JUMO

More than sensors + automation

Pressure

Innovative solutions for the toughest requirements

Contact:
Phone: +49 661 6003-715
Email: pressuremeasurement@jumo.net

Dear Readers,

Sensor technology is one of our core areas of expertise – particularly in the field of pressure sensor technology as we produce both the pressure sensors and the electronics ourselves. The high quality of our products is the result of more than 30 years of knowledge and experience – and the motivation to continually improve ourselves.

We attach just as much importance to new developments as to the continuous improvement of existing products. At the same time, we continuously streamline our production methods to ensure that we can stay competitive and flexible. As a universal supplier for all industrial sectors, JUMO develops standard devices and customized versions both in small and large quantities with the same diligence and commitment.

Why is this diversity so important to us? Because we do not only want to be among the best in Germany but also in all other markets throughout the world. As a result, we make sure that all our products meet the current standards, directives, and laws.

This brochure gives an overview of JUMO's extensive range of products for pressure measurement technology. In addition, we would be happy to work with you to attain solutions that are tailored to your specific requirements. We look forward to hearing from you.

Further information about our products can be found at www.jumo.net using the specified type designation or data sheet number. auf.

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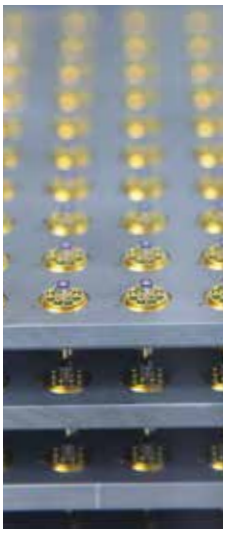

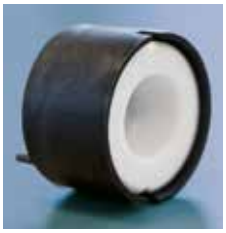

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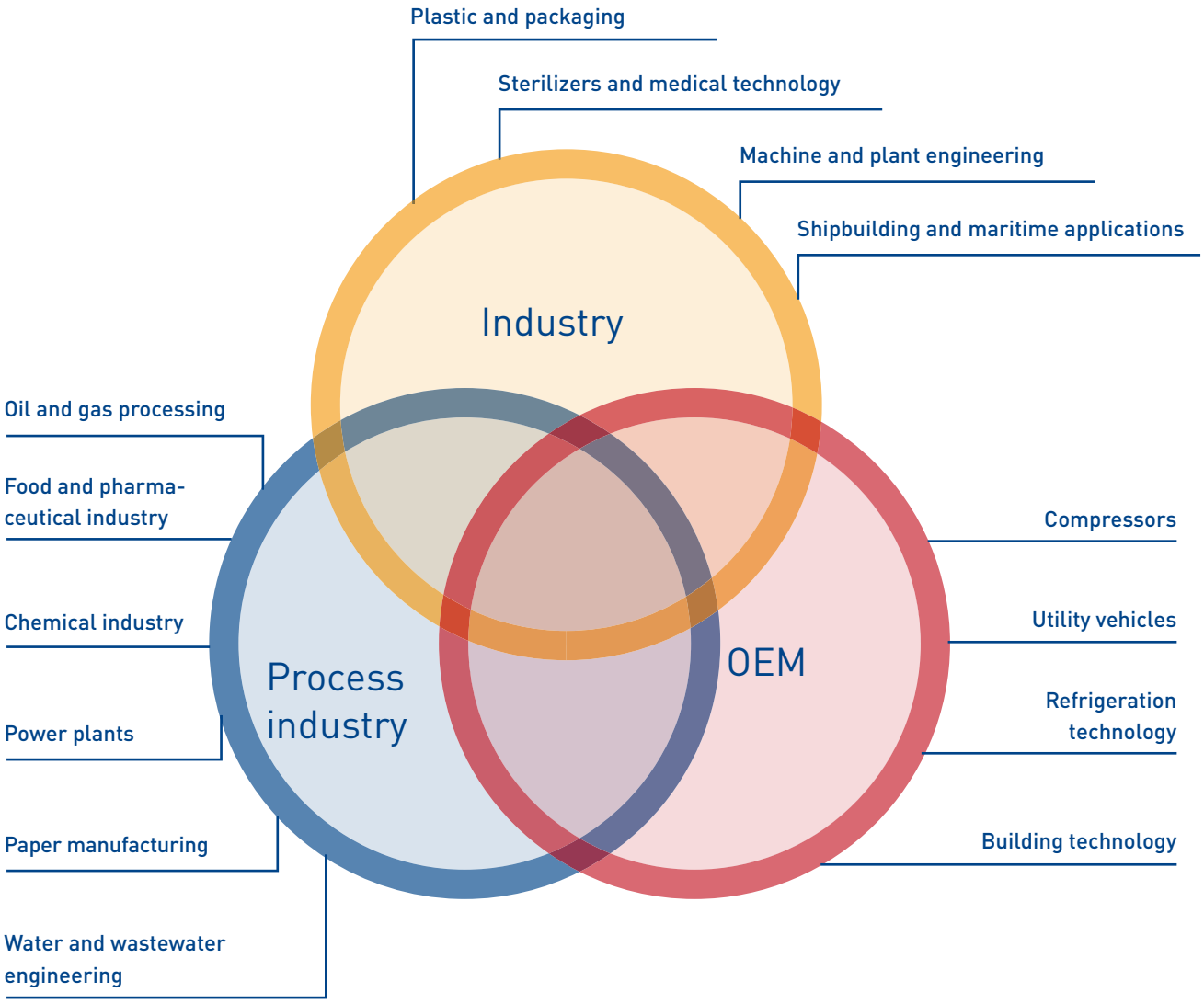
Pressure measurement

