

Pressure transmitter PASCAL CV

for diaphragm seal operation, robust

Type series CV312.-....-D..



Application area

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

Features

- Modular pressure transmitter with diaphragm seal technology. Output signal:
 - 4...20 mA
 - HART® protocol, optional
- Function modules
 - Multifunctional display with 5-segment digital display and bar graph
 - Switching module with 2 flating 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"
- Various process connections
- Limits of measuring range 0...80 mbar to 0...100 bar
- Accuracy $\leq 0,15\%$
- Turndown 5:1
- Degree of protection IP 66, piezoresistive measuring cell directly aerated

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
- Approvals/Certificates
 - Explosion protection (ATEX/IECEX/UKEX) for gases and dust
 - Material certificate as per EN 10204-3.1
 - Calibration certificate as per EN 10204-3.1
 - Classification per SIL2
- As per UKCA regulations
- Degree of protection IP 69K

Application

The modular pressure transmitter PASCAL CV is suited for measuring the relative and absolute pressures of gases, vapors and liquids. The diaphragm seal with flange connection is applicable for pressure measurement with aggressive, highly viscous, solidifying or crystallising media.

PASCAL CV - the modulare pressure transmitter

Basic modul

4...20 mA



Function modules

Switching module



HART®-module



Display module



Technical data

Measuring ranges

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

Nominal range	Measuring span		Overload limit **	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...100 bar rel.	20 bar	101 bar	200 bar rel.	0 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.

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

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: 4K4H per EN 60721 3-4

Pressure compensation: PTFE filter system

Window: Polycarbonate

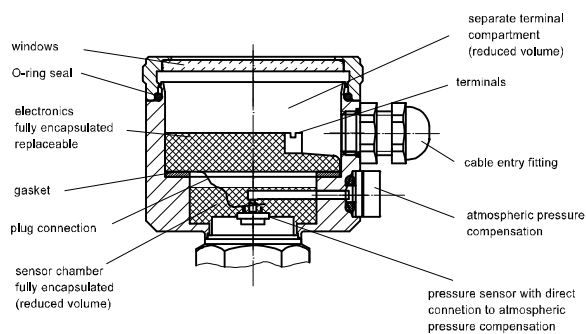
El. connection: Screw terminal 1 mm²

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

Construction: Welded design,
Variants 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 FD1, free of silicone, FDA compliant

Accuracy

General:

Limit point setting: per DIN 16086

Reference conditions: per EN 60770-1

Linearity errors: ≤ 0.15 % of span
TD 5:1 no modification

Hysteresis: ≤ 0.05 % of nominal range

Repeatability: ≤ 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

Temperature influence 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

Inline diaphragm seal	Zero point error
DN 25/1"	9.5 mbar/10K
DN 32/1 1/2"	4.1 mbar/10K
DN 40	3.9 mbar/10K
DN 50/2"	3.9 mbar/10K

The specified 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:	$R \leq (U-12V \text{ DC})/0.022 \text{ A } [\Omega]$ U = supply voltage

Supply voltage

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

Temperature ranges

Ambient:	-20...85 °C
Media:	up to 125 °C, short term up to 140 °C with temperature decoupler up to 160 °C with capillary up to 350 °C
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

ATEX:	TÜV 04 ATEX 2387 X Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb Ex II 2G Ex ia IIC T4/T5/T6 Gb Ex II 2D Ex ia IIIC Txx °C Db
UKEX:	CML 21UKEX21176X Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb Ex II 2G Ex ia IIC T4/T5/T6 Gb Ex II 2D Ex ia IIIC Txx °C Db

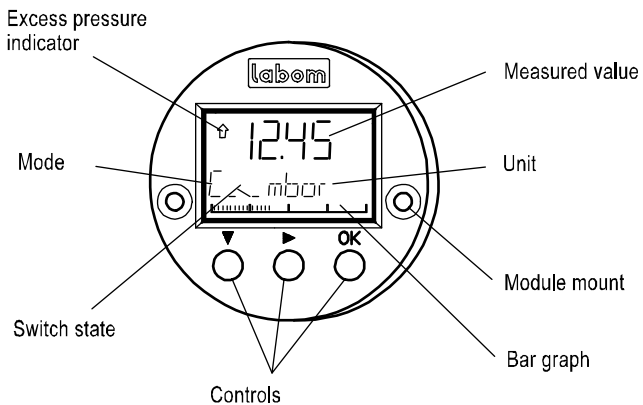
For detailed Information see Ex Safety Instruction XA_015.

