



#### Application area

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

#### Features

- Pressure transmitter for level measurement of atmospheric vessels
- Suitable for measurement of
  - Level
  - Tank capacity (volume and weight)
  - Pressure
- Display continuously rotatable and illuminated
- Intuitive operator guidance focusing on level measurement settings. Calculation and scaling performed by transmitter
- Easy teach-in function for different tank shapes
- Comprehensive parameterisation, simulation and diagnostic functions
- Level wizard for easy and intuitive parameterisation
- Measuring range 20 mbar to 16 bar
- Accuracy 0.1 %
- Output signal 4...20 mA with HART® - protocol
- Configuration memory
- Sturdy stainless steel case, degree of protection IP 65/67
- Medium temperature up to 200 °C
- Various metallic diaphragm seals and coatings
- Approved according to NAMUR NE95

#### Options

- Approvals/Certificates
  - Explosion protection for gases and dust
  - Certificate of measuring equipment for Russian Federation
  - Calibration certificate per DIN EN 10204
  - Classification per SIL2
- Active temperature compensation (ATC technology)
- Removable display and control unit
- Degree of protection IP 69K
- Front cover of stainless steel with window of non splintering glass
- Customised solutions

#### Application

The level transmitter PASCAL Ci4 LEVEL is suitable for the measurement of level, tank capacity and pressure of atmospheric vessels.

## Technical data

### Measuring range

Up to a turndown of 100:1 the measuring span can be freely selected

Nominal range	Measuring range	Measuring span *		Overload capacity		Static pressure, both sides
		min. span	max. span	Oc + side	Oc - side	
0.25 bar rel.	-0.25...0.25 bar rel.	0.02 bar	0.5 bar	10 bar rel.	5 bar	75 bar
1 bar rel.	-1...1 bar rel.	0.02 bar	2 bar	20 bar rel.	10 bar	75 bar
4 bar rel.	-1...4 bar rel.	0.04 bar	5 bar	50 bar rel.	25 bar	75 bar
16 bar rel.	-1...16 bar rel.	0.16 bar	17 bar	50 bar rel.	25 bar	75 bar

\* Recommended min. span: 0.02 bar

### Constructional design / case

Design:	Two-chamber case, continuously rotatable by $\pm 170^\circ$
Material front cover:	<ul style="list-style-type: none"> <li>■ Polypropylene, black</li> <li>■ Stainless steel mat.no. 1.4305 (303)</li> <li>■ Stainless steel mat.no. 1.4404 (316L)</li> </ul>
Gaskets:	Silicone / NBR
Degree of protection:	<ul style="list-style-type: none"> <li>■ IP 65 / IP 67 per EN 60529</li> <li>■ IP 69K</li> </ul>
Climatic category:	EN 60721 3-4, 4K4H
Vibration resistance:	per EN 61298-3 10...60 Hz: $\pm 0.35$ mm 60...1000 Hz: 5 g
Material window:	<ul style="list-style-type: none"> <li>■ Macrolon</li> <li>■ Non splintering glass (requires front cover of stainless steel)</li> </ul>
Elec. connection:	<ul style="list-style-type: none"> <li>■ Circular connector M12</li> <li>■ Cable gland M16x1.5, PA black</li> <li>■ Cable gland M16x1.5, stainless steel</li> <li>■ Cable gland M20x1.5, PA black</li> <li>■ Cable gland M20x1.5, stainless steel</li> <li>■ 1/2" NPT, PA black</li> </ul> <p>Further connections upon request</p>
Terminal blocks:	<ul style="list-style-type: none"> <li>■ Spring clamp terminals up to 1.5 mm<sup>2</sup></li> <li>■ Pole terminals up to 2.5 mm<sup>2</sup></li> <li>■ Screwed terminals up to 2.5 mm<sup>2</sup></li> </ul>
Weight:	approx. 1.4 kg (without diaphragm seal)
Type plate:	Laser marking

### Process connection

Design: See order details

### Material wetted parts

Material: See order details

### Hygienic design

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

Diaphragm foil:	Ra $\leq 0.4$ $\mu\text{m}$
Laser welds:	Ra $\leq 0.8$ $\mu\text{m}$
Turned parts:	Ra $\leq 0.8$ $\mu\text{m}$

Further versions of hygienic design upon request.

