Level transmitter PASCAL Ci4 LEVEL,
for pressurised vessels,Type series CI4400

Application area

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

Features

- Differential pressure transmitter for level measurement of atmospheric and pressurised 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 100 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 – 90 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
- 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 in atmospheric and pressurised vessels. The transmitter is suitable for pressure measurement of aggressive, corrosive, viscous, high-temperature or solidifying media.

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.	0.01 bar	0.5 bar	10 bar rel.	5 bar	75 bar
1 bar rel.	-1…1 bar rel.	0.01 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: 0.100 bar

Constructional design / case

Design: Two-chamber case, continuously rotatable by ± 170°

Material case:
- Stainless steel mat.-no. 1.4301 (304) Case surface blasted
- Stainless steel mat.-no. 1.4404 (316L)

Material front cover:
- Polypropylene, black
- Stainless steel mat.no. 1.4305 (303)
- Stainless steel mat.no. 1.4404 (316L)

Gaskets: Silicone / NBR

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

Climatic category: EN 60721 3-4, 4K4H

Vibration resistance: per EN 61298-3
10…60 Hz: ± 0.35 mm
60…1000 Hz: 5 g

Material window:
- Macrolon
- Non splintering glass (requires front cover of stainless steel)

Elec. connection:
- Circular connector M12
- Cable gland M16x1.5, PA black
- Cable gland M16x1.5, stainless steel
- Cable gland M20x1.5, PA black
- Cable gland M20x1.5, stainless steel
- 1/2" NPT, PA black

Further connections upon request

Terminal blocks:
- Spring clamp terminals up to 1.5 mm^2
- Pole terminals up to 2.5 mm^2
- Screwed terminals up to 2.5 mm^2

Weight: approx. 1.4 kg (without diaphragm seal)

Type plate: Laser marking

Process connection

Plus side: Diaphragm seal technology
See order code

Minus side: Process flange with connection dimension per EN 61518
See order code

Material wetted parts

Plus side: See order code

Minus side: Stainless steel mat. no. 1.4404/1.4435 (316L)

Measuring system

System filling: Synthetic oil, free of silicon FD1, FDA listed, class USDA-H1

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_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
MBA = 0 bar

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
≤ 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 diaphragm seal connection:
Depending on design

Nominal width	Tubus	Zero point error (mbar/10 K)
DN 50 / 2“	without	1.5
	with	2.6
DN 80 / 3“	without	0.2
	with	0.6

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 ± 170 (detent every 90°)
- 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.

Supply voltage

Functional range: 12…30 V DC

Ripple: ± 5 %

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 µA

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

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

Temperature ranges

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

Medium: -90…200 °C *

Storage: -40…80 °C

* Depending on pressure transmission fluid. Further media temperatures upon request.

Tests and certificates

Ex approvals

ATEX: TÜV 13 ATEX 120264 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 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

For more detailed information see Ex Safety Instruction XA_010

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

Parameterisation, simulation and adjustment

Parameterisation

Parameter	Values	Default setting
Device		
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
Display and control unit		
filling height unit	mm, cm, m, ft, in, yd	m
volume unit	l, hl, m^3, in^3, ft^3, yd^3, gal	l
weight unit	g, kg, t, lb	kg
density unit	g/cm^3, kg/cm^3, t/m^3, kg/l, lb/in^3, lb/ft^3	g/cm³
pressure unit	mbar, bar, Pa, hPa, kPa, MPa, g/cm^2, kg/cm^2, psi, atm, torr, mmH_2O, mH_2O, inH_2O, ftH_2O, 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
Level		
density	0.1...20 g/cm^3 or according to unit	1 g/cm^3
offset height	depending on unit (5 points in total: meter +- 99.999)	0 m
Current output		
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
Maintenance counter		
maintenance interval	0…9999 days	0 days
status	on, off	off
HART data		
HART address	0...63	0
number of response preambels	5...20	5
current mode	proportional, constant	proportional

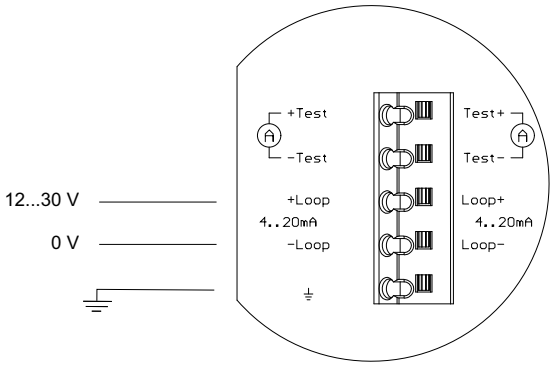
Diagnostic functions

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	/
Process diagnostics		
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	/
Measuring circuit diagnostics		
Height, volume, weight, current, pressure	By using the simulation function each measured value can be simulated manually	

