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MID flow transmitter

Brief description

The flow rate transmitter has a magnetically inductive sensor (MID).

Standardized fittings ensure easy installation of the transmitter into tubes ranging from DN15 to DN400 (see Data Sheet 406090).

The transmitter can be used in liquids with a conductivity of 20 $\mu\text{S}/\text{cm}$ or greater.

Flow speeds from 0.2 to 10 m/s can be measured.

The transmitter provides an output signal of 4 to 20 mA.

The measurement is also represented as a frequency pulse signal of 0 to 240 Hz.

Simple control tasks can be implemented with the installed relay.



Type 406010/ ...

Example of mounting



Flow transmitter



Fitting
See Data Sheet 406090

Key features

- Stainless steel design.
- Simple mounting.
- For pressures up to PN16 and temperatures up to 150°C.

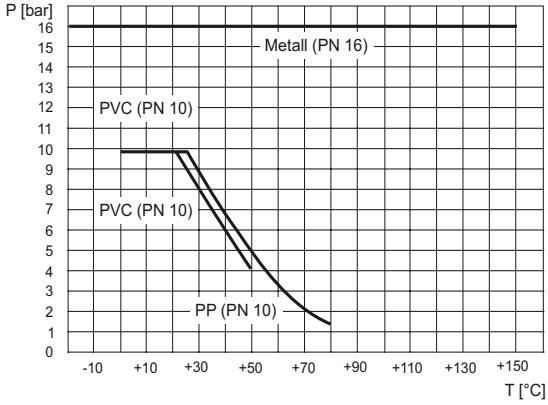
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Technical data

Operating conditions	
Measurement medium	Water or other conductive liquids Minimum conductivity: 20 µS/cm
Medium temperature	In combination with a PVC fitting: 0 to +50°C In combination with a PE fitting: 0 to +70°C In combination with a PP fitting: 0 to +80°C In combination with a stainless steel fitting: -15 to +150°C
Ambient temperature	-10 to +60°C operating temperature -20 to +60°C storage temperature
Tube diameter	For diameters DN15 to DN 400. Only in combination with fittings as per Data Sheet 406090.
System pressure	In combination with a PVC or PE fitting: 
Minimum inlet and outlet distances	See illustrations on page 5/5
Relative humidity	< 80%, non-condensing
Enclosure protection	IP65
EMC	EN 50081-1, EN 61000-6-2
Safety	EN 61010-1
Vibration	EN 60068-2-6
Impact	EN 60068-2-27
Measuring range	
Flow speed	0.2 to 10 m/s
Accuracy (With a flow speed of from 1 to 10 m/s and a medium temperature in the range from -15 to 70°C)	With standard K factor: $\leq \pm 4\%$ of measured value after teach-in: $\leq \pm 2\%$ of measured value
Linearity	$\leq \pm 1\%$ of measured value + 0.1% of measurement range end
Repeatability	$\leq \pm 0.25\%$ of measured value
Materials	
Housing, cover, nut	PPA
Screws, seal, cable gland	Sensor: stainless steel, EPDM, PA
Parts in contact with medium	Sensor: stainless steel 1.4404/316L, FKM, PEEK Fitting: see data sheet 406090

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




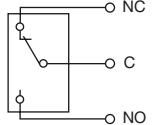
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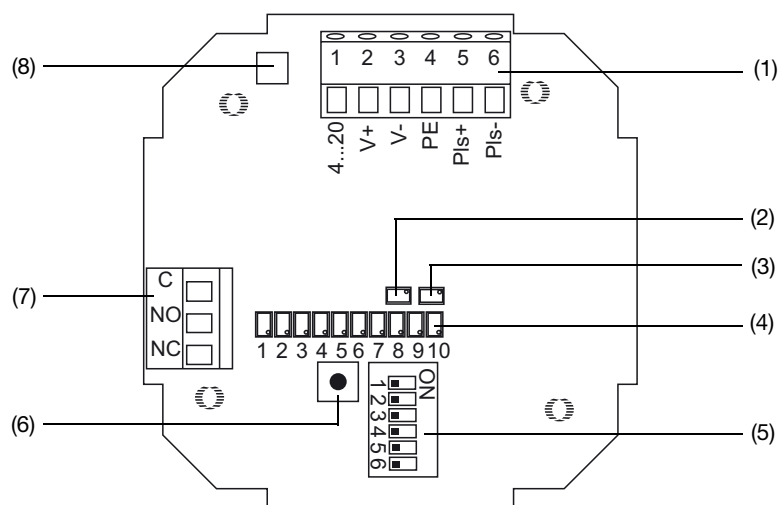
Electrical data	
Power supply voltage	DC 18 to 36 V, reverse polarity protected
Power consumption	≤ 220 mA
Output	Current: 4 to 20 mA, three wires Loop resistance: max. 1100 Ω at 36 V DC or max. 330 Ω at 18 V DC Frequency pulse: 0 to 240 Hz clock ratio: 50%, ≤ 100 mA, protected against short circuit and reverse polarity Relay: 3 A, 250 VAC, changeover contact Alarm: when exceeding scale value: 22 mA or 256 Hz Device error: 22 mA or 0 Hz
Cable gland	M20 x 1.5
Series terminals	for lines with cross-section up to 0.75 mm ²

