

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

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Overview



The SITRANS F M 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 (392 °F)
- Hose proof IP67/NEMA 4X enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M 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 terminal box
- ATEX 2G D version
- FM Class I, Div 2

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which 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 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, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

Technical specifications

Version	MAG 1100	MAG 1100 HT (High temperature)
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	DN 2 ... 65 (1/12" ... 2½"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz	DN 15 ... 50 (½" ... 2"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 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		
<u>Ambient conditions</u>		
Ambient temperature		
• Standard sensor	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)
• Ex sensor	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
• Compact with transmitter MAG 5000/6000	-20 ... +60 °C (-4 ... +140 °F)	
• Compact with transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	
• Compact with transmitter MAG 6000 I Ex	-20 ... +60 °C (-4 ... 140 °F)	
<u>Temperature of medium</u>		
• MAG 1100 (Ceramic)	-20 ... +150 °C (-4 ... +302 °F)	-20 ... +200 °C (-4 ... +392 °F)
• MAG 1100 Ex (Ceramic)	-20 ... +150 °C (-4 ... +302 °F)	-20 ... +180 °C (-4 ... +356 °F)
• MAG 1100 (PFA)	-30 ... +130 °C (-22 ... +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
<u>Temperature shock</u>		
• 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 ≤ 144 °F/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1½", 2", 2½"): Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4"): Max. ΔT ≤ 108 °F/min)	• DN 15, 25: Max. ΔT ≤ 80 °C/min (½", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1½", 2": Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 108 °F/min)
• MAG 1100 (PFA)	Max. ± 100 °C (212 °F) momentarily	
<u>Operating pressure</u>		
• 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}) DN 80 ... DN 100: CO ₂ pressure max. 7 bar (101.5 psi)	
<u>Mechanical load (vibration)</u>		
	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 g RMS • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS • 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 g RMS
<u>Enclosure rating (standard)</u>	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min
EMC	2014/30/EU	2014/30/EU

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Version	MAG 1100	MAG 1100 HT (High temperature)
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 (not for Ex)	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. 302 °F, 600 psi))	Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))
- Option	• Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi)) • PTFE (max. 130 °C, PN 25 (max. 266 °F, 300 psi))	
• Pipe connection adapters: DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8")	• Stainless steel, AISI 316/1.4436 • Hastelloy C22/2.4602 • PVDF	
Liner		
• MAG 1100 (Ceramic)	• DN 2, 3 (1/12", 1/8"): Zirconium oxide (ZrO ₂) (ceramic) • DN 6 ... 100 (1/4" ... 4"): Aluminum oxide Al ₂ O ₃	DN 15 ... 100 (1/2" ... 4"): Aluminum oxide Al ₂ O ₃
• MAG 1100 (PFA)	Reinforced PFA (not for Ex)	
Electrodes		
• MAG 1100 (Ceramic)	• DN10 ... 100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy • DN 2 ... 6 (1/12" ... 1/4"): Platinum	Platinum with gold / Titanium brazing alloy
• MAG 1100 (PFA)	• DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276/2.4819 • DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602	
Cable entries	• Remote installation 2 x M20 or 2 x 1/2" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT - MAG 6000 I: 2 x M25 (for supply/output) - MAG 6000 I Ex: 2 x M25 (for supply/output)	Remote installation 2 x M20 or 2 x 1/2" NPT
Certificates and approvals		
Calibration		
• Standard production calibration	Zero-point, 2 x 25 %, 2 x 90 %	Zero-point, 2 x 25 %, 2 x 90 %
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point	
Hazardous areas		
• MAG 1100 F (Ceramic)		
- Ex sensor in compact or remote version with MAG 6000 I Ex	ATEX, EAC Ex - Zone 1 Ex d e ia IIB T6 Gb ATEX - Zone 21 Ex tD A21 IP67	ATEX, EAC Ex - Zone 1 Ex d e ia IIB T6 Gb ATEX - Zone 21 Ex tD A21 IP67
- Standard sensor in compact or remote version with MAG 5000/6000/6000 I	FM - NI Class I Div. 2 Groups A, B, C, D	FM - NI Class I Div. 2 Groups A, B, C, D
• MAG 1100 F (PFA)		
- Standard sensor in compact or remote version with MAG 5000/6000/6000 I	FM - NI Class I Div. 2 Groups A, B, C, D	
Hygienic		
• MAG 1100 F (Ceramic)	3A (remote version with Polyamide terminal box)	
• MAG 1100 F (PFA)	3A (remote version with Polyamide terminal box) EHEDG (remote version with Polyamide terminal box, DN 25 ... 100/1 ... 4") Hygienic EC 1935:2004 European food contact material	
Pressure Equipment	PED - 2014/68/EU CRN (only PFA)	PED - 2014/68/EU
Others	EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)	EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)

For technical specification for transmitter - see transmitter pages.

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 EPDM gaskets included	7ME6110-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	A0-
Diameter	
DN 2 (1/12")	1 D
DN 3 (1/8")	1 H
DN 6 (1/4")	1 M
DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
Liner material	
PFA - DN 10 ... 100 (3/8" ... 4")	1
Ceramic	2
Electrode material	
Hastelloy C (only with PFA liner)	1
Platinum (only with ceramic liner)	2
Transmitter	
Standard sensor for remote transmitter (order transmitter separately)	A
Ex sensor for remote transmitter (order transmitter separately)	B
MAG 6000 I, Aluminum 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex	D
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex	E
MAG 6000 Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamide terminal box or MAG 6000 I compact	1
1/2" NPT: Polyamide terminal box or MAG 6000 I compact	2
Metric: Stainless steel terminal box	3
1/2" NPT: Stainless steel terminal box	4

¹⁾ Quick ship only in combination with Ceramic liner

Selection and Ordering data	Order code
Additional information	
Please add "-Z-" to Article No. and specify Order code(s) and plain text.	
Certificates	
• Material certificate according to EN 10204-3.1	C12
• Factory certificate according to EN 10204-2.2	C14
• Factory certificate according to EN 10204-2.1	C15
Special calibration	
• 5-point calibration ¹⁾	D01
• 10-point calibration ²⁾	D06
• Default (2 x 25 % and 2 x 90 %) matched-pair calibration	D11
• 5-point, matched-pair calibration ¹⁾	D15
• 10-point, matched-pair calibration ²⁾	D18
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• KCC label (South Korea)	W28
Tag name plate, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain text)	Y99
Additional calibrations	
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request ³⁾
• Customer-specified calibration up to 10 points	On request ³⁾
• Customer-witnessed calibration	On request ³⁾
Any of above calibration	
¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max}	
³⁾ Product Variation Request (PVR)	

Operating instructions for SITRANS F M MAG 1100

Description	Article No.
• English	A5E02435647

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.
Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220

