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JUMO DELOS HP

Precision Pressure Transmitter with Switching Contacts and Display

Application

- Hydraulic plants
- Machine and plant engineering
- Test benches
- Laboratory equipment

Brief description

The JUMO DELOS HP high-precision electronic pressure switch with analog output is predestined for use on test benches, with laboratory equipment, and for construction of special machines. These areas frequently demand precise measurement and a configuration adapted to the measurement task.

The stainless steel sensor welded to the process connection features a high burst safety, which is in part as much as 5x the measuring range. Consequently, the plant is reliably protected against medium leaks in the event of a malfunction.

Default nominal measuring ranges of 160 and 600 bar are available. These can be rescaled with a ratio of 1:4 allowing the user to conduct a variety of measurement tasks with only a single measuring device. Depending on the application, the following output versions are available: 1x PNP or 2x PNP switching outputs or 1x PNP switching output and an analog output signal.

The process pressure is visualized by a large and positively-lit LCD display.

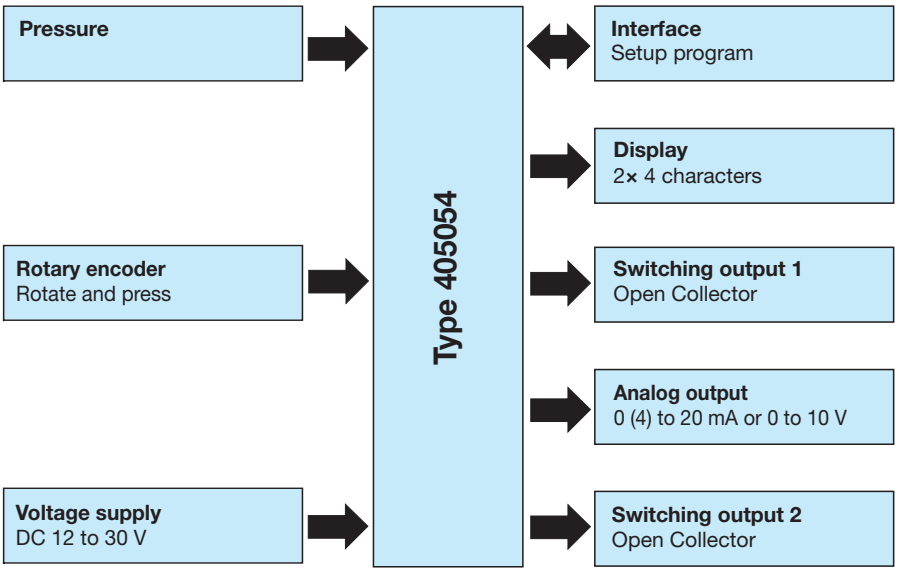
Configuration is easy to perform either on the device itself or via the easy-to-use setup program.

For enhanced legibility, the case can be rotated by +/-160° and the display can be mirror-imaged by 180° during installation. The JUMO DELOS HP also features an auto-zero function for subsequent zero point adjustment.



Type 405054

Block diagram



Special features

- Linearity 0.1 %
- Measuring range scaling 1:4
- Large, vibrant display
- Easy configuration on the device or using the setup program
- Any installation position possible with rotatable case (±160°)
- Available with flush-mounted process connection
- Units of measurement can be selected
- Software display rotatable by 180°

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Technical data

General information

Reference conditions	DIN 16086 and DIN EN 60770
Sensor system	Thin film on metal body (piezo-resistive)
Admissible load changes	> 10 million
Position	
Mounting orientation	Any
Calibration position	Device upright, process connection at the bottom
Zero point correction	Possible on-site or through setup (20 % of nominal measuring range)
Display	Positively-lit display
Alignment	Display rotatable by 180° with software
	Case rotatable by ±160° (use supplied combined tool)
Size	Display 16 mm x 26 mm, font size 7 mm, 2x 4-digit
Color	Standard operation: amber-colored
	Malfunction: amber-colored (text “Err”, error code 1 to 9 flashing)
	Setup interface occupied: red
Switching status display	K1, K2
Unit of measurement	bar, kPa, MPa, psi, %
Operation	
On device	With the control element beneath the sealing screw with combination tool or screwdriver 0.5 x 3 or Allen key af 2
Setup interface	Pin 5 of the M12 x 1 round plug

Input – nominal measuring range

Relative pressure	Nominal measuring ranges begin at 0 bar.		
Nominal measuring range	160	600	bar
Overload capability[a]	320	900	bar
Burst pressure	800	1800	bar

[a] All measuring ranges can be overloaded up to -1 bar (vacuum resistant).