### Measuring system

Pressure transmission fluid	■ Synthetic oil, free of silicone FD1
	■ Vacuum and High-temperature oil FV3H
	■ Low-temperature oil FM5
	■ Halocarbon oil FC

Negative pressure and vacuum applications have to be specified separately.

Temperature limits refer to „General Technical Advices“ TA\_038 Pressure transmission fluids.

### Accuracy

Reference cond.:	Per DIN EN 60770-1 T <sub>U</sub> = const. (15...25) °C $\phi$ = const. (45...75) % r.F. p <sub>U</sub> = const. (860...1060) mbar U <sub>B</sub> = 24 V DC ( $\pm 3$ V DC) R <sub>B</sub> = 50 $\Omega$ , HART: 250 $\Omega$ Ground connected MBA = 0 bar
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Calibration position: Vertical mounting

Deviation of characteristic: Refer to the adjusted measuring span (Limit point method per DIN 16086)

#### Nominal range 1-16 bar

Turndown 5:1	0.1 %
Turndown > 5:1	0.02 % x TD

#### Nominal range 0.25 bar

Turndown 5:1	0.15 %
Turndown > 5:1	0.03 % x TD

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

Operational availability < 12 s

Response time  $t_{90}$  at current output  
 for 20 Hz measuring rate: typically 120 ms  
 for 100 Hz measuring rate: typically 50 ms

Temperature influence, case:  
 Refer to nominal range  
**Ambient temperature -20...80 °C:**

Nominal range 1-400 bar	0.1 % /10K, max. 0.3 %
Nominal range 0.25 bar	0.15 % /10K, max. 0.4 %

**Ambient temperature -40...-20 °C:**  
 Typical 0.2 % /10K

Temperature - influence process-connection:

Depending on design

Nominal width	Standard [mbar/10K]	Temperature compensated* [mbar/10K]
DN 25/1"	4.8	1.0
DN 32/1 1/2"	2.3	0.7
DN 40	1.6	0.6
DN 50/2"	0.6	0.3

\* Active compensation of process temperatures (ATC-Technology, see General Technical Advices TA\_041)

Zero point errors are reduced significantly if process temperatures are monitored.

Influence static pressure: Refer to nominal range

0.25 bar	0.12 % x stat. pressure [bar] x TD
1 bar	0.03 % x stat. pressure [bar] x TD
4 bar	0.02 % x stat. pressure [bar] x TD
16 bar	0.005 % x stat. pressure [bar] x TD

### Indication

Display:

- High-resolution graphic display with backlight
- 4-button operation
- Freely configurable display modes
- continuously rotatable by  $\pm 170^\circ$  (detent every  $90^\circ$ )
- Optional: Remote display and control unit, can be used up to 10 m away from measuring point

Configuration memory

- All parameterisation data can be copied from the devices into the configuration memory in the display module. The data is permanently stored there.

- The parameters can be transferred simply and quickly to other devices.
- The data continues to be stored even in the event of power failure.

### 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: Adjustable:

- Linear
- Tank shape table with up to 64 support points

Turndown: Max. 100:1

Damping: 0...999.9 s selectable in steps of 0.1 s

Measuring rate: 20 Hz, switchable to 100 Hz

Resolution: 1  $\mu$ A

Current sensing func.: 3.55...21.5 mA selectable in steps of 0.001 mA

Load  $R_B$ :  $R_B \leq (U_V - 12V \text{ DC}) / 0.022 \text{ A [Ohm]}$   
 $U_V$  = supply voltage

### Supply voltage

Functional range: 12...30 V DC

Ripple:  $\pm 5\%$

### Temperature ranges

Ambient: -40...80 °C  
 (Display visibility is limited at temperatures below -30 °C)

Media: -20...160 °C  
 With temperature decoupler up to 200 °C  
 Vacuum application see „General Technical Advices TA\_038 Pressure transmission fluids“

Storage: -40...80 °C

## Tests and certificates

### Ex approvals

ATEX: TÜV 13 ATEX 120264 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 13.0018X  
Ex ia IIC TX Ga/Gb  
Ex ia IIIC Txx°C Da/Db  
Ex ia IIC TX Gb  
Ex ia IIIC Txx°C Db

