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# JUMO DELOS SI

## Precision pressure transmitter with switching contacts and display

### Application

- Food & pharma
- CIP/SIP systems
- Machine and system construction
- Air conditioning and refrigeration system construction

### Brief description

The JUMO DELOS SI high-precision, electronic pressure switch with analog output meets technical requirements relevant to hygiene. In a readily cleanable design and with a front-flush, seal-free measuring system, it is specifically geared to hygienic process safety standards. The nominal measuring ranges set at the factory extend from 400 mbar to 60 bar. They can be rescaled in the ratio 1:4, allowing the user to perform several measurement tasks with just one measuring instrument.

The following output variants are available, depending on the application: 1× PNP or 2× PNP switching outputs or 1× PNP switching output and an analog output signal.

The process pressure is visualized by a large, positively lit LC display.

Configuration can simply be performed on the measuring instrument, or by using the more convenient setup program. The enclosure can be rotated  $\pm 160^\circ$  to make it easier to read, and the display can be rotated  $180^\circ$  for overhead mounting.

A high-temperature variant is available for hot media up to  $200^\circ\text{C}$  (CIP and SIP cleaning systems).

### Customer benefits

- **Process safety**  
An hygienic design, with parts in contact with the medium made from stainless steel. The system has no dead zones, which prevents microbial contamination and ensures maximum process safety for hygienic processes.
- **Uncomplicated and time-saving**  
Save time with easy, local measuring instrument configuration or configuration via a more convenient setup program.
- **Flexible**  
The enclosure can be turned  $\pm 160^\circ$  and the display rotated  $180^\circ$  for user-friendly and individual alignment of the measuring instrument for optimum readability, configuration and electrical installation in any mounting position, as well as for running an auto-zero function.



Type 405052

### Special features

- Linearity from 0.1 % of MSP (measuring span)
- Scaling of measuring range 1:4
- Large, brilliant two-color display with alarm function
- Time-saving and simple configuration on the instrument or via a more convenient setup program
- Flexible mounting variance by rotating the display ( $180^\circ$ ), followed by auto zeroing
- Enclosure can be turned ( $\pm 160^\circ$ ) to improve readability
- Option for increased medium temperature up to  $200^\circ\text{C}$  (SIP and CIP capability)

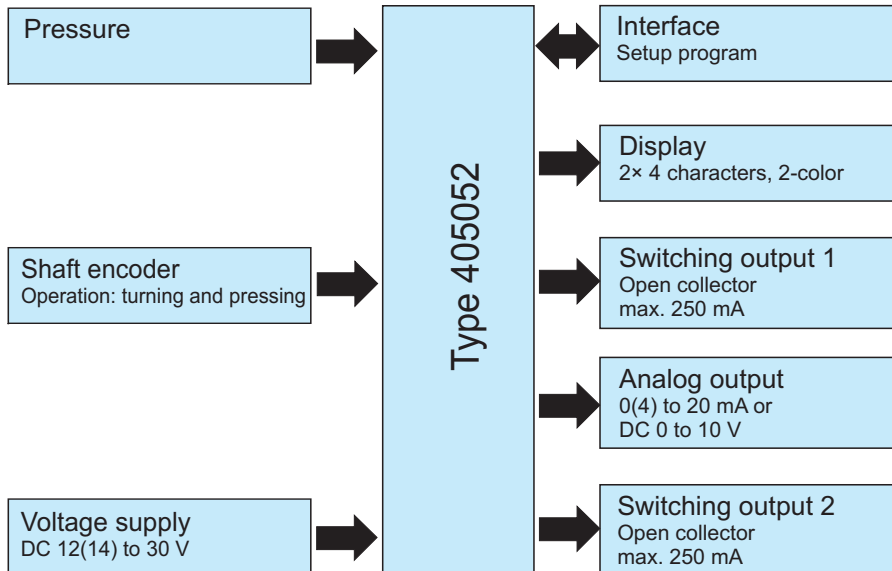
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## Block diagram



