Differential pressure transmitter PASCAL CV4 Delta P

for general applications

Type series CV4300

Application area

- Chemical and petrochemical industry
- General process engineering
- Plant and machinery engineering
- General process technology

Features

- Compact case of stainless steel, continuously rotatable by ± 170°, degree of protection IP 65/67
- 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 ≤ 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

- Accuracy ≤ 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 digital differential pressure transmitter PASCAL CV4 Delta P is suitable for level measurement on pressure vessels and for monitoring filters. Its compact design and the rotatable display qualify it for use in small systems. This is made possible by individual alignment options even in confined spaces. Extensive parameterisation, simulation and diagnostic functions are possible both via the 4-button user guidance directly on the device and via HART® protocol.

Technical data

Measuring ranges

Up to a turndown of 20:1 the measuring span can be freely selected.

Nominal range	Measuring span		Overload capacity		Static excess pressure	Lower measuring limit
	min	max	+ side	- side	double-sided	
-0.25…0.25 bar	0.0125 bar	0.5 bar	3.5 bar	0.35 bar	75 bar	750 mbar abs
-1…1 bar	0.05 bar	2 bar	4 bar	1 bar	75 bar	30 mbar abs
-1…4 bar	0.2 bar	5 bar	25 bar	1 bar	75 bar	30 mbar abs
-1…16 bar	0.8 bar	17 bar	100 bar	1 bar	100 bar	30 mbar abs
-1…40 bar	2.0 bar	41 bar	100 bar	1 bar	100 bar	30 mbar abs

Constructional design / case

Design: Hygienic case of stainless steel, continuously rotatable by ± 170°

Material case: Stainless steel mat.no. 1.4305 (303)
Option:
Stainless steel mat.no. 1.4404 (316L)

Material front cover: Stainless steel mat.no. 1.4305 (303)
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: Macrolon hardened
Option: Non-splintering glass

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 mm^2

Type plate: Adhesive label

Process connection

Design: Process flange with connection dimension per DIN EN 61518

- Process connection 1/4 – 18 NPT
  Mounting thread 7/16 – 20 UNF
- Process connection 1/2 – 14 NPT
  via oval flange (see accessories)

Process flange incl. 1/4“ NPT sealing plug, alternative with vent valve.

The process flange is rotatable.

Further process connections upon request.

Material wetted parts

Process flange: Stainless steel, mat.-no. 1.4408

Diaphragm: Stainless steel, mat.-no. 1.4404/1.4435 (316L)

Gasket: FKM

Ventilation valve: Stainless steel, mat.-no. 1.4404 (316L)

Sealing plug: Stainless steel 316L

Measuring system

Sensor: Piezoresistive measuring element

System filling: Synthetic oil FD1, free of silicone, FDA compliant

Accuracy

Reference cond. per EN 61298-1: T_U = const. (15…25) °C
φ = const. (45...75) % r.F.
p_U = const. (860...1060) mbar
U_B = 24 V DC (± 3 V DC)
R_B = 50 Ω, 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 ≤ ± 0.15 % Turndown > 5:1 ≤ ± 0.03 % x TD Option (not for NR 250 mbar): Up to Turndown 5:1 ≤ ± 0.1 % Turndown > 5:1 ≤ ± 0.02 % x TD
Long-term drift:	Refer to nominal range ≤ 0.1 %/year
Temperature influence process case:	Refer to nominal range Ambient temperature -20…80 °C: 0.15 %/10K , max. 0.4 % Ambient temperature -40…-20 °C: Typical ± 0.2 %/10K
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

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

Device driver:

- EDD for SIMATIC PDM
- DTM for PACTware or compatible systems (FDT compliance)

Function:	■ Linear ■ Invers ■ Table function with up to 32 support points
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:	$R_B \leq (U_V\text{-}12V\ DC)/0.022\ A\ [\Omega]$ U_V = 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:	-20…100 °C
Storage:	-40…80 °C

Tests and certificates

Ex approvals

ATEX:	TÜV 20 ATEX 265286 X ⟨Ex⟩ II 1/2G Ex ia IIC TX Ga/Gb ⟨Ex⟩ II 1/2D Ex ia IIIC Txx °C Da/Db ⟨Ex⟩ II 2G Ex ia IIC TX Gb ⟨Ex⟩ 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 ⟨Ex⟩ II 1/2G Ex ia IIC TX Ga/Gb ⟨Ex⟩ II 1/2D Ex ia IIIC Txx °C Da/Db ⟨Ex⟩ II 2G Ex ia IIC TX Gb ⟨Ex⟩ II 2D Ex ia IIIC Txx °C Db

For detailed information see Ex Instruction XA_027.