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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Function modules

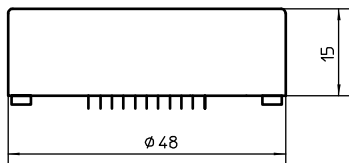
Display module (multifunctional display) optional

pluggable with automatic module detection - plug and measure -

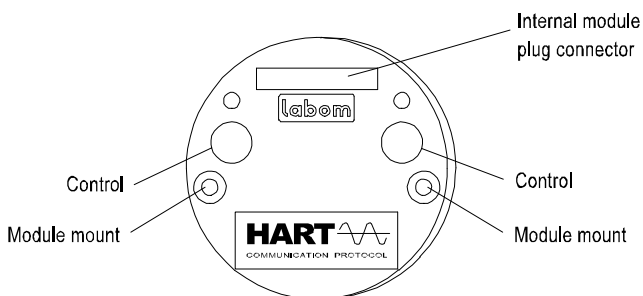


- Module housing made of ABS, encapsulated electronics unit
- Many operating mode menus
- 5-segment pressure read-out with unit
- Read-out display
 - pressure (standard)
 - percent
 - current
 - sensor temperature
- Bar graph 36 segment suitable 0...100 %
- Loop test (current sensing function) 3.55...22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

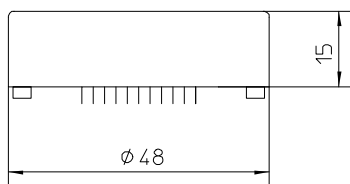
Details of the operator menu see parameterisation.



HART® module optional

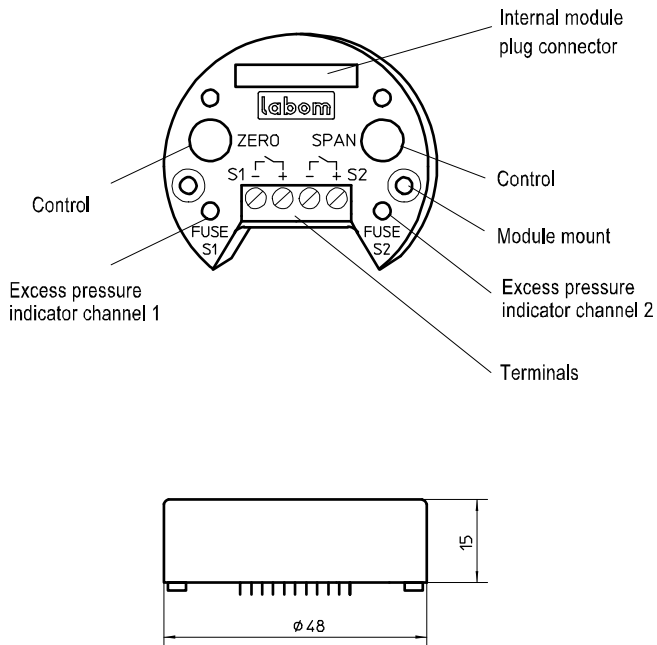


- HART® communication, HART 6
- Response characteristic FSK
- Parameterisation via
 - operating elements
 - HART® communication
- Siemens PDM
- Emerson 375/475 Field Communicator



Switching module optional

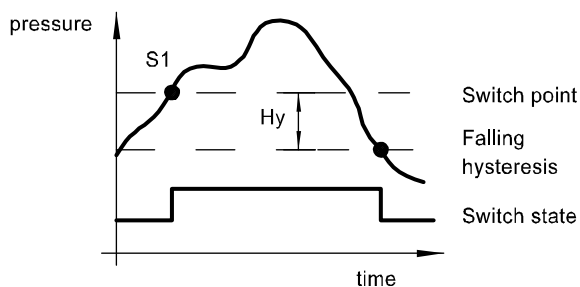
pluggable with automatic module detection - plug and measure -



