

Pressure transmitter PASCAL CV, for food/pharmaceutical/biotechnology, Type series CV311.-...-K



Application area

- Pharmaceutical industry
- Food industry
- Biotechnology

Features

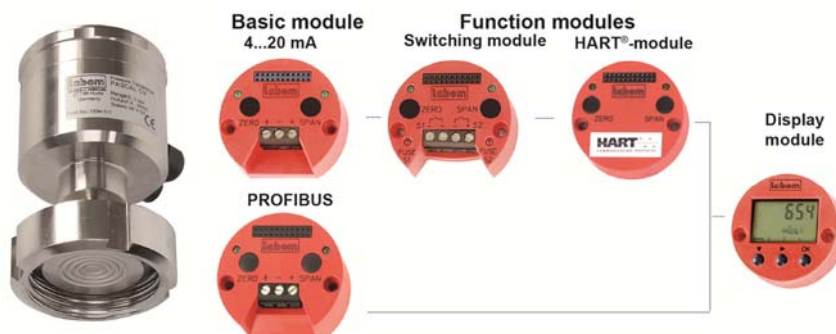
- Modular pressure transmitter
Output signal:
 - 4...20 mA
 - HART® protocol (rev. 6), option
 - PROFIBUS PA, option
- Function modules
 - Multifunctional display with 5-segment digital display and bar graph
 - Switching module with 2 floating channels, maximum 0.5 A switching current, electrically isolated at all sides, without additional auxiliary power
- Function module replacement on site without recalibration "plug and measure"
- Hygienic design according to EHEDG, FDA and GMP recommendations
- Material and surface quality according to the hygienic requirements
- Limits of measuring range 0...80 mbar to 0...40 bar
- Accuracy $\leq 0.15\%$
- Turndown 5:1
- Degree of protection IP 66, piezoresistive measuring cell directly aerated

Options

- Approvals/Certificates
 - Explosion protection for gases and dust
 - Certificate of measuring equipment for Russian Federation
 - Material certificate as per EN 10204-3.1
 - Calibration certificate as per EN 10204-3.1
 - Classification per SIL2
- Hygienic design
- Degree of protection IP 69K

Application

The modular pressure transmitter PASCAL CV is suited for measuring the relative and absolute pressure of gases, vapors and liquids. The use of a HYGIENIC process adapter allows the device to be deployed in a variety of processes.



Process connection: all standard connections for hygienic applications

Technical data

Measuring ranges

Up to a turndown of 5:1 the measuring span can be freely selected.

Nominal range	Measuring span		Overload capacity **	Lower measuring range limit ***
	min.	max.		
0...0.4 bar *	80 mbar	0.8 bar	1 bar rel.	600 mbar abs
0...1 bar *	0.2 bar	2 bar	3 bar rel.	100 mbar abs
0...4 bar rel. *	0.8 bar	5 bar	10 bar rel.	100 mbar abs
0...16 bar rel. *	3.2 bar	17 bar	60 bar rel.	100 mbar abs
0...40 bar rel. *	8 bar	41 bar	100 bar rel.	100 mbar abs
0...4 bar abs	0.8 bar abs.	4 bar abs.	10 bar abs.	30 mbar abs
0...16 bar abs	3.2 bar abs.	16 bar abs.	60 bar abs.	30 mbar abs

* Short term or sporadic measurement in vacuum range permitted up to lower measuring limit. Lower range value up to -1 bar rel. adjustable.

** High overload protected designs are available upon request.

** Vacuum-proof designs are available upon request.

Constructional design / case

Design: Two-chamber case design with screw cap.
Minimum case volume, excellent moisture and condensate protection

Material: Stainless steel mat.-no. 1.4301 (304)

Degree of protection per EN 60529:

- IP 66
- optional: IP 69K

Climatic category per EN 60721 3-4: 4K4H

Pressure compensation: PTFE filter system

Window: Non splintering plastic: Makrolon

Case seal: O-ring: NBR

El. connection: Screw terminal 1 mm²

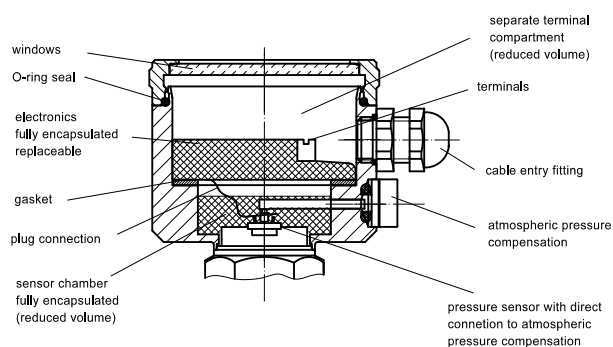
Cable gland:

- Cable gland M16, material: PA
- Circular connector M12

Further details see order code and upon request.