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Output

All analog outputs in three-wire connection/switching outputs: open collector, PNP switching

Analog output	
Current	
Output 475	4 to 20 mA and 1x PNP switching output
Output 476	0 to 20 mA and 1x PNP switching output
Voltage	
Output 477	0 to 10 V and 1x PNP switching output
Measuring range scaling (turn down)	1:4
Step response time (analog input) T90	≤ 100 ms
Switching output	
Output 470, 475, 476, or 477	1x PNP switching output
Output 471	2× PNP switching output
Switching type	N/C contact / N/O contact
Switching function	Window / hysteresis
Switching point	Can be configured within nominal measuring range (> release point)
Release point	Can be configured within nominal measuring range (< switching point)
Hysteresis	Can be configured within nominal measuring range
Input attenuation	0 to 99.99 s
Input delay	0 to 99.99 s
Contact rating	
Voltage drop from U_B	PNP ≤ 2 V
Switching capacity	In ≤ 250 mA, out ≤ 1 mA
Switching cycles	> 10 million
Response time	≤ 20 ms
Short-circuit proof	Yes
Load check, current	
Pulse period	2 s; T_{ON} 40 ms
Periodic protective circuit for overcurrent	f = 0.5 Hz Display: Err3 switching output K 1, Err4 switching output K 2
Burden	
Current	
4 to 20 mA, three-wire	$R_L \leq (U_B - 6.5\ V) \div 0.022\ A\ (\Omega)$
0 to 20 mA, three-wire	$R_L \leq (U_B - 6.5\ V) \div 0.022\ A\ (\Omega)$
Voltage	
DC 0 to 10 V, three-wire	$R_L \geq 10\ K\Omega$

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Mechanical features

Process connection	
Material	Stainless steel 316L
Process seal	The measuring system is welded and therefore entirely free of seals[a].
Sensor	
Material	Stainless steel 630
Case	
Material	Stainless steel 316L
Threaded sleeve M12 x 1	Stainless steel 316L
Case seal	VMQ silicone; FDA-compliant
Display	PA (polyamide)
Sealing screw of control element	
Material	Aluminum 3.2315
Surface	Anodized surface
Seal	VMQ silicone; FDA-compliant
Weight	200 g with process connection 504 (G 1/2)

[a] Pressure transmitters with process connection 521 and 523 are supplied with external FPM seals.
Note the medium resistance of the sealing material!

Ambient conditions

Admissible temperatures	
Medium	-25 to +100 °C
Ambient	-25 to +75 °C
Ambient temperature -50 °C	Restricted function: only stationary use, risk of cable break, display without function
Storage	-40 to +85 °C
Admissible humidity	
Operation	100 % rel. humidity incl. condensation on the device outer case
Storage	90 % rel. humidity without condensation
Admissible mechanical load	
Vibration resistance[a]	20 g, 10 to 2000 Hz
Shock resistance[b]	50 g for 11 ms, 100 g for 1 ms
Electromagnetic compatibility	Only with 4-pin connecting cable and grounded case!
Interference emission[c]	Class B
Interference immunityc	Industrial requirement
Protection type[d]	IP67

[a] IEC 60068-2-6
[b] IEC 60068-2-27
[c] EN 61326-2-3
[d] EN 60529 (in mated condition with suitable counterpart)

Accuracy

Relative pressure	Nominal measuring ranges begin at 0 bar.		
Nominal measuring range	160	600	bar
Linearity[a]	**0.1**	**0.1**	% of the measuring span of the nominal measuring range
Accuracy at +20 °C[b]	0.25	0.25	% of the measuring span of the nominal measuring range
Accuracy at -20 to +75 °C[c]	0.5	0.5	% of the measuring span of the nominal measuring range
Long-term stability[d]	0.2 % of the measuring span of the nominal measuring range per year		

[a] Linearity after limit point setting
[b] Includes: linearity, hysteresis, repeatability, deviation from measuring range start and measuring range end
[c] Includes: linearity, hysteresis, repeatability, deviation from measuring range start and measuring range end, thermal influence on measuring range start and measuring span
[d] EN 61298-1

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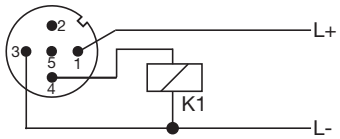
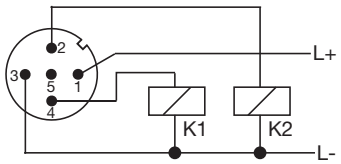
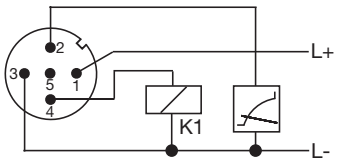
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Auxiliary energy

Voltage supply U_B[a]	Nominal voltage DC 24 V
0 to 20 mA, three-wire, output 476	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
Admissible voltage supply not reached	Display: Err 5
Maximum voltage supply exceeded > DC 34 V	The specified features are no longer met.
Reverse voltage protection	Yes
Power consumption	≤ 45 mA without load, ≤ 545 mA with load 2x PNP
Electrical connection	Round plug M12 x 1, 4-pin, A-coded (for assignment see "Connection diagram", page 6)
Electrical circuit	SELV

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

Connection diagram

Output 470		**Output 471**		**Output 475 - 477**	
1x PNP switching output		2x PNP switching outputs		1x PNP switching output + 1x analog output	
					
