



Fig 1 Electromagnetic flow sensor *mag-flux S* with inductive transmitter *mag-flux M1*

Application domain

These electromagnetic flow sensors (MID) are suitable for measuring standard applications.

The special design of this electromagnetic flowmeter (MID) is in particular of his extremely robust and compact but light-weight construction used to built-in plastic pipes without reinforcement. Integrated earthing rings guarantee best measuring results and ensure also a safe connection built-in in steel pipes.

The main applications of the flow sensor *mag-flux S* can be found in the following fields:

- Water and sewage plants
- Food- and beverage industry
- Steel industry

The *mag-flux M1* is a microprocessor controlled and programmable transmitter with pulsed constant field. It is designed for flow velocities up to 10 m/s.

The device can be used to perform measurements with any liquid with a minimum conductivity of 3 $\mu\text{S}/\text{cm}$., providing that the sensor's material is suitable for the fluid.

Special features

Sensor (MID)

- Extremely compact and light weighted design
- Suitable for installation in plastic or steel pipes
- Sensor firmly connected to stainless steel rings
- No other earthing required
- No movable parts

Special features (continued)

Transmitter

- High-speed signal processing by 16-bit microcontroller
- Easy navigation with a two-line display (Option)
- Self-monitoring system
- Analog output (0/4-20 mA) and digital outputs (pulse, device status, limit, frequency)
- Internal simulation for all output values
- multilingual menus

Connection and system design

The flange-less sensor is firmly screwed between flange connections. The following table shows the suitable installations for the respective nominal diameters.

DIN 2501 (BS 4504)

PN	65	80	100
6	x	x	x
10	x	x	x
16	x	x	x
25	x	x	x
40	x	x	x

ANSI B16.5

	2½"	3"	4"
150	x	x	x
300	x	x	x

The metering system consists of a transmitter *mag-flux M1* and a connected sensor *mag-flux S*.series with pulsed constant field.

Operating principle

According to Faraday's law of electromagnetic induction, an electrical voltage is generated by the sensor which is proportional to the velocity of the liquid inside the measuring tube.

This voltage is gained and processed by the *mag-flux M1* and transduced into analog and digital outputs.

A control unit is available as an additional option which provides a local display and the opportunity to customize the transmitter's configuration.

The *mag-flux M1* is prepared for HART® communication. An appropriate version is available on request.

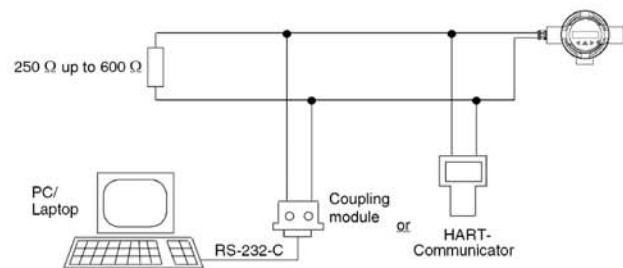


Fig 2 Electrical connection for HART® communication, schematic diagram

Electromagnetic flow Sensor *mag-flux S (compact version)*

Application note

- The magnetic-inductive metering system is entirely suitable for the measurement of volume flow rates of conductive liquids.
- Before replacing a device ensure that the meter is pressureless and free from hazardous media.
- The operation of the device is only valid within the temperature range specified on the rating plate.
- The limits for the electrical connections of the transmitter are specified on the rating plate and have to be observed strictly.
- The transmitter is compliant with the EMC Directive 89/336/EEC und low-voltage Directive 73/23/EWG.
- The *mag-flux* M1 is designed for mainly stationary applications.
- Improper installation and use of the transmitter (metering system) could cause a loss of warranty.
- The sensor must not be affected by external loads
- The units are designed for predominantly recumbent load.
- The flowmeter complies with the requirements of the Pressure Equipment Directive 97/23/EC, article 3, paragraph 3. The most hazardous permissible media are the fluids defined in group 1.
- Provide a touch guard for surface temperatures of > 70°C. This touch guard must be designed in a way that the max. allowable ambient temperature on the unit is not exceeded.

