EMKOMETER FLOW METERS & LEVEL INDICATORS

F 5 Electromagnetic Flowmeter

DATASHEET AND MANUAL

Doc. no.: 228, en_cat, man_F5, 4/2020

Summary:

Instrument description

The F 5 flowmeter has been designed on the basis of the well-known Faraday's law of electromagnetic induction, according to which a voltage is induced by electrically conductive liquids flowing through the magnetic field of flowmeters. This voltage is sensed by two electrodes in direct contact with the medium and evaluated in a transducer.

F 5 electromagnetic flowmeters are solely suitable for measuring volumetric flow rates of electrically conductive liquids with a minimum conductivity of 50 µS/cm.

These flowmeters are used for flow measurement at a flow velocity of 0.2 to 12 m/s.
The maximum accuracy is achieved within the range of 1 to 10 m/s.

Scope of delivery

The accessories vary according to the flow sensor model and above-standard optional features.

Threaded model
A transducer with a mounting bracket for wall mounting (not for the compact model), a flow sensor (in the compact model the transducer is an integral part of the flow sensor), a connecting grounding cable, mounting instructions.

Wafer model
A transducer with a mounting bracket for wall mounting (not for the compact model), a flow sensor (in the compact model the transducer is an integral part of the flow sensor), bolts for mounting the sensor between the flanges (see the table of torque values below), nuts and washers, a connecting grounding cable, mounting instructions.

Flanged model
A transducer with a mounting bracket for wall mounting (not for the compact model), a flow sensor (in the compact model the transducer is an integral part of the flow sensor), a connecting grounding cable, mounting instructions.

Food model
A transducer with a mounting bracket for wall mounting (not for the compact model), a flow sensor (in the compact model the transducer is an integral part of the flow sensor), a DIN 11851 pipe adapter, a connecting grounding cable, mounting instructions.

The induction sensor in the remote measurement model is fitted with a special cable to connect to the flowmeter. **Do not lengthen or shorten this cable.**

Storage Conditions

The temperature during transport and storage must be within the range of -10 ° C to 50 ° C.

The fractory-installed wooden boards on the flanges protect the PTFE flange liners during storage and transport. Remove these protective boards just before mounting the flowmeter in a pipeline !!! When handling flanged flowmeters during transport, do not lift the transducer head or the terminal box of the remote model ! To transport the flowmeters up to DN125, use some straps, fixing them near both process connections. Using chains may damage flowmeter heads! For DN 150 and larger diameters, use only metal ring lugs on the flanges to transport, lift and mount the sensors in a pipeline !!!

Warranty

Incorrect installations or misuse of electromagnetic flowmeters may result in invalidating the warranty much like failure to observe the mounting or operating conditions according to this manual.

Mounting in a pipeline

Important location information

!! Do not lengthen or shorten the cable of the remote model !!

Outdoor conditions

Ensure that the flow sensor is not directly exposed to climatic influences. A frozen medium in the flow sensor may damage the measuring tube.
If the transducer is installed outdoors, the manufacturer recommends using a protective box or a roof to protect the transducer electronics from direct sunshine (excessive overheating).

Sources of interference

The most frequent sources of steady fluid flow interference are as follows:

- Alterations to the pipeline cross section, if not made as a cone at an angle of $\alpha \leq 7$ where **α** is the angle of the pipe reducer´s tapered walls.
- Incorrectly centered gaskets, seals of small internal diameters or soft elastic seals extruded into the pipe when the flanges are tightened.
- Anything that interferes with liquid flow e.g. thermometer wells, branches, T-pieces, bends, elbows, slide valves, cocks, flaps, shut-off valves, control valves, throttle valves or check valves. Pipeline outlets from tanks, heat exchangers and filters.
- Induction flow sensors **must not** be installed in the vicinity of an intense electromagnetic field.

The specified straight piping sections **must not** include any sources of steady fluid flow interference. Such sources should be mounted in a pipeline behind the flow sensor or as far ahead as possible.

Interference sources may significantly reduce the measuring range and accuracy of electromagnetic flowmeters.

Vibrations

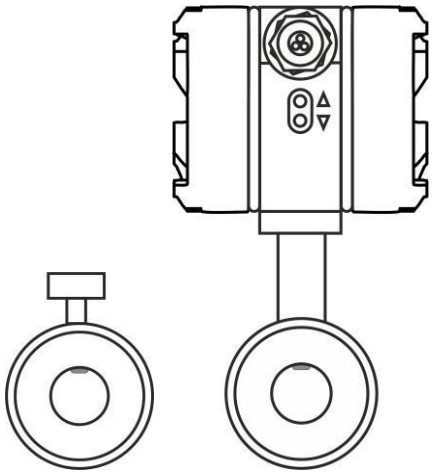
To partially eliminate vibrations, we recommend supporting the connecting pipes at both sides of the flowmeter. According to IEC 068-2-34, the vibration level and range should be below 2.2 g within the frequency range of 20 ÷ 50 Hz. If the pipes are exposed to excessive vibrations (e.g. from pumps), we do not recommend using compact flowmeters.

Mounting

The flow sensor **must not** be mounted at the top of a pipeline that may be aerated or in the downward or even horizontal piping with an open end into which some air may penetrate. Long-term measurements of very low flow rates (Q <0.1 m) may result in some deposit buildup. There should be sufficient pressure at the mounting point to prevent bubbling steam or gases from liquids. Sometimes small bubbles from liquids may accumulate on one of the electrodes, causing the flowmeter to malfunction. Gas bubbles rise from fluids even in the case of sudden pressure drops. Therefore, throttle valves and similar components should be installed **behind the flow sensor**. For the same reason, the flow sensor **must not** be mounted on the suction side of the pump. To prevent bubbles from accumulating in the flow sensor at low flow rates, the pipeline should rise slightly or the flow sensor should be mounted in a vertical pipeline.

In an open system, place the flow sensor at the bottom of a U pipeline profile to ensure that the medium does not flow out of the sensor.

Due to the presence of an empty-tube-detection electrode (the 3rd or 4th electrode in the upper part of the measuring tube profile), there is no risk of incorrect flow volume reading caused by aerating the measuring electrodes.



The empty-tube detection works properly in the horizontal mounting position only if the transducer faces upwards (see the figure below). Otherwise, it is not possible to ensure that the empty-tube detection is activated when the pipeline is partially filled with the medium or empty.

Due to the principle of measurement, the maximum medium conductivity for detecting an empty pipe is 6,000 microseconds. Above this limit, some errors may occur in the empty-tube test. In such a case, stop the empty-tube test. If the medium conductivity is out of the permissible range, the flowmeter may detect an empty pipeline although the pipeline is filled with a medium. No measurement will be triggered.

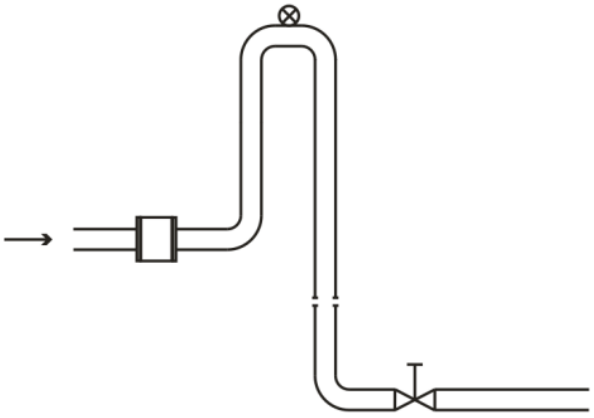
In the case of any interference with the measuring circuit, consider a pipeline to be filled with a medium regardless of the displayed status of the tested tube !!!

Installation examples

The trouble-free and accurate operation of the flowmeter depends on its correct location in the system. See the figures below for the most frequent mounting methods.