Weight: Standard device without diaphragm seal and function modules approx. 0.65 kg

case design:



Process connection

Design: See order details

Material wetted parts

Material: Stainless steel mat. no. 1.4435 (316L/316)

Gasket: EPDM-FDA listed (in case of flush mounted diaphragm with O-ring)

Measuring system

Sensor: Piezoresistive measuring element

System filling: Synthetic oil, free of silicone FD1, FDA listed, class USDA-H1

Hygienic design

The surface quality of the wetted parts made of stainless steel is of major importance. The hygienic type device (Code: HY) guarantees the following surface roughness values:

Diaphragm foil: $Ra \leq 0.4 \mu m$

Laser welds: $Ra \leq 0.8 \mu m$

Turned parts: $Ra \leq 0.8 \mu m$

Further versions of hygienic design upon request.

Accuracy

General:

Limit point setting: per DIN 16086

Reference conditions: per EN 60770-1

Linearity errors: $\leq 0.15 \%$ of span
TD 5:1 no modification

Hysteresis: $\leq 0.05 \%$ of nominal range

Repeatability: $\leq 0.05 \%$ of nominal range

Calibration position: Vertical mounting position

Influence of mounting position:	≤ 3.5 mbar
Long-term drift: (EN 60770-1)	≤ 0.1 % / year of nominal range
Temperature influence case:	Lower range value / upper range value Range 0...60 °C: ± 0.15 % / 10K of nominal range Range < 0 °C, > 60 °C: ± 0.2 % / 10K of nominal range

Process connection

depending on design

Diaphragm seal	Zero point error
DN 25/1"	4.8 mbar/10K
DN 32/1 1/2"	2.3 mbar/10K
DN 40	1.6 mbar/10K
DN 50/2"	0.6 mbar/10K
HYGIENIC G1A	1 mbar/10K

The specify zero error for the process connection is a guide value for a standard design. We can provide a detailed system calculation upon request. Systems with reduced diaphragm seal errors are also available.

Output

General:

Delay time:	approx. 160 ms
Measuring cycle:	6 measurements / second
Measuring range setting:	Turndown 5:1

Basic module: 4...20 mA

Signal:	4...20 mA, 2-wire
Current range:	3.8...20.8 mA
Current limitation:	approx. 22 mA
Alarm state:	< 3.6 mA, optional > 21 mA
Damping:	0...120 seconds
Load R:	$R \leq (U-12V \text{ DC})/0.02 \text{ A } [\Omega]$ U = supply voltage

Basic module: PROFIBUS PA

Signal:	digital per IEC 61158-2
Protocol:	EN 50170-PROFIBUS PA, Profile 3.0
Sensor address:	0...126 (126 = factory setting)
Power consumption:	constantly 11 mA
Alarm current I_{FDE} :	2 mA
Damping:	0...300 seconds
Parameterisation:	SIMATIC PDM

Supply voltage

Basic module:	4...20 mA	PROFIBUS PA
<u>Standard design:</u>		
Functional range:	12...40 V DC	9...32 V DC
<u>Ex-design:</u>		
Functional range:	12...30 V DC	9...17.5 V DC

Temperature ranges

Ambient:	-20...85 °C
Media:	depending on design, see order code
Storage:	-40...85 °C

Note safety values as per examination certificate!

Tests and certificates

Interference emission:	per EN 55011
Noise immunity:	per EN 61326-1 *, NAMUR NE21 *

* Devices with cable gland or switching outputs might suffer from a short-time measuring deviation if exposed to strong electromagnetic fields (EN 61000-4-3).

