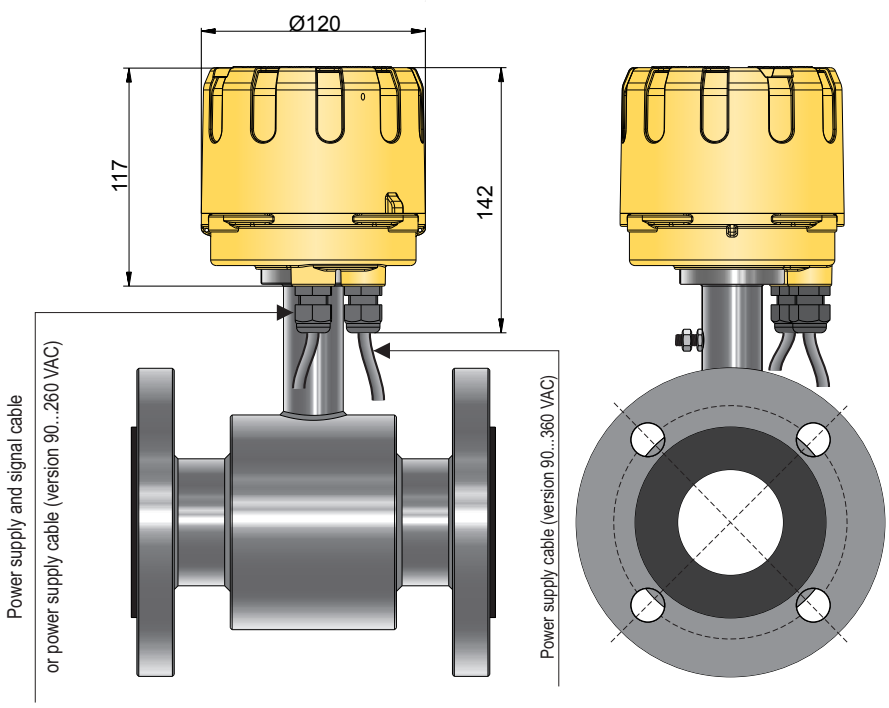
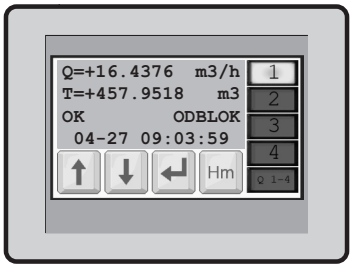
Electromagnetic flowmeter type PEM-500

- ✓ **Nominal size: DN 10...300 (ANSI 0,5...12")**
- ✓ **Maximum static pressure 1,6 MPa, 2,5 MPa or 4 MPa**
- ✓ **Accuracy 0,5%**
- ✓ **Output signal 4 ÷ 20 mA, pulse output or frequecy output**
- ✓ **Communication interface Modbus RTU / RS485**
- ✓ **Version for installation without straight in/out sections**

New special version for installation without straight in/out sections





HMI panel for panel mounting

Optionally remote HMI panel is used to visualize metrological data and to configure electromagnetic flowmeters PEM-500 model, which is not equipped with a local display.
The HMI user has remote access to the connected flowmeter allowing:
- full access to the flow meter menu after logging in
- reading current flow rate and totalizer values
- viewing diagnostic and information screens.

HMI panel is avaliable also in case for wall mounting.

