

Differential pressure transmitter PASCAL CV4 Delta P for diaphragm seal operation Type series CV4330



Application area

- Pharmaceutical industry
- Food industry
- General process engineering
- General process technology

Features

- Compact case of stainless steel, continuously rotatable by $\pm 170^\circ$, degree of protection IP 65/67
- Various process connections with diaphragm seal technology
- Smallest nominal sizes from DN 25
- High-resolution graphic display with Intuitive operation and backlight
- Quick access to device data
- Comprehensive parameterising, simulation and diagnostic functions
- Nominal range -0.25...0.25 bar up to -1...40 bar
- Accuracy $\leq 0.15\%$
- Turndown up to 20:1
- Output signal 4...20 mA with HART® protocol
- Digital communication via PDM/EDD and FDT/DTM
- Output functions: linear, inverse
- Table function with up to 32 support points

Options

- Labom REconnect quick coupling device for easy and safe separation and connection of diaphragm seal systems; Type series MK1000, see data sheet DB_D6-022
- Accuracy $\leq 0.1\%$
- Approvals/Certificates
 - Explosion protection (ATEX/IECEx/UKEX) for gases and dust
 - Material certificate per EN 10204-3.1
 - Calibration certificate per EN 10204-3.1
- As per UKCA regulations
- Degree of protection IP 69K
- Case and front cover of stainless steel 316L

Application

The PASCAL CV4 Delta P digital differential pressure transmitter has been specially designed for diaphragm seal attachment with a volume-reduced differential pressure chamber, which enables the use of small diaphragm seal diameters and therefore very low temperature errors. Its very compact design and the rotatable display qualify it for use in small systems. It is used for level measurement on pressure vessels and for monitoring filters.

Extensive parameterisation, simulation and diagnostic functions are possible both via the 4-button user interface directly on the device and via the HART® protocol.

Technical data

Measuring range

The measuring span can be freely selected up to a turndown of 20:1.

Nominal range	Measuring span		Overload limit		Static overpressure
	min	max	+ side	- side	
-0.25...0.25 bar	0.0125 bar	0.5 bar	10 bar	5 bar	75 bar
-1...1 bar	0.05 bar	2 bar	20 bar	10 bar	75 bar
-1...4 bar	0.2 bar	5 bar	50 bar	25 bar	75 bar
-1...16 bar	0.8 bar	17 bar	100 bar	75 bar	100 bar
-1...40 bar	2.0 bar	41 bar	100 bar	75 bar	100 bar

For information on definitions of terms regarding the Pressure Equipment Directive, see Technical Instruction TA_068.

Constructional design / case

Design: Hygienic case of stainless steel, continuously rotatable by $\pm 170^\circ$

Material case and front cover: Process connection back:
Stainless steel mat.-no. 1.4305 (303)
Option: stainless steel mat.-no. 1.4404 (316L)
Process connection bottom:
Stainless steel mat.-no. 1.4301 (304)
Option: stainless steel mat.-no. 1.4404 (316L)

Gasket: Silicone
EPDM / FKM (if degree of protection IP 69K)

Degree of protection per EN 60529: IP 65 / IP 67
Option: IP 69K

Climatic category: 4K4H per EN 60721 3-4

Material window: ■ Non-splintering glass
■ Polycarbonate

Electrical connection: Circular connector M12
Option: Cable glands
■ M16 x 1.5, PA black
■ M16 x 1.5, brass nickel-plated
■ M16 x 1.5, stainless steel
■ M20 x 1.5, PA black
■ M20 x 1.5, brass nickel-plated
■ M20 x 1.5, stainless steel
■ 1/2" NPT, PA black

Further connections upon request

Terminal blocks: Spring clamp terminals up to 2 mm²

Type plate: Adhesive label

Material wetted parts

Material: see product group D5

Measuring system

Sensor: piezoresistive

System filling: Due to the application there are different system fillings available, see Technical Instruction TA_031.

