OneTemp pty ltd
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JUMO

More than sensors + automation

Flow

Innovative solutions for the toughest requirements

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Flow measurement

Flow measurement is an important measurement task in many industries, especially where the quantity or velocity of liquids or gases must be measured. The JUMO product range offers the right measuring device for a variety of applications: from paddlewheel sensors to highly complex electromagnetic flow-meters.

This way to your product

The following criteria should be considered during the planning phase when finding the suitable measuring device for an application:

- Flow area
- Nominal width
- Installation conditions
- Accuracy
- Pressure and temperature
- Pressure loss
- Choice of material on the basis of corrosion and abrasion resistance
- Measuring task

If several measuring principles are available, acquisition costs, user-friendliness, and maintenance costs can also play an important role in the selection. The exact definition of the application is decisive for the perfect choice. JUMO will then provide you with expert support in selecting the optimum measuring system.

The right measuring device for your application

	Magnetic-inductive		Calorimetric	Paddlewheel	Differential pressure	
						
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JUMO product	JUMO flowTRANS MAG I series	JUMO flowTRANS MAG S and H series	JUMO PINOS L02	JUMO flowTRANS PW I01	JUMO flowTRANS DP R series	JUMO flowTRANS DP P series
Installation	Insertion	Inline	Insertion	Insertion	Inline	Insertion
Accuracy	3.5 % of the measured value	0.2 % of the measured value	8 % of the measuring range end value	2.5 % of the measured value	0.5 % of the measured value*	1 % of the measured value*
Inlet and outlet sections	–	+	±	–	±	±
Expenses	±	–	+	±	–	–
Maintenance effort	±	+	±	–	±	±
Applications with conductive liquids	✔	✔	✔	✔	✔	✔
Applications with non-conductive liquids	✗	✗	✔	✔	✔	✔
Applications with gas or steam	✗	✗	✗	✗	✔	✔
Approvals	None	Ex; SIL	None	None	Ex	Ex

* = uncertainty of the primary element

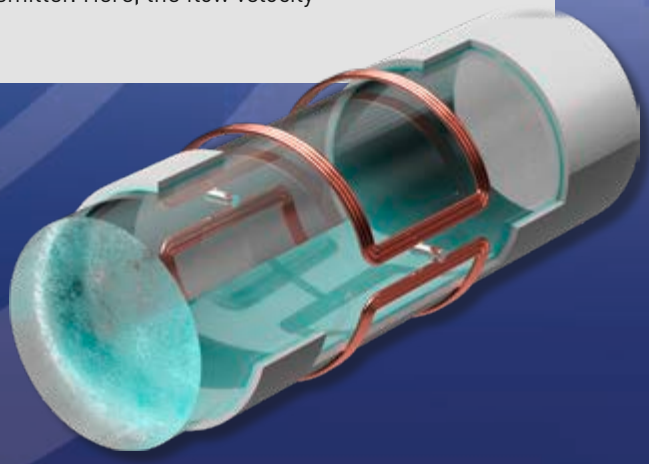
+ = low ± = medium – = high ✔ = suitable ✗ = unsuitable

Electromagnetic flowmeters

JUMO offers electromagnetic flowmeters especially for flow measurements in liquids with an electrical conductivity greater than 5 µS/cm. The devices in the JUMO flowTRANS MAG series were designed for the process industry. They are used in various liquid media with different features (e.g. for viscosity, concentration, and density). Examples of these media include water, drinking water, wastewater, pastes, acids, solvents, sludge, fruit juices, and puree.

The measuring principle

The Faraday laws of induction provide the basis for the electromagnetic flow measurement. If a conductor or conductive liquid moves through a magnetic field, an electrical voltage is induced. The induced voltage is guided through 2 opposite measuring electrodes to a transmitter. Here, the flow velocity is proportional to the induced voltage.