Recommended mounting location

- Install a vent valve behind the sensor

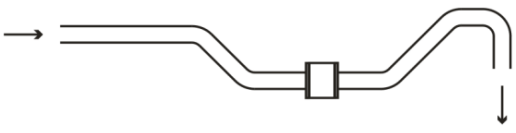


- Horizontal pipeline

  Mount the sensor in the rising pipeline

- Open inlet or outlet

  built into the U-shaped pipeline



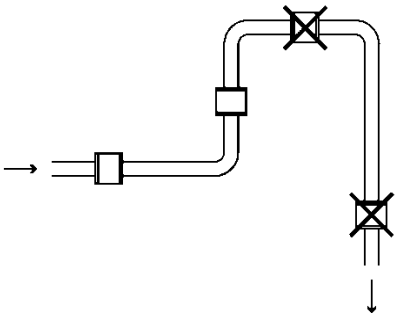
Install the sensor in a slightly rising pipe

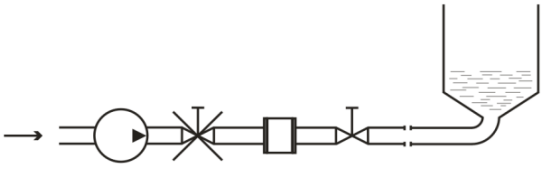
Always install the control and closing members behind the sensor

Gravity piping

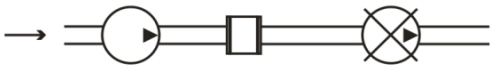
Bubbles in the pipeline, incorrect measurement.

- Correct installation.
- Empty pipeline, incorrect
- measurement





Pumps The Flowmeter must not be installed



Build into a U-shaped pipe. The flowmeter must not be installed at the suction side of the pump

The liquid flow in the flow sensor should be **steady and free of vortices**. For this reason, straight piping sections of the same diameter as the flow sensor (with a +5% tolerance) are usually included ahead of and behind the flow sensor. The recommended minimum length of straight sections is 5xd ahead of the flow sensor or 3xd behind the flow sensor (**d** is the flowmeter diameter in millimeters). The same principles refer to bidirectional flow measurements ahead of and behind the flow sensor.

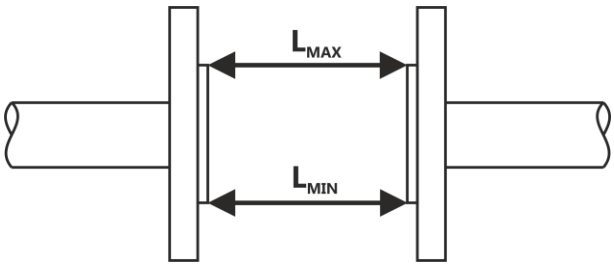
Recommendation

- If any vortices occur, lengthen the smoothing sections of the pipeline or incorporate a flow controller.
- For use with mixed mediums, install the flowmeter ahead of the mixing point or at a sufficient distance behind it (min. 30 x **d**, **d** is the flowmeter diameter in millimeters). Otherwise, indication instability may occur.
- Use grounding rings with plastic pipes or metal pipes with internal non-conductive layers.
- Pumps, bends and elbows installed close together in different planes should be at least 20 x **d** ahead of the flow sensor. A single knee or elbow should be placed 10 x **d** ahead of the flowmeter.
- For piston, diaphragm and hose pumps, include a pulse damper.
- To ensure maximum accuracy, the flowmeter should constantly be filled with the medium even if the flow sensor may carry out an empty-tube test. For example, mount the sensor in a U-shaped pipeline. Then, this flow sensor serves as an additional preventer for empty tube detection.

A project engineer or a user is responsible for the selection and use of electromagnetic flowmeters.

Mounting in a pipeline

When welding two counter-flanges to a pipeline, keep their **alignment** to ensure that the flange faces fit the sensor faces perfectly. However, do not tighten the bolts unevenly as any thermal stress may cause leakage or rupture of the measuring tube. The difference between the maximum LMAX distance and the minimum LMIN distance of flange faces before mounting the flow sensor **must not be greater than 0.5 mm.**



Likewise, ensure that the opposite holes in the counter-flanges are aligned with the bolts. Allow sufficient space for the bolts and nuts behind the flanges when mounting the flow sensor in a pipeline.

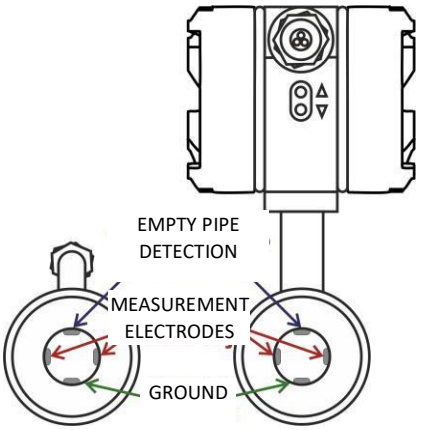
The manufacturer recommends using a mounting spacer for welding. Using the flow sensor as a mounting spacer is absolutely impossible due to thermal damage. During electrical welding, the welding current **must not** pass through the flow sensor. Mount the flow sensor after welding, painting, building and similar work.

The flow sensor is to be mounted between counter-flanges welded to a smoothing pipe (5 × **d** ahead and 3 × **d** behind in the flow direction). A liquid should flow through the flow sensor in the direction **indicated by an arrow** on the sensor plate.

When mounting the flow sensor, do not lift the transducer, the terminal box of the remote model or the metal housing. Always fix some straps near the process connections or use ring lugs on the flanges to lift the instrument.

Mounting position

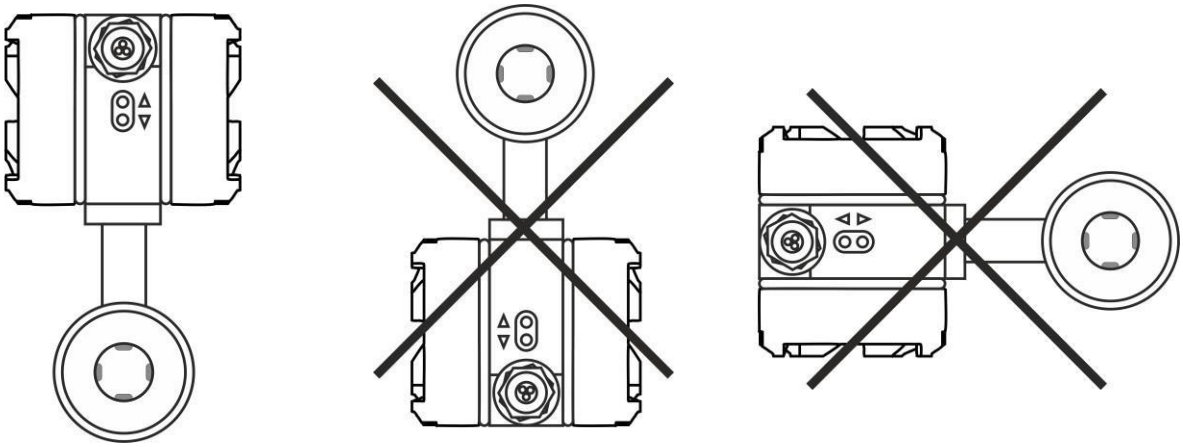
The induction flow sensor may be mounted in any position in a vertical pipeline. In a horizontal pipeline, make sure that the measuring electrodes are in the horizontal position. If you use a flowmeter with a grounding electrode or an empty-tube-detection electrode, the reference grounding electrode should always face downwards while the sensor´s terminal box or the transducer should face upwards. Then, the reference grounding electrode is at the bottom and the empty-tube-detection electrode is in the upper position of the flow sensor.

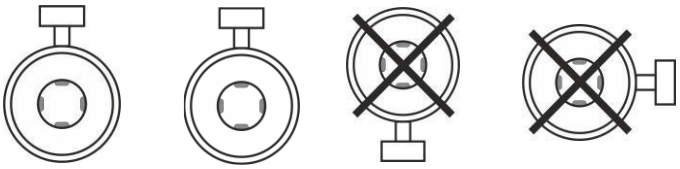


Every time the empty-tube-detection electrode is not in the medium for at least 5 seconds, the "Empty Tube" status will be displayed. If necessary, an error message stops the measurement. This preserves the measurement accuracy.
As soon as the electrode is in the medium again, the error message will disappear and the flowmeter will measure again.