Electrical connection

Connection	Terminal assignment
Supply voltage DC 11.5 to 36 V	 2 L+ 3 L-
Output 4 to 20 mA, three wires	 1 L+ max. 1100 Ω at 36 V DC 3 L- max. 330 Ω at 18 V DC
Output Frequency pulse	 5 Pls+ 6 Pls-
Equipotential bonding PE	4 
Screen	4 
Relay	

Terminal assignment

- (1) Connection terminals
- (2) Green display
- (3) Red display
- (4) Bar graph
- (5) DIP switch for configuration
- (6) Button
- (7) Relay connection
- (8) Switch: Sink / source



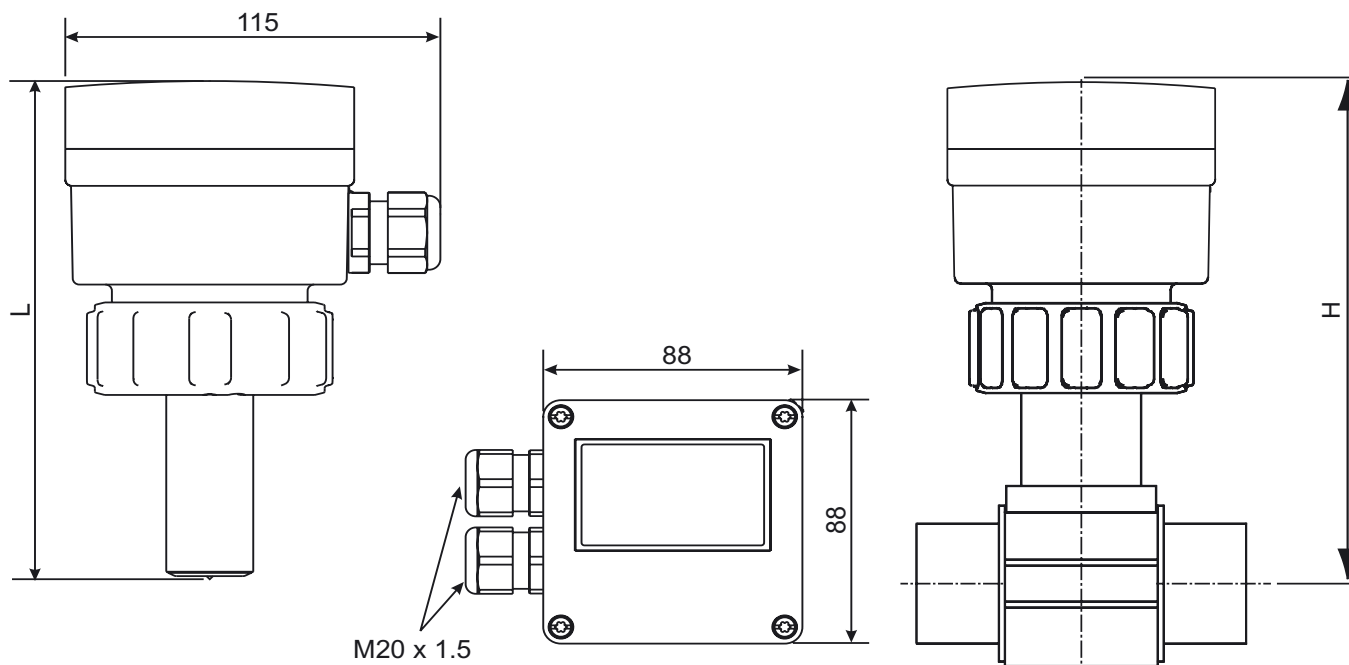
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Dimensions



Tube diameter DN	L	H Built into T fitting	Tube diameter DN	L	H Built into welded adapter
15	162	168	65	199	187
20		166	80		193
25		166	100		200
32		169	125		235
40		173	150		242
50		179	200		263
			250		281
			300		293
			350		306
			400		321

Note: suitable fittings can be found in Data Sheet 406090.

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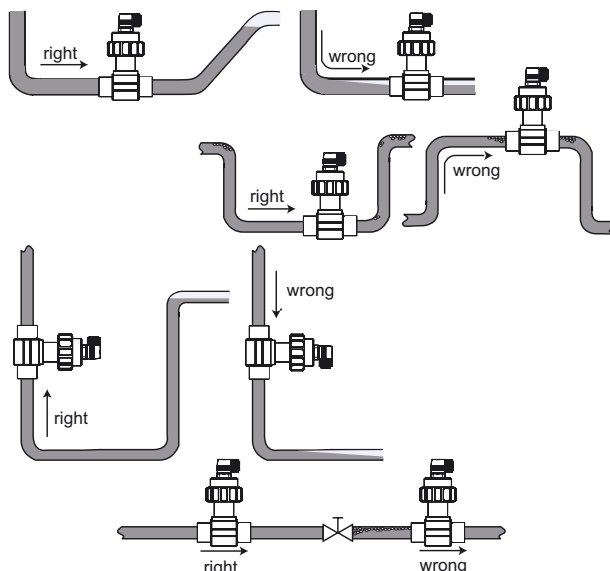
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Mounting

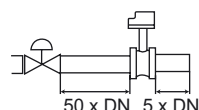
Installation

To ensure accurate flow measurements, the flow transmitter of type 406010 must be installed in vertical or horizontal tubing.

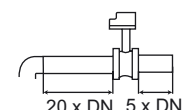


Minimum inlet and outlet distances

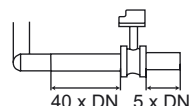
To eliminate turbulence in the tubing, the minimum inlet and outlet distances must be observed.
 To ensure greater accuracy, the length of these zones for eliminating turbulence can be increased.
 For additional information see EN ISO 5167-1.
 The direction of flow is from left to right.
 DN = Nominal tube width.