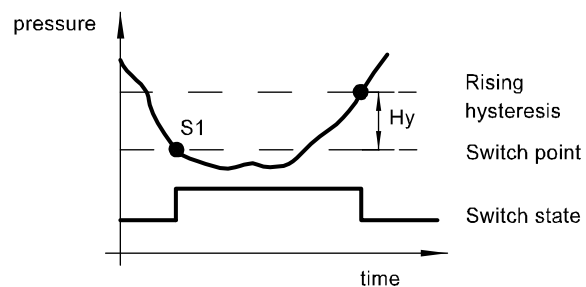
- No additional auxiliary power required
- Module housing made of ABS, encapsulated electronics unit
- Electronic switch for 2 limit values, voltage free, short-circuit-proof
- Switching capacity 30 V DC / 0.5 A ($R_i < 0.3 \Omega$)
- Indicator: red LED, indicates overload or short-circuit
- Cut-out 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			
		variability	standard	BM	SM	DM	HM PDM 475
zero point	RANGE/Zero	see instrument ranges	0 bar	x	x	x	x
measuring span	RANGE/Span	see instrument ranges	nominal range	x	x	x	x
damping	DAMP	4...20 mA: 0...120 sec.	0 sec.	w	-	x	x
min-max-value	HI/LO	pressure and temperature resettable	-	-	-	x	x
characteristic	FUNC	linear, table	linear	w	-	x	x
pressure unit	UNIT	bar, mbar, kPa, MPa, mmH ₂ O, mH ₂ O, kg/cm ² , PSI	bar	w	-	x	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
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
factory data reset	RESET	-	-	-	-	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 % hyst. 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 = configurable
w = factor setting

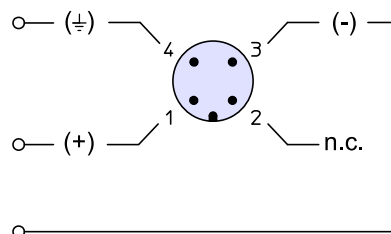
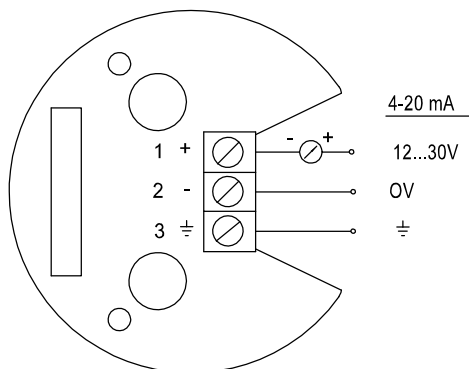
DM = display module
BM = basic module
SM = switching module
HM = HART-module
PDM = Siemens Process Device Manager
475 = Emerson Handheld Communicator

Connection diagram

Basic module: 4...20mA

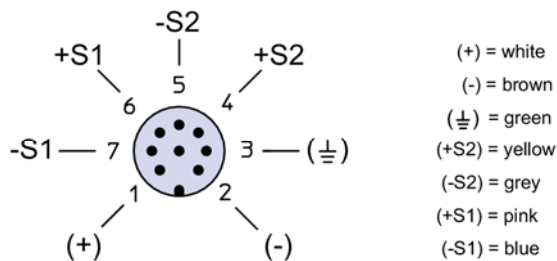
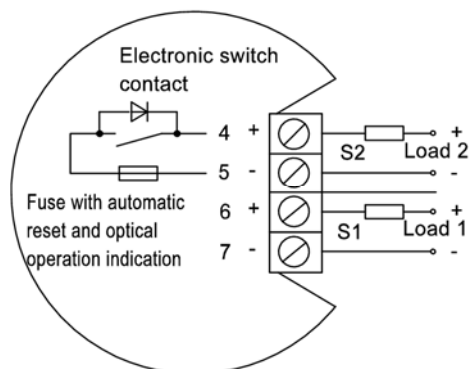
Internal terminals with cable gland design

Circular connector ¹



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

Circular connector ¹



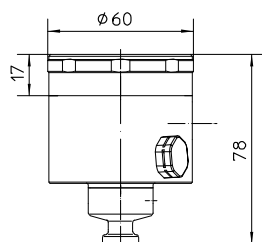
¹ color code as Binder series 763

Dimensions

Case

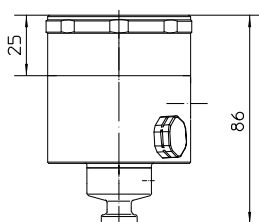
housing design type 17

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



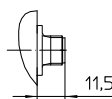
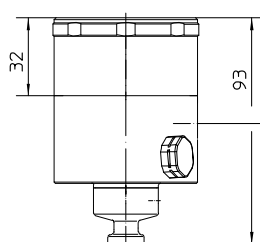
housing design type 25

with display module (optional)