Accuracy

Reference cond. per EN 61298-1: $T_U = \text{const. (15...25) } ^\circ\text{C}$
 $\varphi = \text{const. (45...75) \% r.F.}$
 $p_U = \text{const. (860...1060) mbar}$
 $U_B = 24 \text{ V DC } (\pm 3 \text{ V DC})$
 $R_B = 50 \Omega$, HART: 250 Ω
Ground connected
Lower range value = 0 bar

Calibration position: vertical

Deviation of characteristic: Refer to the adjusted measuring span (Limit point method per DIN 16086)
Up to Turndown 5:1 $\leq \pm 0.15 \%$
Turndown > 5:1 $\leq \pm 0.03 \% \times \text{TD}$

Option (not for NR 250 mbar)

Up to Turndown 5:1 $\leq \pm 0.1 \%$
Turndown > 5:1 $\leq \pm 0.02 \% \times \text{TD}$

Long-term drift: Refer to nominal range
 $\leq 0.1 \%/ \text{year}$

Temperature influence case: Refer to nominal range
Ambient temperature -20...80 $^\circ\text{C}$:
0.15 %/10K, max. 0.4 %

Ambient temperature -40...-20 $^\circ\text{C}$:
Typical $\pm 0.2 \%/10\text{K}$

Process connection

Design: Volume reduced differential pressure chamber, suitable for the direct mounting of diaphragm seals with capillary connection.
Diaphragm seals see product group D5.

Influence static pressure:	Refer to nominal range	
	-0.25...0.25 bar	0.12 % x stat. pressure [bar] x TD
	-1...1 bar	0.03 % x stat. pressure [bar] x TD
	-1...4 bar	0.02 % x stat. pressure [bar] x TD
	-1...16 bar	0.002 % x stat. pressure [bar] x TD
	-1...40 bar	0.001 % x stat. pressure [bar] x TD

Indication

Display:	- High-resolution graphic display with backlight - 4-button operation - Freely configurable display modes - Continuously rotatable - Removable under voltage
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Output

Signal:	2-wire technology	4...20 mA
	Lower limit	3.8...4 mA
	Upper limit	20...21 mA
	Lower alarm current	< 3.6 mA
	Upper alarm current	> 21 mA
	Current limitation	22 mA
	Digital communication:	HART®-protocol, version 7
Function:	Device driver:	
	■ EDD for SIMATIC PDM	
	■ DTM for PACTware or compatible systems (FDT compliance)	
	■ Linear	
Turndown:	Up to 20:1	
	Damping:	0...999.9 s
Measuring rate:	20 Hz	
Resolution:	≤ 1 µA	
Current sensing func.	3.55...21.5 mA selectable in steps of 0.001 mA	
Load R _B :	$R_B \leq (U_V - 12V \text{ DC}) / 0.022 \text{ A } [\Omega]$ $U_V = \text{supply voltage}$ for HART® communication $R_B \geq 230 \Omega$	

Supply voltage

Functional range:	12...30 V DC, protected against polarity reversal 13...30 V DC (Ex), protected against polarity reversal
Ripple:	< 5 %

Temperature ranges

Ambient:	-20...80 °C
Option:	-40...80 °C
	(Display visibility is limited at temperatures below - 30 °C)
Media:	-90...400 °C*
	<u>Negative pressure application:</u> For detailed information on limits of use for negative pressure applications, see general technical information TA_038.
Storage:	-40...80 °C

* depending on the design of the diaphragm seal and the system filling

Tests and certificates

Ex approvals

ATEX:	TÜV 20 ATEX 265286 X
	⊕ II 1/2G Ex ia IIC TX Ga/Gb
	⊕ II 1/2D Ex ia IIIC Txx °C Da/Db
	⊕ II 2G Ex ia IIC TX Gb
	⊕ II 2D Ex ia IIIC Txx °C Db
IECEX:	IECEX TUN 20.0015X
	Ex ia IIC TX Ga/Gb
	Ex ia IIIC Txx °C Da/Db
	Ex ia IIC TX Gb
	Ex ia IIIC Txx °C Db
UKEX:	CML 21UKEX21177X
	⊕ II 1/2G Ex ia IIC TX Ga/Gb
	⊕ II 1/2D Ex ia IIIC Txx °C Da/Db
	⊕ II 2G Ex ia IIC TX Gb
	⊕ II 2D Ex ia IIIC Txx °C Db

For detailed information see Ex Instruction XA_027.

EMV :	Per EN 61326-1
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Parameterisation, simulation and adjustment