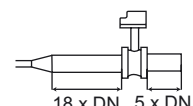
Control valve



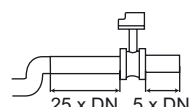
1 x 90° elbow
or T piece



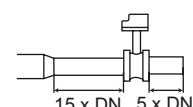
2 x 90° elbow
Three-dimensional



Extension



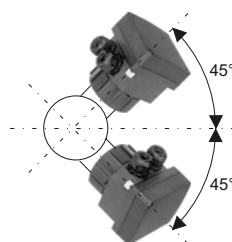
2 x 90° elbow



Reduction

Note: 45° angle installation position

We recommend installing the flow rate transmitter at an angle of 45° to the central axis of the tube!
 This will largely prevent accumulation from forming on the electrodes and measurement errors due to air bubbles.



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Mounting recommendation

Fittings for flow rate sensors - see Data Sheet 406090

PVC and stainless steel T fitting 	Nominal flow rate width DN15 to DN50	Sensor version (basic type extension) Short sensor
PE welded adapter 	Nominal flow rate width DN65 to DN100 DN125 to DN400	Sensor version (basic type extension) Short sensor Long sensor
Stainless steel welded adapter with radius 	Nominal flow rate width DN50 to DN200 DN250 to DN350	Sensor version (basic type extension) Short sensor Long sensor
PP connecting clamps 	Nominal flow rate width DN50 to DN200	Sensor version (basic type extension) Long sensor

Information for ordering: MID flow transmitter

- (1) **Basic type**
 406010 MID flow transmitter
- (2) **Basic type extension**
 001 Short sensor¹
 002 Long sensor¹
- (3) **Output**
 406 4 to 20 mA, three wires
- (4) **Electrical connection**
 82 Cable gland
- (5) **Extra codes**
 000 None

Order code (1) (2) (3) (4) (5)
 Sample order 406010 / 001 - 406 - 82 / 000

¹ See "Mounting recommendation" table above.



JUMO flowTRANS MAG I02

Electromagnetic flowmeter with display

Applications

- Industrial wastewater treatment and recovery
- Irrigation
- Drinking water
- Monitoring cleaning cycles in the foodstuff industry

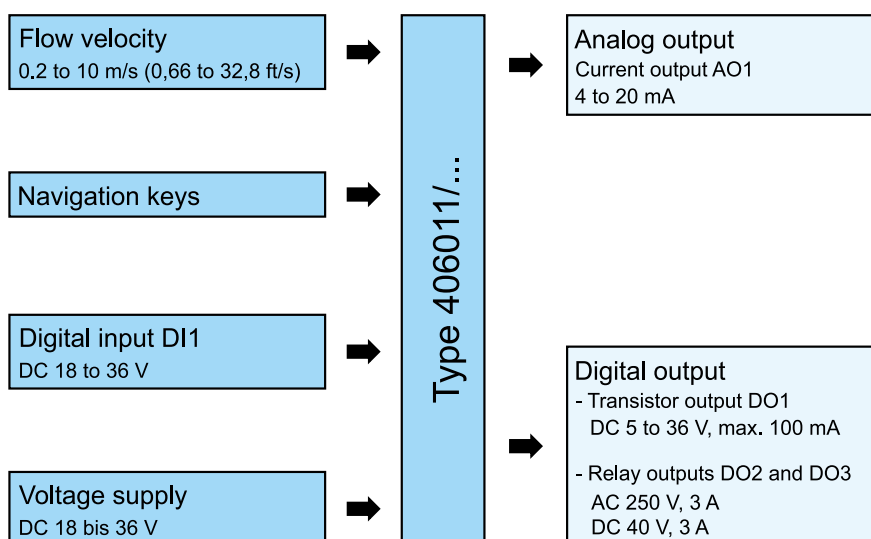
Brief description

The flowmeter is based on the magnetic-inductive measurement method. Standardized fittings (⇒ see data sheet 406090) enable easy installation of the flow meter in pipes of DN 15 to DN 400. Application areas are neutral, contaminated, or aggressive liquids with a minimum conductivity of 20 µS/cm. Flow velocities of 0.2 to 10 m/s can be measured here which generate an output signal of 4 to 20 mA and a pulse signal of 0 to 250 Hz. Two relay outputs and a digital input expand the functionality of the device. The flow rate is measured by two independent counters.



Type 406011/...

Block diagram



Special features

- Sensor without moving parts
- Display of the flow rate and volume
- Simulation of all output signals
- CIP capability
- FDA compliant materials

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Technical data

Measuring range and accuracy

Flow velocity	0.2 to 10 m/s (0,66 to 32,8 ft/s)
Measuring deviation with standard K-factor after Teach-In	$\leq \pm 3.5\%$ of the measured value ^a $\leq \pm 0.5\%$ of measured value ^a
Linearity	$\leq \pm 0.5\%$ of measuring range limit value ^b
Repeatability	$\leq \pm 0.25\%$ of measured value ^a

^a under reference conditions, i. e. measurement medium = water, ambient and water temperature = 20 °C, observing the necessary inlet and outlet sections and associated fitting (406090)

^b 10 m/s (32,8 ft/s)

