CPC-C-35

- capacitive level meters
- for continuous level measurement of liquids or bulk-solid materials
- wide spectrum of use, direct mounting into tanks, vessels, sumps or silos and hoppers
- setting using a magnetic pen without the need for complete emptying of the tank
- possibility of linear measurement even in non-conductive or variously shaped vessels
- optical indication of function and status of level meter by two LEDs
- wide selection of electrical connection: connector or cable glands
- housing, electrodes and reference tubes made from stainless steel
- variants with coated electrode for aggressive or electrically conductive media

CE

The capacitive level meters **CPC-C-35** are intended for continuous level measurement of liquid and bulk solids in tanks, vessels, sumps or silos, hoppers etc. They are comprised of a housing with electronic module and measuring electrodes. The electronic part converts the size of the capacity to the current signal (4...20 mA) or voltage signal (0...10 V). Level meters are made in several modifications of measuring electrodes (rod and rope). The electrodes can be covered by an insulating coating in case level measurement of adhesive, aggressive or electrically conductive media. Rod electrodes are also available in a version with reference (coaxial) tube for level measurement of liquids in tanks made from non-conductive material.

Level meters are produced in the following performances:
N: fnormal,
NT: high temperature.

CPC-C-35 are o ered in variants with various types of process connection (metric and pipe thread, pressure thread NPT).

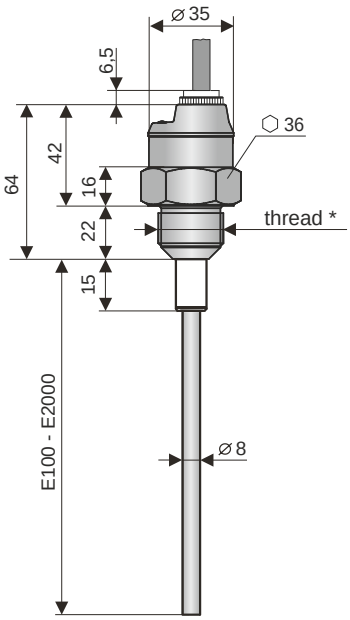
VARIANTS OF LEVEL METERS

- **CPC-C-35_–20** **Uncoated rod electrode** for level measurement of bulk-solids (cement, flour, sand, plastic granulate) and electrically non-conductive liquids (vegetable oil, diesel fuel, petrol). Electrode length 0,1 ... 2 m.
- **CPC-C-35_–21** **Coated rod electrode (insulation FEP)** for level measurement of water and other electrically conductive liquids. Can also be used for polluted liquids in metal tanks, concrete sumps, etc. Electrode length 0,1 ... 2 m.
- **CPC-C-35_–22** **Coated rod electrode (insulation PFA)** with enhanced resistance to permeation (di usion) of vapours and gases. For level measurement of water and other electric conductive liquids in the food, pharmaceutical and chemical industries. Electrode length 0,1 ... 2 m.
- **CPC-C-35_–25** like **CPC-C-35_-21** but higher pressure resistance at high temperature. Suitable for high temperature applications (hot steam) etc. Electrode length 0,1 ... 2 m.
- **CPC-C-35_–30** **Uncoated rod electrode used** for level measurement of bulk-solids (cement, flour, sand, plastic granulate) and electrically non-conductive liquids (vegetable oil, diesel fuel, petrol). Electrode length 0,1 ... 3 m.
- **CPC-C-35_–31** **Coated rod electrode (FEP)** for level measurement of water and other electrically conductive liquids. Can also be used for polluted liquids in metal tanks, concrete sumps, etc. Electrode length 0,1 ... 3 m.
- **CPC-C-35_–40** **Uncoated rod electrode with reference tube (coaxial electrode)** for accurate level measurement of unpolluted electrically non-conductive liquids (oils, diesel fuel, petrol). The measurement is not dependent on the tank shape and on the presence of objects in close proximity to the reference tube. Electrode length 0,1 ... 1 m.
- **CPC-C-35_–41** **Coated rod electrode with reference tube (coaxial electrode)** for accurate level measurement of unpolluted electrically conductive liquids in plastic and glass tanks. The measurement is not dependent on the tank shape and on the presence of objects in close proximity to the reference tube. Electrode length 0,1 ... 1 m.
- **CPC-C-35_–50** **Uncoated rope electrode with weight** for level measurement of bulk-solids (e.g. grains, sand, gravel, cement, etc.). Electrode length 0,5 ... 6 m.
- **CPC-C-35_–52** **Coated rope electrode with weight** (FEP) for electrically conductive and non-conductive liquids. Electrode length 1 ... 10 m.