EMC: Per DIN EN 61326-1, NAMUR NE21

SIL 2: Classification per SIL2,  
TÜV-Reg.-Nr. 44 799 13190201

- Certificate of measuring equipment for Russian Federation

For more detailed information see Ex Safety Instruction  
XA\_010

# Parameterisation, simulation and adjustment

## Parameterisation

Parameter	Values	Default setting
<b>Device</b>		
device ID	16 digits, freely selectable	LABOM PASCAL Ci4
measuring rate	20 Hz, 100 Hz	20 Hz
damping	0.0...999.9 s	0.0 s
<b>Display and control unit</b>		
filling height unit	mm, cm, m, ft, in, yd	m
volume unit	l, hl, m <sup>3</sup> , in <sup>3</sup> , ft <sup>3</sup> , yd <sup>3</sup> , gal	l
weight unit	g, kg, t, lb	kg
density unit	g/cm <sup>3</sup> , kg/cm <sup>3</sup> , t/m <sup>3</sup> , kg/l, lb/in <sup>3</sup> , lb/ft <sup>3</sup>	g/cm <sup>3</sup>
pressure unit	mbar, bar, Pa, hPa, kPa, MPa, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , psi, atm, torr, mmH <sub>2</sub> O, mH <sub>2</sub> O, inH <sub>2</sub> O, ftH <sub>2</sub> O, mmHg, inHg	bar
temperature unit	°C, °F, °R, K	°C
lighting	on, off	on
language	german, english, chinese	german
decimal point	auto, x.xxxx, xx.xxx, xxx.xx, xxxx.x, xxxxx	auto
display mode	level 4 values, level 2 values, five values, four values, three values, two values, big display	level 4 value
main value	fill height, fill volume, fill weight, pressure, current in mA, measured value in %	fill height
secondary values	fill height, fill volume, fill weight, pressure, current in mA, measured value in % (temperature), device ID, HART-TAG, HART descriptor	measured value in %, current in mA, device ID
<b>Level</b>		
density	0.1...20 g/cm <sup>3</sup> or according to unit	1 g/cm <sup>3</sup>
offset height	depending on unit (5 points in total: meter +- 99.999)	0 m
<b>Current output</b>		
measured value	height, volume, weight, pressure	height
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 (mounting position)	on, off	off
<b>Maintenance counter</b>		
maintenance interval	0...9999 days	0 days
status	on, off	off
<b>HART data</b>		
HART address	0...63	0
number of response preambels	5...20	5
current mode	proportional, constant	proportional

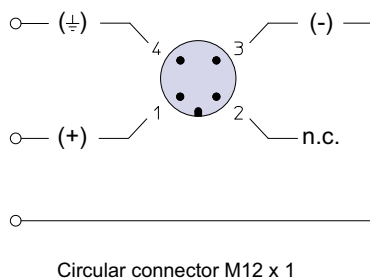
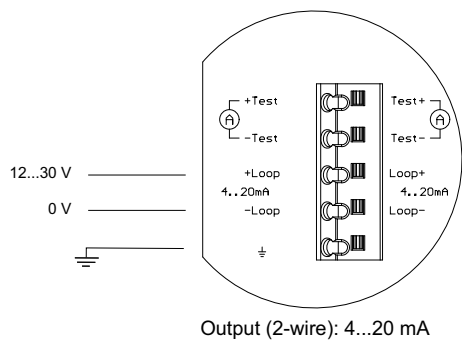
## Diagnostic functions

Self- diagnosis	Description	Value range
RAM-Test	Permanent check of the read/write memory	/
ROM-Test	Permanent check of the checksum via the program memory	/
Bridge circuit test	Permanent check of the bridge circuit	/
CRC parameterisation test	Permanent check of the checksum via the parameter memory	/
Electronics temperature monitoring	Permanent check of the electronics temperature	/
<b>Process diagnostics</b>		
Maintenance timer	Check of the maintenance cycles	/
Operating hours counter	Capture of operating hours	/
Trailing pointer	Check of minimum and maximum process pressure and sensor temperature	/
<b>Measuring circuit diagnostics</b>		
Height, volume, weight, current, pressure	By using the simulation function each measured value can be simulated manually	

