MAG 3100

Overview

The SITRANS F M 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 SITRANS F M in-situ verification using the 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
- 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 CSA/FM versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Approvals for PTB, OIML R 75 and OIML R 117
- 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, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and 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)

MAG 3100

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 (≤ 12"): 0.3 ... 50 bar (4 ... 725 psi) - 350 ≤ DN ≤ 600 (14" ≤ DN ≤ 24"): 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 25 ... 100 (1" … 4"): Vacuum ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" … 12") (130/180 °C (266 °F/356°F)): 0.3/0.6 ... 50 bar (4/8 ... 725 psi) (180 °C (356 °F) PTFE has factory mounted grounding SS rings type E & SS terminal box) • PFA - DN 25 ... 100 (1" … 4"): Vacuum ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" … 12") : 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 15 ... 100 (1" … 4"): Vacuum ... 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 (-4 °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

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.