Pipeline installation and location of the measuring electrodes in the flow sensor

A model with a reference grounding electrode and an empty-tube-detection electrode



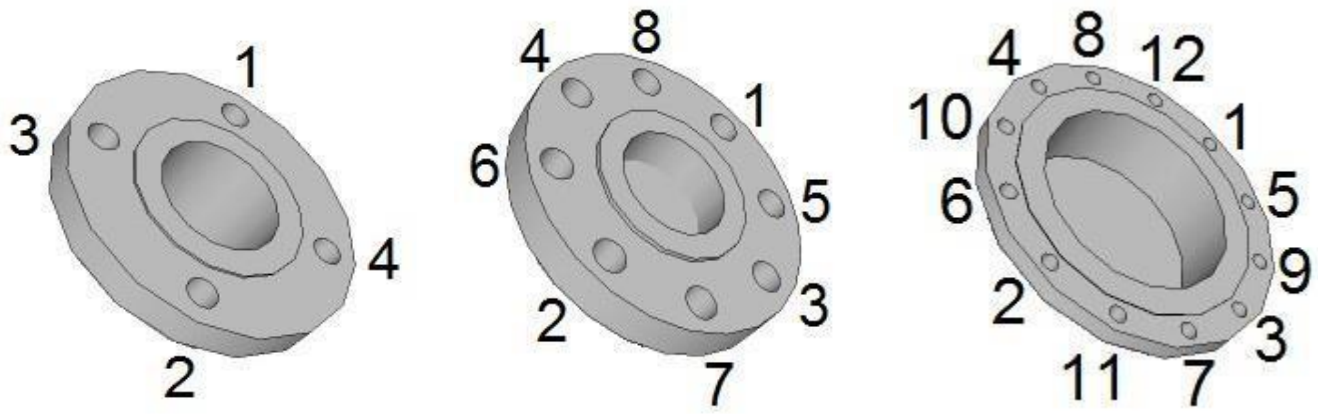


When mounting the flowmeter, be careful

- not to drop the flowmeter on the ground. This may damage the measuring tube or electronics.
- not to smear the electrodes. Do not touch the electrodes.
- to use an auxiliary seal between the flow sensor´s flanges and a pipeline. It **must never** interfere with the fluid flow profile. Otherwise, more errors in flow measurement may occur.

Torque values

Tighten the bolts and nuts evenly crosswise in the given order. See the figures and the table for maximum torque values.



If you tighten the bolts too much when mounting the pipes, the sealing surface may be deformed. See the table below for correct torque values.

Table of bolt torque values:

Inner diamter DN	PN10			PN16		
	Bolt	Torque (Nm) Rubber	Torque (Nm) PTFE	Bolt	Torgue (Nm) Rubber	Torque (Nm) PTFE
15	4 x M12	20	25	4 x M12	20	25
20		20	25		20	25
25		20	25		20	25
32	4 x M16	20	25	4 x M16	20	35
40		20	25		20	35
50		20	45		20	45
65		20	46		20	46
80	8 x M16	20	48	8 x M16	20	48
100		20	50		20	50
125		20	80		20	80
150	8 x M20	24	90	8 x M20	27	90
200		25	115	12 x M20	28	80

Inner diameter DN	PN25			PN40		
	Bolt	Torque (Nm) Rubber	Torque (Nm) PTFE	Bolt	Torque (Nm) Rubber	Torque (Nm) PTFE
15	4 x M12	25	25	4 x M12	25	25
20		25	25		25	25
25		25	25		25	25
32	4 x M16	25	35	4 x M16	25	40
40		25	35		35	50
50		35	45		35	60
65	8 x M16	35	46	8 x M16	45	55
80		40	48		45	60
100	8 x M20	40	55	8 x M20	50	75
125	8 x M24	50	110	8 x M24	70	120
150		57	115		75	136
200	12 x M24	68	100	12 x M27	85	145

The flange connections are in compliance with EN 1092-1.
The same torque values refer to corundum, thermoplastic or PTFE tubes. See the pressure range.

If the technical parameters are not listed in the torque table, you have a special or non-standard model. Contact the manufacturer for more information.

Tighten the bolts three times. First, up to 50% of the maximum torque (see the table above). Second, up to 80%. Third, up to 100% of the maximum torque. We recommend checking the bolts for tightness approx. 24 hours after the flowmeter has been mounted.

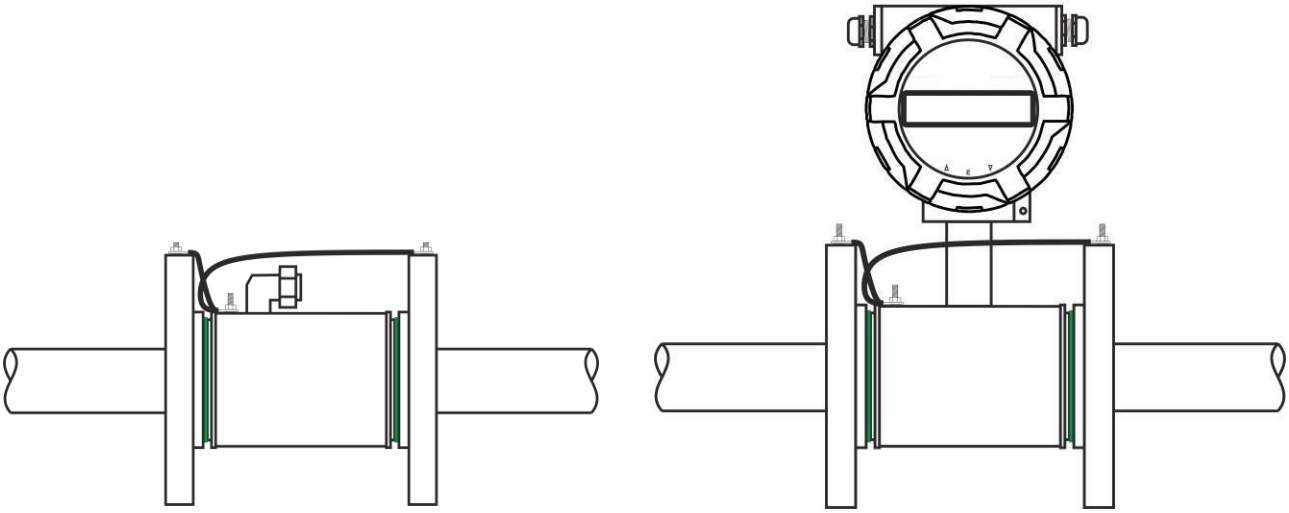
If all the bolts have been fully tightened and the flange connection is not tight enough, do not continue tightening. Loosen the bolts opposite the leaking side and tighten the bolts on the other side. If there is still any leakage, check the sealing surfaces for scratches or mechanical impurities. If the scratches or similar defects are not deeper than about 15% of the flange thickness, they can be removed with fine sandpaper.
As for the threaded connections, check the bolting on the sensor when tightening the thread. It should not turn.

Sealing

A protruded liner cannot seal properly. Therefore, insert a precisely centered gasket between the sensor and a pipeline. If the gasket overlaps into the flow profile, it may cause vortices and reduce the quality of measurement. Use 5 mm thick gaskets which are compatible with the liquid. When holding the gasket, do not use graphite or other electrically conductive materials. This could affect the accuracy of the measurement signal.

