

Pressure transmitter PASCAL CV for general applications, Type Series CV310 .



Features

- Modular pressure transmitter with internal or flush-mounted diaphragm
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"
- Limits of measuring range 0...80 mbar to 0...400 bar
- Accuracy: $\leq 0.15\%$
- Turndown 5:1
- Degree of protection IP 66, piezoresistive measuring cell directly aerated

Options

- Explosion protection for gases and dust
- Classification per SIL 2
- Inspection certificates
 - material certificate as per DIN EN 10204-3.1
 - calibration certificate as per DIN EN 10204-3.1
- Degree of protection IP 69K



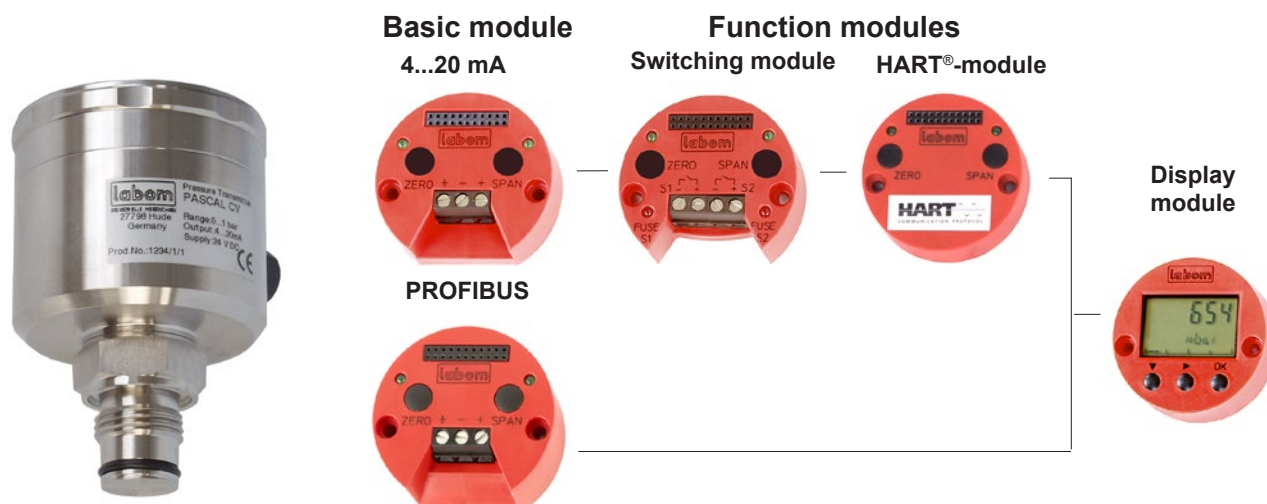
Application area

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

Application

The modular pressure transmitter PASCAL CV is suited for measuring the relative and absolute pressures of gases, vapors and liquids.

PASCAL CV - the modular pressure transmitter



Process connection: all standard thread variants with internal or flush-mounted diaphragm

Technical Data**Instrument ranges**

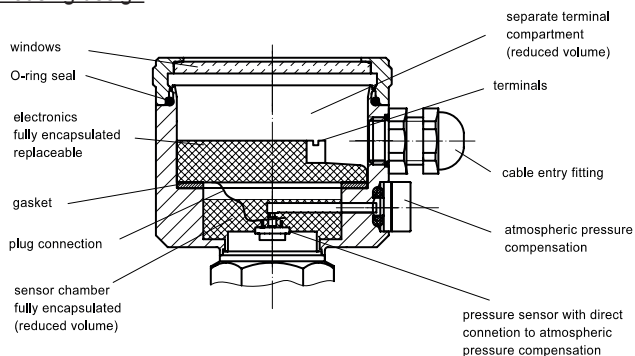
nominal range	Turndown	measuring ranges	measuring spans ²		overload limits	vacuum tight at < 50 °C ¹
			min. span	max. span		
0.4 bar	5 : 1	-0.4...+0.4 bar	80 mbar	0.8 bar	1 bar	400 mbar abs
1 bar		-1...+1 bar	0.2 bar	2 bar	3 bar	40 mbar abs
4 bar		-1...+4 bar	0.8 bar	5 bar	10 bar	20 mbar abs
16 bar		-1...+16 bar	3.2 bar	17 bar	60 bar	20 mbar abs
40 bar		-1...+40 bar	8 bar	41 bar	100 bar	20 mbar abs
100 bar		-1...+100 bar	20 bar	101 bar	150 bar	20 mbar abs
400 bar		-1...+400 bar	80 bar	401 bar	600 bar	---
4 bar abs		0...4 bar abs	0.8 bar abs	4 bar abs	10 bar abs	20 mbar abs
16 bar abs		0...16 bar abs	3.2 bar abs	16 bar abs	60 bar abs	20 mbar abs

