



Features

- Small temperature error by means of reduced-volume measuring element
- Operating temperature up to 200 °C
- Different process connections can be supplied
- Case DN 100 and pressure element assembly of stainless steel
- Option: case with liquid filling and type of protection IP 66
- Hygienic design (option)
- Electrical contact device per DIN 16085:
 - slow acting contact
 - magnetic snap contact
 - inductive contact devices

Application

The pressure gauge with electrical contact device can be used in the food processing industry and general process technology for indicating and monitoring pre-selectable minimum and/or maximum pressure values. The dead-zone free measuring arrangement is required for highly viscous and aggressive media at changing temperatures.

Technical Data

Case

high quality case with bayonet ring DN 100
material: st. steel mat.-no. 1.4301

Type of protection (EN 60529)

IP 65 case with and without liquid filling

Pressure element assembly

bourdon tube and pressure connection
material: st. steel mat.-no. 1.4571

Case filling

liquid filling Labofin for damping of vibrations

Process connection

with integrated diaphragm seal, see order details

Membrane material

see order details

Diaphragm seal system filling

see order details

Movement

stainless steel segment

Scale

pure aluminium, white with black inscription.

Option: with red marking or with fixed reference pointer.

Special scale upon request

Pointer

pure aluminium, black (standard)

Option: with micro adjustment for zero-point correction

Window

non splintering laminated glass

Case seal

sealing ring: Perbunan
filling plug: Desmopan

Atmospheric pressure compensation

for cases with liquid filling:
≤ 16 bar with reclosable filling plug

Nominal ranges

per EN 837-1
-1...3 bar up to 0...400 bar
other measuring units can be supplied

Overload protection

standard: 1.3 times
higher overload protection see order details

Accuracy class

max. effect of contact devices on indication
per DIN 16085

nominal range (bar)	DN 100	
	no. of contacts	
1	class 1	class 1.6
≥ 1.6	class 1	class 1

Temperature ranges

operating temperature range (ambient)

without liquid filling	-20...+60 °C
with liquid filling	-20...+50 °C

process temperature (measured medium)

without liquid filling	max. +200 °C
	min. -40 °C
with liquid filling	max. +140 °C
	min. -20 °C

The maximum values stated could be restricted due to:


- size of membrane
- meas. range
- diaphragm seal system filling

Electrical connection

black terminal box with cable gland M 20 x 1.5 and removable test cover, mat. Macrolon

Ex-approval

contact device suitable for intrinsically safe circuits

 IICG EEx ia/ib IIC T4/T5/T6
PTB 99 ATEX 2219X,
PTB 00 ATEX 2049X

Functional safety

classification per SIL2 IEC 61508 (type BR4..1 with inductive contact device, order code N1..., N2... and N4...)

Temperature influence

process temperature error depending on diaphragm seal system:

DN 25	20 mbar / 10 K
DN 32	5 mbar / 10 K
DN 40	3 mbar / 10 K
DN 50	1 mbar / 10 K
G 3/4 A	25 mbar / 10 K
G 1 A	20 mbar / 10 K
G 1 1/2 A	4 mbar / 10 K
Clamp 1 1/2"	6 mbar / 10 K
Clamp 2"	2 mbar / 10 K

If necessary, we can provide you with a detailed error calculation.

Weights

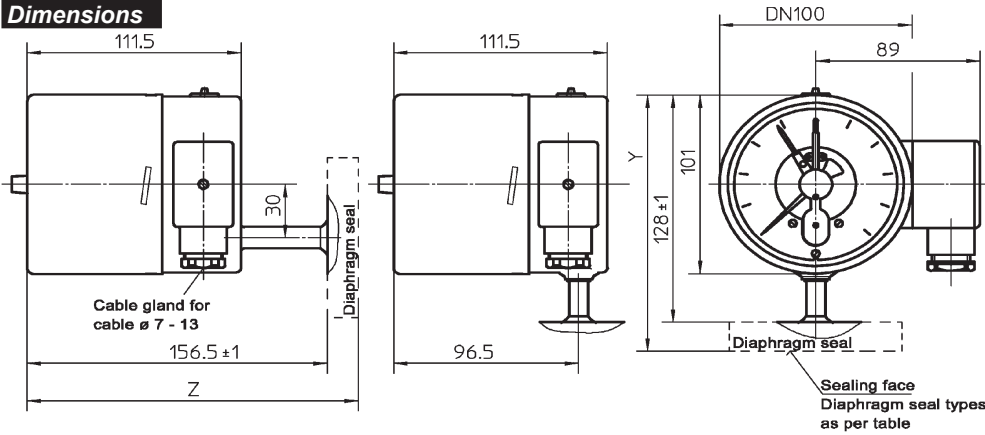
- DN 100, without liquid filling approx. 1.0 kg + process conn. (diaphragm seal)
- DN 100, with liquid filling approx. 1.5 kg + process conn. (diaphragm seal)

Special design

- certification of material testing for process connection per EN 10204

Information on other models see order details or upon request.