Ex approvals:	TÜV 04 ATEX 2387 X ⊕ II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb ⊕ II 2G Ex ia IIC T4/T5/T6 Gb ⊕ II 2D Ex ia IIIC Txx °C Db
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For detailed Information see Ex Safety Instruction XA_015 and XA_020.

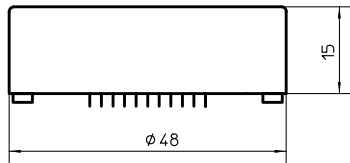
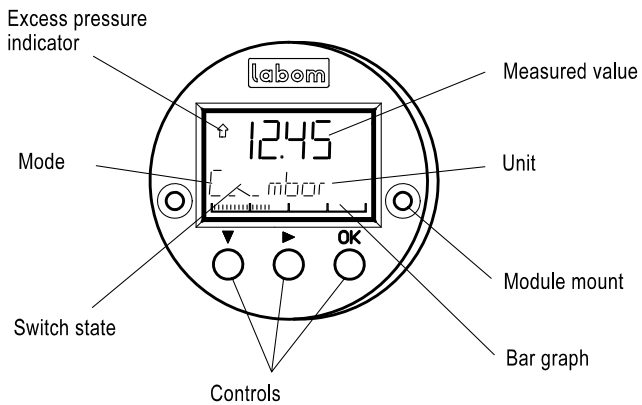
SIL2:	Functional safety per EN 61508, Classification per SIL2. For basic module 4...20 mA, switching module, display module and HART® module TÜV-Reg.-No. 44 799 13190201
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- EAC declaration upon request
- Certificate of measuring equipment for Russian Federation

Function modules

Display module (multifunctional display) optional

pluggable with automatic module detection - plug and measure -

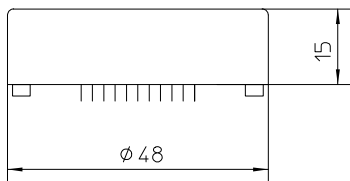
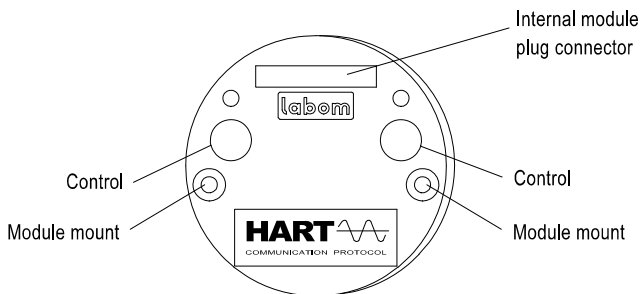


- Module housing made of ABS, encapsulated electronics unit
- Many operating mode menus
- 5-segment pressure read-out with unit
- Read-out display
 - pressure (standard)
 - percent *
 - current *
 - sensor temperature
- Bar graph 36 segment suitable 0...100 %
- Loop test (current sensing function) 3.55...22 mA *
- Alarm indicator on display
- Switching function indicator *

* not with basic module PROFIBUS PA

Details of the operator menu see parameterisation.

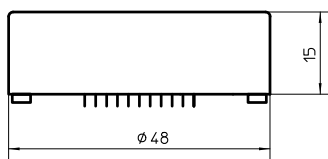
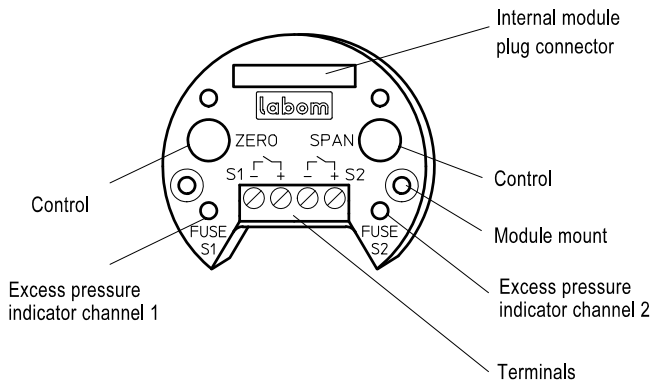
HART® module (for basic module 4...20 mA) optional