## Technical data

### General Information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor system	Silicon sensor with stainless steel separating diaphragm
Pressure transfer means	Synthetic oil (silicon oil), FDA-compliant oil
Permissible load changes	> 10 million
Location	
Mounting position	Any
Position-dependent zero point offset	Device standing upright, process connection on bottom
Basic type 000 standard	≤ 1 mbar
Basic type 004 high-temperature design	≤ 10 mbar
Display	Positively lit display
Alignment	Display can be rotated 180° via software Enclosure rotatable ±160° (use the combination tool supplied)
Size	Display field 16 × 26 mm, font size 7 mm, 2× 4-digit
Color	Normal operation: amber-colored
Switching state display	K1, K2
Measuring unit	mbar, bar, kPa, MPa, psi, %
Operation	
Local	Via control element under the screw plug with combination tool or 0.5 × 3 screwdriver or 2AF hex key
Setup interface	Pin 5 of the M12 × 1 round plug

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## Measuring range and accuracy

Nominal measuring range bar	Linearity <sup>a</sup>	Accuracy at		Long-term stability <sup>b</sup> % MSP per year	Overload capacity <sup>c</sup> bar	Burst pres- sure bar
	% MSP	20 °C <sup>d</sup> % MSP	-20 to +75 °C <sup>e</sup> % MSP			
0 to 0.4 bar relative pressure	0.15	0.35	0.7	≤ 0.2	1.6	2
0 to 1 bar relative pressure	0.15	0.3	0.6		4	5
0 to 4 bar relative pressure	0.1	0.25	0.5		16	20
0 to 10 bar relative pressure	0.1	0.25	0.5		40	50
0 to 25 bar relative pressure	0.1	0.25	0.5		100	125
0 to 60 bar relative pressure	0.1	0.25	0.5		240	300
-0.4 to +0.4 bar relative pressure	0.15	0.35	0.7		1.6	2
-1 to +1 bar relative pressure	0.15	0.3	0.6		4	5
-1 to +3 bar relative pressure	0.1	0.25	0.5		16	20
-1 to +9 bar relative pressure	0.1	0.25	0.5		40	50
-1 to +24 bar relative pressure	0.1	0.25	0.5		100	125
0 to 0.4 bar absolute pressure	0.15	0.35	0.7		1.6	2
0 to 1 bar absolute pressure	0.15	0.3	0.6		4	5
0 to 4 bar absolute pressure	0.1	0.25	0.5		16	20
0 to 10 bar absolute pressure	0.1	0.25	0.5		40	50
0 to 25 bar absolute pressure	0.1	0.25	0.5		100	125
0 to 60 bar absolute pressure	0.1	0.25	0.5	240	300	

<sup>a</sup> Linearity according to limit point setting

<sup>b</sup> Reference conditions EN 61298-1

<sup>c</sup> All pressure transmitters are vacuum-proof.

<sup>d</sup> Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

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

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## Outputs

All analog outputs in 3-wire technology/Switching outputs: open collector, PNP switching

