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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



Type 405052

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 ±160° to make it easier to read, and the display can be rotated 180° for overhead mounting.

A high-temperature variant is available for hot media up to 200 °C (CIP and SIP cleaning systems).

The device is certified according to EHEDG in the versions with process connections (clamp) DN 25, 32, 40, and 50 as well as JUMO PEKA.

Customer benefits

- Process safety
  An hygienic design, with parts in contact with the medium made from stainless steel. The sys-tem has no dead zones, which prevents microbial contamination and ensures maximum pro-cess safety for hygienic processes.
- **Uncomplicated and time-saving**
  Save time with easy, local measuring instrument configuration or configuration via a more con-venient setup program.
- **Flexible**
  The enclosure can be turned ±160° and the display rotated 180° for user-friendly and individual alignment of the measuring instrument for optimum readability, configuration and elec-trical installation in any mounting position, as well as for running an auto-zero function.

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°), followed by auto zeroing
- Enclosure can be turned (±160°) to improve readability
- Option for increased medium temperature up to 200 °C (SIP and CIP capability)

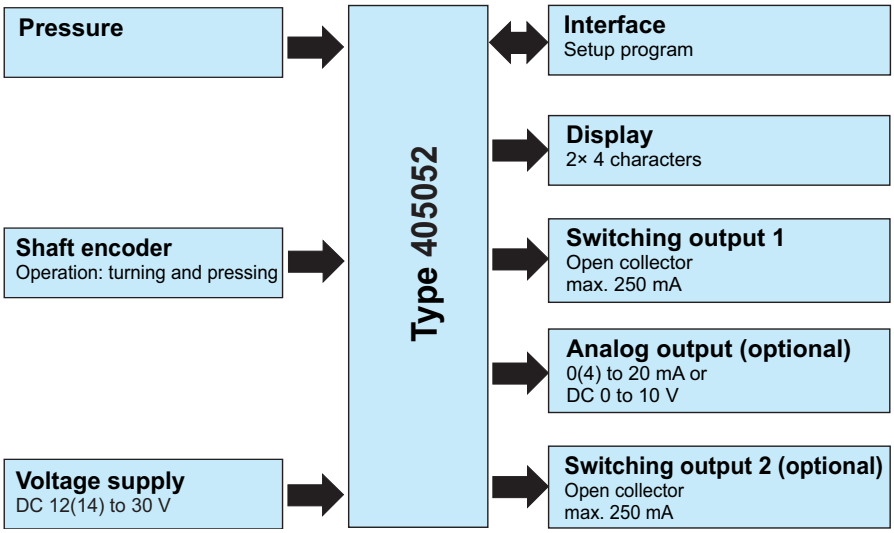
Approvals and approval marks (see "Technical data")

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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[a] % MSP	Accuracy at 20 °C[d] % MSP	 -20 to +75 °C[e] % MSP	Long-term stability[b] % MSP per year	Overload capacity[c] bar	Burst pressure bar
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

[a] Linearity according to limit point setting

[b] Reference conditions DIN EN 61298-1

[c] All pressure transmitters are vacuum-proof.

[d] Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

[e] 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 ≤ (U_B-6.5 V) ÷ 0.022 A (Ω)
0 to 20 mA, three-wire (output 476)	RL ≤ (U_B-6.5 V) ÷ 0.022 A (Ω)
Voltage	
DC 0 bis 10 V, three-wire (output 477)	RL ≥ 10 kΩ
Step response time (analog input)	
T_{90}	≤ 100 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 ≤ 2 V
Contact rating	ON ≤ 250 mA/OFF ≤ 1 mA
Switching cycles	> 10 million
Response time	≤ 20 ms
Short-circuit proof	Yes
Current load check	
Pulse period	2 s; T_{ON}40 ms
Periodic protective circuit with overcurrent	f = 0.5 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
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	According to IEC 60068-2-6, IEC 60068-2-27
Vibration resistance	20 g, 10 to 2000 Hz
Shock resistance	50 g for 11 ms/100 g for 1 ms
Electromagnetic compatibility	According to DIN EN 61326-2-3, with 4-pin connecting cable and grounded enclosure only!
Interference emission	Class B[a]
Interference immunity	Industrial requirements
Protection	IP67, according to DIN EN 60529 (with suitable mating piece when connected)

[a] The product is suitable for industrial use as well as for households and small businesses.