Electromagnetic flowmeters

JUMO flowTRANS MAG S series

Designation	JUMO flowTRANS MAG S01/02	JUMO flowTRANS MAG S10
Data sheet	Sensor: 406012, 406013 Transmitter: 406018, 406019	Sensor: 406060 Transmitter: 406067
Type of installation	Inline	
Nominal width	DN 3 to DN 2000	
Nominal pressure	PN 6 to PN 100	PN 6 to PN 40
Measuring accuracy	0.3 % (optional: 0.2 %) of the measured value	0.5 % of the measured value
Process connection	Flange according to DIN, ASME, JIS	
Lining material	PTFE; hard rubber; soft rubber; PFA; ETFE; ceramic carbide (more upon request)	PTFE; hard rubber; soft rubber; PFA; ETFE (more upon request)
Measuring electrode material	Stainless steel: 1.4539, 1.4571; HASTELLOY® B-3 (2.4600), HASTELLOY® C-4 (2.4610); titanium; tantalum; platinum-iridium; tungsten carbide; double layer; wolfram carbide	Stainless steel: 1.4571, HASTELLOY® B-3 (2.4600), HASTELLOY® C-4 (2.4610); titanium; tantalum; platinum-iridium
Maximum medium temperature	180 °C	130 °C
Input and output	Analog output 4 to 20 mA; HART®; digital input; digital output	Analog output 4 to 20 mA; digital output 1 and 2 (passive)
Communication	HART® (standard); PROFIBUS PA; FOUNDATION Fieldbus	–
Protection type	IP65; IP67; IP68 (remote mount design type); NEMA 4X	IP65; IP67; IP68 (remote mount design type)
Voltage supply	AC 100 to 230 V; AC/DC 24 V	AC 100 to 240 V; DC 24 to 48 V

Electromagnetic flowmeters

JUMO flowTRANS MAG H series

Designation	JUMO flowTRANS MAG H01/02	JUMO flowTRANS MAG H10
Data sheet	Sensor: 406015, 406016 Transmitter: 406018, 406019	Sensor: 406061 Transmitter: 406067
Type of installation	Inline	
Nominal width	DN 1 to DN 100	DN 3 to DN 100
Nominal pressure	PN 10 to PN 40	
Measuring accuracy	0.3 % (optional: 0.2 %) of the measured value	0.5 % of the measured value
Process connection	Screw connection according to DIN; welded socket according to DIN, ISO; Tri-Clamp according to DIN, ASME BPE; connection flange; flange according to DIN, ASME, JIS; 1/8" sanitary connection; external thread according to DIN, ISO	Screw connection according to DIN; welded socket according to DIN, ISO; Tri-Clamp according to DIN, ASME BPE; connection flange; flange according to DIN, ASME, JIS; external thread according to DIN, ISO
Process connection material	Stainless steel with seal (EPDM, silicone) and fastening; PVC, POM, and stainless steel (with 1/8" sanitary connection)	Stainless steel with seal (EPDM, silicone) and fastening
Lining material	PFA (as of DN 3); PEEK (for DN 1 to DN 2)	PFA
Measuring electrode material	Stainless steel 1.4539, 1.4571; HASTELLOY® B-3 (2.4600), HASTELLOY® C-4 (2.4610); tantalum; titanium; platinum-iridium (more upon request)	
Maximum medium temperature	180 °C	130 °C
Input and output	Analog output 4 to 20 mA; HART®; digital input; digital output	Analog output 4 to 20 mA; digital output 1 and 2 (passive)
Communication	HART® (standard); PROFIBUS PA; FOUNDATION Fieldbus	–
Protection type	IP65; IP67; IP68 (remote mount design type); NEMA 4X	IP65; IP67; IP68 (remote mount design type)
Voltage supply	AC 100 to 230 V; AC/DC 24 V	AC 100 to 240 V; DC 24 to 48 V
Special feature	FDA compliant	

