Pressure transmitter with CANopen interface

- Ceramic thick film or metallic thin film strain gauge measurement principles
- Process connections: G, NPT in ¼ or G ¾ (with hygienic flush diaphragm) or 1½" clamp
- Linearised and temperature-compensated measuring ranges from -1...5 bar or 0...0.25 bar to 0...16 bar selectable, relative pressure
- Media temperature range depends on the measurement principle: - 20...+ 85 °C (ceramic), - 40...+ 125 °C (metallic)
- Access to measured value, device status and settings via the CANopen interface

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

Type ME43 ▸
Fieldbus gateway

PLC
With CANopen interface

Integration into CANopen and büS networks

Type description

The device Type 8312 is used for measuring relative pressures (or absolute pressures, on request) in liquid and gaseous media.

The pressure transmitter is available with either a metallic thin-film strain gauge or a ceramic thick-film strain gauge. As a result, the specifications of the device depend on the type of technology it is equipped with.
The main differences are: the pressure measuring ranges available, fluid temperature limitations, the types and sizes of process connections available, the presence or absence of a process connection seal and the availability of the flush diaphragm option.

The device digitises the pressure value and makes it available through the CANopen digital communication interface (CAN slave). Indeed, instead of an analogue output, this device offers a digital CANopen interface. This allows bidirectional data transfer, e.g. with a CAN/Ethernet gateway, or directly to the PLC that is itself equipped with a CAN interface.
CAN devices can also be connected to the Bürkert digital communication interface (büS). A driver used for data exchange and settings of the Type 8312 is integrated in the PC tool Bürkert Communicator, which is available on our website.

Several useful additional functions have been implemented through the DS 404 device profile.

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Visit product website ▸

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1. General technical data

Product properties	
Material	
Make sure the device materials are compatible with the fluid you are using. Further information can be found in chapter "3.1. Bürkert resistApp" on page 6.	
Non wetted parts	
Housing	Stainless steel 1.4305 (303)
Wetted parts	
Process connection	• Ceramic variant: stainless steel 1.4305 (303) • Metallic G or NPT variant: stainless steel 1.4571 (316Ti) • Metallic clamp variant: stainless steel 1.4435 (316L)
Measuring element	• Ceramic variant: ceramic Al_2O_3 (96 %) • Metallic variant: stainless steel 1.4435 (316L)
Seal	• Ceramic variant: FPM (FFPM on request) • Metallic variant: none
Surface quality	Ra < 0.8 µm (clamp connection)
Dimensions	Further information can be found in chapter "4. Dimensions" on page 6.
Weight	95 g with process connection G ¼
Measurement technology	• Ceramic thick film strain gauge • Metallic thin film strain gauge
Measured quantity	Relative pressure (absolute pressure on request)
Measuring range	-1...5 or 0...0.25; 1; 1.6; 2.5; 4.0; 6.0; 10.0 or 16.0 bar Further information can be found in chapter "7.3. Ordering chart" on page 10.
Monitoring	• Measuring circuit – Underrange (freely selectable lower limit) – Overrange (freely selectable upper limit) • Probe short circuit • Probe break
Performance data	
Compensated ambient temperature range ($T_{amb.}$)	- 20...+ 85 °C (- 4...+ 185 °F)
Temperature coefficient (Tc)	In compensated $T°_{amb.}$ range
Average Tc of zero	• Ceramic variant: ≤ 0.02 % / °C typical, ≤ 0.04 % / °C max. • Metallic variant: – ≤ 0.03 % / °C typical, ≤ 0.05 % / °C max. for measuring ranges ≤ 0.4 bar – ≤ 0.02 % / °C typical, ≤ 0.04 % / °C max. for measuring ranges > 0.6 bar
Average Tc of measuring span	• Ceramic variant: ≤ 0.02 % / °C typical, ≤ 0.04 % / °C max. • Metallic variant: ≤ 0.02 % / °C typical, ≤ 0.04 % / °C max.
Thermal hysteresis	• Ceramic variant: ≤ ± 0.4 % of measuring span • Metallic variant: – ≤ ± 0.5 % of measuring span (in compensated temperature range) – ≤ ± 1 % of measuring span for range 0...0.25 bar
Zero offset	≤ 0.3 % of measuring span
Cycle time	1 ms
Measuring resolution	12 Bit
Measurement deviation	Related to characteristic curve: ≤ 0.5 % of measuring span (limit point setting)
Hysteresis	• Ceramic variant: ≤ 0.2 % of measuring span • Metallic variant: ≤ 0.1 % of measuring span
Repeatability	• Ceramic variant: ≤ 0.1 % of measuring span • Metallic variant: ≤ 0.05 % of measuring span
Overload limit	3 x measuring span
Burst pressure	4 x measuring span Further information on burst pressure can be found in chapter "7.3. Ordering chart" on page 10.