Pressure measurement is one of the most important tasks in almost all industrial sectors.

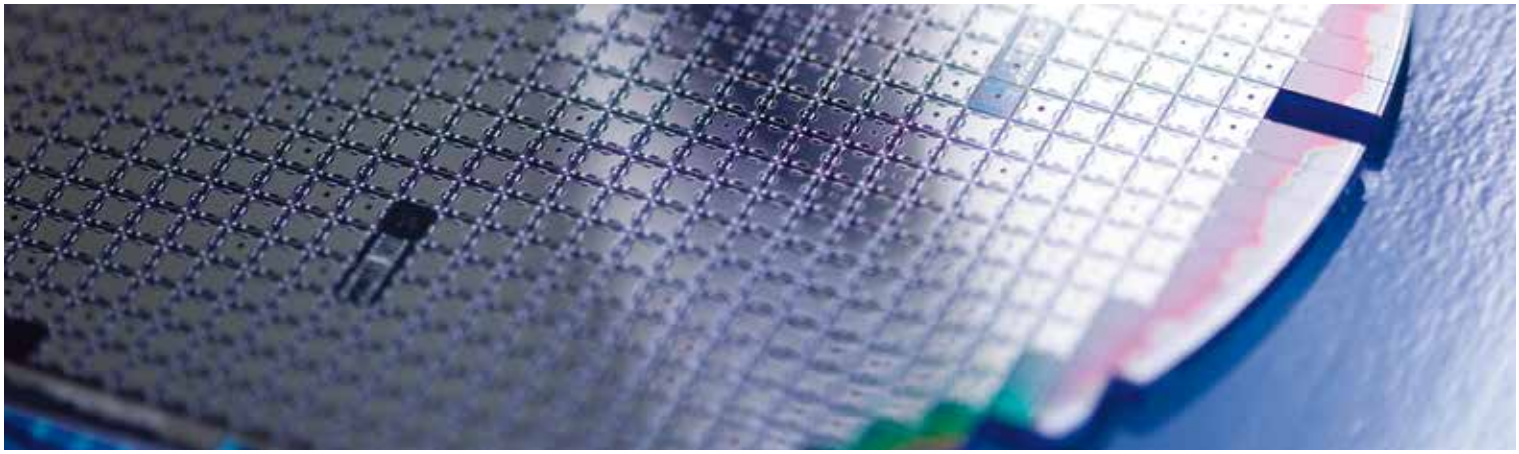
High-quality pressure measuring devices ensure reliable and safe measuring results. JUMO supplies precision solutions for the process industries, hygienic solutions for the food and pharmaceutical industry, universal solutions for machine and plant engineering, large quantities for the OEM market, and even modules for its competitors. JUMO can also provide the right solution for your specific application.

The industries



The right solution for every task: due to the wide range of our portfolio, we can offer the perfect sensors for machine and plant engineering, the process industry, and the OEM sector.

In addition to the standard devices, JUMO offers individual customized versions for special applications.



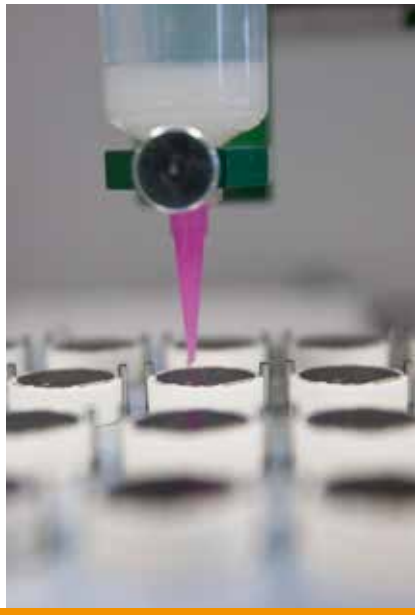
JUMO sensor and measuring system production

Due to our modern production lines, many years of experience, and a huge variety of manufacturable sensor technologies we can offer maximum quality and flexibility with pressure sensors and measuring systems designed and patented by us.