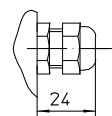


housing design type 32

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



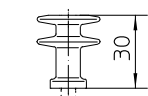
for circular connector
M12x1; 4 pole/8 pole
for 4...20 mA



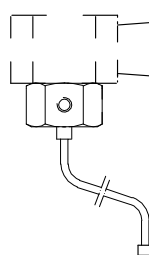
cable gland
M16x1,5 f. cable ø4,5-10

direct

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



temperature decoupler
for process temperatures
up to 160°C

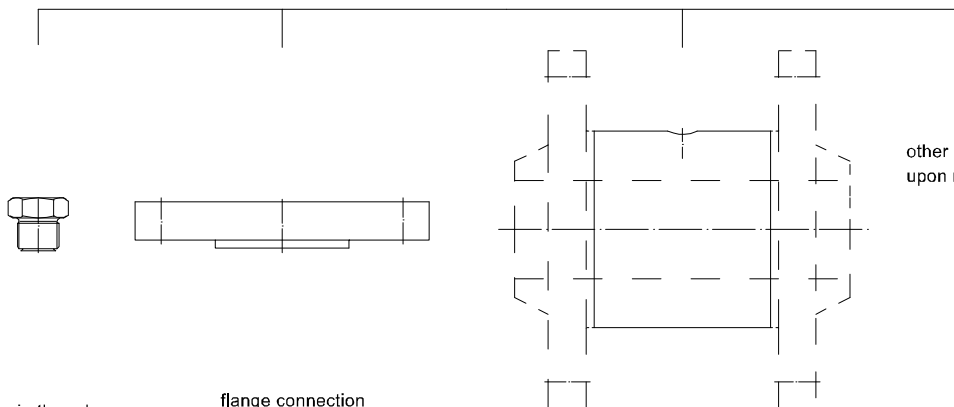


with capillary for
process temperatures
up to 350°C

wall bracket
100 mm nominal length
code MM1100-A1

Process connection

for details see order details
and relevant data sheets.
product group D5



other connections
upon request

screw in thread
with flush mounted
diaphragm
G1/2...G2A
data sheet D5-032

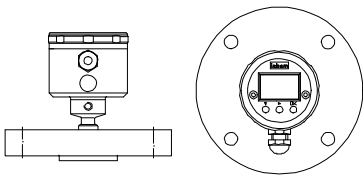
flange connection
per DIN oder ANSI
with flush mounted
diaphragm
DN25...DN100
DN 1" ... DN3"
data sheet D5-030

inline flange connection
per DIN or ANSI
DN25...DN100
DN 1" ... DN4"
data sheet D5-068

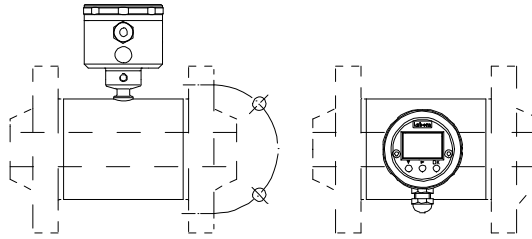
Mounting position

Mounting position: any

Flat Diaphragm Seal



Inline Diaphragm Seal



Standard position of display module and electrical connection.
Please state variant arrangement.