Measurement media

Medium type	Neutral, contaminated, and aggressive liquids
Minimum conductivity of the medium	20 µS/cm
Viscosity	< 1000 mPas
Medium temperature ^a in conjunction with fitting made of PVC PE PP Stainless steel	0 to 50 °C (32 to 122 °F) 0 to 70 °C (32 to 158 °F) 0 to 80 °C (32 to 176 °F) -15 to +110 °C (5 to 230 °F)
Medium pressure ^a in conjunction with fitting made of PVC PE PP Stainless steel	PN 10 (145 psi) PN 10 (145 psi) PN 10 (145 psi) PN 16 (232 psi)

^a ⇒ see also "pressure temperature diagram", page 4

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Electrical data

Voltage supply	DC 18 to 36 V, filtered and regulated
Tolerance of the applied voltage	±0,5 %
Current consumption	Max. 300 mA at DC 18 V

Digital input DI1

Switching voltage	DC 18 to 36 V
Safety	Protected against polarity reversal and voltage peaks, galvanically isolated
Input impedance	15 kΩ
Minimum pulse length	200 ms
Switching thresholds	PLC level: logical „0“ < 7 V, logical „1“ > 10 V

Analog output AO1

Type	Current output
Signal range	4 to 20 mA, sink or source (depending on the connection), 22 mA for reporting faults
Load resistance	
at DC 18 V	450 Ω
at DC 24 V	700 Ω
at DC 30 V	1000 Ω
at DC 36 V	1300 Ω

Digital output DO1

Type	Transistor output (open-collector output), NPN/PNP (depending on connection)
Function (adjustable)	Pulse output (default setting), hysteresis/window mode, reverse flow direction message, generate a warning message
Pulse frequency	0 to 250 Hz
Switching voltage	DC 5 to 36 V
Switching current	Max. 100 mA
Duty cycle at f > 2 Hz	0,5
Minimum pulse length at f < 2 Hz	250 ms
Safety	Protected against excess voltage, polarity reversal, and short circuiting, galvanically isolated

Digital outputs DO2 and DO3

Type	Relay output
Function (adjustable)	Hysteresis (default setting), hysteresis/window mode, reverse flow direction message, generate a warning message
Switching output	N/O contact
Switching capacity	3 A at AC 250 V resistive load, 3 A at DC 40 V resistive load
Operating life	100000 cycles
Galvanic isolation	Mixed switching of mains voltage AC 230 V and SELV or PELV voltage is not admissible due to the basic insulation between the relays!

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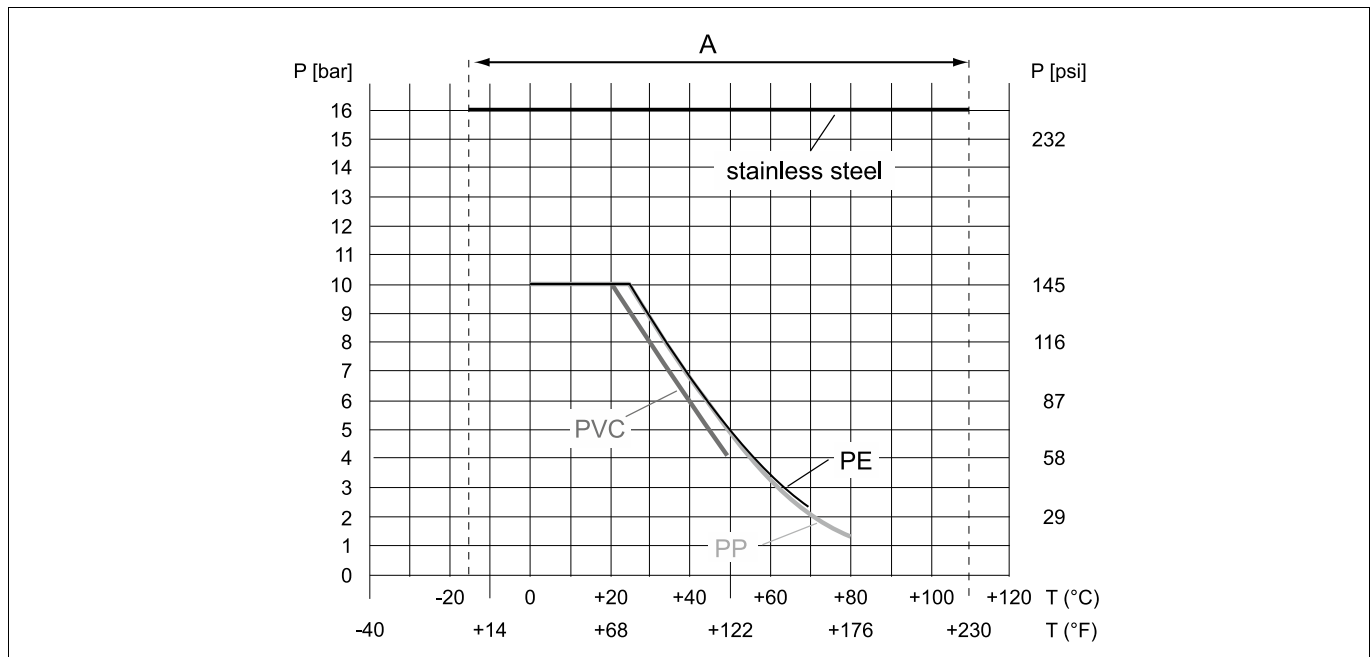
Mechanical features