JUMO sensor and measuring system production

Working in a clean room for pressure sensors

Production: Silicon pressure sensors



Production: Ceramic pressure sensors

Quality through attention to detail

Our products set the benchmark for precision. This quality results from the extensive experience of our highly qualified staff as well as close cooperation with our customers in development and production. We are familiar with the complex interrelationships and therefore consider quality to be a process that needs continuous attention and adjustment: starting with the new development of products on the basis of the sensors produced in our own factory, on to the monitoring of the manufacturing process on state-of-the-art production lines, through to the final 100 % inspection of each device.

Flexibility

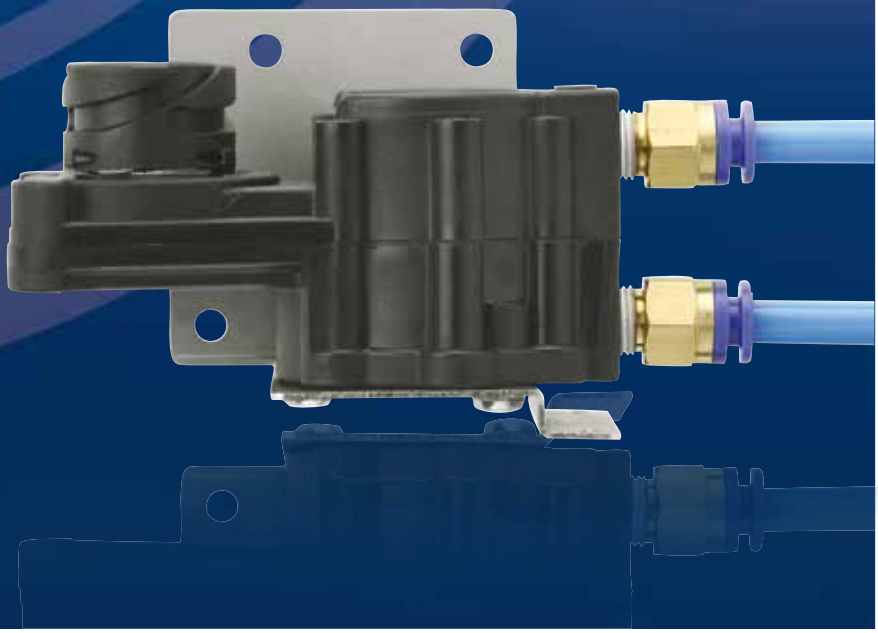
At JUMO we develop, manufacture, and test our own new products and customized versions. Our high degree of vertical integration allows management of the quality process and leads to increased flexibility, enabling us to give special consideration to customer requirements and application-orientated conditions.

Diversity and expertise

Even the sensor itself – the basis of any pressure measuring device – can be individually adapted to your applications and requirements. You can choose between different measuring systems such as silicon piezoresistive, metal thin film, ceramic thick film, or ceramic capacitive as well as additional selection criteria such as size and materials.
Our sensors are available in various configuration levels as modules or in complete devices.

JUMO MIDAS series

The pressure transmitters of the MIDAS series are the ideal solution if you are looking for a reliable, compact measuring system that offers long-term stability and excellent value for the money. The high quality of this series is ensured by production on fully automatic production lines and a final 100 % inspection. The extensive spectrum of measuring ranges, process connections, and electrical connections allows optimum adaptation to every measuring task.



Application examples

Filtration plant

JUMO MIDAS DP10
OEM differential pressure transmitter
Type 401050

Filter monitoring with JUMO MIDAS DP10

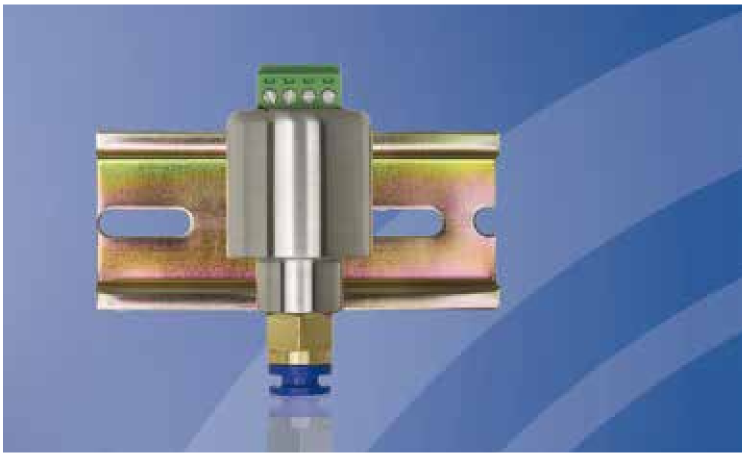
Filters are used for cleaning liquid and gaseous media to achieve specific product properties or to prepare them for further processes. The filter has to be cleaned or replaced at regular intervals as polluted filters reduce the performance of systems and increase their energy consumption. Differential pressure measurement upstream and downstream of the filter can be used to monitor the degree to which the filter is clogged. Depending on the measuring task of the MIDAS DP 10 within a plant, the device can adjust the pump capacity, send a signal for filter maintenance, or activate thermal cleaning of a soot particle filter. Two possible applications for these filters are in the intake channel of compressors or in the diesel soot particle filter of a vehicle.