## Adjustment

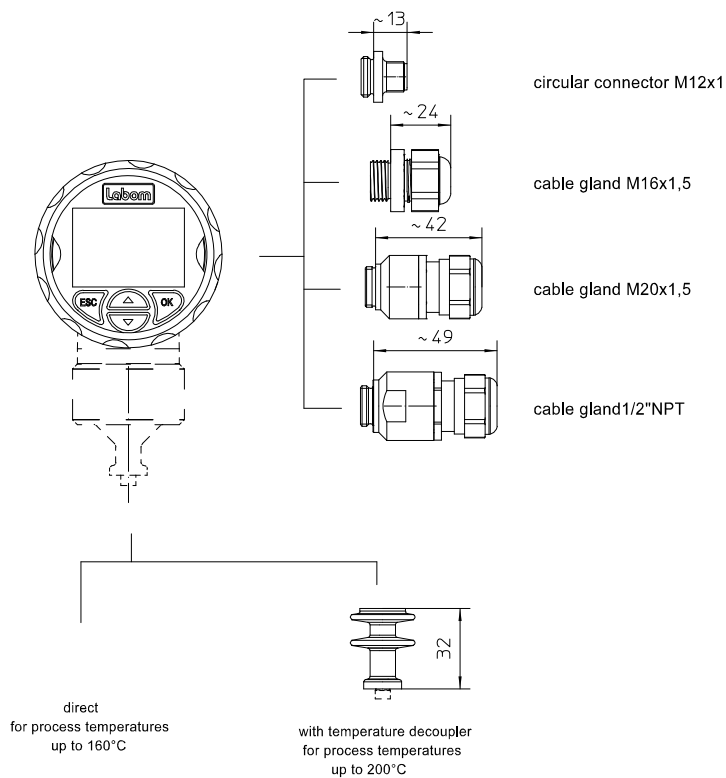
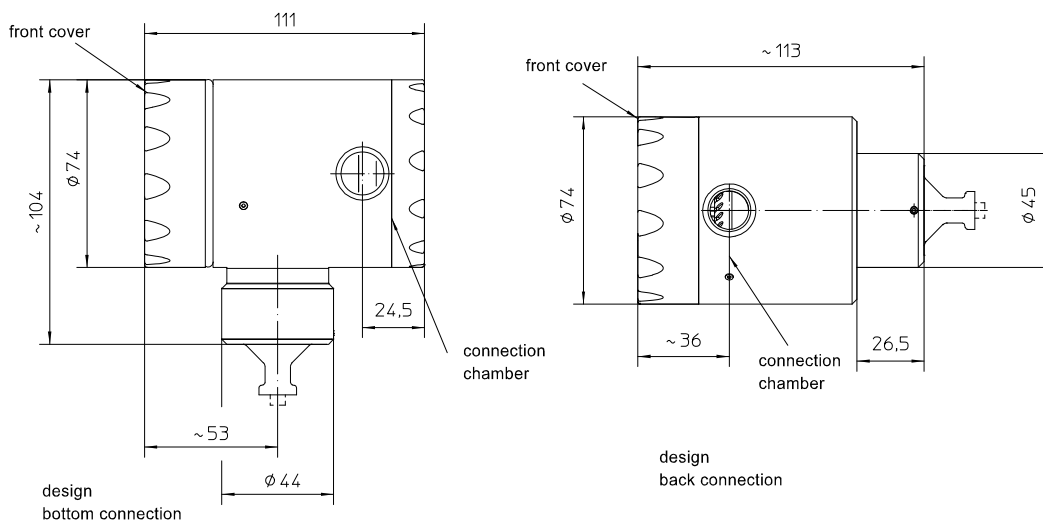
Type	Description
zero point correction	adjusts reading to zero at ambient pressure
position correction	adjusts reading of mounted instrument to zero at ambient pressure
lower adjustment	adjusts reading to applied pressure (affects zero point + span)
upper adjustment	adjusts reading to applied pressure (affects span only)
current adjustment	adjusts current output to achieve 4 resp. 20 mA at the end of the measurement chain