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Stability	Per year: • Ceramic variant: ≤ 1 % of measuring span • Metallic variant: ≤ 0.5 % of measuring span
Electrical data	
Operating voltage	10...30 V DC, filtered and regulated
Power source (not supplied)	The auxiliary energy of the pressure sensor must meet SELV requirements; optionally, an energy-limited current circuit according to paragraph 9.3 of DIN EN 61010-1 and UL 61010-1 can be used.
DC reverse polarity protection	Yes
Overvoltage protection	Yes
Short circuit protection	Yes
Current consumption	Max. approx. 45 mA
Recommended connection cable	5-wire shielded cable, length depends on the transmission speed. The physical CAN transmission is standardized according to ISO 11898-2 (high-speed) and ISO 11898-3 (low-speed)
Medium data	
Fluid	Liquid and gaseous medium
Fluid temperature	• Ceramic variant: - 20...+ 85 °C (- 4...+ 185 °F) • Metallic variant: - 40...+ 125 °C (- 40...+ 257 °F)
Product connections	
Process connection	• Ceramic variant: G ¼ or NPT ¼ (according to EN 837) • Metallic variant: – G ¼ or NPT ¼ (according to EN 837) – G ¾ flush diaphragm (according to ISO 228-1) – Clamp 1½" (according to ISO 2852) Further information on the process connection can be found in chapter "7.3. Ordering chart" on page 10.
Electrical connection	M12 × 1 male connector, 5-pin according to DIN IEC 60947-5-2
Digital communication: CANopen	
Protocol	CiA DS 301, V4.02, CANopen slave
Profile	CiA DS 404, V1.2; measuring devices and closed-loop controllers
Data transfer rate (Baud rate)	20 kbaud to 1 Mbaud, setting via LSS or SDO
Node ID	1 to 127, setting via LSS or SDO
PDO	0 Rx, 1 Tx
SDO	1 Rx, 1 Tx
Emergency	Yes
Heartbeat	Yes
Node Guarding	Yes
LSS	Yes
SYNC	Yes
Operation and project design	All parameters are accessible via the CANopen object directory (EDS) and can be set via standard CANopen software tools or Bürkert Communicator.
EDS (electronic data sheet)	• Device driver in Bürkert Communicator tool Type 8920, see "Bürkert Communicator" on the website in the Software chapter **Type 8920** ▶. • See "Device Description Files" on the website in the Software chapter **Type 8312** ▶.
Factory setting	See "Operating Instructions Type 8312" on the website in the User Manuals chapter **Type 8312** ▶.
Approvals and conformities	
Directives	
CE directive	Further information on the CE Directive can be found in chapter "2.2. Standards" on page 5.
Pressure equipment directive	• The device does not meet the requirements for "safety accessories" within the meaning of the pressure equipment directive 2014/68/EU. • Complying with article 4, paragraph 1 of 2014/68/EU directive. Further information on the pressure equipment directive can be found in chapter "2.3. Pressure Equipment Directive (PED)" on page 5.

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Environment and installation	
Ambient temperature	• Operation: - 20...+ 85 °C (- 4...+ 185 °F) • Storage: - 40...+ 85 °C (- 40...+ 185 °F)
Relative air humidity	• During operation: ≤ 100 %, without condensation on the outer housing surface of the device • During storage: ≤ 90 %, without condensation
Climate class	3K7 according to EN 60721-3-3
Application range	Indoor and outdoor Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions.
Degree of protection according to IEC/EN 60529	IP67, with M12 female connector screwed on
Mounting position	• Installation: unrestricted • Calibration: device upright, process connection at the bottom

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2. Approvals and conformities

2.1. Conformity

In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.2. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

2.3. Pressure Equipment Directive (PED)

The device conforms to article 4, paragraph 1 of the Pressure Equipment Directive (PED) 2014/68/EU under the following conditions:

Device used on a pipe

Note:

- The data in the table is independent of the chemical compatibility of the material and the fluid.
- PS = maximum admissible pressure (in bar), DN = nominal diameter of the pipe