Voltage supply	→	Voltage supply	→	Voltage supply	→
1 L+	DC 12 to 30 V	1 L+	DC 12 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/DC 0 to 10 V
2	nc	4 K1		4 K1	Highside Open Collector max. 250 mA
5	Interface	5	Interface	5	Interface

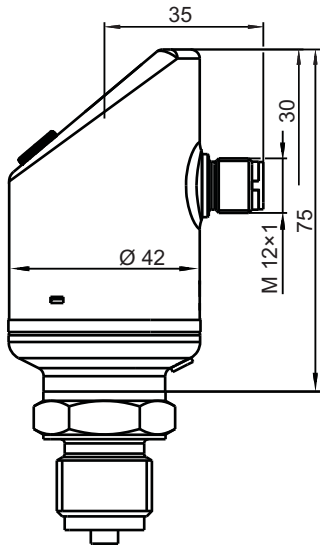
Color coding: M12 x 1 round plug	1 BN	Brown	4 BK	Black	The color coding is valid for A-coded standard cables **only**!
	2 WH	White	5 GY	Gray	
	3 BU	Blue			

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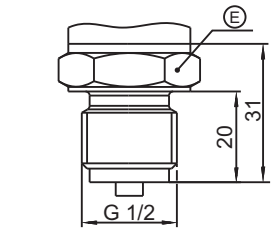
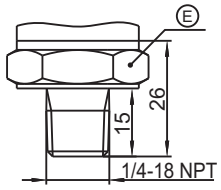
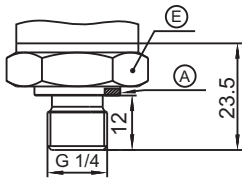
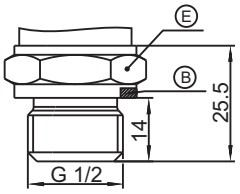
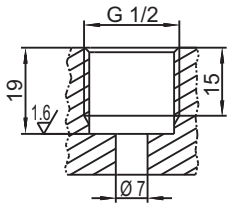
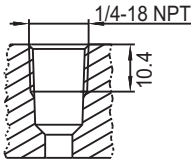
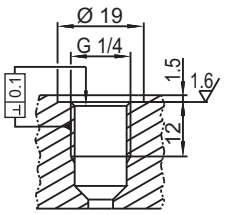
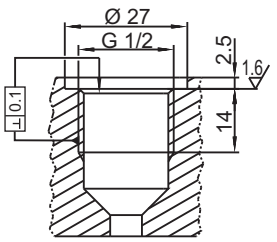
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Dimensions



Type 405054/000-...

Process connections, not flush-mounted

504	511	521	523
			
			

A = Profile seal DN G 1/4

B = Profile seal DN G 1/2

E = af 27

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Order details

	(1)	**Basic type**
405054/000		JUMO DELOS HP - Precision Pressure Transmitter with Switching Contacts and Display[a]
405054/999		JUMO DELOS HP - Precision Pressure Transmitter with Switching Contacts and Display, Special Design
	(2)	**Input – nominal measuring range**
465		0 to 160 bar relative pressure
468		0 to 600 bar relative pressure
	(3)	**Output**
470		1x PNP switching output
471		2× PNP switching output
475		1x PNP switching output and 1x analog output, 4 to 20 mA, configurable[b]
476		1x PNP switching output and 1x analog output, 0 to 20 mA, configurable[a]
477		1x PNP switching output and 1x analog output, 0 to 10 V, configurable[a]
	(4)	**Process connection**
504		G 1/2 DIN EN 837
511		1/4-18 NPT DIN EN 837
521		G 1/4 DIN 3852-11
523		G 1/2 DIN 3852-11
	(5)	**Process connection material**
20		CrNi (stainless steel)
	(6)	**Electrical connection**
36		Round plug M12 x 1
	(7)	**Extra codes**
000		None
100		Customer-specific default setting (specify parameters in plain text)
591		Choke in the pressure channel
624		Oil and grease free

[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] Factory setting – the analog output can be configured by the user.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		-		-		-		-		-		/	
Order example	405054/000	-	465	-	471	-	521	-	20	-	36	/	100

Stock version

Delivery within 3 working days after receipt of order

Type	Version	Part no.
405054/000-468-475-504-20-36/000	0 to 600 bar rel., 1x PNP switching output and 4 to 20 mA, G 1/2	00573780

Accessories

Item	Part no.
Cable socket, straight, 4-pin, M12 x 1, with 2 m PVC cable	00404585
Cable socket, angled, 4-pin, M12 x 1, with 2 m PVC cable	00409334
JUMO DELOS CD setup program 405050[a]	00522384
PC interface with USB/TTL converter[a]	00456352
Y transmitter cable, 5-pin[a]	00507861
Combination tool	00526614
Measuring device holder for wall and 2" pipe	00597711

[a] Configuration with the setup program can only take place in conjunction with these accessory parts.