Technical Data

Mode of operation and design

Measuring principle	magnetic inductive with pulsed constant field (PDC)
Magnetic field excitation	Internal clock with DC supply 1,56 Hz / 3,125 Hz / 6,25 Hz / 12,5 Hz / 25 Hz

Outputs

Electrical isolation	outputs electrically isolated from each other and from the power supply
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Current output

- Signal
 - Signal range 0 ... 20 mA / 4 ... 20 mA, selectable
 - Failure signal > 22 mA oder < 3,8 mA, can be switched
- Load
 - Output < 600 Ω
 - for HART communication ≥ 250 Ω

Communication via analog output with PC coupling module or HART Communicator HART, version 7.0

Protocol

Digital output

- Signal
 - Design Optocoupler, passive
 - Rated values max. 1,8W, max. 30 V, 60 mA

Output configuration

- Pulse
 - Significance ≤ 1000 pulses/s
 - Pulse width ≥ 0,1 ms (max. 2s), selectable
- Frequency
 - Signal range 0 ... 1 kHz

Digital output 2

- Signal
 - Design Optocoupler, passive
 - Rated values max. 1,8W, max. 30 V, 60 mA
- Output configuration Status output: forward flow, reverse Flow, MIN, MAX, Alarm (selectable)

Measuring accuracy (under reference conditions)

Pulse output	± 0,5 % of measured value 0,25 m/s to 10 m/s ±0,05 % per 10 K
Current output	± 0,5 % of measured value 0,25 m/s to 10 m/s ±0,1 % per 10 K
Reproducibility	± 0,15 % of measured value 0,25 m/s to 10 m/s

Operating conditions

Mounting position	vertical or horizontal
permissible ambient temperature	-15°C - 50°C / 5 - 122 °F
permissible operating temperature	-15°C - 60°C / 5 - 140°F Processtemp.: max. 60 °C (104 °F)
Control unit (<i>mag-flux</i> M1)	0 ... +50 °C (32 ... 122 °F)

Pressure/temperature limits with PVC- connection (DIN 8062)	Temperature		Max. pressure	
	°C	°F	Bar	Psi
	10	50	18	261
	20	68	16	232
	30	86	13	189
	40	104	10	145
	50	122	6	87
	60	140	4	58

Pressure/temperature limits with PVDF- connection (DIN 8062)	Temperature		max. pressure	
	°C	°F	Bar	Psi
	10	50	18	261
	20	68	16	232
	30	86	13	189
	40	104	11	160
	50	122	9	80
	60	140	8	65

Protection class IP 67 (NEMA 4x) / optionally IP 68 (NEMA 6)

Electromagnetic compatibility (EMC)

- Emitted interference acc. to EN 61000-6-3:2001 (for use in home and industry)
- Noise immunity acc. to EN 61000-6-2:1999 (for use in industry)
NAMUR NE21 (Ver. 10.02.2004)

Control unit (Option)

