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# JUMO flowTRANS MAG I02

## Electromagnetic flowmeter with display

### Applications

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

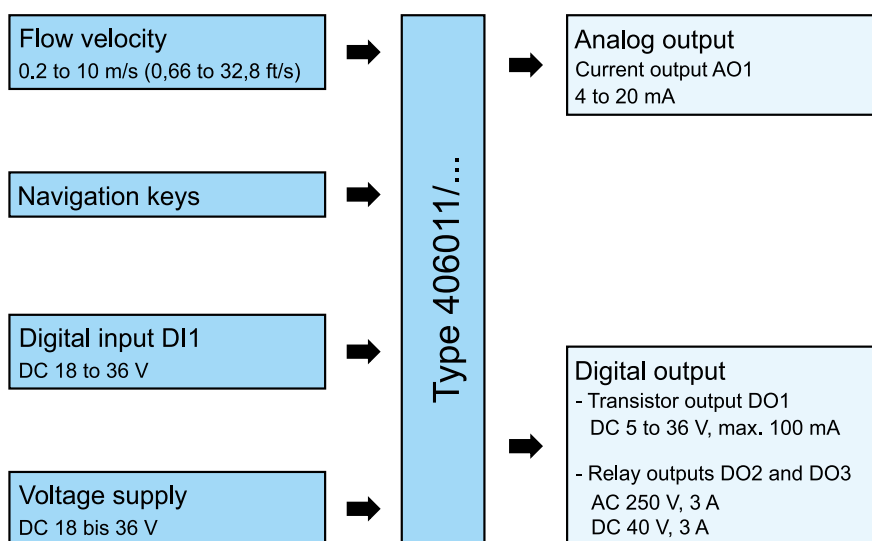
### Brief description

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	≤ ±3.5 % of the measured value <sup>a</sup> ≤ ±0.5 % of measured value <sup>a</sup>
Linearity	≤ ±0.5 % of measuring range limit value <sup>b</sup>
Repeatability	≤ ±0.25 % of measured value <sup>a</sup>

<sup>a</sup> 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)

<sup>b</sup> 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 <sup>a</sup> in conjunction with fitting made of	
PVC	0 to 50 °C (32 to 122 °F)
PE	0 to 70 °C (32 to 158 °F)
PP	0 to 80 °C (32 to 176 °F)
Stainless steel	-15 to +110 °C (5 to 230 °F)
Medium pressure <sup>a</sup> in conjunction with fitting made of	
PVC	PN 10 (145 psi)
PE	PN 10 (145 psi)
PP	PN 10 (145 psi)
Stainless steel	PN 16 (232 psi)

<sup>a</sup> ⇒ 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	<b>Mixed switching of mains voltage AC 230 V and SELV or PELV voltage is not admissible due to the basic insulation between the relays!</b>