Type of fluid	Conditions
Fluid group 1, article 4, paragraph 1.c.i	DN ≤ 25
Fluid group 2, article 4, paragraph 1.c.i	DN ≤ 32 or PS*DN ≤ 1000
Fluid group 1, article 4, paragraph 1.c.ii	DN ≤ 25 or PS*DN ≤ 2000
Fluid group 2, article 4, paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 or PS*DN ≤ 5000

Device used on a vessel

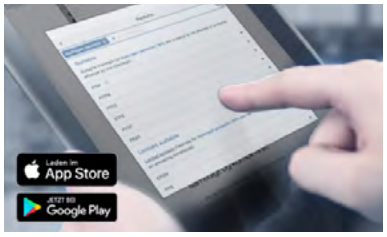
Note:

- The data in the table is independent of the chemical compatibility of the material and the fluid.
- PS = maximum admissible pressure (in bar), V = vessel volume

Type of fluid	Conditions
Fluid group 1, article 4, paragraph 1.a.i	V > 1 L and PS*V ≤ 25 bar.L or PS ≤ 200 bar
Fluid group 2, article 4, paragraph 1.a.i	V > 1 L and PS*V ≤ 50 bar.L or PS ≤ 1000 bar
Fluid group 1, article 4, paragraph 1.a.ii	V > 1 L and PS*V ≤ 200 bar.L or PS ≤ 500 bar
Fluid group 2, article 4, paragraph 1.a.ii	PS > 10 bar and PS*V ≤ 10000 bar.L or PS ≤ 1000 bar

3. Materials

3.1. Bürkert resistApp



Bürkert resistApp – Chemical resistance chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

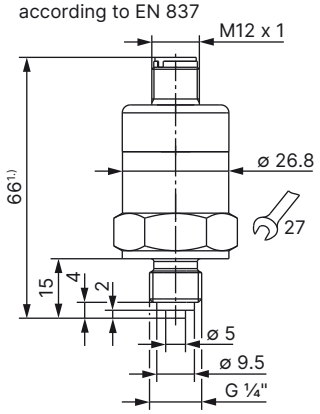
Start chemical resistance check

4. Dimensions

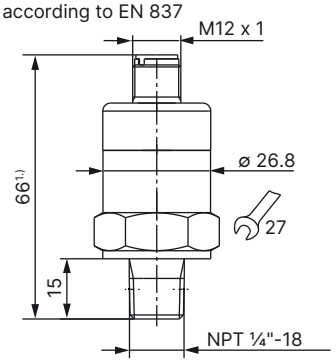
4.1. Ceramic variant

Note:
Dimensions in mm, unless otherwise stated

Process connection:
G ¼
according to EN 837



NPT ¼
according to EN 837



1.) The total height is increased by the height of the used female connector and cable.

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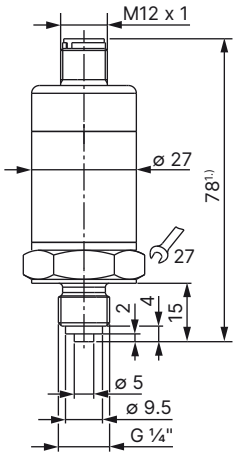
4.2. Metallic variant

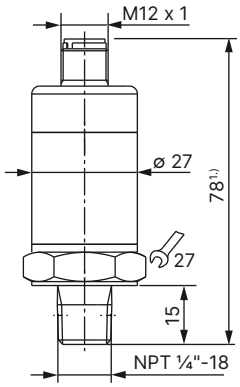
Note:
Dimensions in mm, unless otherwise stated

Process connection :

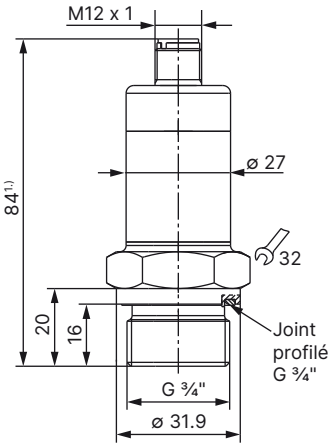
G ¼
according to EN 837



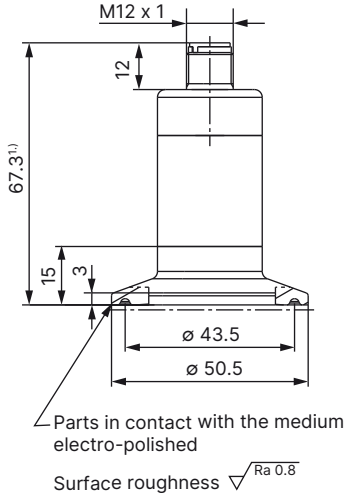
NPT ¼
according to EN 837



G ¾ front-flush
according to EN ISO 228-1



Clamp 1½"
according to EN ISO 2852



1.) The total height is increased by the height of the used female connector and cable.