## Connection diagram



## Dimensions

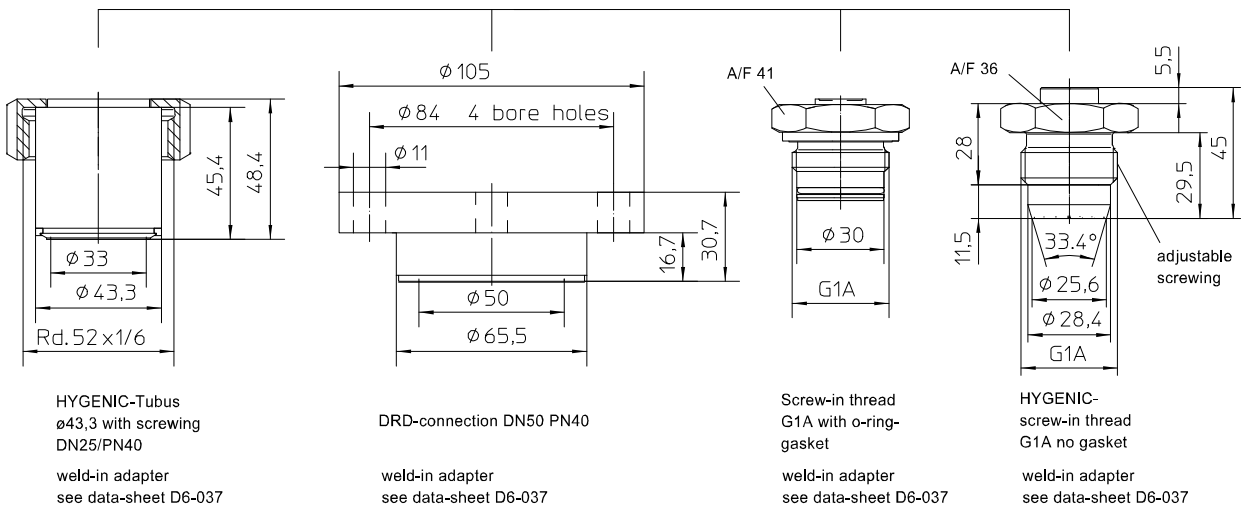
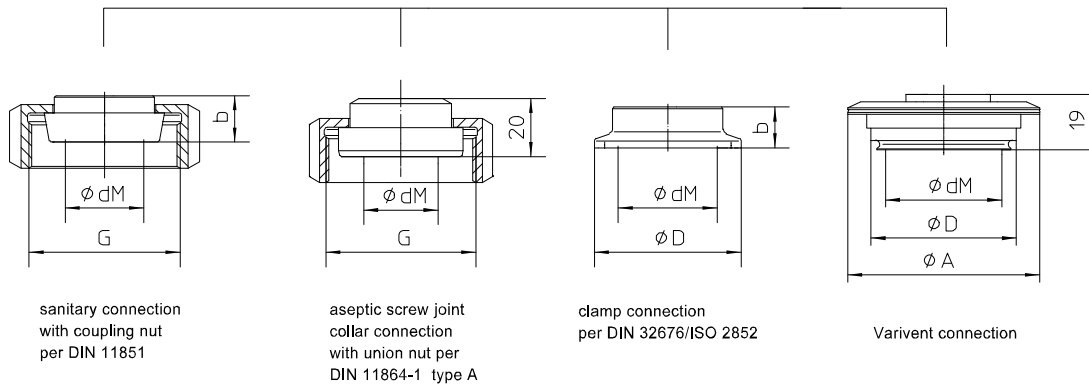
### Case



All dimensions are in millimeter

## 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 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	50.5
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
1"	25	22.6	14	50.5
1 1/2"	25	34	12	50.5
2"	16	46	14	64

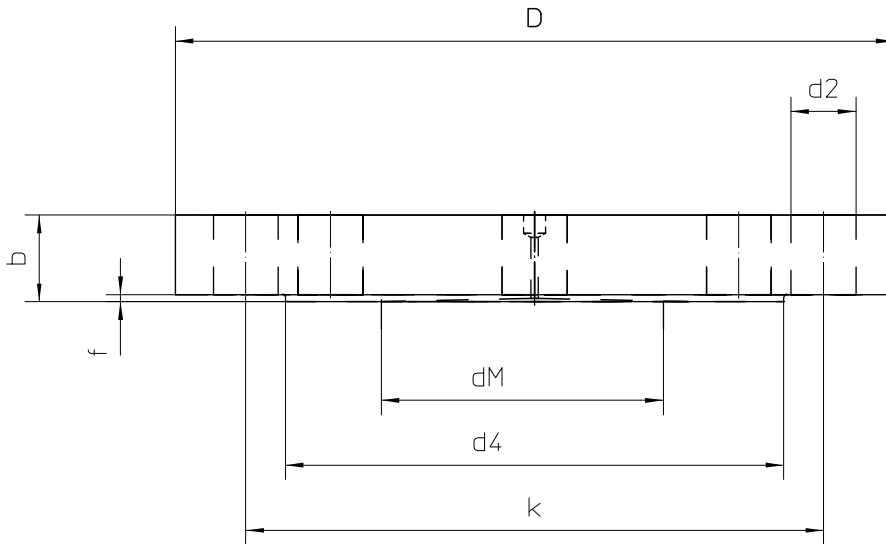
### Clamp connection per ISO 2852 for pipes per ISO 2037