Attenuation	0 to 99.99 s
Analog output	
Current	
Output 475	4 to 20 mA (and 1× PNP switching output)
Output 476	0 to 20 mA (and 1× PNP switching output)
Voltage	
Output 477	0 to 10 V (and 1× PNP switching output)
Setting range	Measurement range scaling (turn down) 1:4
Switching point	Configurable in the nominal measuring range (> release point)
Release point	Configurable in the nominal measuring range (< switching point)
Hysteresis	Configurable in the nominal measuring range
Input delay	0 to 99.99 s
Burden	
Current	
4 to 20 mA, three-wire (output 475)	$RL \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$
0 to 20 mA, three-wire (output 476)	$RL \leq (U_B - 6.5 \text{ V}) \div 0.022 \text{ A } (\Omega)$
Voltage	
DC 0 bis 10 V, three-wire (output 477)	$RL \geq 10 \text{ k}\Omega$
Step response time (analog input)	
$T_{90}$	$\leq 100 \text{ ms}$
Switching output	
Output 470, 475, 476 or 477	1× PNP switching output
Output 471	2× PNP switching outputs
Switching type	Break contact/make contact
Switching function	Window/hysteresis
Switching capacity	
Voltage drop from $U_B$	PNP $\leq 2 \text{ V}$
Contact rating	ON $\leq 250 \text{ mA}$ /OFF $\leq 1 \text{ mA}$
Switching cycles	> 10 million
Response time	$\leq 20 \text{ ms}$
Short-circuit proof	Yes
Current load check	
Pulse period	2 s; $T_{ON} 40 \text{ ms}$
Periodic protective circuit with overcurrent	$f = 0.5 \text{ Hz}$ Display: Err3 switching output K 1, Err4 switching output K 2

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## Mechanical features

Process connection	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Process seal	All flange connections are welded and therefore have no seals!
Process connection 521, 523, 571, 576, 652	FPM as standard
Process connection 575	FPM as standard, O-ring at front; FDA-compliant
Process connection 997 (JUMO PEKA)	FPM, VMQ, silicon EPDM; FDA-compliant, options see data sheet 409711
Measuring diaphragm	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Housing	
Material	Stainless steel 316 L
Surface	Ra ≤ 0.8 µm
Threaded sleeve M12 × 1	Stainless steel 316 L
Housing seal	VMQ silicon; FDA-compliant
Display	PA (polyamide)
Control element screw plug	
Material	Aluminum 3.2315
Surface	Eloxal coating
Seal	VMQ silicon; FDA-compliant
Weight	200 g with G 1/2 (process connection 504)

## Environmental influences

Permissible temperatures	
Medium	-25 to +100 °C (135 °C max 1 hour/day; no function here)
For basic type extension 004	-25 to +200 °C
Environment	-25 to +75 °C
Ambient temperature -50 °C	Restricted function: stationary use only, danger of broken cable, display does not function
Storage	-40 to +85 °C
Permissible relative humidity	
In operation	100 % rel. humidity, including condensation of instrument outer sleeve
Storage	90 % rel. humidity, no condensation
Permissible mechanical loading	
Vibration resistance <sup>a</sup>	20 g, 10 to 2000 Hz
Shock resistance <sup>b</sup>	50 g for 11 ms/100 g for 1 ms
Electromagnetic compatibility	With 4-pin connecting cable and grounded enclosure only!
Interference emission <sup>c</sup>	Class B <sup>d</sup>
Interference immunity <sup>c</sup>	Industrial requirements
Protection <sup>e</sup>	IP67

<sup>a</sup> IEC 60068-2-6

<sup>b</sup> IEC 60068-2-27

<sup>c</sup> IEC 61326-2-3

<sup>d</sup> The product is suitable for industrial use as well as for households and small businesses.

<sup>e</sup> EN 60529 (with suitable mating piece when connected)

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## Auxiliary power

Voltage supply $U_B^a$ 0 to 20 mA, three-wire (output 476)	Nominal voltage DC 24 V DC 12 to 30 V
4 to 20 mA, three-wire (output 475)	DC 12 to 30 V
0 to 10 V, three-wire (output 477)	DC 14 to 30 V
Less than the permitted voltage supply	Display Err 5
Reverse polarity protection	YES
Power consumption	$\leq 45$ mA without load, $\leq 545$ mA with load 2× PNP
Electrical connection	Round plug M12 × 1, 4-pin, A-coded (for assignment see "Connection diagram")
Circuit Requirements	SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

<sup>a</sup> Residual ripple: Peak voltages must not exceed or fall below the values specified for the voltage supply!