- HART®-protocol, revision 6.5
- Response characteristic FSK
- Load with HART® communication
 - with Hart® modem 230...500 Ω
 - with Hart® communicator 230...1100 Ω
- Parameterisation via
 - operating elements
 - HART® communication
- PDM 6.0
- AMS
- 375 Field Communicator

Switching module, (not with basic module PROFIBUS PA) optional

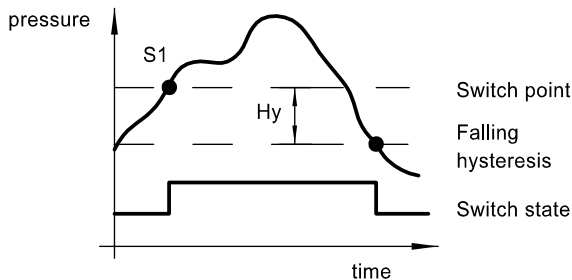
pluggable with automatic module detection - plug and measure -



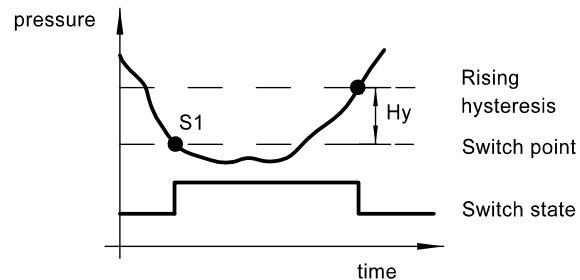
- No additional auxiliary power required
- Module housing made of ABS, encapsulated electronics unit
- Electronic switch for 2 limit values, voltage free, short-circuit-proof
- Switching capacity 30 V DC / 0.5 A ($R_i < 0.3 \Omega$)
- Indicator: red LED, indicates overload or short-circuit
- Cut-out fuse protects against overload / short-circuit with automatic reset
- Switch points: 0.0 - 100.0% adjustable, Standard: 50.0%
- Switching function: maker or breaker, adjustable, Standard: breaker
- Contact open when device switched off
- Hysteresis: 0.0...100 % adjustable, Standard 0.1 %
 - falling or rising, adjustable, standard: falling
- Switching rate: 6 Hz
- Electrically isolated to all sides, Insulation voltage: 500 V, 2.5 kV/2 sec.
- Electrical connection: terminal blocks 1 mm²

Hysteresis functions

-falling hysteresis-



-rising hysteresis-



Description of switching module and HART® module upon request.

Parameterisation

The module selected determines which parameters can be set

operating menus	display of display module	parameter		basic module: 4...20 mA				basic module: PROFIBUS PA		
		variability	standard	BM	SM	AM	HM PDM AMS 475	BM	AM	PDM
zero point *	RANGE/Zero	see instrument ranges	0 bar	x	x	x	x	-	-	x
measuring span *	RANGE/Span	see instrument ranges	nominal range	x	x	x	x	-	-	x
damping	DAMP	4...20 mA: 0...120 sec. Profibus: 0...300 sec.	0 sec.	w	-	x	x	-	-	x
min-max-value	HI/LO	pressure and temperature reset-table	-	-	-	x	x	-	x	x
characteristic	FUNC	linear, table	linear	w	-	x	x	-	-	x
pressure unit	UNIT	bar, mbar, kPa, MPa, mmH ₂ O, mH ₂ O, kg/cm ² , PSI	bar	w	-	x	x	-	w	x
loop test	LOOP	3.55...22 mA	-	-	-	x	x	-	-	-
alarm state	ALARM	< 3.6 mA, > 21 mA	< 3.6 mA	w	-	x	x	-	-	-
current trimming	I-CAL	-2...5 %	-	-	-	x	x	-	-	-
pressure trimming	P-CAL	zero point: -50...50 % v.N span: -10...10 % v.N	-	-	-	x	x	x	x	x
table function	TABLE	2...31 points of table	0% = 4 mA 100% = 20 mA	w	-	x	x	-	-	-
system info	INFO	software, serial number, revision level	-	-	-	x	x	-	x	x
factory data reset	RESET	-	-	-	-	x	x	-	x	x
BUS address	BUS	0...126	126	-	-	-	-	w	x	x
switch points	SWCH1(2)	0...100 % of nominal range	50 %	-	x	x	x	-	-	-
hysteresis	SWCH1(2)/Hyst.	0...100 % of nominal range	0,1 % hyster. falling	-	w	x	x	-	-	-
switch function	SWCH1(2)/SwTyp	breaker, maker	breaker	-	w	x	x	-	-	-
HART® address	HART/Adres	0...63	0	-	-	x	x	-	-	-
HART® current	HART/CUrr	fixed/float	float	-	-	x	x	-	-	-
write protection	-	ON/OFF	OFF	x	x	x	x	x	x	x