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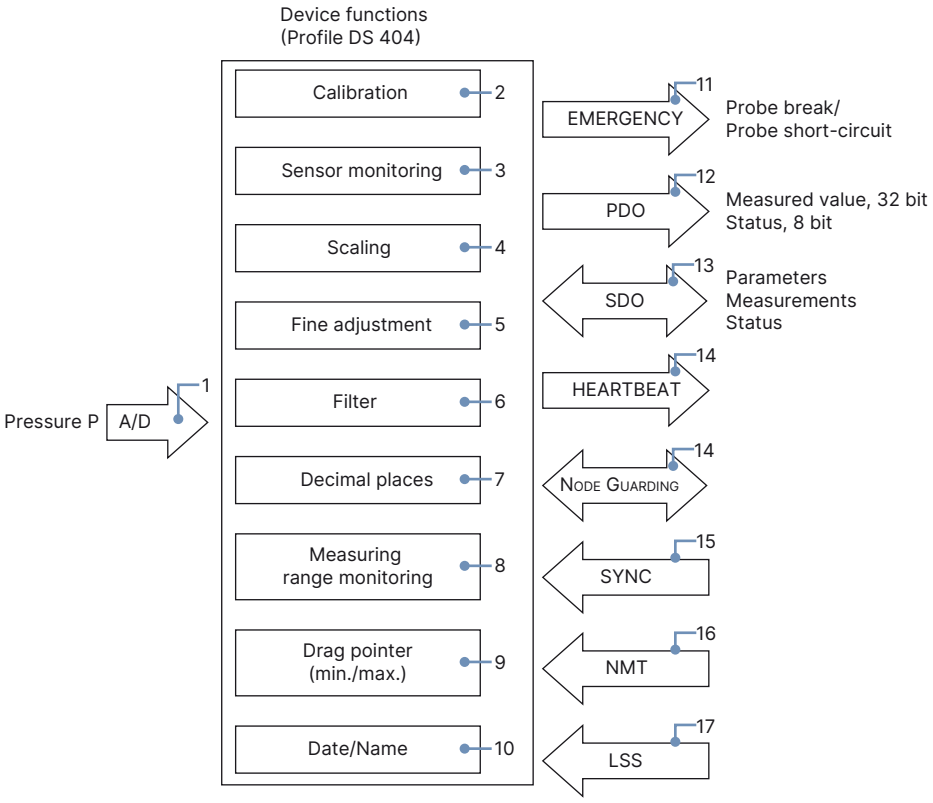
5. Product operation

5.1. Functional overview



No.	Description
1	The analog signal from the pressure cell is digitized with 12 Bit resolution.
2	The pressure signal is digitally calibrated at the factory.
3	The sensor monitoring facility continuously checks the correct performance of the sensor signal and triggers high priority emergency telegrams in the event of an error.
4	The pressure measurement can be scaled to any dimensional unit (or in % of range).
5	Fine calibration features and auto-zeroing function and a freely adjustable shift of the characteristic.
6	Undesirable signal fluctuations can be suppressed through the constant (adjustable) filter.
7	The measurement output has a freely selectable decimal place.
8	Free choice of upper and lower limits for range monitoring. The result is given as a status byte in addition to the measurement in the PDO frame.
9	The drag pointer (“min./max. index”) function records the minimum and maximum pressure values.
10	Date and name of the last servicing action can be stored.
11	An emergency telegram is triggered in the event of a sensor fault.
12	The PDO frame contains a 32-bit measurement and a 8-bit status. The measurement output can be controlled by means of different trigger conditions.
13	Parameters can be set through SDO frames, and measurements and status can be requested.
14	The heartbeat signal or Node Guarding can be used to additionally monitor the transmitter function.
15	The transmission of measurements can be controlled through the Sync command.
16	NMT frames serve to control the operational state of the transmitter.
17	The CAN Node ID and CAN baud rate are set via LSS or SDO, according to choice.