¹ Long-term vacuum measurements at temperatures above +50°C may cause changes in the properties of the measurement device (only for piezoresistive measuring systems). Vacuum-proof designs are available upon request.

² calibrated measuring span for devices with PROFIBUS PA basic module

**Housing design**

Housing	hygienic housing design with screw cap
Material	housing: st. steel mat.no. 1.4301 (304) window: Macrolon gasket: NBR O-ring
Construction	two-chamber system, minimum housing volume, excellent moisture and condensate protection
Pressure compensation	PTFE filter system
Degree of protection	IP 66 per EN 60529, optional: IP 69K
Climatic category	DIN EN 60721 3-4, 4K4H
Electrical connection	· screwed terminals 1 mm ² , cable entry fitting through screwing · circular connector M 12
Weight	standard device with G 1/2 without function modules approx. 0.65 kg

Housing design**Supply**

Basic module	4...20mA	PROFIBUS PA
Standard design	12...40 VDC	9...32 V DC
Ex- proof design	12...30 VDC	

Output

General	
Delay time	approx. 160 ms
Measuring cycle	6 measurements / second
Meas. 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	$R \leq \frac{U - 12 V}{22.5 \text{ mA}}$ (Ohm)

Basic module: PROFIBUS PA

Output signal	digital output signal IEC 61158-2
Protocol	EN 50170 - PROFIBUS PA, Profile 3.0
Sensor address	0...126 (126 = factory setting)
Power consumption	constantly 11 mA
Fault current I_{FDE}	2 mA
Damping	0...300 seconds
Parameterization	SIMATIC PDM

Accuracy

General	
Limit point setting	per DIN 16086
Reference conditions	per DIN EN 60770-1
Calibration position	vertical mounting position
Linearity errors	≤ 0.15 % of span TD 5:1 no modification ≤ 0.05 % of nominal range
Hysteresis	≤ 0.05 % of nominal range
Repeatability	≤ 0.05 % of nominal range
Influence of mounting position	≤ 3.5 mbar
Long-term drift	≤ 0.1 % year of nominal range
DIN EN 60770-1	
Temperature effect	
Lower range value / upper range value	
range 0...60 °C	± 0.15 %/10 K of nominal range
range <0°C, >60°C	± 0.2 %/10 K of nominal range

Approval/tests

Interference emission	EN 55011
Noise immunity	EN 61326-1 *, NE21 *
Ex-approval	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 IIC T xx °C Db

Classification per SIL 2 for basic module 4...20 mA, switching module, display module and HART module, TÜV-Reg.-No. 44 207 09 555548-001.

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

Process connection

Variants / material	see order code
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Measuring system

Sensor type	piezoresistiv	thin film
Sensor filling	foodstuff oil as per FDA	—

Materials (wetted parts)