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Electrical data

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

[a] Residual ripple: Peak voltages must not exceed or fall below the values specified for the voltage supply!

Approvals and approval marks

EHEDG	
Test facility	Research Center Weihenstephan for Brewing and Food Quality
Certificate/Certification number	EL Class 1/EHEDG-C2000058 (2020-11-06)
Inspection basis	EHEDG design specifications (doc. 8 – Hygienic Design Principles) EHEDG tests for verifying ease of cleaning (doc. 2, Third Edition, July 2004, updated June 2007)
Valid for	Process connection 613 (Clamp DN 25, 32, 40), Process connection 616 (Clamp DN 50), Process connection 997 (JUMO PEKA hygienic process connection)

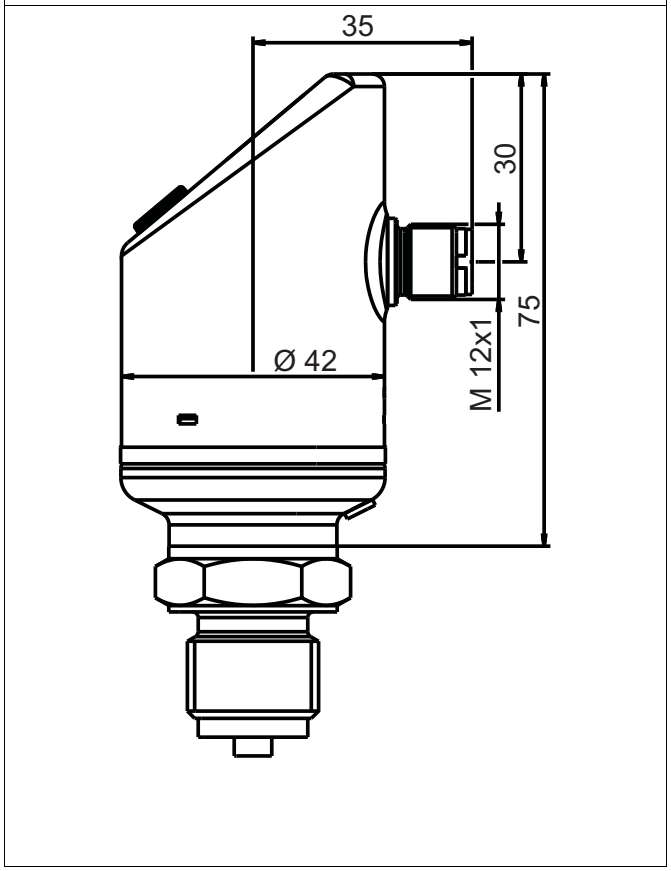
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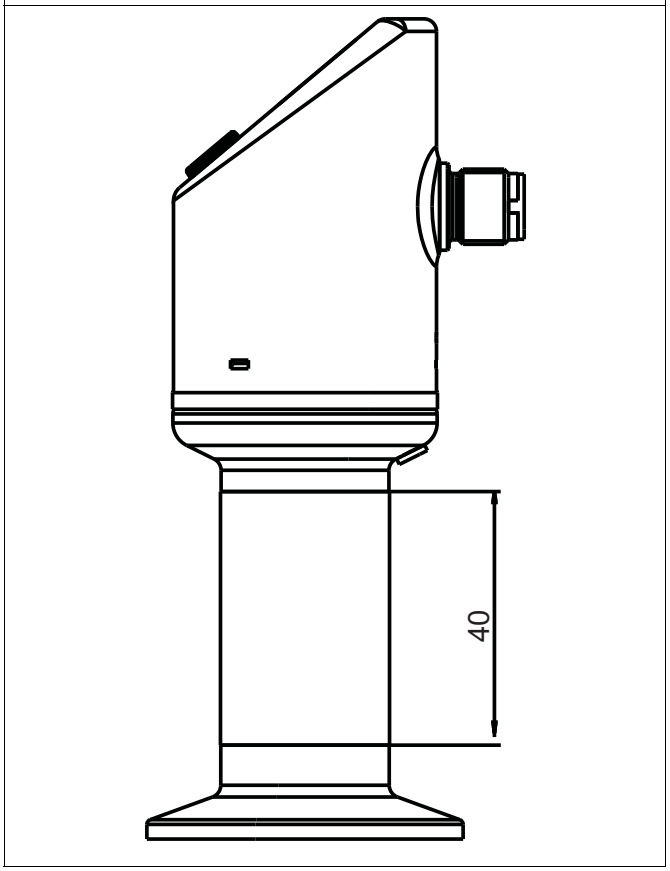
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Dimensions