Dimensions



Overall height "Y" and "Z"

diaphragm seal	type	see data sheet	Y				Y				Z				Z			
			DN 25	DN 32	DN 40	DN 80	3/4"	1"	1 1/2"	2"	DN 25	DN 32	DN 40	DN 80	3/4"	1"	1 1/2"	2"
sanitary connection	DL1	D5-025	144	144	144	145	-	-	-	-	172,5	172,5	172,5	173,5	-	-	-	-
clamp connection	DL3	D5-026	-	-	-	-	-	-	140	142	-	-	-	-	-	-	117	119
screw-in thread	DE1	D5-032	-	-	-	-	143	143	146	146	-	-	-	-	120	120	123	123
flange connection	DA2	D5-030	148	-	-	149	-	-	-	-	125	-	-	126	-	-	-	-

Switch function and terminal connection

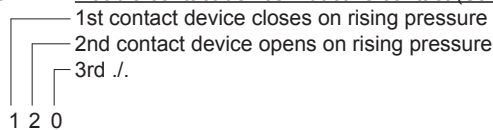
Switch function, terminal connections and directions of effect are realized according to DIN 16085.

switching element	switch function		direction of effect	function code
	slow acting contact magnetic snap contact	inductive contact device		
makers	makes contact	makes contact; control current on	increasing pressure	1
			decreasing pressure	4
breakers	breaks contact	breaks contact; control current off	increasing pressure	2
			decreasing pressure	5
change over contact	makes or breaks contact	not applicable	increasing pressure	3
			decreasing pressure	6

Identification of the switch functions

The switch functions are clearly identified by a three-digit number key. The key must be specified in the order details. The free positions in the number code for the single and double contact devices are each to be assigned a zero.

Example: Double contact device inductive contact (SJ2 - N)



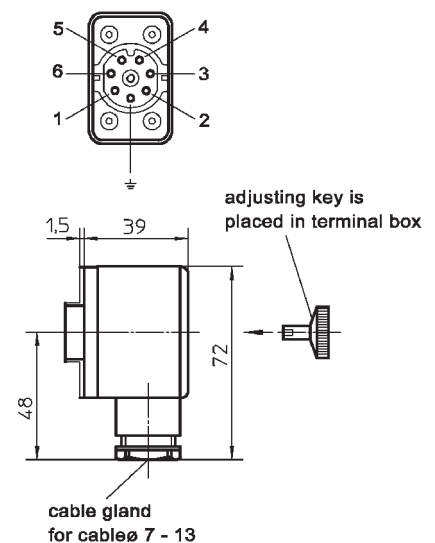
order code option:	N 4 1 2 0
switch function per DIN 16085 and details on type plate:	1 2

Connections plug / terminal connection

The assignment of terminal connections is realized according to DIN 16085.

Pin connection for contact devices

contact device contact function	switch function	slow acting and magnetic snap contact		inductive contact device	polarity
		standard	separate supply		
single	makers or breakers	1 + 4	--	1 / 2	- / +
single change over element	makers	1 + 4	--		
	breakers	2 + 4	--		
double	1st contact	1 + 4	1 + 2	1 / 2	- / +
	2nd contact	2 + 4	3 + 4	3 / 4	- / +
double change over element	1st change over element makers	1 + 4	1 + 4		
	breakers	2 + 4	2 + 4		
	2nd change over element makers	5 + 4	5 + 3		
	breakers	6 + 4	6 + 3		



Touch contacts

Connection characteristic data for touch contacts

hysteresis error:	2 up to 5% of meas. span (hysteresis) according to DIN 16085
switching accuracy:	1.5 of accuracy class (setting accuracy per DIN 16085)
contact setting range:	can be adjusted across the entire scale range (adjustment made with contact lock)
ambient temperatur:	-25 up to +70°C
contact material:	silver-nickel 10 µ gold plating, standard

Recommended contact load under resistive and inductive load and operation in air

voltage per DIN IEC 28		slow acting contact			magnetic snap contact		
DC	AC	resistive load		inductive load cos φ > 0,7	resistive load		inductive load cos φ > 0.7
DC	AC	DC	AC		DC	AC	
220 V	230 V	40 mA	45 mA	25 mA	100 mA	120 mA	65 mA
110 V	110 V	80 mA	90 mA	45 mA	200 mA	240 mA	130 mA
48 V	48 V	120 mA	170 mA	70 mA	300 mA	450 mA	200 mA
24 V	24 V	200 mA	350 mA	100 mA	400 mA	600 mA	250 mA

The switching current should not be lower than 20 mA for 24 V DC.

