

Bourdon tube pressure gauge with switch function NS 100/160, Type series BE4...



Application area

- General process technology
- Chemical and petrochemical industry
- Machinery construction
- Shipping

Features

- Bourdon tube pressure gauge with switch function
- Nominal ranges -1...0 bar to -1...24 bar, 0...1 bar to 0...1600 bar
- High quality case with bajonet ring NS 100/160 per EN 837-1 S1, alternative safety version per EN 837-1 S3
- Case, measuring element and pressure connection of stainless steel
- Switch functions (electrical contact devices) per DIN 16085:
 - slow acting contact
 - magnetic snap contact
 - inductive contact
 - inductive contact with integrated switching amplifier
- EAC declaration (upon request)

Options

- Approvals/Certificates
 - Explosion protection
 - Classification per SIL2
 - Certificate of measuring equipment for Russian Federation
 - Material certificate per EN 10204
 - Calibration certificate per EN 10204
- Higher overload protection
- Case with liquid filling
- Damping of movement
- Electronical angle-of-rotation sensor, Type series PL1100, see data sheet D6-020
- Extended temperature range
- Oxygen free of oil and grease
- Connection to Zone 0

Application

The bourdon tube pressure gauge with switch function (electrical contact device) is suitable for use in measurement and control systems for indicating and monitoring pre-selectable minimum and/or maximum pressure values. Mechanical contacts are used as slow acting contacts or with magnetic snap contacts. The devices can also be supplied with inductive contact.

Technical data

Constructional design / case

Design: High quality case with bayonet ring per EN 837-1 S1, material: stainless steel mat.-no.-Nr. 1.4301 (304) ; with blow-out device, material: PUR, ventilation valve, material: PUR

Alternative:

Safety design with blow-out back and solid baffle wall per EN 837-1 S3, Material: Stainless steel 1.4301 (304)

Nominal size: NS 100 or NS 160

Degree of protection per EN 60529:	<ul style="list-style-type: none"> ■ Without filling: IP 65 ■ With filling S1 case: IP 65 ■ With filling S3 case: IP 66
Case filling:	Labofin
Atmosph. pressure compensation:	Standard case, filled, ≤ 10 bar: with ventilation valve > 10 bar filling plug, material: PUR Safety case, filled: with pressure compensation diaphragm, material: silicone
Case seal:	Material gasket: NBR
Window:	Non-splintering laminated glass. Option: Non-splintering plastic (Macrolon)
Contact lock:	Stainless steel with NBR gasket
Measuring element:	Bourdon tube < 60 bar: c-type ≥ 60 bar: spiral
Movement:	Stainless steel segment Optional: movement with integrated damping system
Scale:	Pure aluminium, white with black inscription. Option: with red marking, special scale upon request.
Pointer:	Pure aluminium, black. With micro adjustment for zero point correction.
Mounting:	Via process connection. Optional with flange for surface mounting or for flush mounting with DIN mounting flange.
Electronical connection:	Connection plug with cable gland M20 x 1.5 and removable test cover, material: Macrolon
Weight:	NS 100 without filling: approx. 0.9 kg NS 160 without filling: approx. 1.8 kg NS 100 with filling: approx. 1.5 kg NS 160 with filling: approx. 3.6 kg

Process connection

Design:	Per EN 837-1. G1/2 B, 1/2" NPT or M20 x 1.5, bottom or back eccentric connection. Optional with throttle screw for system damping, further process connections upon request
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Material wetted parts

Measuring element:	Bourdon tube and pressure connection material stainless steel mat.-no. 1.4571 (316Ti)
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Nominal range

See order details, further ranges upon request

Overload-protection: Standard: loading up to full scale
Higher overload protection see order code.

Accuracy

Accuracy class:	NS 100			
	nominal range (bar)	no. of contacts		
		1	2	3
1		cl. 1	cl. 1.6	-
≥ 1.6		cl. 1	cl. 1	cl. 1.6
≥ 1000		cl. 1.6	cl. 1.6	cl. 1.6
Accuracy class:	NS 160			
	nominal range (bar)	no. of contacts		
		1	2	3
1		cl. 1	cl. 1.6	cl. 2.5
1.6		cl. 1	cl. 1.6	cl. 2.5
≥ 2.5		cl. 1	cl. 1	cl. 1.6
≥ 1000		cl. 1.6	cl. 1.6	cl. 1.6

Plus effect of switch function on indication per DIN 16085.