Grounding

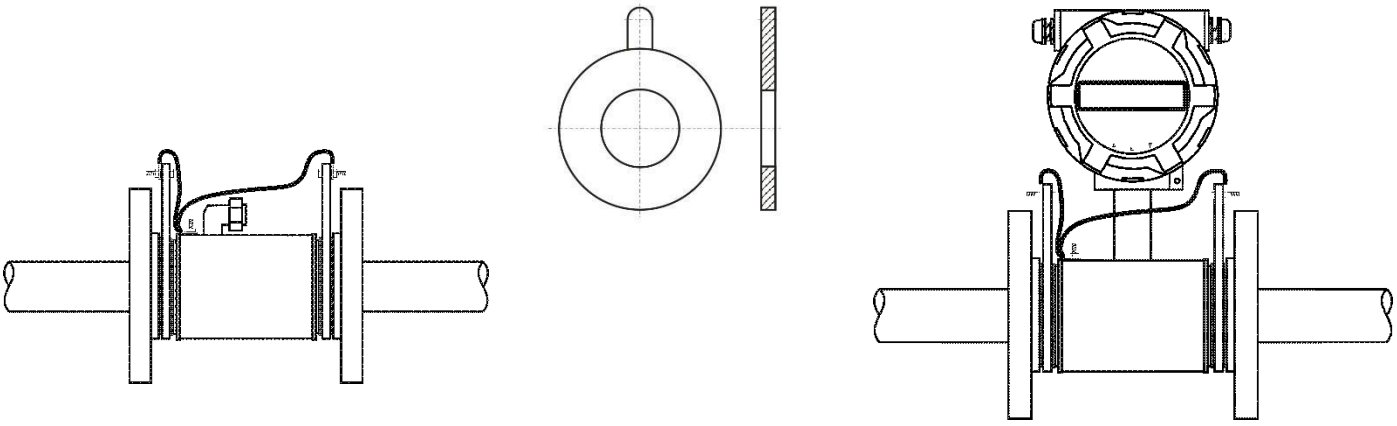
In order for the induction sensor to work properly, make sure it is perfectly grounded. The grounding cable **must not** transmit any disturbance voltage. It **must not** be used for grounding other electrical instruments.
The flow sensor is fitted with a M5 stainless steel grounding screw, a washer and a nut for a high quality connection of the sensor body to both metal pipeline counter-flanges. Screw the grounding eyelet of the grounding cable here. Then, connect the cable to the counter flanges conductively. We recommend welding it to the bolts or to a drilled threaded hole. Connecting the cable uder the flange bolts is not recommended as such a connection may corrode over time, causing failures in the measurement.
When not sure that the conductive counter-flanges are in direct contact with the measured medium, use grounding rings (see below).



Grounding rings

For use with plastic pipes or metal pipes with plastic liners protruded from flange faces. Conductive stainless steel rings form a conductive connection with the medium. Normally, the potential is equalized using a reference grounding electrode in the measuring tube. In exceptional cases, the equalizing current may pass through a reference electrode. This may damage the sensor, for example by the electrochemical disintegration of electrodes. In such cases, it is necessary to equalize the potential using grounding rings. This also refers to two-phase or two-component flows where the medium is poorly mixed or the compounds cannot be mixed. In general, grounding rings always protect an instrument against stray currents while guaranteeing accurate measurement.

The flow sensor is fitted with a stainless steel grounding screw for the grounding cable which is supplied with accessories. Connect it to the grounding rings conductively.
These grounding rings are not part of the standard package and must be ordered separately. The chemical resistance of materials should correspond to a liquid. As a rule, the rings are made of the same material as the sensor electrodes. When installing the gasket, insert it on both sides of the grounding ring. Make sure that the gasket does not overlap into the internal sensor profile to cause vortices.



Electrodes

The electrode material must be selected according to the chemical resistance to the medium. The cleanliness of electrodes may affect measurement accuracy. High impurity concentrations may interrupt measurements. After delivery, it is not necessary to clean the electrodes before installing the sensor in a pipeline. If the electrodes are dirty, clean them with a soft cloth or chemical cleanser. Do not damage the liner! Normally, with most liquids, it is not necessary to clean the flowmeter throughout its operation. Self-cleaning with flowing fluids is enough (recommended speed is over 2 m/s).

PTFE liner

The flowmeters with PTFE liners are fitted with protective covers to prevent damage to the sealing surfaces during transportation or storage, and to prevent shape changes (PTFE material tends to restraighten in the tube). The protective caps can only be removed just before the flowmeter is installed. If these caps have been removed for inspection, they must be replaced immediately.
Mount the flowmeter at the lowest point of the pipeline to prevent decompression. Never separate

or damage the PTFE flange liner protruded from the flow sensor face. Remove the protective caps from the inlet and the outlet just before inserting the sensor between the pipe flanges and replace them with 0.3 to 0.6 mm thick sheets. After inserting the sensor, pull out the sheets and tighten the bolts.

High temperature pipeline

High temperature medium

At a medium temperature above 100 ° C it is necessary to compensate the forces caused by the longitudinal expansion of a hot pipeline. Use flexible seals for short pipes. For long pipes, use flexible pipe elements such as bends.

The flow sensor **must never** be thermally insulated. If the sensor is mounted in a thermally insulated pipe, the thermal insulation should be interrupted and the flow sensor should be mounted without any thermal insulator.

When using a compact flowmeter (transducer is attached to the flowmeter body), make sure that the maximum medium temperature is 90 ° C. If this temperature is exceeded, we cannot guarantee the correct operation of the transducer. It may even be destroyed.

Mounting inspection

After mounting the flow sensor in a pipeline, see the tag for pressure, temperature, flowmeter dimensions etc. at the measuring point and make sure that

- the arrow direction on the instrument is the same as the medium flow direction in the pipe.
- the measuring electrodes are in the horizontal position.
- the empty-tube-detection electrode is up.
- all the bolts are properly tightened.
- if any grounding rings are used, they are correctly placed and connected to the sensor.
- the flow sensor is grounded.
- smoothing pipe sections are installed as necessary.
- the sensor is protected against vibrations and mechanical stress.
- the sensor tag (serial number) corresponds to the transducer tag.
-

Wiring

Any incorrect operation results in invalidating the warranty !!!

The remote model consists of a transducer unit and a separate flow sensor. This instrument is calibrated and its parts are uniquely paired. Therefore, make sure ***that the serial numbers*** *of the two parts* ***are the same****!!!*

The special connecting cable for the remote model **must not** be lengthened or shortened.

The signal cable of the remote induction flow sensor should not pass any power supply cables, motors, solenoids, contactors, frequency converters and similar sources of electromagnetic interference in parallel. If this is inevitable, place the cable in a grounded iron pipe.

To ensure that the transducer cover is properly sealed, keep the gasket undamaged and clean. Replace damaged gaskets immediately. Make sure that the cable entry holes are sealed.

Transducer

The battery-powered transducer starts to measure as soon as it is inserted into a pipeline and the measuring tube is filled with a medium.

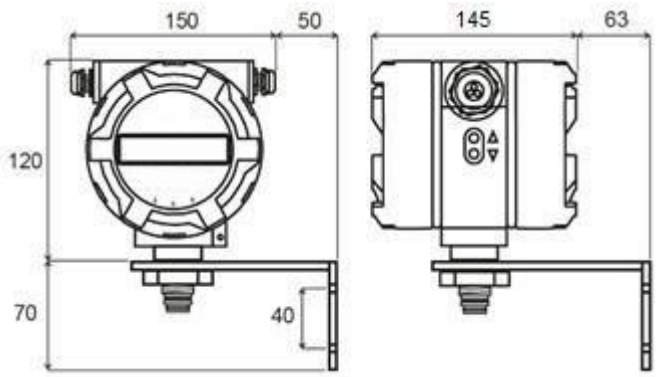
Battery power supply

The flowmeter is fitted with a battery power supply. Whenever the voltage drops below the specified limit, LOWBAT is displayed. This message indicates that it is necessary to replace the battery. The manufacturer strongly emphasizes that only original spare parts and spare batteries can be used. This is the only way to prevent any damage to the flowmeter or even its destruction.

Mounting the remote transducer

HEAD design (H) - A standard compact or remote model (as ordered)

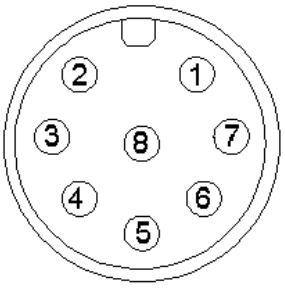
First, decide whether you want to fix the mounting bracket behind or under the electronic unit (bracket holes up or down). Fasten the mounting bracket to the aluminum housing of the instrument and mount this set on a wall or on a structure according to your requirements. In this position, mark the openings to fix the bracket. Unscrew the bracket and fix it in the marked location using wall plugs and screws. Screw the electronic unit onto the mounting bracket and connect the cable from the flow sensor (use a connector). Fasten the cable to a wall or to a structure so that it will not hang from the connector. Create a " downward drip loop" below the connector so that no water can run down to the connector. In a similar way, fix the power supply and output wires. After connecting all wires, turn the electronic unit to the desired position and tighten the retaining nuts to the bracket.