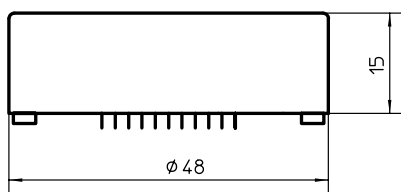
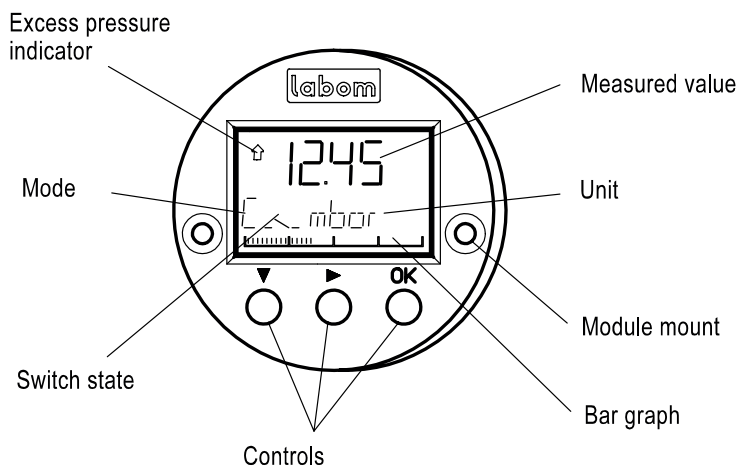
Sensor type	piezoresistiv	thin film
Sensor diaphragm	1.4404/1.4435(316L)	1.4542(630)
Socket	1.4404/1.4435(316L)	1.4301/1.4404(304/316L)

Temperature ranges

Ambient temperature	-20 to 85°C
Process temperature	-20 to 90°C
Allowed storage temperature	-40 to 85°C
Note safety values as per examination certificate!	

Function modules**Display module (multifunctional display) optional**

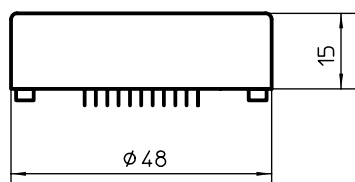
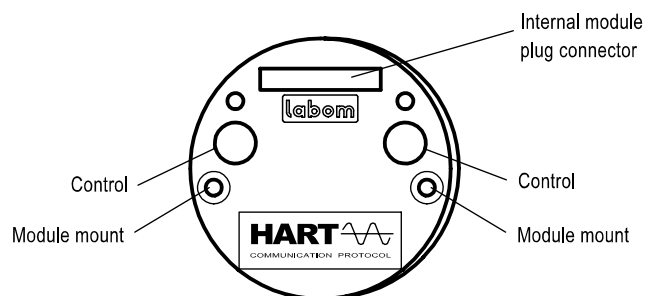
pluggable with automatic module detection - plug and measure -



- 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 segments $\hat{=}$ 0...100%
- Measuring circuit test (current sensing function) *
3.55...22.0 mA *
- Alarm indicator on display
- Switching function indicator (with switching module) *

* not with basic module PROFIBUS PA

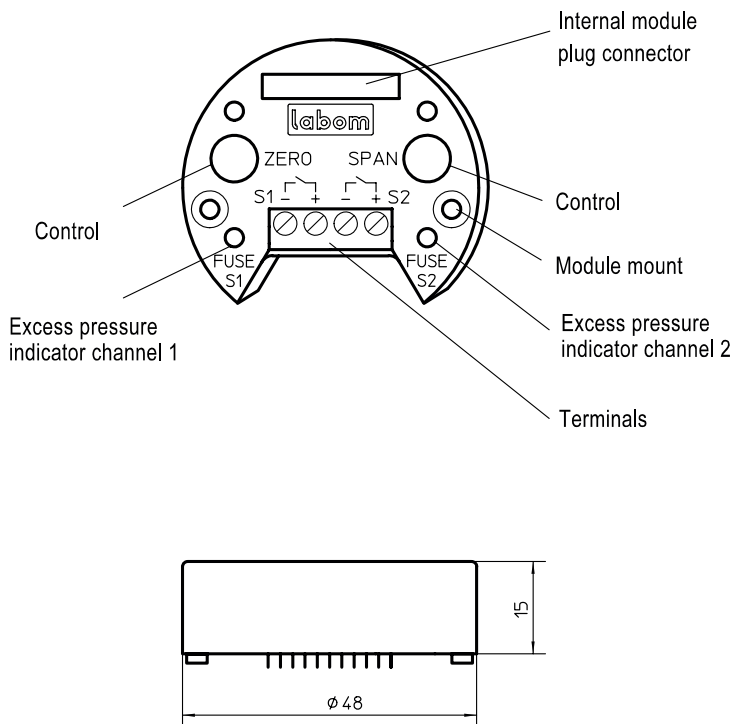
Operator menus	
4...20 mA	PROFIBUS PA
meas. range selection	min-max-value
damping	pressure trimming
min-max-value	system-info
characteristic	factory data reset
pressure units	BUS address
measuring circuit test	
alarm state	
current trimming	
pressure trimming	
table function	
system info	
factory data reset	
switch points	
hysteresis	
switching function	
HART address	
Current mode	