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

## Process connection flange



dimensions (mm) EN 1092-1									
DN	PN	D	dM	d4	k	d2	bores	b	f
50	10/40	165	51	102	125	18	4	20	2
80	10/40	200	86	138	160	18	8	24	2

dimensions (mm) ASME									
DN	PN psi	D	dM	d4	k	d2	bores	b	f
2"	150	150	51	92	120,7	19	4	19,5	2
3"	150	190	86	127	152,4	19	4	24,3	2



## Order details

### Level transmitter PASCAL Ci4 LEVEL for atmospheric vessels, Type series CI4200

#### Order details PASCAL Ci4 LEVEL CI4200

Level transmitter PASCAL Ci4 LEVEL for atmospheric vessels

<b>CI4200</b>	design with process connection bottom			
<b>CI4203</b>	design with process connection back			
<b>A1078</b>	nominal range	0.25 bar		
<b>A1053</b>		1 bar		
<b>A1056</b>		4 bar		
<b>A1059</b>		16 bar		
<b>F1</b>	parameterisation	factory settings (standard)		
<b>F2</b>		as per customer's specification (pls. specify)		
<b>H21</b>	output signal	4...20 mA, with HART-protocol		
<b>Y1.</b>	material case	stainless steel mat.-no. 1.4301/1.4305 (304)/(303)		
<b>Y2.</b>		stainless steel mat.-no. 1.4404 (316L)		
<b>1</b>	material front cover	polypropylene (black), window Macrolon		
<b>2</b>		stainless steel, window non splintering glass		
<b>3</b>		stainless steel, closed, without window		
<b>T20.</b>	electrical connections	cable glands	M16 x 1.5 PA for cable Ø 4.5-10 mm	
<b>T22.</b>			M16 x 1.5 stainless steel mat.-no.1.4404 (316L) for cable Ø 5-9.5 mm	
<b>T15.</b>			M20 x 1.5 PA for cable Ø 7-13 mm	
<b>T17.</b>			M16 x 1.5 stainless steel mat.-no 1.4404 (316L) for cable Ø 8-13 mm	
<b>T27.</b>			1/2" NPT PA for cable Ø 6-12 mm	
<b>0</b>		cable clamps	spring clamp terminals up to 1.5 mm <sup>2</sup>	
<b>5</b>			pole terminals up to 2.5 mm <sup>2</sup>	
<b>6</b>			screwed terminals up to 2.5 mm <sup>2</sup>	
<b>T30</b>		circular connector M12 x 1 (4-pin)		
<b>K1085</b>		design	standard	
<b>K2085</b>	with temperature decoupler			
<b>K102</b>	process connection	sanitary pipe connection with union nut per DIN 11851	DN 25	
<b>K103</b>			DN 32	
<b>K104</b>			DN 40	
<b>K105</b>			DN 50	
<b>K162</b>			aseptic screw joint collar connection with union nut per DIN 11864-1 type A	DN 25
<b>K163</b>		DN 32		
<b>K165</b>		DN 40		
<b>K166</b>		DN 50		
<b>K124</b>		clamp connection per ISO 2852 for pipes per ISO 2037	DN 25 (1")	
<b>K126</b>			DN 38 (1 1/2")	
<b>K127</b>			DN 51 (2")	
<b>K144</b>		clamp connection per DIN 32676, model A (metric) for pipes per DIN 11850	DN 25	
<b>K146</b>			DN 32	
<b>K147</b>			DN 40	
<b>K148</b>			DN 50	
<b>K213</b>			clamp connection per DIN 32676, model B (OD, ISO) for pipes per EN ISO 1127	DN 26.9
<b>K214</b>		DN 33.7		
<b>K215</b>		DN 42.4		
<b>K216</b>		DN 48.3		
<b>K136</b>		clamp connection per DIN 32676, model C (Tri-Clamp) for pipes per ASME BPE	DN 1"	
<b>K137</b>			DN 1 1/2"	
<b>K138</b>			DN 2"	
<b>K152</b>		Varivent	D= 50 for Varivent DN 25 and 1"	
<b>K153</b>			D= 68 for Varivent DN 40...125 and 1 1/2"...6"	
<b>K172</b>		HYGIENIC Tubus	Ø 43.3 mm with screwing DN 25/PN 40	
<b>K185</b>		DRD connection	nominal width DN 50 / nominal pressure PN 40	
<b>K195</b>		screw-in thread	G 1 A with O-ring seal	
<b>K80</b>			G 1 A with hygienic process connection (elastomerfree)	