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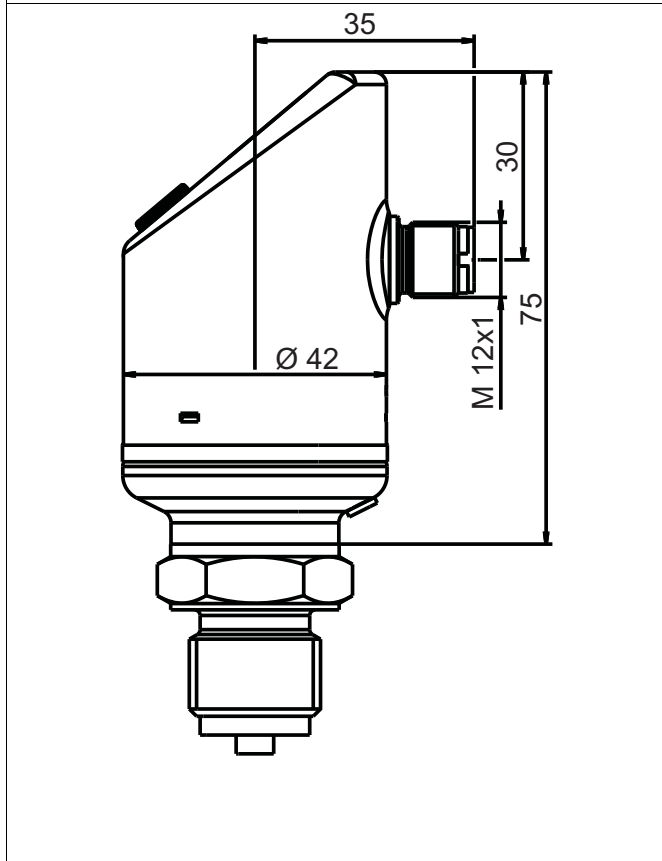
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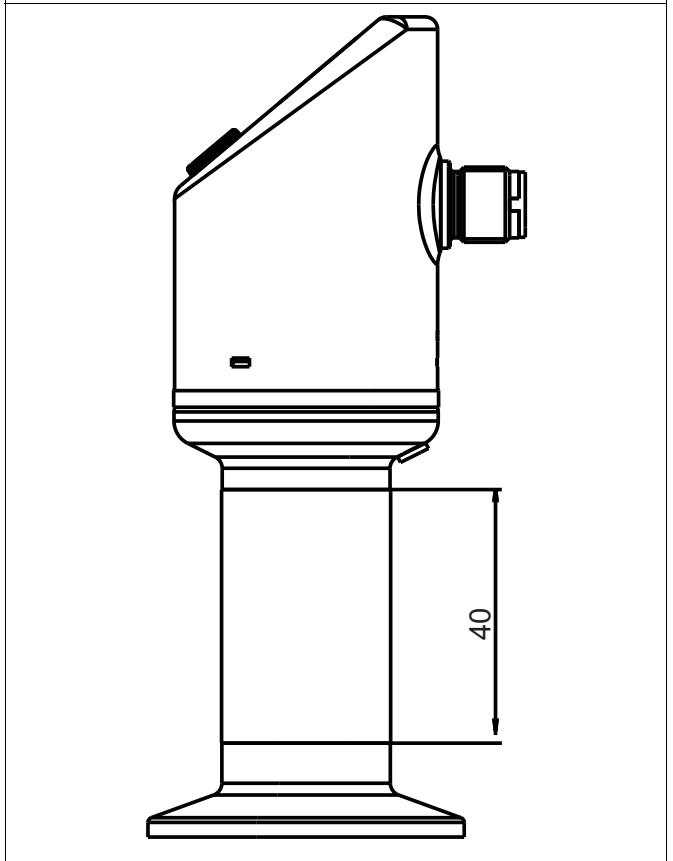
## Dimensions

Type 405052/000-...