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

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

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

pluggable with automatic module detection - plug and measure -

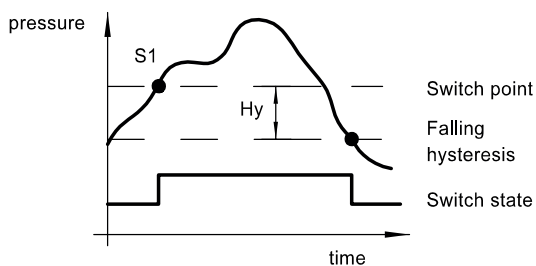


- No additional auxiliary power required
- Module housing made of ABS, encapsulated electronics unit
- Electronic switch for 2 limit values, voltage free, short-circuit-proof
- Switching capacity 30 V DC / 0.5 A ($R_i < 0.3 \Omega$)
- Overload indicator: LED red, overload or short-circuit
- Fusible cut-out at overload /short-circuit with automatic reset
- Switch points: 0.0 - 100.0% adjustable
Standard: 50.0%
- Switching function: maker or breaker, adjustable
Standard: breaker
- Device of circuit: contact open
- Hysteresis: 0.0% to 100.0%, 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

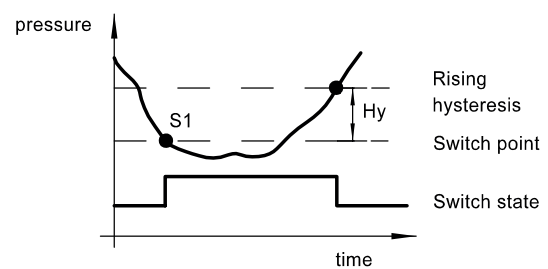
Profibus module description and HART® connection upon request

Hysteresis functions

- falling hysteresis -



- rising hysteresis -



Parameterizing

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	basic module	switching module	display module	HART®-module	basic module	display module	PDM
zero point *	RANGE / Zero	see instrument ranges	nominal range	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.	0.0 sec.	w	—	x	x	—	—	x
min-max-value	HI / LO	pressure and temperature resettable	—	—	—	x	x	—	x	x
characteristic	FUNC	linear, table	linear	w	—	x	x	—	—	x
pressure unit	UNIT	bar, mbar, kPa, MPa, mmH2O, mH2O, kg/cm², PSI	bar	w	—	x	x	—	w	x
measuring circuit test	LOOP	3.55...22 mA	—	—	—	x	x	—	—	—
alarm state	ALARM	<3.6 mA, >21.0 mA	<3.6 mA	w	—	x	x	—	—	—
current trimming	I-CAL	-2 %...+5 %	—	—	—	x	x	—	—	—
pressure trimming	P-CAL	zero point -50...+50 % of n.r. span -10...+10 % of n. range	—	—	—	x	x	x	x	x
table function	TABLE	2...31 points int able	0 % = 4 mA 100 % = 20 mA	—	—	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)	0.0...100.0 % of nominal range	50 %	—	x	x	x	—	—	—
hysteresis	SWCH1(2)/Hyst.	0.0...100.0 % 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 = factory setting