Materials

Housing/seal	PPA, black/NBR
Union nut	PPA
Safety cap/seal	PSU/silicone
Front film	Polyester
M20 × 1.5 cable fittings/ seal	PA/neoprene
Screws	Stainless steel
Components in contact with the medium sensor	Stainless steel 316 L (1.4404), FKM, or EPDM, PEEK
Fitting	⇒ See data sheet 406090

Pressure temperature diagram

Relationship between the medium pressure and temperature for a device with a stainless steel sensor and a 406090 fitting made from stainless steel, PVC, PP, or PE:



Environmental influences

Wire diameter	DN 15 to DN 400 (1/2 to 16")
Fitting	Type 406090
Inlet and outlet sections	⇒ see "Inlet and outlet sections", page 8
Operating temperature range	-10 to +60 °C (14 to 140 °F)
Storage temperature range	-20 to +60 °C (-4 to +140 °F)
Relative humidity	< 85 %, non-condensing Height above sea level: max. 2000 m (6562 ft)
Protection type according to EN 60529	IP65, With connected device, screwed cable glands and screwed flap cover
EMC	EN 61000-6-3, EN 61000-6-2
Safety	EN 61010-1

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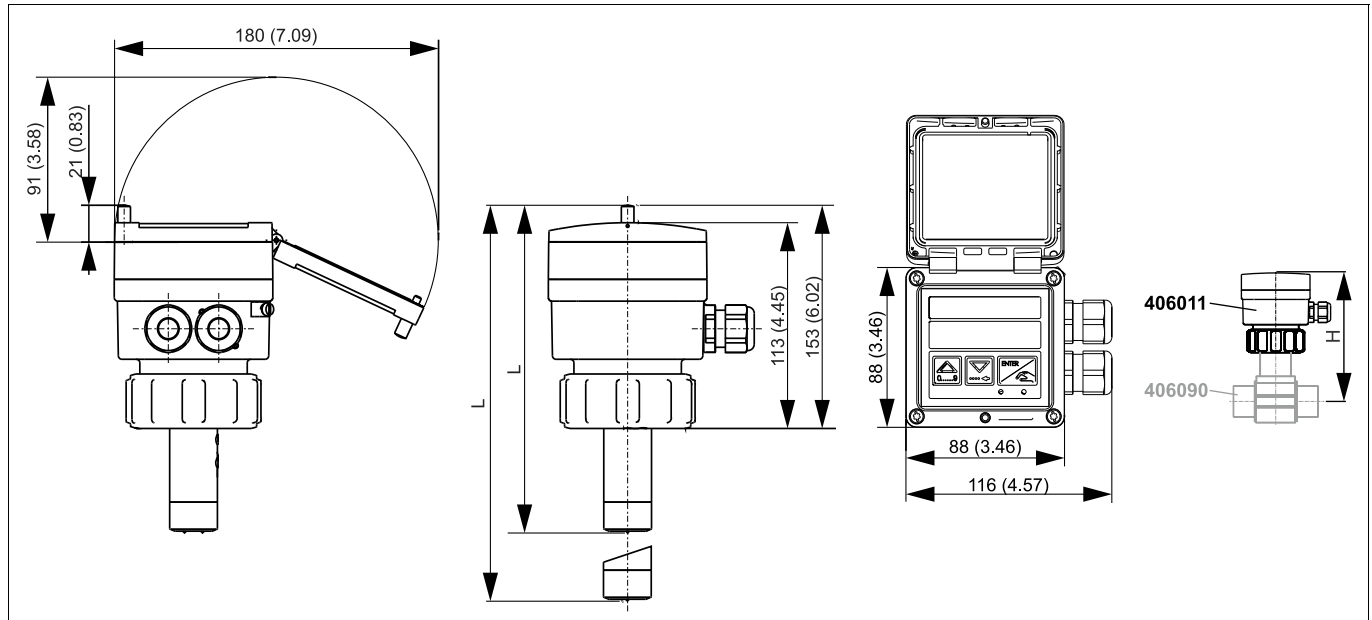
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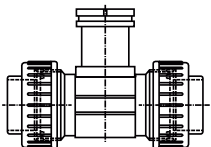
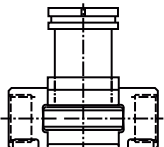
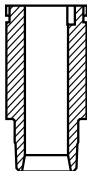
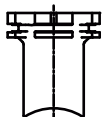
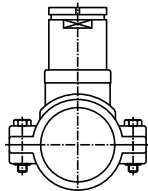
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Dimensions

Dimensions in mm (inch)



	installed in										
	T-fitting PVC		T-fitting stainless steel		Welded socket PE		Welded socket stainless steel		Connection clamp PP		
											
DN	L	H	L	H	L	H	L	H	L	H	
15 (1/2)	181 (7,13)	187 (7,36)	181 (7,13)	187 (7,36)							
20 (3/4)		185 (7,28)		185 (7,28)							
25 (1)											
32 (1 1/4)		188 (7,40)		188 (7,40)							
40 (1 1/2)		192 (7,56)		192 (7,56)							
50 (2)		198 (7,80)		198 (7,80)							
65 (2 1/2)					181 (7,13)	206 (8.11)	181 (7,13)	193 (7.60)	218 (8.58)	223 (8.78)	
80 (3)								199 (7.83)		222 (8.74)	
100 (4)								204 (8.03)		226 (8.90)	
110 (4 1/4)								214 (8.43)		231 (9.09)	
125 (5)					218 (8.58)	254 (10.00)	181 (7,13)	225 (8.86)		227 (8.94)	
150 (6)								261 (10.28)		236 (9.29)	234 (9.21)
180 (7)											244 (9.61)
200 (8)											268 (10.55)
250 (10)					218 (8.58)	282 (11.10)	181 (7,13)	257 (10.12)		280 (11.02)	
300 (12)								300 (11.81)		218 (8.58)	317 (12.48)
350 (14)								312 (12.28)			336 (13.22)
400 (16)								325 (12.8)			348 (13.70)
								340 (13.39)			

Suitable fittings ⇒ see data sheet 406090

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Connection diagram



NOTE!