Electromagnetic flowmeters

JUMO flowTRANS MAG I series

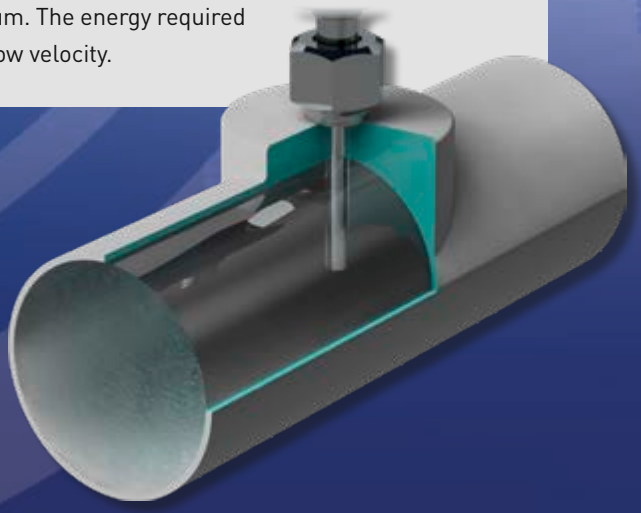
Designation	JUMO flowTRANS MAG I01	JUMO flowTRANS MAG I02
Data sheet	406010	406011
Type of installation	Insertion	
Nominal width	DN 15 to DN 400	
Nominal pressure	Up to PN 16	
Measuring accuracy	≤ ± 3.5 % of the measured value (standard calibration factor) ≤ ± 0.5 % of the measured value (Teach-In)	
Measuring range	0.2 to 10 m/s	
Parts in contact with medium	Stainless steel 316L (1.4404); FKM or EPDM; PEEK	
Minimum conductivity	20 µS/cm	
Maximum medium temperature	150 °C	110 °C
Input and output	4 to 20 mA (three-wire); frequency; relay	4 to 20 mA (three-wire); frequency; 2 × relay; digital input
Protection type	IP65	
Voltage supply	DC 18 to 36 V	
Special feature	–	With display
Accessories	T-fittings made of PVC or stainless steel; PE or stainless steel welded socket; PP connection clamps (type 406090)	

Calorimetric flow sensors

The JUMO PINOS L02 is available for flow measurements in liquids, regardless of whether they are conductive or not. This device functions according to the calorimetric measuring principle so that it does not require any wear-prone mechanical parts. The device is suitable for measuring flow velocities, but can also be used for monitoring pumps, cooling circuits, and heat exchangers.

The measuring principle

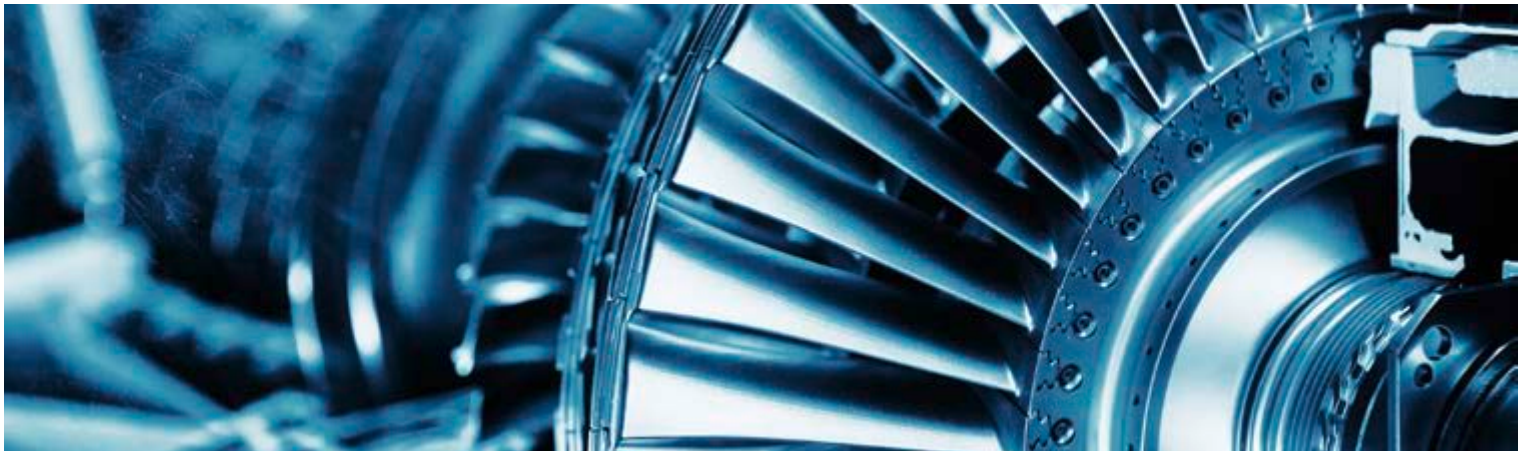
The calorimetric measuring principle is based on the cooling of a heating element from which heat is extracted by the passing medium. A reference sensor is installed in the heating element to measure the temperature of the medium. The temperature of the heating element is regulated to a fixed temperature difference in relation to the flowing medium. The energy required to maintain the temperature difference is a measure of the flow velocity.