Parameterisation

Parameter	Values	Default setting
Device		
device ID	16 digits, freely selectable	ID: PASCAL CV4
damping	0,0...999,9 s	0,0 s
Display and control unit		
pressure unit	mbar, bar, Pa, hPa, kPa, MPa, g/cm ² , kg/cm ² , psi, atm, torr, mmH ₂ O, mH ₂ O, inH ₂ O, ftH ₂ O, mmHg, inHg	bar
temperature unit	°C, °F, °R, K	°C
lighting	on, off	on
language	English, German, Chinese	German
decimal point	auto, x.xxxx, xx.xxx, xxx.xx, xxxx.x, xxxxx	auto
display mode	four values, three values, two values, big display,	three values
main value	pressure, current (%), current (mA)	pressure
secondary values	pressure, current (%), current (mA), sensor temperature, device ID, HART-TAG, HART descriptor, <empty>	device ID , Bargraph
Current output		
output function	linear, invers, table	linear
number of table points	2...32	2 (0 % ≡ 4 mA, 100 % ≡ 20 mA)
lower range value	at any value within nominal range	0 bar
upper range value	at any value within nominal range	upper range limit
lower current limit	3,8...4,0 mA	3,8 mA
upper current limit	20...21 mA	20,5 mA
alarm current	low (<3.6 mA), high (> 21.0 mA)	low (<3.6 mA)
position correction	on, off	off
HART® data		
HART® address	0...63	0
number of response preambels	5...20	5
current mode	proportional, constant	proportional

Diagnostic functions

Measuring circuit diagnostics	Description	Value
loop-test	setting of a fixed current value at the output	3.55...21.5 mA
pressure simulation	setting a fixed pressure value, it also considers damping and tabular function unlike the current simulation	nominal range
min/max values	for process pressure and sensor temperature	/

Adjustment

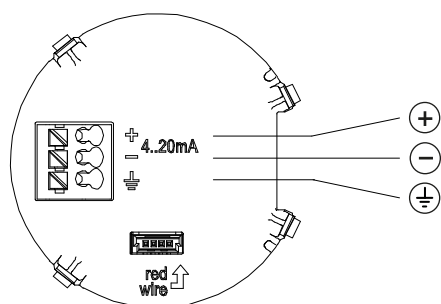
Type	Description
zero point correction	adjusts reading to zero at ambient pressure (for differential and gauge pressure devices)
position correction	adjusts reading of mounted device to zero at ambient pressure (only relative pressure measurement devices)
lower adjustment	adjusts reading of mounted device to zero at ambient pressure
upper adjustment	adjusts reading to applied pressure (affects span only)
current adjustment	adjusts current output to achieve 4 resp. 20 mA at the end of the measurement chain

Parameterisation for devices without a firmly fitted display

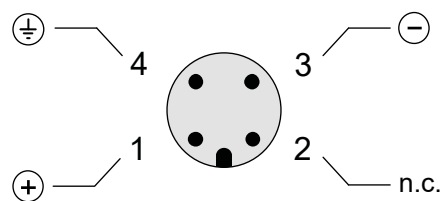
Parameterisation possible via HART® protocol.

Parameterisation possible at any time via plugging a display module.