Type 405052/004-...

for increased measuring material temperatures



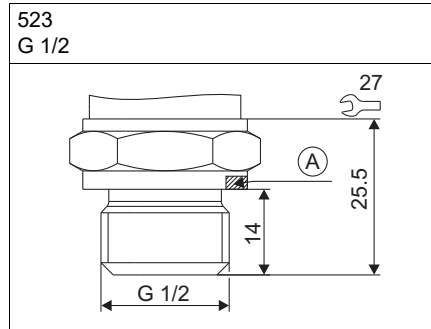
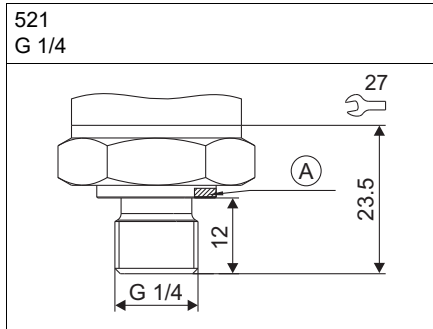
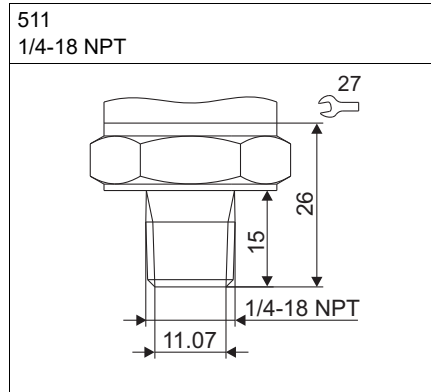
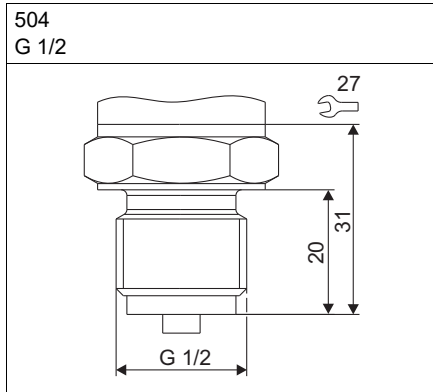
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**Process connections, not front-flush**



A Profile seal DN G 1/4

A Profile seal DN G 1/2



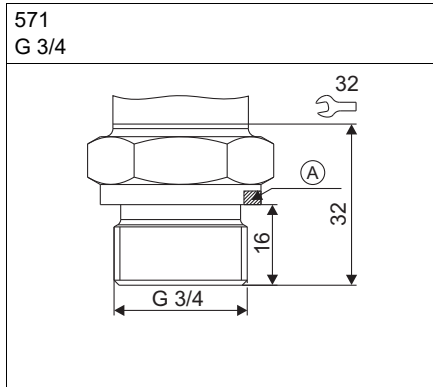
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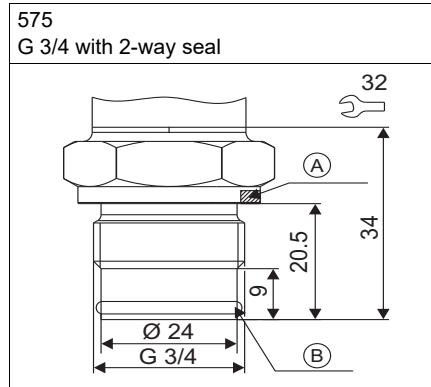
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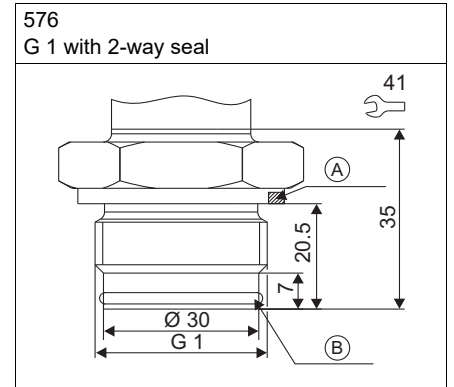
**Process connections, front-flush**



