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**JUMO Process Control, Inc.**  
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# JUMO CEROS S01 M

## Digital pressure measuring cell

### Applications

- Module for the production of pressure transmitters or level probes
- Installation in valve blocks, pumps, and additional compact devices
- For hygienic applications (front-flush installation)

### Brief description

The digital pressure measuring cell is used to measure the pressure of liquid and gaseous media. In contrast to conventional pressure measuring cells, it is an active component that supplies a temperature-compensated and calibrated digital/analog output signal. The piezoresistive sensing element with integrated signal processing is hermetically encapsulated and ensures stable and precise linearity and accuracy values even under adverse conditions.

The basic variants of digital pressure measuring cells use standard measuring ranges for relative or absolute pressure measurements. In addition, individual adjustments of the measuring range or the temperature compensation tailored to the relevant measurement task can be taken into consideration.

The compact design type of the digital pressure measuring cell opens up the potential of use as a module in a pressure transmitter, a level probe, or for use directly customer applications, such as valve blocks, pumps etc. For electric connection to downstream electronic components, versions with a PIN connection, stranded wires, or plug contacts are possible. Customized connection options and direct mounting onto a circuit board are also viable.

The pressure measuring cell can be accessed using an I<sup>2</sup>C interface and setup program. The setup program visualizes the actual process values. In addition, various configurations and offset correction in the event of environmental influences or in the working point can also be carried out. The clear digital signature of the pressure measuring cell enables traceability right up to the process level.

High level of accuracy, compact design, and the possibility for setup configuration reduces subsequent production steps to a minimum.



Type 405101  
(rear view)



Type 405101  
(front view)



### Customer benefits

- Prealigned and temperature-compensated
- Zero point correction possible via setup software (e.g. after installation)
- Pressure and temperature values as a digital signal
- Direct mounting on circuit board possible (without additional connector)
- Customer-specific configuration options (signal limitation, limit values)
- Traceability of the sensor with a clear digital signature

### Special features

- Measuring range from 100 mbar (1.45 psi) up to 100 bar (1450 psi)
- Operating temperature from -40 to +125 °C
- Surface roughness Ra < 0.8 µm (optional)
- High signal resolution with 15 bit
- High electric strength of ±40 V

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## Technical data

### General Information

Reference conditions	DIN 16086, DIN EN 60770
Measuring principle	Piezoresistive (absolute pressure sensor, relative pressure sensor)
Admissible load changes	> 10 million
Mounting position	Any
Calibration position	Measuring cell vertically upright, membrane downwards

### Measuring range and accuracy

#### Pressure input

The reference conditions according to EN 61298-1 apply. Observe the calibration position!

Measuring range bar	Linearity <sup>a</sup> % MSP <sup>e</sup>	Accuracy at		Long-term stability % MSP per year	Overload capability <sup>b</sup> bar	Burst pressure bar
		20 °C <sup>c</sup> % MSP	-20 to +100 °C <sup>d</sup> % MSP			
0 to 100 mbar relative pressure	0.3	0.5	1.4	<0.2	0.4	0.6
0 to 160 mbar relative pressure					0.6	1
0 to 250 mbar relative pressure					1	1.5
0 to 400 mbar relative pressure					2.4	3.6
0 to 600 mbar relative pressure			1.6		2.4	
-400 to +400 mbar relative pressure			1.2		6	
-600 to +600 bar relative pressure						4
0 bar to 1 bar relative/absolute pressure	1.4	10				
0 bar to 1.6 bar relative/absolute pressure			6		10	
0 bar to 2.5 bar relative/absolute pressure	0.2	0.4	1.1		10	15
0 bar to 4 bar relative/absolute pressure					16	24
0 bar to 6 bar relative/absolute pressure					24	36
0 bar to 10 bar relative/absolute pressure			0.9		40	60
0 bar to 16 bar relative/absolute pressure					60	100
0 bar to 25 bar relative/absolute pressure				100	150	
0 bar to 40 bar relative/absolute pressure				180	250	
0 bar to 60 bar relative/absolute pressure	0.3	0.5	1.2	4	6	
0 bar to 100 bar relative/absolute pressure				6	10	
-1 to 0 bar relative pressure				10	15	
-1 to +0.6 bar relative pressure				16	24	
-1 bar to +1 bar relative pressure				24	36	
-1 to +1.5 bar relative pressure				40	60	
-1 to +3 bar relative pressure				60	100	
-1 to +5 bar relative pressure	0.2	0.4	0.9	100	150	
-1 to +9 bar relative pressure				40	60	
-1 to +15 bar relative pressure				60	100	
-1 to +24 bar relative pressure				100	150	