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

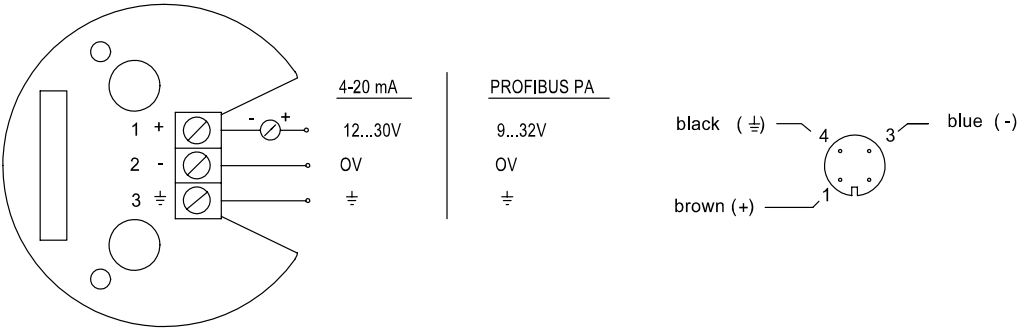
Connection diagram

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

Internal terminals with cable gland design

Circular connector

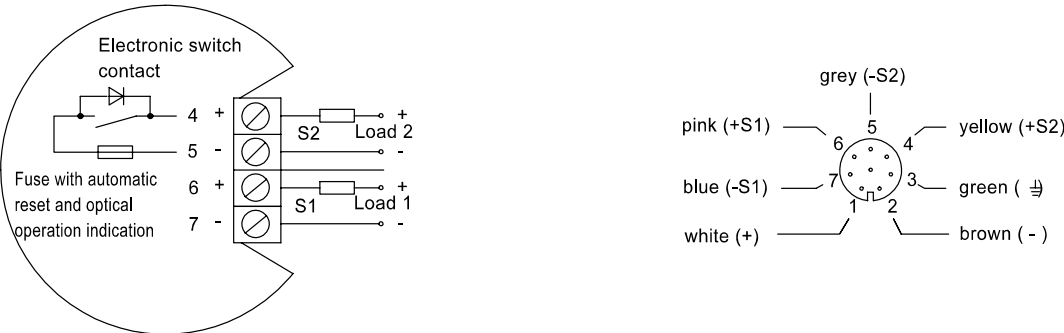
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Switching module (only with basic module: 4...20 mA)

