						**6**	**B**				
G / buna N						**7**	**B**				
H / buna N						**8**	**B**				
For Tubux Flow tube: size / material											
A, B / Viton						**1**	**C**				
C / Viton						**2**	**C**				
D / Viton						**3**	**C**				
E, F / Viton						**5**	**C**				
G, H / Viton						**7**	**C**				
For Unox Flow tube: size / material											
A, B, C / Viton						**1**	**D**				
D up to D1000 / Viton						**3**	**D**				
D for D1250 and above / Viton						**4**	**D**				
E / Viton						**5**	**D**				
F / Viton						**6**	**D**				
G / Viton						**7**	**D**				
H / Viton						**8**	**D**				
Accessories											
Without accessories											**A**
2 stainless steel limit springs for:											
Flow tube size A, B											**B**
Flow tube size C											**C**
Flow tube size D											**D**
Float guide rod and buna N limits for Tubux											
Flow tube size C, D											**E**
Flow tube size E, F											**F**
Flow tube size G, H											**G**

Selection and Ordering data		Order No.								
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux	F)	**7ME5890-**	■	■	■	■	-	■	■	■	0
2 stainless steel limits with float guide rod and buna N limits for Unox											
Flow tube size C											**H**
Flow tube size D											**J**
Flow tube size E											**K**
Flow tube size F											**L**
Flow tube size G											**M**
Flow tube size H											**N**

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Calibration certificate	**B06**
Measured medium Always required, specify in plain text: Medium, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure	**Y01**
With etched scale (>90 °C (194 °F))	**Y02**
Silicone-free version	**Y04**
Medium: water Viscosity: 1 mPa·s (1 cp) Density: 1 kg/l (62.43 lb/cu.ft)	**Y05**
Special version: specify quotation number/date in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FVA250 variable area meter

Overview

SITRANS FVA250 variable area meter

Application

The SITRANS FVA250 variable area meters with a standard length of 250 mm (9.84 inch) and their completely metal design can be used to measure many different types of liquids and gases passing through closed piping. The robust design means that they can also be used in harsh conditions. Different types of flanges, liners and float materials satisfy the requirements of the pharmaceutical and chemical industries.

The measured value is displayed directly on the scale, and output via a switch contact or as a current output (HART or PROFIBUS PA).

The SITRANS FVA250 is primarily used in the following industries:

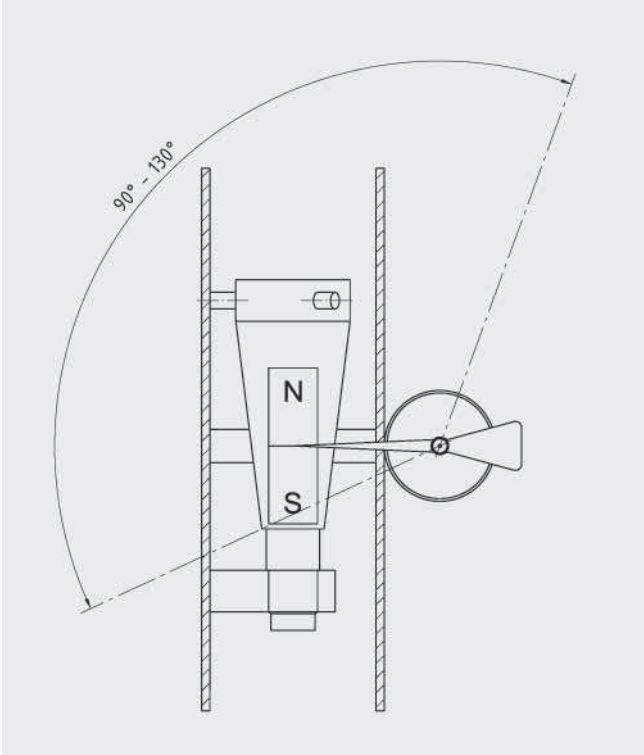
- Chemical industry
- Water
- Power generation and distribution.

Special features

- Standard design available at short notice
- Robust all-metal fitting with impact-resistant housing cover
- Can also be used for corrosive and flammable media
- Use possible at high pressures and temperatures
- Product and percentage scales
- Can be optionally fitted with heating and cooling sheaths
- Contamination-insensitive guiding of float.

Design and mode of operation

Like the other units in the SITRANS F VA range, the SITRANS FVA250 operates according to the variable-area flow tube principle: the flowing medium lifts the conical float in the flow tube. The annular gap is then increased until there is an equilibrium between the buoyant force of the medium and the force due to the weight of the float. The height of the float is directly proportional to the flow quantity. The movement of the float is transmitted by a magnet to a slave magnet in the display unit outside the flow tube.



Flow tube/tube angle

Float damping

A float damping is generally recommended

- for gas measurements
- if air pockets cannot be completely prevented in the medium
- if the pipelines are subject to knocking caused by delays in the flow rate, e.g. due to fast throttling or when the pipe is shut off
- if turbulence, pulsations or other instabilities cause the float to oscillate
- when it is not possible to slowly build up the flow pressure
- when it is not possible to prevent vibrations in the pipeline

Technical specifications

Application	See page 4/300
Design and mode of operation	See page 4/300
Measuring principle	Variable area flowmeter
Input	
Measuring range	See table on page 4/303
Pressure rating	PN 10 to PN 40 (145 to 580 psi) depending on version (see table on page 4/303)
Flow	upwards
Dimensions for mesured variables	l/h, from 4000 l/h (17.6 USgpm) in m^3/h
Rated conditions	
Mounting	vertical
Ambient temperature	
• With local display	-40 ... +80 °C (-40 ... +176 °F)
• With limit transmitter	-40 ... +65 °C (-40 ... +149 °F)
• With HART, PA output	-40 ... +70 °C (-40 ... +158 °F)
Medium conditions	
• Messuring accuracy	
- For liquids	± 1.6%
- For gases	± 2.0%
• Temperature of medium	See page 4/303

Viscosity limits

Q_{max} m^3/h	Q_{max} (USgpm)	Viscosity mPa·s (cp)
≤ 0.1	(≤ 0.44)	1.0
> 0.1 ... 0.5	(> 0.44 ... 2.20)	1.0 ... 3.0
> 0.5 ... 3	(> 2.20 ... 13)	1.0 ... 5.0
> 3 ... 10	(> 13 ... 44)	1.0 ... 8.0
> 10 ... 25	(> 44 ... 110)	1.0 ... 10
> 25 ... 50	(> 110 ... 220)	1.0 ... 15
> 50 ... 100	(> 220 ... 440)	1.0 ... 25
> 100	(> 440)	1.0 ... 50

Design	
Flanges	EN 1092-1, ANSI
Material	
• Fitting	Stainless steel, mat. No. 1.4404/316L
• Float	Stainless steel, mat. No.1.4404/316L, Hastelloy, PTFE
• Wetted parts materials	Stainless steel mat. No. 1.4404/316L, PTFE, C 22.8, Hastelloy depending on version
Degree of protection (display unit)	
• Display unit made of aluminium	IP65
• Display unit made of stainless steel	IP66
Electromagnetic immunity	
• EN 61000-6-2: 1999	Interference immunity industrial environment
• EN 50081-1	IEmitted interference residential environment
• EN 55011: 1998 + A1: 1999	Group 1, Class B
• NAMUR recommendation	NE 21

Classification according to pressure equipment directive (DGRL 97/23/EG)

	Order No. 7ME5822-7ME5823-	Permissible media	Category
DN 15	xAxxx-xxxx	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
DN 20	xFxxx-xxxx		Article 3.3
DN 25	xBxxx-xxxx		Article 3.3
DN 32	xGxxx-xxxx		III
DN 40	xHxxx-xxxx		III
DN 50	xCxxx-xxxx		III
DN 65	xJxxx-xxxx		III
DN 80	xDxxx-xxxx		III
DN 100	xExxx-xxxx		III

Technical specifications of contacts

Limit transmitter	
Switching principle	Inductive contact, single contact and twin contact
Connection	M20x1.5
Auxiliary power supply	DC 8 V
Self-inductance	500 µH
Self-capacitance	80 nF
Ambient temperature	
• When used in non-hazardous locations	-40 ... +65 °C (-40 ... +149 °F)
Explosion protection	II 2G EEx ia IIC T6 - T4
EC-Type Examination Certificate for Directive 94/9/EG	PTB 99 ATEX 2219 X
Electric remote transmitter, signal output HART	
Connection	2 wire connection
Auxiliary power supply	DC 14 ... 30 V
Output	4 ... 20 mA
Load	min. 250 Ω
Ambient temperature	
• When used in non-hazardous locations	-40 ... +70 °C (-40 ... +158 °F)
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075
Electric remote transmitter, signal output PROFIBUS PA	
Auxiliary power supply	DC 10 ... 25 V
Basic current	< 16.5 mA
Fault current	< 18 mA
Transfer rate	31.25 kBaud
Ambient temperature	
• When used in non-hazardous locations	-40 ... +70 °C (-40 ... +158 °F)
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075

Function

Device setting

Limit sensor (inductive contact)

The measuring instrument is supplied as ordered ready for operation. Limit sensors are preset to the required values. If you have not stipulated any particular specifications, the basic settings are as follows:

- 1 contact device:
  Min. contact switching point at 10 % falling flow rate.
  (damped/closed-circuit operation)
- 2 contact devices:
  Min. contact switching point at 10 % falling flow rate and max. contact switching point at 90 % rising flow rate

SITRANS FVA250 variable area meter

Adjusting the limit sensors

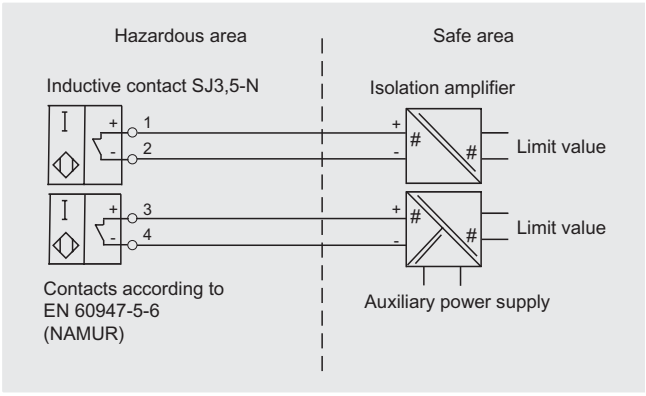
The contacts can be adjusted over the contact position indicator located on the scale. For this purpose, you need to remove the indicator hood, loosen the contact position indicator, set it to the required value and tighten again.

Analog output with magnetoelectrical transmitter

The magnetoelectrical transmitter is factory-calibrated to the scale intervals.

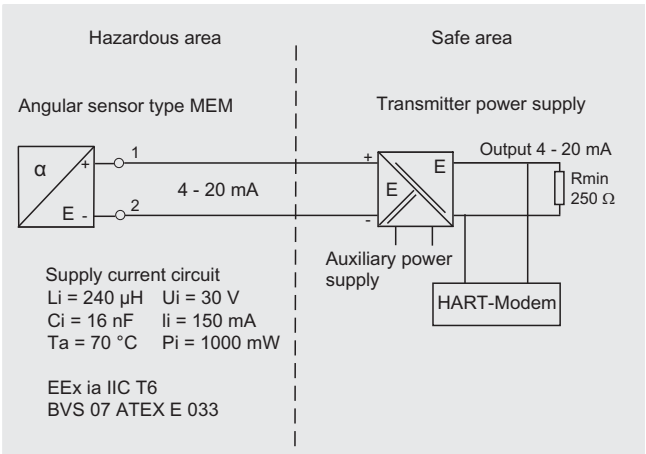
For HART, the signal output is solely available with 2-wire connection with 4 to 20 mA. The signal output and the limit value can be configured over a HART modem using the configuration program SIMATIC PDM.

The PROFIBUS PA is fitted with an interface for a digital communication circuit in accordance with the FISCO model. The signal output is configured using SIMATIC PDM.

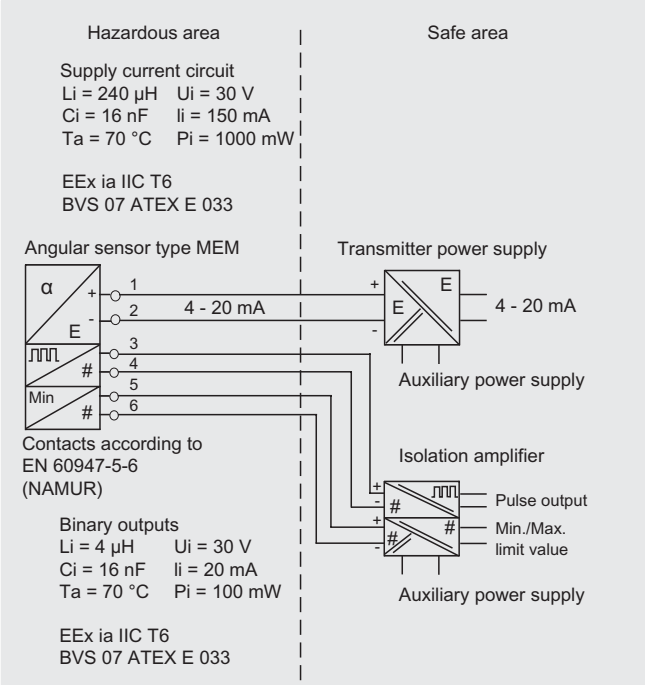


Connection diagram for inductive limit transmitter

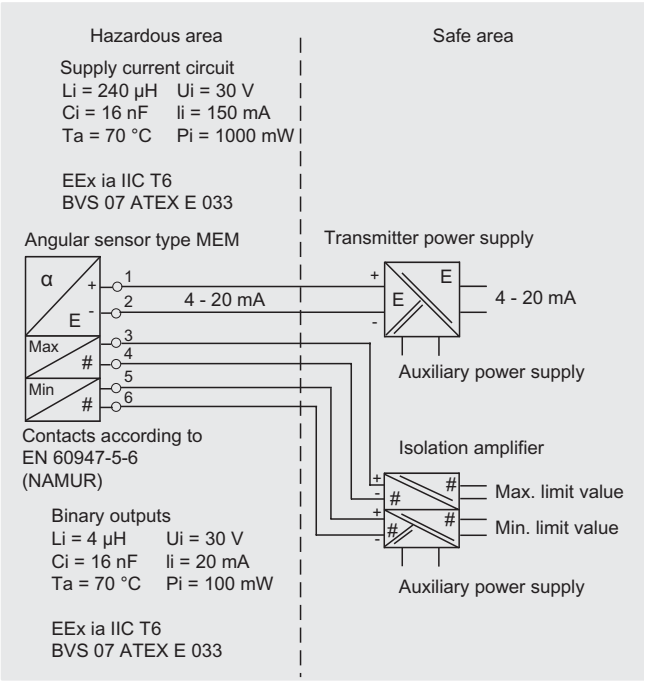
Schematics



Connection diagram for HART magnetoelectrical transmitters



Connection diagram for HART transmitters with 4 to 20 mA output, pulse output and limit contact



Connection diagram for HART transmitters with 4 to 20 mA output, and 2 limit contacts

Measuring ranges for liquids/gases

		Design	CF-S		EF-H		FF-P[1]	
		Wetted parts materials	Mat. No. 1.4404/316L		Hastelloy C		PTFE	
		Fitting	Mat. No. 1.4404/316L		Mat. No. 1.4571/316Ti		Mat. No. 1.4571/316Ti with PTFE liner	
		Flange	Mat. No. 1.4404/316L		≤ DN 25: Hastelloy > DN 25: Hastelloy/ stainless steel		Mat. No. 1.4571/316Ti with PTFE liner	
		Float/flow tube	Mat. No. 1.4404/316L		Hastelloy		PTFE	
		Max. temperature of medium	200 °C (392 °F) optional 350 °C (662 °F)		200 °C (392 °F) optional 350 °C (662 °F)		125 °C (257 °F)	
Possible flange connections to EN 1092-1 gray = Type CF-S and Type EF-H X = Type FF-P		Nominal pressure	DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)		DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)		PN 16 (232 psi)	

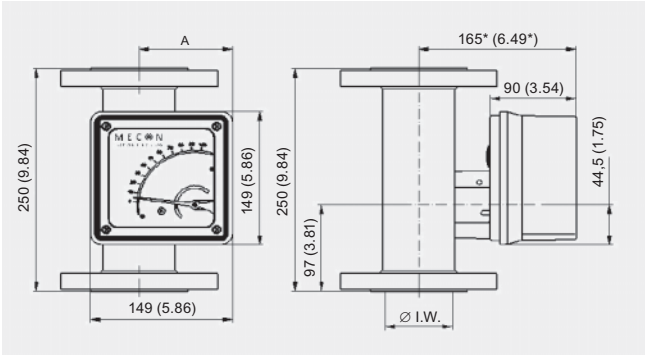
DN 15[2]	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	Pressure loss [mbar] in relation to full-scale value	Order code in MLFB	Liquid l/h	Gas m³/h	Liquid l/h	Gas m³/h	Liquid l/h	Gas m³/h
									40	**Z + K1A**	5	0.15	–	–	–	–
									40	**Z + K1B**	10	0.30	–	–	–	–
									40	**A**	16	0.48	–	–	–	–
									40	**B**	25	0.75	–	–	–	–
									40	**C**	40	1.3	–	–	–	–
X		X							40	**Z + K1C**	50	1.5	50	1.5	50[1]	1.5[1]
X		X							40	**D**	70	2.1	70	2.1	70[1]	2.1[1]
X		X							60	**E**	100	3.0	100	3.0	100[1]	3.0[1]
X		X							60	**F**	160	4.6	160	4.6	160	4.6
X		X							60	**G**	250	7.0	250	7.0	250	7.0
X		X							70	**H**	400	11.0	400	11.0	400	11.0
X		X							80	**J**	600	17.0	600	17.0	600	17.0
		X							60	**K**	1000	30.0	1000	30.0	1000	30.0
		X							70	**L**	1600	46.0	1600	46.0	1600	46.0
		X							DN < 40: 100 DN ≥ 40: 50	**M**	2500	70.0	2500	70.0	2500	70.0
					X				DN < 40: 240 DN ≥ 40: 80	**N**	4000	110.0	4000	110.0	4000	110.0
					X				DN < 40: 180 DN ≥ 40: 90	**P**	6000	170.0	6000	170.0	6000	170.0
					X				110	**Q**	10000	290.0	10000	290.0	10000	290.0
					X		X		DN < 80: 230 DN ≥ 80: 70	**R**	16000	460.0	16000	460.0	16000	460.0
					X				DN < 80: 230 DN ≥ 80: 70	**S**	20000	550.0	20000	550.0	–	–
							X		DN < 80: 500 DN ≥ 80: 100	**T**	25000	700.0	25000	700.0	25000	700.0
								X	DN < 80: 350 DN ≥ 80: 120	**U**	40000	1100.0	40000	1100.0	40000	1100.0
								X	DN < 80: 350 DN ≥ 80: 120	**V**	50000	1350.0	50000	1350.0	50000	1350.0
									360	**W**	60000	1700.0	60000	1700.0	–	–
									600	**Z + K1D**	80000	2400.0	80000	2400.0	–	–
									600	**X**	100000	3000.0	100000	3000.0	–	–

[1] The measuring range dynamics is always 1:10. For type FF-P, the measuring range dynamics 1:5 for small flow rates.

[2] Not available in ANSI ½" for type FF-P; rated size available: ANSI ¾".

SITRANS FVA250 variable area meter

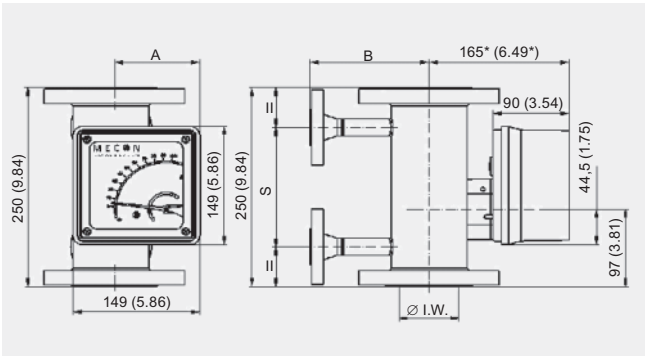
Dimensional drawings



DN		ANSI		I. W.		A		Weight	
				mm	inch	mm	inch	kg	lbs
15	PN40	½“	150 lbs	26	1.02	74	2.91	3,0	6.6
20	PN40	¾“	150 lbs	26	1.02	74	2.91	3,0	6.6
25	PN40	1“	150 lbs	32	1.26	77	3.03	4,2	9.3
32	PN40	1¼“	150 lbs	32	1.26	77	3.03	5,2	11.5
40	PN40	1½“	150 lbs	46	1.81	88	3.46	6,0	13.2
50	PN40	2“	150 lbs	70	2.76	97	3.82	7,5	16.5
65	PN16	2½“	150 lbs	70	2.76	97	3.82	8,5	18.7
80	PN16	3“	150 lbs	102	4.02	113	4.45	13	28.7
100	PN16	4“	150 lbs	125	4.92	126	4.96	18	39.7

* + 100 mm (3.94 inch) with pulled-out display unit

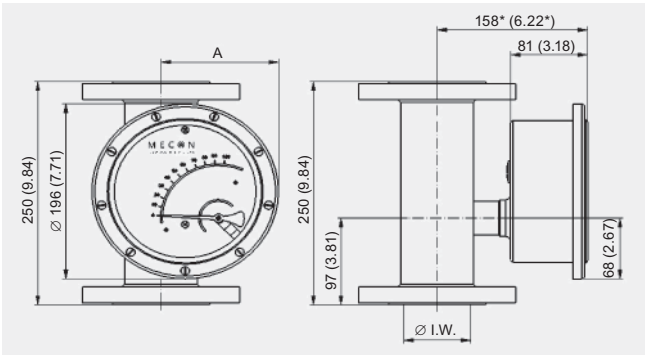
SITRANS FVA250, enclosure of display unit made of aluminum, dimensions in mm (inch)



DN		B (flange)		B (Ermeto)		S		Weight	
		mm	inch	mm	inch	mm	inch	kg	lbs
15	½“	110	4.33	53	2.09	150	5.91	3,0	6.6
20	¾“	110	4.33	53	2.09	150	5.91	3,0	6.6
25	1“	110	4.33	58,5	2.3	150	5.91	4,2	9.3
32	1¼“	110	4.33	58,5	2.3	150	5.91	5,2	11.5
40	1½“	130	5.12	63	2.48	150	5.91	6,0	13.2
50	2“	140	5.51	77,5	3.05	150	5.91	7,5	16.5
65	2½“	140	5.51	77,5	3.05	150	5.91	8,5	18.7
80	3“	160	6.3	93,5	3.68	150	5.91	13	28.7
100	4“	175	6.89	110	4.33	120	4.72	18	39.7

* + 100 mm (3.94 inch) with pulled-out display unit

SITRANS FVA250, enclosure of display unit made of aluminum with heating connection, dimensions in mm (inch)



DN		ANSI		I. W.		A		Weight	
				mm	inch	mm	inch	kg	lbs
15	PN40	½“	150 lbs	26	1.02	103	4.06	3,0	6.6
20	PN40	¾“	150 lbs	26	1.02	103	4.06	3,0	6.6
25	PN40	1“	150 lbs	32	1.26	105	4.13	4,2	9.3
32	PN40	1¼“	150 lbs	32	1.26	105	4.13	5,2	11.5
40	PN40	1½“	150 lbs	46	1.81	115	4.53	6,0	13.2
50	PN40	2“	150 lbs	70	2.76	129	5.08	7,5	16.5
65	PN16	2½“	150 lbs	70	2.76	129	5.08	8,5	18.7
80	PN16	3“	150 lbs	102	4.02	145	5.71	13	28.7
100	PN16	4“	150 lbs	125	4.92	158	6.22	18	39.7

* + 100 mm (3.94 inch) with pulled-out display unit

SITRANS FVA250, enclosure of display unit made of stainless steel, dimensions in mm (inch)

Selection and Ordering data		Order No.	Order Code
SITRANS FVA250 variable area meter, made completely of metal			
• for the measurement of liquids	F)	7ME5822 - ■■■0■ - ■■■■	■■■
• for the measurement of gases	F)	7ME5823 - ■■■0■ - ■■■■	■■■
Design			
Type: CF-S (standard) Fitting: Stainless steel 1.4404/316L, Flange: Stainless steel 1.4404/316L float: Stainless steel 1.4404/316L		2	
Type: EF-H Fitting: Stainless steel 1.4404/316L, Flange: 1.4404/316L with Hastelloy liner float: Hastelloy		4	
Type: FF-P Fitting: Stainless steel 1.4404/316L, Flange: 1.4404/316L with PTFE liner float: PTFE		5	
Nominal diameter/flange connection			
Flange to DIN 2501			
DN 15, PN 40		A	
DN 20, PN 40		F	
DN 25, PN 40		B	
DN 32, PN 40		G	
DN 40, PN 40		H	
DN 50, PN 40		C	
DN 65, PN 16		J	
DN 65, PN 40		Z	J 1 A
DN 80, PN 40		D	
DN 100, PN 16		E	
DN 100, PN 40		Z	J 1 B
Flanges to ASME			
½" ANSI 150 RF B16.5 (not for DN15 with type FF-P)		K	
½" ANSI 300 RF B16.5 (not for DN15 with type FF-P)		Z	J 2 A
¾" ANSI 150 RF B16.5		L	
¾" ANSI 300 RF B16.5		Z	J 2 B
1" ANSI 150 RF B16.5		M	
1" ANSI 300 RF B16.5		Z	J 2 C
1¼" ANSI 150 RF B16.5		N	
1¼" ANSI 300 RF B16.5		Z	J 2 D
1½" ANSI 150 RF B16.5		P	
1½" ANSI 300 RF B16.5		Z	J 2 E
2" ANSI 150 RF B16.5		Q	
2" ANSI 300 RF B16.5		Z	J 2 F
2½" ANSI 150 RF B16.5		R	
2½" ANSI 300 RF B16.5		Z	J 2 G
3" ANSI 150 RF B16.5		S	
3" ANSI 300 RF B16.5		Z	J 2 H
4" ANSI 150 RF B16.5		T	
4" ANSI 300 RF B16.5		Z	J 2 J

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS FVA250 variable area meter

Selection and Ordering data

Order No. 7ME5822-■■■0■-■■■■ 7ME5823-■■■0■-■■■■ Order Code ■■■

SITRANS FVA250 variable area meter, made completely of metal

- for the measurement of liquids F)
- for the measurement of gases F)

Flow tube

Measuring range for liquids l/h	Measuring range for gases m³/h	Nominal diameters FF-P	EF-H	CF-S		Order Code
0.5 ... 5	0.015 ... 0.15	–	–	DN 15 ... 25	Z	K1A
1 ... 10	0.03 ... 0.3	–	–	DN 15 ... 25	Z	K1B
1.6 ... 16	0.045 ... 0.48	–	–	DN 15 ... 25	A	
2.5 ... 25	0.075 ... 0.75	–	–	DN 15 ... 25	B	
4 ... 40	0.13 ... 1.3	–	–	DN 15 ... 25	C	
5 ... 50	0.15 ... 1.5	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	Z	K1C
7 ... 70	0.2 ... 2.1	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	D	
10 ... 100	0.3 ... 3.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	E	
16 ... 160	0.5 ... 4.6	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	F	
25 ... 250	0.7 ... 7.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	G	
40 ... 400	1.0 ... 11	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	H	
60 ... 600	1.7 ... 17	DN 15 ... 25	DN 15 ... 25	DN 15 ... 40	J	
100 ... 1000	3 ... 30	DN 25	DN 15 ... 25	DN 15 ... 40	K	
160 ... 1600	4 ... 46	DN 25	DN 15 ... 25	DN 15 ... 40	L	
250 ... 2500	7 ... 70	DN 25	DN 15 ... 25	DN 15 ... 40	M	
400 ... 4000	11 ... 110	DN 50	DN 25 ... 65	DN 25 ... 65	N	
600 ... 6000	17 ... 170	DN 50	DN 40 ... 65	DN 40 ... 65	P	
1000 ... 10000	29 ... 290	DN 50	DN 50 ... 65	DN 50 ... 65	Q	
1600 ... 16000	46 ... 460	DN 50 ... 80	DN 50 ... 80	DN 50 ... 80	R	
2000 ... 20000	55 ... 550	–	DN 50 ... 80	DN 50 ... 80	S	
2500 ... 25000	70 ... 700	DN 80	DN 50 ... 80	DN 50 ... 80	T	
4000 ... 40000	110 ... 1100	DN 100	DN 80 ... 100	DN 80 ... 100	U	
5000 ... 50000	135 ... 1350	DN 100	DN 80 ... 100	DN 80 ... 100	V	
6000 ... 60000	170 ... 1700	–	DN 100	DN 100	W	
8000 ... 80000	240 ... 2400	–	DN 100	DN 100	Z	K1D
10000 ... 100000	300 ... 3000	–	DN 100	DN 100	X	

Temperature shield/degree of protection

Standard up to 150 °C for electric output /200 °C for local display	0
Standard, with displaced display	2
Stainless steel IP66 for process temperature 150 °C	5
Stainless steel IP66 preferred	6

Heating/cooling sheath

Without (standard)	0
H/C with flange connection	2
H/C without flange connection	3

Display

With local display	AA
With local display and an inductive contact, SJ 3.5N (1 NC for downward violation of a limit value)	CJ
With local display and two inductive contacts, SJ 3.5N	CL
With HART protocol, 4 ... 20 mA, EEx ia	FA
With HART protocol, 4 ... 20 mA, EEx ia with two inductive contacts, SJ 3.5N (1 NO contact for downward violation of a limit value, 1 NO contact for upward violation of a limit value)	GL
With HART protocol, 4 ... 20 mA, EEx ia with one inductive contact, SJ 3.5N and a pulse output (1 NC contact for downward violation of a limit value)	HJ
Electric transmitter with PROFIBUS PA, EEx ia	PA

Calibration

Standard calibration	
• Without calibration certificate	0
• With calibration certificate	1

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data	Order Code
Further designs for measurement of liquids and gases	
Add "-Z" to Order No. and specify Order Code.	
Rating plate in English	**B11**
Factory certificate 2.2	**C11**
Acceptance test B to DIN 50 049, Section 3.1 and EN 10 204	**C12**
Measured medium specify in plain text (always required) Medium, measuring range, dimension, density, density dimension, viscosity, viscosity dimension, operating temperature, operating pressure	**Y01**
Silicone-free version	**Y04**
Stainless steel tag plate	**Y17**
Specify special version in plain text	**Y99**

Note:

For all possible combinations of nominal diameters and flow tubes, see the table on page 4/303

Selection and Ordering data	Order Code								
Further designs for measurement of liquids									
Add "-Z" to Order No. and specify Order Code									
Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with liquid damping	**D01**	**D02**	**D03**	**D04**	**D05**	**D06**	**D07**	**D08**	**D09**
Type EF-H with liquid damping	**E01**	**E02**	**E03**	**E04**	**E05**	**E06**	**E07**	**E08**	**E09**
Type FF-P with liquid damping Note: The overall length for the FF-P version is 5 mm (0.2“) longer.	**P01**	**–**	**P03**	**–**	**–**	**P06**	**–**	**P08**	**P09**

Selection and Ordering data	Order Code								
Further designs for measurement of gases									
Add "-Z" to Order No. and specify Order Code.									
Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with gas damping	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**	**D19**
Type EF-H with gas damping	**E11**	**E12**	**E13**	**E14**	**E15**	**E16**	**E17**	**E18**	**E19**
Type FF-P with gas damping Note: The overall length for the FF-P version is 5 mm (0.2“) longer.	**P11**	**–**	**P13**	**–**	**–**	**P16**	**–**	**P18**	**P19**

SITRANS F O delta p - Primary differential pressure devices

Technical description

Primary differential pressure devices to DIN EN ISO 5167

		Nominal diameters	Nominal pressure
	**Orifice plates with annular chambers**	EN: DN 50 ... DN 1000 ASME: 2 inch … 40 inch	EN: PN 6 ... PN 100 ASME: Class 150 … 600
	**Orifice plates with single tappings**	EN: DN 50 ... DN 500 ASME: 2 inch … 20 inch	EN: PN 6 ... PN 315 ASME: Class 150 … 2500
	**Metering pipes**		
	• Orifice plate with annular chambers, mounted between flanges	EN: DN 10 ... DN 50 ASME: ½ inch … 2 inch	EN: PN 10 ... PN 100 ASME: Class 150 … 600
	• Orifice plate with single tappings, mounted between flanges	EN: DN 10 ... DN 50 ASME: ½ inch … 2 inch	EN: PN 10 ... PN 160 ASME: Class 150 … 2500

Further products for the complete setup for flow measurements with a primary differential pressure device,

e.g. an orifice plate

+

For **compensation vessels**, see Chap. 2
For **threaded flange pairs**, see Chap. 2

+

For **initial shut-off valves**, see Chap. 2

+

For **valve manifolds**, see Chap. 2, e.g.

5-spindle valve manifold or

Valve manifold combination DN 8 for vapor measurement

+

For **SITRANS P DS III differential pressure transmitter**, see Chap. 2

Possible measuring cells:
20, 60, 250, 600 and 1600 mbar

Overview

Primary differential pressure devices are standardized mechanical flow sensors, often also referred to as differential pressure transducers.

Through constriction of the line diameter in the pressure device, the flow rate creates a differential pressure that is converted with the help of a differential pressure transmitter into a proportional current signal or flow value. The assignment of differential pressure to flow is created by means of a "calculation of the primary differential pressure device".

Primary differential pressure devices are suitable for single-phase media such as gas, vapor and liquids without solid components.

On lines with small nominal diameters (DN 10 to DN 50) the measurements are influenced by the wall roughness and diameter tolerances of the pipes, far more so than by large nominal diameters. These influences are counteracted by using metering pipes with fitting inlet and outlet pipe sections made of precision pipes. The flow coefficient C for exact measurements with metering pipes must be determined by means of calibration.

Requirement when ordering a primary differential pressure device

The orifice plate calculation and the classification according to the pressure equipment directive (PED) must be quoted when placing an order. The complete data of the measuring point are thus required. Details of installation conditions, flow conditions, corrosiveness/resistance and properties of the media are needed in addition. Pressure conditions, permissible pressure losses and accuracy requirements must be considered.

You must enclose a completed "Questionnaire for calculation of a primary differential pressure device to DIN EN ISO 5167" with the order (see page 4/314).

More information is available under "Pressure equipment directive 97/23/EC" and "Calculation of primary differential pressure devices".

Technical description

Benefits

- Primary differential pressure devices are suitable for universal use across the globe.
- Primary differential pressure devices are very robust and can be used in a wide range of nominal diameters.
- Suitable for high temperature and pressure ranges.
- No wet calibration required as they use an internationally standardized flow rate measurement procedure.
- The differential pressure transmitter can be used over a long distance from the measuring location.
- The differential pressure method is well known and has a large installed base.
- The SITRANS P differential pressure transmitter is easy to parameterize again if process data change. They are adapted by recalculating and assigning new parameters to the transmitter or, in the case of the version orifice plate with annular chamber, by using a new orifice disk.

Application

Power stations

Measurement of steam, condensate and water.

Petrochemical industry

Measurement of water, steam and liquid and gas hydrocarbons.

Chemical industry

Measurement of various liquid and gas media.

Design

Orifice plate with annular chambers

The version orifice plate with annular chambers comprises two support rings which are connected to the inside of the pipe over an annular chamber and an annular gap. Tapping sockets direct the differential pressure from the support rings to the differential pressure transmitter over shut-off fittings and differential pressure lines.

The orifice disk is inserted between the support rings together with a gasket.

Orifice plate with single tappings

In the version of the orifice plate with single tappings the orifice plate is a single unit. The inside of the tube is connected to the tapping sockets by two single tappings.

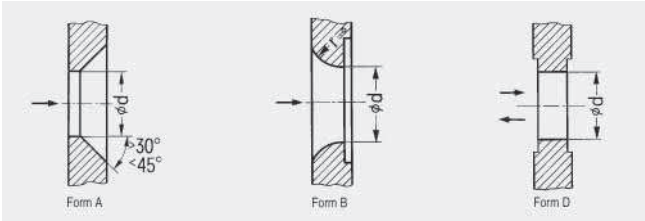
Both types of orifice plate are installed between two flanges in the pipeline.

Function

Mode of operation

The orifice plate creates a differential pressure. The pressure is transferred through the vertical columns of medium in the differential pressure lines to the measuring cell of the differential pressure transmitter. The transmitter converts the pressure signal with square-root characteristic into a flow-proportional current or into a digital signal, e.g. PROFIBUS.

Types of primary differential pressure devices



Shapes of the orifice disk aperture

The primary differential pressure devices are manufactured according to DIN EN ISO 5167. According to this, the application range of the standard orifice disk aperture form A is limited by the Reynolds number. The limits depend on the diameter ratio β = d/D. (D: internal diameter of pipe).

In the case of Reynolds numbers from approx. 500 to 2.5 x 10^5 and DN 40 to DN 150, the orifice disk aperture form B (quarter circle) can be used for slightly less accurate measurements. The profile radius r depends on the diameter ratio ß and results from the calculation of the diameter of the orifice disk aperture d.

The cylindrical orifice disk aperture form D is used for measurements in both flow directions.

Tapping sockets

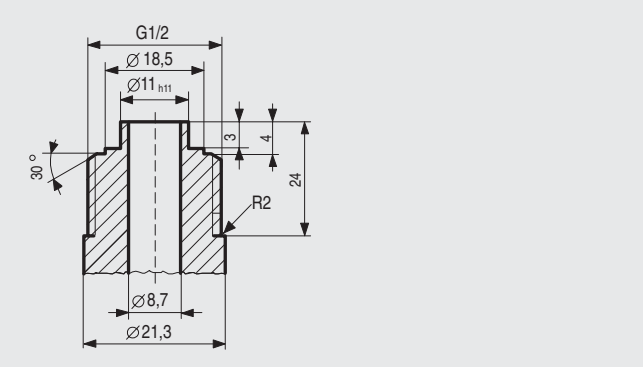
Type of threaded connections and welding connections dependent on the measured medium and the nominal pressure of the shut-off fitting

The type of socket connections depends on the measured medium and the nominal pressure of the shut-off fittings; the socket length depends on the nominal diameter (pipe diameter) of the primary differential pressure device and the operating temperature (because of the thermal insulation!). If using with high temperatures and stronger insulations, please quote the insulation thickness and the required length of the tapping sockets when placing an order. The socket position depends on the measured medium and the flow direction.

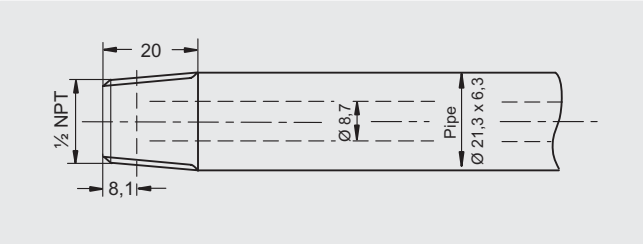
- With threaded connection G½ DIN ISO 228/1, connection dimensions to DIN 19207 Form V, for liquids and gases up to PN 160, for steam up to PN 100
- With threaded connection ¼-14 NPT male, for version to ASME up to class 600
- With threaded connection ¾-14 NPT male, for version to ASME from class 900 to 1500
- With ferrule for pipe Ø 12 mm, S series
- With welding connection Ø 21.3 mm for liquids, gases and steam up to PN 400 or Ø 24 mm for liquids, gases and steam over PN 400

Other connections on request.