Flowmeter wiring

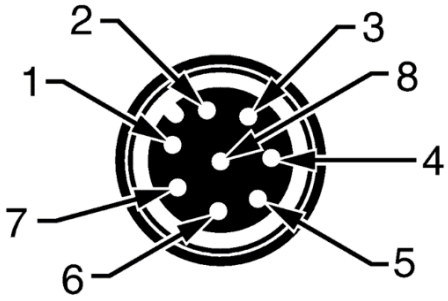
The flowmeter is fitted with two M12 connectors (8pin and 4pin) to connect to the outputs or an external power supply.

M12-8pin connector with RS485 outputs. OUTs are unipolar transistors.

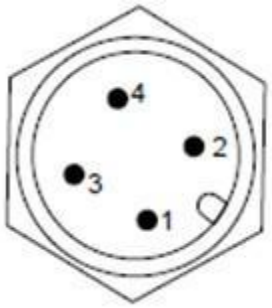


1 ImpOUT collector
2 emitter ImpOUT
3 not used
4 not used
5 not used
6 RS485 A+
7 RS485 B-
8 not used

Standard cable connection to the M12 8pin connector (opposite the flowmeter socket):

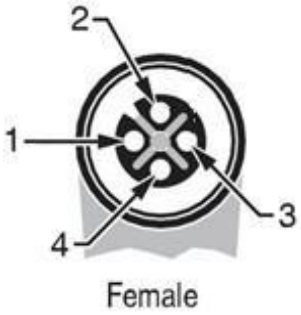


M12-4pin connector



1 + 12V (external power supply)
2 TXD (Original GSM or GPRS)
3 -12V (external power supply)
4 RXD (original GSM or GPRS)

Standard cable connection to the M12 connector (opposite the flowmeter socket)



Wiring check

After completing the wiring system, make sure that

- the connecting cables are not damaged.
- the cables are suitable for the connectors.
- the cables are not mechanically stressed.
- the connectors are tight enough.
- the caps on the O-rings are properly tightened after the instrument is closed.

Starting up

Instrument status:
This status is continuously displayed as one of the items marked with an arrow on the screen.

1) Low Bat replace the battery
2) Empty tube empty tube
3) SD card SD card in the flowmeter

Flow direction:
The arrow indicates the flow direction in the sensor and the correct sensor angle for mounting the instrument in a pipeline.

Setting the basic parameters
The flowmeter parameters have been set by the manufacturer according to your purchase order. If these parameters have not been specified in your order, the flowmeter will be configured with standard parameters according to the flowmeter dimensions. User settings are available by means of the INI file on the SD card or using a micro USB connector connected to a PC.

Safety regulations for operators
Any interference with the flow sensor or the transducer by an operator is forbidden. Any incorrect operation of the induction flow sensor may result in scalding persons with a hot medium.

F 5 INSTRUCTION MANUAL

The unit has been fitted with two external buttons on the side of the electronics housing, which are used to scroll through the flowmeter menu.

Flowmeter menu

Measured values:
Total volume Σ V
Volume in the positive direction compared to the arrow on the instrument tag +V

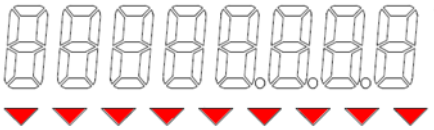
Volume in the negative direction compared to the arrow on the instrument tag	-V
User volume (variable) in the positive direction only	rV
Current flow	Q
Measurement period	Msrmnt period [sec]
Year, month, day, hour and minute	

Setting the flowmeter:

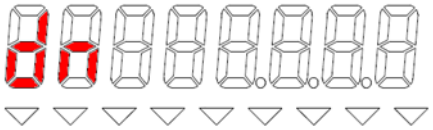
serial number
DN
run time [days]
pulse constant
pulse width
communication
address
transmission speed
beginning of measurement - starting flow rate
damping - flow rate averaging
calibration constant **k**
calibration constant **n**
SD card interval entry

Measured values are indicated at the display bottom.
The bottom indicator also displays an empty tube (empty pipeline) and whether the SD card has been inserted.

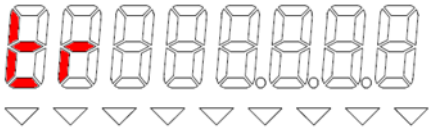
Symbols for setting the flowmeter



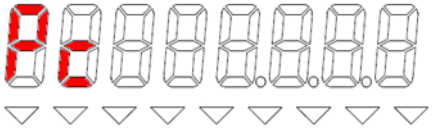
SN



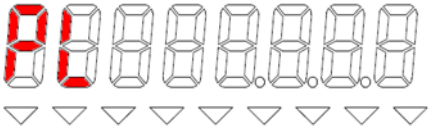
DN



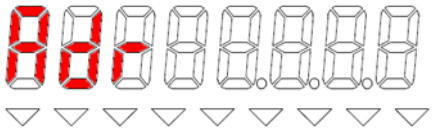
Run time (days)



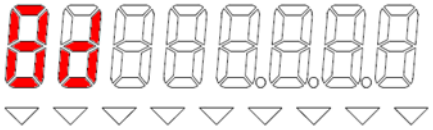
Pulse constant (L/imp)



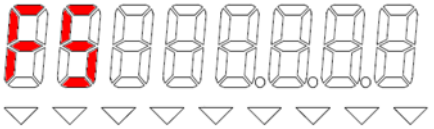
Pulse width (ms)



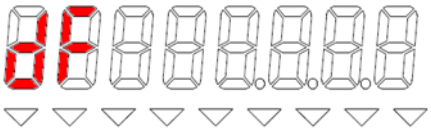
Address



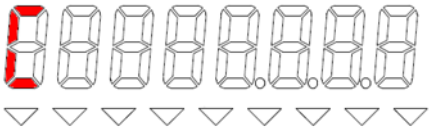
Transmission speed



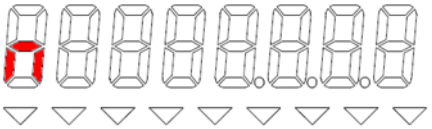
Start measuring (Qmin)



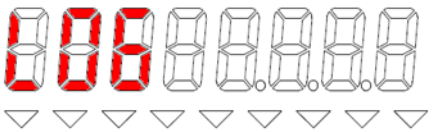
Damping



Calibration constant C



Calibration constant N



Write interval to SD (min)

Set the flowmeter using a PC via the built-in USB interface or load the flowmeter configuration from the SD card.

In case you decide to use the configuration settings from the SD card, format the SD card to FAT32. Set the "cluster size" to 512B and create a "SETUP.INI" file on the card.
Example: "SETUP.INI" file

UnitQ = 0
// flow unit 0 = m3 / hr, 1 = l / min
Point V = 3
// number of decimal places for volume counters
Periode = 1
// measurement period [sec]
ImpOut = 1
// pulse constant [liter / pulse]
PulseW = 2
// pulse width [ms]
Address = 1
// RS485 and 3.3V USART communication addreses
Logger = 60
Interval entry [min] for DATALOGGER

The above FAT32 file should be set for the "logger" function as well.

To activate the inserted SD card, remove the top cover and press the internal buttons located at the bottom edge of the flowmeter three times.