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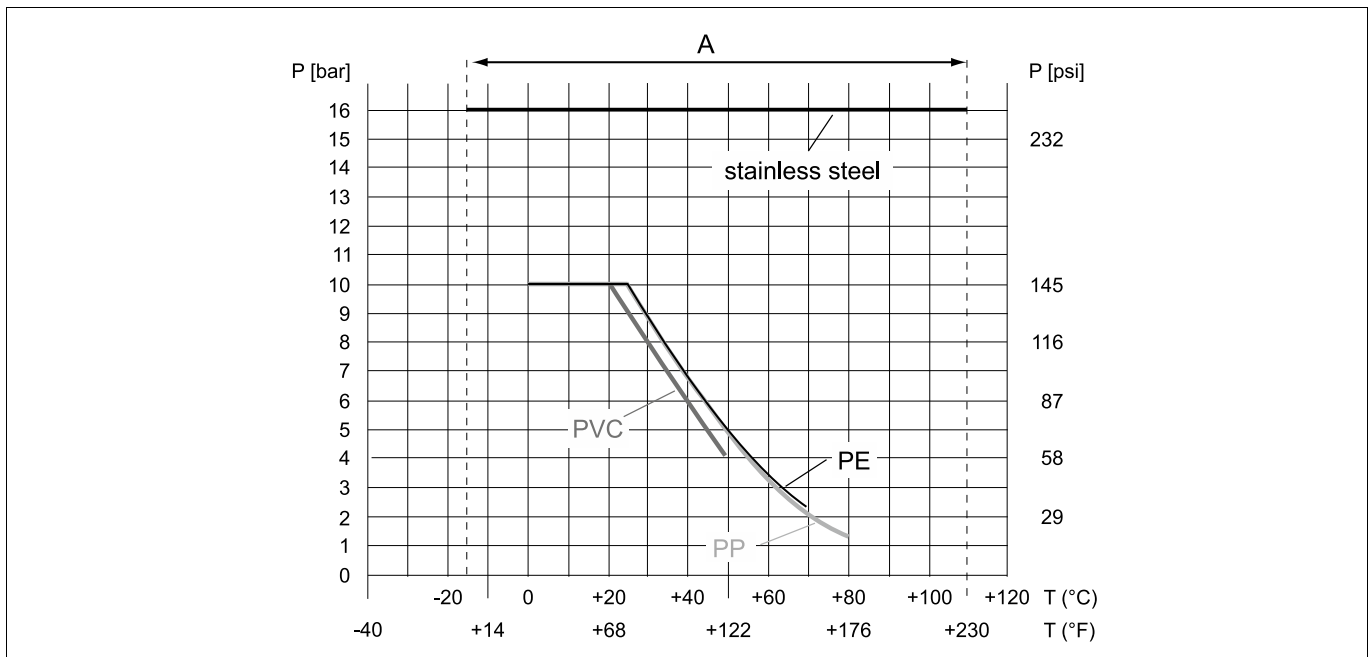
## Mechanical features

### Materials

Housing/seal	PPA, black/NBR
Union nut	PPA
Safety cap/seal	PSU/silicone
Front film	Polyester
M20 x 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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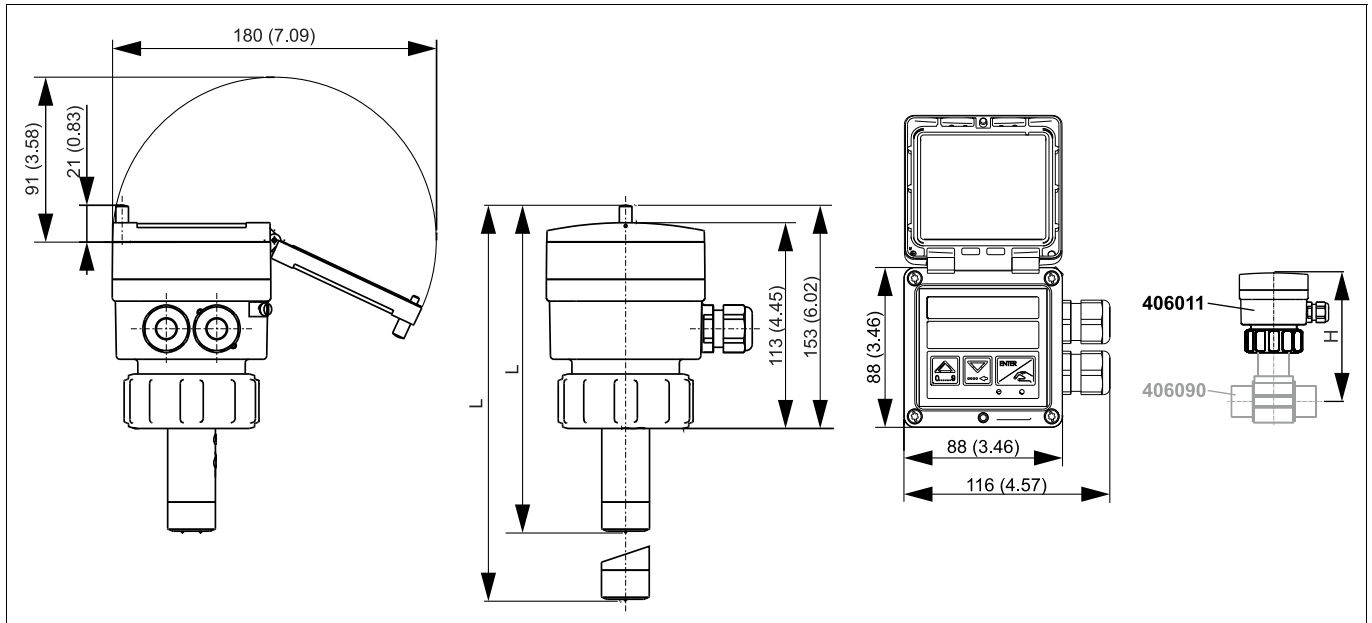
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# Dimensions