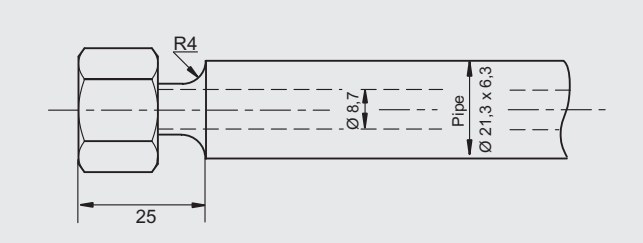
Technical description



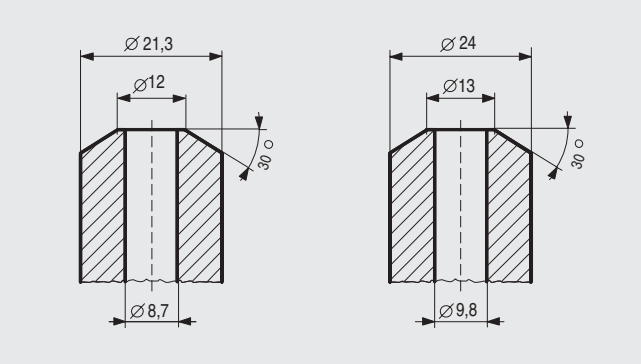
Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm



Threaded connection ½-14 NPT male, dimensions in mm



Ferrule for pipe Ø 12 mm, S series, dimensions in mm

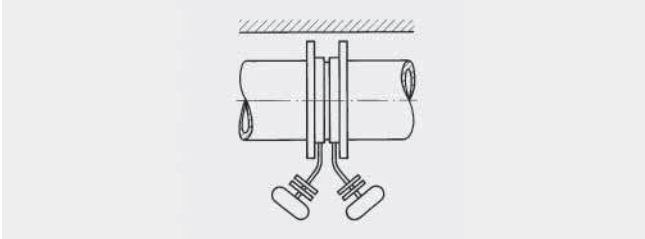


Welding connections of tapping sockets, dimensions in mm
left: Ø 21.3 mm for liquids, gases and steam up to PN 400
right: Ø 24 mm for liquids, gases and steam over PN 400

Position of the tapping sockets

The arrangement of the tapping sockets is optional when measuring liquids and gases; the compensation vessels must be at the same height when measuring steam.

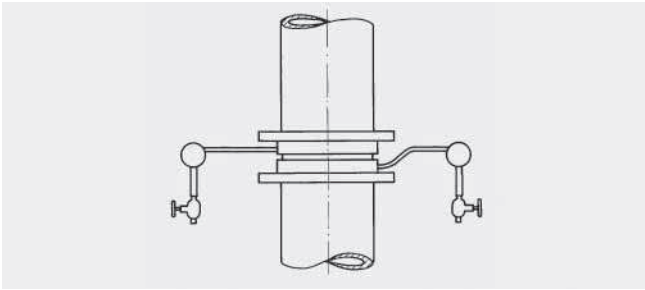
- Horizontal steam lines



Horizontal pipe in front of a wall with primary differential pressure device and valve combination; with annular chamber orifice plate or single part orifice plate with special length of 65 mm

In the case of horizontal steam lines, straight sockets are arranged opposite each other or, if the pipe is close to a wall, bent sockets on one side.

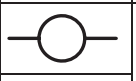
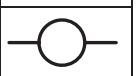
- Vertical steam lines



Vertical steam line with primary differential pressure device and valve combination

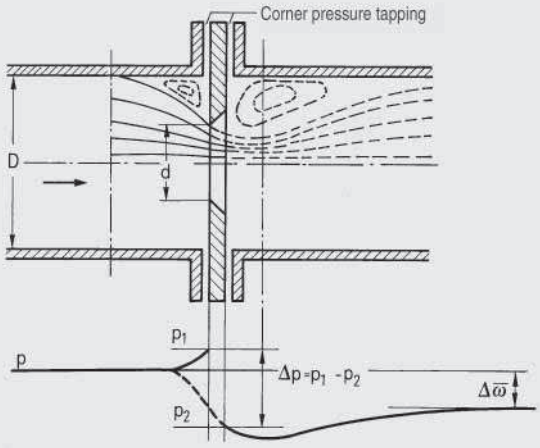
In the case of vertical and inclined steam lines, the lower socket is bent upwards so that the connection flanges and compensation vessels are also at the same height in this case.

Extract from DIN 19205, Part 1, August 1988

No.	Pipe position and flow direction			Position of the tapping sockets		Application
1	Horizontal		→	180°		With compensation vessels
2 [1)2)]				0°		
3 [1) 2)]						
4	Vertical	Rising	↑	90°		
5		Falling	↓			
6		Rising	↑	180°		
7		Falling	↓			
10	Horizontal		→	<γ [3)]		Without compensation vessels
11	Horizontal, vertical		→↓↑	180°		
13	Vertical		↓↑	90°		

[1)] Not possible with orifice plates with single tappings (overall length 40 mm). Special length of 65 mm is possible.
[2)] Only possible with orifice plates with annular chambers (overall length 65 mm) with bent-up tapping sockets.
[3)] Angle γ is dependent on the nominal pressure and nominal diameter in accordance with DIN 19205.

Principle of the differential pressure method



D Internal diameter of pipe
d Diameter of orifice disk aperture
p Pressure in the pipe
p_1 Pressure immediately upstream of primary device
p_2 Pressure immediately downstream of primary device
$\Delta\rho$ Differential pressure
$\Delta\varpi$ Remaining pressure loss

Principle of the differential pressure method: Pressure curve at a pipe restriction

A primary differential pressure device is installed at the measuring point to measure the flow. This restricts the pipe and has two connections for sampling the differential pressure. If the properties of the primary device and the medium are known such that the equation below can be evaluated, the differential pressure is a measure of the absolute flow. No comparison measurements are required; the flow measurement can be checked independent of the device manufacturer.

The differential pressure method is based on the law of continuity and Bernoulli's energy equation.

According to the law of continuity, the flow of a moving medium in a pipeline is the same at all points. If the cross-section is reduced at one point, the flow velocity must increase at this point. According to Bernoulli's energy equation, the energy content of a flowing medium is constant and is the total of the static (pressure) and kinetic (movement) energies. An increase in the flow rate therefore results in a reduction in the static pressure (see the figure "Principle of the differential pressure method: Pressure curve at a pipe restriction"). This pressure difference Δp, the so-called differential pressure, is a measure of the flow.

In general the following equation applies: $q = c\sqrt{\Delta p}$

Where:

- q: flow (q_m, q_v) mass flow or volume flow
- Δp: Differential pressure
- c: Factor depending on the dimensions of the pipeline, the type of constriction, the density of the flowing medium etc.

According to this equation, the differential pressure created by the constriction is proportionally equal to the square of the flow (see the figure "Relationship between flow q and differential pressure Δp").

Integration

The orifice plate is installed between two flanges in the pipeline. Using compensation vessels (for steam) and initial shut-off valves the differential pressure of the high-pressure side and low-pressure side is directed through differential pressure lines to a multiple valve manifold and on to the differential pressure transmitter. For media with extreme pressure and temperature fluctuations it makes sense to take an additional measurement of the pressure and temperature in order to correct the flow signal of the transmitter in a subsequent correction computer.

Selection of mounting point

The flow measuring regulations DIN EN ISO 5167 do not only consider the design of primary differential pressure devices, but also assume that their installation is in accordance with the standard so that the specified tolerances can be retained. Installation in accordance with the standard should already be considered when planning the pipeline. Particular attention must be paid to ensure that the primary device can be fitted in a sufficiently long straight section of pipe. Bends, valves and similar must be fitted so far upstream of the primary device that they no longer have a detrimental effect. Primary devices with a large diameter ratio are particularly sensitive to interferences.

Design of measuring point

The design of the measuring point depends on the medium and on the spatial conditions. The designs for gas and water only differ in the arrangement of the tapping sockets (see the figure "Measuring setup"); compensation vessels must additionally be provided for steam.

Options

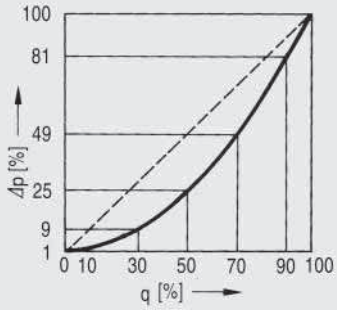
Further versions that are available on request:

- Other nominal diameters and nominal pressures to EN and ASME
- Other lengths, special lengths
- Other materials
- Sealing face with recess or groove
- Flushing rings
- Other tapping sockets, multiple tappings
- Material acceptance test certificates or cold water pressure tests

Technical description

Characteristic curves

The orifice plate has a square-law relationship between differential pressure and flow. A square-root transmitter is required therefore to create a linear flow characteristic.



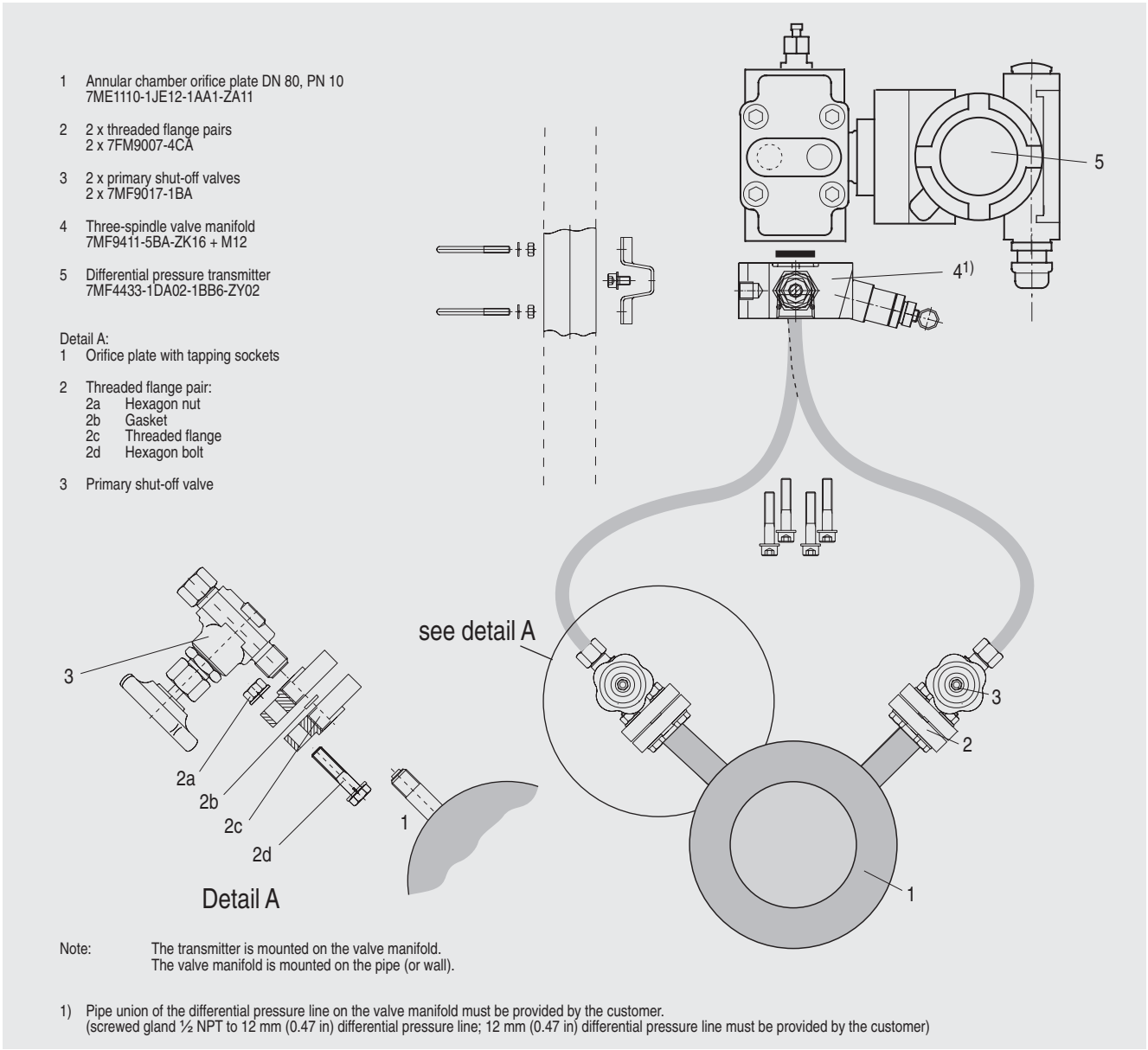
q	0	1	3	5	8	10	15	20	30	40	50	60	70	80	90	100	%
Δp	0	0.01	0.09	0.25	0.64	1	2.25	4	9	16	25	36	49	64	81	100	%

Setting range for application point of square-rooted charateristic for SITRANS P differential pressure transmitter

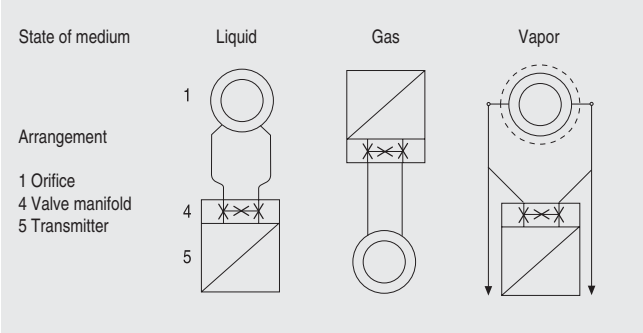
Relationship between flow q and differential pressure Δp

More information

- Standards
- Instruction Manual SITRANS P
- Installation Instructions



Design of measuring point with gas measurement as example (non-corrosive, non-hazardous)



Measuring setup

Technical specifications

The technical properties of the orifice plates depend on the device:

- Nominal diameters
- Nominal pressure
- Materials
- Mass
- Temperature limits

Accessories

- Compensation vessels
- Threaded flange pairs
- Primary shut-offs
- Valve manifold
- Differential pressure lines (to be provided by the plant owner)
- Gaskets, bolts, screws (to be provided by the plant owner)
- Differential pressure transmitter

Pressure equipment directive 97/23/EC

Overview

The pressure equipment directive 97/23/EC applies to the alignment of the statutory orders of the European member states for pressure equipment. Equipment as defined by the directive includes vessels, pipelines and accessories with a maximum permissible pressure of more than 0.5 bar above atmospheric.

The pressure equipment directive can be used starting November 29, 1999, and is compulsory starting May 29, 2002.

Division according to the danger potential

Equipment is divided in line with the pressure equipment directive according to the danger potential (medium/pressure/volume/nominal diameter) into the categories I to III or Article 3 Paragraph 3.

The following criteria are decisive for assessment of the danger potential and are also shown in the diagrams (see "Characteristic curves").

Fluid group	Group 1 or 2
Aggregate state	Liquid or gaseous
Type of pressurized equipment	
• Pipeline	Nominal diameter, pressure or product of pressure and nominal diameter (PS * DN)

Note

Liquids according to Article 3 are those liquids whose steam pressure is not more than 0.5 bar above standard atmospheric pressure (1013 mbar) at the maximum permissible temperature.

The maximum permissible temperature for the used liquids is the maximum process temperature which can occur, as defined by the user. This must be within the limits defined for the equipment.

Division of media (liquid/gaseous) into the fluid groups

Fluids are divided according to Article 9 into the following fluid groups:

Group 1

Potentially explosive

R phrases:

e.g.: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)

Highly toxic

R phrases:

e.g.: 26, 27, 28, 39 (32)

Highly combustible

R phrases:

e.g.: 12 (17)

Toxic

R phrases:

e.g.: 23, 24, 25 (29, 31)

Readily flammable

R phrases:

e.g.: 11, 15, 17 (10, 30)

Fire stimulating

R phrases:

e.g.: 7, 8, 9 (14, 15, 19)

Flammable if the maximum permissible temperature is above the flash point.

Group 2

All fluids not belonging to Group 1.

Also applies to fluids which are e.g. dangerous to the environment, corrosive, dangerous to health, irritant or carcinogenic (if not highly toxic).

Conformity rating

Pressure equipment of categories I to IV must comply with the safety requirements of the directive and be assigned the CE symbol.

They must comply with a conformity rating procedure according to Appendix III of the directive.

Pressure equipment according to Article 3 Paragraph 3 must be designed and manufactured in agreement with the sound engineering practice SEP applying in a member country, and must not be assigned a CE symbol (CE symbols from other directives are not affected).

The manufacturer issues a declaration of conformity if the orifice plates are produced for use in the area covered by the PED and are assignable to the categories I, II, III or IV. This depends on the maximum permissible design data of the customer plant, which must be specified in the "Questionnaire for manufacture according to the pressure equipment directive PED - Directive 97/23/EC".

Following information is mandatory:

- PS (maximum permissible pressure (not PN)) of the plant
- TS (maximum permissible temperature (not operating temperature)) of the plant
- DN
- Fluid

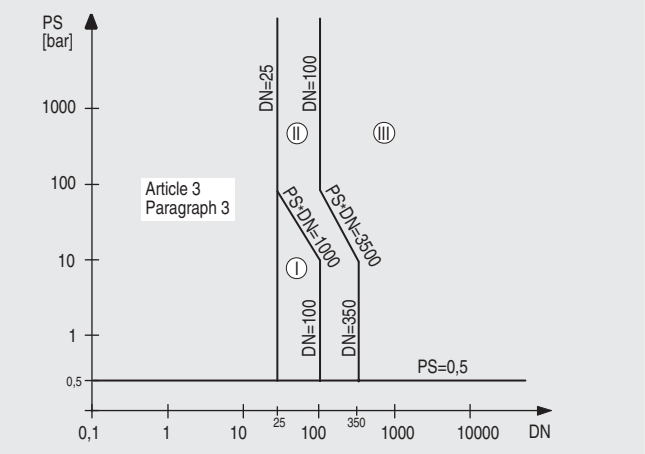
Note

Equipment designed for media with a high danger potential (e.g. gases of fluid group 1) may also be used for media with a lower danger potential (e.g. gases of fluid group 2, or liquids of fluid groups 1 and 2).

The pressure equipment directive according to Article 1 Paragraph 3 does not apply to equipment such as e.g. mobile offshore plants, ships, aircraft, water supply and waste water networks, nuclear plants, rockets and pipelines outside industrial plants.

Characteristic curves

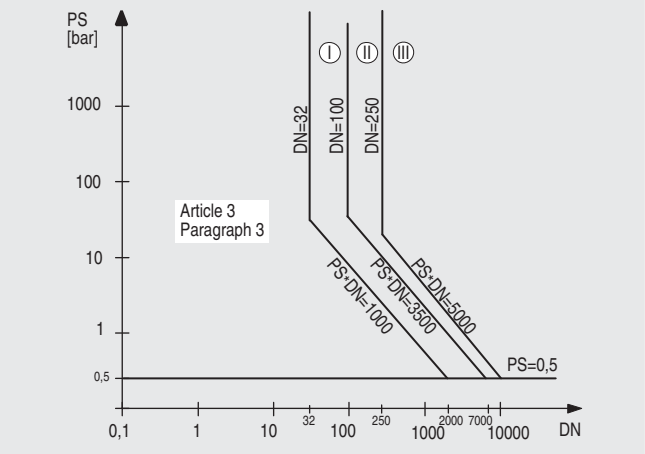
Gases of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter a) First dash

Exception: Unstable gases belonging to Categories I and II must be included in Category III.

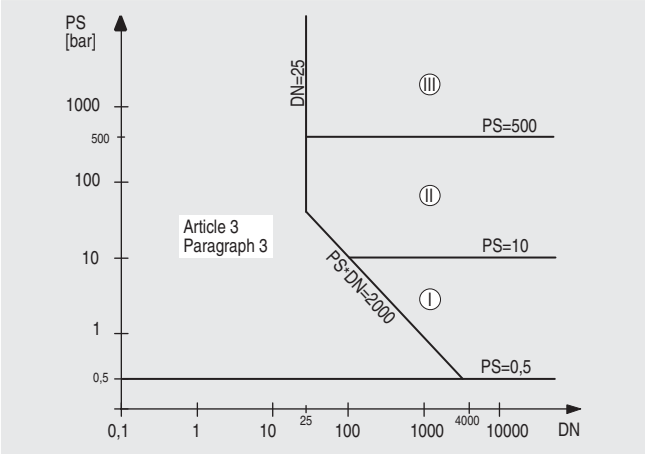
Gases of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter a) Second dash

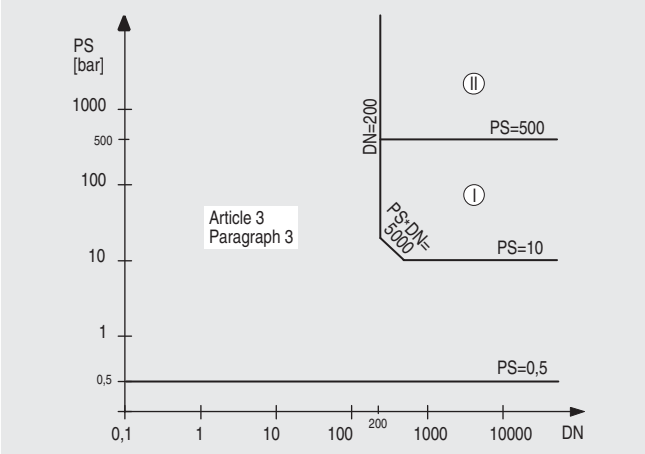
Exception: Liquids at temperatures > 350 °C belonging to Category II must be included in Category III.

Liquids of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter b) First dash

Liquids of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter b) Second dash

SIEMENS

Questionnaire for the calculation of a primary differential pressure device to EN ISO 5167-1 and data for manufacturing according to "Pressure equipment directive 97/23/EC"

Language of the calculation protocol ☐ German ☐ English ☐ French ☐ Dutch ☐ Spanish ☐ Polish

Tag (e.g. measuring-point number): _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Company: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Application according to "Pressure equipment directive 97/23/EC" (use in Europe)

☐ **Yes** **The following data are required:**

Design values of pipeline

- **Maximum permissible pressure** (*not PN*) PS[1] _____ ☐ bar ☐ psi
  - at the **maximum permissible temperature** TS[2] _____ ☐ °C ☐ °F

[1] PS: setting pressure of the safety mechanism (valve, bursting disk)
[2] TS: range of the temperature limits

- **Nominal diameter** DN _____
- **Fluid** (batch material) _____ Name

  additionally for liquids:
  - **Dependent on steam pressure** _____ ☐ bar ☐ psi
- **Dangerous fluids** - Explosive
  - Slightly of highly combustible
  - Fire stimulating
  - Toxic, very toxic

  Group 1 ☐

  All others Group 2 ☐

Appendix II of the pressure equipment directive contains 4 diagrams with which the associated category of the primary differential pressure devices can be determined (see page 4/315).

☐ Article 3, paragraph 3
☐ Category I
☐ Category II
☐ Category III

☐ **No** **When manufacturing without the pressure equipment directive, it is essential to specify the reason:**

☐ Use outside the scope of the pressure equipment directive
☐ Customer with users' testing agency

For calculation of the primary differential pressure device

Medium: _____

☐ Liquid
☐ Vapor ⇒ ☐ overheated; ☐ saturated ρ_1; ☐ saturated t_1; ☐ steam
☐ Gas ⇒ ☐ dry ☐ moist Relative humidity φ _____ %

Absolute operating pressure p_1: _____ ☐ **bar** ☐ **psi**
(overpressure on measuring point plus atmospheric pressure at location)

Operating temperature t_1: _____ ☐ **°C** ☐ **°F**

Density: _____ ☐ **kg/m³** ☐ **.....** ☐ standard condition ☐ operating condition

SIEMENS

Questionnaire for the calculation of a primary differential pressure device to EN ISO 5167-1 and data for manufacturing according to "Pressure equipment directive 97/23/EC"

Dynamic viscosity: _____ ☐ **Pa · s** ☐ **cp**

Boiling pressure (p_1) : _____ ☐ bar ☐ psi

Boiling temperature (t_1) :_____ ☐ °C ☐ °F

Isentropic exponent (only for gas and vapor): _____

Real gas constant Z_n: _____ Z_1: _____ (without data: $Z_{n,1} = 1$)

Internal pipe diameter: _____ ☐ **mm** ☐ inch

Pipe roughness: _____ ☐ **mm** ☐ inch

Material of pipeline: _____ Material no.: _ _ _ _ _ _ _ _ _ _ _ _

Material of primary device: _____ Material no.: _ _ _ _ _ _ _ _ _ _ _ _

Primary device:

		Kind of tapping/kind of device				
☐ Orifice plate	⇒	☐ Corner tap	☐ D, D/2	☐ flange		
	⇒	☐ Quarter circle	☐ Segment			
☐ Nozzle	⇒	☐ ISA 1932	☐ Long radius	☐ Quarter circle	☐ Venturi	
☐ Venturi tube	⇒	☐ Raw cast	☐ Machined	☐ Sheet steel		
☐ Other	⇒	_____		C: _____ ;	ε:_____	

Calculation of: ☐ **"d";** ☐ differential pressure; ☐ flow

Design: ☐ **2/3 max. flow** ☐ max. flow

Max. flow: _____ ☐ q_m ☐ kg/h ☐ ..... (mass flow for all media)

☐ q_v ☐ m^3/h ☐ ..... (volume flow for liquids and gases)

☐ q_n ☐ m^3/h ☐ ..... (volume flow for gases at standard condition)

Differential pressure: _____ ☐ **mbar** ☐ **.....**

Orifice disk aperture "d": _____ ☐ **mm** ☐ inch

Max. permanent pressure loss: _____ ☐ **mbar** ☐ **.....**

Uncertainties to be allowed for calculation in % (without data: 0 %)

Operating temperature_____; Absolute pressure _____; Differential pressure_____;

Operating density _____; Additional uncertainty _____

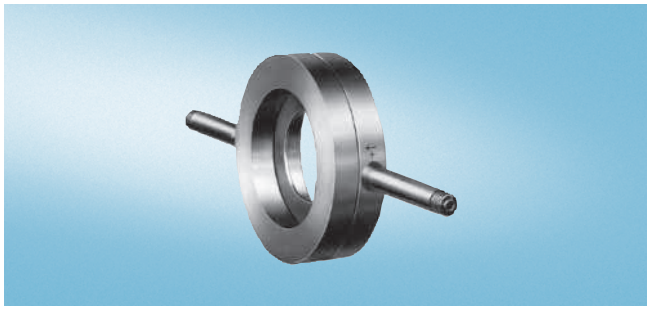
For clarification of any questions:

Name: _____ ☎ _____ **Fax:** _____

Note: The delivery time will be delayed if the data are incomplete.

Orifice plate with annular chambers

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -60 to +550°C.

Design

- Two support rings with replaceable orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials.
- Graphite gasket with noncorrosive metal foil insert between orifice disk and support ring outlet

Overall length

65 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 1000
ASME: 2 inch to 40 inch

Nominal pressure

EN: PN 6 to PN 100
ASME: class 150 to 600

Sealing face to the mating flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 6 to PN 40)
- Plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 100)
- Plane, RF (raised faced) for version to ASME

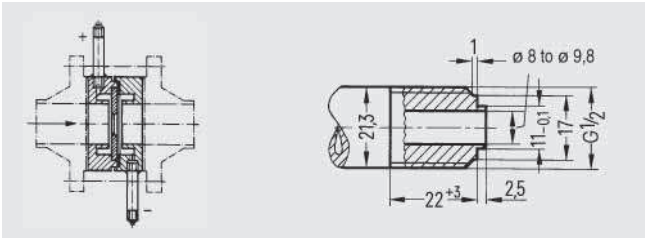
Tapping sockets

For the dimensions of the following tapping sockets (see page 4/310):

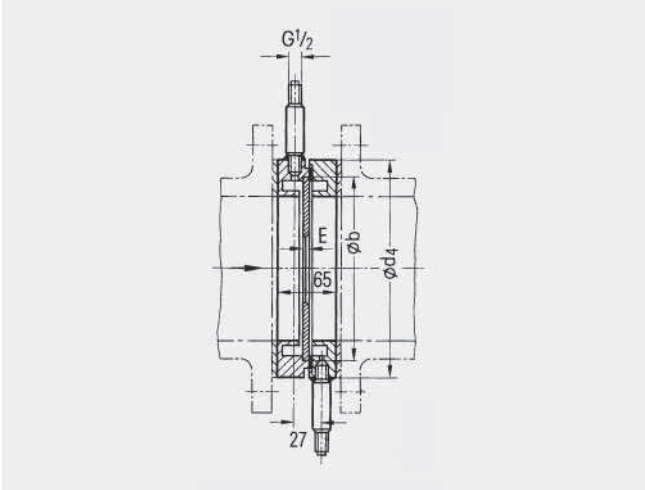
- With connection thread G½ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- with ferrule for pipe Ø 12 mm, S series
- with welding connection Ø 21.3 mm

See "Technical description" and "Function" for position of the tapping sockets.

Dimensional drawings



Orifice plate with annular chamber (left); tapping socket with threaded connection, dimensions in mm



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2).
- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.						
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
50	43 ... 55	96	107	107	107	107	113	119
65	59 ... 71	116	127	127	127	127	138	144
80	73 ... 85	132	142	142	142	142	148	154
100	90 ... 108	152	162	162	168	168	174	180
125	114 ... 132	182	192	192	194	194	210	217
150	142 ... 160	207	218	218	224	224	247	257
200	185 ... 211	262	273	273	284	290	309	324
250	237 ... 262	317	328	329	340	352	364	391
300	285 ... 314	373	378	384	400	417	424	458
350	328 ... 362	423	438	444	457	474	486	512
400	380 ... 408	473	489	495	514	546	543	–
500	477 ... 514	578	594	617	624	628	–	–
600	581 ... 610	679	695	734	731	–	–	–
700	686 ... 710	784	810	804	833	–	–	–
800	776 ... 810	890	917	911	942	–	–	–
900	876 ... 910	990	1017	1011	1042	–	–	–
1000	976 ... 1010	1090	1124	1128	1154	–	–	–

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1, dimensions in mm and weights

DN	L				E	Weight (approx. in kg)	
	PN 6	PN 10 ... PN 25	PN 40	PN 63 ... PN 100	PN 6 ... PN 100	With smallest nominal pressure	With largest nominal pressure
50	79	79	79	79	2±0.2	2,5	4.5
65	96	96	96	96	2±0.2	3.4	6.4
80	115	115	115	115	4±0.2	4.3	6.9
100	137	137	137	137	4±0.25	4.7	8.6
125	164	164	164	164	4±0.25	6.3	12.4
150	193	193	193	193	4±0.29	7.0	17.0
200	247	247	247	247	4±0.29	10.3	26.2
250	302	302	302	302	4±0.32	13.1	36.6
300	354	354	354	354	4±0.36	17.3	49.0
350	403	403	403	403	4±0.4	25.0	63.0
400	452	452	452	452	4±0.4	28.0	73.8
500	553	563	563	–	6±0.4	36.2	65.9
600	659	659	–	–	6±0.4	42.5	75.6
700	757	762	–	–	8±0.4	51.8	89.5
800	869	875	–	–	8±0.4	61.7	109
900	969	975	–	–	8±0.4	68.3	123
1000	1071	1079	–	–	10±0.4	74.0	148

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1, dimensions in mm and weights (contd.)

Orifice plate with annular chambers

Nominal diameter acc. to ASME

Nominal diameter	External diameter d4 / sealing face: Plane, RF (raised faced)			L			E	Weight (approx. in kg)	
	Class 150	Class 300	Class 600	Class 150	Class 300	Class 600	Class 150 ... 600	With smallest nominal pressure	With largest nominal pressure
2 inch	105	111	111	79	79	79	2±0.2	2.5	4.5
2½ inch	124	130	130	96	96	96	2±0.2	3.4	6.4
3 inch	137	149	149	115	115	115	4±0.2	4.3	6.9
4 inch	175	181	194	137	137	137	4±0.2	4.7	8.6
5 inch	197	216	241	164	164	164	4±0.25	6.3	12.4
6 inch	222	251	267	193	193	193	4±0.29	7.0	17.0
8 inch	279	308	321	247	247	247	4±0.29	10.3	26.2
10 inch	340	362	400	302	302	302	4±0.32	13.1	36.6
12 inch	410	422	457	354	354	354	4±0.36	17.3	49.0
14 inch	451	486	492	403	403	403	4±0.4	25.0	63.0
16 inch	514	540	565	452	452	452	4±0.4	28.0	73.8
20 inch	549	597	613	553	563	563	6±0.4	36.2	65.9
24 inch	717	775	790	659	659	–	6±0.4	42.5	75.6

Orifice plates with annular chambers for installation between ASME flanges to ASME B16.5, dimensions in mm and weights

Orifice plate with annular chambers

Selection and ordering data	Order No.
Orifice plate with annular chambers	**7ME1110–■■■■■–■■■■–Z**
for mounting between flanges Sealing faces to the mating flanges: plane.	
Nominal diameter acc. to EN	
DN 50	
• PN 6	1GA
• PN 10 ... 40	1GE
• PN 63	1GF
• PN 100	1GG
DN 65	
• PN 6	1HA
• PN 10 ... 40	1HE
• PN 63	1HF
• PN 100	1HG
DN 80	
• PN 6	1JA
• PN 10 ... 40	1JE
• PN 63	1JF
• PN 100	1JG
DN 100	
• PN 6	2AA
• PN 10 and PN 16	2AC
• PN 25 and PN 40	2AE
• PN 63	2AF
• PN 100	2AG
DN 125	
• PN 6	2BA
• PN 10 and PN 16	2BC
• PN 25 and PN 40	2BE
• PN 63	2BF
• PN 100	2BG
DN 150	
• PN 6	2CA
• PN 10 and PN 16	2CC
• PN 25 and PN 40	2CE
• PN 63	2CF
• PN 100	2CG
DN 200	
• PN 6	2EA
• PN 10 and PN 16	2EC
• PN 25	2ED
• PN 40	2EE
• PN 63	2EF
• PN 100	2EG
DN 250	
• PN 6	2FA
• PN 10	2FB
• PN 16	2FC
• PN 25	2FD
• PN 40	2FE
• PN 63	2FF
• PN 100	2FG
DN 300	
• PN 6	2GA
• PN 10	2GB
• PN 16	2GC
• PN 25	2GD
• PN 40	2GE
• PN 63	2GF
• PN 100	2GG
DN 350	
• PN 6	2HA
• PN 10	2HB
• PN 16	2HC
• PN 25	2HD
• PN 40	2HE
• PN 63	2HF
• PN 100	2HG
DN 400	
• PN 6	2JA
• PN 10	2JB
• PN 16	2JC
• PN 25	2JD
• PN 40	2JE
• PN 63	2JF
DN 500	
• PN 6	2KA
• PN 10	2KB
• PN 16	2KC
• PN 25	2KD
• PN 40	2KE
DN 600	
• PN 6	3AA
• PN 10	3AB
• PN 16	3AC
• PN 25	3AD
DN 700	
• PN 6	3BA
• PN 10	3BB
• PN 16	3BC
• PN 25	3BD
DN 800	
• PN 6	3CA
• PN 10	3CB
• PN 16	3CC
• PN 25	3CD
DN 900	
• PN 6	3DA
• PN 10	3DB
• PN 16	3DC
• PN 25	3DD
DN 1000	
• PN 6	3EA
• PN 10	3EB
• PN 16	3EC
• PN 25	3ED
Nominal diameter acc. to ASME	
2 inch	
• Class 150	5GA
• Class 300	5GB
• Class 600	5GC
2½ inch	
• Class 150	5HA
• Class 300	5HB
• Class 600	5HC
3 inch	
• Class 150	5JA
• Class 300	5JB
• Class 600	5JC
4 inch	
• Class 150	6AA
• Class 300	6AB
• Class 600	6AC

Orifice plate with annular chambers

Selection and ordering data	Order No.														
Orifice plate with annular chambers	**7ME1110–**							**–**					**–**		**Z**
5 inch															
• Class 150				**6**	**B**	**A**									
• Class 300				**6**	**B**	**B**									
• Class 600				**6**	**B**	**C**									
6 inch															
• Class 150				**6**	**C**	**A**									
• Class 300				**6**	**C**	**B**									
• Class 600				**6**	**C**	**C**									
8 inch															
• Class 150				**6**	**E**	**A**									
• Class 300				**6**	**E**	**B**									
• Class 600				**6**	**E**	**C**									
10 inch															
• Class 150				**6**	**F**	**A**									
• Class 300				**6**	**F**	**B**									
• Class 600				**6**	**F**	**C**									
12 inch															
• Class 150				**6**	**G**	**A**									
• Class 300				**6**	**G**	**B**									
• Class 600				**6**	**G**	**C**									
14 inch															
• Class 150				**6**	**H**	**A**									
• Class 300				**6**	**H**	**B**									
• Class 600				**6**	**H**	**C**									
16 inch															
• Class 150				**6**	**J**	**A**									
• Class 300				**6**	**J**	**B**									
• Class 600				**6**	**J**	**C**									
20 inch															
• Class 150				**6**	**K**	**A**									
• Class 300				**6**	**K**	**B**									
• Class 600				**6**	**K**	**C**									
24 inch															
• Class 150				**7**	**A**	**A**									
• Class 300				**7**	**A**	**B**									
• Class 600				**7**	**A**	**C**									
for non-corrosive media															
• Support rings made of P250GH, Mat.No. 1.0460 or P265GH, Mat.No. 1.0425; Tappet sockets made of P235G1TH, Mat.No. 1.0345; orifice disk made of X 6 CrNiMoTi 17-12-2, Mat.No. 1.4571; permissible operating temperature –10 up to +450 °C, for tapping socket with ferrule for pipe, 12 mm, S series, max. 200 °C									**1**	**2**					
For corrosive media															
• Support rings, tapping socket and orifice disk made of X 6 CrNiMoTi 17-12-2, Mat.No. 1.4571; permissible temperature –60 to +550 °C, for tapping socket with ferrule for pipe, 12 mm, S series, max. 400 °C									**1**	**4**					

Selection and ordering data	Order No.														
Orifice plate with annular chambers	**7ME1110–**							**–**					**–**		**Z**
Tapping sockets															
• With threaded connection G½; for liquids and gases PN 160, for steam PN 100															
- Opposite one another, straight											**1**	**A**			
- Opposite one another, bent-up, for vertical pipelines											**1**	**B**			
- Arranged on one side, for horizontal pipelines											**1**	**C**			
• With threaded connection ½-14 NPT male															
- Opposite one another, straight											**1**	**Q**			
- Opposite one another, bent-up, for vertical pipelines											**1**	**R**			
- Arranged on one side, for horizontal pipelines											**1**	**S**			
• With ferrule for pipe Ø 12 mm, S series															
- Opposite one another, straight											**1**	**J**			
- Opposite one another, bent-up, for vertical pipelines											**1**	**K**			
- Arranged on one side, for horizontal pipelines											**1**	**L**			
• With welding connection Ø 21.3 mm; for liquids and gases PN 100 to PN 400 for steam PN 100															
- Opposite one another, straight											**1**	**D**			
- Opposite one another, bent-up, for vertical pipelines											**1**	**E**			
- Arranged on one side, for horizontal pipelines											**1**	**F**			
Shape of orifice disk aperture (see figure "Shapes of orifice disk aperture")															
• For flow in one direction															
- Orifice plate form A													**A**		
- Quarter-circle nozzle form B													**B**		
• For flow in both directions															
- Cylindrical orifice plate form D													**D**		
Manufactured according to pressure equipment directive (see "Questionnaire" (page 4/316))															
• Without[2)]														**0**	
• According to Article 3, Paragraph 3														**1**	
• According to category 1														**2**	
• According to category 2														**3**	
• According to category 3														**4**	

Orifice plate with annular chambers

Selection and ordering data	Order No.
Orifice plate with annular chambers	**7ME1110–■■■■■–■■■■–Z**
Further designs Add "-**Z**" to Order No. and specify Order code(s) and plain text.	Order code[1]
Calculation of orifice disk aperture Enclose a calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167" with the order!	**A11**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzler **r = ... mm**	**Y01**
Material certificate according to EN 10204-3.1	**C01**
Orifice plate degreased for oxygen measurements Note: Cleaned and foil-packed. When using, note that the orifice plate must be completely degreased when fitted in the pipeline.	**A12**
Orifice disk including gasket	**On request**
Other materials	**On request**
Additional nominal diameters and nominal pressure stages according to EN and ASME	**On request**
Acceptance test certificate B acc. to EN 10204, cold water pressure test at 1.5 × PN	**On request**
Flushing rings	**On request**
Support rings made of 1.7335	**On request**
Sealing face of orifice plate with recess or groove	**On request**

1) Order codes additive, any sequence.