<sup>a</sup> According to limit point setting.

<sup>b</sup> All pressure measuring cells are vacuum proof.

<sup>c</sup> Includes: linearity, hysteresis, repeatability, deviation from measuring range initial value and measuring range end value.

<sup>d</sup> Includes: linearity, hysteresis, repeatability, deviation from measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span.

<sup>e</sup> MSP = measuring span.

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## Temperature input

Measuring range	-40 to +125 °C
Accuracy	±1,5 K

Temperature values can only be read out via the digital interface I<sup>2</sup>C.

## Output

Possible outputs	Analog output 412	Digital output 525
	DC 0.5 to 4.5 V, three-wire <sup>a</sup> , ratiometric 10 to 90 % of the voltage supply	I <sup>2</sup> C, DC 5 V, four-wire
Burden	R <sub>L</sub> ≥ 5 kΩ	-
Voltage DC 0.5 to 4.5 V		
Pull-up resistor	-	R <sub>Pull-up</sub> 1 to 10 kΩ
Bit rate	-	≤ 400 MHz (15 bit)
Operational readiness time	< 5 ms	
Conversion time	< 0.5 ms	
Step response t <sub>90</sub>	< 3 ms	
Maximum current consumption	< 7 mA	

<sup>a</sup> With nominal voltage DC 5 V.

## Electrical data

Voltage supply	DC 5 V ±10 % nominal voltage
----------------	------------------------------

## Interface

Details for communication ⇒ [JUMO CEROS S01 M - Interface Description](#).

Bus type	I <sup>2</sup> C (NXP trademark)
Transmission type	Serial transmission (master-slave communication)
Standard address	0x28

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## Mechanical features

### Materials

Membrane <sup>a</sup>	AISI 316 L (1.4435)
Welding ring <sup>a</sup>	AISI 316 L (1.4404)
O-ring <sup>a</sup>	FPM, EPDM, VMQ <sup>b</sup>
Filling oil	Silicon oil (FDA compliant)

<sup>a</sup> Observe the media resistance of the materials.

<sup>b</sup> Compliant according to FDA 21 CFR 177.2600, BfR recommendation XV silicone.

## Environmental influences

Admissible medium temperature	-40 °C to +125 °C
Admissible ambient temperature	-40 to +125 °C (for electrical connections 05 and 24) <sup>a</sup> -25 to +85 °C (for electrical connection 39) <sup>a</sup>
Admissible storage temperature	-40 to +125 °C (for electrical connections 05 and 24) <sup>a</sup> -25 to +85 °C (for electrical connection 39) <sup>a</sup>
Admissible humidity Storage <sup>b</sup>	90 %
Electromagnetic compatibility (EMC) of the integrated ICs: EMC protection <sup>c</sup> GND, U <sub>B</sub> , A <sub>out</sub> SCL, SDA Latch-up immunity (EIA/JESD 78) Emission Cable-bound interference immunity	According to ESD human body model (MIL883, method 3015.7) ≥ 4 kV ≥ 2 kV > ±100 mA Requirements according to IEC 61967 Requirements according to IEC 62132-4 1 to 1000 MHz, error band < ±1 %
Vibration resistance <sup>d</sup>	20 g for 5 to 2000 Hz
Shock resistance <sup>e</sup>	75 g for 11 ms and 100 g for 1 ms
Overvoltage	±40 V
Insulation voltage	AC 500 V
Insulation resistance	> 10 MΩi at DC 50 V

<sup>a</sup> ⇒ "Electrical connection", Page 7.