x = configurable

w = factor setting

* = calibrated measuring span for devices with PROFIBUS PA basic module

DM = display module

BM = basic module

SM = switching module

HM = HART-module

PDM = Siemens Process Device Manager

AMS = Asset Management Solutions

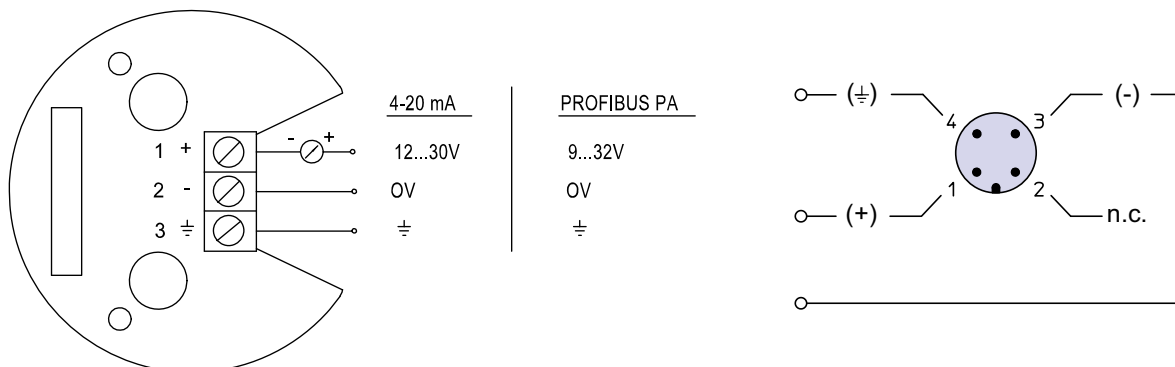
475 = Emerson Handheld Communicator

Connection diagram

Basic module: 4...20mA / PROFIBUS PA

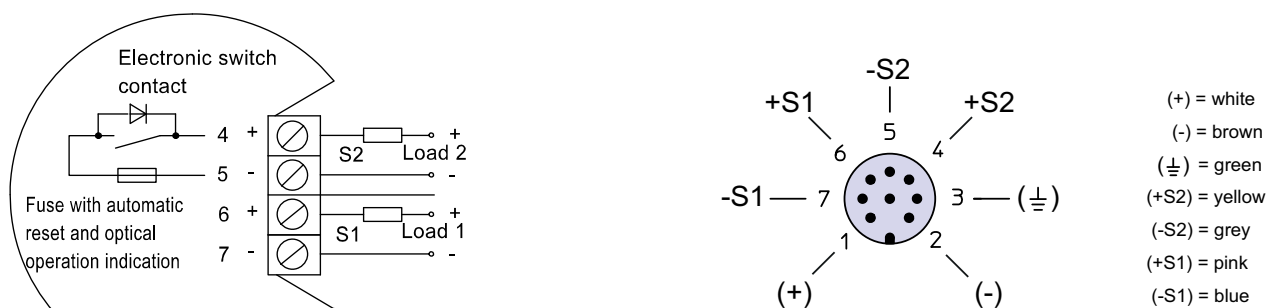
Internal terminals with cable gland design

Circular connector ¹



Switching module: (only with basic module 4...20 mA)

Circular connector ¹



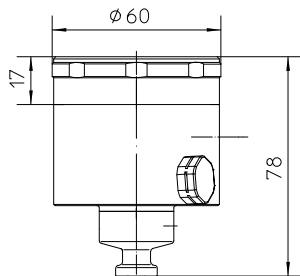
¹ color code as Binder series 763

Dimensions

Case

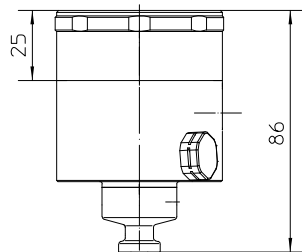
housing design type 17

- basic module: 4...20 mA
- with one function module (optional)
- basic module: PROFIBUS PA