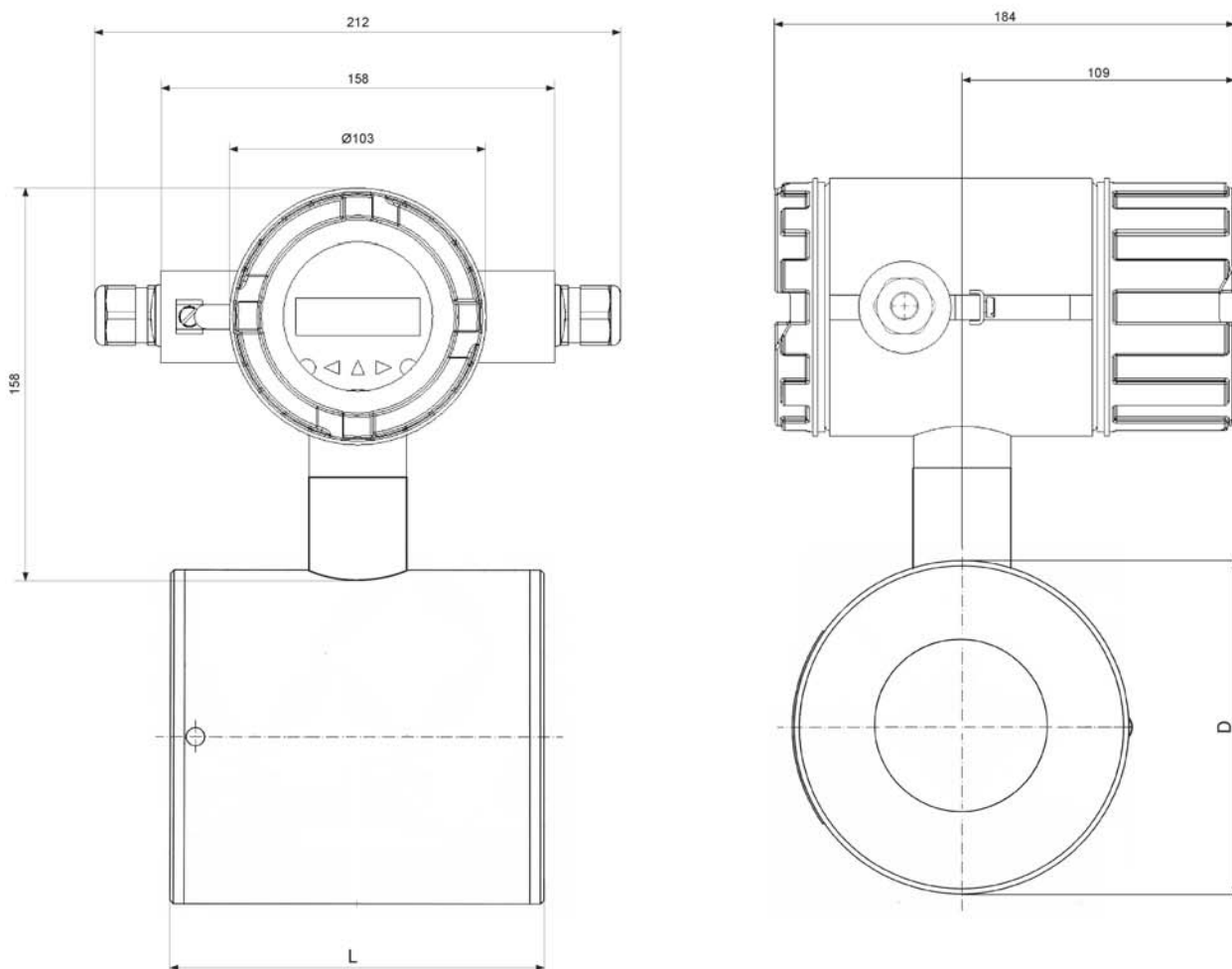
Display (general)	LCD, background illumination two rows of 16 characters
Multi-display for ...	flow, volume, flow velocity
Key pad	6 keys for input

Power supply

as specified on the rating plate

- AC voltage 230 V, ±10 %, 50/60 Hz
115 V, ±10 %, 50/60 Hz
- DC voltage 24 V, ±15 %
- Power consumption approx. 10 VA
- Mains fuse
 - AC voltage 100 mA (T)
 - DC voltage 1 A (T)

Dimensions



<i>DN</i>	65	80	100
<i>L</i>	150		
<i>D</i>	114,3	127	146

Electromagnetic flow Sensor *mag-flux S* (compact version)

Order code

Electromagnetic flow Sensor *mag-flux S*

MAG5410-**█****█****█****█** A 0-0 A 0

Metering tube materials and nominal diameters		
• Metering tube made of PVC, DN 65 / ANSI 2 1/2	1 K	↑
• Metering tube made of PVC, DN 80 / ANSI 3	1 L	
• Metering tube made of PVC, DN 100 / ANSI 4	1 M	
• Metering tube made of PVDF, DN 65 / ANSI 2 1/2	2 K	↑
• Metering tube made of PVDF, DN 80 / ANSI 3	2 L	
• Metering tube made of PVDF, DN 100 / ANSI 4	2 M	
Materials metering tube connection		
• mat.No. 1.4305	1	↑
• other materials	9	
Degree of protection		
• IP 67 / NEMA 5		B
• IP 68 / NEMA 6		C
Further designs:		
• TAG plate inscription in english		B11
• with 3- point calibration certificate		B06
• with 6- point calibration certificate		B07
• Silicone-free materials		Y04
• TAG plate stainless steel		Y17

Magnetic inductive transmitter *mag-flux M1*

MAG5040-**█****█****█****█** 0-2 A A 0

Power supply		
• AC 230 V, 50/60 Hz	1	↑
• AC 115 V, 50/60 Hz	2	
• DC 18-36 V	3	
Output / communication		
• 4 - 20 mA	A	↑
• 4 - 20 mA with HART protocol	B	
Operator display and keypad		
• without	A	↑
• with	B	
Cable glands		
• M20/M16 x 1.5	1	↑
• 1/2" - 14 NPT	2	
Other models		
• Rating plate in English		B 1 1
• Measuring range, specify in plain text		Y 0 1
• Silicone-free materials		Y 0 4
• Measuring-point number		Y 1 5
• Measuring-point description		Y 1 6
• Stainless steel tag plate		Y 1 7



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