Type 405052/000-...



Type 405052/004-...
for increased measuring material temperatures



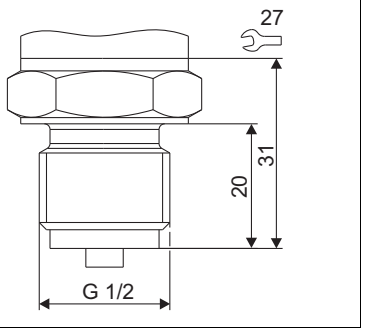
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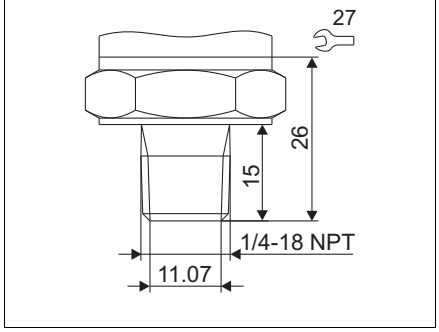
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Process connections, not front-flush

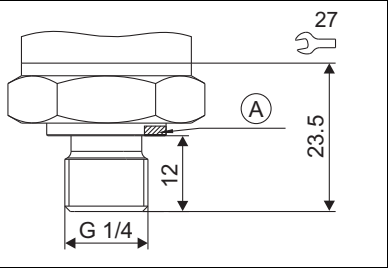
504
G 1/2



511
1/4-18 NPT

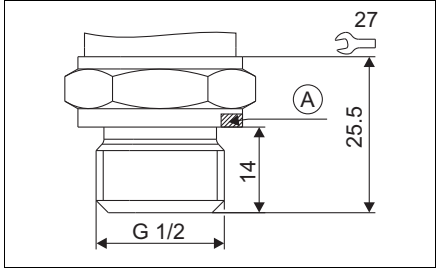


521
G 1/4



A Profile seal DN G 1/4

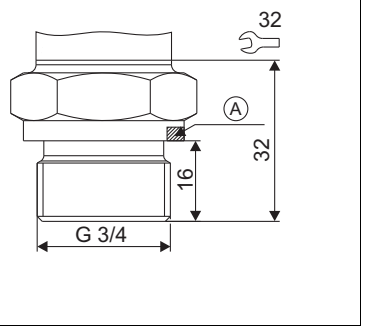
523
G 1/2



A Profile seal DN G 1/2

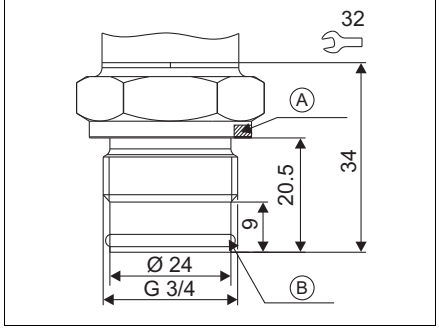
Process connections, front-flush

571
G 3/4



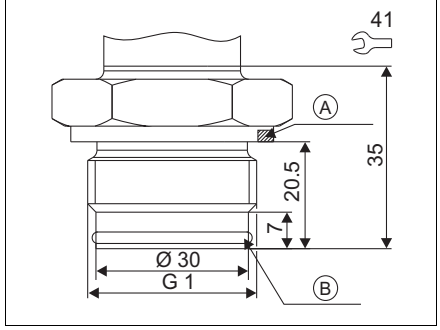
A Profile seal DN G 3/4

575
G 3/4 with 2-way seal



A Profile seal DN G 3/4
B O-ring 20.35 × 1.78

576
G 1 with 2-way seal



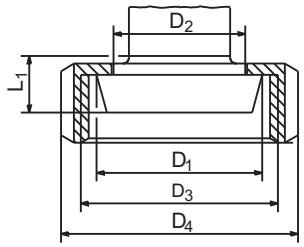
A Profile seal DN G 1
B O-ring 26.7 × 1.78

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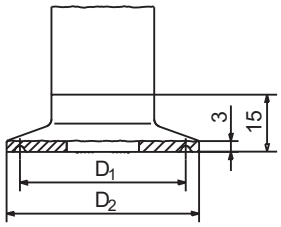
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603 to 607
Taper socket with union nut



612 to 616
Clamp