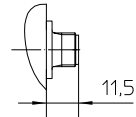
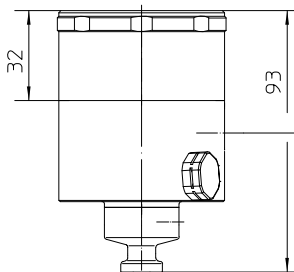
housing design type 25

- basic module: PROFIBUS PA
- with display module (optional)

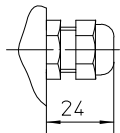


housing design type 32

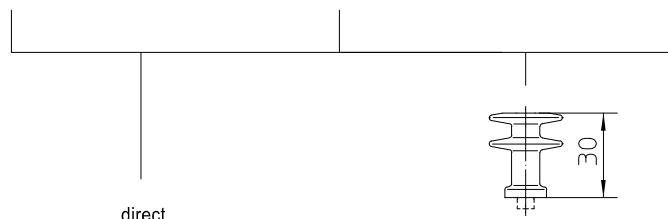
- basic module: 4...20 mA
- with two function modules (optional)



for circular connector
M12x1; 4 pole/8 pole
for 4...20 mA/PROFIBUS PA



cable gland
M16x1,5 f. cable $\varnothing$ 4,5-10



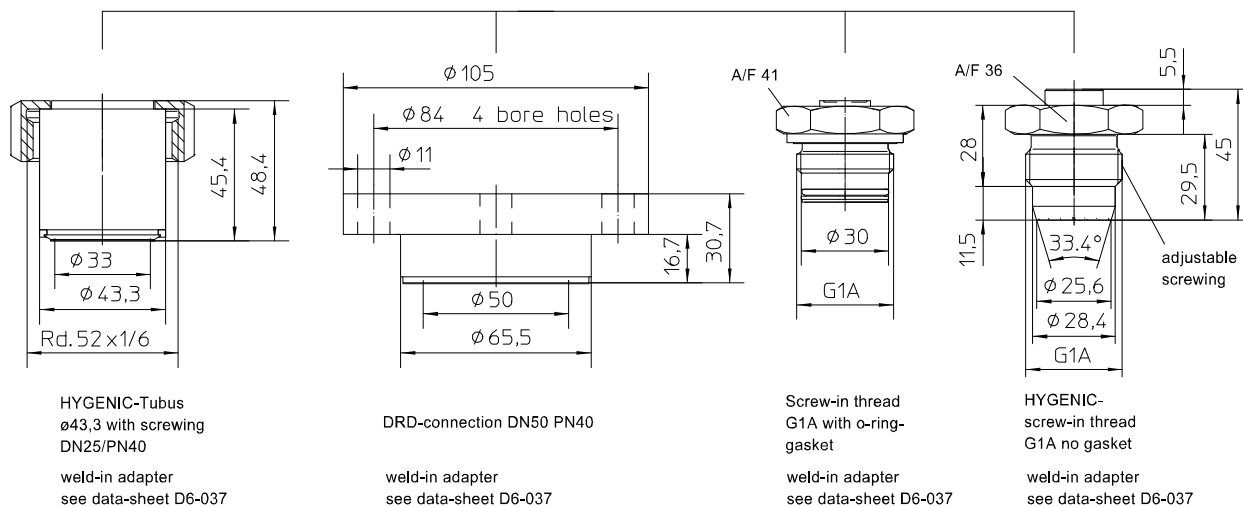
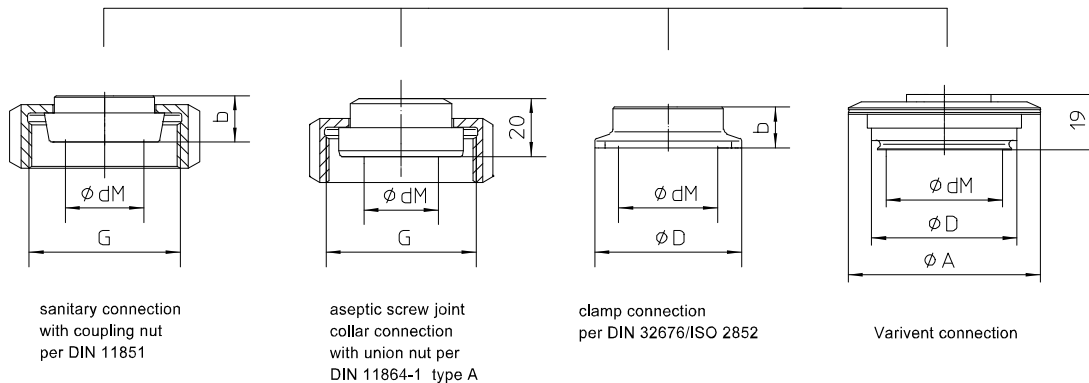
direct
for process temperatures
up to 125°C
(short period up to 140°C, 1h)