2) Option only available outside Europe (manufactured according to Article 3, Paragraph 3 of the pressure equipment directive, without CE marking).

Note on ordering

Enclose a filled-out calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167" with the order (necessary for device selection)!

scope of delivery

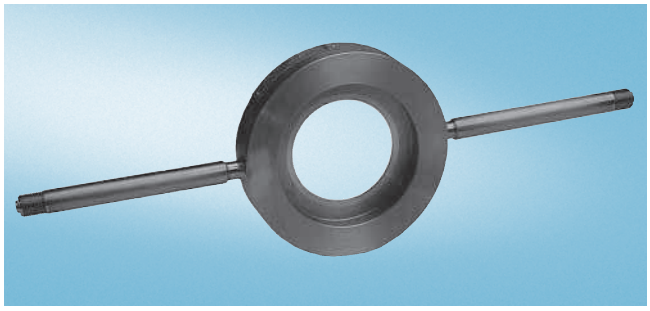
Two support rings with tapping sockets, one orifice disk, one gasket between orifice disk and support ring.
Graphite (99.85 %) flat gasket with foil insert (1.4401, 0.1 mm).
Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories

See "SITRANS P measuring instruments for pressure".

Orifice plate with single tappings

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -60 to +570 °C

Design

One-piece orifice plate, orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials.

Overall length

40 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 500
ASME: 2 inch to 20 inch

Nominal pressure

EN: PN 6 to PN 315
ASME: class 150 to 2500

Sealing face to the mating flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 6 to PN 40)
- Plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 400)
- Plane, RF (raised faced) for versions to ASME

Tapping sockets

- With connection thread G½ DIN ISO 228/1, for connection dimensions to DIN 19207 form V(see page 4/310)
- With threaded connection ½-14 NPT male, for version to ASME
- With ferrule for pipe Ø 12 mm, S series
- With welding connection Ø 21.3 mm

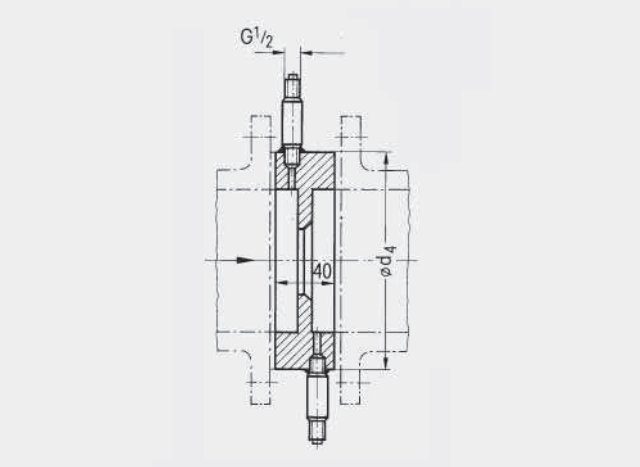
Connection size

The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e.g.

- For liquids and gases,
  - up to PN 160: Thread G½ or welding connection Ø 21.3 mm
  - from PN 6 and PN 400: Welding connection Ø 21.3 mm
  - > PN 400: Welding connection Ø 24 mm
- For steam
  - up to PN 100: Thread G½ or welding connection Ø 21.3 mm
  - from PN 6: Welding connection Ø 24 mm

See "Technical description" and "Function" for position of the tapping sockets.

Dimensional drawings



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2), dimensions in mm
- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100,

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.										Weight (approx. in kg)	
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 315	With smallest nom. pressure	With largest nom. pressure
50	45 ... 55	96	107	107	107	107	113	119	119	124	134	1.6	4.0
65	61 ... 71	116	127	127	127	127	138	144	144	154	170	2.2	6.3
80	77 ... 85	132	142	142	142	142	148	154	154	170	190	2.9	7.8
100	94 ... 108	152	162	162	168	168	174	180	180	202	229	3.2	11.5
125	117 ... 132	182	192	192	194	194	210	217	217	242	274	4.3	15.9
150	144 ... 160	207	218	218	224	224	247	257	257	284	311	4.7	20.6
200	188 ... 211	262	273	273	284	290	309	324	324	358	398	7.0	33.7
250	240 ... 262	317	328	329	340	352	364	391	388	442	488	9.0	50.6
300	292 ... 314	373	378	384	400	417	424	458	458	538	–	12.3	37.3
350	331 ... 362	423	438	444	457	474	486	512	–	–	–	17.7	44.6
400	383 ... 408	473	489	495	514	546	543	–	–	–	–	19.8	43.1
500	480 ... 514	578	594	617	624	628	–	–	–	–	–	25.6	46.6

Orifice plates with single tappings for installation between EN flanges to EN 1092-1, dimensions in mm and weights

Nominal diameter acc. to ASME

Nominal diameter	External diameter d4 / sealing face: plane, with recess or with groove.			Weight (approx. in kg)	
	Class 150	Class 300	Class 600	With smallest nominal pressure	With largest nominal pressure
2 inch	105	111	111	1.6	4.0
2½ inch	124	130	130	2.2	6.3
3 inch	137	149	149	2.9	7.8
4 inch	175	181	194	3.2	11.5
5 inch	197	216	241	4.3	15.9
6 inch	222	251	267	4.7	20.6
8 inch	279	308	321	7.0	33.7
10 inch	340	362	400	9.0	50.6
12 inch	410	422	457	12.3	37.3
14 inch	451	486	492	17.7	44.6
16 inch	514	540	565	19.8	43.1
20 inch	549	597	613	25.6	46.6

Orifice plates with single tappings for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

Orifice plate with single tappings

Selection and ordering data	Order No.
Orifice plate with single tappings	7ME1120–■■■■■–■■■■–Z
for mounting between flanges	
Sealing faces to the mating flanges: plane.	
Nominal diameter acc. to EN	
DN 50	
• PN 6	1GA
• PN 10 ... 40	1GE
• PN 63	1GF
• PN 100 and PN 160	1GH
• PN 250	1GJ
• PN 315	1GK
DN 65	
• PN 6	1HA
• PN 10 ... 40	1HE
• PN 63	1HF
• PN 100 and PN 160	1HH
• PN 250	1HJ
• PN 315	1HK
DN 80	
• PN 6	1JA
• PN 10 ... 40	1JE
• PN 63	1JF
• PN 100 and PN 160	1JH
• PN 250	1JJ
• PN 315	1JK
DN 100	
• PN 6	2AA
• PN 10 and PN 16	2AC
• PN 25 and PN 40	2AE
• PN 63	2AF
• PN 100 and PN 160	2AH
• PN 250	2AJ
• PN 315	2AK
DN 125	
• PN 6	2BA
• PN 10 and PN 16	2BC
• PN 25 and PN 40	2BE
• PN 63	2BF
• PN 100 and PN 160	2BH
• PN 250	2BJ
• PN 315	2BK
DN 150	
• PN 6	2CA
• PN 10 and PN 16	2CC
• PN 25 and PN 40	2CE
• PN 63	2CF
• PN 100 and PN 160	2CH
• PN 250	2CJ
• PN 315	2CK
DN 200	
• PN 6	2EA
• PN 10 and PN 16	2EC
• PN 25	2ED
• PN 40	2EE
• PN 63	2EF
• PN 100 and PN 160	2EH
• PN 250	2EJ
• PN 315	2EK

Selection and ordering data	Order No.
Orifice plate with single tappings	7ME1120–■■■■■–■■■■–Z
DN 250	
• PN 6	2FA
• PN 10 and PN 16	2FC
• PN 25	2FD
• PN 40	2FE
• PN 63	2FF
• PN 100 and PN 160	2FH
• PN 250	2FJ
• PN 315	2FK
DN 300	
• PN 6	2GA
• PN 10	2GB
• PN 16	2GC
• PN 25	2GD
• PN 40	2GE
• PN 63	2GF
• PN 100 and PN 160	2GH
DN 350	
• PN 6	2HA
• PN 10	2HB
• PN 16	2HC
• PN 25	2HD
• PN 40	2HE
• PN 63	2HF
• PN 100	2HG
DN 400	
• PN 6	2JA
• PN 10	2JB
• PN 16	2JC
• PN 25	2JD
• PN 40	2JE
• PN 63	2JF
DN 500	
• PN 6	2KA
• PN 10	2KB
• PN 16	2KC
• PN 25	2KD
• PN 40	2KE
Nominal diameter acc. to ASME	
2 inch	
• Class 150	5GA
• Class 300	5GB
• Class 600	5GC
2½ inch	
• Class 150	5HA
• Class 300	5HB
• Class 600	5HC
3 inch	
• Class 150	5JA
• Class 300	5JB
• Class 600	5JC
4 inch	
• Class 150	6AA
• Class 300	6AB
• Class 600	6AC
5 inch	
• Class 150	6BA
• Class 300	6BB
• Class 600	6BC

Selection and ordering data	Order No.
Orifice plate with single tappings	**7ME1120–□□□□□–□□□□–Z**
6 inch	
• Class 150	6CA
• Class 300	6CB
• Class 600	6CC
8 inch	
• Class 150	6EA
• Class 300	6EB
• Class 600	6EC
10 inch	
• Class 150	6FA
• Class 300	6FB
• Class 600	6FC
12 inch	
• Class 150	6GA
• Class 300	6GB
• Class 600	6GC
14 inch	
• Class 150	6HA
• Class 300	6HB
• Class 600	6HC
16 inch	
• Class 150	6JA
• Class 300	6JB
• Class 600	6JC
20 inch	
• Class 150	6KA
• Class 300	6KB
• Class 600	6KC
for non-corrosive media	
• Orifice plate and tapping socket made of 13 CrMo 4-5, Mat.No. 1.7335; metering edge with X 5 CrNiMoNb 19 12, Mat.No. 1.4576, deposition welded; permissible working pressure –10 to +570 °C, for tapping socket with ferrule for pipe, 12 mm, S series, max. 200 °C	24
for corrosive media	
• Orifice plate and tapping socket made of X 6 CrNiMoTi 17-12-2, Mat. No. 1.4571; permissible operating temperature -200 to +550 °C, for tapping socket with ferrule for pipe, 12 mm, S series, max. 400 °C	22

Selection and ordering data	Order No.
Orifice plate with single tappings	**7ME1120–□□□□□–□□□□–Z**
Tapping sockets	
• With threaded connection G½; for liquids and gases PN 160, for steam PN 100	
- Opposite one another, straight	1A
- Opposite one another, bent-up, for vertical pipelines	1B
- Any arrangement of tapping sockets (specify angle in plain text)	1G
• With threaded connection ½-14 NPT male	
- Opposite one another, straight	1Q
- Opposite one another, bent-up, for vertical pipelines	1R
- Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	1T
• With ferrule for pipe Ø 12 mm, S series, max. 200 °C permissible	
- Opposite one another, straight	1J
- Opposite one another, bent-up, for vertical pipelines	1K
- Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	1M
• With welding connection Ø 21.3 mm; for liquids and gases PN 100 ... 400, for steam PN 100 or Ø 24 mm; for liquids and gases over PN 400, for steam over PN 100	
- Opposite one another, straight	1D
- Opposite one another, bent-up, for vertical pipelines	1E
- Any arrangement of tapping sockets (specify angle in plain text)	1H
Shape of orifice disk aperture (see figure "Shapes of orifice disk aperture")	
• For flow in one direction	
- Orifice plate form A	A
- Quarter-circle nozzle form B	B
• For flow in both directions	
- Cylindrical orifice plate form D	D
Manufactured according to pressure equipment directive (see "Questionnaire" (page 4/316))	
• Without[2)]	0
• According to Article 3, Paragraph 3	1
• According to category 1	2
• According to category 2	3
• According to category 3	4

Orifice plate with single tappings

Selection and ordering data	Order No.
Orifice plate with single tappings	**7ME1120–■■■■■–■■■■–Z**
Further designs Add "-**Z**" to Order No. and specify Order code(s) and plain text.	Order code[1]
Calculation of orifice disk aperture Add calculation sheet "Questionnaire for calculation of a primary differential pressure device acc. to DIN EN ISO 5167" to the order!	**A11**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzler **r = ... mm**	**Y01**
Material certificate according to EN 10204-3.1	**C01**
Orifice plate degreased for oxygen measurements Note: Cleaned and foil-packed. When using, note that the orifice plate must be completely degreased when fitted in the pipeline.	**A12**
Angle between tapping sockets (specify in plain text: Angle between the tapping sockets ... °)	**Y02**
Other materials	**On request**
Additional nominal diameters and nominal pressure stages according to EN and ASME	**On request**
Overall length 65 mm (required for tapping sockets arranged on one side)	**On request**
Acceptance test certificate B acc. to EN 10 204, cold water pressure test at 1.5 × PN	**On request**
Flushing rings	**On request**
Sealing face of orifice plate with recess or groove	**On request**

Note on ordering
Enclose a filled-out calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167" with the order (necessary for device selection)!

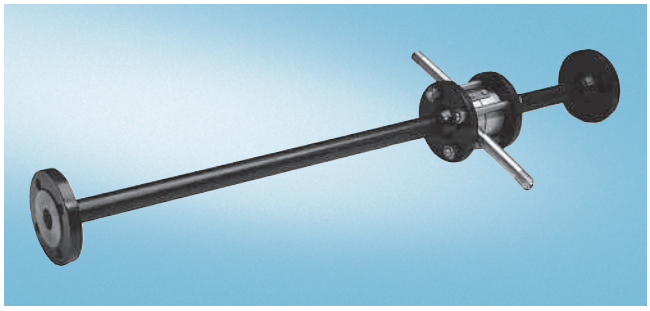
Scope of delivery:
One-part orifice plate with tapping sockets

Accessories:
See "SITRANS P measuring instruments for pressure".

1) Order codes additive, any sequence.

2) Option only available outside Europe (manufactured according to Article 3, Paragraph 3 of the pressure equipment directive, without CE marking).

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400 °C.

Design

Orifice plate with annular chambers consisting of two support rings with replaceable orifice disk form A or B (see types of primary differential pressure devices in "Technical description", "Function"); flanged between inlet and outlet pipe sections with lengths according to DIN 19205.

Nominal diameters

- EN: DN 10 to DN 50
  ASME: ½ inch to 2 inch

Nominal pressure

- EN: PN 10 to PN 100
  ASME: class 150 to 600

Sealing face of the end flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 10 to PN 40)
- Plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 100)
- Plane, RF (raised faced) for versions to ASME

Tapping sockets straight or bent

- With connection thread G½ DIN ISO 228/1, for connection dimensions to DIN 19207 form V, see page 4/310
- With threaded connection ½-14 NPT male, for version to ASME
- With ferrule for pipe Ø 12 mm, S series
- With welding connection Ø 21.3 mm.

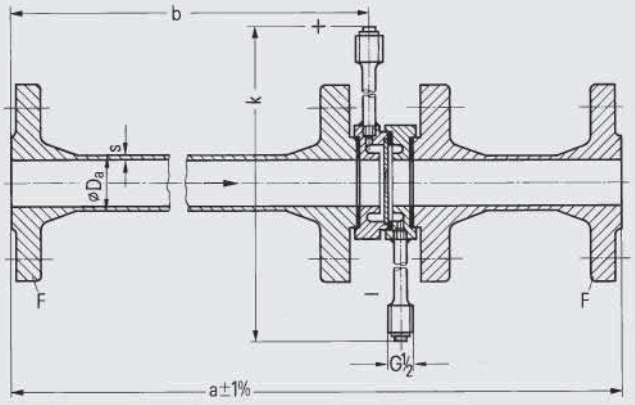
For length of tapping sockets for all metering pipe L = 120 mm and position of tapping socket, see "Technical Description" and "Function".

Technical specifications

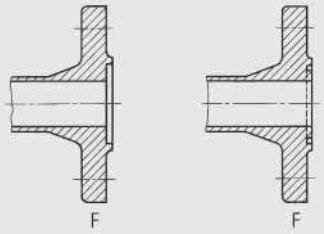
Permissible operating temperature	–10 to + 400 °C
Pipes made of	P235G1TH, Mat. No. 1.0305, ST37.4, Mat. No. 1.0255 or P235GH, Mat. No. 1.0345
Tapping sockets made of	P235G1TH, Mat. No. 1.0305
Flanges made of	P250GH, Mat. No. 1.0460
Support rings made of	P250GH, Mat. No. 1.0460
Orifice disk made of	X 6 CrNiMoTi 17 12-2, Mat. No. 1.4571

Metering pipe with orifice plate and annular chambers

Dimensional drawings



Sealing faces of the end flanges: plane



Recess to DIN 25 13

Groove to DIN 25 12

Nominal diameter acc. to EN

DN	PN	a	L	k	Pipe[1] D_a x s	Weight kg
10	10 and 16 25 and 40 63 and 100	400	218	320 320 295	16 x 3	4.5 5 6.5
15	10 and 16 25 and 40 63 and 100	550	368	325 325 300	20 x 2.5	5 5.5 7.5
20	10 and 16 25 and 40	700	488	335	25 x 2.5	6.5 7
25	10 and 16 25 and 40 63 and 100	900	638	310	30 x 2.5	8 9 14
32	10 and 16 25 and 40	1100	788	320	38 x 3	11.5 12.5
40	10 and 16 25 and 40 63 and 100	1300	988	330 330 335	48, 3 x 3.6 or 50 x 5	13 15 25
50	10 and 16 25 and 40 63 100	1500	1188	340 340 345 345	60 x 5	20 22 34 34

Metering pipes with orifice plates and annular chambers for installation between EN flanges to EN 1092.1, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Nominal diameter acc. to ASME

Nom. diameter	PN	a	L	k	Pipe[1] D_a x s	Weight kg
½ inch	Class 150 Class 300 Class 600	550	368	297 307 307	20 x 2.5	5 5.5 7.5
¾ inch	Class 150 Class 300 Class 600	700	488	297 307 307	25 x 2.5	6.5 7 8
1 inch	Class 150 Class 300 Class 600	900	638	307 313 313	30 x 2.5	8 9 14
11/4 inch	Class 150 Class 300 Class 600	1100	788	316 322 322	38 x 3	11.5 12.5 14
11/2 inch	Class 150 Class 300 Class 600	1300	988	326 335 335	48, 3 x 3.6 or 50 x 5	13 15 25
2 inch	Class 150 Class 300 Class 600	1500	1188	345 371 351	60 x 5	20 22 34

Metering pipes with orifice plates and annular chambers for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Metering pipe with orifice plate and annular chambers

Selection and ordering data	Order No. 7ME1310–					–				– Z
Metering pipe for mounting between flanges for non-corrosive media										
Orifice plate with annular chambers mounted between flanges										
permissible operating temperature -10 bis +400 grad Celsius,										
Orifice disk made of Mat. No. 1.4571, support rings and flanges made of Mat. No. 10460, pipes and tapping sockets made of Mat. No. 10305, 1.0255 or 1.0345										
Sealing faces to the mating flanges: plane, with recess or with groove.										
Nominal diameter acc. to EN										
DN 10										
• PN 10 and PN 16			1	A	C	3	2			
• PN 25 and PN 40			1	A	E	3	2			
• PN 63			1	A	F	3	2			
• PN 100			1	A	G	3	2			
DN 15										
• PN 10 and PN 16			1	B	C	3	2			
• PN 25 and PN 40			1	B	E	3	2			
• PN 63			1	B	F	3	2			
• PN 100			1	B	G	3	2			
DN 20										
• PN 10 and PN 16			1	C	C	3	2			
• PN 25 and PN 40			1	C	E	3	2			
DN 25										
• PN 10 and PN 16			1	D	C	3	2			
• PN 25 and PN 40			1	D	E	3	2			
• PN 63			1	D	F	3	2			
• PN 100			1	D	G	3	2			
DN 32										
• PN 10 and PN 16			1	E	C	3	2			
• PN 25 and PN 40			1	E	E	3	2			
DN 40										
• PN 10 and PN 16			1	F	C	3	2			
• PN 25 and PN 40			1	F	E	3	2			
• PN 63			1	F	F	3	2			
• PN 100			1	F	G	3	2			
DN 50										
• PN 10 and PN 16			1	G	C	3	2			
• PN 25 and PN 40			1	G	E	3	2			
• PN 63			1	G	F	3	2			
• PN 100			1	G	G	3	2			
Nominal diameter acc. to ASME										
½ inch										
• Class 150			5	B	A	3	2			
• Class 300			5	B	B	3	2			
• Class 600			5	B	C	3	2			
¾ inch										
• Class 150			5	C	A	3	2			
• Class 300			5	C	B	3	2			
• Class 600			5	C	C	3	2			
1 inch										
• Class 150			5	D	A	3	2			
• Class 300			5	D	B	3	2			
• Class 600			5	D	C	3	2			
1¼ inch										
• Class 150			5	E	A	3	2			
• Class 300			5	E	B	3	2			
• Class 600			5	E	C	3	2			

Selection and ordering data	Order No. 7ME1310–					–				– Z
Metering pipe for mounting between flanges for non-corrosive media										
1½ inch										
• Class 150			5	F	A	3	2			
• Class 300			5	F	B	3	2			
• Class 600			5	F	C	3	2			
2 inch										
• Class 150			5	G	A	3	2			
• Class 300			5	G	B	3	2			
• Class 600			5	G	C	3	2			
Tapping sockets										
• With threaded connection G½; for liquids and gases PN 160, for steam PN 100										
- Opposite one another, straight								1	A	
- Opposite one another, bent-up, for vertical pipelines								1	B	
- Arranged on one side, for horizontal pipelines								1	C	
• With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100										
- Opposite one another, straight								1	Q	
- Opposite one another, bent-up, for vertical pipelines								1	R	
- Arranged on one side, for horizontal pipelines								1	S	
• With ferrule for pipe Ø 12 mm, S series, max. 200 °C permissible										
- Opposite one another, straight								1	J	
- Opposite one another, bent-up, for vertical pipelines								1	K	
- Arranged on one side, for horizontal pipelines								1	L	
• With welding connection Ø 21.3 mm; for liquids and gases PN 100 to PN 400 for steam PN 100										
- Opposite one another, straight								1	D	
- Opposite one another, bent-up, for vertical pipelines								1	E	
- Arranged on one side, for horizontal pipelines								1	F	
Shape of orifice disk aperture (see figure "Shapes of orifice disk aperture")										
• Orifice plate form A									A	
• Quarter-circle nozzle form B									B	
Manufactured according to pressure equipment directive (see "Questionnaire" (page 4/316))										
• Without[2)]										0
• According to Article 3, Paragraph 3										1
• According to category 1										2
• According to category 2										3

4

Metering pipe with orifice plate and annular chambers

Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	**7ME1310–■■■■■–■■■■–Z**
Further designs Add "**-Z**" to Order No. and specify Order code(s) and plain text.	Order code[1]
Calculation of orifice disk aperture Add calculation sheet "Questionnaire for calculation of a primary differential pressure device acc. to DIN EN ISO 5167" to the order!	**A11**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzler **r = ... mm**	**Y01**
Material certificate according to EN 10204-3.1	**C02**
Other materials	**On request**
Additional nominal diameters and nominal pressure stages according to EN and ASME	**On request**
Acceptance test certificate B acc. to EN 10204, cold water pressure test at 1.5 × PN	**On request**
Sealing face of metering pipe with orifice plate, with recess or groove	**On request**
Metering pipes for corrosive media	**On request**

Note on ordering

Enclose a filled-out calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167" with the order (necessary for device selection)!

Scope of delivery:

Orifice plate comprised of two support rings with tapping sockets and an orifice disk; flanged between inlet and outlet pipe section, with gaskets between orifice plate and support ring and between support rings and flanges of the inlet and outlet pipes, including screws and nuts.
Graphite (99.85 %) flat gasket with foil insert (1.4401, 0.1 mm). application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories:

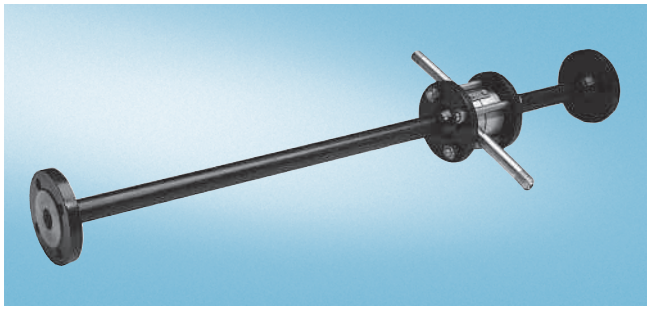
See "SITRANS P measuring instruments for pressure".

1) Order codes additive, any sequence.

2) Option only available outside Europe (manufactured according to Article 3, Paragraph 3 of the pressure equipment directive, without CE marking).

Metering pipe with orifice plate with single tappings

Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400 °C

Design

Orifice plate with single tappings, orifice disk aperture form A or B (see types of primary differential pressure devices in "Technical description"); flanged between standard inlet and outlet pipe sections with lengths according to DIN 19205.

Nominal diameters

EN: DN 10 to DN 50
ASME: ½ inch to 2 inch

Nominal pressure

EN: PN 10 to PN 160
ASME: class 150 to 2500

Sealing face of the end flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 10 to PN 40)
- Plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 160)
- Plane, RF (raised faced) for versions to ASME

Tapping sockets straight or bent

- With connection thread G½ DIN ISO 228/1, for connection dimensions to DIN 19207 form V (see page 4/310)
- With threaded connection ½-14 NPT male, for version to ASME
- With ferrule for pipe Ø 12 mm, S series
- With welding connection Ø 21.3 mm.

For length of tapping sockets for all metering pipe L = 120 mm and position of tapping socket, see "Technical Description" and "Function".

Connection size

The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e.g.

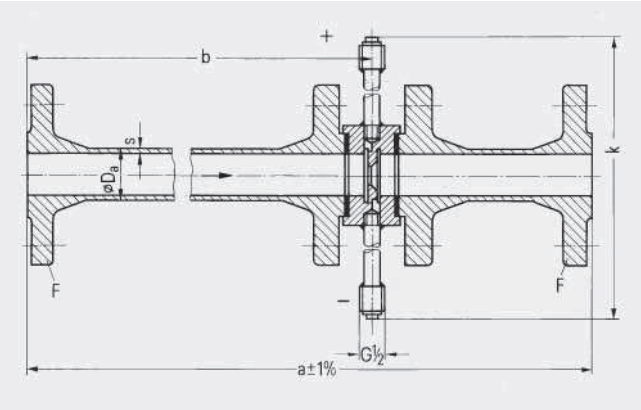
- For liquids and gases,
  - up to PN 160: Thread G½ or welding connection Ø 21.3 mm
  - from PN 6 and PN 400: Welding connection Ø 21.3 mm
  - > PN 400: Welding connection Ø 24 mm
- For steam
  - up to PN 100: Thread G½ or welding connection Ø 21.3 mm
  - from PN 6: Welding connection Ø 24 mm

Technical specifications

Permissible operating temperature	–10 to + 400 °C
Pipes and tapping sockets made of	P235G1TH, Mat. No. 1.0305, ST37.4, Mat. No. 1.0255 or P235GH, Mat. No. 1.0345
Flanges made of	P250GH, Mat. No. 1.0460
Orifice plate made of	Mat. No. 1.0460
Metering edge deposition welded	Mat. No. 1.4576

Metering pipe with orifice plate with single tappings

Dimensional drawings



Nominal diameter acc. to ASME

DN	PN	a	L	k	Pipe[1] D_a x s	Weight kg
10	10 and 16 25 and 40 63 and 100 160	400	229 229 229 230	297 307 307	16 x 3	4,5 5 6,5 6,5
15	10 and 16 25 and 40 63 and 100 160	550	379 379 379 380	297 307 307	20 x 2,5	5 5,5 7,5 7,5
20	10 and 16 25 and 40	700	499	307 313	25 x 2,5	6,5 7
25	10 and 16 25 and 40 63 and 100 160	900	649 649 649 650	316 322 322	30 x 2,5	8 9 14 14
32	10 and 16 25 and 40	1100	799	310 335	38 x 3	11,5 12,5
40	10 and 16 25 and 40 63 and 100 160	1300	999 999 999 1000	345 371 351	48,3 x 3,6 or 50 x 5	13 15 25 22,5
50	10 and 16 25 and 40 63 100 160	1500	1199 1199 1199 1199 1200	297 307 307	60 x 5	20 22 34 34 35

Metering pipes with orifice plates and with single tappings for installation between EN flanges to EN 1092-1, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Nominal diameter acc. to ASME

Nom. diameter	PN	a	L	k	Pipe[1] D_a x s	Weight kg
½ inch	Class 150 Class 300 Class 600	550	368	297 307 307	20 x 2,5	5 5,5 7,5
¾ inch	Class 150 Class 300 Class 600	700	488	297 307 307	25 x 2,5	6,5 7 8
1 inch	Class 150 Class 300 Class 600	900	638	307 313 313	30 x 2,5	8 9 14
1¼ inch	Class 150 Class 300 Class 600	1100	788	316 322 322	38 x 3	11,5 12,5 14
1½ inch	Class 150 Class 300 Class 600	1300	988	326 335 335	48,3 x 3,6 or 50 x 5	13 15 25
2 inch	Class 150 Class 300 Class 600	1500	1188	345 371 351	60 x 5	20 22 34

Metering pipes with orifice plates and with single tappings for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	7ME1320-■■■■■-■■■■-Z
Orifice plate with single tappings, flanged	
Sealing faces to the mating flanges: plane	
Permissible operating temperature -10 bis +400 grad Celsius,	
Orifice plate made of Mat. No. 1.0460, metering edge deposition welded of Mat. No. 1.4576, flanges and pipes made of Mat. No. 10460, pipes and tapping sockets made of Mat. No. 10305/1.0255/or 1.0345	
Nominal diameter acc. to EN	
DN 10	
• PN 10 and PN 16	1AC35
• PN 25 and PN 40	1AE35
• PN 63	1AF35
• PN 100	1AG35
• PN 160	1AH35
DN 15	
• PN 10 and PN 16	1BC35
• PN 25 and PN 40	1BE35
• PN 63	1BF35
• PN 100	1BG35
• PN 160	1BH35
DN 20	
• PN 10 and PN 16	1CC35
• PN 25 and PN 40	1CE35
DN 25	
• PN 10 and PN 16	1DC35
• PN 25 and PN 40	1DE35
• PN 63	1DF35
• PN 100	1DG35
• PN 160	1DH35
DN 32	
• PN 10 and PN 16	1EC35
• PN 25 and PN 40	1EE35
DN 40	
• PN 10 and PN 16	1FC35
• PN 25 and PN 40	1FE35
• PN 63	1FF35
• PN 100	1FG35
• PN 160	1FH35
DN 50	
• PN 10 and PN 16	1GC35
• PN 25 and PN 40	1GE35
• PN 63	1GF35
• PN 100	1GG35
• PN 160	1GH35
Nominal diameter acc. to ASME	
½ inch	
• Class 150	5BA35
• Class 300	5BB35
• Class 600	5BC35
¾ inch	
• Class 150	5CA35
• Class 300	5CB35
• Class 600	5CC35
1 inch	
• Class 150	5DA35
• Class 300	5DB35
• Class 600	5DC35

Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	7ME1320-■■■■■-■■■■-Z
1¼ inch	
• Class 150	5EA35
• Class 300	5EB35
• Class 600	5EC35
1½ inch	
• Class 150	5FA35
• Class 300	5FB35
• Class 600	5FC35
2 inch	
• Class 150	5GA35
• Class 300	5GB35
• Class 600	5GC35
Tapping sockets	
• With threaded connection G½; for liquids and gases PN 160, for steam PN 100	
- Opposite one another, straight	1A
- Opposite one another, bent-up, for vertical pipelines	1B
- Any arrangement of tapping sockets (specify angle in plain text)	1G
• With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100	
- Opposite one another, straight	1Q
- Opposite one another, bent-up, for vertical pipelines	1R
- Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	1T
• With ferrule for pipe Ø 12 mm, S series, max. 200 °C permissible	
- Opposite one another, straight	1J
- Opposite one another, bent-up, for vertical pipelines	1K
- Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	1M
• With welding connection Ø 21.3 mm; for liquids and gases PN 100 ... 400, for steam PN 100 or Ø 24 mm; for liquids and gases over PN 400, for steam over PN 100	
- Opposite one another, straight	1D
- Opposite one another, bent-up, for vertical pipelines	1E
- Any arrangement of tapping sockets (specify angle in plain text)	1H
Shape of orifice disk aperture (see figure "Shapes of orifice disk aperture")	
• Orifice plate form A	A
• Quarter-circle nozzle form B	B
Manufactured according to pressure equipment directive (see "Questionnaire" (page 4/316))	
• Without[2)]	0
• According to Article 3, Paragraph 3	1
• According to category 1	2
• According to category 2	3

4

Metering pipe with orifice plate with single tappings

Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	**7ME1320–■■■■■–■■■■–Z**
Further designs Add "**-Z**" to Order No. and specify Order code(s) and plain text.	Order code[1]
Calculation of orifice disk aperture Enclose a calculation sheet "Questionnaire for calculation of a primary differential pressure device acc. DIN EN ISO 5167" with the order!	**A11**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzler **r = ... mm**	**Y01**
Material certificate according to EN 10204-3.1	**C02**
Other materials	**On request**
Angle between the tapping sockets Specify in plain text: Angle between the tapping sockets ...°	**Y02**
Additional nominal diameters and nominal pressure stages according to EN and ASME	**On request**
Acceptance test certificate B acc. to EN 10204, cold water pressure test at 1.5 × PN	**On request**
Sealing face of metering pipe with orifice plate, with recess	**On request**
Metering pipes for corrosive media	**On request**

Note on ordering

Enclose a filled-out calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167" with the order (necessary for device selection)!

Scope of delivery:

One-piece orifice plate with tapping sockets flanged between inlet and outlet pipes, with gaskets between orifice plate and flanges of the inlet and outlet pipes, including screws and nuts. Graphite (99.85 %) flat gasket with foil insert (1.4401, 0.1 mm). Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories:

See "SITRANS P measuring instruments for pressure".

1) Order codes additive, any sequence.

2) Option only available outside Europe (manufactured according to Article 3, Paragraph 3 of the pressure equipment directive, without CE marking).

Overview

When ordering a primary differential pressure device, the calculation can be ordered at the same time.

Add the Order code "A11" to the Order No. of the primary device, and enclose a filled-out calculation sheet ("Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167) with the order.

If the calculation sheet is not complete, an extra charge will be made for the additionally required calculations.

Selection and Ordering data	Order No.
Calculation of orifice disk aperture of an orifice plate, orifice plate without support rings, ISA 1932 nozzle or Venturi nozzle (without measuring sheet or sketch)	**7ME1910–0A–Z**
Calculation of differential pressure or flow on an existing primary device	**7ME1910–0D–Z**
Further designs Please add "-**Z**" to Order No. and specify Order code(s) and plain text.	Order Code
Enclose a calculation sheet "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167 with the order!	**Y01**

Gardex flowmeter

Overview

SITRANS F I Gardex flowmeter

Application

The SITRANS F I Gardex flowmeter is a robust device for measuring and monitoring the flow of liquid and gaseous media in any flow direction. The measured value is indicated on a scale, and is optionally available via contact switches or a current output. Standard scales are available for liquids with a density of 1 kg/l (62.43 lb/cu.ft). The accuracy corresponds to ± 3% of the full-scale value. When selecting the size, it is recommendable for the normal flow (operating point) to be approx. 75% of the maximum flow listed in Table on page 4/341.

Benefits

- Product scale for liquids and gases
- Simple installation resulting from rugged sandwich design
- Can be optionally fitted with limit contact and remote transmitter.

Design and mode of operation

The sensor of the SITRANS F I Gardex flowmeter consists of a baffle plate with balance beam and operates according to the eflection method. The baffle plate (b) causes a back-pressure in the medium and the balance beam (c) is deflected. This movement is transmitted via the beam to the indicator mechanism (e) using a bellows bushing (d). A gear unit (f) converts the deflection of the balance beam into a rotary movement of the pointer (h). The pointer movement is damped by an eddy-current brake (g). The bellows bushing isolates the measured medium from the display unit.

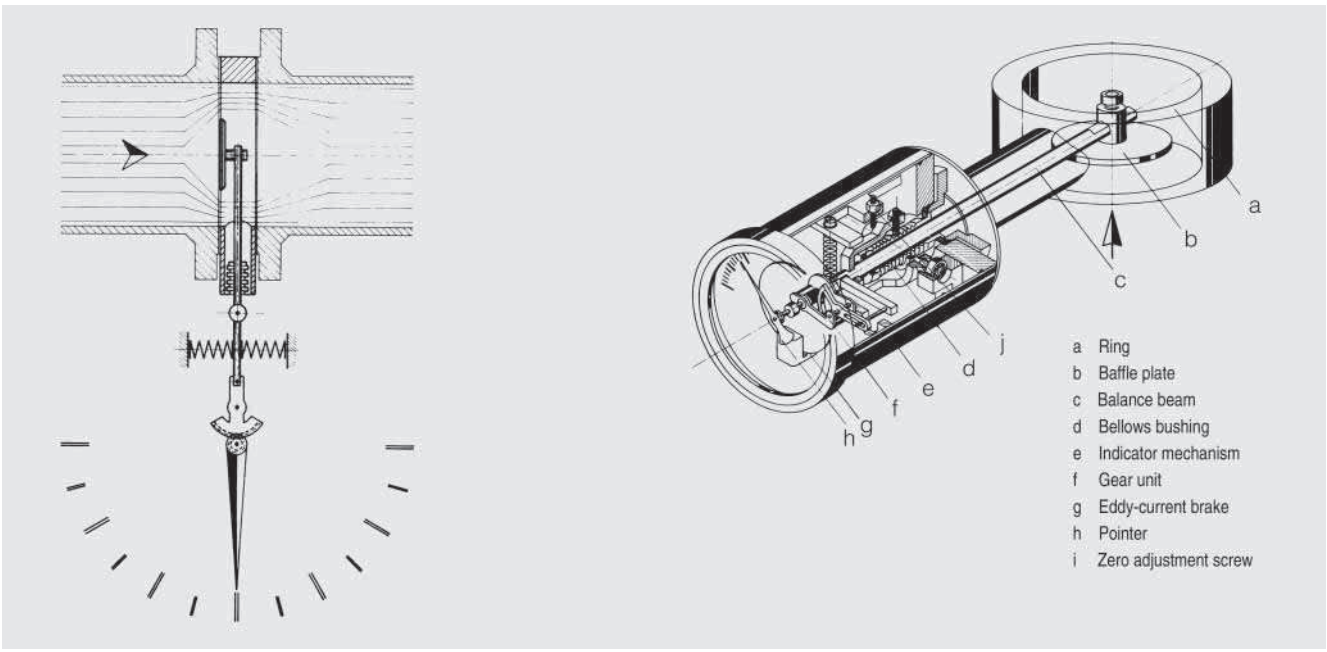
Connection and installation instructions

The flowmeter can be used for any flow direction and in any mounting position. However, because of the possibility of contamination of the bellows, installation with the indicator pointing downwards should be avoided. The desired flow direction must already be specified when ordering so that the weight of the sensor (baffle plate) can be taken into consideration in the calibration. Subsequent changing of the flow direction may result in larger inaccuracies and may necessitate a subsequent correction of the zero point.