<sup>b</sup> Without condensate formation.

<sup>c</sup> If necessary, further measures must be taken in a terminal device to meet the application-specific EMC requirements.

<sup>d</sup> IEC 60068-2-6.

<sup>e</sup> IEC 60068-2-27.

## Placing onto market

The component not meet the requirements of "equipment with safety function" according to Pressure Equipment Directive 2014/68/EU.

The pressure measuring cell is a component and not an end device and is therefore not subject to application-specific EMC requirements.

Placing the resulting end product onto the market in the European Economic Area (EEA) means that testing according to with standards mentioned, a declaration of conformity, and affixing CE marking can be carried out independently.

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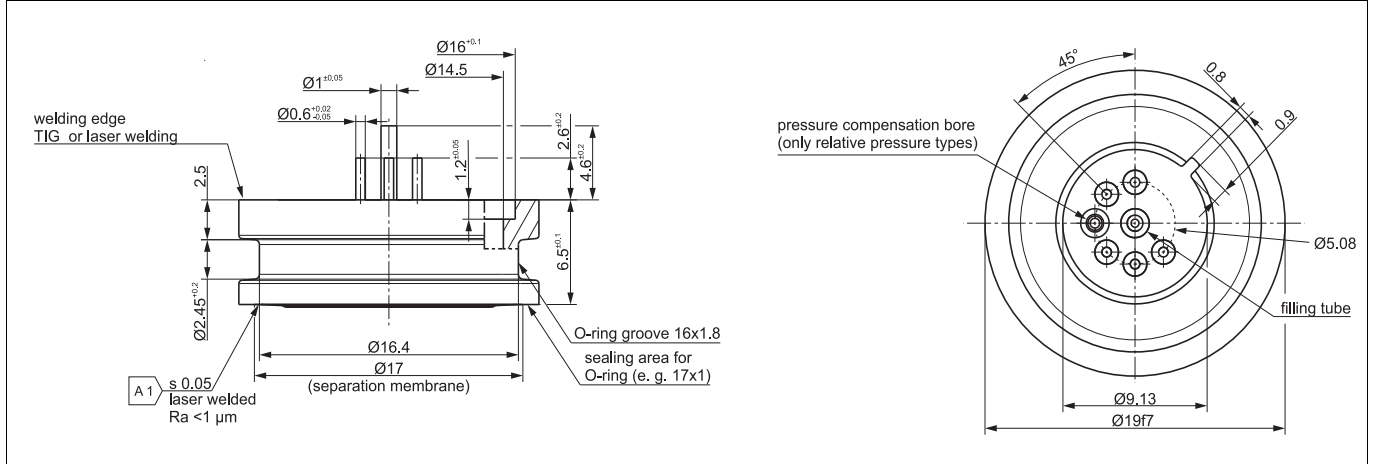


# Dimensions

## Pressure measuring cell

210, 211, 212, 213

Pressure measuring cell for welding in, with O-ring (EPDM, FPM, VQM)



