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Level probe with ceramic measuring cell

Type 4391

General application

The level probe Type 4391 is used to measure hydrostatic levels in liquids. It features a capacitive-ceramic sensor. The pressure is converted into an electrical signal.
Advantages of the ceramic measuring system:

- small ranges
- high overload capability (up to 80 times)
- very good long-term stability
- high chemical resistance
- diaphragm highly resistant to mechanical stress (cleaning, abrasive materials)

Type 404391/000...

Type 404391/022

Technical data

Reference conditions
to DIN 16 086 and IEC 770/5.3

Ranges
see Order details

Overload limit

Code	Range	Overload[1]
412	0 — 50 mbar	-0.3/4 bar
414	0 — 100 mbar	-0.3/4 bar
415	0 — 160 mbar	5 bar
451	0 — 0.25 bar	6 bar
452	0 — 0.4 bar	6 bar
453	0 — 0.6 bar	10 bar
454	0 — 1.0 bar	10 bar

[1] in plastic housing: max. 2 bar

Bursting pressure
150 bar for all ranges

Parts in contact with liquid
normally: aluminium oxide Al2O3 (96%)
stainless steel, Mat. Ref. 1.4571
FPM, polyolefine, polyamide,
depending on cable: polyurethane, polyethylene
others on request
with basic type extension 022:
aluminium oxide Al_2O_3 (99.9%) and PTFE

Output
0.5 — 4.5 V burden ≥ 10 kΩ
4 — 20 mA burden ≤(U_B-12 V) / 0.02A

Burden error
< 0.15%

Zero signal deviation
≤0.3% of full scale

Ambient temperature error
within range -20 to +60° C
(compensated temperature range)
zero: < 0.1%/10°C typical,
< 0.3%/10°C max.
span: < 0.1%/10°C typical,
< 0.2%/10°C max.

Deviation from characteristic
≤0.2% of full scale
(limit point setting)

Response time
≤10 msec

Stability per year
≤0.2% of full scale

Supply
12 — 30 VDC (for output 4 — 20 mA)
5 V ±0.5 V DC (for output 0.5 — 4.5 V)
Ripple: the voltage peaks must not go above or below the value specified for the supply voltage.
max. current drawn:
at 5 VDC: 2 mA max.
at 24 V DC: 25 mA max.

Supply voltage error
≤0.01% per V
(nominal supply voltage 24 V DC)
ratiometric with supply 5 V DC (±0.5 V)

Permissible ambient and medium temperature
normally: -20 to +60° C
with basic type extension 022: 0 to +40° C
(instrument must not freeze in medium)

Storage temperature
-20 to +100° C

Electromagnetic compatibility EMC
EN 61 326
interference emission: Class B
immunity to interference: to industrial requirements

Mechanical shock
100 g/1 msec

Mechanical vibration
20 g max. at 15 — 2000 Hz

Protection
with connecting cable
IP68 (up to 40 bar) to EN 60 529
with basic type extension 022:
IP68 (up to 4 bar) to EN 60 529

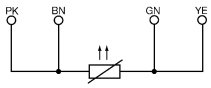
Pressure connection
see Order details;
other connections on request

Electrical connection
6-core screened cable with internal pressure equilibration tubing (core dia. 0.25 mm^2). Minimum bending radius of cable: 120 mm (fixed installation).
Can be used to 250 m depth without additional tension relief.

Nominal position
vertical / hanging on the control cable

Weight
350 gm approx. (without cable)