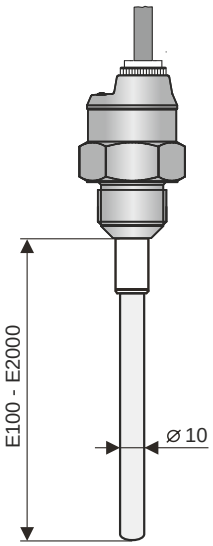
DIMENSION DRAWINGS

All dimensions are in mm

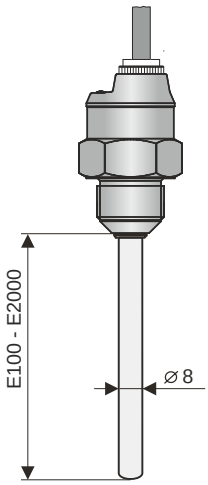
CPC-C-35_ – 20



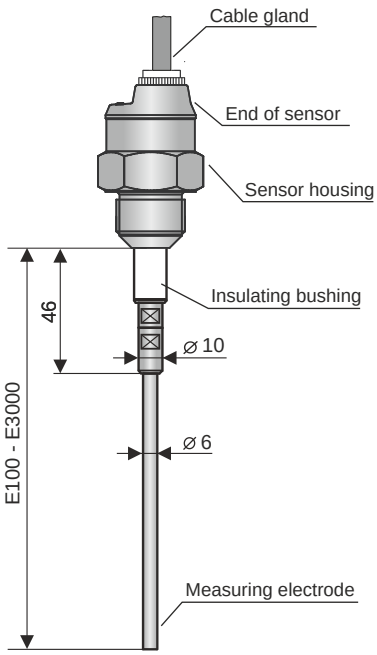
CPC-C-35_ – 21, 22



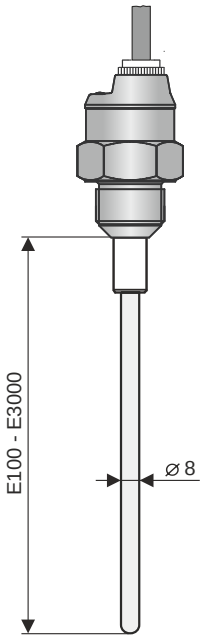
CPC-C-35_ – 25



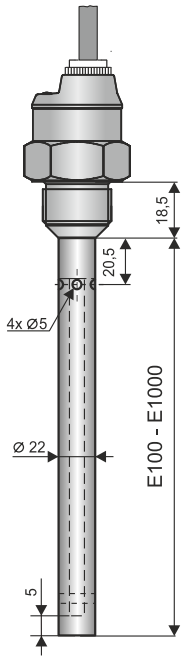
CPC-C-35_ – 30



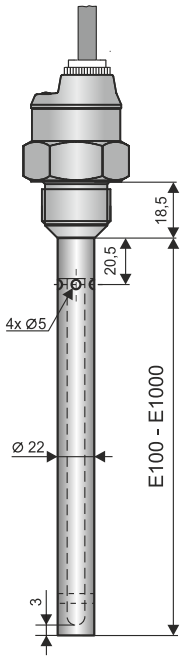
CPC-C-35_ – 31



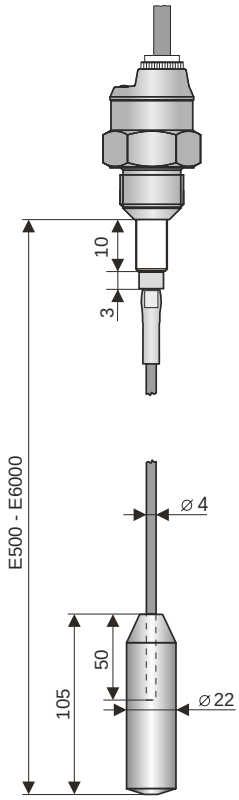
CPC-C-35_ – 40



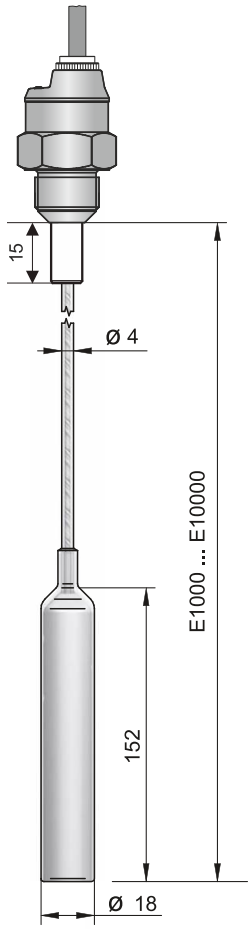
CPC-C-35_ – 41



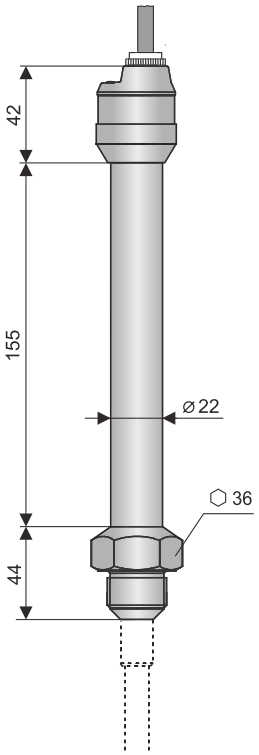
CPC-C-35_ – 50



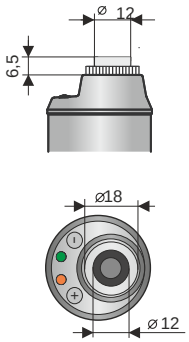
CPC-C-35_ – 52



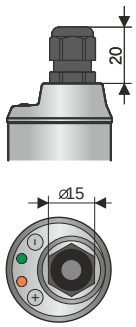
High temperatures variants



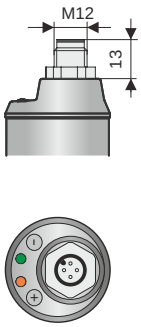
Variant “A” with short stainless steel gland



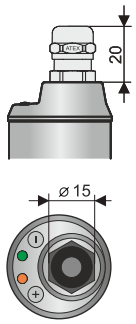
Variant “B” with plastic threaded cable gland



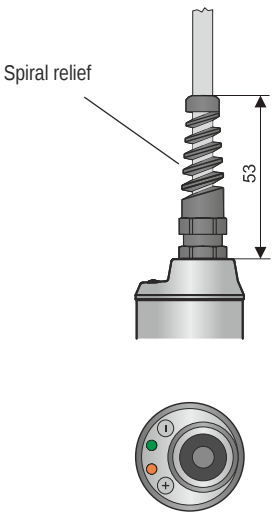
Variant “C” with connector M12



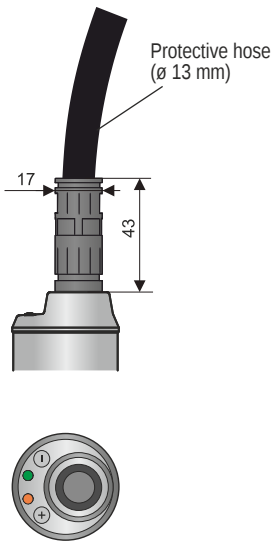
Variant “D” with dustproof cable outlet



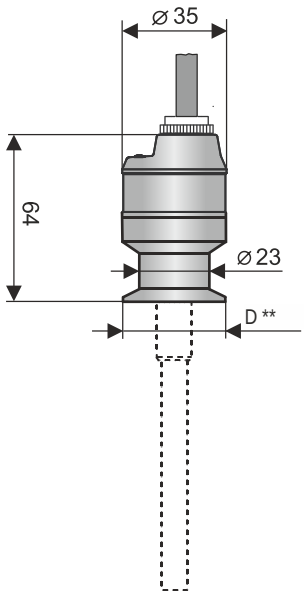
Variant “V” with plastic cable gland with spiral relief - for case of increased mechanical wear on the cable.