## Dimensions in mm (inch)



DN	installed in		T-fitting stainless steel		Welded socket PE		Welded socket stainless steel		Connection clamp PP		
	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)						212 (8.35)		199 (7.83)		222 (8.74)	
100 (4)						219 (8.62)		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)		234 (9.21)	
150 (6)						261 (10.28)		236 (9.29)		244 (9.61)	
180 (7)										268 (10.55)	
200 (8)					218 (8.58)	282 (11.10)	181 (7,13)	257 (10.12)		280 (11.02)	
250 (10)						300 (11.81)		218 (8.58)		317 (12.48)	
300 (12)						312 (12.28)				336 (13.22)	
350 (14)						325 (12.8)		348 (13.70)			
400 (16)						340 (13.39)					

Suitable fittings ⇒ see data sheet 406090

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## Connection diagram



### NOTE!

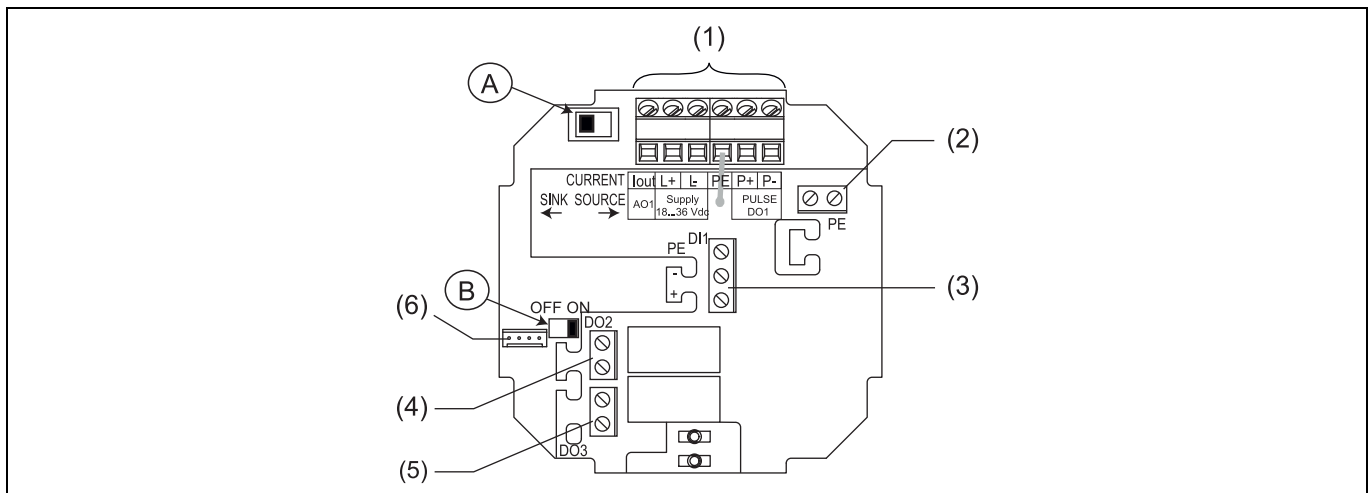
The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical compliance with the safety information and warnings contained 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      |