Application and construction

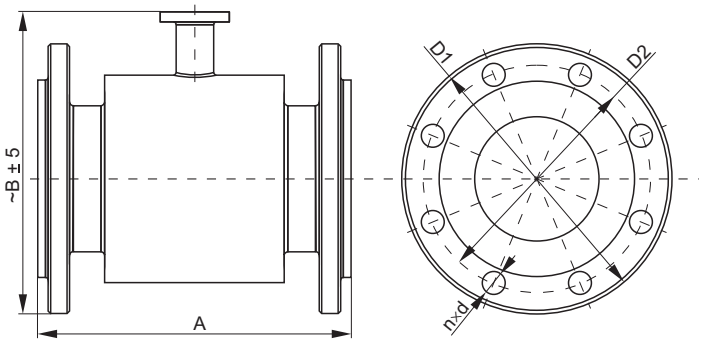
Electromagnetic flowmeter type PEM-500 is applicable to the measurement of flow of the liquids with minimum conductivity of 5ěS/cm. Device measures flow and volume of liquids in both directions of flow. For correct measurement pipe of sensor has to be fully filled by liquid.
Sensor doesn't have any mechanical parts inside flow tube which ensure undisturbed flow of medium. Flowmeter is able to measure flow of medium like pure liquids but also pastes and chemically aggressive liquids.
It's applicable is in water treatment facilities for flow measure of water and wastewater, chemical industry, food industry or heat plants. Compact construction with ingress protection rating IP68 (special version) allows to bury device underground.
Sensors and control unit of electromagnetic flowmeter PEM-500 can't be disconnected by user.
The casing of the control unit is made of aluminium alloy cast. User has no access to the electronic boards. Electrical connection of flowmeter is provided by the factory assembled cables. Wires in cables are marked by colours or numbers (detailed description available in table). Number of cable depends on version of power supply. Version with power supply 90…260 VAC is equipped with two separate cables – signal cable and power supply cable. Version with power supply 10…36 VDC is equipped with one signal-supply cable. In standard flowmeter is equipped with 3m long cables. Other cable length are available on request. As an option PEM-500 flowmeter can be delivered with junction box PP-PEM with ingress protection class IP67 with factory connected flowmeter's cable which allows users connecting cables to terminals.
Flowsensor tube have flanges (which allows to mount sensor in pipeline), inner electrodes and isolating pipe lining (both matched to measured medium). Electrodes in standard are made of stainless steel but as option user can choose other materials appropriate for chemical characteristic of measured medium.

Configuration and communication

Configuration and communication is handled by interface RS485 and Modbus RTU protocol. User can communicate with PEM-500 flowmeter by using PC computer with RS-485/USB converter and software RAPORT 2 or any other software which can refer to registers described in interface's documentation.
User have possibility of programing for example: empty pipe detection, low flow detection, alarms or registering of measured values or events. For visual indication of measurement user can use HMI panels working as Modbus master device.

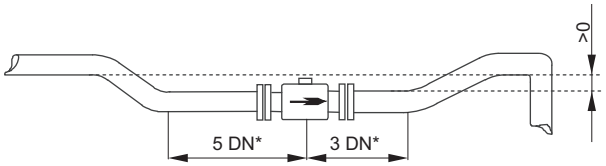
Dimensions of sensor

PN 16							
	Dimensions [mm]						Estimated weight [kg]
DN	A	B	D1	D2	d	n	
10	200	153	90	60	14	4	5
15		155	95	65	14	4	5
20		160	105	75	14	4	6
25		167	115	85	14	4	7
32		180	140	100	18	4	8
40		185	150	110	18	4	8
50		191	165	125	18	4	9
65		209	185	145	18	4	11
80		224	200	160	18	8	13
100	250	245	220	180	18	8	16
125		276	250	210	18	8	21
150	300	305	285	240	22	8	26
200	350	375	340	295	22	12	36
250	450	430	405	355	26	12	60
300	500	487	460	410	26	12	80

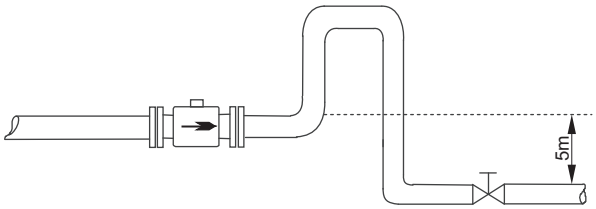


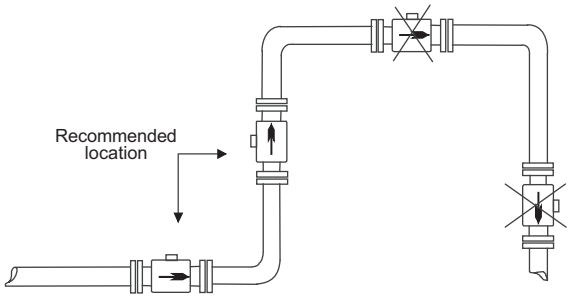
DN 10 – DN 150 A ± 5 mm, DN 200 - DN 300 A ± 10 mm