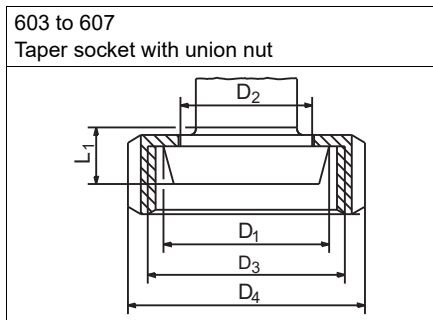
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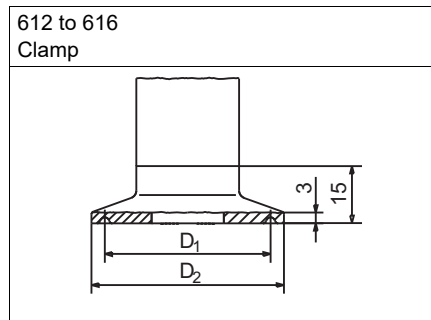
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 B O-ring 20.35 × 1.78



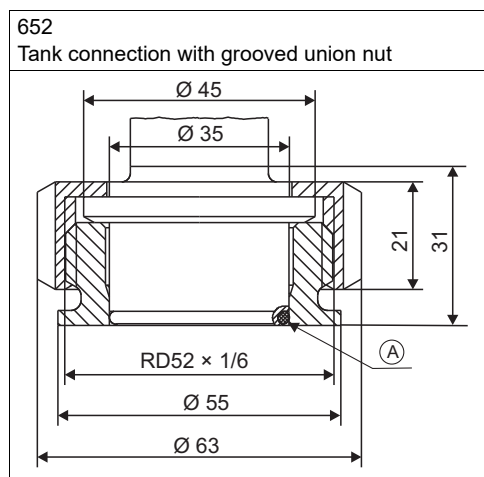
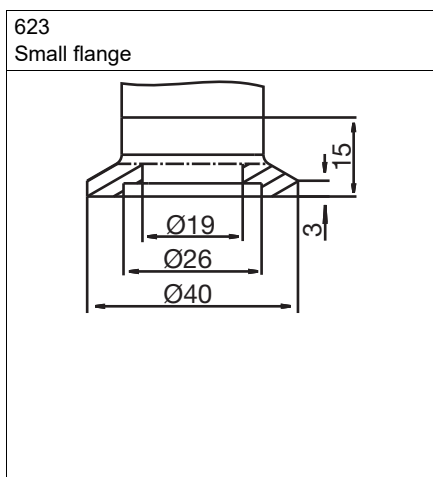
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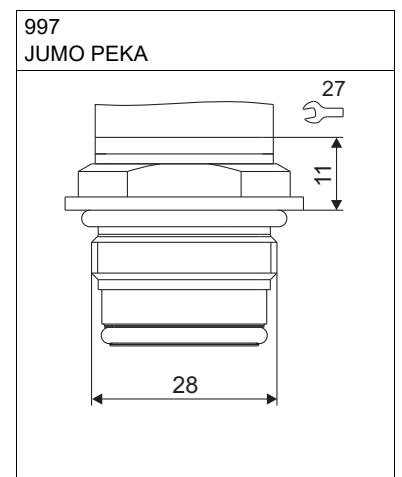
Process connection	DN	Ø D <sub>1</sub>	Ø D <sub>2</sub>	Ø D <sub>3</sub>	Ø D <sub>4</sub>	L <sub>1</sub>
603	20	36.5	30	RD 44 × 1/6	54	13
604	25	44	35	RD 52 × 1/6	63	15
606	40	56	48	RD 65 × 1/6	78	15
607	50	68.5	61	RD 78 × 1/6	92	16



Process connection	DN DIN 32676	DN (inch)	DN ISO 2852	Ø D <sub>1</sub>	Ø D <sub>2</sub>
612	10		8	27.5	34
	15		10		
	20		15		
613	25	1	20	43.5	50.5
	32	1.5	25		
	40		32		
616	50	2	40	56.5	64



A O-ring 29.82 × 2.62



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## Connection diagram

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.