The calibration is carried out at defined conditions of the medium. Deviations in the density, pressure or temperature of gases or changes in the density or viscosity of liquids, result in errors. It is therefore essential to observe the calibration conditions which are specified on the scale. Therefore the measured medium, density and viscosity at operating temperature and pressure must be specified when ordering. With gases, it is additionally necessary to specify the exact pressure reference point (pressure above atmospheric or absolute pressure).

To avoid oscillations of the baffle plate when measuring gases, the full static pressure must be applied to the device. The valve must therefore be installed downstream of the flowmeter. The position of the valve is unimportant when measuring liquids. The recommended inlet and outlet pipe sections must always be provided.

The ring (sandwich design) is installed, centered and screwed tight together with the corresponding gaskets between two flanges of the pipeline. The arrow on the device indicates the flow direction for the medium.



SITRANS F I Gardex, design

Contact assembly

Various contacts/remote transmitters are available:

- Magnet spring contacts as twin contacts
- Inductive contacts as single or twin contacts
- Current output

Maintenance

No maintenance work is necessary.

Zero correction

A corresponding correction can be made if the pointer zero is offset (e.g. resulting from a changed mounting position). The flowmeter need not be dismounted to do this.

Remove the housing cover to the front by loosening the three screws and rotating. You can then adjust the zero point using the screw (j,).It is recommendable to first bring the pointer into a positive indication and to then turn it back until it rests properly on the limit pin.

It is recommendable to subsequently check the function. To do this, apply a flow to move the indicator up to 60 to 100%. Alternatively, you can press in the bushing rod. With a zero flow, the pointer must again rest on the limit pin.

Startup

When starting up new plants, material residues (e.g. welding spatter) may be conveyed in the medium and deposited on the measuring unit. In such cases we therefore recommend cleaning the device after a short period of operation.

In order to prevent knocking in the line, always start up against a closed valve. The valve can then be slowly adjusted.

Technical specifications

Application	See page 4/338
Design and mode of operation	See page 4/338
Measuring principle	Baffle plate
Input	
Measuring range	See table on page 4/341
• For liquids	0.4 to 1350 m^3/h (1.76 to 5944 USgpm)
• For gases	12 to 40500 m^3/h (0.007 to 23.84 scfm)
Dynamic range	1 : 5
Dimension of measured variable	m^3/h
Max. permissible pressure	
• DN 25 to DN 150 / 1 to 6 inch	16 bar (232 psi)
• DN 200 / 8 inch	10 bar (145 psi)
• DN 250 / 10 inch	6 bar (87 psi)
• DN 300 / 12 inch	4 bar (58 psi)
• Option: ANSI B 16.5	
Rated operation conditions	
Mounting position	Vertical or horizontal
Flow direction	No limitations
Inlet and outlet pipe sections	
• DN 25/1" to DN 150/6“	At least 5 D (with v < 2.5 m/s (8.2 ft/s)), otherwise 10 D
• DN 200/8" to DN 300/12"	At least 10 D (with v < 2.5 m/s (8.2 ft/s)), otherwise 20 D
Medium conditions	
• Accuracy	± 3% of full-scale value; ± 5% of full-scale value with magnet spring contact and electric remote transmitter
Temperature of medium	Dependent on gasket material and version
• Standard version	≤ 90 °C (194 °F)
• With temperature shield	≤ 130 to 250 °C (266 to 482 °F)
Design	
Ring connection	DN 25 to DN 300: DIN 2501 1" to 12": ANSI B 16.5 RF
Material	
• Indicator housing	Mat. No. 1.4301/304
• Ring and transverse pipe, baffle plate, balance beam, bellows and gasket	See Table on page 4/341
Degree of protection (indicator unit)	
• Standard design	IP65
• Version with contact/remote transmitter	IP54
Weight	See Table on page 4/341
Certificates and approvals	
Classification according to PED 97/23/EC	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

Gardex flowmeter

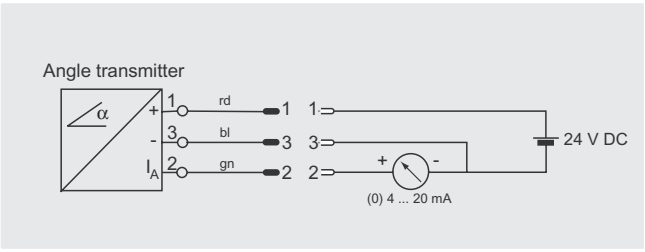
Technical specifications of contacts

Switching principle	**Magnet spring contact, twin contact**
Connection	Pg 9
Hysteresis	± 3% of full-scale value
Degree of protection	IP 54
Ambient temperature	-20 to +70 °C (-4 to 158 °F)
Max. switching frequency	5/min
Max. rating	250 V AC / 1 A / 50 VA 250 V DC / 1 A / 30 W Rating data apply to resistive loads; a suppressor circuit is required for inductive loads

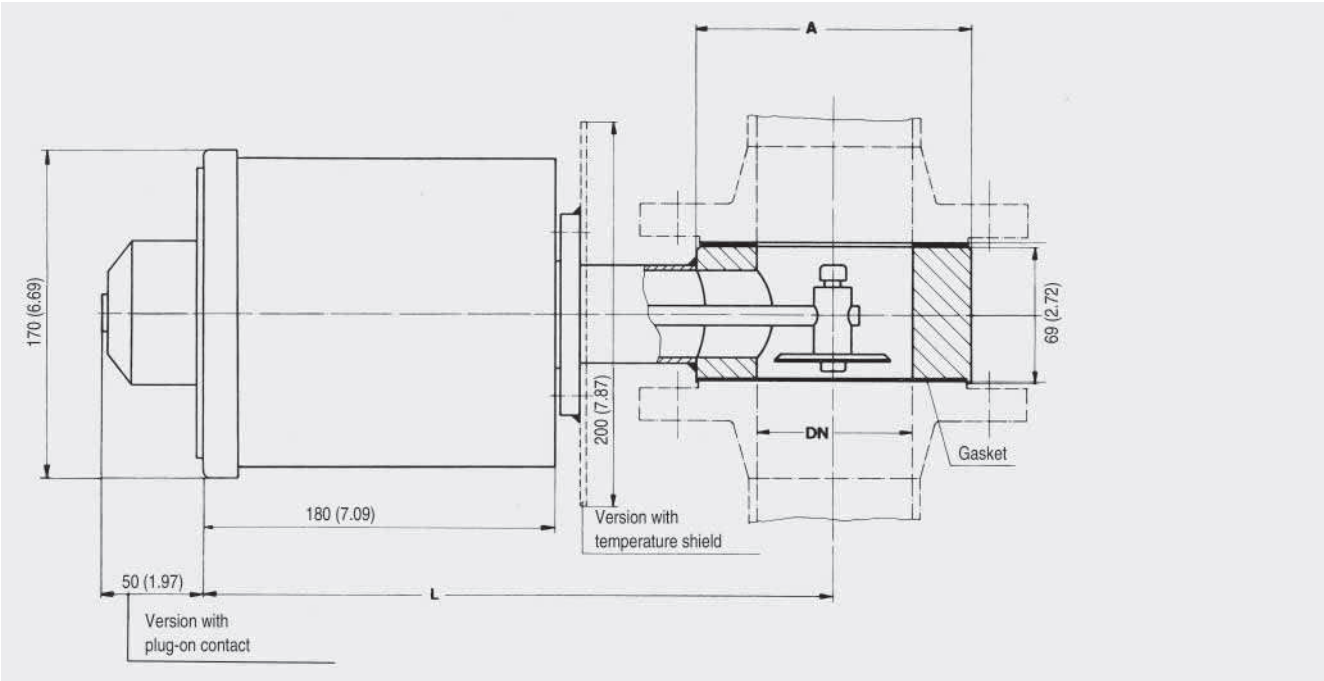
Switching principle	**Inductive contact, single contact and twin contact**
Connection	Pg9
Rated voltage	DC 8 V
Degree of protection	IP 65
Self-inductance	100 µH
Self-capacitance	30 nF
Ambient temperature	
• without Ex protection	-20 ... +70 °C (-4 ... +158 °F)
• with Ex protection	-20 ... +55 °C (-4 ... +131 °F)
Ex approval	EEx ia IIC T6

Technical specifications of contacts

Switching principle	**Rotation angle transmitter**
Connection	Appliance plug (according to IEC 61984) with Pg 7
Rated voltage U_B	24 V DC (-5 to +25%)
Current consumption	approx.16 mA + I_A
Current output I_A	0 to 20 mA or 4 to 20 mA
Load at U_B = 24 V	Max. 750 Ω
Ambient temperature	-20 to +80 °C (-4 to 176 °F)
Ex approval	None
Remark	To comply with EN 50 082-2 (EMC), a screened cable must be used which is earthed at one end



Rotation angle transmitter SITRANS F I Gardex, wiring diagram



SITRANS F I Gardex, dimensions in mm (inch)

Measuring ranges, pressure losses and dimensions (liquids and gases)

Remark:
Standard measuring ranges for liquid (ρ = 1 kg/l (62.43 lb/cu.ft), viscosity 1 mPa·s (1 cp)) and air (Pe = 0 bar above atmospheric, T = 20 °C (68 °F)) (dynamic range 1:5)

Nom. diameter of pipe DN	Full-scale value for water [m^3/h]			Full-scale value for air [m^3/h]			Min. inlet pressure [bar]	Pressure loss *) [mbar]	PN 10/16 dimensions [mm]		Weight [kg]
	Measuring range			Measuring range							
	Small	Medium	Large	Small	Medium	Large			L	A	
25	2	4	6	60	120	180	0.6	270-380	280	71	6.5
40	3	9	15	90	270	450	0.5	100-250	295	92	7.5
50	9	27	45	270	810	1350	0.4	50-150	305	106	8.5
65	12	36	60	360	1080	1800	0.4	50-150	315	126	9.5
80	18	54	90	540	1620	2700	0.4	50-150	325	142	10.5
100	30	90	150	900	2700	4500	0.4	50-150	330	162	11.5
125	55	160	270	1650	4875	8100	0.4	50-150	345	192	13.5
150	70	205	345	2100	6225	10350	0.3	40-120	365	217	15.5
200	120	360	600	3600	10800	18000	0.3	40-120	390	273	19.5
250	200	585	975	6000	17625	29250	0.3	40-120	425	327	23.5
300	270	810	1350	8100	24300	40500	0.3	40-120	450	377 (PN 10) 385 (PN 16)	27.0

Measuring ranges, pressure losses and dimensions (liquids and gases)

Nom. diameter of pipe inch	Full-scale value for water [USgpm]			Full-scale value for air [scfm]			Min. inlet pressure [psi]	Pressure loss *) [psi]	PN 10/16 dimensions [inch]		Weight [lb]
	Measuring range			Measuring range							
	Small	Medium	Large	Small	Medium	Large			L	A	
1	8.8	17.6	26	0.035	0.071	0.106	8.7	3.9-5.5	11.02	2.80	14.3
1½	13.2	40	66	0.053	0.159	0.265	7.25	1.45-3.6	11.61	3.62	16.5
2	40	119	198	0.159	0.477	0.795	5.8	0.73-2.2	12.01	4.17	18.7
2½	53	159	264	0.212	0.636	1.06	5.8	0.73-2.2	12.40	4.96	20.9
3	79	238	396	0.318	0.954	1.59	5.8	0.73-2.2	12.80	5.59	23.1
4	132	396	660	0.530	1.59	2.65	5.8	0.73-2.2	12.99	6.38	25.4
5	242	704	1189	0.971	2.87	4.77	5.8	0.73-2.2	13.58	7.56	29.8
6	308	903	1519	1.24	3.66	6.09	4.4	0.58-1.74	14.37	8.54	34.2
8	528	1585	2642	2.12	6.36	10.59	4.4	0.58-1.74	15.35	10.75	43.0
10	881	2576	4293	3.53	10.37	17.22	4.4	0.58-1.74	16.73	12.87	51.8
12	1189	3566	5944	4.77	14.30	23.84	4.4	0.58-1.74	17.72	14.8 (PN 10) 15.2 (PN 16)	59.5

*) The pressure loss defines the range from the small to the large measuring range.

SITRANS F I Gardex versions

Version	Type 1	Type 2	Type 3	Type 4	Type 5
Ring and transverse pipe	Steel DN 25 to 40 (1 to 1½") ST-37 DN 50 to 65 (2 to 2½") ST-52.3 DN 80 (3") and above ST-37	Stainless steel Mat. No. 1.4571/316Ti	Steel DN 25 to 40 (1 to 1½") ST-37 DN 50 to 65 (2 to 2½") ST-52.3 ab DN 80 (3") and above ST-37		
Liner	-		Hard rubber		Hastelloy C
Baffle plate, balance beam, bellows	Stainless steel, mat. No. 1.4571/316Ti		Stainless steel, mat. No. 1.4571/316Ti	Hastelloy C	Hastelloy C
Gasket (between transverse pipe flange and cast housing)	Buna N up to 90 °C (194 °F) Viton up to 160 °C (320 °F) Klinger SIL C 4500 up to 250 °C (482 °F)		Buna N up to 90 °C (194 °F) Viton up to 90 °C (194 °F)		PTFE up to 160 °C (320 °F)

SITRANS F I Gardex, versions

Gardex flowmeter

Selection and Ordering data	Order No.	Order code
SITRANS F I flowmeter Gardex F)	**7ME5842-**	
Version (according to Table on page 4/341)		
• Type 1 Ring: steel Baffle plate: stainless steel 1.4571/316Ti	0	
• Type 2 Ring: stainless steel 1.4571/316Ti Baffle plate: stainless steel 1.4571/316Ti	1	
• Type 3 Ring: steel with rubber liner Baffle plate: stainless steel 1.4571/316Ti	2	
• Typ 4 Ring: steel with rubber liner Baffle plate: Hastelloy	3	
• Type 5 Ring: steel with Hastelloy liner Baffle plate: Hastelloy	4	
Nominal diameter		
• DN 25 (1" ANSI)	A	
• DN 40 (1½" ANSI)	B	
• DN 50 (2" ANSI)	C	
• DN 65 (2½" ANSI)	D	
• DN 80 (3" ANSI)	E	
• DN 100 (4" ANSI)	F	
• DN 125 (5" ANSI)	G	
• DN 150 (6" ANSI)	H	
• DN 200 (8" ANSI)	J	
• DN 250 (10" ANSI)	K	
• DN 300 (12" ANSI)	L	
Measuring ranges (acc. to Table on page 4/341)		
Liquid measurement		
• Small	A	
• Medium	B	
• Large	C	
Gas measurement		
• Small	D	
• Medium	E	
• Large	F	
• Special measuring range (specify in plain text)	Z	K 1 Y
Flange connection standard DIN 2501 (BS 4504)		
• DN 25 ... 250 PN 10/16 (DN 300 only with PN 10)	1	
• ANSI B16.5, 150 lb/sqinch	2	
• Other flanges specify in plain text	9	L 1 Y
Temperature shield		
• Without (standard)	0	
• With stainless steel temperature shield (130 ... 250 °C (266 ... 482 °F))	2	
Gasket material		
• Buna N (standard)	1	
• Viton	4	
• Klinger SIL C 8200	5	
Display		
• With local display (standard)	A	
• With magnet spring contact	B	
• With inductive contact	C	
• With electr. remote transmitter (0 ... 20 mA)	D	
• With electr. remote transmitter (4 ... 20 mA)	E	

Selection and Ordering data	Order No.	Order code
SITRANS F I flowmeter Gardex F)	**7ME5842-**	
Contact function		
No contact (standard)		A
Magnetic spring contact		
Closes on upward or downward violation of limit		D
Opens on upward or downward violation of limit		E
Closes on downward violation, opens on upward violation of limit		G
Opens on downward violation, closes on upward violation of limit		H
Inductive contact		
Opens on downward violation of limit		J
Closes on downward violation of limit		K
Closes on upward or downward violation of limit		L
Opens on upward or downward violation of limit		M
Closes on downward violation, opens on upward violation of limit		N
Opens on downward violation, closes on upward violation of limit		P
Flow direction		
• Downwards (vertical piping)		1
• Upwards (vertical piping)		2
• From left to right (horizontal piping)		3
• From right to left (horizontal piping)		4

Selection and Ordering data	Order code
Further designs	
Please add „-Z" to Order No. and specify Order code(s).	
With calibration certificate (not with electric remote transmitter)	**B06**
Special scale Specify in plain text: Medium, measuring range, dimension, density, density dimension, viscosity, viscosity dimension, operating temperature, operating pressure	**Y01**
Silicone-free version	**Y04**
Medium: water Viscosity: 1 mPa·s (cp) Density: 1 kg/l (62.43 lb/cu.ft)	**Y05**
Special version: specify in plain text	**Y99**

F) Subject to export regulations AL: 9I999, ECCN: N.

Overview

Mechanical registers, automatic batchmeters and digital registers with current and pulse output

Rotary-piston meter DN 15 (½“) with single-pointer dial type 01 without acceccories

Acid resistant rotary-piston meter DN 25 (1“) with single-pointer dial type 01 without acceccories

Rotary-piston meter DN 25 (1“) with single-pointer dial type 01

Rotary-piston meter DN 50 (2") with mech. Single-pointer dial type 01, with accessories (here: cooling attachment and pulser)

Rotary piston meter with electric flow register in compact form

Automatic batch meter DN 50 (2“), with rotary-piston meter, quantity pre-set register and shut-off valve

Rotary-piston meters - Introduction Application

Benefits

- High measuring accuracy (approved for custody transfer)
- Suitable for flow rates up to 1000 l/min (264 USgpm)
- Wide flow rate range
- Low dependence on viscosity
- Low pressure drop
- Simple compact design
- High reliability
- Advantages with extremely high viscosity since pressure drops up to 3 bar (43.5 psi) permissible
- Advantages with very low viscosity (e.g. liquefied gas) since only low pressure drops occur because of the light-weight mechanism with good running characteristics
- Wide range of available materials, e.g. plastic lining for particularly corrosive liquids
- Easy service as a result of simple design
- Liquid temperatures up to 300 °C
- Also available with external heater
- Metering and dispensing without a power supply
- No inlet or outlet pipe sections required
- Independent of flow profile, conductivity and damping

Rotary-piston meters are characterized by:

- Accuracy
- Reliability
- Robust design

Application

For use in closed liquid circuits at pressures up to PN 63 (MWP914 psi) and liquid temperatures up to 300 °C (572 °F).

- For all liquids ranging from lubricating oils up to corrosive acids, viscosity ≤ 0.2 mPa s (cp) and for pasty, viscous liquids (e.g. colors for offset printing with 350 000 mPa s (cp))
- For measurements requiring an accuracy associated with custody transfer.

A prerequisite for exact measurements is that the liquid is homogeneous without coarse solid impurities or gas inclusions.

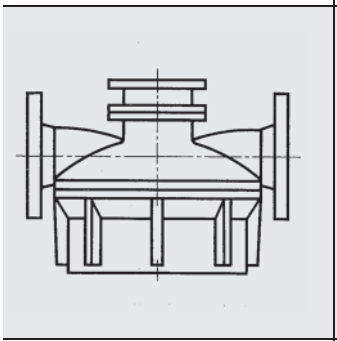
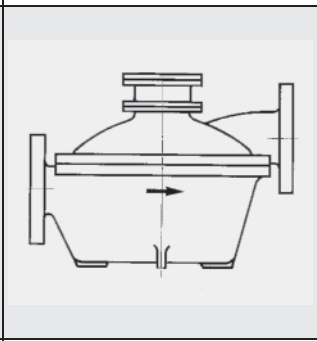
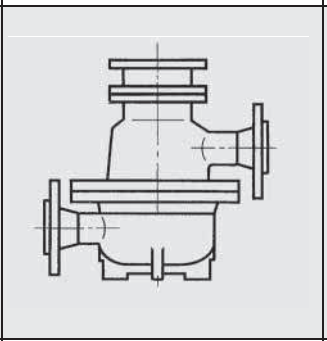
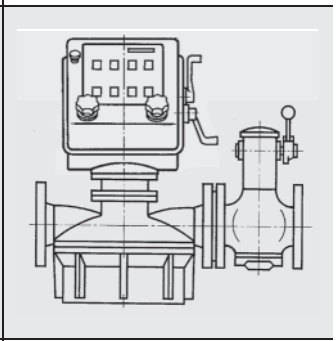
Rotary-piston meters are mainly used in the petroleum industry, the raw material industries, the chemical industry, the foodstuffs and beverage industries and in power stations and district heating stations:

In the basic version (meter mechanism and register) for metering in the production, distribution and consumption of liquids.

- With quantity preset register and mechanical shut-off valve as an automatic batchmeter without a power supply
- With accessories (pulser etc.) for flow rate measurement, remote metering and digital data processing

They complement one another with respect to the flow rate ranges but have particular advantages for specific applications.

Rotary-piston meters are approved for custody transfer in the European Union and in many other countries.

Rotary-piston meter												**Automatic batchmeter**			
Industrial design DN 25 (1“) ... DN 80 (3“) PN 4, 6, 10, 16				Industrial design DN 15 (½“) ... DN 80 (3“) PN 25, 40, 63				Acid-resistant model DN 25 (1“), PN 10				Rotary-piston meter with mechanical shut-off valve and quantity preset register DN 25 (1“), PN 10 DN 25 (2“), PN 6			
															
For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.				For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.				For particularly corrosive liquids such as: Phosphoric acid, hydrochloric acid, dilute sulfuric acid, etc.				For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.			
Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page
l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)		
20 (5.3)	15 (½“)	7MR1020 7MR1030	4/359	500 (132)	50 (2“)	7MR1410 7MR1420 7MR1430 7MR1440	4/363	100 (26)	25 (1)	7MR1111	4/367	100 (26)	25 (1)	7MR1112 7MR1113	4/368
100 (26.4)	25 (1“)	7MR1110 7MR1120 7MR1130 7MR1140	4/361	1000 (264)	80 (3“)	7MR1610 7MR1620 7MR1630 7MR1640	4/365					500 (132)	50 (2)	7MR1412 7MR1413	4/369

Function

Measuring principle

When metering flowing liquids, either the volume V is recorded over a given time t or the momentary flow rate q is determined.

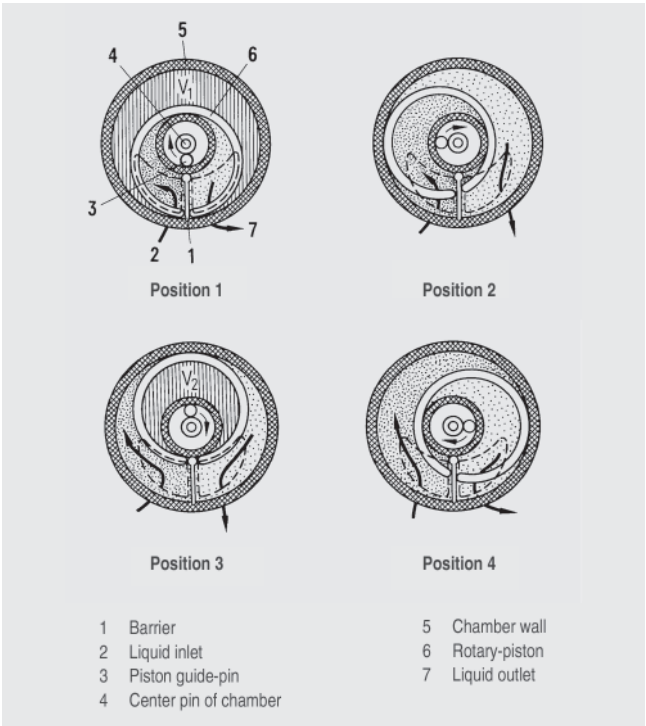
The relationship between these variables is $V = q \cdot t$.

In accordance with these two measuring principles, a differentiation is made between:

- direct volumetric meters, also referred to as positive displacement meters. These include rotary-piston meters.
- indirect volumetric meters such as velocity meters, where the flow velocity v represents a direct measure of the flow rate q at a given cross-section F according to the relationship $q = v \cdot A$. Examples include electromagnetic flowmeters and flowmeters operating according to the differential pressure principle.

Rotary-piston meters are direct volumetric meters: They operate according to the positive displacement principle. Their operation is based on the continuous limitation of defined portions of the volumetric flow in the mechanism by continuous filling and emptying of the measurement space. This consists of the walls of the measuring chamber and the moving part, i.e. the rotary-piston.

The rotary-piston is driven by the pressure difference in the metered liquid between the inlet and outlet. The meters are basically purely mechanical devices operating without a power supply.



Measuring process in the rotary-piston

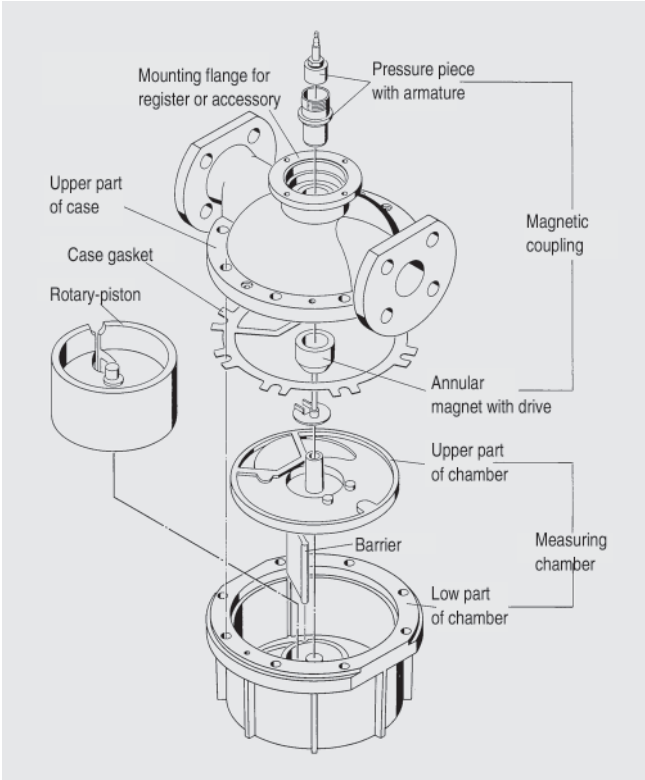
The rotary-piston (6) which has a double T-shaped cross section is guided by its gudgeon or guide pin (3) in an annular space in the base of the measuring chamber and also by its slot on the barrier (1).

The inlet port (2) and outlet port (7) are located on either side of the barrier. They are continuously sealed by the rotary-piston and the barrier.

The incoming liquid fills the sickle-shaped spaces, attempts to enlarge them and thus turns the piston until the volumes V_1 und V_2 are reached in succession. With the further movement of the piston, this filled space is connected to the outlet and emptied. Since the two sickle-shaped spaces – the inner and outer – are displaced with respect to one another, no deadpoint occurs during the movement of the piston. The piston moves continuously according to the flow of the metered liquid.

The rotary movement of the piston guide-pin is picked up by a drive member and transmitted via a gland-free (industrial design only) permanent magnetic coupling to the register. One revolution of the piston pin corresponds to the passage of the capacity of the measuring chamber (V_1+V_2) through the meter. A gear unit converts the revolutions into a decimal value of e.g. 10 l, 100 l, 1 m^3 or gallons.

Design

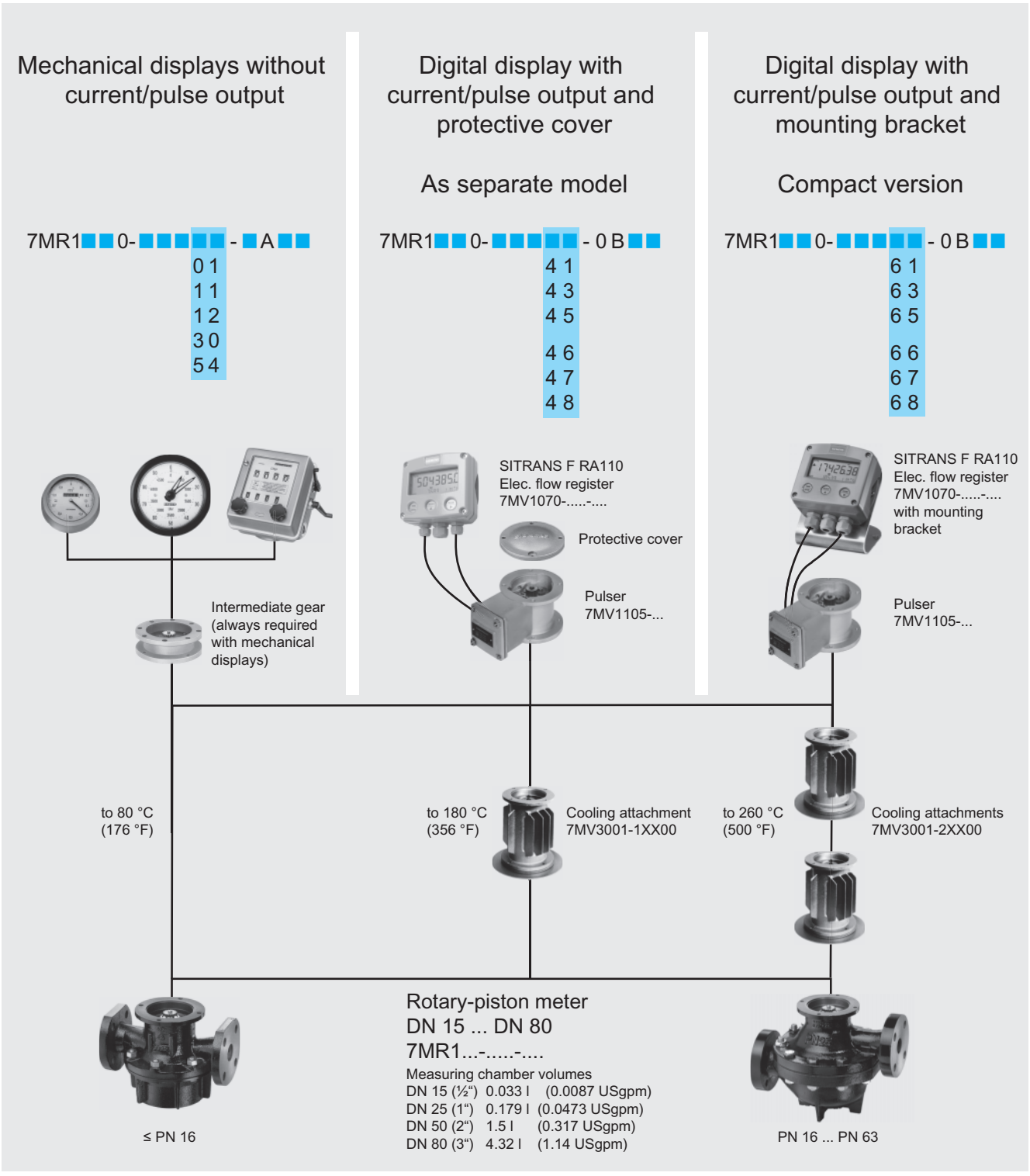


Metering mechanism of a rotary-piston meter DN 25/PN 10 (1"/MWP 145 psi) (industrial model)

The measuring chamber is inserted into the case for the rated pressure classes PN 25, PN 40 and PN 63 (MWP 363, 580 and 914 psi). The meters for rated pressures PN 4, PN 6 and PN 10 (MWP 58, 87 and 145 psi) have a measuring chamber machined to the lower part of the case.

All components of the meters are made of wear-resistant materials. Several materials are available for the parts which come into contact with the metered liquid (see Selection and Ordering data). The most suitable combination can be selected taking into account the corrosion resistance with respect to the liquid to be measured as well as the running characteristics and the permissible temperatures; the summary on aids selection.

4



Rotary-piston meter configurations

Configuration

Planning a liquid metering system

When planning a liquid metering system, it is first necessary to clarify the operational and measuring requirements:

- Purpose of the system, e.g. plant supervision, closed-loop or open-loop process control or metering for accounting
- purposes
- Designation, composition and viscosity of the metered liquid; flow rate, operating pressure and temperature
- Minimum and maximum quantities to be measured
- Distances between storage tank, metering point and quantity limitation point.

Intended use of the system

This determines the operating mode, which can be continuous or intermittent.

- Continuous operation
  The consumption of the measured liquid depends on the plant demand. An example is the metering of the oil flow to a firing plant. The decisive factor is that a specific heating power is produced. The measured values are used for plant supervision or as a slave variable in a closed-loop control system.
- Intermittent operation
  Up to 4 h daily or 1500 h/year, the quantity to be measured is often fixed in advance; with metering for accounting purposes, for example, according to the capacity of the transport tank; in process engineering for example in the apportioning of solvents for paint manufacture according to a recipe. The measurement thus determines the sequence of the process.

The type of volumetric meter to be used and the design of the measuring system also depends on the intended use.

- The type and size of the volumetric meter must also be clarified before planning begins. Their fundamental relationships with the system design will be dealt with in more detail below.

Although the numerical ranges must be greater in systems for continuous measurements, the registers for this mode of operation can be simpler.

The system design also becomes much simpler for continuous operation. For example, there is no need to consider the problems of quantity limitation as in the case of intermittent operation. In the latter type of systems, the reliable separation of the liquid remaining in the metering system from the metered quantity - the quantity limitation - is one of the most important conditions for the accuracy of the system.

The distances between storage tanks, metering point and quantity limitation point

The distances are mostly determined by fixed local conditions. In this case it is often necessary to find a means of reaching a practical compromise between system engineering and operational necessities.

Design of a liquid metering system

A liquid metering system can consist of:

- Filters
- Gas separators
- Volumetric meter

Like the filter and gas separator, the meter should also be installed in the pipe such that it always remains filled with liquid. Errors in measurement and corrosion due to the ingress of air are avoided in this manner.

- Rotary-piston meters
  These volumetric meters consist of a metering mechanism and a register combined into one unit. The register is selected according to the forms in which the measured values are to be presented. Any accessories used depend on the intended use of the metering system.
- Metering mechanism
  When determining the rated size of the meter, the flow rate required for the operation of the system, the viscosity of the metered liquid and the permissible pressure loss in the meter are decisive factors. These three values depend on one another. They must be taken into account jointly when selecting the rated size of the meter and adapted to one another if necessary.
  It is not necessary to consider the rated size of the installed pipe during this determination.
  The decisive factors for the choice of materials are the nature and temperature of the liquid.
- Registers
  Pointer dials, quantity preset registers and flow registers are available as registers For descriptions and technical data, see "Registers and quantity preset registers" page 4/389.
- Accessories
  The normal range of the rotary-piston meters can be extended using accessories. Example of accessories available:
  - Electrical transmitters for remote metering,
  - Electrical and electronic instruments for flow measurements
  - Thermal insulation attachments.

All the meters, displays and accessories are designed on a modular basis, and therefore all have the same connecting flanges.

Shut-off device

The flow of liquid is interrupted using this device - valve, gate, tap, etc. - when the intended quantity has been delivered.

In order to prevent harmful pressure surges (water hammer) and large overshoot quantities, the flow should be throttled continuously or in several stages before the final shut-off. Our quantity preset register with mechanical shut-off valve operates with four shut-off stages (cf. page 4/389).

The SITRANS F RA110 current or pulse output can also be used to control electric shut-off valves.

Quantity limitation

When the metered liquid has flowed through the metering system, it passes either into the process plant or into a vessel for further transport. The transition point from the metering system is significant from a measuring viewpoint and is referred to as the quantity limitation. If exact measurements are to be achieved, the metering system - from the gas separator to the quantity limitation - must always be filled with measurement material. A differentiation is made between two modes of operation depending on the location of the quantity preset limitation:

- empty-hose installations or systems and
- filled-hose installations or systems.

Minimum delivery quantity and value per revolution

When planning systems for batch operations it is important to take account of the “minimum delivery quantity” which can be measured and indicated with insufficient accuracy by the selected register. The regulations for metering systems for custody transfer can serve as a guideline:

The minimum delivery quantity is the smallest quantity which can be measured in one operation with permissible error limit.

It is also dependent on the value per revolution of the fastest element of the register. The value per revolution corresponds to that quantity which is indicated by a full revolution of this element (pointer or drum).

The minimum delivery quantities generally have the following relationships to the values per revolution:

- for pointer dial type 01: 1 x value per revolution.
- for all other pointer dials: 0.5 x value per revolution
- for all drum-type counters: 1 x value per revolution.

Rotary-piston meters - Introduction Configuration

Certain values per revolution or certain values of the minimum delivery quantity are assigned to each rated size of the individual meter types. These values have been selected such that they almost always represent the best solutions to the metering problems. Should it be found during the planning of a system that the minimum delivery quantity attainable with the value per revolution stated in the catalogue does not correspond to the operational requirements, please contact us.