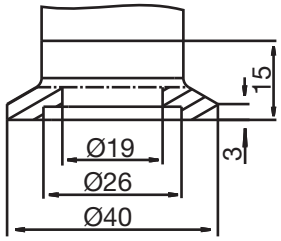


Process connection	DN	Ø D_1	Ø D_2	Ø D_3	Ø D_4	L_1
603	20	36.5	30	RD 44 × 1/6	54	13
604	25	44	35	RD 52 × 1/6	63	15
606	40	56	48	RD 65 × 1/6	78	15
607	50	68.5	61	RD 78 × 1/6	92	16

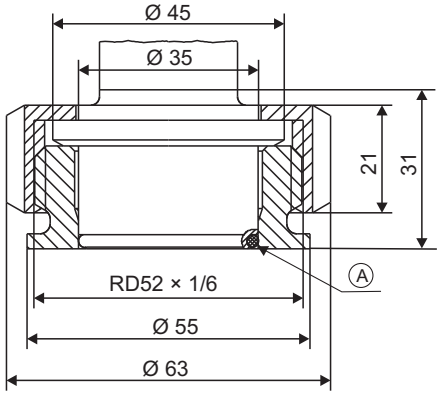
Process connection	DN DIN 32676	DN (inch)	DN ISO 2852	Ø D_1	Ø D_2
612	10		8	27.5	34
	15		10		
	20		15		
613[a]	25	1	20	43.5	50.5
	32	1.5	25		
	40		32		
616[a]	50	2	40	56.5	64

[a] certified according to EHEDG

623
Small flange

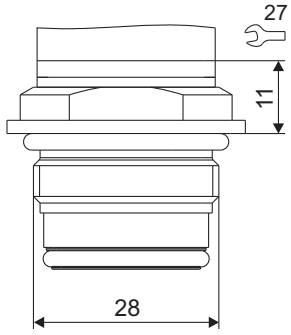


652
Tank connection with grooved union nut



A O-ring 29.82 × 2.62

997
JUMO PEKA[a]



[a] certified according to EHEDG

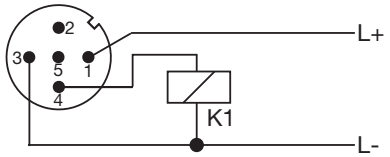
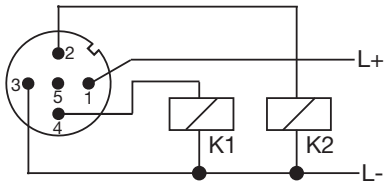
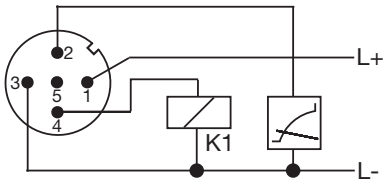
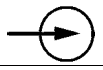
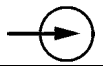
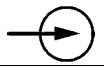
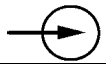
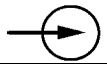
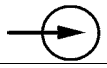
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Connection diagram