Order details

Pressure transmitter PASCAL CV for diaphragm seal operation, robust				
CV312.	Pressure transmitter PASCAL CV for diaphragm seal operation, robust			
0	Ex-protection	without		
1		Ex-protection, type of protection as follows		
		nominal range	overload limit	
A1051	nominal range	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	
A1063		100 bar	200 bar	
B1056		4 bar abs	10 bar	
B1059		16 bar abs	60 bar	
F10	measuring range	0 to nominal range, unit: bar (standard)		
F11		0 to nominal range, unit: mbar		
F22		0 to nominal range, unit: kPa		
F23		0 to nominal range, unit: MPa		
F30		0 to nominal range, unit: mmH2O		
F32		0 to nominal range, unit: mH2O		
F41		0 to nominal range, unit: kg/cm²		
F50		0 to nominal range, unit: PSI		
F80		set from... to... unit		
F81		adjusted and calibrated from....to....., unit (pls. fill in details), s. below for calibration report		
H11 . .	output signal	4...20 mA, rising characteristic (standard)		
H15 . .		20...4 mA, falling characterictic		
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				> 21.0 mA
M1	display module	without		
M2		multifunctional display with 5-position digital display and bar graph, pluggable		
N10	switching module ²	without switching module		
N5 .		switching module with 2 contacts, pluggable		switching capacity 30 V DC / 0.5 A
0		setting ¹		standard
1				at the factory, specify as required
T30	electrical connection	circular plug connector	M12x1 (4-pin)	
T31			M12x1 (8 pin, required for switching module)	
T20		cable gland M16x1,5	polyamide black	
T21			brass-nickel plated	
T22			stainless steel	
K1085	design	for media temperature up to 125 °C (short term up to 140 °C), standard		
K2085		for media temperature up to 160 °C (with temperature decoupler) ³		
DE1280	process connection ⁴	screw-in connection	G3/4 A	
DE1380			G1 A	
DE1580			G1 1/2 A	
DA1 . . .		flange	raised face DIN EN 1092-1 model B1 (DIN 2526 model C/D)	
DA2 . . .			raised face B2 (model E), in case of special diaphragm material	
. . . 120			DIN	DN 25, PN 10/40
. . . 420				DN 50, PN 10/40
. . . 620				DN 80, PN 10/40
				further DN/PN upon request
DA51 . .			raised face ASME B16.5 RF500 RMS	
DA5 . . .			raised face ASME B16.5 RFSF, in case of special diaphragm material	
. . . 120			ASME	DN 1" Class 300
. . . 320				DN 2" Class 300i
. . . 520				DN 3" Class 300
				further DN/PN upon request

DP2180		inline flange connection (cell design)	DIN with plain raised face, model B2	DN 25
DP2380				DN 40
DP2480				DN 50
DP2580				DN 65
D2680				DN 80
				further DN/PN upon request
DP6180			ASME with plain raised face ASME B16.5 RFSF	DN 1"
DP6280				DN 1 1/2"
DP6380				DN 2"
DP6480				DN 2 1/2"
DP6580				DN 3"
				further DN/PN upon request
A4007	material wetted parts	stainless steel mat.-no. 1.4435		
A4002		Tantalum		
A4003		Hastelloy C 276		
A4006		stainless steel material with PTFE foil		
A4001		stainless steel mat.-no. 1.4404/1.4435 (ASTM 316 L)		
L22	system filling	foodstuff oil FD1 (USDA-H1 acc. to FDA) temperature range: -10...+140 °C, standard		
L23		foodstuff oil FD1 (USDA-H1 acc. to FDA) L23 pls. specify temperature range, max. -40...+200 °C		
L31		high temperature oil, temperature range: -10...+350 °C		
		other liquids and temperature ranges upon request		
F1	immersion length L ⁵	60 mm standard at ≥ DN 80 (3")		
F2		100 mm standard at ≤ DN 65 (2 1/2")		

Additional features (to be indicated if required)			
S68	Ex marking ²	ATEX	⚠ II 2 G Ex ia IIC T4/T5/T6 Gb, II 2 D Ex ia IIIC Txx°C Db
S66			⚠ II 1/2 G Ex ia IIC T4/T5/T6 Ga/Gb
S88		UKEX	⚠ II 2 G Ex ia IIC T4/T5/T6 Gb, II 2 D Ex ia IIIC Txx°C Db
S86			⚠ II 1/2 G Ex ia IIC T4/T5/T6 Ga/Gb
T4	degree of protection	IP 69K	
W1020	material certificate as per EN 10204-3.1, wetted parts (stainless steel)		
W1201	calibration certificate as per EN 10204- 3.1, 5 measuring points		
W2602	functional safety as per EN 61508, classification per SIL2		
W2660	as per UKCA regulations ⁶		

Order code (example): CV3120 - A1051 - F11- H1100 - M2 - N10 - T20 - K1085 - DE1280 - A4001 - L22 - ...

¹ Settings see parameterisation.

² Ex-design not possible with switching module.

³ Higher temperatures upon request.

⁴ Further process connections upon request.

⁵ Necessary for inline diaphragm seals (cell design) only.

⁶ Not possible with inline diaphragm seals.