Circular connector

1



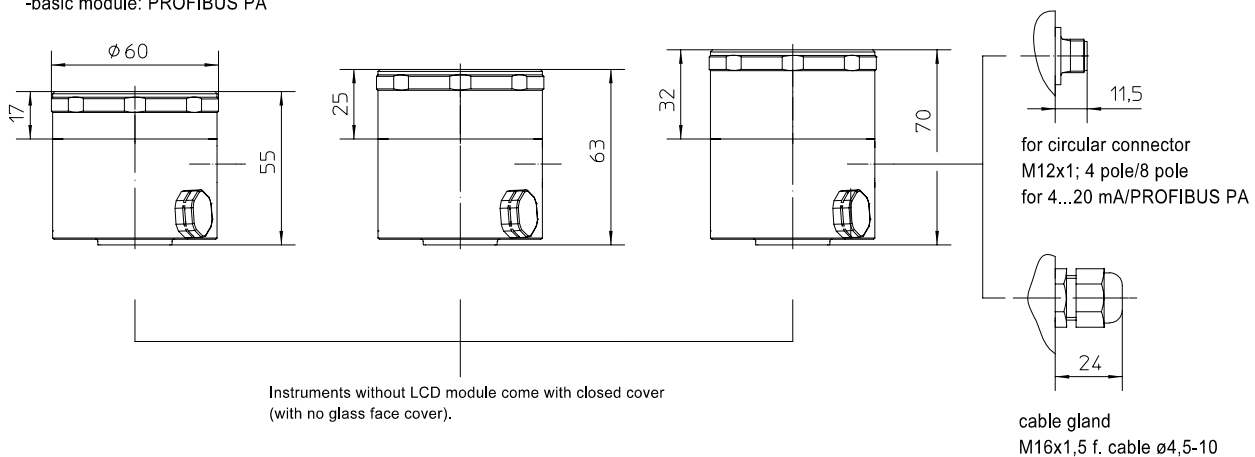
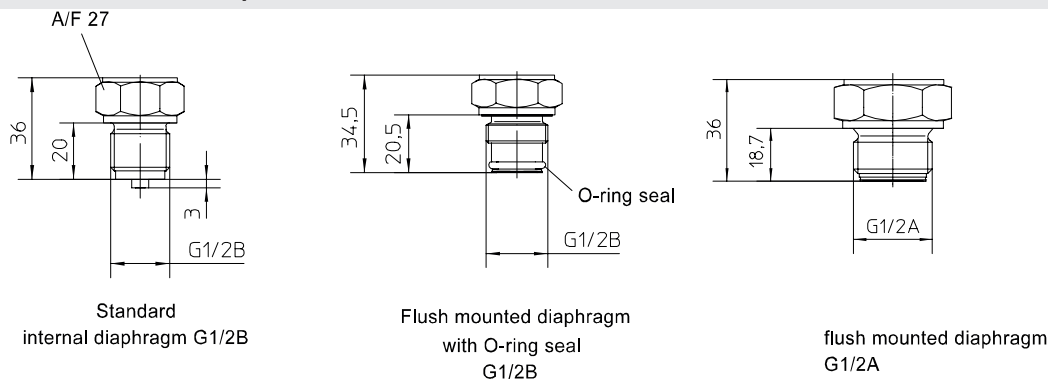
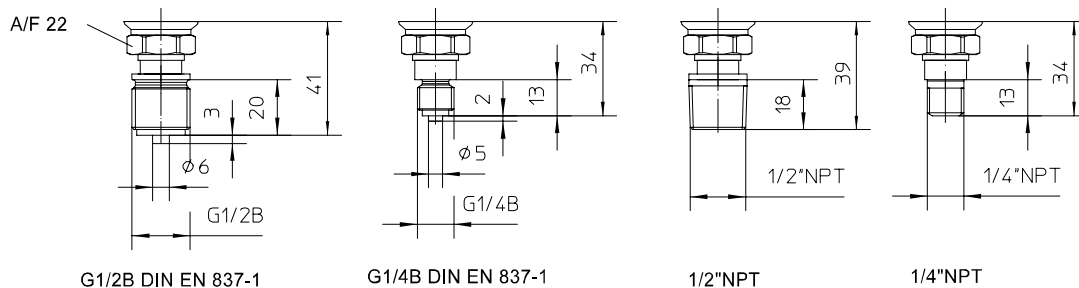
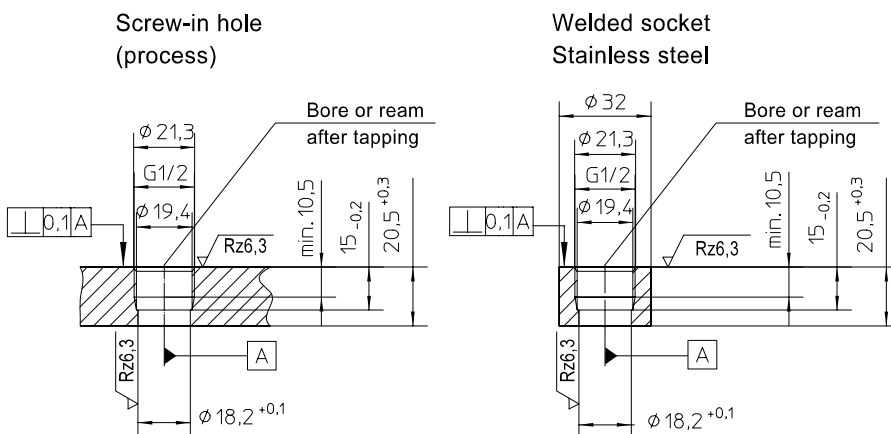
1 color code as Binder series 763

Dimensions/Designs**Housing**

with one function module (optional)
-basic module: PROFIBUS PA

with display module (optional)

with two function modules (optional)

**Process connections piezoresistiv****Process connections thin film****Screw-in hole/welded socket for flush mounted diaphragm with O-ring**