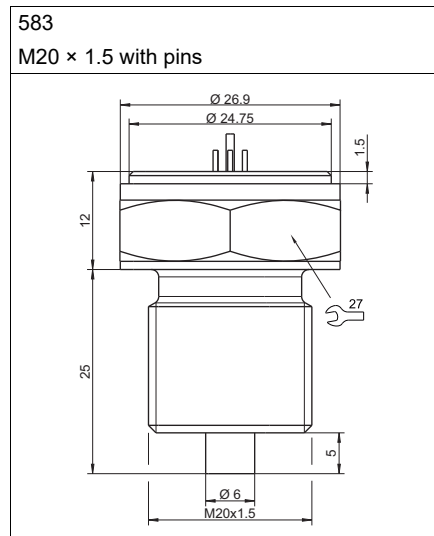
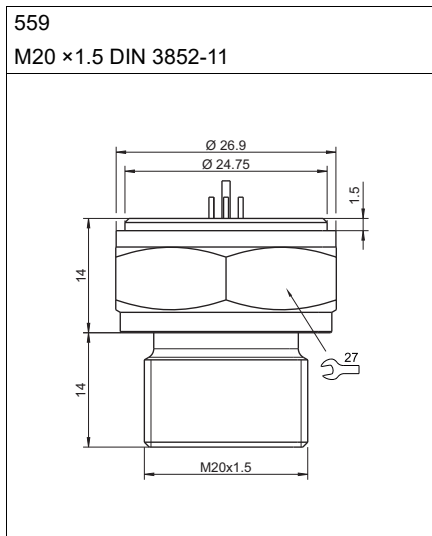
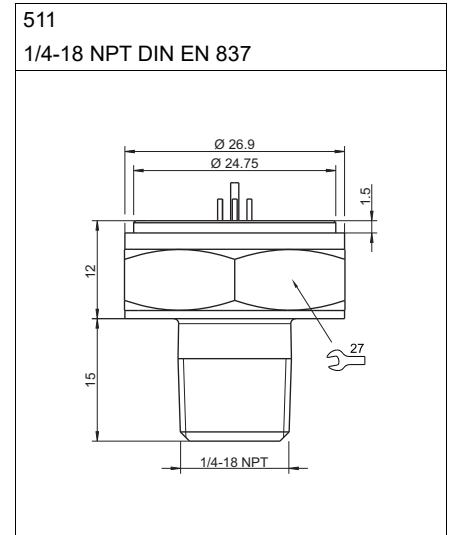
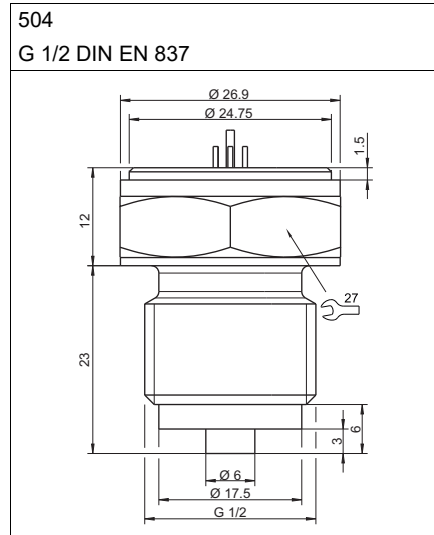
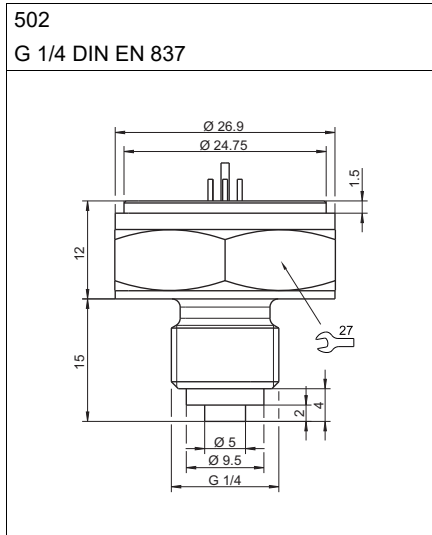
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**Process connections**