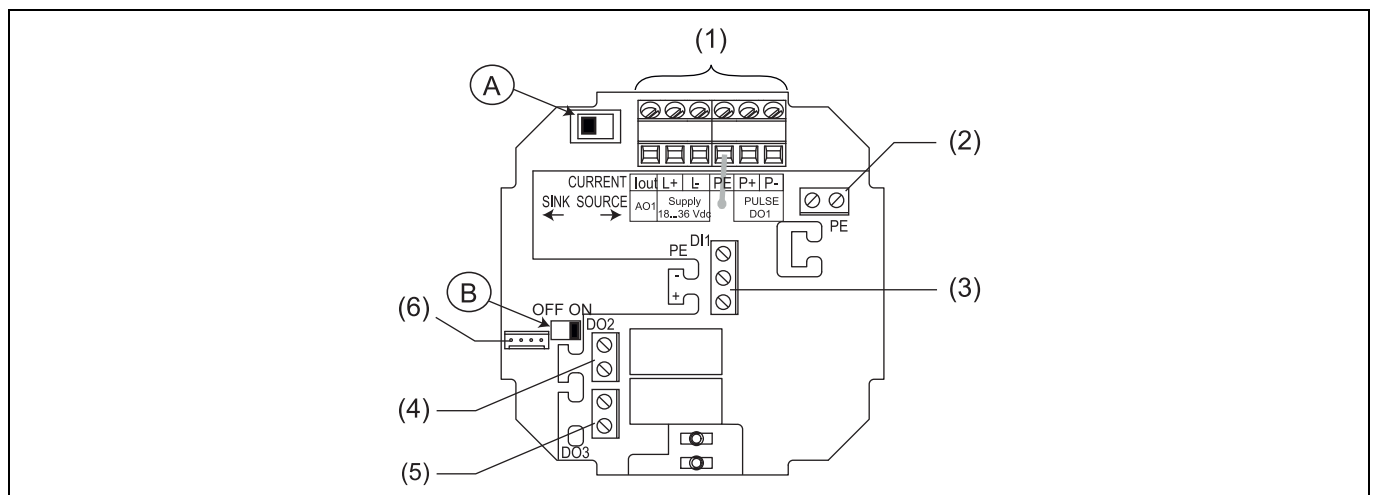
The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.



HINWEIS!

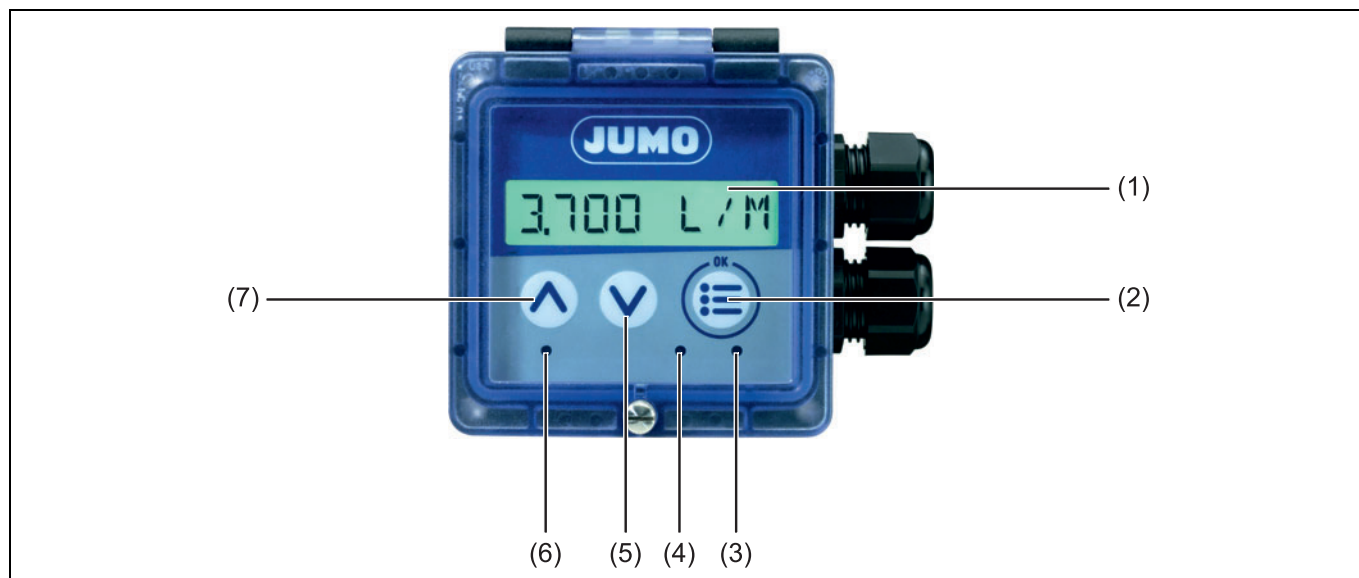
Galvanic isolation of relay outputs DO2 and DO3

Mixed switching of mains voltage AC 230 V and SELV or PELV voltage is not admissible due to the basic insulation between the relays!