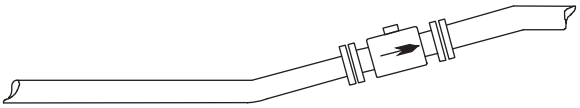
Recommendations regarding installation



* DN - moninal diameter of sensor







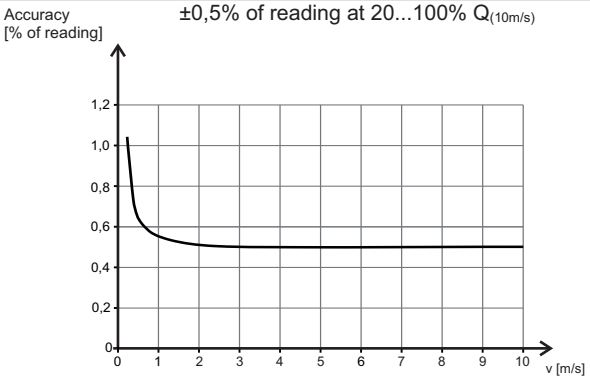
Marking of wires in cables

	Colour	Number**	Description		
Power supply	Blue	3	90….260 VAC	(-)	10…36 VDC
	Brown	4		(+)	
2-state output	Transparent	10	Reverse polarity protection, galvanic insulation, passive		
	Grey	5			
Pulse/frequency output	Pink	8	Reverse polarity protection, galvanic insulation, passive		
	Violet	7			
Current output 4÷20mA	Red	6	(+)	Active (passive on request)	
	Black	2	(-)		
Communication	Black-white	12	RS 485 A		
	Blue-white	13	RS 485 B		
	White	1	RS 485 GND/shield		
2-state input (passive)	Orange	9	Reverse polarity protection, galvanic insulation,		
	Beige	11			
Grounding	Green-yellow	0	Connection inside casing		

**In case of using cable with numbered wires marking according to VDE 0293

Technical details

Minimal electrical conductivity of the medium	≥ 5µS/cm
Input resistance	≥ $10^{10}\Omega$
Accuracy*	±0,5% of reading at 20...100% $Q_{(10m/s)}$



Accuracy in fuction of flow speed

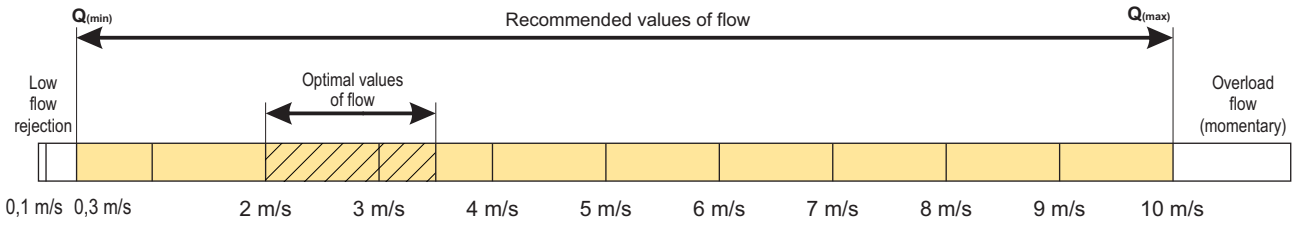
* Reference conditions according to PN-EN 29104:2003

Low flow rejection	Adjustable, any value
Actual flow	Both directions (l/s, m^3/h, m^3/s, other)
Totalizers	3 totalizer: total, positive, negative (m^3, l, other)
Low flow alarm	Adjustable, any value
Configuration	RS485 and Modbus RTU protocol
Empty pipe detection	Cyclic, programmable
Analogue outputs	4…20mA/500Ω, active (passive on request)
Pulse/frequency outputs	max. 24V/10mA DC; 0,1...2000 Hz in frequency mode; up to 500Hz in pulse mode Passive, galvanic insulation, reverse polarity protection
2-state output OC	Open collector. Max. 35V DC /100mA for each output. Galvanic insulation, reverse polarity protection
Communication output	Modbus RTU/RS 485 Galvanic insulation
2-state input	5...35V DC/2 mA Passive, galvanic insulation, reverse polarity protection
Power supply	90...260V AC/ 50Hz/15VA 10...36V DC / 15W (reverse polarity protection)
Ingress protection class Special version	IP67 IP68
Nominal diameters	DN 10...300 ANSI 0.5”...12”
Max. static pressure Special version	1,6 MPa 2,5 MPa, 4 MPa
Process connection	Flanges according to DIN or ANSI
Ambient temperature	-20...60°C
Liner temperature range	Hard rubber -5...90°C Teflon -25...90°C PFA -10...90°C
Electrodes material Special version	316L Hastelloy, Tantalum
Material of lining	Hard rubber DN40...300 Teflon DN15...300 PFA DN10
Material of casing and flanges (sensor)	Carbon steel in protection paint
Accessory	Grounding rings (stainless steel)
Excitation of coils isolation class	E
Measuring principle	Electromagnetic
Weight	0,5 kg (control unit) + weight of the sensor