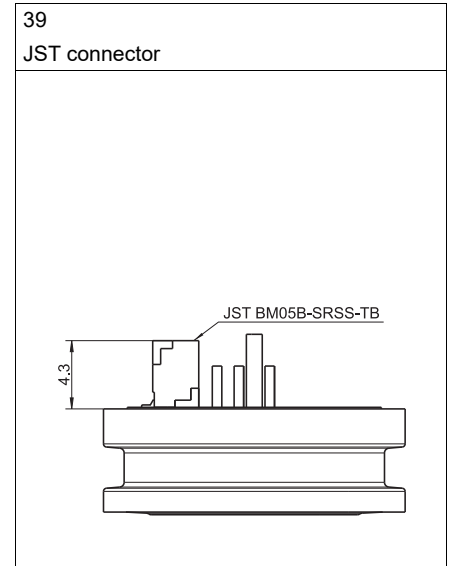
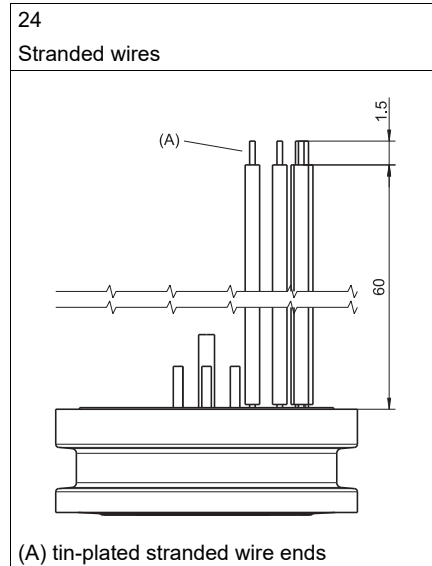
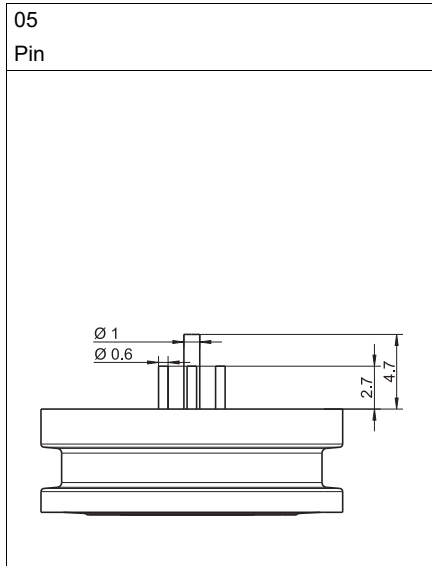
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## Electrical connection



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## Connection diagram

412			
Electrical connection	05 Pins	24 Stranded wires	39 JST connector (type BM05B-SRSS-TB)
GND	3	Bk	4
U <sub>B</sub>	4	Rd	3
SCL	6	Wh	2
SDA	7	Bu	1

525			
Electrical connection	05 Pins	24 Stranded wires	39 JST connector (type BM05B-SRSS-TB)
A <sub>out</sub>	2	Ye	5
GND	3	Bk	4
U <sub>B</sub>	4	Rd	3
SCL	6	Wh	2
SDA	7	Bu	1