temperature decoupler
for process temperatures
up to 160°C

All dimensions are in mm

Process connection standard

process connection (standard)



All dimensions are in mm

Sanitary pipe connection with union nut per DIN 11851

DN	PN	dM	b	G
25	40	27	16	Rd.52x1/6"
32	40	30	16	Rd.58x1/6"
40	40	34	16	Rd.65x1/6"
50	25	48	17	Rd.78x1/6"

Aseptic screw joint collar connection with union nut per DIN 11864-1 type A

DN	PN	dM	G
25	40	24	Rd.52x1/6"
32	40	30	Rd.58x1/6"
40	40	34	Rd.65x1/6"
50	25	48	Rd.78x1/6"

Clamp connection per DIN 32676 model A (metric) for pipes per EN 10357 (DIN 11850)

DN	PN	dM	b	D
25	25	22.6	14	50.5
32	25	27	12	50.5
40	25	34	12	50.5
50	16	46	14	64

Clamp connection per DIN 32676 model B (OD, ISO) for pipes per DIN EN ISO 1127

DN	PN	dM	b	D
26.9	25	22.6	14	50.5
33.7	25	27	12	50.5
42.4	25	34	12	64
48.3	16	46	14	64

Clamp connection per DIN 32676 model C (Tri-Clamp) for pipes per ASME BPE

DN	PN	dM	b	D
3/4"	25	15.5	15	25
1"	25	22.6	14	50.5
1 1/2"	25	34	12	50.5
2"	16	46	14	64

Clamp connection per ISO 2852 for pipes per ISO 2037

DN	PN	dM	b	D
25	16	22.6	14	50.5
38	16	34	12	50.5
51	16	46	14	64

Varivent connection

DN / Zoll	PN	dM	A	D
25 / 1"	25	40	66	50
40-80/ 1 1/2 "- 3"	25	58	84	68
100 /4"	20	58	84	68
125 / 6"	10	58	84	68

Order details

Pressure transmitter PASCAL CV, standard process connections, for food/pharmaceutical/biotechnology, Type series CV311.-.-K.

Order details PASCAL CV311.-.-K.