Calorimetric flow sensors

JUMO PINOS L02

Designation	JUMO PINOS L02
Data sheet	406041
Nominal width	DN 20 to DN 300
Nominal pressure	Up to PN 75
Measuring accuracy	Flow: 8 % of the measuring range end value Temperature: ± 1 °K
Measuring range	Flow: 0 to 300 cm/s Temperature: -25 to +90 °C
Parts in contact with medium	Stainless steel 316L, 316Ti (1.4404, 1.4571); sealing material FPM
Maximum medium temperature	-25 to +90 °C
Input and output	4 to 20 mA (three-wire); 1 × PNP switching output; 1 × PNP switching output, and 1 × analog output
Protection type	IP65; IP67
Voltage supply	DC 24 V ± 10 %
Special feature	Direction-independent mounting (360°); robust design for difficult environmental influences
Accessories	Welded socket; Screw-in adapter; PVC spigot; PVC T-piece

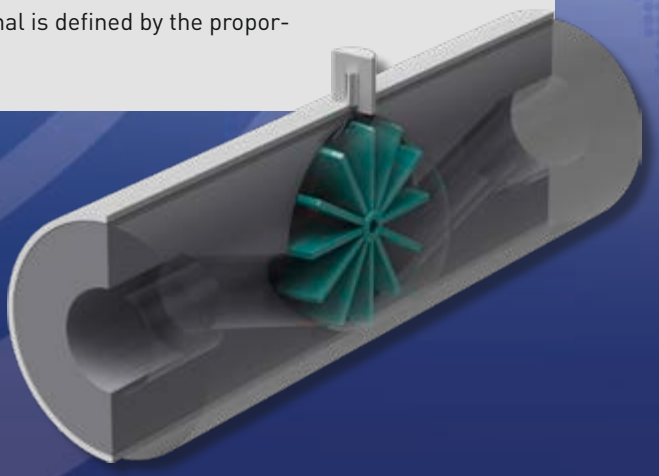


Paddlewheel flowmeters

A simple flow measurement in liquids can be carried out with the JUMO flowTRANS MAG PW I01 paddlewheel flowmeter. This device consists of a sensor and a paddlewheel. The paddlewheel technology allows flows in a wide variety of liquids to be measured and monitored. The measuring device can be used universally in many applications and is ideally suited for installation in confined spaces.

The measuring principle

The paddlewheel technology is based on a contactless transfer of the rotary motion into a frequency signal. The flowing liquid sets the paddlewheel in motion. The permanent magnets used in the paddlewheel, which are not in contact with the medium, generate a frequency signal which is proportional to the flow velocity of the liquid. The conversion of the flow velocity into a flow signal is defined by the proportionality factor K.