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6. Product accessories

Note:
To configure a device, use the USB-büS-Interface set Type 8923 and the Bürkert Communicator software Type 8920.

See **Software manual Type 8920** ▶ for more information.

Accessories	No.	Description
USB-büS-Interface set 1 	**1**	Quick-Start
	2	Power supply: 100...240 V AC/24 V DC 1 A and adapters for power supply worldwide use
	3	büS terminating resistor on büS Y-splitter
	4	5-pin M12 male connector wired on free end cable, cable length: 0.2 m
	5	büS connection cable with 5-pin M12 male connector, micro USB B plug, cable length: 0.3 m
	6	büS adapter with 5-pin M12 male connector, A-coded to 5-pin M12 male connector, A-coded
	7	büS stick (USB to büS/CANopen adapter)
	8	büS service cable with 5-pin M12 female connector, mini USB plug and circular female connector for power supply, cable length: 0.7 m
	9	Magnetic key
USB-büS-Interface set 2 		The Bürkert Communicator software can be downloaded from our website under the "Software" heading of **Type 8920** ▶.

7. Ordering information

7.1. Bürkert eShop

Bürkert eShop – Easy ordering and quick delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

7.2. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements?
Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

7.3. Ordering chart

Ceramic variant

Note:
The following variants have a 10...30 V DC operating voltage and a digital CANopen interface.

Pressure range (relative pressure) [bar]	Burst pressure (relative pressure) [bar]	Process connection	Seal	Article no.
0...1.6	6.4	G ¼	FPM	574590
0...2.5	10			574591
0...4	16			574592
0...6	24			574593
0...10	40			574594
0...16	64			574595
0...1.6	6.4	NPT ¼		574596
0...2.5	10			574597
0...4	16			574598
0...6	24			574599
0...10	40			574600
0...16	64			574601

Metallic variant

Note:
The following variants have a 10...30 V DC operating voltage and a digital CANopen interface.

Pressure range (relative pressure) [bar]	Burst pressure (relative pressure) [bar]	Process connection	Seal	Article no.
0...0.25	1	G ¼	–	574602
0...1	4			574603
0...0.25	1	NPT ¼		574604
0...1	4			574605
0...0.25	1	G ¾ flush diaphragm		574606
0...1	4			574607
0...1.6	6.4			574608
0...2.5	10			574609
0...4	16			574610
0...6	24			574611
0...10	40			574612
0...16	64			574613
- 1...5	20	Clamp 1½"		572107
0...0.25	1			572106
0...1	4			572105
0...1.6	6.4			572104
0...2.5	10			572103
0...4	16			572102
0...10	40			572101
0...16	64			572100

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Further variants on request	
Process connection G ½	**Pressure** • Relative pressure: up to 600 bar or 8700 PSI • Absolute pressure: up to 25 bar or 360 PSI
Material Seal: FFPM [1.] for ceramic variant	

1.) Product characteristics similar to PTFE

7.4. Ordering chart accessories

Note:

- büS communication specifications are based on CANopen.
- The following accessories can be used for CANopen as well.

Description			Article no.
System Connect			
Type ME43 Gateway/Interface			
Industrial Ethernet gateway (PROFINET IO, EtherNet/IP, Modbus TCP, EtherCAT®)			307390
PROFIBUS gateway (PROFIBUS DPV1)			307393
Interface accessories			
USB-büS-Interface set			
	USB-büS-Interface set 1 (Type 8923) Further information can be found in chapter "6. Product accessories" on page 9.		772426
USB-büS-Interface set 2 (Type 8923) Further information can be found in chapter "6. Product accessories" on page 9.			772551
Connectors			
büS Y-distributor (M12 female connector, 5-pin to M12 male and female connectors, 5-pin)			772420
büS Y-distributor with power interrupt (M12 female connector, 5-pin to M12 male and female connectors, 5-pin)			772421
büS adapter (M12 male connector, 5-pin, A-coded to M12 male connector, 5-pin, A-coded)			772867
büS terminating resistor 120 ohms, M12 male connector, 5-pin			772424
büS terminating resistor 120 ohms, M12 female connector, 5-pin			772425
Extensions			
	M12 female and male connectors, 5-pin, straight, moulded on büS cable, shielded	0.5 m	772403
		1 m	772404
		3 m	772405
		5 m	772406
		10 m	772407
		20 m	772408
Software			
Software Bürkert Communicator			Download **Type 8920** ▶

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