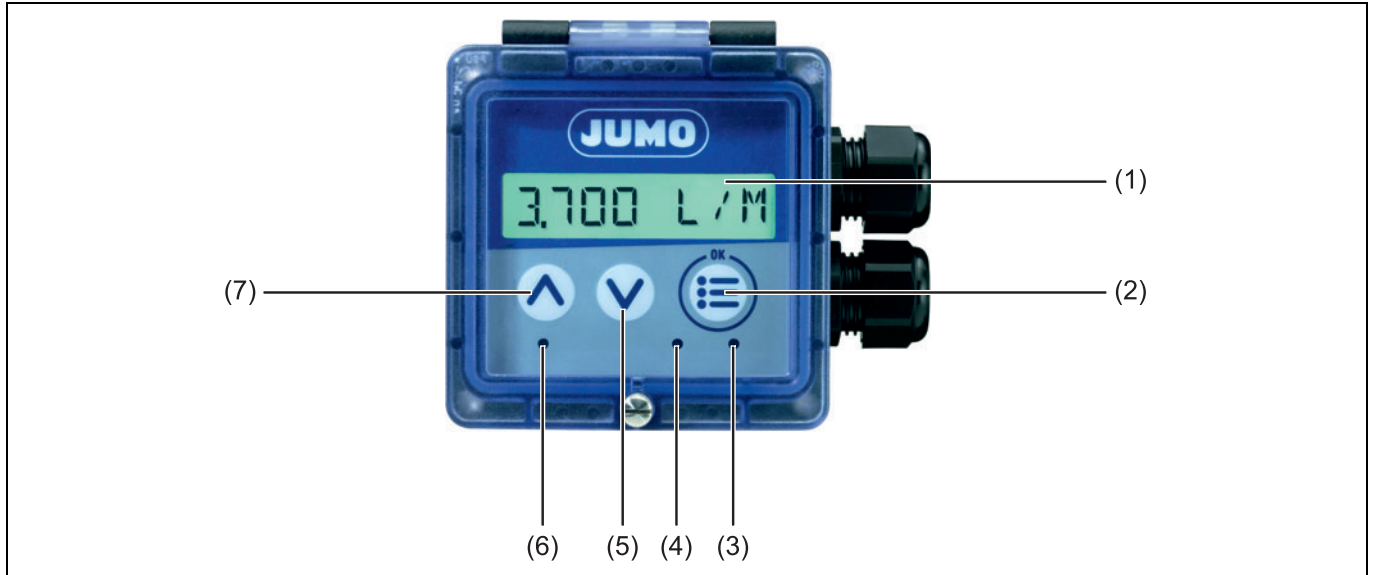
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## Display, navigation keys and status LEDs



- (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"> <li>• The digital input DI1 is active</li> <li>• The checking function for proper output response is active</li> <li>• Calibration of the zero flow rate is active</li> <li>• The daily counter is held at zero</li> </ul>

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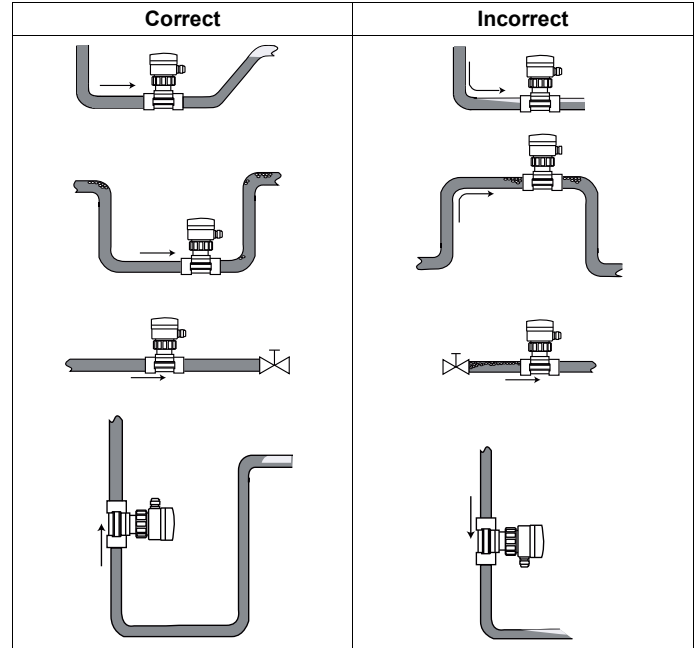
# Mounting