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

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

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

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Order details

	(1)	**Basic type**
405052/000		JUMO DELOS SI – Precision pressure transmitter with switching contacts and display[a]
405052/004		JUMO DELOS SI – Precision pressure transmitter with switching contacts and display for increased measuring material temperatures up to 200 °C[b]
405052/999		JUMO DELOS SI – Precision pressure transmitter with switching contacts and display, special version
	(2)	**Input**
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
447		-400 to +400 mbar relative pressure
449		-1 to +1 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
	(3)	**Output**
470		1× PNP switching output
471		2× PNP switching outputs
475		1× PNP switching output and 1× analog output 4 to 20 mA[c]
476		1× PNP switching output and 1× analog output 0 to 20 mA[c]
477		1× PNP switching output and 1× analog output 0 to 10 V[c]
	(4)	**Process connection**
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)[d]
604		Taper socket with union nut DN 25 DIN 11851 (dairy screw connection)[d]
606		Taper socket with union nut DN 40 DIN 11851 (dairy screw connection)[d]
607		Taper socket with union nut DN 50 DIN 11851 (dairy screw connection)[d]
612		Clamp DN 10, 15, 20 DIN 32676
613		Clamp DN 25, 32, 40 DIN 32676[e]
616		Clamp DN 50 DIN 32676, 2“ ISO 2852[e]
623		Small flange DN 25 DIN 28403
652		Tank connection with grooved union nut DN 25[f]
653		Tank connection with grooved union nut DN 40
997		JUMO PEKA hygienic process connection[e, g]
998		Diaphragm seal, version with screw connection

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	(5)	**Process connection material**
20		CrNi (stainless steel)
	(6)	**Electrical connection**
36		Round plug M12 × 1
	(7)	**Measuring system filling medium**
01		Silicon oil
12		FDA-compliant oil
	(8)	**Extra codes**
000		None
100		Customized setting (specify required setting in plain text)
374		Inspection certificate 3.1 Material DIN EN 10204
452		Parts in contact with the medium are electropolished
591		Restrictor in pressure channel
624		Free of oil and grease
634		TAG-number
691		Improved humidity/vibration protection
769		Calibration certificate
871		Inspection certificate 3.1 Accuracy DIN EN 10204

[a] This JUMO product is licensed under United States and Canadian patents. Purchasers of the JUMO product outside of the United States and Canada should advise JUMO of any planned sales of products incorporating the JUMO product into the United States and Canada.

[b] Measuring devices for increased measuring material temperatures can only be delivered with process connection 571, 575, 576, 603, 604, 606, 607, 612, 613, 623, 652, 997.

[c] Per default: The analog output is freely configurable.

[d] The grooved union nut is included in scope of delivery.

[e] certified according to EHEDG

[f] Welding socket, seal and grooved union nut are included in scope of delivery.

[g] Suitable adapter for process connection see data sheet 409711.

	(1)		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**		**(7)**		**(8)**
Order code		-		-		-		-		-		-		/	
Order example	405052/000	-	459	-	471	-	504	-	20	-	36	-	01	/	000

Stock versions

Order code	**Part no.**
405052/000-452-475-504-20-36-01/000	00528746
405052/000-454-475-504-20-36-01/000	00527029
405052/000-457-475-504-20-36-01/000	00528156
405052/000-459-475-504-20-36-01/000	00520630
405052/000-461-475-504-20-36-01/000	00528994
405052/000-449-475-504-20-36-01/000	00523317

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Accessories

Article	Part no.
PC interface cable including USB/TTL converter[a]	00456352
Y transmitter cable, 5 pole[a]	00507861
Combination tool	00526614
Cable connector, straight, 4 pole, M12 × 1, 2 m PVC cable	00404585
Cable connector, angled, 4 pole, M12 × 1, 2 m PVC cable	00409334
Cable socket, 5 pole, M12 × 1, straight, without connecting cable, assembly by customer	00419130
Measuring device holder for wall and 2" pipe	00597711
CD-setup program[a]	00522384

[a] The setup program can only be used for configuration in conjunction with these accessories.

Software

Designation	Part no.
Setup JUMO DELOS 405050[a]	00522384

[a] The setup program can only be used for configuration in conjunction with these accessories.