Combustion engine

JUMO MIDAS C08
OEM pressure transmitter
Type 401002

Pressure monitoring in the cooling circuit of an internal combustion engine using JUMO MIDAS C08

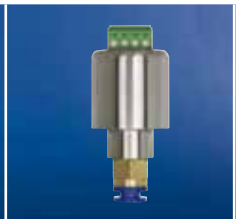
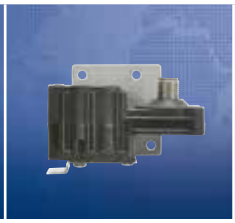
The lubrication and cooling of an internal combustion engine is vital for its safe and reliable operation. The correct oil pressure is important for lubrication and temperature compensation as otherwise increased wear or damage to bearings, camshaft, or pistons can result.
Without the excess pressure, gas bubbles form in the cooling system which interrupt the flow of the coolant and cause the temperature to partially exceed the permissible value.
The JUMO MIDAS C08 can be used to record this excess pressure. Cooling circuits are used in off-highway applications such as in combined heat and power (CHP) units.



OEM pressure transmitter series JUMO MIDAS

					
	OEM pressure transmitter	**Basic**	**Universal**	**Low pressure**	**High pressure**
	Type/data sheet designation	401002 JUMO MIDAS C08	401010 JUMO MIDAS S05	401011 JUMO MIDAS S06	401005 JUMO MIDAS HP
Application	**Facility management**	•			
	Hydraulics				•
	Industry	•	•	•	•
	Air conditioning technology and refrigeration engineering		•	•	
	Compressors	•		•	•
	Co-generation (combined heat and power)	•	•	•	
	Railway				
	Medical technology		•	•	
	Pneumatics	•			
	Packaging and filling	•	•	•	
	Wind power		•		•
Technical data	**Input**	Rel 1.6 to 60 bar	Rel, abs 1 to 60 bar	Rel 100 to 600 mbar	Rel 100 to 600 bar
	Measuring system	Elastomer seal	Welded	Welded	Welded
	Medium temperature	–20 to +125 °C	–40 to +125 °C	–20 to +100 °C	–30 to +125 °C
	Accuracy (linearity))	0.25 %	0.2 to 0.3 %	0.2 to 0.3 %	0.5 %
	Output	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire
	Process connection	Thread, threaded union for pipe/hose	Thread	Thread threaded union for pipe/hose	Thread

OEM pressure transmitter series JUMO MIDAS

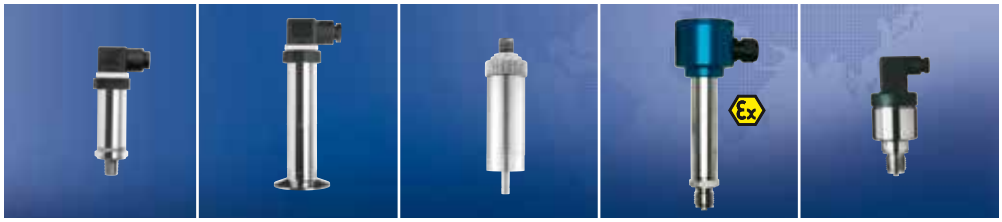





	OEM pressure transmitter	Railway	Cabinet	Differential pressure	Seawater
	Type/data sheet designation	401008 JUMO MIDAS S19 R	401009 JUMO MIDAS DR	401050 JUMO MIDAS DP10	401012 JUMO MIDAS C18 SW
Application	Facility management			•	
	Hydraulics				
	Industry	•	•	•	
	Air conditioning technology and refrigeration engineering	•		•	
	Compressors	•	•	•	
	Co-generation (combined heat and power)			•	
	Railway	•			
	Medical technology				•
	Pneumatics		•		
	Packaging and filling			•	
	Water treatment				•
Technical data	Input	Rel 1.6 to 100 bar	Rel 1.6 to 16 bar	DP 400 mbar to 16 bar	Rel 1.6 to 100 bar
	Measuring system	Welded	Elastomer seal	Elastomer seal/ welded	Elastomer seal
	Medium temperature	–40 to +125 °C	–15 to +60 °C	–15 to +100 °C	–20 to +125 °C
	Accuracy (linearity)	0.25 to 0.3 %	0.5 %	0.5 %	0.25 to 0.3 %
	Output	4 to 20 mA 2-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire, DC 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire
	Pressure connection	Thread	Female Rp 1/8, threaded union for pipe/hose	Female G 1/8", stainless steel socket, pipe screw connection	G 1/4" DIN EN 837 with enlarged pressure channel Ø 8 mm

JUMO dTRANS p30 series

Our JUMO dTRANS p30 series stands out for its flexibility. Its universal use is reflected in the large selection of measuring ranges, process connections, and electrical connections. With its front-flush, sealless measuring system and its high temperature variant for use in media with temperatures of up to 200 °C, this series also meets the requirements of hygienic applications. This flexible series is complemented by a variation with explosion protection so that virtually all application areas are covered.