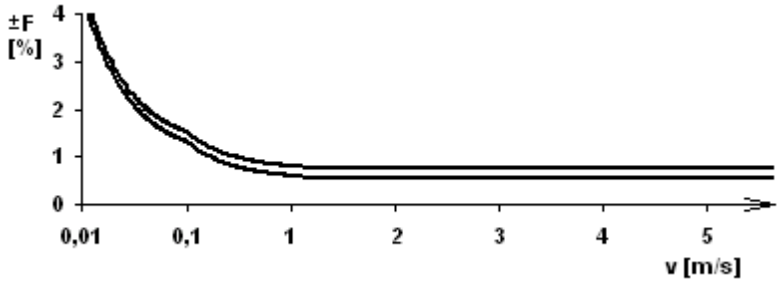
Specification

Transducer	
Power supply:	Insertable lithium battery set
Display:	alphanumeric single-line LCD
Dimensions:	DN 15 ÷ 600, up to
Liner:	rubber (hard, soft, drinking water certificate)
	DN20 ÷ DN600 (up to 80 ° C)
	PTFE: DN 15 ÷ DN 600 (up to 150 ° C)
Electrodes:	CrNi steel DIN 1.4571, Hastelloy C4, titanium, tantalum
Construction:	all-welded
Sensor materials:	flanged sensors made of stainless steel or structural steel with polyurethane coating
	wafer, threaded, food processing - stainless steel
Process connection:	wafer
	DIN (EN1092) flanges
	threaded (EN ISO 228-1)
	food processing (DIN 11851 clamp)
	insertion type threaded with ball valve
Measuring range:	(Qmin / Qmax) 0.2 ÷ 12 m / s (1/60)
Measuring period:	user-adjustable, 1 ÷ 60s
Flow ranges:	1:60
Accuracy:	better than 1% for 1 ÷ 10 m / s
Minimum medium conductivity:	50µS / cm
Displayed values:	flow in m3 / h, l / min with a sign
	volume in m3; positive, negative, user adjustable
Control:	outside buttons - a-
	inside buttons -, E,-
Outputs:	M12 - 4p (External Power, UART)
	M12 - 8p (ImpOut, RS485, GSM/GPRS)
Logger:	microSD slot
Ingress protection:	IP65 (standard), IP68 optional
Ambient temperature:	5 ÷ 55 °C
Humidity:	max. 90%
Weight:	1,790 g (remote model)
Dimensions:	144 x 151 x 145 mm (H x W x D)
	104 mm head diamater
Material:	Al casting, powder paint, optional stainless steel case

If any technical parameters are not listed in the Table of Flow Sensor Specifications, you have a special or non-standard model. You can find this information on the sensor label or contact the manufacturer

for more information.

Error limits under reference conditions (range 1: 100)



Inner diameter	Max. error from the measured values			Curve
DN [mm]	v >= 1 m/s	1 m/s > v >= 0,1 m/s	v < 0,1 m/s	
<= DN 10	0.9 % z M*	0.82 % + 0.8 mm/s	1.27 % + 0.35 mm/s	1
>= DN 15	0.8 % z M*	0.72 % + 0.8 mm/s	1.17 % + 0.35 mm/s	2

- z M – from the measured value

Factory setting

Display resolution

Inner diameter	Resolution V	Resolution Q
DN≤15	V [0.001 m3]	Q [0.001 m3/h]
50≥DN>15	V [0.01 m3]	Q [0.01 m3/h]
DN>50	V [0.1 m3]	Q [0.1 m3/h]

Flow rates

Inner diameter (mm)	Qmin (m3/h) 1/60 (0.2m/s)	Qmax (m3/h) (12m/s)
DN 15	0.13	7.6
DN 20	0.24	14.2
DN 25	0.35	21
DN 32	0.6	34
DN 40	0.9	54
DN 50	1.4	84
DN 65	2.4	144
DN 80	3.6	220
DN 100	5.6	340
DN 125	8.9	534
DN150	13	760

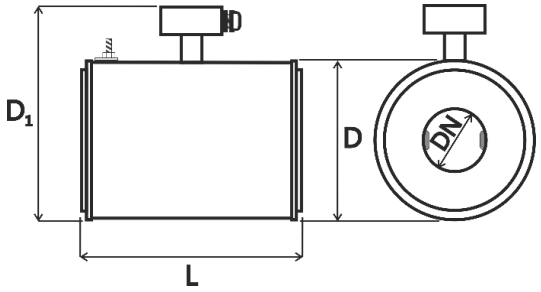
Basic dimensions of the sensors

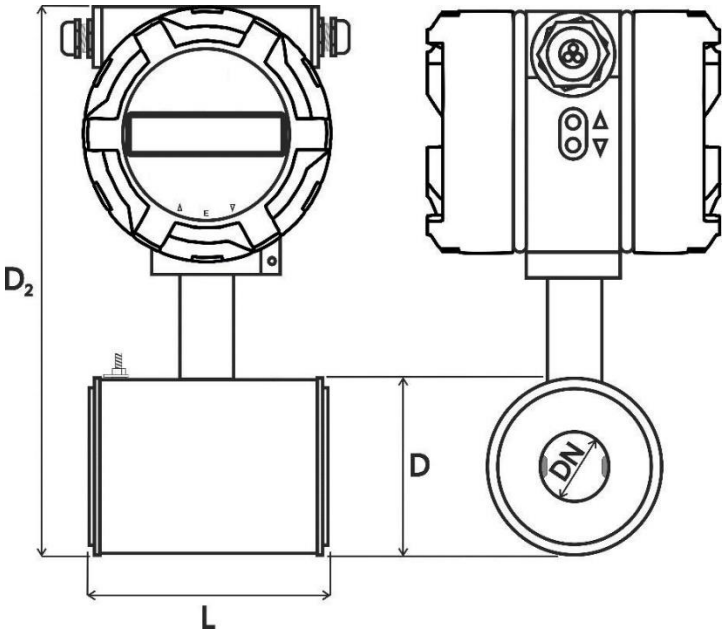
Threaded model PN 25

Inner diameter	Thread	D Outer diameter of the sensor	L Sensor length	D1 Sensor height	Remote sensor weight	D2 Compact flowmeter height	Compact flowmeter weight
15	½“	69	196	188	4	275	5
20	¾“	79	206	194	4	281	5
25	1“	89	206	204	5	291	6
32	1 ¼“	99	233	210	5	297	6
40	1 ½“	115	256	232	6	319	7

Wafer model PN25

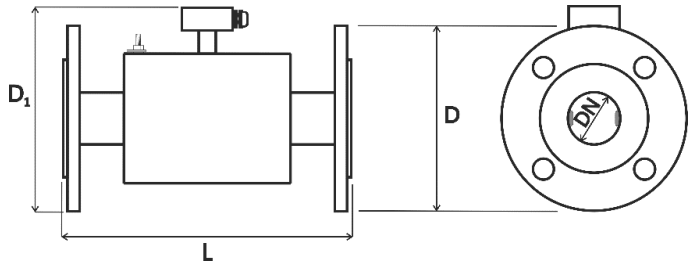
Inner diameter [mm]	D Outer diameter of the sensor	L Sensor length	D1 Sensor height	Remote sensor weight (kg)	D2 Compact flowmeter height	Compact flowmeter weight (kg)
15	51	90	110	2	195	3
20	61	90	120	2	205	3
25	71	90	130	3	215	4
32	82	90	140	3	226	4
40	92	110 150 4 236 5	150	4	236	5
50	107	110	165	4	251	5
65	127	130	185	5	271	6
80	142	130	200	6	286	7
100	168	200	226	7	312	8
125	194	200	253	9	338	10
150	224	200	283	11	368	12
200	284	200	340	14	427	15