- | | | | |
|-----|----------------|-------|--|
| (1) | Terminal strip | I out | Current output AO1 (4 to 20 mA) |
| | | L+ | V+ (positive power supply) |
| | | L- | 0 V (ground for the power supply) |
| | | PE | Functional ground |
| | | P+ | Positive transistor output DO1 |
| | | P- | Negative transistor output DO1 |
| (2) | Terminal strip | PE | Shielding on the supply cable and output cables of AO1 and DO1 |
| (3) | Terminal strip | PE | Functional ground for the cable for the digital input DI1 |
| | | - | Negative signal for the digital input DI1 |
| | | + | Positive signal for the digital input DI1 |
| (4) | Terminal strip | | Connection for the relay output DO2 |
| (5) | Terminal strip | | Connection for the relay output DO3 |
| (6) | Terminal strip | | 4-pin ribbon cable for connecting the sensor |
| (A) | Switch | | Sink / Source selection switch |
| (B) | Switch | | Selection switch for locking or unlocking the CONFIRM key |

Display, navigation keys and status LEDs



- (1) Digital indicator with eight digits (four numerical, four alphanumeric)
- (2) CONFIRM key: to select the displayed function, confirm settings
- (3) Status LED for the relay DO3 (LED on = contact closed)
- (4) Status LED for the relay DO2 (LED on = contact closed)
- (5) To read messages, to scroll down through the functions, to select the digit on the left
- (6) Device status LED ⇒ see table below
- (7) To scroll up through the functions, to increase the selected digit

Device status LED	Device status
Green	The device is working properly.
Orange	A warning message has been generated.
Red	An error message has been generated and the current output AO1 emits 22 mA.
Flashing, regardless of the color	<ul style="list-style-type: none"> The digital input DI1 is active The checking function for proper output response is active Calibration of the zero flow rate is active The daily counter is held at zero

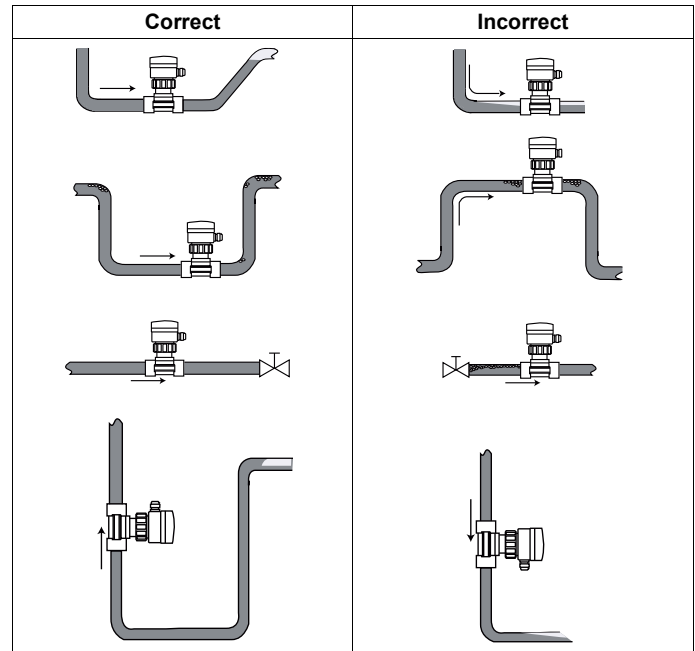
Mounting

Installation

The device can be installed in either a horizontal or vertical pipeline.

Make sure that:

- The section of pipe around the sensor is always filled.
- The direction of flow (arrow) points upwards when installing vertically.
- The formation of bubbles is avoided in the pipeline containing the device.
- The device is always installed upstream from discharge points for liquids with increased conductivity (e.g.: acids, bases, salt solutions).



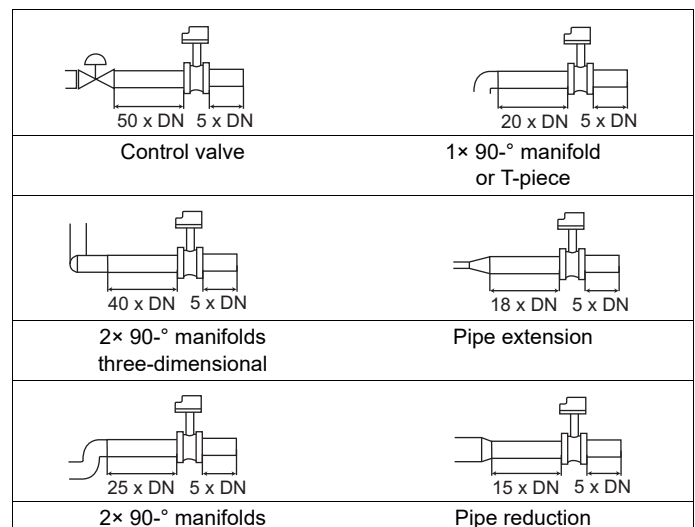
Inlet and outlet sections

To calm the flow in the pipeline, the specified inlet and outlet sections are required at the very least.

For increased accuracy, you can make these sections of contact longer.

Direction of flow: from left to right.