Temperature influence: Max. ± 0.4% / 10K of measuring span per EN 837-1

Temperature ranges

	without filling	with filling
Ambient:	-20...70 °C	-20...70 °C (60 °C) ₃
Medium: ¹	-20...150 °C	-20...100 °C
Storage:	-40...70 °C	-40...70 °C (-20...60 °C) ³

Extended temperature range (optional):²

	without filling	with filling
Ambient:	-40...100 °C	-40...80 °C (60 °C) ₃
Media: ¹	-40...200 °C	-40...200 °C

Devices with classification per SIL2:

	without filling	with filling
Ambient:	-20...70 °C	-20...70 °C (-20...40 °C) ³
Media:	-20...70 °C	-20...70 °C (-20...40 °C) ³

¹ Nominal range ≤ 1 bar up to 100 °C

² Inductive safety initiator necessary

³ Safety case S3 (IP66)

For measuring devices with inductive contact type SJ2-S1N (NS 100, double contact): For safe operation refer to TA_044!

Approvals/Certificates

Ex-protection: Magnetic snap contact:
Simple electrical apparatus per IEC/DIN EN 60079-11 suitable for intrinsically safe circuits Ex IIC TX.

Inductive contact:
Contact device suitable for intrinsically safe circuits

- ⊗ II 2G Ex ia IIC T4/T5/T6 Gb
- Reg.-no.: ■ PTB 99 ATEX 2219X
■ PTB 00 ATEX 2049X

Ex-protection (ATEX) for mechanical devices:

- ⊗ II 2G c Tx
⊗ II 2D c Tx

Further details see operation instruction BA_037 and Ex Safety Instructions XA_005, XA_013, XA_014 and XA_021.

SIL 2: Functional safety:
per EN 61508, classification per SIL 2, TÜV-Reg.-Nr. 44 799 13190203.
For devices with inductive contact only (Typ N1, N2 and N4).

- EAC declaration (upon request)
- Certificate of measuring equipment for Russian Federation

Switch functions

Slow acting contact: Type L2

- max. 3 touch contacts
- Contact load: 10 W / 18 VA
- Switching up to 230 V DC
- Available with separate circuit (Type M2)

Magnetic snap contact: Type L4

- max. 3 touch contacts
- Contact load: 30 W / 50 VA
- Switching up to 230 V DC
- Available with separate circuit (Type M4)

Inductive contact: (standard) Type N4

- max. 3 contacts, contactless
- Control unit required, see product group M7

Inductive contact: (SN) Type N1

- Safety initiator
- max. 3 contacts, contactless
- Control unit required, see product group M7

Inductive contact inverse: (S1N) Type N2

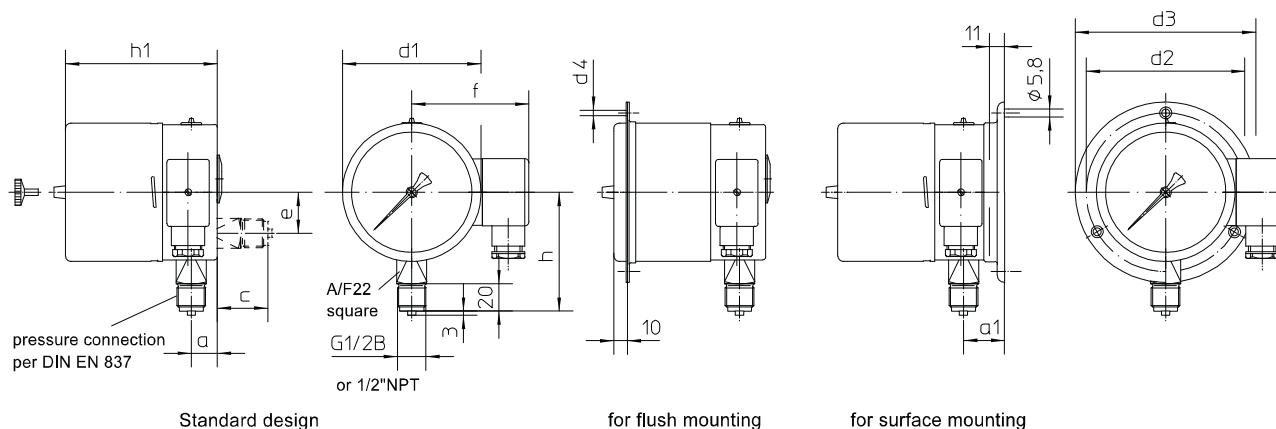
- Safety initiator, inverse switching
- max. 2 contacts, contactless
- Control unit required, see product group M7

Inductive contact with integrated amplifier: Type N6

- max. 2 contacts, contactless
- 100 mA
- 3-wire technology, suitable for direct activation at a PLC

Further information see operating instruction BA_037 and Technical Information TA_039.