Paddlewheel flowmeters

JUMO flowTRANS MAG PW I01

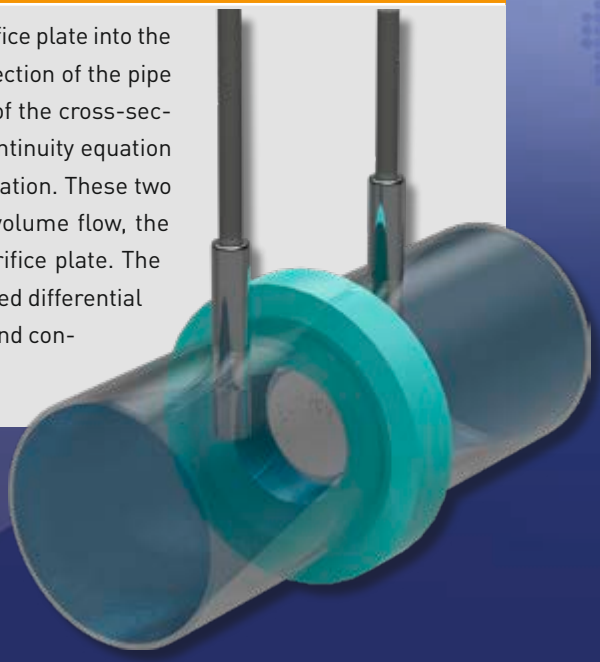
Designation	JUMO flowTRANS MAG I01
Data sheet	406020
Nominal width	DN 20 to DN 400
Nominal pressure	Up to PN 10
Measuring accuracy	≤ ± 2.5 % of the measured value (standard calibration factor) ≤ ± 1 % of the measured value (Teach-In)
Measuring range	0.3 to 10 m/s
Parts in contact with medium	PVDF, ceramic, FKM, or EPDM
Maximum medium temperature	80 °C
Input and output	Frequency (three-wire)
Protection type	IP65
Voltage supply	DC 12 to 36 V
Accessories	T-fittings made of PVC or stainless steel; PE or stainless steel welded socket; PP connection clamps (type 406090)

Flowmeters according to the differential pressure principle

Flow measurement according to the differential pressure principle is used especially in gases and steam, but also in all liquids. For this purpose JUMO offers devices from the JUMO flowTRANS DP P and JUMO flowTRANS DP R series, which are based on differential pressure measurement. You can measure the flow using either a pitot tube or orifice plate. The generated differential pressure is acquired with the JUMO dTRANS p02 or JUMO dTRANS p20 DELTA differential pressure transmitter and converted into a proportional flow signal.

The measuring principle

The differential pressure method involves the installation of an orifice plate into the pipe as a measuring insert. The orifice plate reduces the cross section of the pipe and causes a pipe flow constriction. As a result of the reduction of the cross-section, the flow speed of the medium increases according to the continuity equation and the static pressure decreases according to the Bernoulli equation. These two relations can be related to the volume flow. To determine the volume flow, the static pressure is measured immediately before and after the orifice plate. The differential pressure is calculated from these values. The generated differential pressure is measured with the differential pressure transmitter and converted into a proportional flow signal.



Flowmeters according to the differential pressure principle

JUMO flowTRANS DP P and JUMO flowTRANS DP R

Designation	JUMO flowTRANS DP P01/P02/P03/P04	JUMO flowTRANS DP R01/R02
Data sheet	409601	409602
Nominal width	DN 25 to DN 2000	DN 10 to DN 1000
Nominal pressure	Up to PN 100	Up to PN 400
Measuring accuracy	1 % of the measured value*	0.5 % of the measured value*
Process connection	Ring nut screw connection, flange	Flange according to DIN or ASME
Installation	Insertion	Inline
Product variant	Dynamic pressure pipe	Orifice plate
Material in contact with medium	Stainless steel1.4571 (more upon request)	Stainless steel 1.4404 (more upon request)
Maximum medium temperature	Up to 1175 °C	Up to 450 °C

Differential pressure transmitter for the primary element

Designation	JUMO dTRANS p02 DELTA	JUMO dTRANS p20 DELTA
Data sheet	404382	403022
Measuring ranges	60 mbar; 250 mbar; 1 bar; 4 bar; 25 bar	10 mbar; 1 bar; 6 bar; 100 bar
Linearity	≥ ± 0.1 % of the measuring range end	≥ ± 0.07 % of the measuring range end
Nominal pressure	PN 160; optionally PN 420	PN 02 (for 10 mbar); PN 210 (not for 10 mbar); optionally PN 420 (not for 10 mbar)
Medium temperature	Up to 120 °C	Up to 110 °C
Output	4 to 20 mA (two-wire); HART®	
Approval	Ex	Ex; SIL

* = uncertainty of the primary element

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