order code: MC 1000-A1

Order Details - please give additional specifications for models not listed -

PASCAL CV pressure transmitter for general application										CV310 .							
explosion protection		· without								0							
		· Ex-protection, types of ex-protection as follows								1							
nominal range	nominal range (Turndown 5:1)	overload limit (bar)	connection DIN EN 837-1		connection		connection with O-ring G 1/2 B	connection DIN 3852 G 1/2 A	sensor type								
			G 1/2 B	G 1/4 B	1/2 NPT	1/4 NPT											
	0,4 bar	1	x	-	-	-	x	x	piezo-resistiv			A1051					
	1 bar	3	x	-	-	-	x	x				A1053					
	4 bar	10	x	-	-	-	x	x				A1056					
	16 bar	60	x	-	-	-	x	x				A1059					
	40 bar	100	x	-	-	-	x	x				A1061					
	100 bar	200	x	-	-	-	-	x				A1063					
	400 bar	600	x	x	x	x	-	-	thin film			A3066					
	4 bar abs	10	x	-	-	-	x	x	piezo-resistiv			B1056					
16 bar abs	60	x	-	-	-	x	x				B1059						
measuring range	0 to nominal range, unit: bar (standard)											F10					
	0 to nominal range, unit: mbar											F11					
	0 to nominal range, unit:: kPa											F22					
	0 to nominal range, unit: MPa											F23					
	0 to nominal range, unit: mmH2O											F30					
	0 to nominal range, unit: mH2O											F32					
	0 to nominal range, unit: kg/cm²											F41					
	0 to nominal range, unit: psi											F50					
	set from... to... unit (please fill in details) not with PROFIBUS PA											F80					
adjusted and calibrated from to, unit (pls.fill in details), see below for calibration report											F81						
output signal	4...20 mA, rising characteristic (standard)											H11 ..					
	20...4 mA, falling characteristic											H15 ..					
	4...20 mA with HART function module, HART protocol rev. 6											H21 ..					
	setting ¹	damping	0.0 sec. (standard)									0					
			0.0...120.0 sec..., set to (please fill in)									1					
		alarm state	< 3.6 mA (standard)									0					
			> 21.0 mA									1					
	PROFIBUS PA, IEC 61158-2, Profile 3.0											H41					
display module	without											M1					
	multifunctional display with 5-position digital display and bar graph, pluggable											M2					
switching module (not with PROFIBUS PA)	without switching module											N10					
	switching module with 2 contacts, pluggable, switching capacity 30 V DC / 0.5 A											N5 .					
	setting 1)				standard, s."Techn. description of switching module"							0					
					at the factory, specify as required							1					
electrical connection	circular connector	M 12x1 (4 pin)									T30						
		M 12x1 (8 pin - required for switching module)									T31						
	cable gland	M16x1.5	· polyamide black									T20					
			· brass nickel-plated									T21					
			· stainless steel									T22					
process connection	sensor type piezoresistiv	· diaphragm female				· G 1/2 B per DIN EN 837-1					K1010						
		· diaphragm flush-mounted				· G 1/2 B with O-Ring from EPDM					K1110						
						· G 1/2 A per DIN 3852					K1150						
	sensor type thin film	· diaphragm female				· G 1/4 B per DIN EN 837-1					K1002						
						· G 1/2 B per DIN EN 837-1					K1010						
						· 1/2" NPT					K1070						
						· 1/4" NPT					K1072						
order code (example):										CV3100	A1051	F10	H1100	M2	N10	T20	K1010

additional features (to be indicated in case of need, only)

explosion protection ²	· Ex II 2G Ex ia IIC T4/T5/T6 Gb, Ex II 2D Ex ia IIIC T xx °C Db	S68
	· Ex II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb	S66
Degree of protection	· IP 69K	T4
PROFIBUS PA	· BUS address, factory setting 0...126, standard, pls specify	Z61
	· measuring-point number/identification max. 32 characters, pls. specify	Z62
	· measuring-point text max. 32 characters, pls. specify	Z63
certificates		
material certificate as per DIN EN 10204-3.1, wetted parts ⁴		W1020
inspection certificate as per DIN EN 10204- 3.1, calibration certificate with 5 measuring points		W1201
functional safety as per EN 61508, classification per SIL 2 ³		W2602

accessories

HART Modem	· RS 232-Interface	MC1020
	· USB-Interface	MC1040
	· USB-Interface, Ex	MC1041
stainless steel welded socket G 1/2"		MC1000-A1

¹ parameterization see page 5, ² Ex-design not possible with switching module, ³ not with PROFIBUS PA, ⁴ only for piezoresistive measuring systems