EMV : Per EN 61326-1

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/cm², kg/cm², psi, atm, torr, mmH₂O, mH₂O, inH₂O, ftH₂O, 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

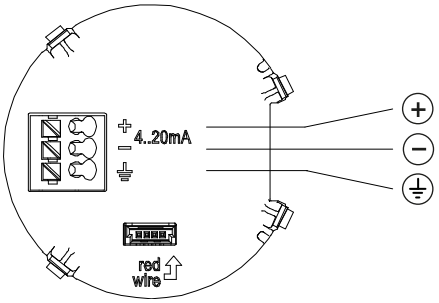
Type	Description
zero point correction	adjusts reading to zero at ambient pressure (for differential and gauge pressure devices)
position correction	adjusts reading of mounted device to zero at ambient pressure (only relative pressure measurement devices)
lower adjustment	adjusts reading of mounted device 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

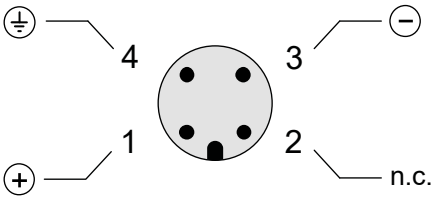
Parameterisation possible via HART® protocol.

Parameterisation possible at any time via plugging a display module.