Process pressure transmitter series JUMO dTRANS p30



	Pressure transmitter	Standard	High temperature	Gases	EX version	Small ranges
	Type/data sheet designation	404366 JUMO dTRANS p30	402050 JUMO dTRANS p31	402051 JUMO dTRANS p32	404753 JUMO dTRANS p33	404327 JUMO dTRANS ceramic
Application	Biogas plants	•				•
	Chemical engineering	•	•			•
	Compressed air control	•		•		
	Food and pharma-ceutical industry	•	•		•	•
	HVAC technology	•		•		
	Industry, universal	•			•	
	Laboratory technology	•		•		
	Medical technology	•	•			•
	Clean room technology			•		
	Sterilization / autoclaving		•			
Technical data	Input	Rel, abs 250 mbar to 600 bar	Rel, abs 1 to 60 bar	Rel 40 to 600 mbar	Rel, abs 250 mbar to 600 bar	Rel 50 mbar to 1 bar
	Medium temperature	–30 to +120 °C	–30 to +200 °C	–30 to +120 °C	–40 to +200 °C	–20 to +80 °C
	Accuracy (linearity)	0.2 to 0.5 %	0.2 to 0.5 %	0.5 %	0.5 %	0.2 %
	Output	4 to 20 mA 2-wire, 0(4) to 20 mA 3-wire, DC 0,5 to 4,5 V 3-wire, DC 0 to 10 V 3-wire, C 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, 0(4) to 20 mA 3-wire, DC 0,5 to 4,5 V 3-wire, DC 0 to 10 V 3-wire, C 1 to 5(6) V 3-wire	4 to 20 mA 2-wire, 0(4) to 20 mA 3-wire, DC 0,5 to 4,5 V 3-wire, DC 0 to 10 V 3-wire, C 1 to 5(6) V 3-wire	4 to 20 mA 2-wire	4 to 20 mA 2-wire, DC 0,5 to 4,5 V 3-wire
	Process connection	Thread, hygienic connections, JUMO PEKA, pressure separa-tors	Thread, hygienic connections, JUMO PEKA, pressure separa-tors	Thread, hose connection	Thread	Thread, hygienic connections

JUMO Wtrans series

The JUMO Wtrans series is a system for the wireless data capture of pressure or temperature measurements using the latest wireless technology. The universally applicable sensors for capturing measured values at moving and fixed locations open up entirely new possibilities for data capture. The measured value is first transmitted wirelessly to the receiver of the Wtrans system from where it is forwarded to measurement and control technology equipment such as controllers, automation systems, displays, or recording devices.

In Europe, the system uses radio frequency 868.4 MHz. In the USA, Canada, Australia, New Zealand, and elsewhere radio frequency 915 MHz is used. These frequencies are generally impervious to external interference influences and are also best suited to use in harsh industrial environments.

The devices work particularly well in mobile, rotating, or even stationary applications – wherever it is too difficult to lay cables and interference-free transmission is required.
Up to 16 transmitters can be connected to each receiver in any combination.

Wireless measured value transmission JUMO Wtrans series

	Type/data sheet designation	902931 JUMO Wtrans receiver	902930 JUMO Wtrans T	707060 JUMO Wtrans B*	402060 JUMO Wtrans p
Application	**Machine and plant engineering**	•	•	•	•
	Food and pharmaceutical industry	•	•	•	•
	Chemical engineering	•	•	•	•
	Plastics	•	•	•	•
	Building technology	•	•	•	•
Technical data	**Input**	Radio signal by transmitters	–200 to 600 °C	Temperature, resistance, voltage	Rel, abs 0.25 to 600 bar
	Medium temperature		–200 to 600 °C		–30 to 85 °C
	Accuracy	0.1 %	Class A	0.1 K/0.1 %	0.2 %
	Output	(0)4 to 20 mA 0 to 10 V relay	Radio signal to receiver	Radio signal to receiver	Radio signal to receiver
	Process connection		Screw connection, pipe screw connection, sheet metal plate JUMO PEKA		Thread, NPT, UNF, JUMO PEKA
	Frequency	868.4 / 915 MHz	868.4 / 915 MHz	868.4 MHz	868.4 MHz
	Transmission interval		1 to 3600 s	1 to 3600 s	0.5 to 3600 s
	Range	Max. 300 m when using the antenna holder for wall mounting for the receiver and 3 m antenna cable			
	Voltage supply	AC 110 to 240 V AC/DC 20 to 30 V	Lithium battery 3,6 V	Lithium battery 3,6 V	Lithium battery 3,6 V

* programmable head transmitter to which different sensors can be attached

JUMO DELOS series

Reduced costs due to measuring range scaling: the DELOS series allows various measuring tasks to be performed with one device. Configuration is performed directly at the device or using a convenient setup program. A large, illuminated LCD display shows the setting parameters during configuration as well as the current measured value and switching contact status during operation. For enhanced legibility the device can be turned ±160° and the display can be rotated 180° when installed overhead. Due to its easy-to-clean design and front-flush sealless measuring system the DELOS series is also suitable for hygienic applications.