Choosing of size and measuring range of flowmeter

Choosing the most suitable diameter of senor tube depends on diameter of pipeline where flowmeter will be installed but also on value of flow of liquid in this pipeline. Minimal measuring range for flowmeter corresponds to flow speed 0,3 m/s and maximum measuring range corresponds to flow speed 10 m/s. Optimal and recommended values of measuring ranges correspond with flow speed in range from 2 to 3, 5m/s. Factory setting of measuring ranges considering optimal flow speeds are indicated in below table.
Measurement of flow for linear flow speed less than 0,1m/s is not recommended.

Factory calibration of flowmeters is performed with flow speed 6 m/s. Results of calibration are shown on calibration certificate supplied together with flowmeter.
Flow speed should also consider physical properties of measured liquid. For erosive mediums like water with sand or limewater flow speed below 2 m/s is recommended. Sedimentary liquids like sewage sludge flow speed should be higher than 2 m/s.



DN	Flow value: Recommended flow values ~Q(min)	Recommended flow values ~Q(max)	Factory setting: Analog output 4...20mA Measuring range	Analog output 4...20mA Flow speed (for URV)	Pulse output: Volume / pulse	Pulse output: Number of pulses / m³	Low flow rejection (v~0,1 [m/s])
	[m³/h]	[m³/h]	[m³/h]	[m/s]	[m³/pulse]		[m³/h]
10	0,08	2,8	0÷1	3,54	0,0000025	400000	0,03
15	0,19	6,4	0÷2	3,14	0,000005	200000	0,06
20	0,34	11	0÷4	3,54	0,00001	100000	0,12
25	0,5	18	0÷5	2,83	0,0000125	80000	0,15
32	0,9	29	0÷10	3,45	0,000025	40000	0,3
40	1,4	45	0÷15	3,32	0,00004	25000	0,45
50	2,1	71	0÷20	2,83	0,00005	20000	0,6
65	3,6	119	0÷30	2,51	0,0001	10000	0,9
80	5	181	0÷50	2,76	0,000125	8000	1,5
100	8	283	0÷100	3,54	0,00025	4000	3
125	13	442	0÷150	3,40	0,0004	2500	4,5
150	19	636	0÷200	3,14	0,0005	2000	6
200	34	1131	0÷360	3,18	0,001	1000	10,8
250	53	1767	0÷500	2,83	0,00125	800	15
300	76	2545	0÷760	2,99	0,002	500	22,8

Ordering procedure

PEM-500 /___-___/___/___/___/___/___

Nominal diameter: **DN10...300 0,5"..12"**
Pressure rating: **PN16, ANSI150**
Electrodes material: **316L, Hastelloy**, **Tantalum**
Special version: **IP68, 0,2%, 304, Qmax, WT, CP, HMI panel, PP.PEM junction box**
Power supply: **90...260 V AC, 10...36 V DC**
Liner material: **hard rubber, PTFE**

IP68 – sensor protection class IP68
0,2% – accuracy 0,2% (for 20…100%$Q_{10m/s}$)
304 – flange and flow tube made in ss304 (DN10…DN200)
Qmax – non-standard value of Qmax.
HMI panel – remote display, available versions for panel and wall mounting

PZH – approval for contact with potable water (PTFE lining)
WT – medium temp. up to 130°C (PTFE lining)
CP – version for measurement without recommended straight sections of pipeline – for DN50…DN300, HR version