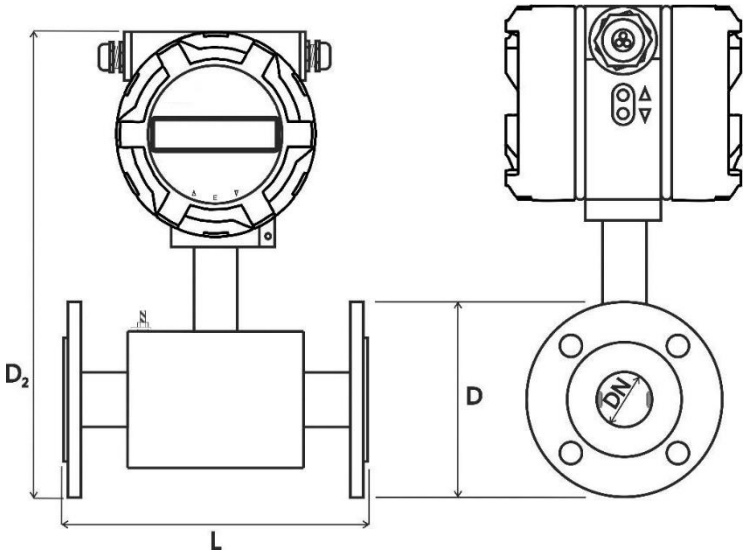




Flanged model PN25

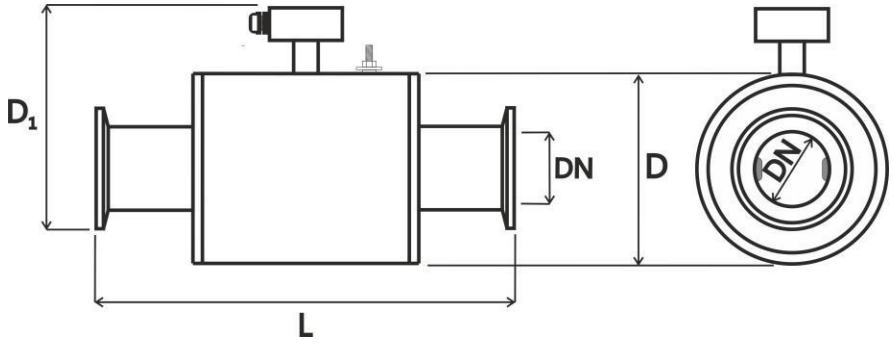
Inner diameter [mm]	D Outer diameter of the sensor	L Sensor length	D1 Sensor height	Remote sensor weight (kg)	D2 Compact flowmeter height	Compact flowmeter weight (kg)
15	100	200	140	4	230	5
20	110	200	150	4	240	5
25	120	200	160	5	250	6
32	140	200	175	6	265	7
40	150	200	185	7	275	8
50	165	200	215	9	300	10
65	185	200	235	11	320	12
80	200	200	250	12	335	13
100	220	250	275	19	360	20
125	250	250	305	26	390	27
150	285	300	335	37	420	38
200	340	350	395	44	480	45

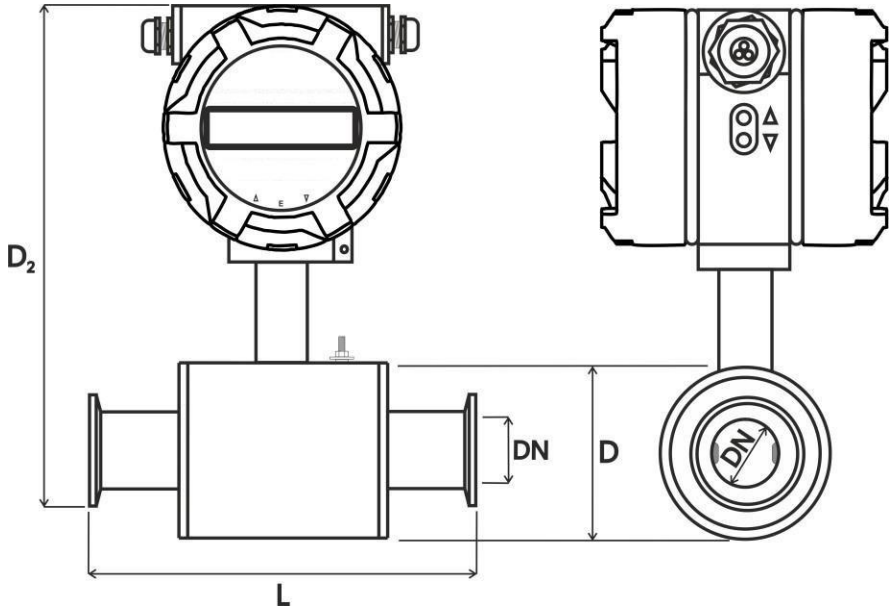




Clamp connection model (sanitary type) PN25

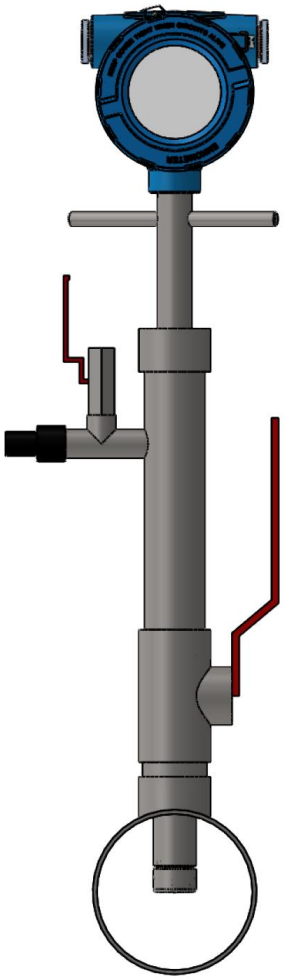
Inner diameter [mm]	Food clamp	D Outer diameter of the sensor	L Clamp length	DIN 11851 dairy connection	D1 Sensor height	Remote sensor weight (kg)	D2 Compact flowmeter height	Compact flowmeter weight (kg)
15	DN 15	69	182	172	188	4	275	5
20	DN 20	79	182	176	194	4	281	5
25	DN 25	89	182	186	204	5	291	6
32	DN 32	99	189	197	210	5	297	6
40	DN 40	115 4 236 5	210	220	232	6	319	7
50	DN 50	110	217	231	236	7	323	8





Internal diameter in mm	DN 15 – DN 20	DN 25 – DN 40	DN 50	DN 65	DN 80
Outer diameter of the clamp socket (mm)	34	50.5	64	91	106

Insertion type sensor

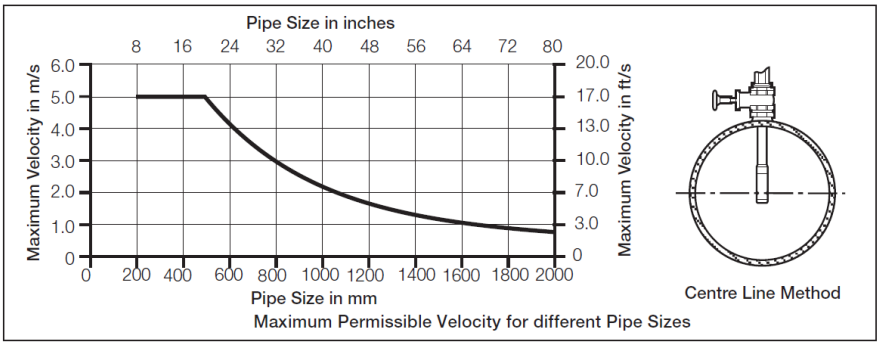


It reduces costs and also makes instalation easier for large diameter tubes. Based on installation conditions up to 1.5% accuracy can be achieved.

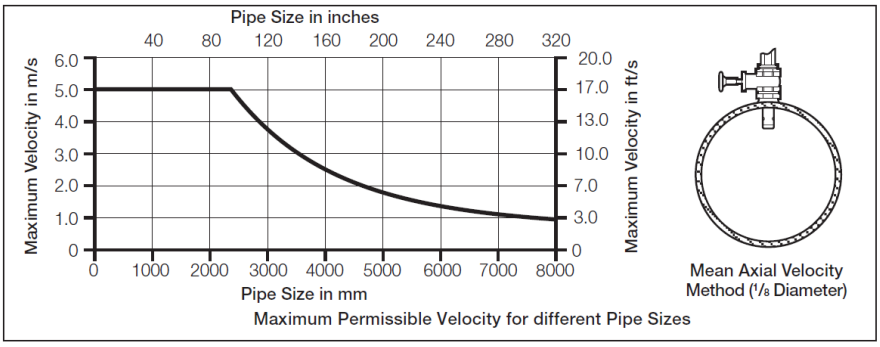
The sensor is designed to measure the flow of water (conductive liquid) in any pipeline from DN 100 up to DN8000. Installation is simple, only smally typping (from G1“) is needed. Using ball valve hot tapping instalation is available.
Temperature and pressure sensors can be integrated as well.

There are limits on velicity to prevente vortex shedding effect causing vibration and potentially affecting measurement. Based on insertion length. Most common method of insertion is 1/8 D. For low velocities or non symmetrical flow profile position of the probe can be adjusted.

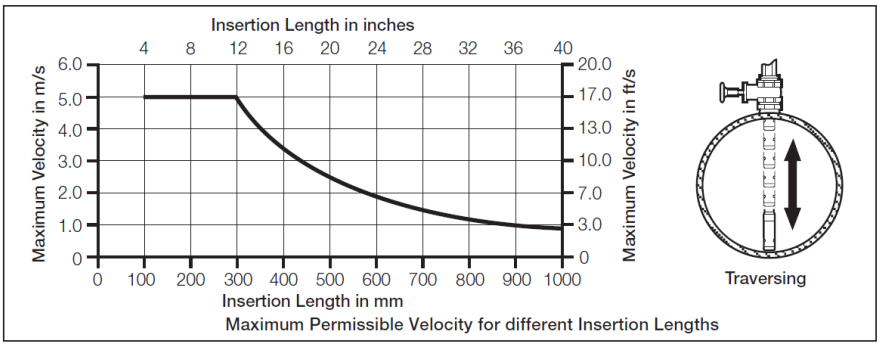
Requested straight runs are the same as for the standard sensors. Installation instructions must be follow for particular type of the sensor.