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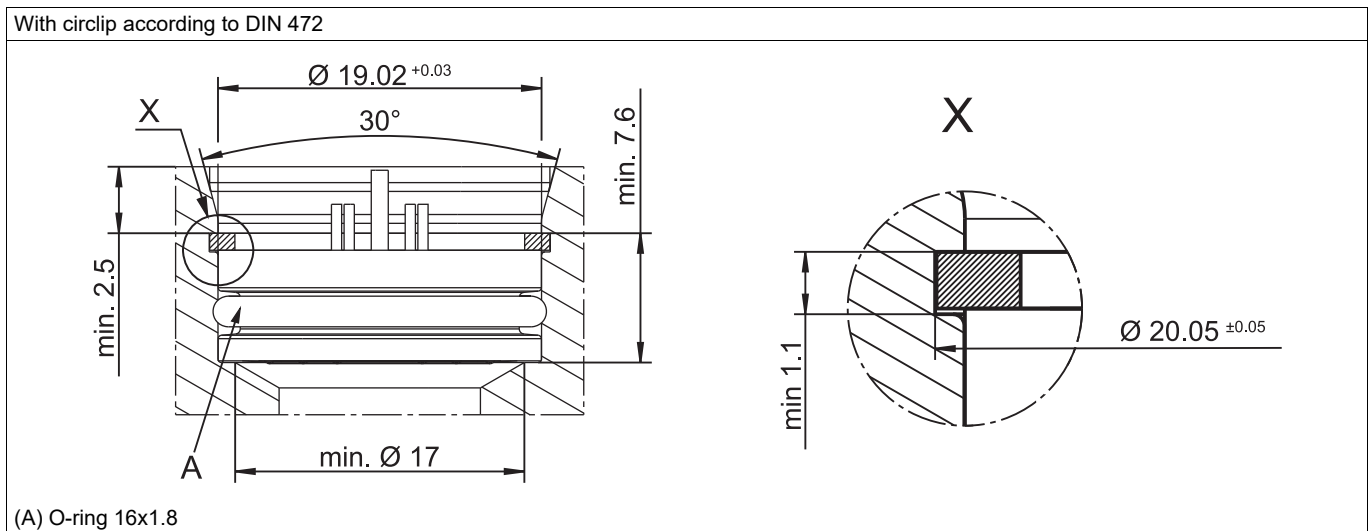
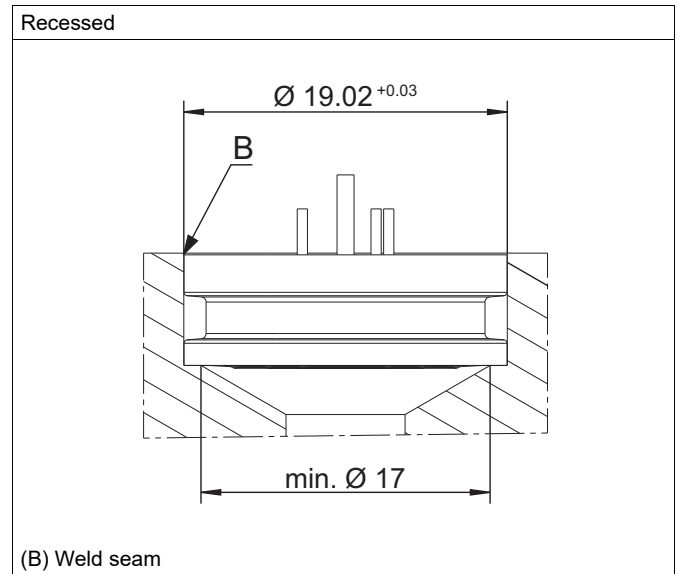
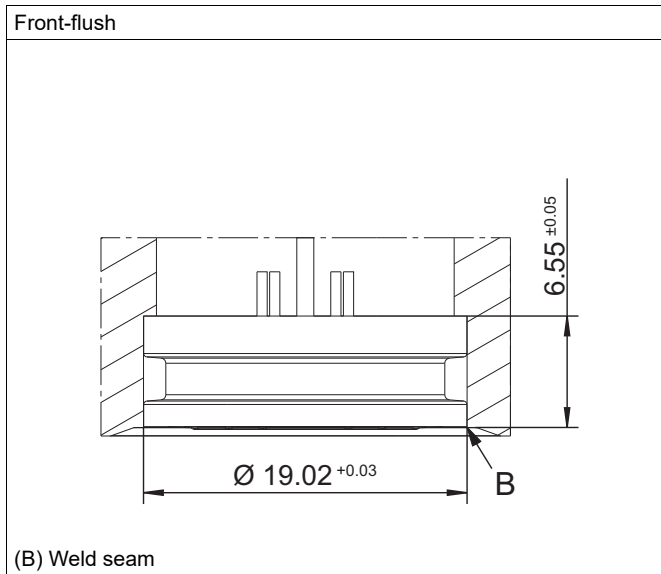


## Installation notes

Avoid influencing the signal due to installation errors.