Viscosity, density

Viscosity in the CGS and SI systems

Viscosity is a measure of the internal friction of a liquid. A differentiation is made between dynamic and kinematic viscosity. Dynamic viscosity is the decisive factor for the use of volumetric meters. Common viscometers generally determine the kinematic viscosity. The dynamic viscosity can be calculated from it as follows:

Dynamic viscosity	= kinematic viscosity	x density
1 mPa·s	= 1 mm²/s	x 1 g/cm³

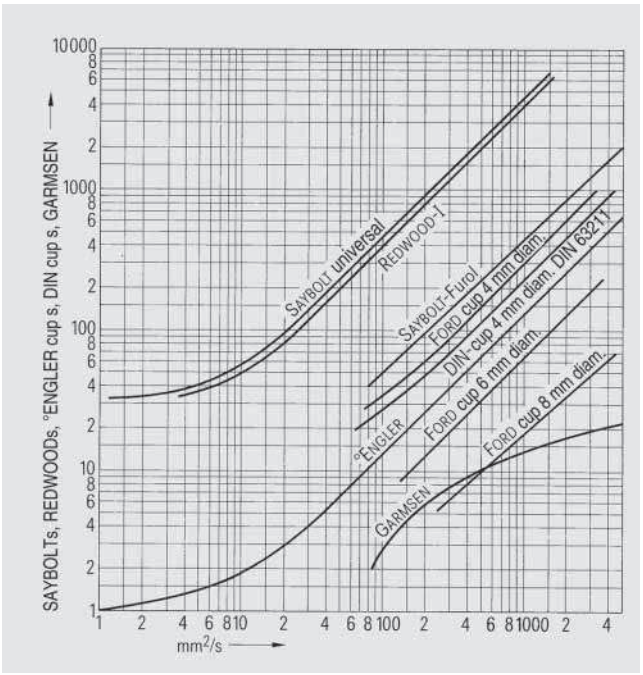
Conventional viscosity units

In practice, calculations were frequently carried out with common engineering units based on the flow times of liquids from standard orifices. The most common units of this kind were

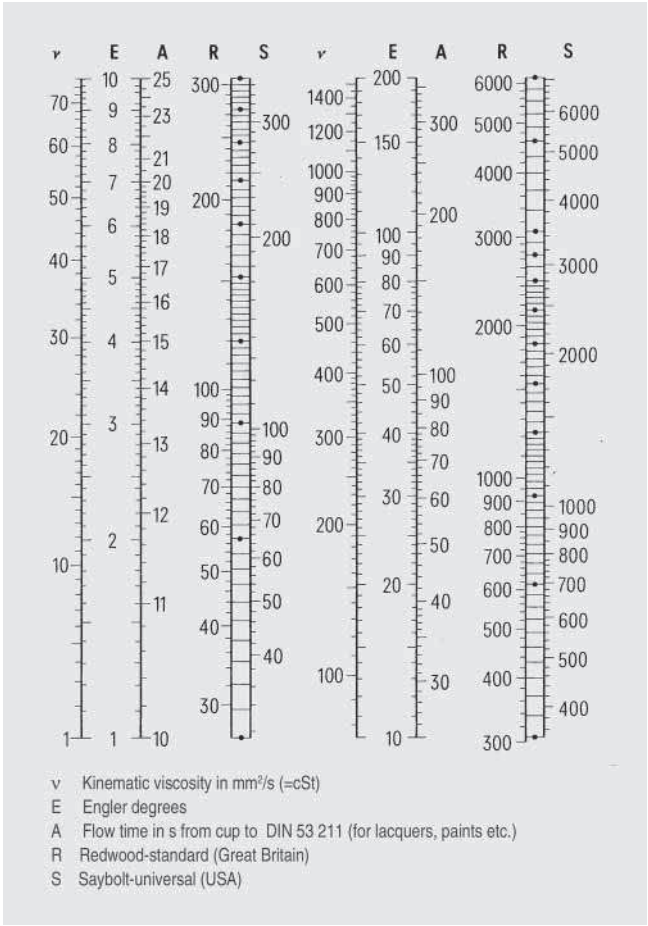
- in Germany Engler-Grade °E
- in Great Britain Redwood-seconds R
- in the USA Saybolt-seconds S

In figure Fig. “Conversion … into common engineering units” shows these common units in comparison with mm²/s values of the kinematic viscosity of the CGS system.

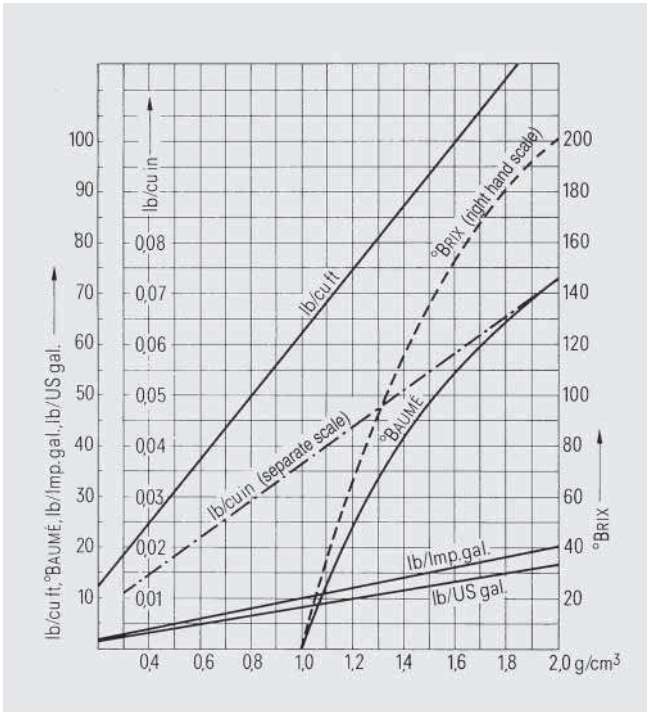
Note: The temperature to which the value refers must be specified with each viscosity value.



Conversion of the kinematic viscosity-unit mm²/s into other units

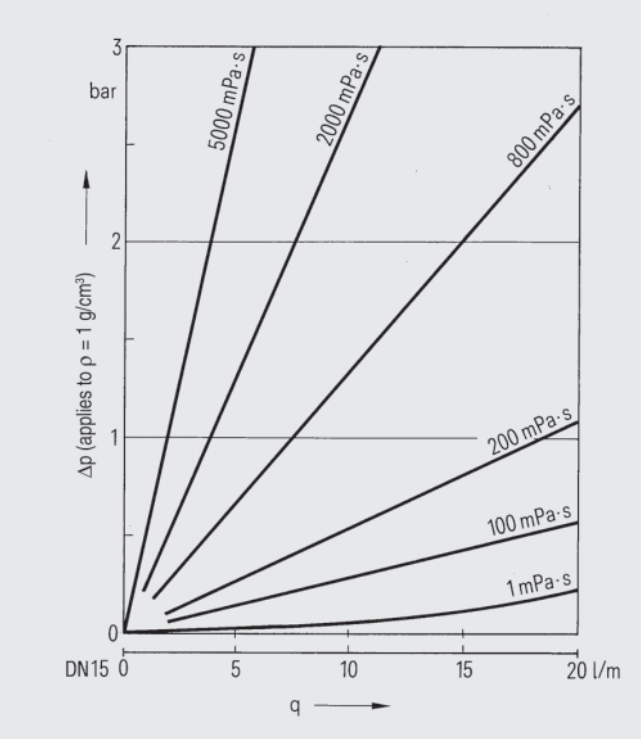


Conversion of the kinematic viscosity into common engineering units, water at 17 °C (68.2 °F) has a dynamic viscosity h = 1.09 mPa · s (cp)

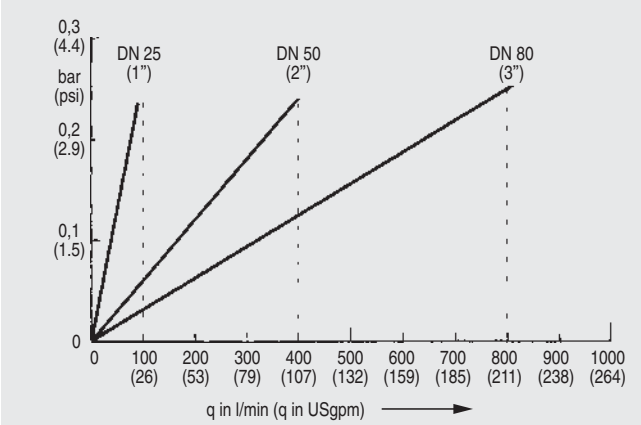


Conversion of the density unit g/cm³ into other units

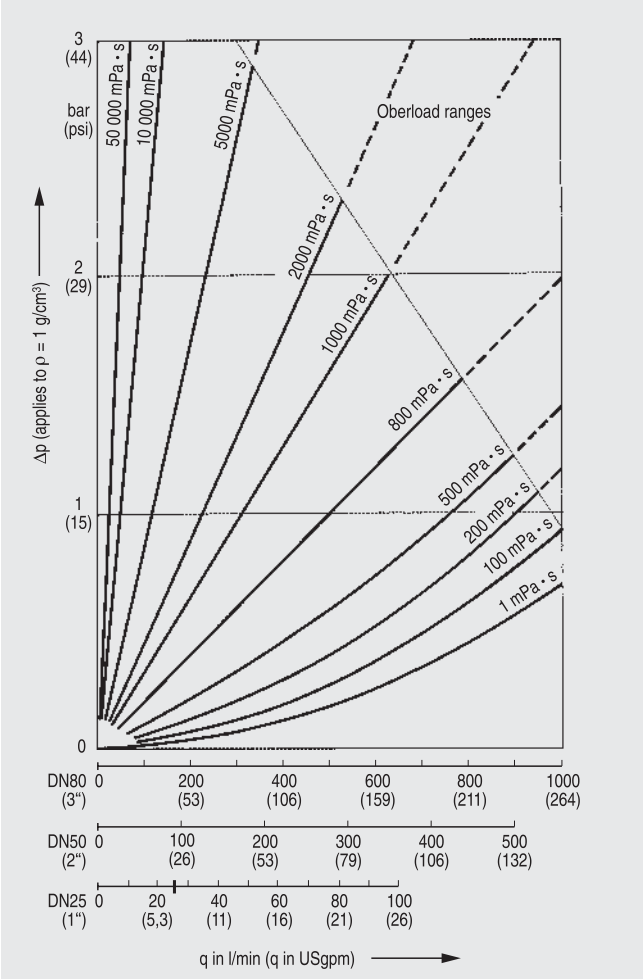
Pressure loss



Pressure loss depending on the flow and viscosity of the measured liquid in a rotary-piston meter DN 15 (½")



Pressure loss Δp for liquid gas with 0.25 mPa·s (cp), approx. 16 °C (60.8 °F) and PN 16 (MWP 232 psi) (values for liquid gas authorized by the German calibration authorities: 100, 400 and 800 l/min (26.4, 106 and 211 USgpm))



Operating ranges for rotary-piston meters DN 25 (1"), 50 (2") and 80 (3"); pressure loss depending on the flow and viscosity of the measured liquid.

Notes

The following limitation applies to the automatic batchmeter because of the higher flow resistance through the associated shut-off valve:

- with the same q, Δp is increased by approx. 30%;
- with the same Δp, q is reduced by approx. 20%.

1 mPa·s = 1 cp

Recommended materials for rotary-piston meters and automatic batchmeters

Several materials are available for the rotary-piston meters from page 4/359 of this catalog for the parts which come into contact with metered liquid. These materials must be combined with due regard to the corrosion resistance against the metered liquid.

The following summary shows combinations of materials for a number of liquids.

In order to keep the summary as simple as possible, only the minimum version is listed in each case. However, higher quality materials can also be used for metered liquids. If this is required by the customer, e.g. for multipurpose use of the meter, please inquire in case of doubt.

The data is based for the greatest part on our many years of experience. Because of the complexity of the corrosion problem, however, the data should only be considered as recommendations. It does not constitute a guarantee.

Restrictions of the application range for the recommended materials imposed by the casing gasket

Rotary-piston meter					Casing gasket		Permissible temperature range	
Order No.	Nominal size (DIN)	Rated pressure (DIN)	Nominal size (ASME)	ASME B16.5[1]	Type	Material	°C	°F
7MR1020	DN 15	PN 25	(½")	(300 … 600)	Flat gasket	AFM 34 [2]	-10 ... +250, up to 300 for short time	(14 ... 482, up to 572 for short time)
7MR1030		PN 40						
7MR1110	DN 25	PN 10/PN 16	(1")	(150)				
7MR1120		PN 25		(300 … 600)				
7MR1140		PN 63		(900 … 1500)				
7MR1410	DN 50	PN 6/PN 10	(2")	(150)				
7MR1420		PN 25		(300 … 600)				
7MR1440		PN 63		(900 … 1500)				
7MR1610	DN 80	PN 4/PN 6	(3")	(150)				
7MR1620		PN 25		(300 … 600)				
7MR1640		PN 63		(900 … 1500)				
7MR1130	DN 25	PN 40	(1")	(300 … 600)	O-Ring	FPM [3]	-10 … +260	(14 … 500)
7MR1130					O-Ring	FEP-FPM [4]	-10 … +200	(14 … 392)
7MR1430	DN 50	PN 40	(2")	(300 … 600)	O-Ring	FPM [3]	-10 … +260	(14 … 500)
7MR1430					O-Ring	FEP-FPM [4]	-10 … +200	(14 … 392)
7MR1630	DN 80	PN 40	(3")	(300 … 600)	O-Ring	FPM [3]	-10 … +260	(14 … 500)
7MR1630					O-Ring	FEP-FPM [4]	-10 … +200	(14 … 392)

1) The flanges are drilled according to ANSI B16.5. The pressure data according to DIN are maximum permissible pressures up to approx. 100 °C (212 °F). The maximum permissible pressure is reduced at higher temperatures. When ordering, the data of the ANSI pressure classification must be specified in plain text.

2) AFM 34: Aramide fibers with inorganic fillers and synthetic elastomers

3) FPM: Fluorine rubber (Viton)

4) FEP-FPM: Fluorine rubber (FEP-Viton), with tetrafluoroethylene-hexafluoropropylene imposed by the casing gasket

Directions for use of the following summary.

The recommended material combinations are marked with "•". If several materials are listed for one metered liquid, these are alternatives for the casing and the measuring chambers since possible limitations apply to the minimum version (see footnotes).

In case of several recommendations for rotary-pistons, the running characteristics and the permissible temperatures have been taken into account. No preference is expressed, the choice should be made according to the customers wishes.

The data in the summary generally applies to a liquid temperature of 20 °C (68 °F) with the exception of substances which can only be metered, when heated, e.g. bitumen or cocoa paste.

The suffix "solution" always denotes an aqueous solution.

Medium to be measured	Materials											
	Casing and measuring chamber			Rotary-piston						Casing gasket		
	Cast iron or cast steel	CrNiMo-steel	With enamel lining	Cat iron	Ni-Resist	Carbon (synth.)	Hard rubber to 40 °C (104 °F)	PCTFE to 40 °C (104 °F)	PTFE/ Graphite to 90 °C (194 °F)	PN 4/6/10/25 /63 AFM 34	PN 40 FPM	PN 40 FEP-FPM
Acetaldehyde		•				•			•	•		•
Acetone	• 1)	•				•				•		•
Acrylnitrile	•					•	•					•
Aluminium sulphate solution						•	•	•	•	•	•	
Formic acid						•		•	•			
Ammonia solution												
• Discoloration possible	•					•	•		•	•		•
• No discoloration		•				•	•		•			
Ammonium chloride solution		•				•		•	•	•	•	
Amyl acetate		•				•				•		•
Amyl alcohol		•				•	•	•	•	•	•	
Aniline	• 1)	•				•				•	•	
Barium chloride solution		•				•	•	•	•	•	•	
Benzaldehyde	• 1)	•				•				•		•
Benzene	• 1)	•					•			•	•	
Benzol	• 1)	•				•				•	•	
Bitumen (heat meter)	•			•		•				•	•	
Lead acetate solution		•				•	•	•	•	•		•
Lead chloride solution		•						•		•	•	
Boric acid ≤5%, ≤50 °C (122 °F)		•				•	•	•	•	•	•	
Butane	• 1)					•	•			•	•	
Butyric acid		•				•	•	•	•	•	•	
Butyl acetate	• 1)	•				•				•		
Calcium chloride solution		• 2)	•			•	•	•	•	•	•	
Caprolactam		•			•					•	•	
Cellosolves	• 1)	•				•		•	•	•		
Chlorbenzene (anhydrous)	• 1)	•				•				•	•	
Chloroform		•				•				•	•	
Choline chloride solution			•			•		•		•	•	
Chromium sulfaph. solution <50 °C (122 °F)		•			•	•	•	•	•	•	•	
Cyclohexanol (Anol)	• 1)	•		• 1)		•		•	•	•	•	
Diacetone alcohol	• 1)	•				•				•		•
Dibutylphthalate	•	•		•	•	•		•	•	•		
Diesel oil	•			•		•	•			•	•	
Dimethylaniline	•	•		•		•				•	•	
Ferric chloride solution			•			•		•		•	•	
Acetis acid		•				•		•	•	•		
Ethyl acetate	• 1)	•				•				•		
Ethylalkohol (Ethanol)	• 1)	•				•	•			•	•	
Ethyl amine	•					•				•		
Ethylene chloride dry	•	•				•				•	•	
Ethylee nglycol anhydrous	• 1)	•		•		•	•	•	•	•	•	
Fatty acid		•			•	•		•	•	•	•	
Liquefield gas 4)	•						•			•	•	
Liquefield wax	•			•						•	•	•
Formalin		•					•	•	•	•	•	•
Freon		•				•				•	• 4)	
Furfurol		•				•		•	•	•		•
Glucose solution		•				•	•			•	•	
Glysantine	• 1)	•		• 1)	•	•		•	•	•	•	
Glycerine										•		
• pur		•			•	•		•	•	•	•	
• crude		•			•	•		•	•	•		
Urea solution (aqueous)		•				•	•	•	•	•	•	
Fuel oil, heavy	•			•		•				•	•	
Hydraulic oil	•			•			•			•	•	
Cocoa butter		•			•	•		•	•	•	•	
Cocoa paste (heated)	•	•		•	•					•	•	
Caustic potash solution		•			•	•	•			•	• 5)	
Potassium bichromate solution		•				•		•	•	•	•	
Potassium chloride solution		• 2)	•			•	•	•	•	•	•	
Magnesium chloride solution		• 2)	•			•		•	•	•	•	

4

Rotary-piston meters - Introduction
Configuration - Recommended materials

Medium to be measured	Materials											
	Casing and measuring chamber			Rotary-piston						Casing gasket		
	Cast iron or cast steel	CrNiMo-steel	With enamel lining	Cat iron	Ni-Resist	Carbon (synth.)	Hard rubber to 40 °C (104 °F)	PCTFE to 40 °C (104 °F)	PTFE/ Graphite to 90 °C (194 °F)	PN 4/6/10/25 /63 AFM 34	PN 40 FPM	PN 40 FEP-FPM
Malt		•			•					•	•	
Masut	•			•						•		
Molasses (alkaline)	•	•		•	•	•	•	•	•	•	•	
Molasses (acid)		•			•	•	•	•	•		•	
Methanol (methyl alcohol)	• 1)3)	•				•	•			•	•	
Methyl chloride	• 3)	•3)	• 6)			•		•	•	•	•	
Methylene chloride		•				•				•	•	
Naphtalene	•	•		•		•		•	•	•	•	
Sodium acetate solution		•				•	•	•	•	•		•
Sodium chloride solution (alkaline)		•				•	•	•	•	•	•	
Sodium chloride solution (basic)			•									
Sodium nitrite solution	•	•		•		•	•	•	•	•	•	•
Caustic soda e. g. 30%, 20 °C (68 °F)	•	•		•		•	•	•	•	•	•	
e. g. 50%, 50 °C (122 °F)		•			•	•			•	•	•	
Nitrobenzene	• 1)	•				•				•	•	
Oleum ≤40%, 60 ... 70%		•						•			•	
Paraffin oil	•			•						•	•	
Permutite process water		•				•	•			•	•	
Petroleum	•					•	•			•	•	
Vegatable oil												
• Neutralized	•	•		•	•					•	•	•
• Crude		•			•					•	•	•
Phenol		•				•		•	•	•	•	
Phosphoric acid		•7)	•6)7)			•		•	•	•	•	
Phosphorous tricloride			• 6)			•		•		•	•	
Castor oil	•	•		•	•					•	•	
Soot oil	•			•						•	•	
Nitric acid max. 65%, 40 °C (104 °F)		•						•			•	
Hydrochloric acid			•			•		•				
Chocolate compound	•	•		•	•					•	•	
Sulfur (liquid)	•			•							•	
Carbon bisulfide	• 1)	•		•		•			•	•	•	
Sulfuric acid			•			•		•	•		•	
• To 80%, max. 80 °C (176 °F)			•			•		•	•		•	
• 80 to 85%, max. 40 °C (104 °F)		•				•		•	•		•	
• 86 to 97%, max. 25 °C (77 °F)	•					•		•	•		•	
• 98 to 100%, max. 50 °C (122 °F)		•				•		•			•	
Sea water		• 2)				•	•		•	•	•	•
Soap (Liquid)		•			•					•	•	
Soap solution		•			•	•	•			•	•	
Silicium tetrachloride		• 2)					•	•		•	•	•
Starch solution		•			•	•	•			•	•	
Carbon tetrachloride	• 1)	• 2)				•			•	•	•	
Toluene	• 1)	•				•				•	•	
Transformer oil	•			•						•	•	
Trichlorethylene	• 2)	•				•				•	•	
Vinyl chloride		•				•				•	•	
Water, demineralized		•				•	•		•	•	•	
Hydrogen peroxide		• 8)								•	•	
Plasticizer	•	•		•	•					•		
Wine		•				•		•	•	•	•	
Xylene	• 1)	•				•				•	•	
Zinc chloride solution		• 2)	•				•	•		•	•	
Sugar solution		•			•		•			•	•	
Sugar syrup		•			•		•			•	•	

1) With metered liquids with a strong degreasing action, rust can occur.
2) Pitting may occur
3) Butane, propane, propylene
4) Not resistant for freon 21, 22, 31, 32
5) Resistant < 30%
6) Duroplast/Tantalum design I
7) Without addition of chlorine and fluorine
8) To be pickled and passivated

Definitions

Flow rate

q_{min} is the smallest flow rate which must be present if readings within the stated tolerance are to be obtained under the given operating conditions. The q_{min} value primarily depends on the viscosity of the liquid.

Attention must also be paid to the weight and material running characteristics of the moving parts of the metering mechanism. Data on q_{min} as a function of the above mentioned factors are listed in the technical specifications of the respective mechanism.

q_{max} is limited by

- The maximum permissible speed which can be expected of the moving parts of the mechanism (rotary piston) without the life (long-term accuracy) of the meter being shortened to an unacceptable extent. For this reason, the permissible q_{max} value for continuous operation is restricted to approx. half of the q_{max} for batch operation (approx. 1500 h/year).
- The pressure loss, i.e. the pressure difference occurring in the mechanism through hydraulic losses. A maximum value of 3 bar (43.5 psi) is permissible. This value is only reached with very high viscosities and large flow rates. The meter size and the viscosity of the liquid are decisive factors for the actual pressure loss which occurs.

Values for $q_{max\ cont.}$ and $q_{max\ batch}$ (dependent on viscosity) are listed in the technical specifications.

Theory of the error curve for volumetric meters

On the basis of the German Standards and Weights and Measures Regulations (also EC and OIML recommendations), the measuring error in volumetric meters, i.e. the difference between the registered quantity (A, actual reading) and the actual quantity (N, correct value) is defined as follows: a positive error means an indication which is too large, a negative error an indication which is too small, compared to the actual quantity (N). To calculate the percentage error, the following applies:

$f = (A - N)/N \cdot 100$ in % of the correct value

The primary cause of measuring errors is the gap loss which cannot be completely avoided despite the highest manufacturing precision for the parts of the mechanism - a flow which does not produce a corresponding rotary movement in the mechanism and is thus not recorded.

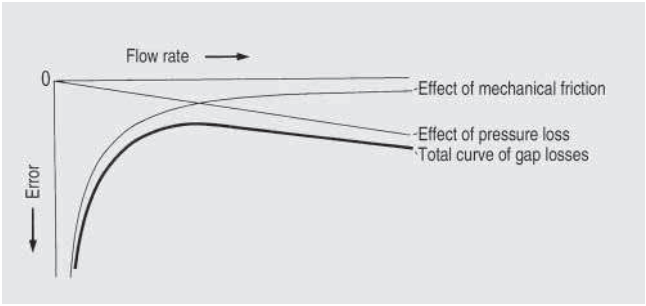


Diagram to illustrate the theory of the error curve for volumetric meters

If it is assumed that other external influences, e.g. gas inclusions in the liquid to be measured, are eliminated by appropriate measures, the following simplified statement can be made on the form of the error curve:

Gap losses always lead to negative errors (positive delivery error corresponds to a negative indication error).

The total gap loss is made up of two components:

- A component with a hyperbolic function which results from the varying influence of mechanical friction (this influence decreases with increasing flow rate after the friction at rest has been overcome) and
- A loss component which increases linearly with the flow rate and is due to the increasing flow resistance and thus the higher pressure difference in the mechanism.

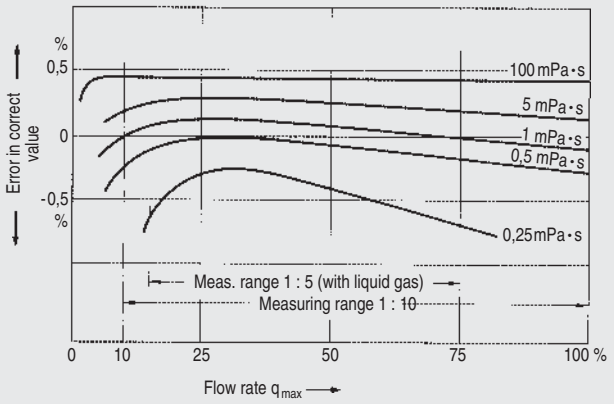
The total curve can be formed from these two effects. It is characteristic for all positive displacement meters. The illustration "Error curves of volumetric meters" is greatly enlarged to simplify understanding.

Error curves of rotary-piston meters

The shape of the error curve is also affected by the viscosity of the metered liquid. The error in measurement increases with decreasing viscosity, especially at the beginning and towards the end of the flow rate range.

By appropriate regulation, i.e. changing a pair of gear-wheels between the meter mechanism and the register, the position of the error curve can be displaced parallel to the zero line and thus the meter can be optimally calibrated. The appropriate pair of replacement gears can be read off from a table or determined with the aid of a calculating disk.

The illustration "Error curves of volumetric meters" shows error curves without any regulation having been carried out.



Examples of rotary-piston meters DN 25 (1") and DN 50 (2")

Error curves of volumetric meters dependent in shape and location on the flow rate and the viscosity of the liquid

Note: 1 mPa·s = 1 cp

Measuring accuracy

The rotary-piston meters are approved in the European Community and in many other countries for the custody transfer.

The following error limits apply between 0.2% and 0.5% of the correct value (depending on the liquid, the measuring range and the relevant calibration specifications).

The stated error limits in % of the correct value apply to the whole flow rate and for any delivery quantity greater than the smallest permissible quantity.

This is an important difference compared to other measuring instruments whose errors are related to the full-scale value and thus only reach the stated accuracy at one point - full-scale deflection. The minimum flow rate should not fall below 10% of the maximum flow rate in order to remain within the stated accuracy limit. This explains why the usual flow rate range for volumetric meters is 1:10.

Rotary-piston meters - Introduction Configuration - Recommended materials

Note: The measuring system of the rotary-piston meter must always be filled with the liquid to be measured in order to achieve a high measuring accuracy.

Service life (long-term accuracy)

The service life of a volumetric meter, i.e. the operating time until an overhaul or recalibration becomes necessary, is determined by the mechanical abrasion of the moving parts of the mechanisms which occurs because of forces from the metered liquid.

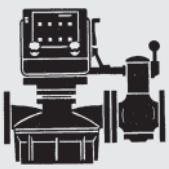
As well as the nature of the materials used (running characteristics), the service life is dependent on the lubricating properties of the metered liquid, the service is dependent on the lubricating properties of the metered liquid, the daily operating time and the cube of the flow rate (speed of rotation). The last factor is one of the reasons why only half of the maximum flow rate specified for the batch operation is permissible for continuous operation.

Since the above factors can hardly be determined exactly with industrial use of the meter, unequivocal statements on the service life (long-term accuracy) are not possible.

Recalibration is required every two years by law (in Germany) for meters used for custody transfer. On the basis of this regulation, it is recommended that meters which are not used for custody transfer be checked and recalibrated if necessary, at intervals of two to three years. Even this recommendation is based on average, “normal” operating conditions. A period of three years is too short, for example, for a meter used for the batch dispensing of lubricating oil, it will still work within the stated error limits even after five years or more

Technical specifications

Meter sizes (DN), pressure stages (PN) and permissible flow rates (q) for rotary-piston meters and automatic batchmeters

Design	DN		PN		Rated flow rate		Permissible flow rate						
							With viscosity	Min. [1] with continuous [2] operation		Max. with intermittent [3][4] operation		Max. with continuous operation	
	mm	(inch)	bar	(psi)	l/min	(USgpm)	mPa·s (cp)	l/min	(USgpm)	l/min	(USgpm)	l/min	(USgpm)
Rotaty-piston meter for industrial use													
	15 [5]	(½) [5]	25 40	(363) (580)	20	(5.3)	≤ 1 < 5 800 2000 5000 10000 [7]	1,5 1,0 0,2 0,2 0,2 0,2	(0.26) (0.2) (0.05) (0.03) (0.03) (0.03)	10 [6] 20 20 10 4 1	(5.3) (5.3) (5.3) (1.3) (0.53) (0.26)	10 10 10 5 2 1	(2.6) (2.6) (2.6) (1.3) (0.53) (0.26)
	25	(1)	10 16 25 40 63	(145) (232) (363) (580) (914)	100	(26.4)	0,3 0,6 1 5 800 5000 10000 20000 [7]	12 6 5 3 1 1 1 1	(3.2) (1.6) (1.3) (0.8) (0.26) (0.26) (0.26) (0.26)	100 100 100 100 100 80 70 50	(26) (26) (26) (26) (26) (13) (5.3) (2.6)	80 80 80 80 80 60 50 30	(13) (13) (13) (13) (13) (13) (5.3) (2.6)
	50	(2)	6 10 25 40 63	(87) (145) [8] (363) (580) (914)	500	(132)	0,3 0,6 1 5 800 5000 10000 20000	40 20 18 10 2 2 2 2	(11) (5.3) (4.8) (2.6) (0.53) (0.53) (0.53) (0.53)	500 500 500 500 500 350 300 150	(106) (132) (132) (132) (106) (53) (21) (11)	350 350 350 350 350 250 180 100	(44) (44) (44) (44) (44) (44) (21) (11)
	80	(3)	6 25 40 63	(58) (87) [8] (363) (580) (914)	1000	(264)	0,3 0,6 1 5 800 5000 10000 20000 [7]	60 35 25 10 5 5 5 5	(16) (9.3) (6.6) (2.6) (1.3) (1.3) (1.3) (1.3)	1000 1000 1000 1000 1000 700 600 300	(211) (264) (264) (264) (211) (93) (40) (20)	700 700 700 700 500 350 250 150	(93) (93) (93) (93) (93) (93) (40) (20)
Rotary-piston meter acid-resistant mode													
	25	(1)	10	(145)	100	(26.4)	0,6 1 5	10 8 4	(2.6) (2.1) (1.0)	100 100 100	(26) (26) (26)	50 50 50	(13) (13) (13)
Automatic batchmeter (Rotary-piston meter with quantity preset register and mechanical shut-off valve)													
	25	(1)	10	(145)	100	(26.4)	0,3 0,6 1 5 800 [9]	12 6 5 3 1	(3.2) (1.6) (1.3) (0.8) (0.26)	100 100 100 100 100	(26) (26) (26) (26) (26)	–	–
	50	(2)	6 10	(87) (145) [8]	500	132	0,3 0,6 1 5 800 [9]	40 20 18 10 2	(11) (5.3) (4.8) (2.6) (0.53)	500 500 500 500 400	(106) (132) (132) (132) (106)	–	–

1) For metal rotary-pistons: increase by a factor of 2, for PCTFE and PTFE/graphite filling rotary-pistons: increase by a factor of 3.
2) Continuous operation: up to 8 hours a day.
3) For metal pistons: reduce by a factor ≈0.8 to extend service life.
4) Intermittent operation: up to 4 hours a day
5) Note: When using pistons made of carbon, there is danger of break in the case of liquid hammers
6) When using pistons made of carbon.
7) Flow rates for higher viscosities on request; we have experience of up to 350 000 mPa·s (cp).
8) Values in brackets apply to casing in CrNiMo steel.
9) Max. permissible viscosity for exact closing of the shut-off valve and for exact dispensing: viscosities up to 4 000 mPa·s (cp) possible.

Note:
In order to extend the service life of the pulse sensor, rotary-piston meters with current and/or pulse output (without intermediate gear) should only be operated at max. 60% of the permissible flow.

4

Piston materials

Piston material	Design	Permissible liquid temperature		Max. perm. dyn. viscosity	Order No. code.
		°C	°F	mPa·s (cp)	
Carbon		-10 ... 300	14 ... 572	25	**K**
Cast iron (mat. No. GG 25) Cast iron (mat. No. GG 25)	 with slotting	-10 ... 300 -10 ... 300	14 ... 572 14 ... 572		**E** **B**
Ni-Resist (mat. No. 0.6660) Ni-Resist (mat. No. 0.6660)	 with slotting	-10 ... 300 -10 ... 300	14 ... 572 14 ... 572		**N** **C**
Hard rubber Hard rubber	 with slotting	-10 ... 40 [1] -10 ... 40 [1]	14 ... 104 [1] 14 ... 104 [1]	50 50	**G** **D**
PTFE/graphite filling PTFE/ graphite filling PTFE/ graphite filling PTFE/ graphite filling	 with slotting with slotting	0 ... 40 [2] 0 ... 40 [2] 0 ... 90 [2] 0 ... 90 [2]	32 ... 104 [2] 32 ... 104 [2] 32 ... 194 [2] 32 ... 194 [2]	120 120 120 120	**F** **L** **R** **M**
PCTFE PCTFE	 with slotting	-10 ... +40 [2] -10 ... +40 [2]	14 ... 104 [2] 14 ... 104 [2]	120 120	**H** **J**
Gni steel with carbon contact surface (DN 25 (1“) only) Gni steel with PTFE contact surface (DN 25 (1“) only)	Collar piston	-10 ... +200 -10 ... +40	14 ... 392 14 ... 104	> 10 > 10	**S** **T**

[1] For 120 min max. 65 °C (149 °F); for 20 min max. 90 °C (194 °F), e. g. for cleaning procedures

[2] Error limit max. 1%; at 90°C (194 °F) max. 2%

Further technical specifications	
Materials and max. permissible liquid temperatures	
Housing (also lining with acid resistant meters) and measuring chamber	Temperature range
• Cast iron, spheroidal graphite, cast steel, Cranium steel	-30 ... +300 °C (-22 ... +572 °F)
• Cast iron/enamel, Duroplast measuring chamber	-20 ... +80 °C (-4 ... +176 °F)
General data	
Error limits	Between 0.2% and 0.5% of the correct value (depending on the metered fluid, the measuring range and the relevant calibration regulations) except for rotary-piston meters DN 15 (½“) and acid-resistant meters with PCTFE pistons; where 1% of the actual value applies.
Reproducibility	Within 0.05%
Adjustment	In steps from 0.01%
Pressure drop	Max. permissible 3 bar (43.5 psi), max. 0.5 bar (7.25 psi) for acid resistant meters
Transmission from wet to dry space	Gland-free, via permanent magnet coupling
Installation position (axis of meter mechanism)	
• Rotary-piston meter for industrial use	
- Acid-resistant model	Any
- Automatic batchmeter	Vertical
• Special designs	
- Rotary-piston meter for oil fuels	Any
- Rotary-piston meter for liquid gas	Meter axis vertical
Special inlet and outlet pipe sections	Not necessary
Pipe connection	Flanges drilled to DIN 2501, DIN 2547 (PN 63 only)
Filter size (mesh width)	0.8 mm (0.031 inch) for rotary-piston meter

Note

The material combinations which can be supplied are listed in the Selection and Ordering data.
The maximum permissible liquid temperature is determined by the “weakest link” in the particular combination (the PCTFE rotary-piston, for example, in a meter made of Cranium steel).

Automatic batchmeter

With this meter, the maximum permissible liquid temperature is also limited by the operation and design of the shut-off valve.

The following temperatures are permissible for valves with maintenance free

- Gland seal: -10 ... +200 °C (14 ... 392 °F)
- Bellows seals: -10 ... + 40 °C, max. 3 bar (14 ... 104 °F, max. 43.5 psi)

Models for higher liquid temperatures on request. The installation of cooling attachments also necessitates a corresponding increase in length of the mechanical shut-off valve.

The following restriction applies to the automatic batchmeters because of the higher flow resistance through the associated shut-off valve:

- with the same value q, Δp is increased by approx. 30%
- with the same value Δp, q is reduced by approx. 20%

In case of a dynamic viscosity 60 mPa·s (cp), constructional details of the shut-off valve cone must be changed.

Furthermore, installation of a filter is omitted for 800 mPa·s (cp) and above.

Rotary-piston meters
Ordering example

Ordering example 1

The following is required:

A rotary-piston meter for heavy fuel oil for flow measurements and monitoring of consumption in a power station.
Pipe connection flanges to DIN,
flow direction downwards,
with display for flow and total value.
Flow-proportional output signal at full-scale value 20 mA, at start-of-scale value 4 mA.
Measuring range 400 to 2000 l/h (6 to 33 l/min.),
operating pressure 40 bar,
max. temperature of fuel oil 120 °C,
viscosity of fuel oil in working condition 25 mPa · s

Selected:

Acc. to application (page 4/344) and rated flow rate (page 4/355),
rotary-piston meter DN 25 for industrial use (page 4/361),
rated pressure PN 63 according to operating pressure,
materials cast steel and cast iron according to the material recommendations (page 4/349)

Order No. according to page 4/361	7MR1140-■EE■■ ■■■■-Z
Flow direction downwards	0
With current output 4 ... 20 mA	47
Accessories mounted (necessary for the flow-proportional output signal and due to liquid temperature)	0B
Works test	A
Plane flanges, drilled to DIN	0

Liquid data acc. to page 4/371	Order code
Temperature 120°C	**C12**
Viscosity 25 mPa·s, rounded up to 30 mPa·s	**G03**
Max. flow rate 2000 l/h ≈ 34 l/min	**K34**
Trade name	**Y01** **Liquid: heavy fuel oil S**

Accessory modules

1 Pulser with inductive pick-up, fitted directly on rotary piston meter, 100 pulses per revolution (technical specifications on page 4/397)
1 cooling attachment model 05 (page 4/399) as separate model acc. to (page 4/346)

Additionally required

1 electric flow register SITRANS F RA110 (technical specifications on page 4/393)

Order as follows:	
1 Rotary-piston meter DN 25	**7MR1140-0EE47-0BA0-Z** **C12 + G03 + K34 + Y01** **Liquid: heavy fuel oil S**
1 Accessory model 70	**7MV3070-1XA00**
1 Electric flow register SITRANS F RA110 **Mechanical registers and quantity preset registers** (page 4/388)	**7MV1070-1BC10-0AA0**

- Heating of mechanism through external heater tubes or electric heater cables on request.

Ordering example 2

The following is required:

Pipe connection flanges to DIN,
flow direction from left to right,
with display of flow and total value,
Flow-proportional output signal at full-scale value 20 mA, at start-of-scale value 4 mA.
Measuring range 500 to 5000 l/h (6 to 100 l/min.),
operating pressure 9 bar,
max. temperature of fuel oil 60 °C,
viscosity of fuel oil in working condition 10 mPa·s

Selected:

acc. to application (page 4/344) and rated flow rate (page 4/355),
rotary-piston meter DN 25 for industrial use (page 4/361),
rated pressure PN 10 according to operating pressure,
Material, cast iron acc. to material recommendation (page 4/349)

Order No. according to page 4/361	7MR1110-■EE■■-■■■■-Z
flow direction from left to right	1
With current output 4 ... 20 mA	66
Accessories mounted (necessary for the flow-proportional output signal)	0B
Works test	A
Plane flanges, drilled to DIN	0

Liquid data acc. to page 4/371	Order code
Temperature 60 °C	**C06**
Viscosity 10 mPa·s	**G01**
Max. flow rate 6000 l/h ≈ 100 l/min	**L01**
Trade name	**Y01** **Liquid: light oil**

Accessory modules

1 Pulser with inductive pick-up, fitted directly on rotary piston meter, 100 pulses per revolution (technical specifications on page 4/397)

Additionally required

1 electric flow register SITRANS F RA110 (page 4/393) with mounting bracket mounted on pulser

Order as follows:	
1 Rotary-piston meter DN 25	**7MR1110-1EE66-0BA0-Z** **C06 + G01 + L01 + Y01** **Liquid: light oil**
1 Electric flow register SITRANS F RA110 **Mechanical registers and quantity preset registers** (page 4/388)	**7MV1070-1BC10-0AA0**

- Heating of mechanism through external heater tubes or electric heater cables on request

When ordering a rotary-piston meter with digital display and pulse/current output you now only need two order items:

- Rotary-piston meter 7MR1…-…..-…. with pulser, poss. with cooling attachments, protective cover and mounting bracket

and

- Electrical flow register SITRANS F RA110 7MV1070 -.....-....