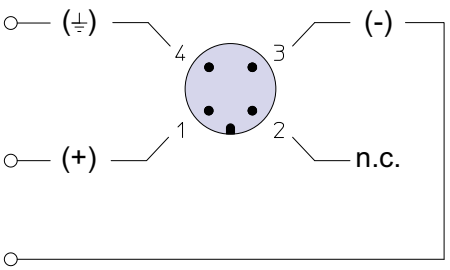
Adjustment

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



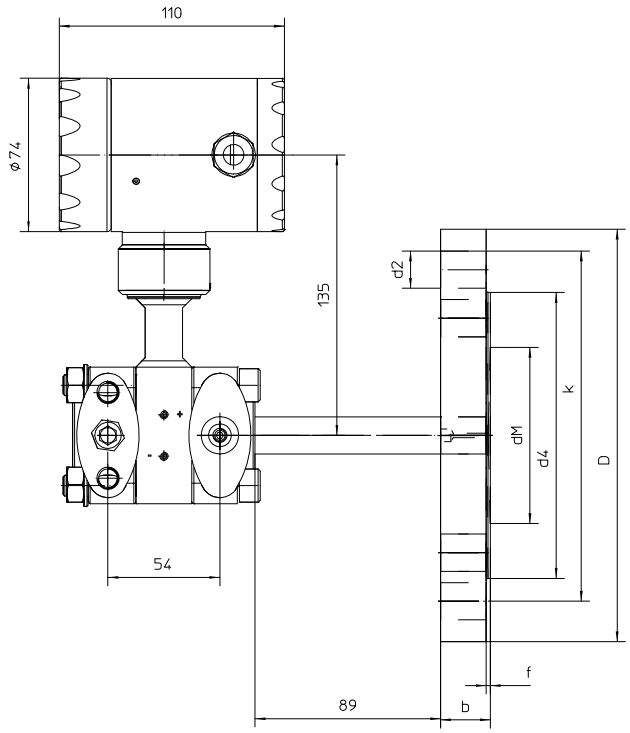
Output (2-wire): 4...20 mA

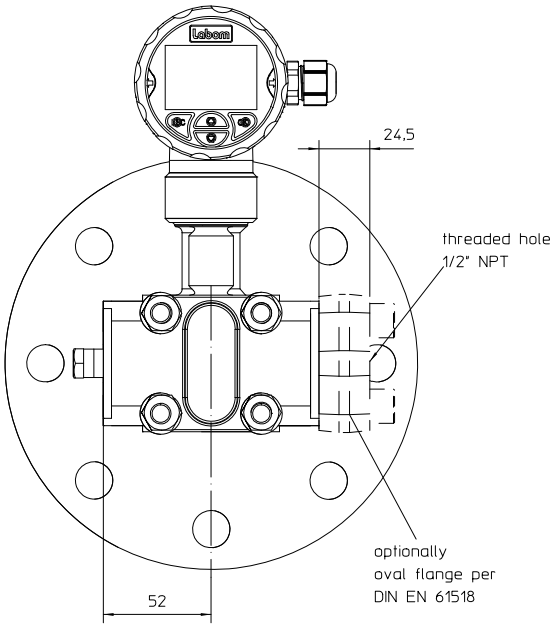


Circular connector M12 x 1

Dimensions

Case and process connection



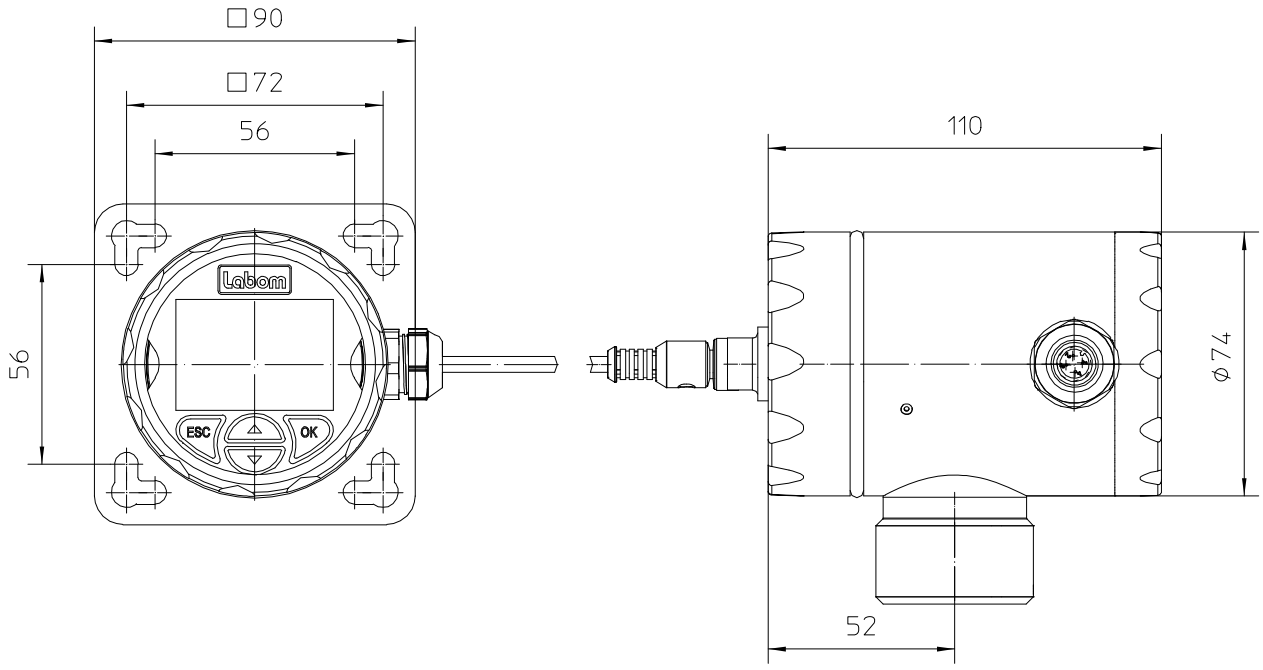


All dimensions are in mm

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

Remote display and control unit (Type series MC1140)



All dimensions are in mm

Order details

Level transmitter PASCAL Ci4 LEVEL for pressurised vessels, Type series CI4400

Order code PASCAL Ci4 CI4400				
CI4400	Level transmitter PASCAL Ci4 LEVEL for pressurised vessels, Type series CI4400			
A1078	nominal range	0.25 bar		
A1053		1 bar		
A1056		4 bar		
A1059		16 bar		
F1	parameterisation	factory settings (standard)		
F2		as per customer's specification (pls. specify)		
H21	output signal	4…20 mA, with HART-Protokoll		
Y1.	material case	stainless steel mat.-no. 1.4301/1.4305 (304)/(303)		
Y2.		stainless steel mat.-no. 1.4404 (316L)		
1	material front cover	polypropylene (black), window Macrolon		
2		stainless steel, window non splintering glass		
3		stainless steel, closed, without window		
T20.	electrical connection	cable glands	M16 x 1.5 PA for cable Ø 4.5-10 mm	
T22.			M16 x 1.5 stainless steel mat.-no. 1.4404 (316L) for cable Ø 5-9.5 mm	
T15.			M20 x 1.5 PA for cable Ø 7-13 mm	
T17.			M16 x 1.5 stainless steel mat.-no. 1.4404 (316L) for cable Ø 8-13 mm	
T27.			1/2" NPT PA for cable Ø 6-12 mm	
0		cable clamps	spring clamp terminals up to 1.5 mm^2	
5			pole terminals up to 2.5 mm^2	
6			screwed terminals up to 2.5 mm^2	
T30		circular connector M12 x 1 (4 pin)		
	process connection plus side (diaphragm seal) via 90 mm distance tube			
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 100 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 (plus sided)	1.4404 / 1.4435 (316 L) (standard)		
G2		Hastelloy C 276 [1]		
G3		Tantal [1]		
G62		316 L with PTFE coating, vacuum-resistant, max. temperature 260 °C [1]		