- Do not exert any tension on the membrane during installation.
- Avoid mechanical damage to the membrane.
- Wet O-rings with a suitable lubricant before use.

## Assembly examples



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## Order details

	<b>(1) Basic type</b>
405101	JUMO CEROS S01 M – digital pressure measuring cell
	<b>(2) Basic type extension</b>
000	None
	<b>(3) Input</b>
414	0 to 100 mbar relative pressure <sup>a</sup>
415	0 to 160 mbar relative pressure <sup>a</sup>
417	0 to 250 mbar relative pressure <sup>a</sup>
424	0 to 400 mbar relative pressure <sup>a</sup>
419	0 to 600 mbar relative pressure <sup>a</sup>
447	-400 to +400 mbar relative pressure <sup>a</sup>
450	-600 to +600 mbar relative pressure <sup>a</sup>
454	0 to 1 bar relative pressure
455	0 to 1.6 bar relative pressure
456	0 to 2.5 bar relative pressure
457	0 to 4 bar relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
460	0 bar to 16 bar relative pressure
461	0 bar to 25 bar relative pressure
462	0 bar to 40 bar relative pressure
463	0 bar to 60 bar relative pressure
464	0 bar to 100 bar relative pressure
478	-1 to 0 bar relative pressure
479	-1 to +0.6 bar relative pressure
449	-1 bar to +1 bar relative pressure
480	-1 to +1.5 bar relative pressure
481	-1 to +3 bar relative pressure
482	-1 to +5 bar relative pressure
483	-1 to +9 bar relative pressure
484	-1 to +15 bar relative pressure
485	-1 to +24 bar relative pressure
488	0 to 1 bar absolute pressure
489	0 to 1.6 bar absolute pressure
490	0 to 2.5 bar absolute pressure
491	0 to 4 bar absolute pressure
492	0 to 6 bar absolute pressure
493	0 to 10 bar absolute pressure
494	0 to 16 bar absolute pressure
495	0 to 25 bar absolute pressure
505	0 to 40 bar absolute pressure
506	0 to 60 bar absolute pressure
507	0 to 100 bar absolute pressure
	<b>(4) Measuring cell</b>
210	Measuring cell for welding in
211	Measuring cell with O-ring, EPDM
212	Measuring cell with O-ring, FPM
213	Measuring cell with O-ring, VMQ

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<b>(5) Process connection</b>	
000	None
502	G 1/4 according to DIN EN 837
504	G 1/2 according to DIN EN 837
511	1/4-18 NPT according to DIN EN 837
559	M20 × 1.5 DIN 3852-11
583	M20 × 1.5 with pins
<b>(6) Output</b>	
412	0.5 to 4.5 V, 3-wire
525	I <sup>2</sup> C, 4-wire, 5 V supply
<b>(7) Electrical connection</b>	
05	Pin
24	Stranded wires
39	JST connector
<b>(8) Extra codes</b>	
374	Inspection certificate 3.1 DIN EN 10204 material
624	Oil and grease free
982	Surface roughness of parts in contact with media Ra ≤ 0.8 µm
983	Test report

<sup>a</sup> Can only be ordered with a process connection.

Order code                     /  -  -  -  -   /  , ...<sup>a</sup>  
 Order example                405101 / 000 - 464 - 210 - 000 - 525                39 / 624

<sup>a</sup> List extra codes in sequence and separate using commas.

**NOTE!**

The packaging unit for JUMO CEROS pressure measuring cells is specified as 40 pieces.

**Accessories**

Designation	Part no.
JUMO CEROS S01 M PC setup program Software for extracting process values for calibration and parameterization of the pressure measuring cell	00698970
PC-Interface with Converter USB/I <sup>2</sup> C 5V TO39	00695325

**Further information and downloads**



[qr-405101-en.jumo.info](http://qr-405101-en.jumo.info)