CERTIFIED EHEDG TYPE EL

Precision transmitters for pressure or temperature



	Precision transmitter	Pressure, level	High pressure	Temperature
	Type/data sheet designation	405052 JUMO DELOS SI	405054 JUMO DELOS HP	902940 JUMO DELOS T
Application	Food and pharmaceutical industry	•		•
	CIP/SIP systems	•		•
	Machinery and plant engineering	•	•	•
	Refrigeration and air conditioning system construction	•		•
	Hydraulic units		•	
	Special features	Programmable, switching output, measuring range scaling 1:4, selectable measuring unit, case and protection fitting made of stainless steel (316L)	Programmable, switching output, measuring range scaling 1:4, selectable measuring unit, case and protection fitting made of stainless steel (316L)	Programmable, switching output, selectable measuring unit, case and protection fitting made of stainless steel (316L)
Technical data	Input	Rel, abs 400 mbar to 60 bar	Rel 160 to 600 bar	–50 to +150 °C –50 to +260 °C with extension tube –50 to +500 °C with wireless RTD temperature probe
	Medium temperature	–25 to +200 °C	–25 to +100 °C	Depends on input
	Ambient temperature	–25 to +75 °C	–25 to +75 °C	–25 to +75 °C
	Accuracy (linearity)	0.1 to 0.15 %	0.1 %	Tolerance class: class A (optional class AA)
	Output	1 x PNP switching output, 2 x PNP switching output, 1 x PNP switching output and 1 x analog output (either: 0(4) to 20 mA, 0 to 10 V)		
	Process connection	Thread, hygienic connections, pressure separators, JUMO PEKA	Thread	Thread, hygienic connections, screw connections, JUMO PEKA

JUMO dTRANS p02/p20 series

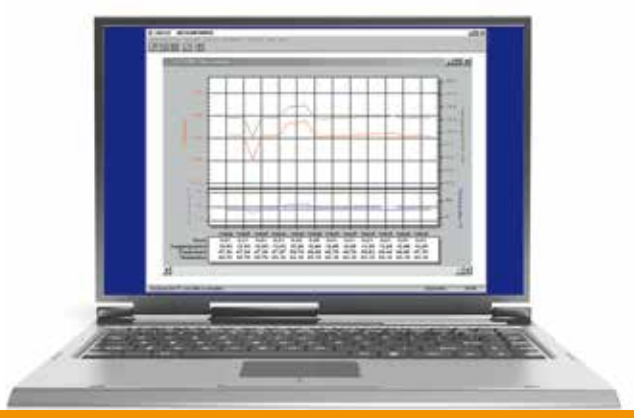
The programmable pressure transmitter from JUMO combines maximum precision with simple operation.

You will find the optimum solution to your task, whether it involves absolute pressure, differential pressure, level, or flow. We provide an extensive selection of process connections and special approvals.

Convenient operation with reduced effort

JUMO setup program for the HART® interface

Parameterization of the device using the setup program



Recording measured values

JUMO dTRANS p02
Process pressure transmitter
Type 404385

JUMO dTRANS p20
Process pressure transmitter
Type 403025

Commissioning with minimum effort

Commissioning can be performed quickly and reliably using the rotary knob or membrane keys.
The devices can also be easily operated in explosive areas, without even having to open the case.

Some device features:

- Clear LCD display as standard
- High precision and stability
- Low temperature drift
- Reduced stockkeeping due to variable setting on the device
- High temperature range
- Robust aluminum or stainless steel case

Our setup program offers numerous functions for operation via the interfaces:

- Convenient parameterization of all device parameters
- Saving or printing of parameters for project documentation
- Clear online display of actual values and device status
- Monitoring and documentation of measured pressure values and sensor temperature for a prolonged period
- Plain text display of all status messages