	system filling	synthetic oil, free of silicone FD1 (standard)		
L31		vacuum and high temperature oil FV3H		
L10		low temperature oil FM5		
L30		halocarbone oil FC		

	process connection minus side	
K41..	process flange with oval flange adapter	process flange of stainless steel with female thread 1/4 - 18 NPT
1		with sealing plug of stainless steel mat.-no. 1.4571 (316Ti)
2		with vent valve of stainless steel mat.-no. 1.4571 (316Ti)
1		gasket of FKM Viton
G1		diaphragm material stainless steel mat.-no. 1.4404 / 1.4435 (316L)

Additional features (to be indicated in case of need, only):			
S66	Ex marking [1]	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° Da/Db, Db
X1	vacuum application	negative pressure service	temperature limits refer to "General Technical Advices" TA_038 Pressure transmission fluids
X2		vacuum service	
T4	case degree of protection	IP 69K [1]	
M1	display	without display	
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 [2]		

Accessories		
MM1110	Device bracket per DIN 16281, model A, for wall and pipe-mounting, stainless steel mat.-no. 1.4571 (316Ti)	
A10	design	for wall mounting
A11		for pipe diameter 35-50 mm
A12		for pipe diameter 2“ (60.3 mm)
MC1140	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	
A1.	connection cable	length: 10 m, material: PUR, with circular connector M12 x1
1	internal cable clamps	spring clamp terminals up to 1.5 mm^2
2		pole terminals up to 2.5 mm^2
3		screwed terminals up to 2.5 mm^2
T1	case degree of protection	IP 65 / IP 67 (standard)
MZ8120-A11	mounting set for wall bracket	2 mounting brackets for pipe and frame mounting Ø 30-50 mm, incl. nuts and washers
MZ8120-A12		2 mounting brackets for pipe and frame mounting Ø 40-64 mm, incl. nuts and washers
MC1020	HART-Modem	RS 232 -interface
MC1040		USB-interface
MC1041		USB-interface, Ex

Order code (example): CI4400 – A1053 – F1 – H21 – Y12 – T200 – K313 – G1 - …

[1] requires front cover of stainless steel (order code: Y12)
[2] not for devices with Ex-protection