Connection diagram



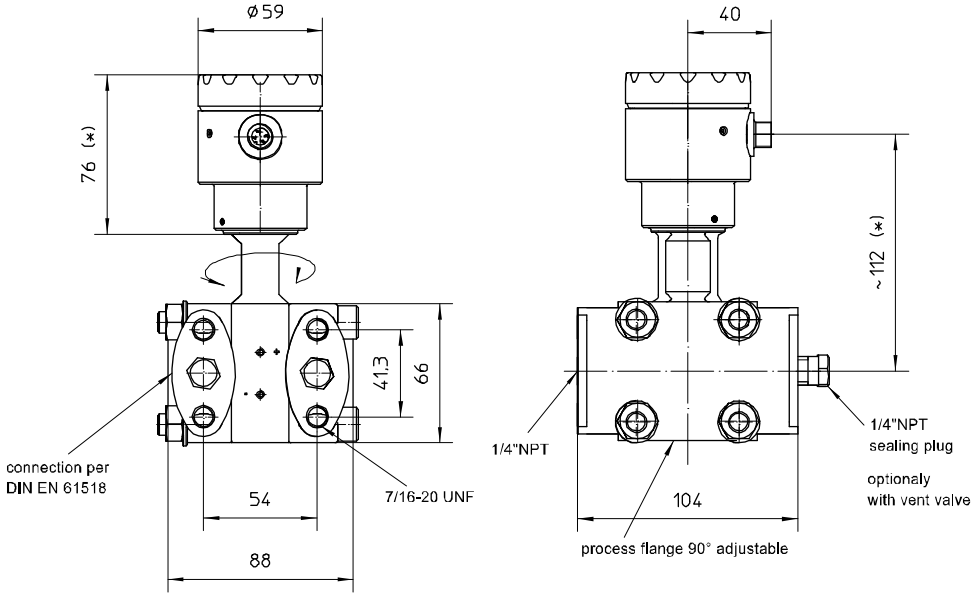
Cable gland

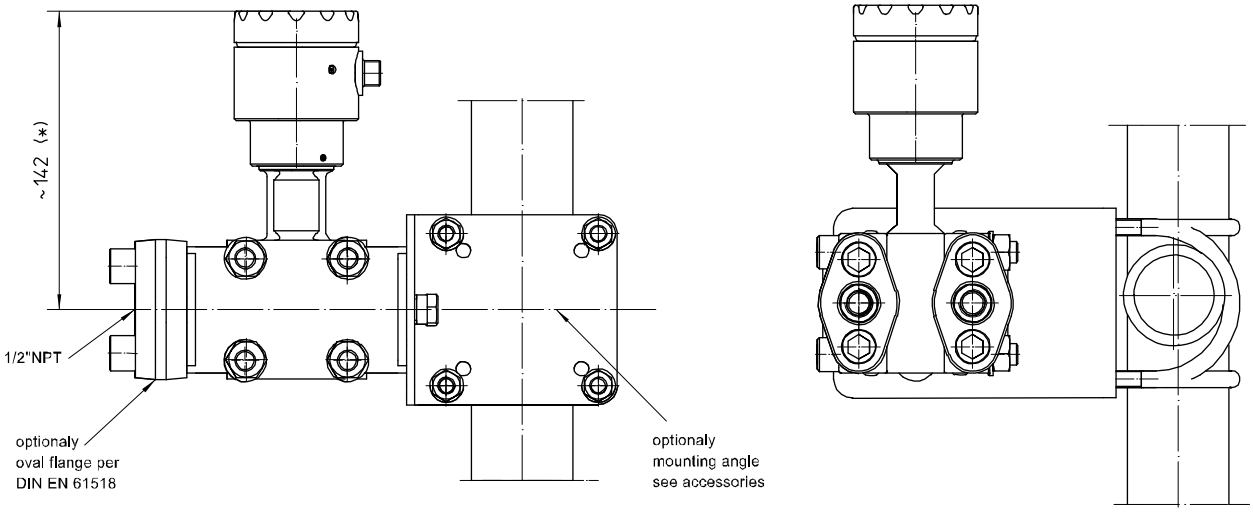


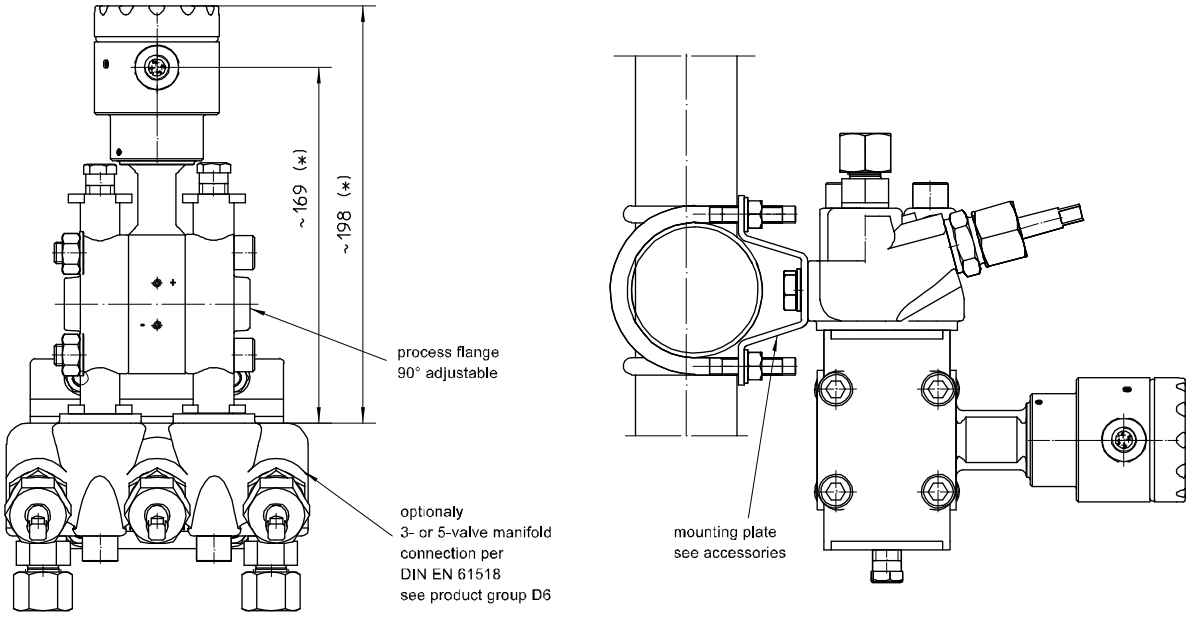
Circular connector M12 x 1

Dimensions

Case and process connections







* The Ex design is 10 mm higher

Order details

Differential pressure transmitter PASCAL CV4 Delta P for general applications
Type series CV4300

Order details PASCAL CV4 Delta P CV4300			
CV4300	Differential pressure transmitter PASCAL CV4 Delta P for general applications		
R70	process connection	back	
R70.1		back, process flange turned by 90°	
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 (pls. specify)	
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 Macrolon	
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 Macrolon	
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, quick access to device data	English
M21.2			German
M21.3			Chinese
M1		without display	
T20	electrical connection	cable gland	M16 x 1.5 PA for cable Ø 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]	
K4111	process connection	process flange with connection dimension per EN 61518 material process flange: 1.4408 material diaphragm: 316L material gasket: FKM	
E1	ventilation	without, with sealing plug of stainless steel (316L)	
E2		with vent valve of stainless steel (316L)	
U1	temperature ambient	-20...80 °C	
U7		-40...80 °C	

Additional features (to be indicated if required)			
S66	Ex marking [4]	ATEX	Ⓔx II 1/2G, II 2G Ex ia IIC TX Ga/Gb, Gb
			Ⓔx 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	Ⓔx II 1/2G, II 2G Ex ia IIC TX Ga/Gb, Gb
			Ⓔx 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		
MM1500-A11	mounting angle	for wall and pipe-mounting Ø 35-50 mm of stainless steel, incl. screws 7/16-20 UNF
MM1500-A12		for wall and pipe-mounting Ø 2“ of stainless steel, incl. screws 7/16-20 UNF
MC1060-A132	oval flange	oval flange 1/2-14 NPT per EN 61518, modal A of stainless steel mat.-no. 1.4404 (316L), incl. 2 screws 7/16-20 UNF, material stainless steel, incl. gasket PTFE
MC1060-A133		oval flange 1/2-14 NPT per EN 61518, modal A of stainless steel mat.-no. 1.4404 (316L), incl. 2 screws 7/16-20 UNF, material stainless steel, incl. gasket FKM

Order detail (example): CV4300 – R70 - A1053 – F1 - Q2 – H21 – Y14 - M21.2 – T22 - K4111 – E1 - U1

[1] not for nominal range 0.25 bar

[2] only possible for devices with window of Macrolon, gasket of FKM and selected electrical connections (see footnote 3)

[3] suitable for degree of protection IP 69K

[4] not possible with window of Macrolon, not suitable for degree of protection IP 69K