Limit values for the contact load under resistive load and operation in air

	slow acting contact	magnetic snap contact
rated insulation voltage U_i	$60 < U_i \leq 250$ V	$60 < U_i \leq 250$ V
rated operation voltage U_{eff} max.	250 V	250 V
rated current:		
- make rating	0.7 A	1.0 A
- break rating	0.7 A	1.0 A
- continuous load	0.6 A	0.6 A
switching capacity	10 W 18 VA	30 V 50 VA

Limit values for current, voltage and output should not be exceeded.

Minimum values for the contact load under resistive load in air

	slow acting contact	magnet snap contact
rated operation voltage U_{eff} min.	24 V	24 V
switching capacity (DC AC)	0.4 W 0.4 VA	0.4 W 0.4 VA

The use of contact protection relays is recommended in order to provide the greatest switching reliability possible, to prevent contact interruptions and to increase the breaking capacity. The service life of the contacts is considerably increased, because 99% of the time the contacts are opened and closed in a voltage-free state. This switching amplifier should definitely be used in measuring devices with liquid filling.

Limit values for the contact load under resistive and inductive load and operation in liquid filling (oil)

	slow acting contact	magnetic snap contact		
		(AC)	(AC)	(AC)
rated operation voltage U_{eff} max:	slow acting contacts are generally unsuitable for devices with liquid filling	230 V ~	110 V ~	48 V ~
rated current:		90 mA	90 mA	90 mA
switching capacity (AC):		20 VA	10 VA	4.3 VA

Maximum values for current (90 mA) and output (20 VA) should also not be exceeded with low operating voltages. This means that 24 V AC operating voltage is too low to assure secure switching in liquid filling. We recommend the use of contact protection relays for DC voltages.

Connection characteristic data for Explosion protection

Switching of intrinsically safe circuits with magnetic snap contacts, only and with following max. values:

$U \leq 24$ V DC $I \leq 30$ mA $P \leq 0,7$ W Regulations of VDE 0165 should be observed!

Inductive contact devices

Connection characteristic data for initiators per DIN EN 60947-5-6 (NAMUR):

nominal voltage:	8 V= ($R_i \approx 1K\Omega$)
operating voltage:	5 - 25 V
current consumption:	> 3 mA (active face uncovered)
switching accuracy:	approx. 0.5% of full scale value
contact setting range:	can be adjusted across the entire scale range (adjustment made with contact lock)
ambient temperature:	-20 up to +70°C

standard specification on type plate

Connection characteristic data and limit values for Explosion protection

Initiators:	SJ 2 - N (DN 100)	SJ 3.5 - N (DN 160)					type of connected circuit as per type examination certif.
PTB 99 ATEX 2219 X	Ex-values for initiator						
connection to intrinsically safe circuits EEx ia IIC/IIB or EEx ib IIC/IIB with:	C_i	L_i	Tu at T4	Tu at T5	Tu at T6		
$U_i = 16$ V $I_i = 25$ mA $P_i = 34$ mW	50nF	250µH	100 °C	88 °C	73 °C	1	
$U_i = 16$ V $I_i = 25$ mA $P_i = 64$ mW	50nF	250µH	100 °C	81 °C	66 °C	2	
$U_i = 16$ V $I_i = 52$ mA $P_i = 169$ mW	50nF	250µH	89 °C	60 °C	45 °C	3	
$U_i = 16$ V $I_i = 76$ mA $P_i = 242$ mW	50nF	250µH	74 °C	45 °C	30 °C	4	

Initiators:	SJ2 - SN, SJ2 - S1N (DN 100)	SJ 3.5 - SN, SJ 3.5 - S1N (DN 160)					type of connected circuit as per type examination certif.
PTB 00 ATEX 2049 X	Ex-values for initiator						
connection to intrinsically safe circuits EEx ia IIC/IIB or EEx ib IIC/IIB with:	C_i	L_i	Tu at T4	Tu at T5	Tu at T6		
$U_i = 16$ V $I_i = 25$ mA $P_i = 34$ mW	30nF	100µH	100 °C	88 °C	73 °C	1	
$U_i = 16$ V $I_i = 25$ mA $P_i = 64$ mW	30nF	100µH	100 °C	81 °C	66 °C	2	
$U_i = 16$ V $I_i = 52$ mA $P_i = 169$ mW	30nF	100µH	89 °C	60 °C	45 °C	3	
$U_i = 16$ V $I_i = 76$ mA $P_i = 242$ mW	30nF	100µH	74 °C	45 °C	30 °C	4	

The allowed electrical connection data and allowed ambient temperatures (Tu) for ex-operation should not be exceeded. Please refer to product category M7 for suitable switching amplifiers and isolation switch amplifiers for ex-areas.