CV311.	Pressure transmitter PASCAL CV, standard process connection, for food/pharmaceutical/biotechnology			
0	design	without		
1		Ex-protection, marking as follows		
	nominal range	nominal range	overload limit	
A1051		0.4 bar	1 bar	
A1053		1 bar	3 bar	
A1056		4 bar	10 bar	
A1059		16 bar	60 bar	
A1061		40 bar	100 bar	
B1056		4 bar abs	10 bar	
B1059		16 bar abs	60 bar	
F10	measuring range	0...nominal range, unit: bar (standard)		
F11		0...nominal range, unit: mbar		
F22		0...nominal range, unit: kPa		
F23		0...nominal range, unit: MPa		
F30		0...nominal range, unit: mmH2O		
F32		0...nominal range, unit: mH2O		
F41		0...nominal range, unit: kg/cm ²		
F50		0...nominal range, unit: PSI		
F80		set from ... to ... unit (please fil in details) not with PROFIBUS PA		
F81		adjusted and calibrated from to, unit (pls.fil in details), see below for calibration report		
H11 . .	output signal	4...20 mA, rising characteristic (standard)		
H15 . .		20...4 mA, falling characteristic		
H21 . .		4...20 mA, with HART® function module		
0		setting ¹	damping	0.0 sec. (standard)
1				0.0...120.0 sec., set to...(please fill in)
0			alarm state	< 3.6 mA (Standard)
1				> 21 mA
H41		PROFIBUS PA, IEC 61158-2, Profil 3.0		
M1	display module	without		
M2		multifunctional display with 5-position digital display and bargraph, pluggable		
N10	switching module ³ (not with PROFIBUS PA) (not with Ex-protection)	without switching module		
N5 .		switching module with 2 contacts, pluggable	switching capacity 30 V DC / 0.5 A	
0		setting ¹		
1		at the factory: specify as required		
T30	electrical connection	circular connector	M12x1 (4-pin)	
T31			M12x1 (8-pin, required for switching module)	
T32			M12x1 (5-pin)	
T20		cable gland M16x1.5	polyamide black	
T21			brass-nickel plated	
T22			stainless steel	
K1085	design	for processing temperature up to 125 °C (short term up to 140 °C)		
K2085		for processing temperature up to 160 °C (with temperature decoupler)		
K102	process connection ² material: ASTM 316L	sanitary pipe connec- tion with union nut per DIN 11851	DN 25	
K103			DN 32	
K104			DN 40	
K105			DN 50	
K162		aseptic screw joint collar connection with union nut per DIN 11864-1 type A	DN 25	
K163			DN 32	
K165			DN 40	
K166			DN 50	
K124		Clamp connection per ISO 2852 for pipes per ISO 2037	DN 25 (1")	
K126			DN 38 (1 1/2")	
K127			DN 51 (2")	

K144	process connection ² material: ASTM 316L	Clamp connection per DIN 32676, model A (metric) for pipes per EN 10357 (DIN 11850)	DN 25
K146			DN 32
K147			DN 40
K148			DN 50
K213		Clamp connection per DIN 32676, model B (OD, ISO) for pipes per EN ISO 1127	DN 26.9
K214			DN 33.7
K215			DN 42.4
K216			DN 48.3
K136		Clamp connection per DIN 32676, model C (Tri-Clamp) for pipes per ASME BPE	DN 1"
K137			DN 1 1/2"
K138			DN 2"
K152		Varivent connection	D=50 for Varivent housing DN 25 and 1"
K153			D=68 for Varivent housing DN 40...125 and 1 1/2...6"
K172		HYGIENIC Tubus	Ø 43,3 mm with screwing DN 25/PN 40
K185		DRD connection	nominal with DN 50 / nominal pressure PN 40
K195		screw-in thread	G 1 A with O ring gasket ³
K80			HYGIENIC G1A, elsatomer-free sealing (1.4436)
	surface roughness	standard	
HY	(wetted parts)	Hygieneausführung nach EHEDG und ASME BPE SF3	

Additional features (to be indicated if required)		
S68	Ex marking ⁴	Ex II 2G Ex ia IIC T4/T5/T6 Gb, II 2 D Ex ia IIIC Txx°C Db
S66		Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
T4	degree of protection	IP 69K
Z61	PROFIBUS PA	factory setting, please specify
Z62		measuring-point number/identification max. 32 characters, please specify
Z63		measuring-point text max. 32 characters, please specify
W4035	process connection (diaphragm seal) electropolished	
W1020	material certificate as per EN 10204-3.1, wetted parts (stainless steel)	
W1201	inspection certificate as per EN 10204-3.1, calibration certificate with 5 measuring points	
W2602	functional safety as per EN 61508, classificatio per SIL2 ⁵	
W2673	certificate of measuring equipment for Russian Federation	

Accessories		
MC1020	HART® Modem for	RS 232-Interface
MC1040		USB-Interface
MC1041		USB-Interface, Ex

Order code (example): CV3110 - A1051 - F11 - H1100 - M2 - N10 - T20 - K1085 - K103 -

¹ extensive parameterization is possible when the transmitter is operated with the display module, the HART® function module or the PROFIBUS module.

² other process connections als well as aseptic designs upon request.

³ hygienic design not possible

⁴ Ex-design not possible with switching module.

⁵ not with PROFIBUS PA