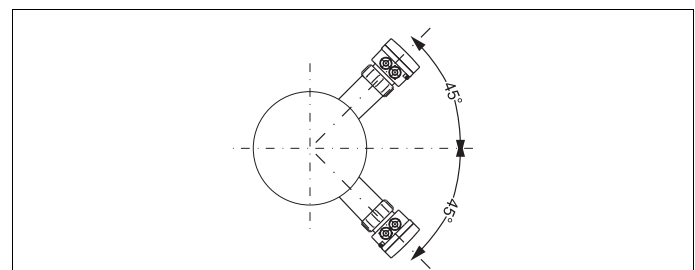
DN = Nominal pipe width



45° angle installation position

We recommend installing the flow rate transmitter at a 45° to the pipe's central horizontal axis.

This helps to avoid the majority of deposits on the measuring electrodes and measuring errors caused by air bubbles.



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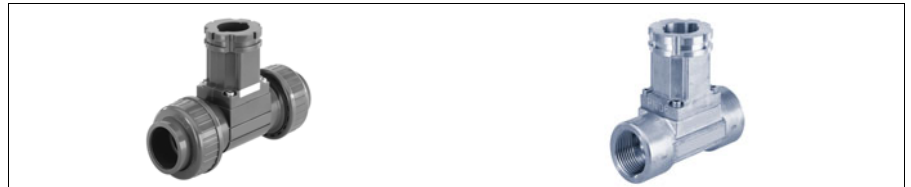


Installation recommendation

Fittings for flow sensors ⇒ see data sheet 406090.

PVC and stainless steel T-fitting

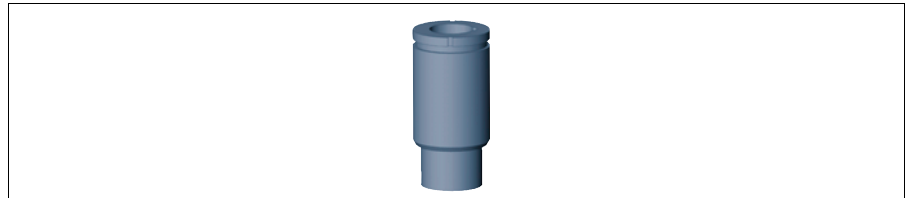
DN 15 to DN 50, short sensor



PE welded socket

DN 65 to DN 100, short sensor

DN 125 to DN 400, long sensor



Stainless steel welded socket with radius

DN 50 to DN 200, short sensor

DN 250 to DN 350, long sensor



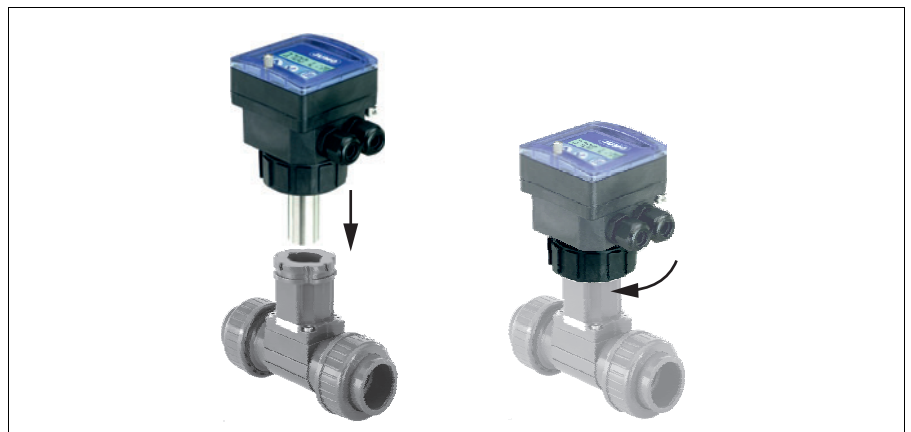
PP connection clamps

DN 50 to DN 200, long sensor



Mounting example

Flow transmitter with fitting



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Order details

(1) Basic type	
406011	JUMO flowTRANS MAG I02 with display
(2) Sensor version	
001	Short sensor (depending on the selected fitting)
002	Long sensor (depending on the selected fitting)
(3) Sensor material	
20	Stainless steel 1.4404/316 L
(4) Measuring electrode material	
01	Stainless steel 1.4404/316 L
(5) Output	
480	4 to 20 mA, three wire, open collector, 2× relays
(6) Electrical connection	
82	Cable fitting
(7) Voltage supply	
5	DC 18 to 36 V

Order code (1) (2) (3) (4) (5) (6) (7)
 Order example 406011 / X - 20 - 01 - 480 - 82 - 5

Spare parts and accessories

Designation	Part no.
PC lid, with flap, window, screws and adhesive film	693539
PPA lid, with flap, window, screws and adhesive film	693548
Set with 2 cable fittings M20 × 1.5 2 flat seals made from CR for cable fittings or screw plugs 2 screw plugs M20 × 1.5 2 multiway seals 2 × 6 mm	693568
Set with 2 reductions M20 × 1.5/NPT 1/2" (with mounted seal) 2 flat seals made from CR for screw plugs 2 screw plugs M20 × 1.5	693590
Set with 1 plug for cable fitting M20 × 1.5 1 multiway seal 2 × 6 mm, for cable fitting 1 green seal made from FKM 1 installation instruction	693607
Set with 1 green seal made from FKM 1 black seal made from EPDM	693610
Set with 1 plug for cable fitting M20 × 1.5 1 multiway seal 2 × 6 mm, for cable fitting	693612
Circlip	693620
PC union nut for PC housing	693625
PPA union nut for PPA housing	693627