Process pressure transmitter series JUMO dTRANS p02

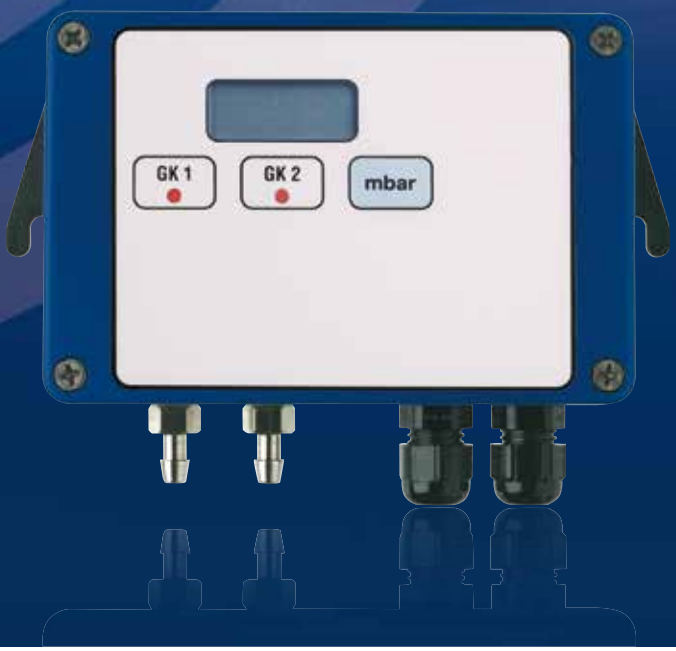
				
	Type/data sheet designation	404385 dTRANS p02	404382 dTRANS p02 DELTA	404387 dTRANS p02 ceramic
Application	**Ex d**			
	Ex ia	•	•	
	Process pressure	•		•
	Differential pressure		•	
	Flow		•	
	Level	•	•	•
	Special features	Maximum precision, programmable, stainless steel sensor, aluminum case	Maximum precision, programmable, stainless steel sensor, aluminum case	Maximum precision, programmable, stainless steel sensor, aluminum case
Technical data	**Input**	Rel, abs 20 mbar to 600 bar	DP 12 mbar to 25 bar	Rel 20 mbar to 25 bar
	Medium temperature	–40 to +200 °C	–40 to +120 °C	–40 to +100 °C
	Accuracy (linearity)	0.1 %	0.1 %	0.1 %
	Output	4 to 20 mA 2-wire, HART®	4 to 20 mA 2-wire, HART®	4 to 20 mA 2-wire, HART®
	Process connection	Thread, hygienic connections, JUMO PEKA, pressure separators	2 x 1/4-18 NPT, pressure separators	Thread, clamp, conical port

Process pressure transmitter series JUMO dTRANS p20

	Type/data sheet designation	403025/26 dTRANS p20 dTRANS p20 Ex d	403022/23 dTRANS p20 DELTA dTRANS p20 DELTA Ex d
Application	**Ex d**	•	•
	Ex ia	•	•
	Process pressure	•	
	Differential pressure		•
	Flow		•
	Level		•
	Special features	Maximum precision, programmable, stainless steel sensor, stainless steel case	Maximum precision, programmable, stainless steel sensor, stainless steel case
Technical data	**Input**	Rel, abs 60 mbar to 600 bar	DP 1 mbar to 100 bar
	Medium temperature	–40 to +200 °C	–40 to +110 °C
	Accuracy (linearity)	0.05 %	0.07 %
	Output	4 to 20 mA 2-wire, HART®	4 to 20 mA 2-wire, HART®
	Process connection	Thread, hygienic connections, JUMO PEKA, pressure separators	2 x 1/4-18 NPT, pressure separators

JUMO differential pressure transmitters

Our differential pressure transmitters are the ideal solution for measuring absolute pressure, differential pressure, flow, and level. Their versatility and simple operation makes them suitable for less critical applications as well as for use in explosive areas.