Connection diagram



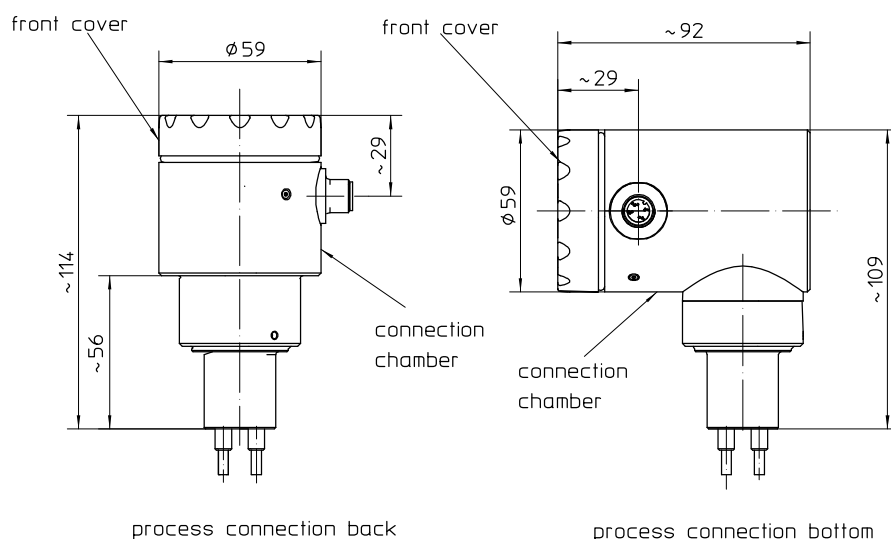
Cable gland



Circular connector M12 x 1

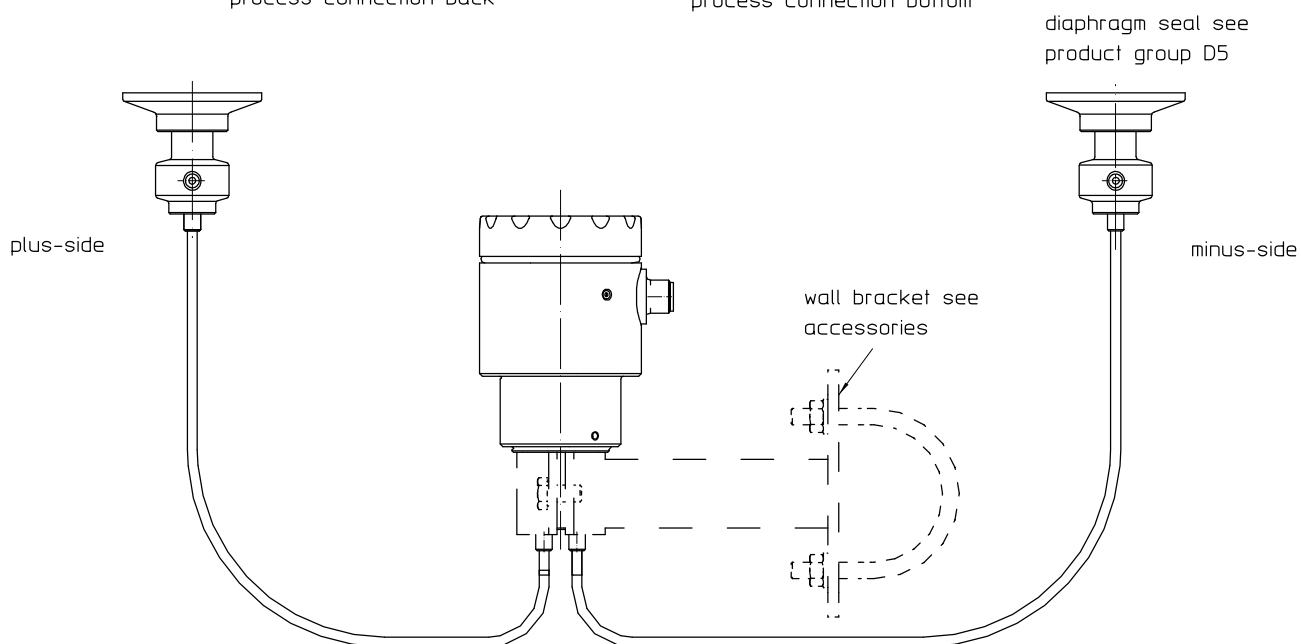
Dimensions

Case and process connection



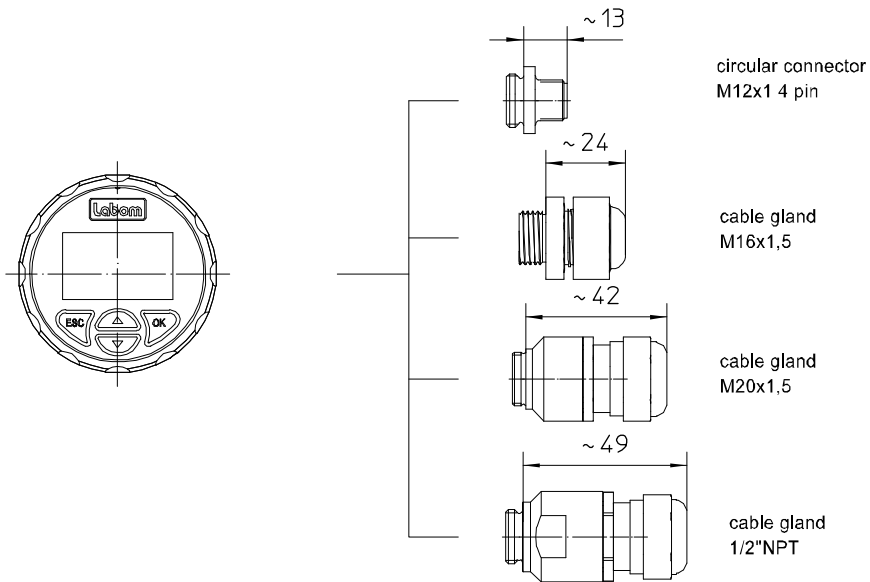
process connection back

process connection bottom

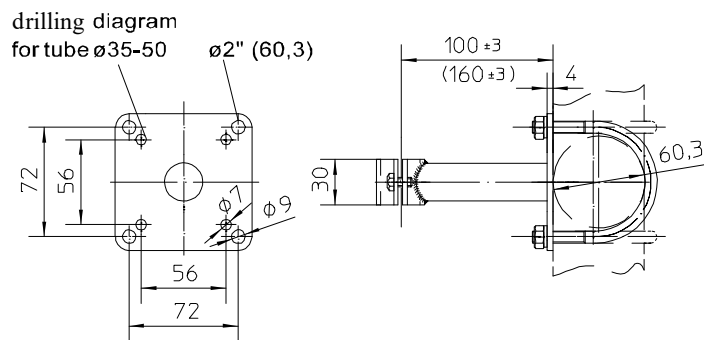


* The Ex version is 10 mm higher or longer

Electrical connection



Wall bracket for wall and pipe mounting (Type series MM1110)