K313	process connection	flange EN 1092-1, type B1	DN 50 / PN 10/40	extension length 0 mm
K313.1				extension length 50 mm
K313.2				extension length 190 mm
K315			DN 80 / PN 10/40	extension length 0 mm
K315.1				extension length 50 mm
K315.2				extension length 100 mm
K323		flange EN 1092-1, type B2 (necessary if special material is required)	DN 50 / PN 10/40	extension length 0 mm
K323.1				extension length 50 mm
K323.2				extension length 100 mm
K325			DN 80 / PN 10/40	extension length 0 mm
K325.1				extension length 50 mm
K325.2				extension length 100 mm
K413		flange ASME B16.5 RF 125-250 AA	DN 2" / PN 150 psi	extension length 0 mm
K413.1				extension length 50 mm
K413.2				extension length 100 mm
K415			DN 3" / PN 150 psi	extension length 0 mm
K415.1				extension length 50 mm
K415.2				extension length 100 mm
K423		flange ASME B16.5, RFSF (necessary if special material is required)	DN 2" / PN 150 psi	extension length 0 mm
K423.1				extension length 50 mm
K423.2	extension length 100 mm			
K425	DN 3" / PN 150 psi		extension length 0 mm	
K425.1			extension length 50 mm	
K425.2			extension length 100 mm	
further process connections upon request				
material wetted parts		stainless steel mat.no. 1.4404 / 1.4435 (316 L) (standard)		
		Hastelloy C 276 <sup>1</sup>		
		tantalum <sup>1</sup>		
		316 L with PTFE coating, vacuum-resistant, max. temperature 260 °C <sup>1</sup>		
system filling		synthetic oil, free of silicone FD1 (standard)		
		Vacuum and high temperature oil FV3H		
		Low temperature oil FM5		
		Halocarbone oil FC		

Additional features (to be indicated in case of need, only):			
S66	Ex marking <sup>2</sup>	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° Da/Db, Db
X1	vacuum application	negative pressure service	Temperature limits refer to "General Technical Advices" TA_038 Pressure transmission fluids
X2		vacuum service	
X3	active temperature compensation (ATC) <sup>3</sup>		
HY	surface roughness	hygienic design	
T4	case degree of protection	IP 69K <sup>2</sup>	
M1	display	without display	
W4035	electropolishing	wetted parts	
W1020	material certificate	per EN 10204-3.1, wetted parts	
W1201	calibration certificate	per EN 10204-3.1, 5 measuring points	
W2602	functional safety per IEC/EN 61508, classification per SIL2, TÜV-reg.-no. 44 799 13190201		
W2673	certificate of measuring equipment for Russian Federation <sup>4</sup>		

Accessories		
<b>MC1140</b>	PASCAL Ci4 mounting kit for remote display and control unit including wall bracket	
	material stainless steel, incl. front ring with seal and blind cap with circular connector M12x1	
<b>A1.</b>	connection cable	length: 10 m, material: PUR, with circular connector M12 x1
<b>1</b>	internal cable clamps	spring clamp terminals up to 1.5 mm <sup>2</sup>
<b>2</b>		pole terminals up to 2.5 mm <sup>2</sup>
<b>3</b>		screwed terminals up to 2.5 mm <sup>2</sup>
<b>T1</b>	case degree of protection	IP 65 / IP 67 (standard)
<b>MZ8120-A11</b>	mounting set for wall bracket	2 mounting brackets for pipe and frame mounting Ø 30-50 mm, incl. nuts and washers
<b>MZ8120-A12</b>		2 mounting brackets for pipe and frame mounting Ø 40-64 mm, incl. nuts and washers
<b>MC1020</b>	HART-Modem	RS 232 -interface
<b>MC1040</b>		USB-interface
<b>MC1041</b>		USB-interface, Ex

**Order code (example): CI4203 – A1053 – F1 – Y11 – T220 – K1085 – K185 – G1 – L22 - ...**

<sup>1</sup> available for flange design process connection only, other process connections made of special material on request

<sup>2</sup> requires front cover of stainless steel (order code: Y12)

<sup>3</sup> not for devices with temperature decoupler

<sup>4</sup> not for devices with Ex-protection