Maximum Permissible Velocity for different Pipe Sizes

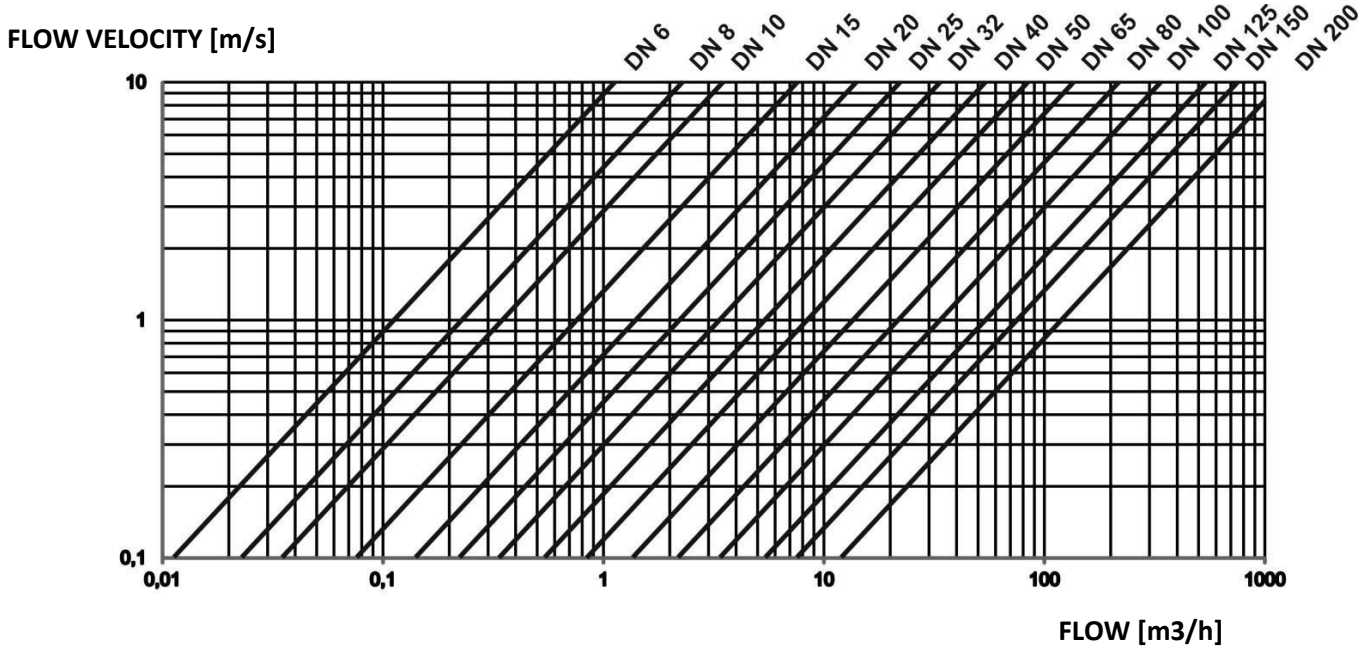


Maximum Permissible Velocity for different Pipe Sizes



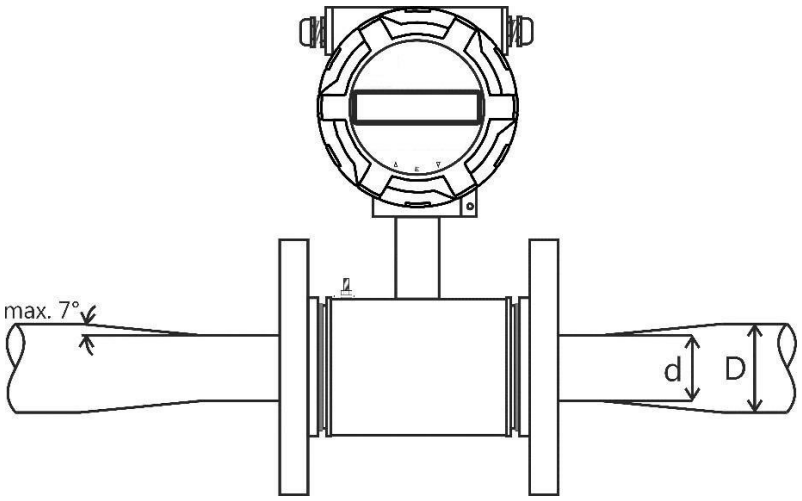
Maximum Permissible Velocity for different Insertion Lengths

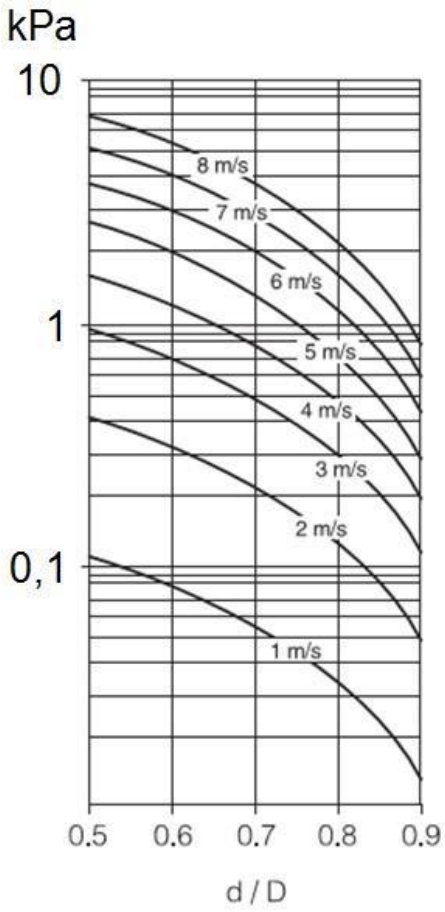
Nomogram for a quick selection of measuring points



Reduction of pipeline diameters

If the pipeline DN exceeds the flowmeter DN





Possible failures during measurement

Unstable indications and outputs may occur in the following cases:
- a high proportion of solid particles
- group inhomogenity
- interface of two liquids
- ongoing chemical reactions in the medium
- use of diaphragm or piston pumps
- poor grounding

Cleaning the flow sensor

Some media contain substances and chemicals that tend to create some buildup on pipe walls and in the measuring tube, affecting measurement accuracy. Then, it is sometimes necessary to clean the flow sensor. Clean ceramic tubes with a steel brush and rinse them with diluted hydrochloric acid or citric acid. Acids are used to remove calcic or black ferrous foulings. Use a sodium or potassium hydroxide solution to remove oily foulings. **Do not clean** flow sensors with PTFE, plastic or rubber measuring tubes using a steel brush. Use chemicals only. After cleaning, rinse the tubes thoroughly with clean water.

Optional GSM Module

The module is integrated with external antenna and connects to M12-4pin connector.

Optional IP68 stainless steel casing allows integrall installation.

It can be operated in any GSM network and it allows remote access to the flowmeter. Due to the best energy efficiency the communication is done via SMS in selected intervals. Data can be monitored directly by the user using cell phone or via centralized automated website interface. Optional Sigfox protocol is available (no SIM required, even lower power consumption). See https://www.sigfox.com/en/coverage for coverage map.

Online application allows to monitor multiple devices under one acount.

Each account has its unique website address and allows multiple users to be created.

Easy monitoring using map available.

The information transmitted contains:

Identification numer

Volume ∑

Volume user

Volume +

Volume - Flow

Software version

Pressure (with pressure module)

Temperature (if integrated)

Error code

Service

All warranty and post-warranty repairs are performed by EMKOMETER s.r.o. or licenced partners only. If any of the above instructions are not followed, the warranty shall become null and void !!! Before opening the transducer, turn off the power supply !!!