All dimensions are in mm

Order details

Differential pressure transmitter PASCAL CV4 Delta P for diaphragm seal operation			
CV4330	Differential pressure transmitter PASCAL CV4 Delta P for diaphragm seal operation		
R70	process connection	back	
R71		bottom	
A1078	nominal range	-0.25...0.25 bar	
A1053		-1...1 bar	
A1056		-1...4 bar	
A1059		-1...16 bar	
A1061		-1...40 bar	
F1	parameterisation	factory settings (standard)	
F9		as per customer's specification	
Q2	accuracy	≤ 0.15 %	
Q1		≤ 0.1 % ¹	
H21	output signal	4...20 mA, with HART® protocol	
Y14	material case/window	stainless steel material-no. 1.4301/1.4305 (304/303), window polycarbonate	
Y12		stainless steel material-no. 1.4301/1.4305 (304/303), window non-splintering glass	
Y13		stainless steel material-no. 1.4301/1.4305 (304/303), closed, without window	
Y24		stainless steel material-no. 1.4404 (316L), window polycarbonate	
Y22		stainless steel material-no. 1.4404 (316L), window non-splintering glass	
Y23		stainless steel material-no. 1.4404 (316L), closed, without window	
T1	degree of protection	IP 65 / IP 67	
T4		IP 69K ²	
			default language
M21.1	display	high-resolution graphic display with backlight, intuitive 4-button operation and quick set-up function	English
M21.2			German
M21.3			Chinese
M1		without display	
T20	electrical connection	cable gland	M16 x 1.5 PA for cable 4.5-10 mm ³
T21			M16 x 1.5 brass nickel-plated for cable Ø 5-10 mm
T22			M16 x 1.5 stainless steel material-no. 1.4404 (316L) for cable Ø 5-9 mm ³
T15			M20 x 1.5 PA for cable Ø 7-13 mm ³
T16			M20 x 1.5 brass nickel-plated for cable Ø 7-13 mm
T17			M20 x 1.5 stainless steel material-no. 1.4404 (316L) for cable Ø 8-13 mm
T27			1/2" NPT, PA for cable Ø 5-12 mm
T30		circular connector M12 x 1 (4-pin) ³	
U1	temperature ambient	-20...80 °C	
U7		-40...80 °C	
Process connections (diaphragm seals) see product group D5			

Additional features (to be indicated if required)			
S66	Ex marking ⁴	ATEX	Ⓔ II 1/2G, II 2G Ex ia IIC TX Ga/Gb, Gb
			Ⓔ II 1/2D, II 2D Ex ia IIIC Txx°C Da/Db, Db
S76		IECEX	Ex ia IIC TX Ga/Gb, Gb
			Ex ia IIIC Txx°C Da/Db, Db
S86		UKEX	Ⓔ II 1/2G, II 2G Ex ia IIC TX Ga/Gb, Gb
			Ⓔ II 1/2D, II 2D Ex ia IIIC Txx°C Da/Db, Db
W1020	material certificate	per EN 10204-3.1, wetted parts	
W1201	calibration certificate	per EN 10204-3.1, 5 measuring points	
W2660	as per UKCA regulations		

Accessories		
MM1110	Device holder similar to DIN 16281, form A, for wall, pipe and frame mounting, stainless steel material no. 1.4571 (316Ti)	
A10	Design	for wall mounting
A11		for pipe diameter 35-50 mm
A12		for pipe diameter 2" (60.3 mm)

Order detail (example): CV4330 - R70 - A1053 - F1 - Q2 - H21 - Y14 - T1 - M21.2 - T22 - U1 - ...

¹ Not for nominal range 0.25 bar.

² Only possible for devices with window of polycarbonate, gasket of FKM and selected electrical connections (see footnote 3).

³ Suitable for degree of protection IP 69K.

⁴ Not possible with window of polycarbonate, not suitable for degree of protection IP 69K.