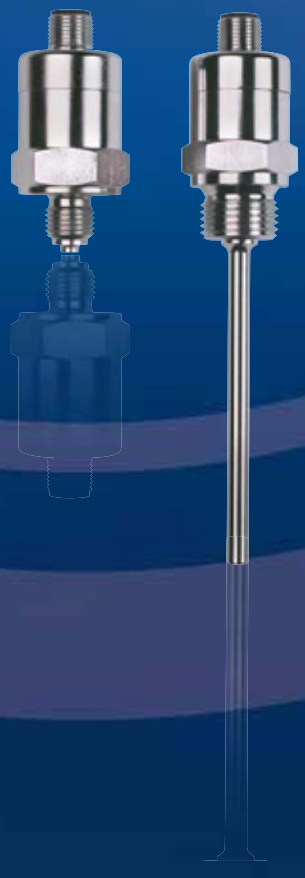
JUMO differential pressure transmitter

	Type/data sheet designation	402005 Multirange pressure and differential pressure transmitter	404304 Pressure and differential pressure transmitter	401050 JUMO MIDAS DP 10	404382 JUMO dTRANS p02 DELTA	403022/403023 JUMO dTRANS p20 DELTA
Application	**Ex d**					•
	Ex ia				•	•
	Gas	•	•	•	•	•
	Liquid			•	•	•
	Heating, air conditioning technology	•	•	•	•	•
	Filter monitoring	•	•	•	•	•
	Pump control			•		
	Differential pressure	•	•	•	•	•
	Flow		•		•	•
	Level				•	•
	Special features	Measuring range adjustable, optional with LCD display	With switching contacts, very small measuring ranges, adjustable, optionally with LCD	For liquid and gaseous media	Maximum precision, programmable, aluminum case	Maximum precision, programmable, stainless steel case
Technical data	**Input min. / max.**	DP, rel 2.5 to 100 mbar	DP, rel 0.50 to 1200 mbar	DP, rel 0.4 to 16 bar	DP, rel 12 mbar to 25 bar	DP, rel 1 mbar to 100 bar
	Medium temperature	–10 to +50 °C	–10 to +50 °C	–15 to +100 °C	–40 to +120 °C	–40 to +110 °C
	Accuracy (linearity)	2 %	1 %	0.5 %	0.1 %	0.07 %
	Output	(0)4 to 20 mA 3-wire, DC 0 to 10 V 3-wire	4 to 20 mA 2-wire, 0 to 20 mA 3-wire, DC 0 to 10 V 3-wire	4 to 20 mA 2-wire, DC 0 to 10 V 3-wire, DC 0,5 to 4,5 V 3-wire	4 to 20 mA 2-wire, HART®	4 to 20 mA 2-wire, HART®
	Process connection	Hose connection	Thread, Hose connection	Female G 1/8", stainless steel socket, pipe screw connection	2x 1/4-18NPT, pressure separators	2x 1/4-18NPT, pressure separators

JUMO CANtrans series

Our CANtrans series transmitters are the first choice for applications with CANopen networking.

The compact and robust sensors with IP67 protection type and high vibration resistance guarantee maximum process reliability. Integrated sensor monitoring in combination with the safety mechanisms of the CAN protocol ensure very reliable detection of measured values.The standardized interface also allows simple integration of the sensors in all CANopen plants.



JUMO CANtrans series for CANopen systems

	Type/data sheet designation	402055 JUMO CANtrans p ceramic	402056 JUMO CANtrans p	402057 JUMO CANtrans pT	902910 JUMO CANtrans T
Application	**Pressure**	•	•		
	Pressure and temperature			•	
	Temperature				•
	Special features	Programmable, ceramic sensor, device profile DS 404	Programmable, stainless steel sensor, device profile DS 404	Programmable, stainless steel sensor and Pt1000, device profile DS 404	Programmable, sensor Pt1000, device profile DS 404, optional: double temperature probe
Technical data	**Input** **Pressure** **Temperature**	Rel 1.6 to 100 bar	Rel, abs 0.25 to 600 bar	Rel, abs 0.25 to 100 bar –40 to +125 °C	 –50 to +450 °C
	Medium temperature	–20 to +85 °C	–40 to +200 °C	–40 to +125 °C	–50 to +450 °C
	Accuracy (linearity)	0.5 %	0.5 %	0.5 %	Class B according to DIN EN 60751
	Output	CANopen	CANopen	CANopen	CANopen
	Process connection	Thread	Thread, hygienic connections, JUMO PEKA	Thread	Thread

JUMO PEKA and pressure separators

To protect the pressure sensor and therefore safeguard the process, pressure separators – either with or without capillary lines – can be used as a connection between the measuring instrument and the medium. Examples of their use are: to protect against aggressive media or for medium temperatures over 200 °C. For hygienic applications, not only pressure separators (which can achieve the lowest roughness depths) are available but also the JUMO PEKA system. It has been designed and certified in accordance with EHEDG guidelines.

CERTIFIED
EHEDG
TYPE EL

JUMO PEKA and pressure separators

JUMO Dtrans T100
Screw-in RTD temperature probe without/with transmitter
Type 902815

JUMO DELOS SI
Precision pressure transmitter with switching contact and display
Type 405052

JUMO tecLine Lf-4P
Conductive 4-electrode conductivity measuring cell
Type 202930

JUMO dTRANS p02
Process pressure transmitter
Type 404382

JUMO PEKA
Process connection adapter system
Type 409711

Pressure Separator
With flange connection according to ANSI B 16.5 and with form RF sealing strip
Type 409786

JUMO PEKA

The process connection JUMO PEKA allows the measuring device (for different physical measuring values or electrolytic conductivity) to be connected to an application-specific process connection adapter (Clamp, VARIVENT®, Aseptic, or Orbital welding socket). Based on an easy-to-clean design without cavities, the modular adapter system is specifically tailored to the requirements of hygienic processes. The rigid connector with rotatable adapter allows alignment of the measuring device and protects the flush-mounted O ring from damage during assembly. The thread allows the measuring device to be installed and removed unlimited times which simplifies assembly, cleaning, and repair work.

Pressure separators

Pressure separators, as extended process connections, protect the measuring device and its sensor from difficult ambient conditions such as media that is contaminated, highly viscous, thickening (curdling), highly corrosive, toxic, and hot. Pressure separators can also be used for installation points that are difficult to access. In such cases, the pressure is transmitted to the sensor via a capillary line (capillary) filled with filling oil.

JUMO offers two basic designs: membrane and pipe Pressure separators. The numerous possibilities of combination with regard to the membrane material (stainless steel, titanium, PTFE, etc.) and filling oil (silicone oil, high-temperature oil, vegetable oil, etc.) also make them suitable for hygienic applications.

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