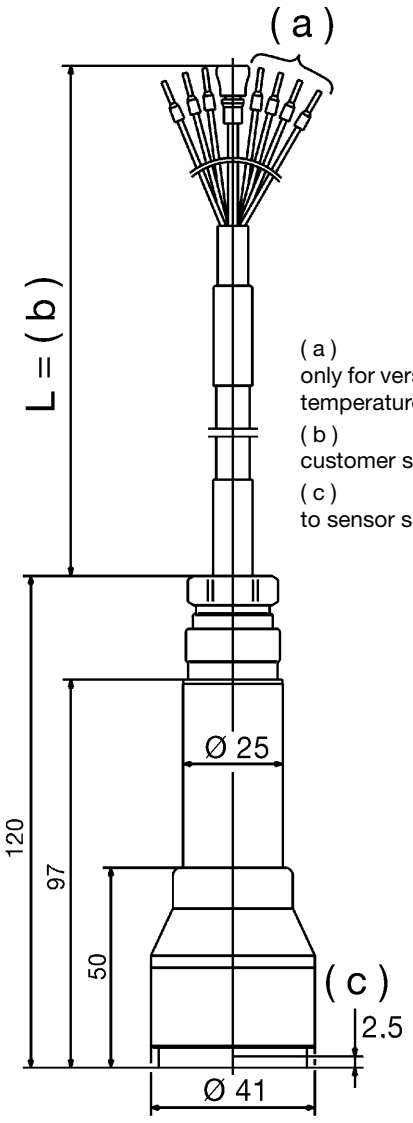
Electrical connection

Connection		Termination / cable
Supply 12 — 30 V DC 5 V DC		+ white - gray
Output 4 — 20 mA 2-wire 4 — 20 mA		+ white - gray proportional current in supply
Output 0.5—4.5V 3-wire ratiometric		+ yellow - gray
Temperature sensor (for 4—20 mA only) 		for version with temperature sensor Pt100 pink (PK), brown (BN) green (GN), yellow (YE)
Screen		black

⚠ Earth instrument! Screen ⏚

Dimensions

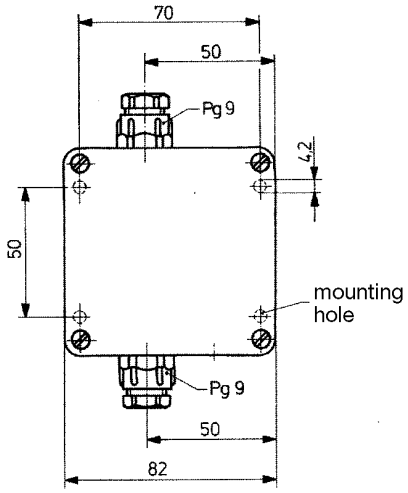
Type 404391/000-... or 404391/007-...

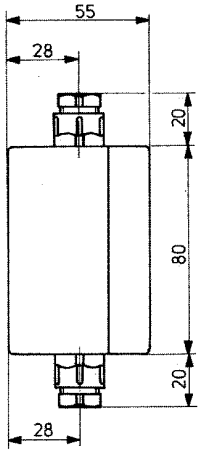


(a)
only for version with Pt100 temperature sensor
(b)
customer specification
(c)
to sensor surface

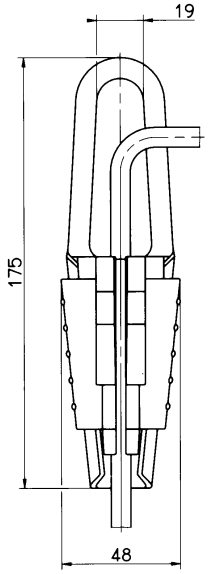
Accessory

Clamping case with pressure equilibration, Part No. 00061206

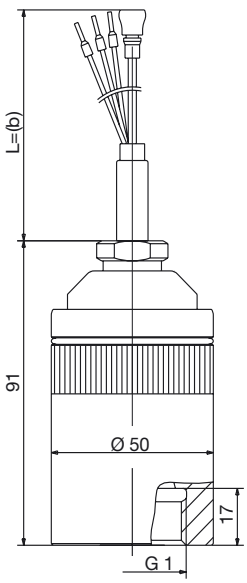




Cable holder Part No. 00061389



Type 404391/022-...



Order details

Basic type

404391 Level probe Type 404391 with capacitive-ceramic sensor

Basic type extensions

/ 000 standard
/ 007 with Pt100 temperature sensor, see Data Sheet 90.6121[1]
/ 022 parts in contact with medium in PTFE and Al_2O_3 99.9%

Input

- 412 0 — 50 mbar gauge pressure
- 414 0 — 100 mbar gauge pressure
- 415 0 — 160 mbar gauge pressure
- 451 0 — 0.25 bar gauge pressure
- 452 0 — 0.4 bar gauge pressure
- 453 0 — 0.6 bar gauge pressure
- 454 0 — 1.0 bar gauge pressure

999 special range

Output

- 405 4 — 20 mA
- 412 0.5 — 4.5 V

Process connection

- 658 connection closed at bottom
- 659 connection open at bottom
- 568 pressure connection G1 internal [2]

Electrical connection

- 13 PE cable, suitable for use in water, (drinking water, lake water, waste water and similar)
- 14 PUR cable, suitable fo use in oil and water, with excellent mechanical characteristics and enhanced UV and ozone resistance[4]
- 15 PE-LD standard cable (normally) suitable for use in water, (drinking water, lake water, waste water and similar)

Cable length[3]

- 001 001 m
- 002 002 m
- " . . . m
- 100 100 m

404391 / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] **Order code**

[1] only possible for basic type extensions: standard and output 4 to 20 mA

[2] only for basic type extension 022

[3] from 5 meters, cable length only in 5m steps (e.g. 30m, 55m, 125m)

[4] not in conjunction with basic type extension /022