Rotary-piston meters – Ordering data
DN 15 (½"), rated flow rate 20 l/min (5.3 USgpm)

Selection and Ordering data — Order No. 7MR1020-□□□□□□□ / 7MR1030-□□□□□□□ — Order code

Rotary-piston meter DN 15 (½")

Nom. press.	Materials: Housing	Meas. chamber	Rotary piston	Casing gasket	Can be heated using 2 thread connections	Weight appr. kg (lb)		Order No.	Order code
PN 25 (363 psi)	Cast iron	Cast iron	• •	Flat gasket AFM 34	R 3/4"	9.0 (19.8)	F)	7MR1020-	E
	CrNiMo steel	CrNiMo steel	• • • •		no	9.0 (19.8)	F)	7MR1020-	S
PN 40 (580 psi)	Cast steel	Cast iron	• •	Flat gasket AFM 34	R 3/8"	11 (24.2)	F)	7MR1030-	E
	Cast steel	CrNiMo steel	• •		R 3/8"	11,5 (25.4)	F)	7MR1030-	D

Rotary piston material					Max. permissible liquid temperature	Order code
Carbon	•				300 °C (572 °F)	K
Cast iron		•			300 °C (572 °F)	E
Hard rubber			•		40 °C (104 °F)	G
PCTFE				•	40 °C (104 °F)	H

		Order code
Flow direction		
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0
Mechanical registers		
Single- pointer dial		
• Type 01		0 1
Double-pointer dial (note mounting position! see description on page 4/390)		
• Type 11, vertical mounting		1 1
• Typ e12, horizontal mounting		1 2
Value per		
• 1 l (0.26 USg) Fastest pointer or fastest drum (without intermediate gear)		1
Accessory modules		
• None		A
• mounted		B
Digital register with current/pulse output		
As separate model: Pulser (page 4/396) mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, see product description on page 4/393)		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		4 1 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		4 3 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		4 5 0 B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		4 6 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		4 7 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		4 8 0 B
Compact version: Pulser mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/393) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 1 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 3 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 5 0 B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 6 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 7 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 8 0 B
Tests		
Works test		A
Works test certificate		B
Flanges		
Plane, drilled to EN 1092-1		0
Plane, drilled to specification		9 R 1 Y
With sealing ridge to specification		9 R 2 Y

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371
Heating systems on request

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data DN 15 (½"), rated flow rate 20 l/min (5.3 USgpm)

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/344

Function and design: see page 4/345

Configuration: see page 4/347 ff.

Operating limits: Permissible liquid temperatures and further technical specifications see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/373 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):
Fliquids of fluid group1; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP)

Ordering example see page 4/358

Rotary-piston meters – Ordering data
DN 25 (1"), rated flow rate 100 l/min (26.5 USgpm)

Selection and Ordering data — Order No: 7MR1110-□□□-□□□ — Order code

Rotary-piston meter DN 25 (1“)

Nom. press.	Materials: Housing	Materials: Meas. chamber	Materials: Rotary piston	Casing gasket	Weight appr. kg (lb)		Order code
PN 10 (145 psi)	Cast iron	Cast iron	• • • • • •	Flat gasket AFM 34	10,5 (23.2)	F)	E
		CrNiMo steel	• • • • • •			F)	D
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	• • • • • •			F)	S
PN 25 (363 psi)	Cast iron	Cast iron	• • • • • •		20 (44.1)	F)	E
		CrNiMo steel	• • • • • •			F)	D
PN 40 (580 psi)	Cast steel	Cast iron	• • • • • •	FKM (O-ring)	24 (52.9)	F)	E
PN 63 (914 psi)	Cast steel	Cast iron	• • • • • •	Flat gasket AFM 34	30 (66.1)	F)	E

Rotary piston material	Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon		0,15 (0.33)	K
Cast iron		0,55 (1.21)	E
Cast iron, grooved		0,5 (1.1)	B
Ni-resist		0,55 (1.21)	N
Ni-resist, grooved		0,5 (1.1)	C
Hard rubber	40 °C (104 °F)	0,1 (0.2)	G
Hard rubber, grooved	40 °C (104 °F)		D
PTFE with graphite filling	40 °C (104 °F)	0,3 (0.66)	F
PTFE with graphite filling, grooved	40 °C (104 °F)		L
PTFE with graphite filling	90 °C (194 °F)		R
PTFE with graphite filling, grooved	90 °C (194 °F)		M
CrNiMo steel with carbon bearing surface		0,45 (0.99)	S
CrNiMo steel with PTFE bearing surface		0,46 (1.01)	T
PCTFE		0,16 (0.35)	H
PCTFE, grooved			J

Flow direction		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers	Weight approx. kg (lb)	Order code
Single- pointer dial		
• Type 01	0,8 (1.76)	0 1
Double-pointer dial (note mounting position! see description on page 4/390)		
• Type 11, vertical mounting	1,5 (3.3)	1 1
• Type 12, horizontal mounting	2,5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	3 0
• Type 54, with electric switch	13,2 (29.1)	5 4
Value per revolution		
• 1 l (0.26 USg)	11 (24.3)	1
• 10 l (2.65 USg)	13,2 (29.1)	2
Accessory modules		
• None		A
• Mounted		B

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data
DN 25 (1"), rated flow rate 100 l/min (26.5 USgpm)

Selection and Ordering data (continued)		Order No	Order code
Rotary-piston meter DN 25 (1")	F)	**7MR1 1 ■ 0 - ■■■■■ - ■■■■**	**■■■**
Digital register with current/pulse output			
As separate model: Pulser mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 393)			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**4 1 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**4 3 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**4 5 0 B**	
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**4 6 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**4 7 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**4 8 0 B**	
Compact version: Pulser (page 4/396) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/393) mounted on mounting bracket.			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**6 1 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**6 3 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**6 5 0 B**	
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachmentk		**6 6 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**6 7 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**6 8 0 B**	
Tests			
Works test		**A**	
Works test certificate		**B**	
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)		**D**	
Preliminary official test (only for vertical mechanism shaft and mech. register or quantity preset register and pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110)		**E**	
Flanges			
Plane, drilled to EN 1092-1		**0**	
Plane, drilled to specification		**9**	**R 1 Y**
With sealing ridge to specification		**9**	**R 2 Y**

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371

Heating systems on request

Accessories	Order No.
Instruction Manual	
7MR1110...	
• German	F) **C73000-B5100-C15**
• English	F) **C73000-B5176-C15**
7MR1120... and 7MR1140	
• German	F) **C73000-B5100-C23**
• English	F) **C73000-B5176-C23**
7MR1130...	
• German	F) **C73000-B5100-C30**
• English	F) **C73000-B5176-C30**

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction" at the beginning of the chapter:

Application: see page 4/344
Function and design: see page 4/345
Configuration: see page 4/347 ff.
Operating limits: Permissible liquid temperatures and further technical specifications see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/373 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):
Fliquids of fluid group1; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP)

Ordering example see page 4/358

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data
DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data — Order No. — Order code

Rotary piston meter DN 50 (2")

Nom. press.	Materials: Housing	Meas. chamber	Rotary piston						Casing gasket	Weight appr. kg (lb)		Order No.
PN 6 (87 psi)	Cast iron	Cast iron		•	•	•	•	•	Flat gasket AFM 34	31 (68,3)	F)	7MR1410-■E■■■-■■■■ ■■■
		CrNiMo steel	•	•	•	•		•			F)	7MR1410-■D■■■ ■■■■ ■■■
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	•	•	•	•		•			F)	7MR1410-■S■■■ ■■■■ ■■■
PN 25 (363 psi)	Spher. cast iron	Cast iron		•	•	•	•	•		45 (99.2)	F)	7MR1420-■E■■■ ■■■■ ■■■
		CrNiMo steel	•	•	•	•	•	•			F)	7MR1420-■D■■■ ■■■■ ■■■
PN 40 (580 psi)	Cast steel	Cast iron		•	•	•	•	•	FKM (O-ring)	60 (132)	F)	7MR1430-■E■■■ ■■■■ ■■■
PN 63 (914 psi)	Cast steel	Cast iron		•	•	•	•	•	Flat gasket AFM 34	94 (207)	F)	7MR1440-■E■■■ ■■■■ ■■■
			↓	↓	↓	↓	↓	↓				

Rotary piston material							Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon						•		0,9 (2.0)	K
Cast iron					•			3,5 (7.7)	E
Cast iron, grooved					•			3,4 (7.5)	B
Ni-resist				•				3,5 (7.7)	N
Ni-resist, grooved				•				3,4 (7.5)	C
Hard rubber			•				40 °C (104 °F)	0,7 (1.5)	G
Hard rubber, grooved			•				40 °C (104 °F)		D
PTFE with graphite filling		•					40 °C (104 °F)	0,5 (1.1)	F
PTFE with graphite filling, grooved		•					40 °C (104 °F)		L
PTFE with graphite filling		•					90 °C (194 °F)		R
PTFE with graphite filling, grooved		•					90 °C (194 °F)		M

Flow direction		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers	Weight appr. kg (lb)	Order code
Single- pointer dial		
• Type 01	0,8 (1.76)	0 1
Double-pointer dial (note mounting position! see description on page 4/390)	1,5 (3.3)	1 1
• Type 11, vertical mounting		
• Type 12, horizontal mounting	2,5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4		
• Type 30	11 (24.3)	3 0
• Type 54, with electric switch	13,2 (29.1)	5 4
Value per revolution		
• 10 l (2.65 USg)		2
• 100 l (26.5 USg)		3
Accessory modules		
• None		A
• Mounted		B

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data
DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data (continued)		Order No.	Order code
Rotary piston meter DN 50 (2“)	F)	**7MR14■0-■■■■■-■■■■**	**■■■**
Digital register with current/pulse output			
As separate model: Pulser mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 4/393)			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment			**41 0B**
• max. material temperature 180 °C (356 °F), one cooling attachment			**43 0B**
• max. material temperature 260 °C (500 °F), two cooling attachments			**45 0B**
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment			**46 0B**
• max. material temperature 180 °C (356 °F), one cooling attachment			**47 0B**
• max. material temperature 260 °C (500 °F), two cooling attachments			**48 0B**
Compact version: Pulser (page 4/396) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/393) mounted on mounting bracket.			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment			**61 0B**
• max. material temperature 180 °C (356 °F), one cooling attachment			**63 0B**
• max. material temperature 260 °C (500 °F), two cooling attachments			**65 0B**
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment			**66 0B**
• max. material temperature 180 °C (356 °F), one cooling attachment			**67 0B**
• max. material temperature 260 °C (500 °F), two cooling attachments			**68 0B**
Tests			
Works test			**A**
Works test certificate			**B**
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)			**D**
Preliminary official test (only for vertical mechanism shaft and mech. register or quantity preset register and pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110)			**E**
Flanges			
Plane, drilled to EN 1092-1			**0**
Plane, drilled to specification			**9 R1Y**
With sealing ridge to specification			**9 R2Y**

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371

Heating systems on request

Accessories		Order No.
Instruction Manual		
7MR1410...		
• German	F)	**C73000-B5100-C15**
• English	F)	**C73000-B5176-C15**
7MR1420... and 7MR1440		
• German	F)	**C73000-B5100-C23**
• English	F)	**C73000-B5176-C23**
7MR1430...		
• German	F)	**C73000-B5100-C30**
• English	F)	**C73000-B5176-C30**

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/344
Function and design: see page 4/345
Configuration: see page 4/347 ff.
Operating limits: Permissible liquid temperatures and further technical specifications see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/373 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):

- 7MR1410 and 7MR1420: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP)
- 7MR1430 and 7MR1440: for liquids of group 2; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP);
  For liquids of fluid group 1 on request.

Ordering example see page 4/358

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data — Order No. — Order code

Rotary piston meter DN 80 (3“)

Nom. press.	Materials: Housing	Materials: Meas. chamber					Casing gasket	Weight appr. kg (lb)		Order No.	Order code
PN 6 (87 psi)	CrNiMo steel	CrNiMo steel	•	•		•	Flat gasket 34	54 (119)	F)	7MR1610-	S
PN 25 (363 psi)	Spher. cast iron	Cast iron	•	•	•	•		108 (238)	F)	7MR1620-	E
		CrNiMo steel	•	•	•	•			F)	7MR1620-	D
PN 40 (580 psi)	Cast steel	Cast iron	•	•	•	•	FKM (O-ring)	150 (331)	F)	7MR1630-	E
PN 63 (914 psi)	Cast steel	Cast iron	•	•	•	•	Flat gasket 34	186 (410)	F)	7MR1640-	E

Rotary piston material					Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon				•		2 (4.4)	K
Cast iron			•			9,5 (21)	E
Cast iron, grooved			•			9,4 (20.7)	B
Ni-resist		•				10 (22)	N
Ni-resist, grooved		•				9,6 (21.2)	C
Hard rubber	•				40 °C (104 °F)	2 (4.4)	G
Hard rubber, grooved	•				40 °C (104 °F)	1,8 (4)	D

Flow direction		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers	Weight appr. kg (lb)	Order code
Single- pointer dial		
• Type 01	0,8 (1.76)	0 1
Double-pointer dial (note mounting position! see description on page 4/390)		
• Type 11, vertical mounting	1,5 (3.3)	1 1
• Type 12, horizontal mounting	2,5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	3 0
• Type 54, with electric switch	13,2 (29.1)	5 4
Value per revolution		
• 100 l (26.5 USg)		3
• 1000 l (265 USg)		4
Accessory modules		
• None		A
• Mounted		B

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data (continued)		Order No.	Order code
Rotary piston meter DN 80 (3")	F)	**7MR1 6■0 -■■■■■ -■■■■**	**■■■**
Digital register with current/pulse output			
As separate model: Pulser mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 4/393)			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**41 0B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**43 0B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**45 0B**	
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**46 0B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**47 0B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**48 0B**	
Compact version: Pulser (page 4/396) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/393) mounted on mounting bracket.			
10 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**61 0B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**63 0B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**65 0B**	
100 pulses/revolution			
• max. material temperature 80 °C (176 °F), without cooling attachment		**66 0B**	
• max. material temperature 180 °C (356 °F), one cooling attachment		**67 0B**	
• max. material temperature 260 °C (500 °F), two cooling attachments		**68 0B**	
Tests			
Works test		**A**	
Works test certificate		**B**	
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)		**D**	
Preliminary official test (only for vertical mechanism shaft and mech. Register or quantity preset register and pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110		**E**	
Flanges			
Plane, drilled to EN 1092-1		**0**	
Plane, drilled to specification		**9**	**R1Y**
With sealing ridge to specification		**9**	**R2Y**

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371

Heating systems on request

Accessories		Order No.
Instruction Manual		
7MR1610...		
• German	F)	**C73000-B5100-C15**
• English	F)	**C73000-B5176-C15**
7MR1620... and 7MR1640		
• German	F)	**C73000-B5100-C23**
• English	F)	**C73000-B5176-C23**
7MR1630...		
• German	F)	**C73000-B5100-C30**
• English	F)	**C73000-B5176-C30**

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction" at the beginning of the chapter:

Application: see page 4/344
Function and design: see page 4/345
Configuration: see page 4/347 ff.
Operating limits: Permissible liquid temperatures and further technical specifications see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/373 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):

- 7MR1610-■ E ■■■ and 7MR1610-■ D ■■■, cast iron housing: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (sound engineering practice SEP)
- 7MR1610-■ S ■■■, stainless steel housing: for liquids of fluid group 1; complies with requirements of article 3, para. 3 (SEP)
- 7MR1620, 7MR1630 and 7MR1640: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (SEP)

Ordering example see page 4/358

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters – Ordering data – DN 25 (1"), acid-resistant, rated fl. rate 100 l/min (26.5 USgpm)

Selection and Ordering data

Rotary-piston meter DN 25 (1“), acid-resistant

Nom. press.	Materials: Housing	Materials: Measuring chamber [1]	Materials: Rotary piston	Max. permissible liquid temperature	Weight approx. kg (lb)		Order No.
PN 10 (145 psi)	Cast iron	Duroplast	Carbon	80 °C (176 °F)	28 (61.7)	F)	7MR1111 - ■PK■■ - ■■■■ - Z
			PCTFE	40 °C (104 °F)		F)	7MR1111 - ■PH■■ ■■■■ - Z

		Order No.
Flow direction		
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Register	Weight approx. kg (lb)	
Single pointer dial		
• Type 01	0.8 (1.76)	0 1
Double pointer dial (note mounting position! Description on page 4/390)		
• Type 11	1.5 (3.3)	1 1
• Type 12	2.5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	3 0
• Type 54	13.2 (29.1)	5 4
Electric flow register SITRANS F RA110 (product description on page 4/393) [2]		7 0 0
Without register		
• With protective cover		8 6
• Without protective cover		8 7
Value per revolution		
1 l (0.26 USg)		1
10 l (2.65 USg) [3]		2
Fastest pointer or fastest drum (without intermediate gear)		8
Accessories (description on page 4/395)		
Without		A
Mounted (separate Order No. required)		B
Tests		
Works test		A
Works test certificate		B
Gasket		
Viton [4]		1
Kalrez		2

1) In order to avoid the measurement chamber components becoming misshapen, the pressure loss should not exceed 0.5 bar (7.25 psi).
2) Separate Order No. required (see Selection and Ordering data table on page 4/394)
3) Not possible with rotary-piston meters with quantity preset register!
4) Consider durability of Viton!

Accessories

Accessories		Order No.
Instruction Manual 7MR1111...		
• German	F)	**C73000-B5100-C23**
• English	F)	**C73000-B5176-C23**

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/344
Function and design: see page 4/345
Configuration: see page 4/347 ff.
Operating limits: Permissible liquid temperatures and further technical specifications see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/373 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):
Fliquids of fluid group1; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP)

Ordering example see page 4/358

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters - Ordering data
Automatic batchmeter DN 25 (1")

Selection and Ordering data

Order No. | Order code

Automatic batchmeter DN 25 (1“)
With mechanical shut-off valve **downstream** of metering mechanism (**upstream** of metering mechanism see page 4/371)

Nom. press.	Materials Housing	Meas. chamber	Rotary piston	Weight appr. kg (lb)		Order No.	Order code
PN 10 (145 psi)	Cast iron	Cast iron	• • • • • • •	38 (83.8)	F)	7MR1 1 1 ■ - ■ E ■ ■ ■ - ■ ■ ■ ■	■ ■ ■
		CrNiMo steel	• • • • • • •		F)	7MR1 1 1 ■ - ■ D ■ ■ ■ ■ ■ ■ ■	■ ■ ■
	CrNiMo steel	CrNiMo steel	• • • • • • •		F)	7MR1 1 1 ■ - ■ S ■ ■ ■ ■ ■ ■ ■	■ ■ ■

Rotary piston material								Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon							•		0,15 (0.3)	K
Cast iron						•			0,55 (1.2)	E
Cast iron, grooved						•			0,5 (1.1)	B
Ni-resist					•				0,55 (1.2)	N
Ni-resist, grooved					•				0,5 (1.1)	C
Hard rubber				•				40 °C (104 °F)	0,1 (0.2)	G
Hard rubber, grooved				•				40 °C (104 °F)		D
PTFE with graphite filling			•					40 °C (104 °F)	0,3 (0.7)	F
PTFE with graphite filling, grooved			•					40 °C (104 °F)		L
PTFE with graphite filling			•					90 °C (194 °F)		R
PTFE with graphite filling, grooved			•					90 °C (194 °F)		M
PCTFE		•						40 °C (104 °F)	0,16 (0.4)	H
PCTFE, grooved		•						40 °C (104 °F)		J
CrNiMo with carbon contact surface	•								0,4 (0.9)	S
CrNiMo with PTFE contact surface	•									T

	Order code
Tappet bushing	
• With maintenance-free sealed bushing	2
• With bellows [1]	3
Flow direction	
Mechanism shaft always vertical • From left to right, valve right	1
• From right to left, valve left	2
Quantity preset register	
(description on page 4/390) • Type 30	3 0
• Type 30, ex-protected switch	5 6
Value per revolution and adjustment step	
1 l/0,1 : 0,1 l	1
10 l/1 : 1 l	2
Accessories (description on page 4/395)	
Without	A
Mounted (separate Order No. required, see Selection and Ordering data table on page 4/370)	B
Tests	
Works test	A
Works test certificate	B
Preliminary official test up to 50 l/min (13.2 USgpm)	C
Flanges	
Plane, drilled to EN 1092-1	0
Plane, drilled to specification	9 R 1 Y
With sealing ridge to specification	9 R 2 Y

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371.

Note: If pressure impacts are likely, the valve should be before the automatic batchmeter in the direction of flow.
(See supplement A04, page 4/371)

1) Restricted operating conditions (max. 40 °C (104 °F), max. 3 bar (43.5 psi))

Accessories

	Order No.
Instruction Manual	
7MR111...	
• German	F) **C73000-B5100-C20**
• English	F) **C73000-B5176-C20**

Informations relevant for ordering

see page 4/370

F) Subject to export regulations AL: 9I999, ECCN: N.

Selection and Ordering data

Order No. | Order code

Automatic batchmeter DN 50 (2")
With mechanical shut-off valve downstream of the metering mechanism (upstream of the metering mechanism see page 4/371)

Nom. press.	Materials: Housing	Meas. chamber	Rotary piston: 1	2	3	4	5	6	Weight appr. kg (lb)		Order No.
PN 6 (87 psi) [1]	Cast iron	Cast iron			•	•	•	•	58,5 (129)	F)	7MR141■-■E■■-■■■■ ■■■
		CrNiMo steel	•	•	•	•		•		F)	7MR141■-■D■■ ■■■■ ■■■
PN 10 (145 psi)	CrNiMo steel	CrNiMo steel	•	•	•	•		•		F)	7MR141■-■S■■ ■■■■ ■■■

Rotary piston material	1	2	3	4	5	6	Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon						•		0,9 (2.0)	K
Cast iron					•			3,5 (5.7)	E
Cast iron, grooved					•			3,4 (7.5)	B
Ni-resist				•				3,5 (5.7)	N
Ni-resist, grooved				•				3,4 (7.5)	C
Hard rubber			•				40 °C (104 °F)	0,7 (1.5)	G
Hard rubber, grooved			•				40 °C (104 °F)		D
PTFE with graphite filling		•					40 °C (104 °F)	0,5 (1.1)	F
PTFE with graphite filling, grooved		•					40 °C (104 °F)		L
PTFE with graphite filling		•					90 °C (194 °F)		R
PTFE with graphite filling, grooved		•					90 °C (194 °F)		M

Option	Code
Tappet bushing	
• With maintenance-free sealed bushing	2
• With bellows [2]	3
Flow direction	
Mechanism shaft always vertical • From left to right, valve right	1
Mechanism shaft always vertical • From right to left, valve left	2
Quantity preset register (description on page 4/390)	
• Type 30	3 0
• Type 30, ex-protected switch	5 6
Value per revolution and adjustment step	
10 l/1 : 1 l	2
100 l/10 : 1 l	3
Accessories (description in section „Accessories“)	
Without	A
Mounted (separate Order No. required, see Selection and Ordering data table „Accessories“, page 4/370)	B
Tests	
Works test	A
Works test certificate	B
Preliminary official test up to 100 l/min (26.5 USgpm)	D
Flanges	
Plane, drilled to EN 1092-1	0
Plane, drilled to specification	9 R1Y
With sealing ridge to specification	9 R2Y

The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity
Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/371.

Note: If pressure impacts are likely, the valve should be before the automatic batchmeter in the direction of flow.
(See supplement A04, page 4/371)

1) Flange connections drilled to PN 10/16 (MWP 145/232 psi)
2) Separate Order No. required (see Selection and Ordering data table „Accessories“)

Accessories

Accessories		Order No.
Instruction Manual		
7MR141...		
• German	F)	**C73000-B5100-C20**
• English	F)	**C73000-B5176-C20**

Informations relevant for ordering

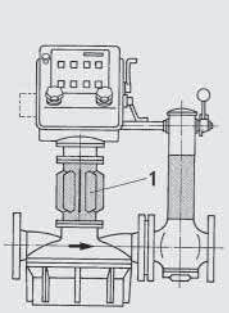
see page 4/370

F) Subject to export regulations AL: 9I999, ECCN: N.

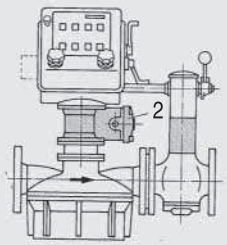
Rotary-piston meters - Ordering data
Accessories for automatic batchmeters

Accessories for automatic batchmeters

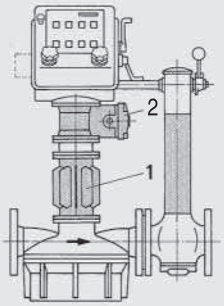
Order No.



Model 21



Model 22



Model 23

1 Insulation attachment(s)
2 Pulser above intermediate gear

Design	Quantity preset register	Pulser with NAMUR output (8 V DC supply required from external unit)	Number of cooling attachments	Permissible liquid temperature	Weight appr. kg (lb)		To order as accessory
	With	Without	0	80 °C (176 °F)			Included in meter
21	With	Without	1	180 °C (356 °F)	1.3 (2.9)	F)	7MV3021-1XX00
21	With	Without	2	300 °C (572 °F)	2.6 (5.7)	F)	7MV3021-2XX00
22	With	With	0	80 °C (176 °F)	1.2 (2.7)	F)	7MV3022-0X■00
23	With	With	1	180 °C (356 °F)	2.6 (5.7)	F)	7MV3023-1X■00
23	With	With	2	300 °C (572 °F)	2.5 (5.5)	F)	7MV3023-2X■00

Pulser (with inductive pick-up, page 4/396)

mounted between rotary-piston meter and quantity preset register	• 1 pick-up	A
	• 2 pick-ups	B
	10 pulses/revolution	
	• 1 pick-up	C
	• 2 pick-ups	D

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/344
Function and design: see page 4/345
Configuration: see page 4/347 ff.
Operating limits:

- DN 25 (1“), flow rate 100 l/min (26.5 USgpm)
- DN 50 (2“), flow rate 500 l/min (132 USgpm)

Perm. liquid temp. and further Technical spec. see page 4/355 ff.
Dimensional drawings: see page 4/372 (dimensions of flanges) and pages 4/386 ff.
Mounting position: mechanism shaft vertical
Certificates and approvals
Classification according to pressure equipment directive (DGRL 97/23/EG):
For liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engeneering practice SEP)
Ordering example see page 4/358

F) Subject to export regulations AL: 9I999, ECCN: N.

Information on liquid

Order No. of rotary-piston meter according to pages 4/359 ff.
7MR1■■■ - ■■■■■ - ■■■■ - Z

Order codes		■■■ +	■■■ +	■■■ +	■■■
Temperature	°C (°F)				
In operating condition	10 (50)	**C01**			
	20 (68)	**C02**			
	30 (86)	**C03**			
	.	.			
	.	.			
In steps of ten up to	300 (572)	**C30**			
Viscosity [1]	mPa·s (cp)				
In operating condition	0.1		**F01**		
(1 mPa·s = 1 cp)	0.2		**F02**		
	0.3		**F03**		
	.		.		
	.		.		
In steps of 0.1 up to	9.9		**F99**		
	10		**G01**		
	20		**G02**		
	30		**G03**		
	.		.		
	.		.		
In steps of 10 up to	990		**G99**		
	1000		**H01**		
	2000		**H02**		
	3000		**H03**		
	.		.		
	.		.		
In steps of 1000 up to	99000		**H99**		
> 99000 mPa · s (cp) on request					
Flow rate	l/min (USgpm)				
In operating condition	1 (0.26)			**K01**	
	2 (0.53)			**K02**	
	3 (0.79)			**K03**	
	.			.	
	.			.	
In steps of 1 up to	99 (26.2)			**K99**	
	100 (26.4)			**L01**	
	200 (52.8)			**L02**	
	300 (79.2)			**L03**	
	.			.	
	.			.	
In steps of 100 up to	1000 (264)			**L10**	

1) If the viscosity exceeds 60 mPa·s (cp) (order code G06 ... G99), constructional details of the shut-off valve cone must be changed.

Further designs

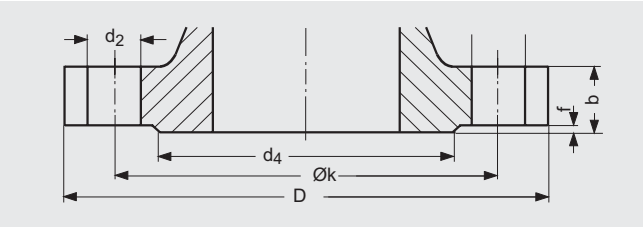
Further designs	Order code
Order No. of the rotary-piston meter according to page 4/359 ff.; 7MR1■■■ - ■■■■■ - ■■■■ - Z	
Mechanical shut-off valve In flow direction in front of the rotary-piston meter (only with the automatic batchmeters 7MR111■... and 7MR141■..., if pressure surges are to be expected)	**A04**
Material acceptance test to EN 10 204-3.1	**E01**

4

Rotary-piston meters - Dimensional drawings
Dimension of flanges

Dimensional drawings

Dimensions of flanges



Dimensions of flanges

4

Dimensions of flanges drilled according to EN

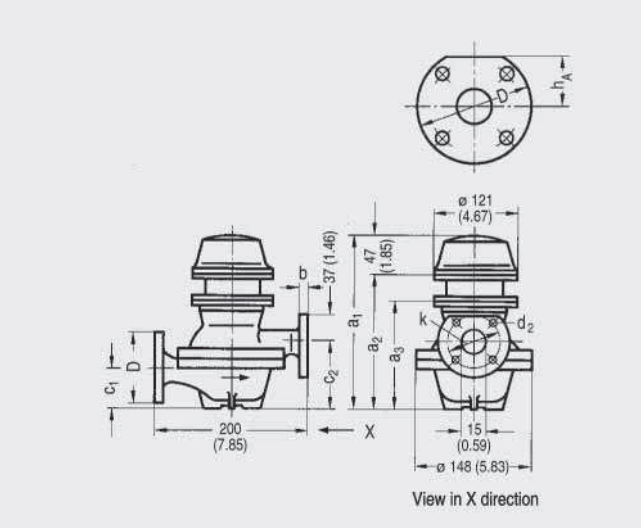
				Dimensions of flanges with plain sealing					Additional dimensions for flanges with raised face	
Order No.	**Material**	**Nom. diameter DN**	**Nom. pressure PN**	**Ø D**	**Ø k**	**n holes**	**Ø d_2**	**b**	**Ø d_4**	**f**
				mm	mm		mm	mm	mm	mm
7MR1020	E/D/S	15	25	95	65	4	14	16	45	2
7MR1030	E/D		40							
7MR1110/111■	E/D/S	25	10	115	85	4	14	16	68	2
7MR1120	E/D		25					18		
7MR1130	E/D		40							
7MR1140	E/D		63	140	100	4	18	24	68	2
7MR1410/141■	E/D	50	6	165	125	4	18	17	102	3
7MR1410/141■	S		16							
7MR1420	E/D/C		25					20		
7MR1430	E/D		40							
7MR1440	E		63	180	135	4	22	26	–	–
7MR1610/161■	E/D	80	4	190	150	4	18	18	128	3
7MR1610/161■	S		6							
7MR1620	E/D		25	200	160	8	18	22	138	3
7MR1630	E/D		40							
7MR1640	E		63	215	170	8	22	28	138	3

Dimensions of flanges drilled according to ASME

				Dimensions of flanges with plain sealing					Additional dimensions for flanges with raised face	
Order No.	**Material**	**Nom. diameter**	**Rated pressure MWP**	**Ø D**	**Ø k**	**n holes**	**Ø d_2**	**b**	**Ø d_4**	**f**
		inch	inch	inch	inch		inch	inch	inch	inch
7MR1020	E/D/S	$^1/_2$	300 … 600	$3^3/_4$	$2^5/_8$	4	$^5/_8$	16	$1^3/_8$	$^1/_{16}$
7MR1030	E/D									
7MR1110/111■	E/D/S	1	150	$4^1/_4$	$3^1/_8$	4	$^5/_8$	16	2	$^1/_{16}$
7MR1120	E/D		300 … 600	$4^7/_8$	$3^1/_2$	4	$^3/_4$	18	2	$^1/_{16}$
7MR1130	E/D									
7MR1140	E/D		900 … 1500	$5^7/_8$	4	4	1	24	2	$^1/_4$
7MR1410/141■	E/D/S	2	150	6	$4^3/_4$	4	$^3/_4$	17	$3^5/_8$	$^1/_{16}$
7MR1420	E/D/C		300 … 600	$6^1/_2$	5	8	$^3/_4$	20	$3^5/_8$	$^1/_{16}$
7MR1430	E/D									
7MR1440	E		900 … 1500	$8^1/_2$	$6^1/_2$	8	1	26	$3^5/_8$	$^1/_4$
7MR1610/161■	E/D/S	3	150	$7^1/_2$	6	4	$^3/_4$	18	5	$^1/_{16}$
7MR1620	E/D		300 … 600	$8^1/_4$	$6^5/_8$	8	$^7/_8$	22	5	$^1/_{16}$
7MR1630	E/D									
7MR1640	E		900 … 1500	$10^1/_2$	8	8	$1^1/_4$	28	5	$^1/_4$

Rotary-piston meter DN 15 (½")

Rotary-piston meter DN 15 (½") without accessories

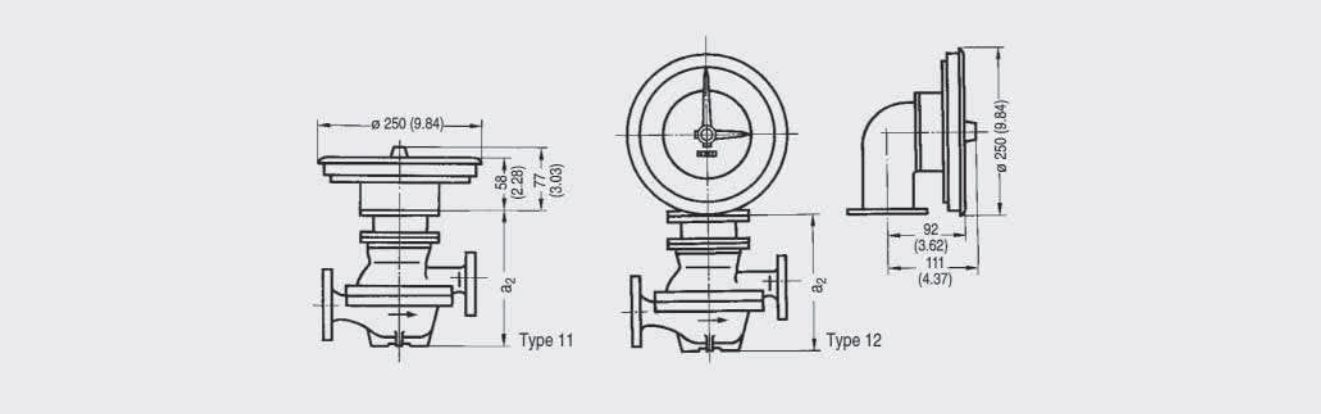


Rotary-piston meter DN 15 (½") with single-pointer dial type 01, without heating device, dimensions in mm (inch)

Rotary-piston meter with single-pointer dial type 01, (PN 25 (MWP 363 psi))

Dimensions	Heating system		
	with	without	
	PN 25 (MWP 363 psi)	PN 25 (MWP 363 psi)	PN 40 (MWP 580 psi)
	mm (inch)	mm (inch)	mm (inch)
a_1	224 (8.82)	247 (9.72)	249 (9.80)
a_2	177 (6.97)	200 (7.87)	202 (7.95)
a_3	140 (5.51)	163 (6.42)	165 (6.50)
c_1	50 (1.97)	66 (2.60)	68 (2.68)
c_2	83,5 (3.29)	106 (4.17)	108 (4.25)
g	-	100 (3.94)	92 (3.62)
h	-	G¾	$G^3/_8$
h_A	37 (1.46)	37 (1.46)	37 (1.46)
l	-	22 (0.87)	26 (1.02)

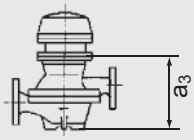
Dimensions of flanges see page 4/372



Rotary-piston meter DN 15 (½") with double-pointer dial, dimensions in mm (inch)

Rotary-piston meters - Dimensional drawings
Rotary-piston meter DN 15 (½")

Rotary-piston meter DN 15 (½") with accessories, other heights/footprints also available



Rotary piston meter DN 15 (½") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/373), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	**a_3 +**
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/373), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

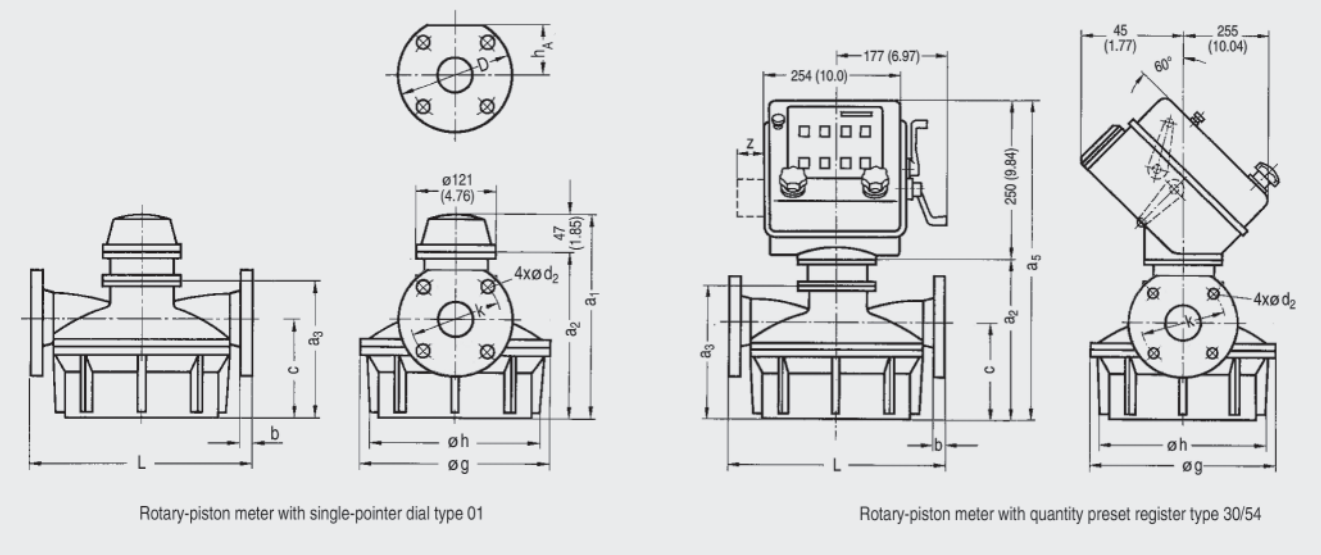
Addition of	**a_3 +**
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