Output 470		Output 471		Output 475 - 477	
1 PNP switching output		2 PNP switching outputs		1 PNP switching output + 1 analog output	
Voltage supply		Voltage supply		Voltage supply	
1 L+	DC 12(14) to 30 V	1 L+	DC 12(14) to 30 V	1 L+	DC 12(14) to 30 V
3 L-	(GND)	3 L-	(GND)	3 L-	(GND)
Output		Output		Output	
4 K1	Highside open collector max. 250 mA	2 K2	Highside open collector max. 250 mA	2 analog	0(4) to 20 mA/0 to 10 V
2	nc	4 K1		4 K1	Highside open collector max. 250 mA
5	Interface	5	Interface	5	Interface

<b>Color assignment: Connecting cable round plug M12 × 1</b>	1 BN	Brown
	2 WH	White
	3 BU	Blue
	4 BK	Black
	5 GY	Grey

The color assignment is **only** apply for A-coded standard cables!

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## Order details

<b>(1) Basic type</b>	
405052/000	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display <sup>a</sup>
405052/004	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display for increased measuring material temperatures up to 200 °C <sup>b</sup>
405052/999	JUMO DELOS SI – Precision pressure transmitter with switching contacts and display, special version
<b>(2) Input</b>	
447	-400 to +400 mbar relative pressure
449	-1 to +1 bar relative pressure
452	0 to 0.4 bar relative pressure
454	0 to 1 bar relative pressure
457	0 to 4 bar relative pressure
459	0 to 10 bar relative pressure
461	0 to 25 bar relative pressure
463	0 to 60 bar relative pressure
481	-1 to +3 bar relative pressure
483	-1 to +9 bar relative pressure
485	-1 to +24 bar relative pressure
486	0 to 400 mbar absolute pressure
488	0 to 1 bar absolute pressure
491	0 to 4 bar absolute pressure
493	0 to 10 bar absolute pressure
495	0 to 25 bar absolute pressure
506	0 to 60 bar absolute pressure
<b>(3) Output</b>	
470	1× PNP switching output
471	2× PNP switching outputs
475	1× PNP switching output and 1× analog output 4 to 20 mA <sup>c</sup>
476	1× PNP switching output and 1× analog output 0 to 20 mA <sup>c</sup>
477	1× PNP switching output and 1× analog output 0 to 10 V <sup>c</sup>
<b>(4) Process connection</b>	
504	G 1/2 EN 837
511	1/4-18 NPT EN 837
521	G 1/4 DIN 3852-11
523	G 1/2 DIN 3852-11
571	G 3/4 front-flush EN ISO 228-1
575	G 3/4 front-flush with 2-way seal
576	G 1 front-flush with 2-way seal
603	Taper socket with union nut DN 20 DIN 11851 (dairy screw connection) <sup>d</sup>
604	Taper socket with union nut DN 25 DIN 11851 (dairy screw connection) <sup>d</sup>
606	Taper socket with union nut DN 40 DIN 11851 (dairy screw connection) <sup>d</sup>
607	Taper socket with union nut DN 50 DIN 11851 (dairy screw connection) <sup>d</sup>
612	Clamp DN 10, 15, 20 DIN 32676
613	Clamp DN 25, 32, 40 DIN 32676
616	Clamp DN 50 DIN 32676, 2" ISO 2852
623	Small flange DN 25 DIN 28403
652	Tank connection with grooved union nut DN 25 <sup>e</sup>
997	JUMO PEKA hygienic process connection <sup>f</sup>
998	Suitable for connection to diaphragm seal
<b>(5) Process connection material</b>	
20	CrNi (stainless steel)