CE marking

The CE marking on the instruments certifies compliance with valid EU directives for bringing products to market within the European Union. The following directives are met: ATEX 94/9 EG, EMV 89/336/EG, PED 97/23/EG
 ATEX 94/9 EG: Electrical equipment in hazardous areas should only be installed and commissioned by competent personnel. Modifications to devices and connections destroy the operating safety, the ex-proofing and the guarantee.
 EMC 89/336/EG: The instrument can only be protected against electromagnetic interference (EMC) when the conditions for screening, earthing, wiring and potential isolation are met during installation.
 PED 97/23/EG: Pressure gauges are pressure accessories in line with the Pressure Equipment Directive. The CE marking is granted after classification in the relevant categories. Unmarked instruments satisfy the Pressure Equipment Directive and are manufactured in accordance with „sound engineering practice“.

Order Details

- please give additional specifications for models not listed -

Bourdon tube pressure gauge with diaphragm connection and electrical contact device

case design	IP 65 without liquid filling	· process conn. bottom	BR420 .	
		· process conn. at back	BR421 .	
	IP 65 with liquid filling	· process conn. bottom	BR422 .	
		· process conn. at back	BR423 .	
design	· standard		0	
	· ex-protection		1	
nominal range	· per table		...	
contact	<i>touch contact</i>			
	· slow acting contact		L2 ...	
	· magnetic snap contact		L4 ...	
	· magnetic snap contact, separated circuits		M4 ...	
	<i>inductive contact device</i>			
	· standard initiator		N4 ...	
	· safety initiator SJ 2 - SN / SJ 3.5 - SN		N1 ...	
· safety initiator invers SJ 2 - S1N / SJ 3.5 - S1N ⁵		N2 ...		
· with integrated switching amplifier ⁶		N6 ...		
switch function	· single contact (1st figure per table)		.00	
	· double contact (1st + 2nd figure per table)		.0	
additional features (to be indicated in case of need, only):				
overload protected	· 2times (meas. range ≥ 25 bar)		H2	
	· 2.5times (meas. range ≤ 16 bar)		H3	
Order code (example): BR4200 A56 L4100				
process connection (diaphragm seals)¹				
process connection (diaphragm seals)	screw-in thread	· G 3/4 A	DE1280	
		· G 1 A	DE1380	
		· G 1 1/2 A	DE1580	
		· G 2 A	DE1680	
	sanitary connection with coupling nut DIN 11851	· DN 25	DL2100	
		· DN 32	DL2200	
		· DN 40	DL2300	
		· DN 50	DL2400	
		· DN 50	DL2400	
	clamp connection ISO 2852	· 1 1/2"	DL3200	
		· 2"	DL3300	
	flange connection per DIN	· DN 25 PN 10...40	DA2120	
		· DN 50 PN 10...40	DA2420	
conn.meas.instrument	directly welded		A400 .	
diaphragm material	stainless steel 1.4404		1	
	Tantalum		2	
	Hastelloy C 276		3	
	stainless steel 1.4435 ⁴		7	
system filling ²	<u>filling liquid</u>	<u>temperature range³</u>		
	· vegetable oil FP, standard	-10...+200 °C	L19	
	· medical white oil FW	-10...+150 °C	L14	
	· glyzerine/water FGW	-20...+120 °C	L15	
	· foodstuff oil FD1 (USDA-H1 per FDA)	-40...+200 °C	L23	

standard nominal ranges			
nominal range bar	order-code	nominal range bar	order-code
0...4	A56	0...160	A64
0...6	A57	0...250	A65
0...10	A58	0...400	A66
0...16	A59	-1...3	A89
0...25	A60	-1...5	A90
0...40	A61	-1...9	A91
0...60	A62	-1...15	A92
0...100	A63		

switch function	fig.
· increasing pressure makes contact	1
· increasing pressure breaks contact	2
· decreasing pressure makes contact	4
· decreasing pressure breaks contact	5
· change-over elements increasing pressure makes or breaks contact	3
· change-over elements decreasing pressure makes or breaks contact	6

Order code (example): DA2420 A4001 L19**Accessory**

SIL 2 IEC 61508 declaration of conformity for bourdon tube pressure gauges with electrical contact device BE 4..1, BR 4..1

W2601

¹ for further process connections (diaphragm seals) see product group D5² please check data sheet no. D5-003 for further information³ max. operating temperature range in °C for abs pressure > 1 bar⁴ cannot be supplied with all nominal widths⁵ not with ex-protection⁶ with DN 100: one contact device only