4

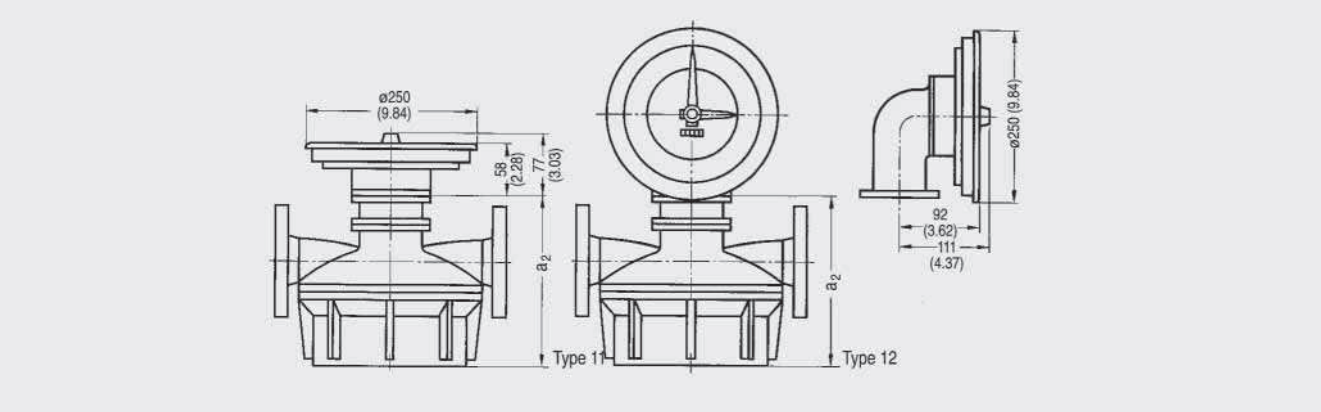
Rotary-piston meter DN 25 (1“)

Rotary-piston meter DN 25 (1“) without accessories

For PN 10 and PN 16 (MWP 145 psi and 232 psi)



Rotary-piston meter DN 25 (1“) for PN 10 and PN 16 (MWP 145 psi and 232 psi) with single-pointer, with quantity preset register, dimensions in mm (inch)



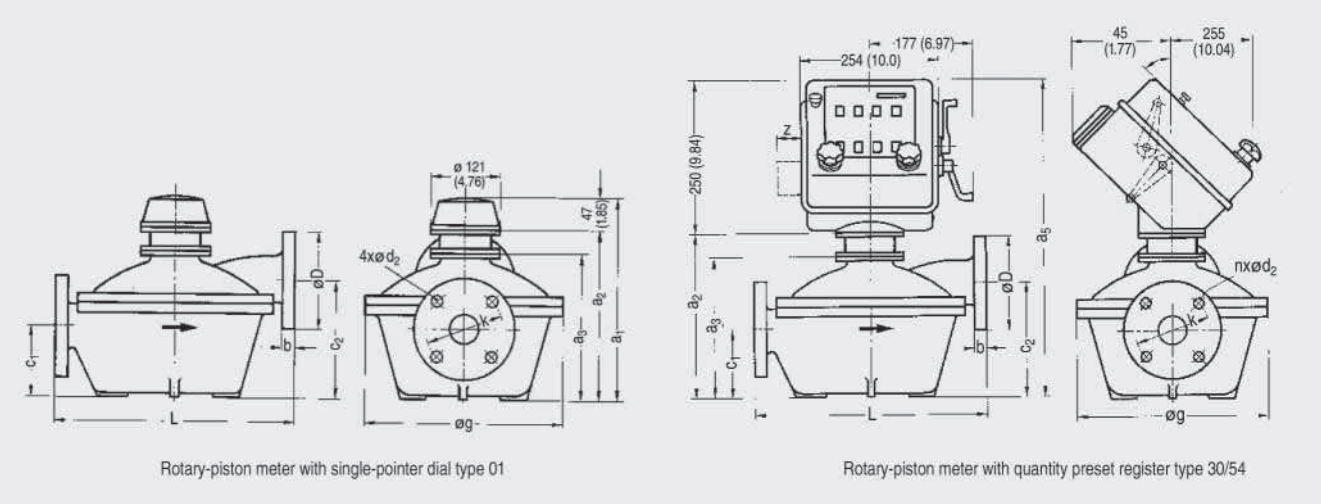
Rotary-piston meter DN 25 (1“) for PN 10 and PN 16 (MWP 145 psi and 232 psi) with double pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 25 (1“) for PN 10 and PN 16 (MWP 145 psi and 232 psi) without accessories, dimensions in mm (inch)									
With single-pointer dial type 01 or with double pointer dial									
a_1	a_2	a_3	c	d_1	e	g	h	h_A	L
237 (9.33)	190 (7.48)	153 (6.02)	90 (3.54)	14 (0.55)	115 (4.53)	155 (6.10)	140 (5.51)	48 (1.89)	210 (8.27)
With quantity preset register type 54									
a_2	a_3	a_5	c	g	h	h_A	L	z	
190 (7.48)	153 (6.02)	440 (17.32)	90 (3.54)	155 (6.10)	140 (5.51)	48 (1.89)	210 (8.27)	54 (2.10) for electric switch	

Dimension of flanges see page 4/372

Rotary-piston meters - Dimensional drawings
Rotary-piston meter DN 25 (1")

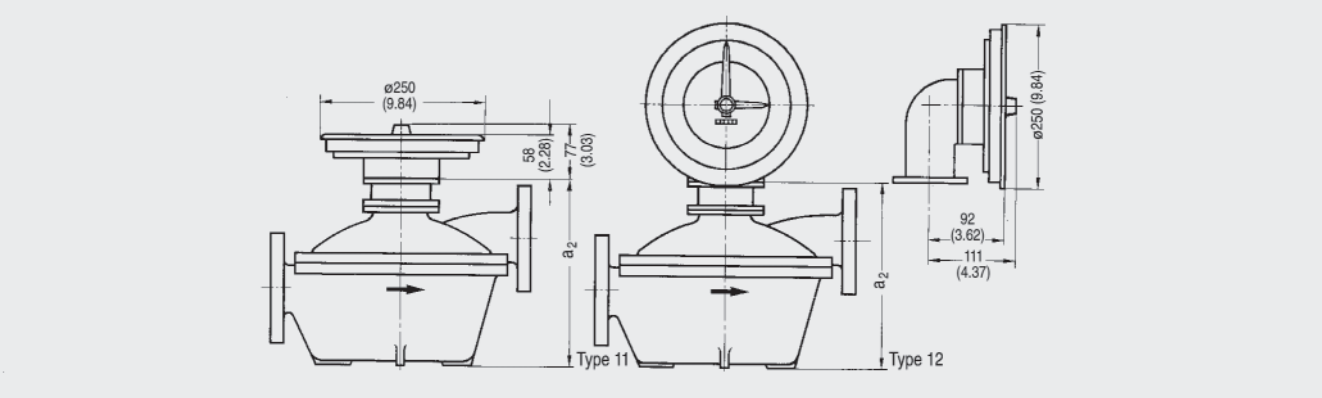
For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary-piston meter with single-pointer dial type 01

Rotary-piston meter with quantity preset register type 30/54

Rotary-piston meters DN 25 (1“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial or with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 25 (1“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double pointer dial, dimensions in mm (inch)

Rotary-piston meters DN 25 (1“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

With single-pointer dial type 01 or with double pointer dial

	a_1	a_2	a_3	c_1	c_2	g	L	
• PN 25, PN 40 (MWP 363 psi, 580 psi)	292 (11.50)	245 (9.65)	208 (8.19)	80 (3.15)	144 (5.67)	205 (8.07)	270 (10.63)	
• PN 63 (MWP 914 psi)	308 (12.13)	261 (10.28)	224 (8.82)	82 (3.23)	157 (6.18)	230 (9.06)	300 (11.81)	

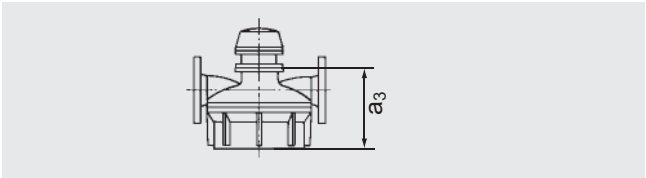
With quantity preset register type 54

	a_2	a_3	a_5	c_1	c_2	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	245 (9.65)	208 (8.19)	495 (19.48)	80 (3.15)	144 (5.67)	205 (8.07)	270 (10.63)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	261 (10.28)	224 (8.82)	511 (20.12)	82 (3.23)	157 (6.18)	230 (9.06)	300 (11.81)	54 (2.10) for electric switch

Dimension of flanges see page 4/372

Rotary-piston meter DN 25 (1") with accessories, other heights/footprints also available

For rated pressure PN 10 and PN 16 (MWP 145 psi and 232 psi)



Rotary piston meter DN 25 (1“) without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/375), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

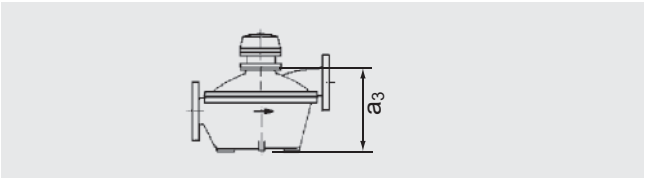
Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/375), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 25 (1“) without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/376), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/376), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

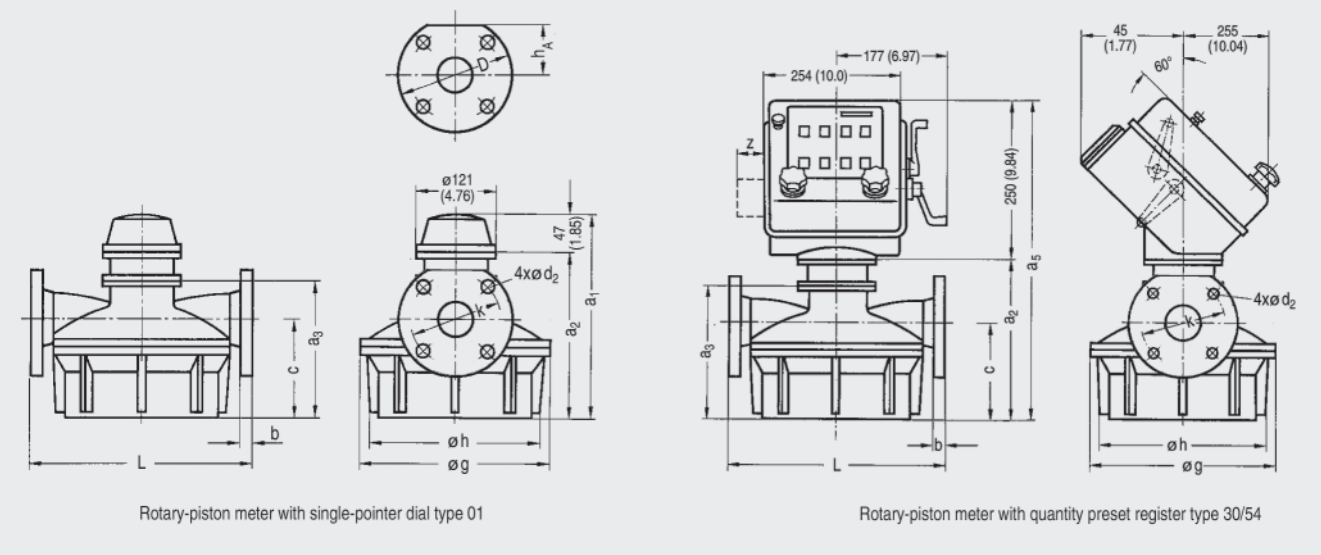
Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

Rotary-piston meters - Dimensional drawings
Rotary-piston meter DN 50 (2")

Rotary-piston meter DN 50 (2“)

Rotary-piston meter DN 50 (2“) without accessories

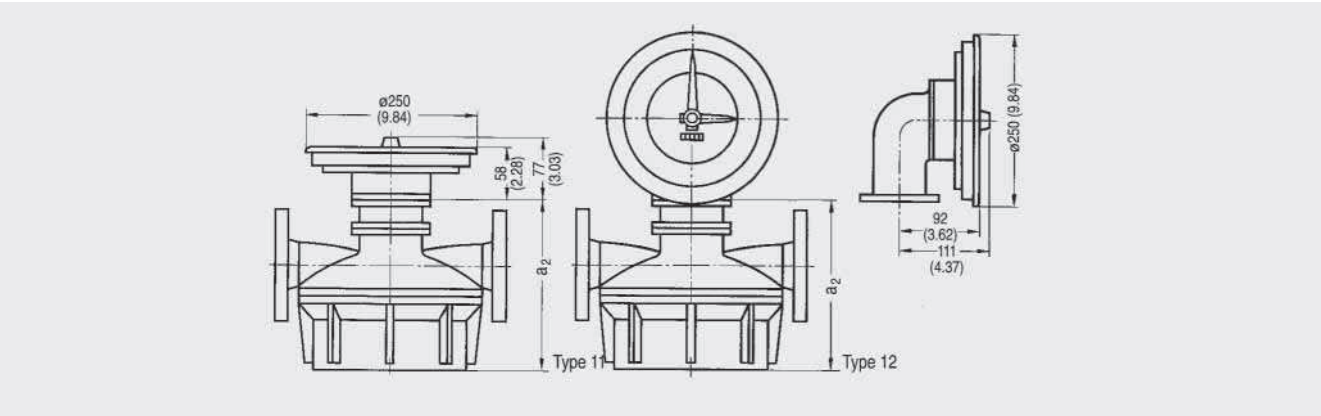
For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary-piston meter with single-pointer dial type 01

Rotary-piston meter with quantity preset register type 30/54

Rotary-piston meter DN 50 (2“) for PN 6 and PN 16 (MWP 87 psi and 232 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)

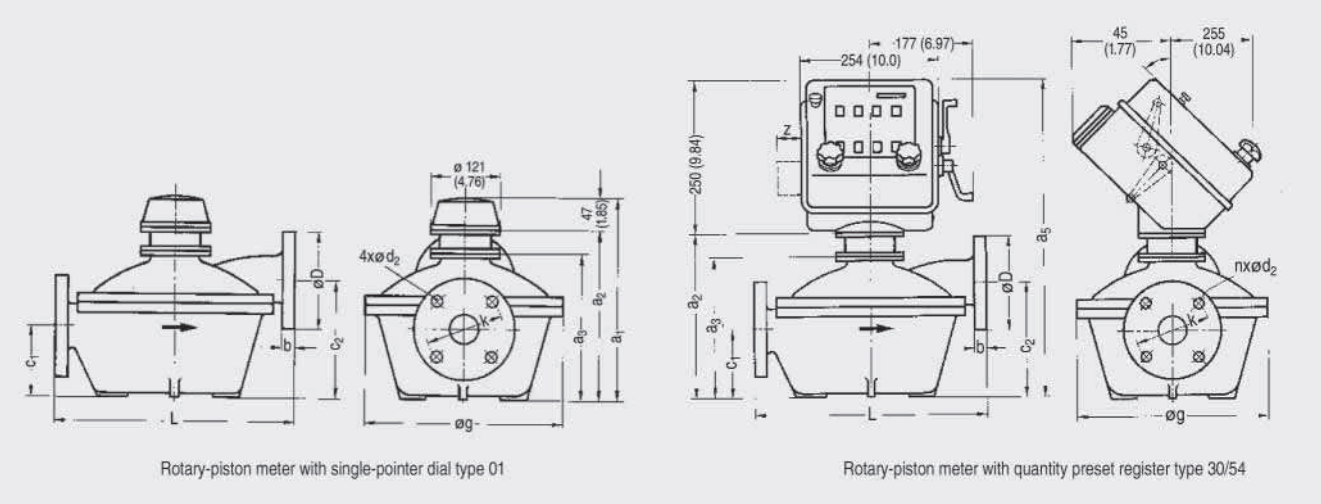


Rotary-piston meter DN 50 (2“) for PN 6 and PN 16 (MWP 87 psi and 232 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 50 (2“) for PN 6 and PN 16 (MWP 87 psi and 232 psi) without accessories, dimensions in mm (inch)									
with single-pointer dial Typ 01 bzw. with double-pointer dial									
a_1	a_2	a_3	c	d_1	e	g	h	h_A	L
289 (11.38)	242 (9.53)	205 (8.07)	147 (5.79)	18 (0.71)	165 (6.50)	275 (10.83)	250 (9.84)	75 (2.95)	325 (12.80)
with quantity preset register Typ 54									
a_2	a_3	a_5	c	g	h	h_A	L	z	
242 (9.53)	205 (8.07)	492 (19.37)	147 (5.79)	275 (10.83)	250 (9.84)	75 (2.95)	325 (12.80)	54 (2.10) for electric switch	

Dimension of flanges see page 4/372

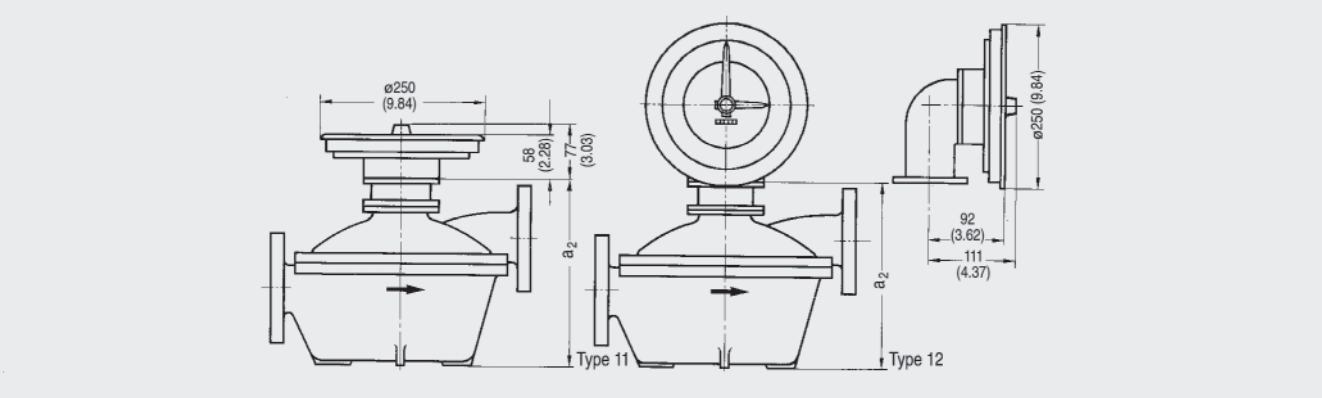
For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary-piston meter with single-pointer dial type 01

Rotary-piston meter with quantity preset register type 30/54

Rotary-piston meter DN 50 (2“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 50 (2“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 50 (2“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

	a_1	a_2	a_3	c_1	c_2	g	L
• PN 25, PN 40 (MWP 363 psi, 580 psi)	347 (13.66)	300 (11.81)	263 (10.35)	120 (4.7)	205 (8.1)	330 (12.99)	400 (15.75)
• PN 63 (MWP 914 psi)	369 (14.53)	322 (12.68)	285 (11.22)	120 (4.7)	230 (9.1)	385 (15.16)	470 (18.50)

with quantity preset register Typ 54

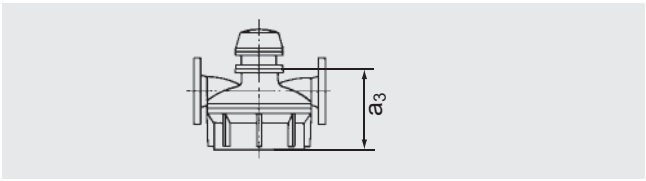
	a_2	a_3	a_5	c_1	c_2	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	300 (11.8)	263 (10.4)	550 (21.7)	120 (4.7)	205 (8.1)	330 (12.99)	400 (15.8)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	332 (12.7)	285 (11.2)	572 (22.5)	120 (4.7)	230 (9.1)	385 (15.2)	400 (15.8)	54 (2.10) for electric switch

Dimension of flanges see page 4/372

Rotary-piston meters - Dimensional drawings
Rotary-piston meter DN 50 (2")

Rotary-piston meter DN 50 (2") with accessories, other heights/footprints also available

For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary piston meter DN 50 (2") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/378), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

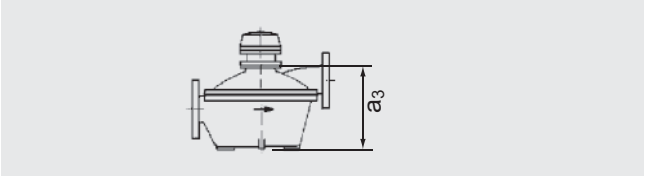
Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/378), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 50 (2") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/379), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

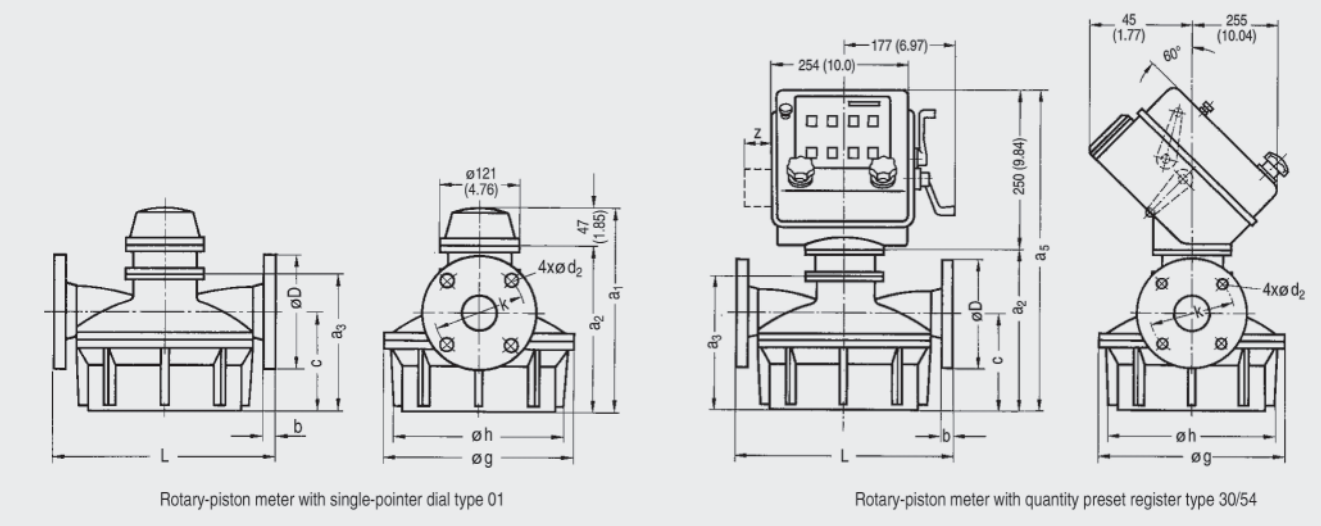
In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/379), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

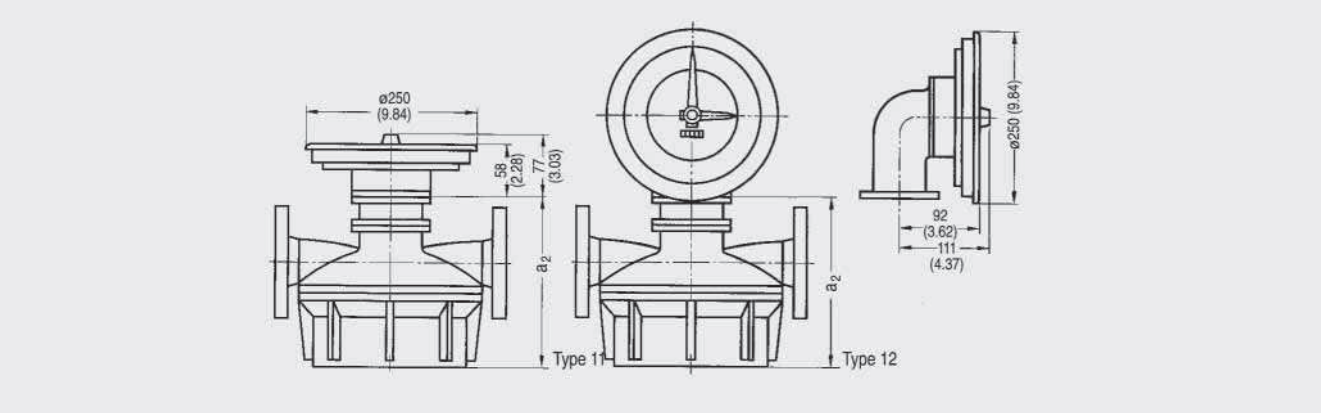
4

Rotary-piston meter DN 80 (3“) without accessories

For rated pressure PN 6 (MWP 58 psi and 87 psi)



Rotary-piston meter DN 80 (3“) for PN 6 (MWP 58 psi and 87 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



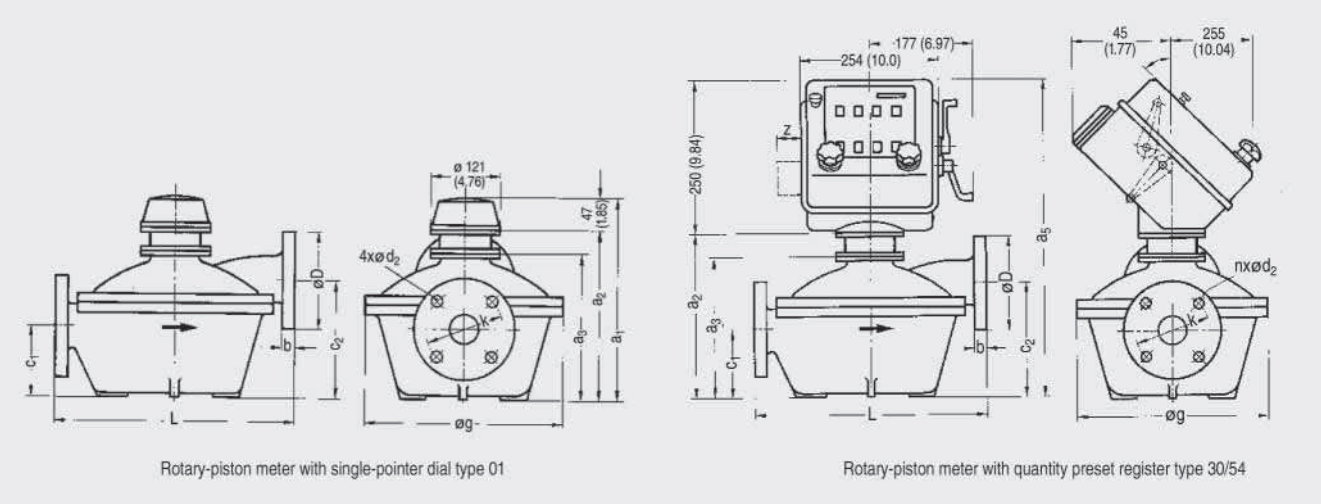
Rotary-piston meter DN 80 (3“) for PN 6 (MWP 58 psi and 87 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 80 (3“) for PN 4 and PN 6 (MWP 58 psi and 87 psi) without accessories, dimensions in mm (inch)								
with single-pointer dial Typ 01 bzw. with double-pointer dial								
a_1	a_2	a_3	c	d_1	e	g	h	L
328 (12.91)	281 (11.06)	244 (9.61)	185 (7.28)	18 (0.71)	190 (7.48)	365 (14.37)	340 (13.39)	410 (16.14)
with quantity preset register Typ 54								
a_2	a_3	a_5	c	e	g	h	L	z
281 (11.06)	244 (9.61)	531 (20.91)	185 (7.28)	190 (7.48)	365 (14.37)	340 (13.39)	410 (16.14)	54 (2.10) for electric switch

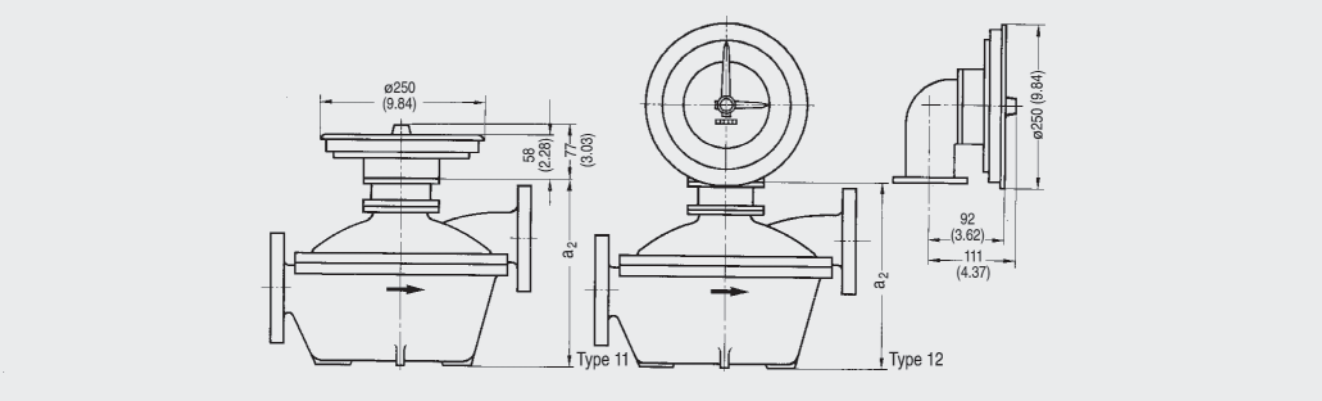
Dimension of flanges see page 4/372

Rotary-piston meters - Dimensional drawings
Rotary-piston meter DN 80 (3")

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary-piston meter DN 80 (3“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 80 (3“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 80 (3“) for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

	a_1	a_2	a_3	c_1	c_2	g	L
• PN 25, PN 40 (MWP 363 psi, 580 psi)	415 (16.34)	368 (14.49)	331 (13.03)	155 (6.10)	271 (10.67)	450 (17.72)	540 (21.26)
• PN 63 (MWP 914 psi)	471 (18.54)	424 (16.69)	387 (15.24)	177 (6.97)	312 (12.28)	515 (20.28)	600 (23.62)

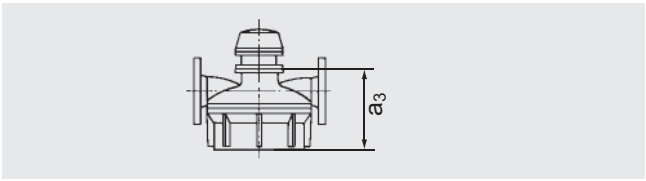
with quantity preset register Typ 54

	a_2	a_3	a_5	c_1	c_2	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	368 (14.48)	331 (13.03)	618 (24.33)	155 (6.10)	271 (10.67)	450 (17.72)	540 (21.26)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	424 (16.69)	387 (15.24)	674 (26.54)	177 (6.97)	312 (12.28)	515 (20.28)	600 (23.62)	54 (2.10) for electric switch

Dimension of flanges see page 4/372

Rotary-piston meter DN 80 (3") with accessories, other heights/footprints also available

For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary piston meter DN 80 (3") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/381), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

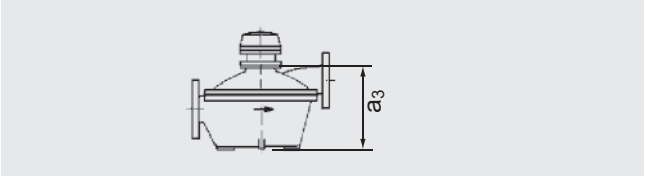
Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/381), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 80 (3") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/382), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

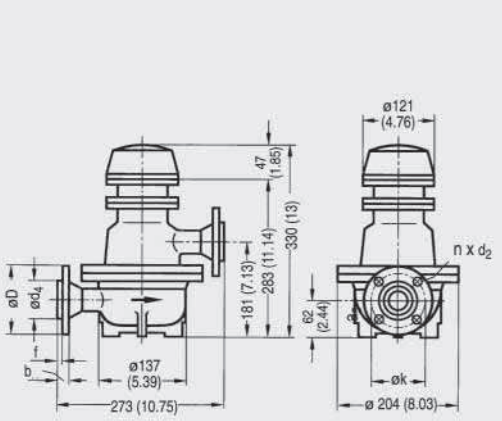
In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/382), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	a_3 +
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

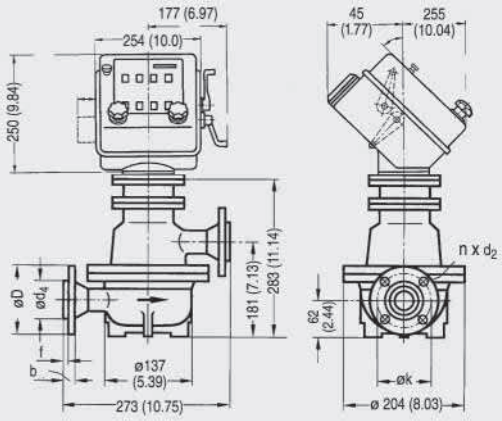
Rotary-piston meters - Dimensional drawings
Acid resistant rotary-piston meter DN 25 (1")

Acid resistant rotary-piston meter DN 25 (1“)

Acid resistant rotary-piston meter DN 25 (1“) without accessories

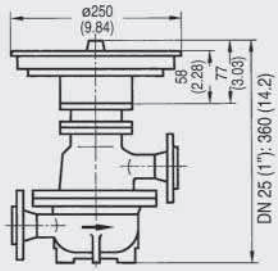


Acid resistant rotary-piston meter with single-pointer dial type 01

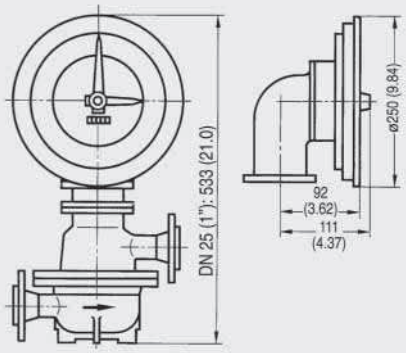


Acid resistant rotary-piston meter with quantity preset register type 30/54

Acid resistant rotary-piston meter DN 25 (1“) for PN 10 (MWP 145 psi) with single-pointer dial or quantity preset register, dimensions in mm (inch), dimensions of flanges see page 4/372



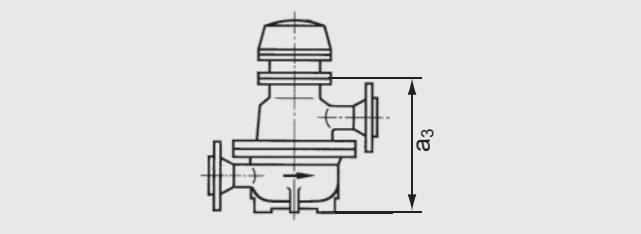
Type 11



Type 12

Acid resistant rotary-piston meter DN 25 (1“) for PN 10 (MWP 145 psi) with double-pointer dial, dimensions in mm (inch), dimensions of flanges see page 4/372

Acid resistant rotary-piston meter DN 25 (1“) with accessories, other heights/footprints also available



Rotary piston meter DN 80 (3“) without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. fig. on page 4/384), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	**a_3 +**
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

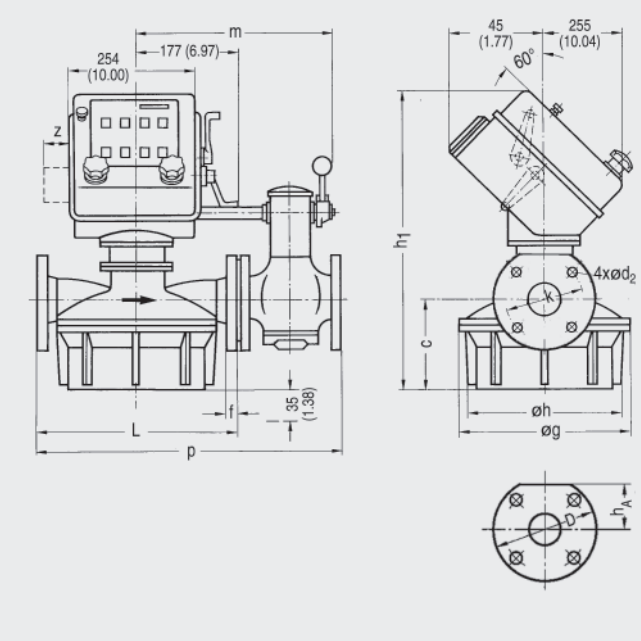
Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. fig. on page 4/384), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	**a_3 +**
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

Rotary-piston meters - Dimensional drawings
Automatic batchmeter DN 25 (1")

Automatic batchmeter DN 25 (1“)



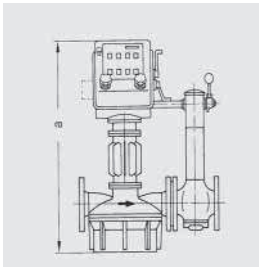
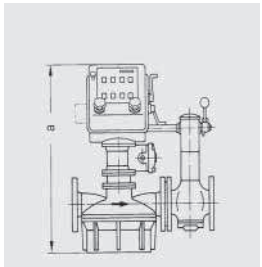
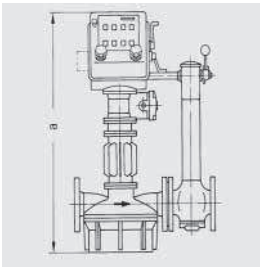
Automatic batchmeter DN 25 (1“) for PN 10 (MWP 145 psi) with quantity preset register, dimensions in mm (inch)

Automatic batchmeter DN 25 (1“) for PN 10 (MWP 145 psi) with quantity preset register type 30, without accessories, dimensions in mm (inch)

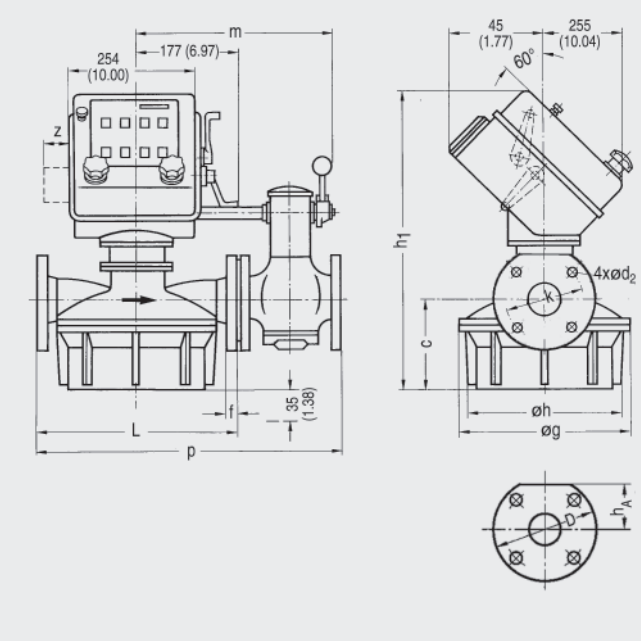
c	g	h	h_A	h_1	L	m	p	z
90 (3.54)	155 (6.10)	140 (5.51)	48 (1.89)	440 (17.32)	210 (8.27)	241 (9.49)	345 (13.58)	54 (2.1) for electric switch

See page 4/372 for flange dimensions

Automatic batchmeter DN 25 (1") with accessories; dimensions in mm (inch)

Model 21	Model 22	Model 23
		
Dimension a for automatic batchmeter with 1 heat insulation attachment		
599 (23.58)	522 (20.55)	681 (26.81)
Dimension a for automatic batchmeter with 2 heat insulation attachments		
758 (29.84)	-	840 (33.07)

Automatic batchmeter DN 50 (2“)



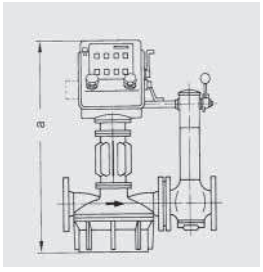
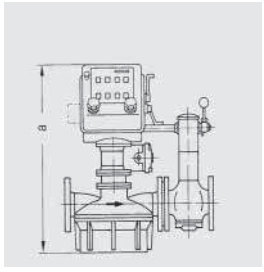
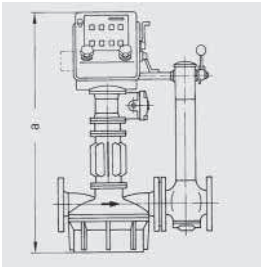
Automatic batchmeter DN 50 (2") with quantity preset register;
dimensions in mm (inch)

Automatic batchmeter DN 50 (2“) for PN 6 and PN 10 (MWP 87 psi and 145 psi) with quantity preset register type 30, without accessories, dimensions in mm (inch)

c	g	h	h_A	h_1	L	m	p	z
147 (5.79)	275 (10.83)	250 (9.84)	75 (2.96)	492 (19.37)	325 (12.80)	318 (12.52)	500 (19.68)	54 (2.1) for electric switch

See page 4/372 for flange dimensions

Automatic batchmeter DN 50 (2“) for PN 6 and PN 10 (MWP 87 psi and 145 psi), with accessories, dimensions in mm (inch)

Model 21	Model 22	Model 23
		
Dimension a for automatic batchmeter with 1 heat insulation attachment		
651 (25.63)	574 (22.60)	733 (28.86)
Dimension a for automatic batchmeter with 2 heat insulation attachments		
810 (31.89)	-	892 (35.12)

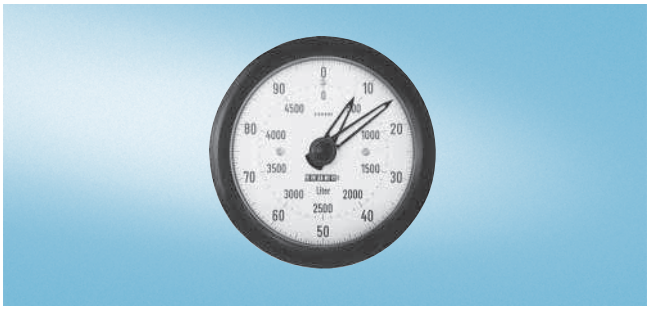
Overview

Register and quantity preset registers

Registers

Single-pointer dial — Type 01

- Non-resettable pointer dial
- Non-resettable 5-digit drum-type counter



Double-pointer dial — Type 11, Type 12

- Resettable pointer dial
- Non-resettable 5-digit totalizer

Accessories

- Hand lever
- Electric and pneumatic switches

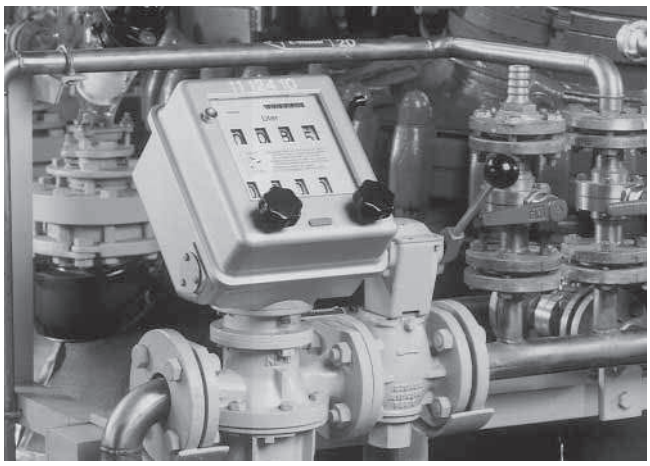
Quantity preset registers

4-digit quantity preset register — Type 30
Resettable 6-digit drum-type counter — Type 54

Electric flow registers SITRANS F RA110

- Large LCD for displaying the current value, total value and accumulated total — Type 70
- Remote design

Design



Automatic batchmeter for solvent in a chemical plant

All registers and quantity preset registers have a transmission ratio of 1:1 and differ only in the scale inscriptions (value per revolution). The dimension of the value per revolution corresponds to the scale inscription. The value per revolution is formed by a separate intermediate gear belonging to the meter mechanism. The intermediate gears are normally assembled with the metering mechanism into one unit - the meter. The registers and quantity preset registers are also available as separate instruments since they are often installed separately from the metering mechanism, e.g. in a central control room.