## 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).



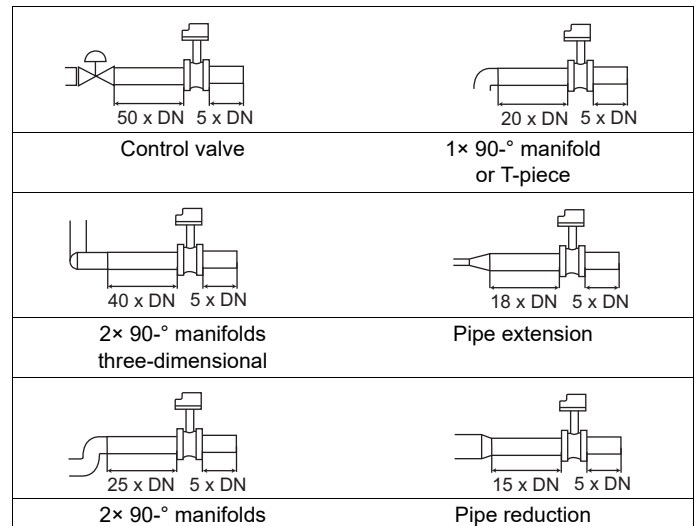
## Inlet and outlet sections

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.

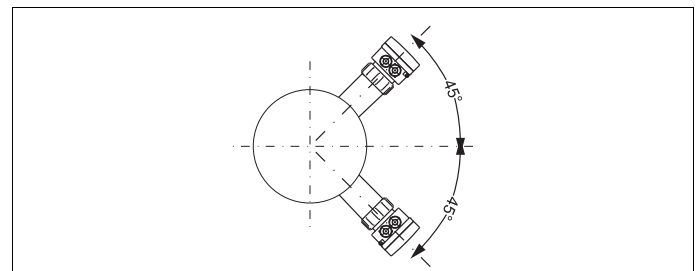
DN = Nominal pipe width



## 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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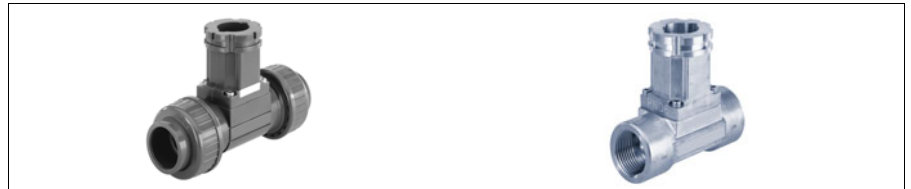


## Installation recommendation

Fittings for flow sensors ⇒ see data sheet 406090.

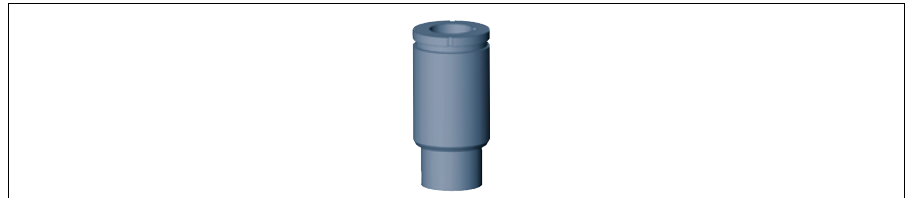
### PVC and stainless steel T-fitting

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



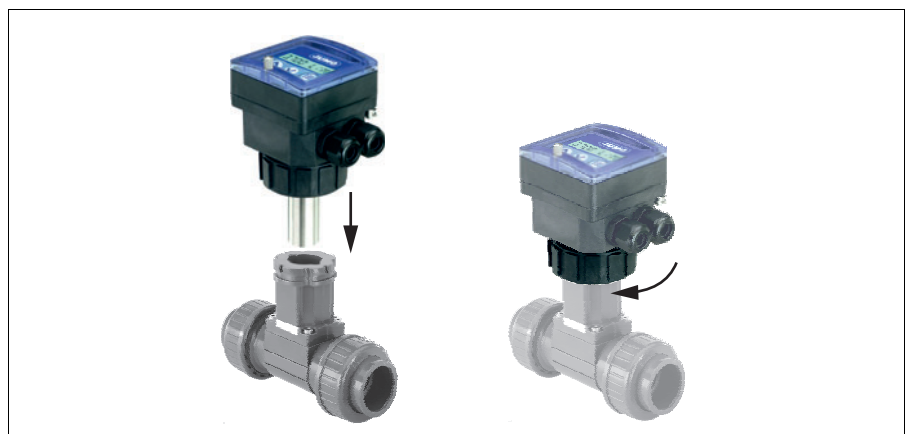
### PP connection clamps

DN 50 to DN 200, long sensor



## Mounting example

Flow transmitter with fitting



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## Order details

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

Order code                             /  -  -  -  -  -   
 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