Dimensions



Dimensions standard design (mm)											
case	d1	h1	a	c	e	f	h	d2	d3	d4	a1
NS 100	100	111	19	37	30	89	83	116	132	4.8	30
NS 160	160	112	19	37	60	119	113	178	196	5.8	30

Dimensions safety case (mm)											
case	d1	h1	a	c	e	f	h	d2	d3	d4	a1
NS 100	100	123	37	-	-	89	83	116	132	4.8	-
NS 160	160	133	37	-	-	119	113	178	196	5.8	-

Order details

Bourdon tube pressure gauge with switch function NS 100/160, Type series BE4...

Order details BE4..				
BE420 .	case design per EN 837-1 S1	NS 100, IP 65	without liquid filling	process connection bottom
BE421.				process connection at back
BE422 .			with liquid filling	process connection bottom
BE423 .				process connection at back
BE430 .		NS 160, IP 65	without liquid filling	process connection bottom
BE431 .				process connection at back
BE432 .			with liquid filling	process connection bottom
BE433 .				process connection at back
BE450 .	safety pattern gauge per EN 837-1 S3	NS 100	IP 65 process connection bottom without liquid filling	
BE454 .			IP 66 process connection bottom with liquid filling	
BE460 .		NS 160	IP 65 process connection bottom without liquid filling	
BE464 .			IP 66 process connection bottom with liquid filling	

0		standard
1	design	Ex-protection
A2...	process connection	G 1/2 B
B2...		1/2" NPT
C2...		M 20 x 1.5
086	nominal range [bar]	-1...0
087		-1...0.6
088		-1...1.5
089		-1...3
090		-1...5
091		-1...9
092		-1...15
093		-1...24
052		0...0,6
053		0...1
054		0...1.6
055		0...2.5
056		0...4
057		0...6
058		0...10
059		0...16
060		0...25
061		0...40
062		0...60
063		0...100
064		0...160
065	0...250	
066	0...400	
068	0...600	
070	0...1000 ¹	
071	0...1600 ¹	

	switch functions	type of contact	number
L4 . 00	touch contact	magnetic snap contact	single contact
L4 . . 0			double contact
L4 . . .			triple contact
L2 . 00		slow acting contact ²	single contact
L2 . . 0			double contact
L2 . . .			triple contact
M4 . . 0		magnetic snap contact, separated circuits	double contact
M4 . . .			triple contact
M2 . . 0		slow acting contact ² separated circuits	double contact
M2...			triple contact

N4 . 00	inductive contact	initiator (N)	single contact
N4 . . 0			double contact
N4 . . .			triple contact
N1 . 00		safety initiator (SN)	single contact
N1 . . 0			double contact
N1 . . .			triple contact
N2 . 00		safety initiator invers (S1N) ³	single contact
N2 . . 0			double contact
N6 . 00		inductiv contact with integrated switching amplifier, 3-wire technology PNP ²	single contact
N6 . . 0			double contact

...	switch function - per contact, replace point with number		
1	switch	increasing pressure makes contact	
2		increasing pressure breaks contact	
4		decreasing pressure makes contact	
5		decreasing pressure breaks contact	
3	change-over element	increasing pressure makes or breaks contact	
6		decreasing pressure makes or breaks contact	

Additional features (to be indicated if required)		
H1	overload protection	1.3 times (meas. range 250...600 bar)
H2		2 times (meas. range 1.0...4.0 bar)
H4		1.5 times (meas. range 6.0...160 bar)
R11	window	Macrolon ²
T2	marking	on scale (please specify)
U2	restrictor screw	restrictor screw 0.3 mm
U3		restrictor screw 0.6 mm
U4		restrictor screw 1.0 mm
V2	mounting	rear flange for surface mounting
V3		front flange for flush mounting
PL1100-....	output signal	4...20mA (20...4 mA) with electr. angle-of-rotation sensor (see M2-030)
W1020	material certificate	per EN 10204-3.1, wetted parts
W1032	for use with acid gas	inspection certificate per EN 10204-3.1
W2603	functional safety per EN 61508, classification per SIL2 ⁵	
W2673	certificate of measuring equipment for Russian Federation ²	
W4001	oxygen free of oil and grease	
W4090	extended temperature ranges	
W4102	damping of movement ^{2,6}	with integrated damping system
Z1	connection to Zone 0 ⁴	with Zone 0 adapter (coupler element KF6)

Order code (example): BE4211 – B2089 – N1100 - ...

¹ accuracy class 1.6 per EN 837-1

² not for devices with Ex-protection

³ with NS 100, 2 times contact: for safety operation refer to TA_044!

⁴ for devices with Ex-protection only, not with magnet snap contact

⁵ for devices with inductive contact only

⁶ for devices with nominal size 100 only