All registers and quantity preset registers have a standard mounting flange which fits all metering mechanisms and accessories. The registers and quantity preset registers can be mounted in four positions, displaced at 90° around the line joining the register (quantity preset register) to the metering mechanism.

The following types are available:

- Pointer dials
- Quantity preset registers

Pointer dials

The following 2 types are available.

Non-resettable single-pointer dial with 5-digit drum-type counter: One revolution of the pointer corresponds to an advance of one figure on the fastest roller of the drum-type counter. Individual quantities are determined from the difference of two readings.

Resettable double-pointer dial with non-resettable 5-digit drum-type counter:
The small pointer indicates the full value per revolution of the large pointer. One revolution of the large pointer corresponds to one revolution of the fastest roller of the totalizer.

Quantity preset register

4-digit preset register with resettable 6-digit drum-type counter. The graduations on the fifth number drum make it possible to display an exact figure. When the filling processes is complete, the graduation is transferred by activation of the lever on the sixth number drum (graduation drum) and at the same time all the number drums are lined up exactly.
This guarantees optimum readability. The green/red status display indicates whether the volume meter is available or not.
A non-resettable 8-digit totalizer adds all the output volumes on an ongoing basis (control function).

The quantity preset register can be mounted individually with electric signal transmitters for separate shut-off valves or on the meter with a mechanical shut-off valve.

The latter version – the automatic batchmeter – enables any quantity of liquid to be preselected and automatically delivered without the need for an additional power supply. In this case, the quantity to be delivered is preset on the register before metering. The drum-type counter is at zero. Delivery commences when the shut-off valve is opened. The quantity preset register runs backwards towards zero, the drum-type counter counts forwards. The flow rate is throttled automatically, step by step, down to approx. 15% of the initial value when the preset quantity has almost been reached. The valve closes completely when the preset quantity has been reached.

In emergencies, the filling process can be interrupted by pressing a stop button.

It is often necessary to locate the valve separate from the quantity preset register. In this case, the turn-on and turn-off movements of the quantity preset register must be transmitted to the valve by a control unit and a supplementary force.

Desiccant device

Quantity preset registers are always supplied with a desiccant device. This consists of a desiccant chamber and a replaceable desiccant cartridge. The cartridge contains silica gel.

The color of the silica gel changes from blue to pinkish red as soon as moisture is absorbed. The shade indicates the degree of saturation of the cartridge.

Quantity preset register with desiccant cartridge removed

4

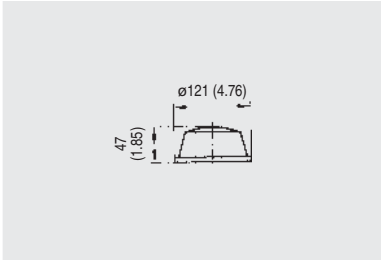
Registers, Technical specifications and Selection and Ordering data

Order No.

Non-resettable single-pointer dial

Scale diameter 100 mm (3.94 inch), permissible operating temperature 90 °C (194 °F), any mounting position, weight approx. 0.8 kg (1.76 lb)

Type 01



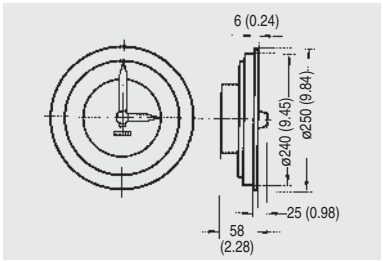
Single-pointer dial		Drum-type counter			
Value per revolution of the pointer	Minimum delivery quantity	Value per revolution of fastest roller	End value		
1 l	0.01 l	10 l	99.999 l	F)	**7MV1001-1A**
10 l	0.1 l	100 l	999.999 l	F)	**7MV1001-2A**
100 l	1 l	1000 l	9.999.999 l	F)	**7MV1001-3A**
1 m³	0.01 m³	10 m³	99.999 m³	F)	**7MV1001-4A**

Resettable double-pointer dial

Scale diameter 200 mm (7.87 inch), permissible operating temperature 60 °C (140 °F), without return flow lock

Type 11

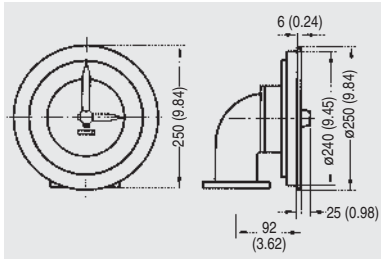
Scale vertical, any mounting position, weight approx. 1.5 kg (3.3 lb)



Double-pointer counter		Totalizer			
Value per revolution large/small pointer	Smallest scale division	Value per revolution of fastest roller	End value		
1/50 l	0.005 l	10 l	9.999 l	F)	**7MV1011-0A**
10/500 l	0.05 l	100 l	99.999 l	F)	**7MV1011-1A**
100/5000 l	0.5 l	1000 l	999.999 l	F)	**7MV1011-2A**
1/50 m³	0.005 m³	10 m³	9.999.9 m³	F)	**7MV1011-3A**

Type 12

Scale vertical, mounting with axis of mechanism vertical, weight approx. 2.5 kg (5.5 lb)



Double-pointer counter		Totalizer			
Value per revolution large/small pointer	Smallest scale division	Value per revolution of fastest roller	End value		
1/50 l	0.005 l	10 l	9.999 l	F)	**7MV1012-0A**
10/500 l	0.05 l	100 l	99.999 l	F)	**7MV1012-1A**
100/5000 l	0.5 l	1000 l	999.999 l	F)	**7MV1012-2A**
1/50 m³	0.005 m³	10 m³	9.999.9 m³	F)	**7MV1012-3A**

F) Subject to export regulations AL: 9I999, ECCN: N.

Quantity preset register, Technical specifications and Selection and Ordering data

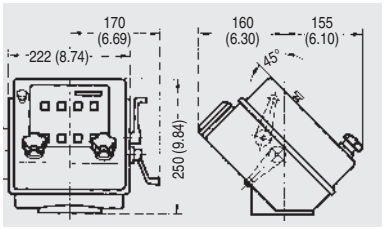
Order No.

4-digit preset register; 4-digit resettable drum-type counter and 7-digit non-resettable totalizer

Drum-type counter and totalizer run synchronously. One desiccant cartridge is included in delivery.

Permissible operating temperature max. 60 °C (140 °F), scale inclined at 45°, mounting with axis of mechanism vertical

- **Type 30**: Without accessories (order accessories of choice with separate Order No. acc. to page 4/392), weight appr. 10 kg (22 lb) — F) **7MV1030-**■■
- **Type 54**: With electrical switch (explosion-proof) (see page4/392), weight approx. 10.6 kg (23.4 lb) — F) **7MV1054-**■■



Preset register			Totalizer		
Value per revolution of fastest drum	Adjustment step	Largest setting quantity	Value per revolution of fastest drum	End value	
1 l	0.1 : 0.1 l	999.9 l	1 l	999.999 l	**1 A**
10 l	1 : 1 l	9.999 l	10 l	9.999.999 l	**2 A**
100 l	10 : 10 l	99.990 l	100 l	99.999.990 l	**3 A**
1 m^3	100 : 100 l	999 m^3	1 m^3	999.999.9 m^3	**4 A**

Notes:

The stated mounting position relates to the connecting line from register or quantity preset register to mechanism (axis of mechanism).

Step sheets can be supplied printed or unprinted and are easy to replace. Operator notices are available in various languages.

Should a register or quantity preset register be ordered together with an intermediate gear, then the value per revolution must be specified in plain text in order to obtain the correct decimal indication.

Ordering of spare parts

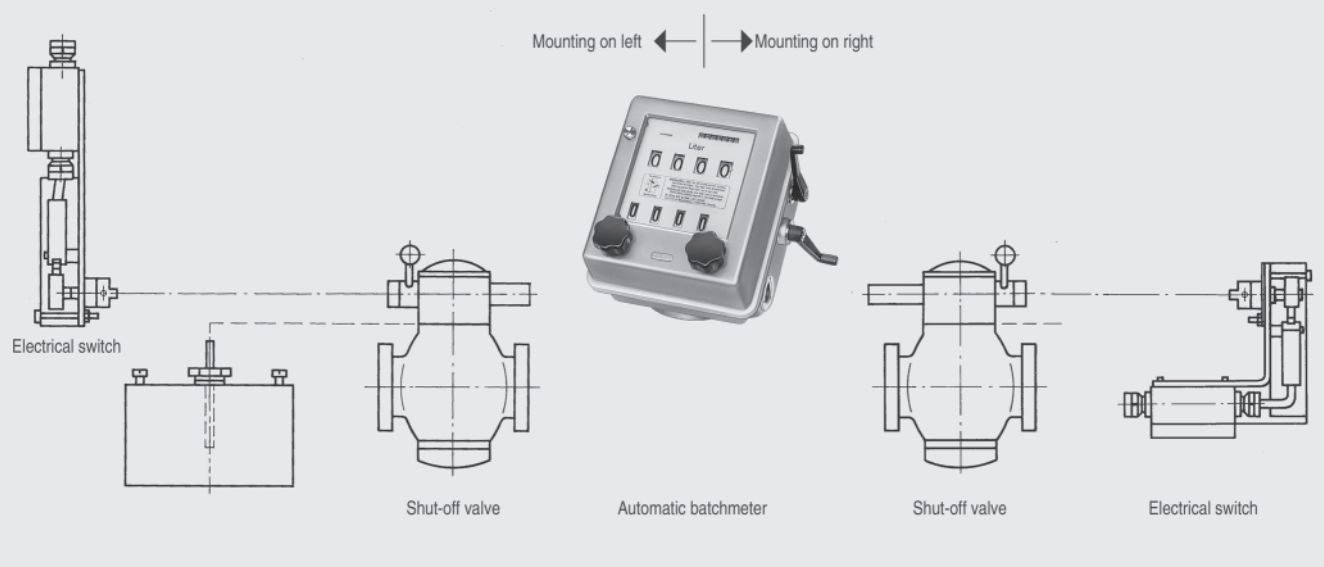
Should a register or quantity preset register be ordered separately, then a separate intermediate gear (see page 4/398) should be ordered with it. This intermediate gear is to be selected in accordance with the existing meter mechanism size and the desired value per revolution.

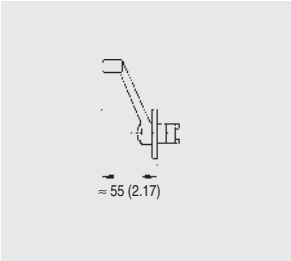
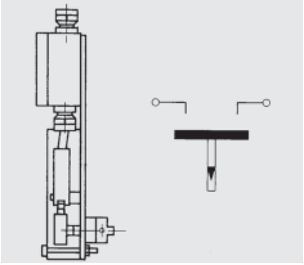
Accessories	Order No.	
Instruction Manual	German	English
Pointer dials		
• 7MV1001- ...	F) **C73000-B5100-C8**	F) **C73000-B5176-C8**
• 7MV101. -...	F) **C73000-B5100-C16**	F) **C73000-B5176-C16**
Quantity preset register		
• 7MV1030-... and 7MV1054-...	F) **C73000-B5100-C6**	F) **C73000-B5176-C6**

F) Subject to export regulations AL: 9I999, ECCN: N.

4

Accessory devices for quantity preset registers with mechanical shut-off valve (automatic batchmeter)



Selection and Ordering data		Order No.
Hand lever		F) **C70428-A17-B160**
	To initiate the filling process, the control shaft of the quantity preset counter must be turned to the initial position with the hand lever, while the shut-off valve is opened through a control unit. The hand lever is mounted on the right. The hand lever is not required if the quantity preset counter is equipped with a pneumatic multi-stage switch or a mechanical shut-off valve (automatic batchmeter).	
Electrical switch (explosion-protected)		
	Degree of protection Contact Switching voltage Switching current Electrical connection Ambient temperature	EC-Type Examination Certificate PTB 00 ATEX 1093X EEx 2G EEx d IIC One normally-open contact Max. 380 V AC Max. 6 A Screwed gland Pg 16 Max. 60 °C (140 °F)
	Mounting	On the left F) **C74315-A19-A21** On the right F) **C74315-A19-A22**

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters
Electric flow register SITRANS F RA110

Overview

Application

The display of the electric flow register is a universal LCD for converting the measured value and displaying the current value, total value and accumulated total. Depending on the design, the flow register can be provided with a scaleable pulse output for the total value and/or a current output of 0/4 to 20 mA.

Design

The electric flow register is fitted with a large, extremely clear LCD (90 x 40 mm in size), where the flow and total value are displayed with seven 17 mm digits and 8 mm digits respectively. Units, time units, flow trend and device status are displayed in addition.

The electronics is fitted in a rugged aluminium housing (IP67) with three large keys. The alphanumeric menu structure in English or German permits simple configuring and can be used for many applications.

Models 61, 63 and 65 are supplied with the electric flow register already mounted on the pulser.

Function

The flow register of the SITRANS F RA110 receives, e.g. from a pulser, information on the current flow. This information is converted into the flow per second, minute, hour or day using a programmable 7-digit K-factor. Conversion is also carried out for the total values and accumulated totals. The units for the flow and accumulated total are completely independent.

The total value can be reset by pressing the "CLEAR" key twice. The accumulated total cannot be reset and is displayed with 11 digits.

The standard configuration displays the total value (17 mm digits) and the flow (8 mm digits) simultaneously. It is also possible to output the current value on the 17 mm digits. In this case, the total value is displayed by pressing "SELECT". The electric register has inputs for Namur sensors. Connection is possible to practically every available sensor system.

The active and passive 0/4 to 20 mA analog output has a resolution of 12 bits and can be connected to a load of 750 Ω.

The pulse output can be exactly defined, e.g. to generate one pulse per 3.5 liters. The pulse lengths can be set to 1 to 9999 ms. The maximum output frequency is limited to 500 Hz. The transistor can switch max. 50 V DC/ 300 mA.

All configuration parameters are saved in an EEPROM. The total value and the accumulated total are saved once a minute, so that only a minimum amount of information is lost in the event of a power failure.

The SITRANS F RA110 can be ordered with powerful LED background lighting for use under unfavorable viewing conditions.

The menu language of the displays can be set to German or English.

Technical specifications

Input	
Pulse input	NAMUR signal
Frequency	NAMUR: 0 ... 500 Hz
Sensor supply	8.2 V or 24 V DC
Output	
Pulse output	Max. frequency 500 Hz, pulse width 1 ... 9999 ms adjustable. Type: Transistor output, max. load 24 V DC/170 mA (active) and 50 V DC/300 mA (passive)
Analog output	Range 0/4 ... 20 mA, accuracy: < ± 0.1%, resolution 12 bit, response time (10 ... 90%): 100 ms, load max. 750 Ω, active or passive, function: flow 0/4 ... 20 mA freely adjustable
Functionality	
Operator	The total value and flow are displayed. The total value is deleted by double-pressing the "CLEAR" key. The total value and the accumulated total are displayed by pressing the "SELECT" key.
Total value	17 mm (0.67 inch) high, 7 digits, max. 3 decimal places; the total value can not be deleted. Units: l, m^3, gal, USg, kg, lb, bbl or none K-factor: 7-digit 0.000010 to 9,999,999 Settings independent of flow
Accumulated total	8 mm high (0.31 inch), max. 11 digits, max. 3 decimal places, the accumulated total cannot be reset
Flow rate	8 mm (0.31 inch) or 17 mm (0.65 inch) high, max. 7 digits, max. 3 decimal places Units: ml, l, m^3, mg, g, kg, ton, Nl, Nm^3, scf, ref, cf, lb, bbl, gal or none Time units: second, minute, hour, day
Rated conditions	
Operating temperature	-40 ... +80 °C (-40 ... +176 °F)
Degree of protection	IP67 (NEMA 4)
Design	
Material	Housing: aluminium, UV-resistant powder coating Window: Polycarbonate Gasket material: Silicone
Dimensions	See dimensional drawings
Power supply	
Power supply with	24 V AC/DC ± 10% or 115/230 V AC ± 10%
Certificate and approvals	
Ex protection	EEx ia IIB/IIC T4
For official calibration inspections	In preparation

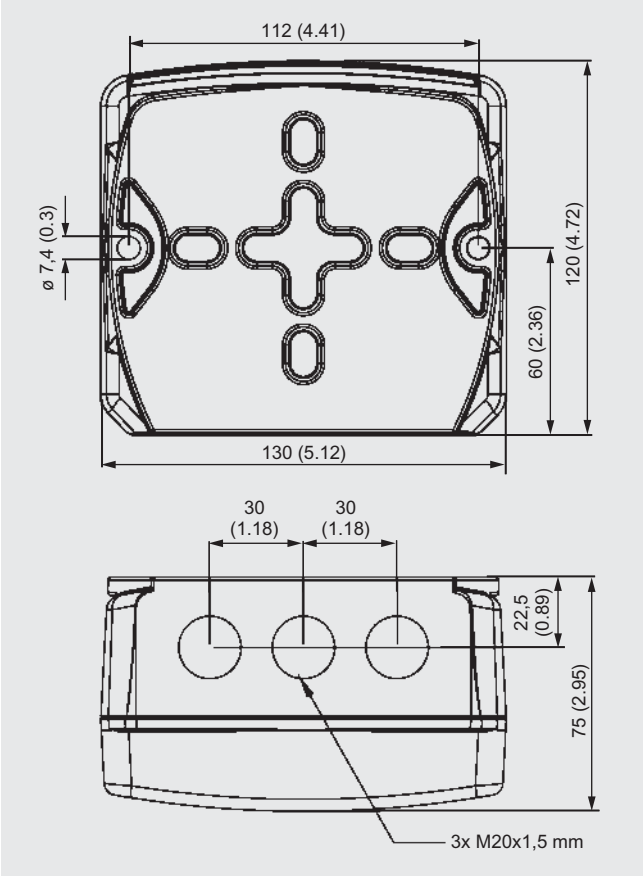
Rotary-piston meters
Electric flow register SITRANS F RA110

Selection and Ordering data		Order No.
Electric flow register SITRANS F RA110	F)	**7MV1070-**
Electric register in aluminium housing for display of flow and total quantity, 7-digit LCD, IP67 (NEMA 4), without explosion protection, menu language German/English		■■■■ - ■■ **A 0**
Signal input		
NAMUR signal		**1**
Power supply		
Incl. sensor supply 8.2 V DC		
24 V AC/DC[1]		**A**
230 V AC[1]		**B**
16 ... 30 V DC[2]		**C**
Function (output)		
Display of flow and total value		**A 0**
Additonal active pulse output[1]		**B 1**
Additonal passive pulse output		**B 2**
Additonal active pulse output and current output [1]		**C 1**
Additonal passive pulse output and current output		**C 2**
Installation		
For wall mounting		**0**
Explosion protection		
without		**0**
EEx ia IIB/IIC T4 up to max. 100 °C		**1**
LED background lighting		
without		**A**
with background lighting		**B**

1) Not for ATEX version
2) For ATEX version only

Note:
Cable glands for M20 are not included in delivery.

Dimensional drawings

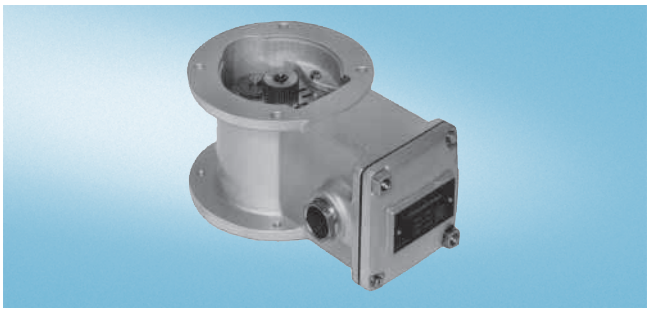


Electric flow register SITRANS F RA110, dimensions in mm (inch)

F) Subject to export regulations AL: 9I999, ECCN: N.

Overview

Accessory modules



Pulser with inductive pick-up

- For quantity measurements in conjunction with electromechanical and electronic pulse counters
- As transmitter with output signal for further electronic processing
- As transmitter for measuring points in potentially explosive atmospheres

Intermediate gear[1] and protective cover

Is employed if, for example: Several accessories with different values per revolution are driven by one mechanism.

The protective cover is used to cover the pulser if no register is employed.

[1] always required with mechanical displays

Cooling attachment

- For preventing heat transfer from the metering mechanism to the dial mechanism or pulser

No diagram

Extension shafts

- For shut-off valves

Rotary-piston meters - Accessory modules
Pulser with inductive pick-up

Overview

Pulser with inductive pick-up

The pulser is used for quantity metering in conjunction with electromechanical pulse counters as a transmitter with output signals for electronic data processing.

Using the pulser, quantity measurements from volumetric meters can be converted into electrical pulses for remote transmission.

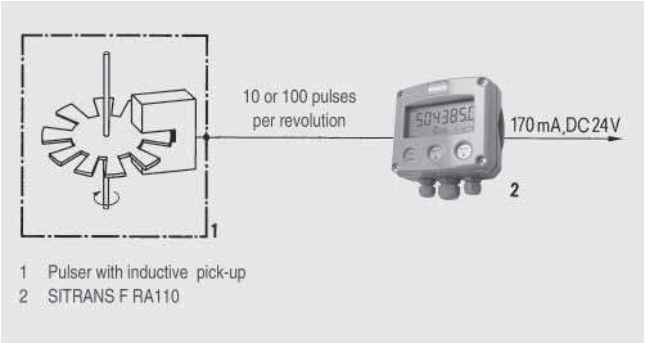
Design

- Electronic design
- High pulse frequency (≤ 3000 Hz)
- Electronic output
  - 170 mA, 24 V DC (delivering current) for electromechanical pulse counters
  - 2 mA, 24 V DC (absorbing current) for electronic processing

Function

Pulse valence with quantity measurements

Conversion of metered quantities into electrical pulses



Measuring system for remote metering and digital data processing

The metering shaft of the volumetric meter drives a pulse disk. The vanes of the pulse disk successively enter the air gap of an inductive pick-up, thus changing the coupling between two coils. This causes a change in resistance that is converted into a pulse by the subsequent pulse amplifier, which also powers the pick-up.

The pulser operates without contacts. No measurable force is exerted on the disk. Hence the system is free from feed-backs.

Depending on the design, 10 or 100 pulses are produced for each revolution of the drive. The pulse amplifier amplifies the incoming pulses. A timing circuit prevents a continuous output pulse.

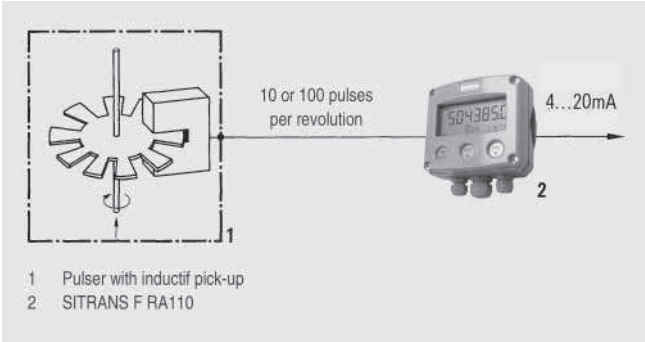
The quantitative value associated with one pulse depends on the value per revolution of the drive (pulses per liter or gallon) or on the respective volume of the measuring chamber of the drive.

The selection of the pulser – whether 10 or 100 pulses per drive revolution – is to be made according to the desired resolution.

Pulsers with two inductive pick-ups are available for systems for custody transfer since at present the PTB regulations specify a duplicated transmission system with pulse comparison.

Pulse valence with flow rate measurements

Conversion of metered quantities into electrical pulses



Measuring system for flow-rate measurement

During flow measurements, the change in resistance is converted to pulses by SITRANS F RA110. Each pulse corresponds to a given quantity of metered liquid. The number of pulses per unit in time (the frequency) is a measure of the flow rate.

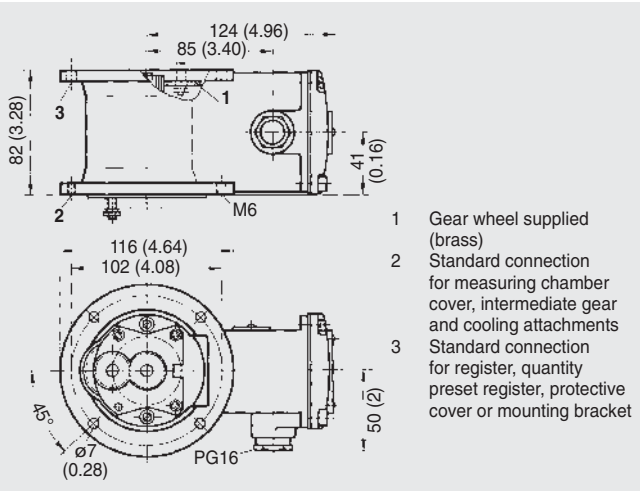
SITRANS F RA110 converts the incoming NAMUR signals into load-independent direct current.

The electric pulser is available for 10 or 100 pulses per revolution. The choice depends on the smallest flow rate still to be indicated.

Technical specifications

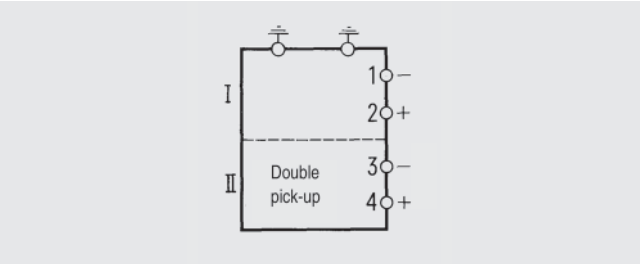
Slot initiator	Sensor SJ 3,5 -N-K37
Power supply (from pulse amplifier)	8 V DC, R_i approx. 1 kΩ (DIN 19234) C_i = 40 nF; L_i = 160 µH
Change in current consumption on pulse	≤ 1 mA/ ≤ 3 mA (DIN 19234)
Permissible line impedance between pick-up and amplifier	≤ 50 Ω (DIN 19234)
Number of pulses per revolution of the drive	10 or 100
Phase position of the channels of the double pick-up	180° : 180° ± 30° Electrically offset 90° ± 30°
Duty factor	1 : 1 ± 17%
Max. pulse frequency	3000 Hz
Pulse valence	Dependent on value per revolution of the drive of the respective meter
Permissible ambient temperature	-25 ... +100 °C (-13 ... +212 °F)
Degree of protection	IP43 to EN 60529 with register
	P65 to EN 60529 with protective cover
	This pulser has the EC-Type Examination Certificate PTB 99 ATEX 2219X.
Mounting position	Any
Weight approx.	1.2 kg (2.65 lb)

Dimensional drawings



Pulser with inductive pick-up, dimension in mm (inch)

Schematics



Pulser with inductive pick-up, connection diagram for clockwise rotation; pick-up I to terminals 3 and 4 for counter-clockwise rotation

Selection and Ordering data

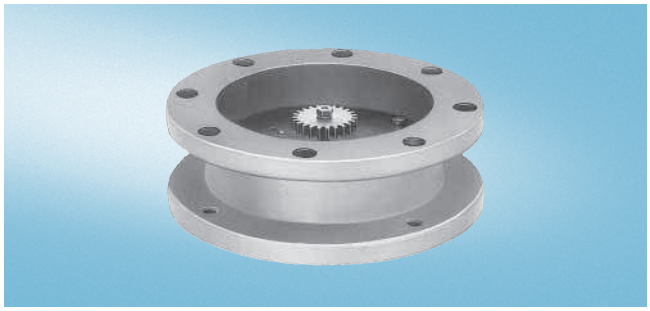
	Order No.
Pulser with inductive pick-up	
Weight approx. 1.2 kg (2.65 lb)	
Single pick-up	
• 10 pulses/revolution	F) **7MV1105-1AA00**
• 100 pulses/revolution	F) **7MV1105-2AA00**
Double pick-up [1]	
(for custody transfer installations)	
• 10 pulses/revolution	F) **7MV1105-3AA01**
• 100 pulses/revolution	F) **7MV1105-4AA01**
Instruction Manual	
German/English	F) **C73000-B5174-C25**

1) Pulse channels electrically offset by 90°

F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters - Accessory modules Intermediate gear and protective cover

Overview



Intermediate gear

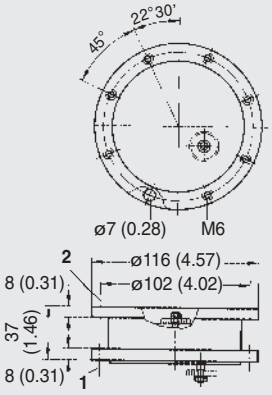
The capacity of the measuring chamber, which differs according to the meter size, can be adapted to the decimal values per revolution using the intermediate gear. The intermediate gear is included in the delivery of the meter mechanism.

The intermediate gear is also suitable for the installation of other ratios, e.g. factor X : 1, kg indication, etc.

Separate ordering is necessary

- if a register is ordered as a spare part or
- if accessories (pulsers) are subsequently ordered to extend the system and the meter mechanism does not yet have a separate modular intermediate gear.

Dimensional drawings

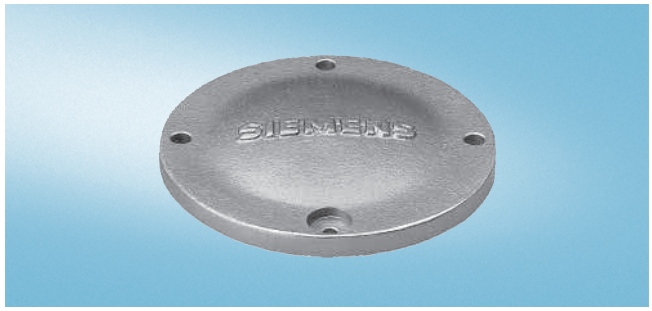


1 Standard connection for measuring chamber cover
2 Standard connection for pulser, cooling attachment, register or quantity preset register

Intermediate gear, dimensions in mm (inch)

Selection and Ordering data			Order No.
Intermediate gear for rotary-piston meter			
Weight approx. 0.6 kg (1.32 lb)			
Power supply	Value per revolution (output drive intermediate gear)		
DN 15 (½")	1 l (0.26 USg)	F)	**7MV1211-1B**
DN 25 (1")	1 l (0.26 USg)	F)	**7MV1211-2B**
	10 l (2.6 USg)	F)	**7MV1211-3B**
DN 50 (2")	10 l (2.6 USg)	F)	**7MV1211-4B**
	100 l/0.1 m³ (26.4 USg)	F)	**7MV1211-5B**
DN 80 (3")	100 l/0.1 m³ (26.4 USg)	F)	**7MV1211-6B**
	1 m³ (264 USg)	F)	**7MV1211-7B**

Overview



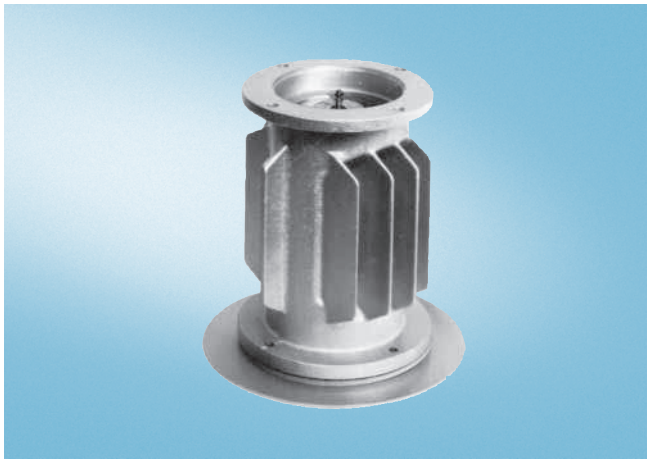
Protective cover for pulser without register

The protective cover can be used to cover a pulser when no register is used.

Selection and Ordering data		Order No.
Protective cover	F)	**C70401-A26-C18**

F) Subject to export regulations AL: 9I999, ECCN: N.

Overview



Cooling attachment

When liquids are metered at high temperatures, the transmission of heat from the meter mechanism to the register or accessory can be reduced by the cooling attachment and thus the operating temperature of these units can be kept within the permissible limits.

The housing is comprised of cast light alloy with cooling fins. The lower flange is equipped with a projecting disk for protection against radiant heat.

If an existing meter has to be modified at a later date, the replaceable gearwheel of the meter mechanism must be replaced by the coupling disk supplied and mounted at the top of the shaft of the insulation attachment.

Technical specifications

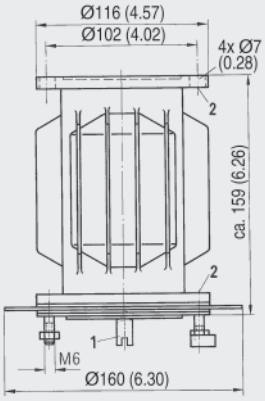
Attached accessory or register	Max. permissible liquid temperature Cooling attachment		
	Without	1	2
Pulser with inductive pick-up, all registers except type 01	80 °C (176 °F)	180 °C (356 °F)	300 °C (572 °F)
Single-pointer dial type 01	90 °C (194 °F)	250 °C (482 °F)	300 °C (572 °F)

The above limits only apply if the meter mechanism is insulated (lagged) for liquid temperatures ≥ 150 °C (302 °F) (this applies to an ambient temperature up to 40 °C (104 °F).

Weight approx. 1.3 kg (2.9 lb)

Selection and Ordering data		Order No.
Cooling attachment	F)	**7MV3001-1XX00**

Dimensional drawings



Cooling attachment, dimensions in mm (inch)

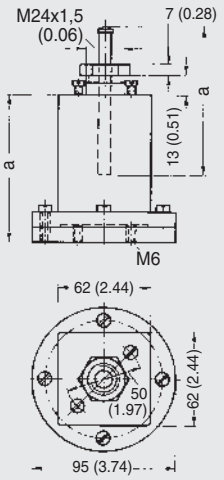
F) Subject to export regulations AL: 9I999, ECCN: N.

Rotary-piston meters - Accessory modules
Extension shaft for shut-off valves

Overview

For extending the actuator linkage of the mechanical shut-off valve on the automatic batchmeter, which is directly connected to the quantity preset register. The extension is always needed when accessories such as a cooling attachment or pulser are installed between the quantity preset register and the metering mechanism.

Dimensional drawings



Extension for mechanical shut-off valve DN 25 (1“) and DN 50 (2“), dimensions in mm (inch)

Selection and Ordering data		Order No.
Extension for shut-off valve		
DN 25 (1“) and DN 50 (2“)		
Overall height „a“ in mm (inch)	Weight approx. in kg (lb)	
• 82 (3.2)	1.0 (2.2)	F) **C70144-A336-A35**
• 159 (6.3)	1.4 (3.1)	F) **C70144-A336-A37**

F) Subject to export regulations AL: 9I999, ECCN: N.