Variant “H” with cable gland for protected hoses - for using in an outdoor area or in area with increased moisture.



Process connection Tri-clamp



**D:
Tri-Clamp CI34 (ø 34 mm)
Tri-Clamp CI50 (ø 50,5 mm)

Technical specification		
Supply voltage	CPC-C-35N(T)–_–_–I CPC-C-35N(T)–_–_–U	9 ... 34 V DC 12 ... 34 V DC
Current output Voltage output		4 ... 20 mA (2-wire) 0 ... 10 V (3-wire)
Power consumption	CPC-C-35_–_ _–_–I CPC-C-35_–_ _–_–U	3.75 ... 20.5 mA 5 mA (voltage output open circuit)
Non-linearity		max. 1%
Temperature error		max. 0.05% / K
Voltage error for current and voltage output		max. 0.3 µA/V and 0.1 mV/V
Leakage resistance (electrode - housing) / dialectic strength		1 MΩ / 200 V DC
Coupling capacity (housing - power) / dielectric strength		50 nF / 350 V AC
Coupling capacity (electrode - power) / dielectric strength		47 nF / 350 V AC
Ambient temperature range:		-40 ... + 85°C
Protection	type CPC-C-35_-_ _-C-_-_ type CPC-C-35_-_ _-A(B,V,H)-_-_	IP67 IP68
Maximum load resistance for current output (at U = 24 V)		R_{max}= 700 Ω
Weight (excluding electrode and cable)	performance N performance NT	approx. 0.3 kg approx. 0.6 kg
Cable (version with cable glands)		PVC 3 x 0.5 mm^2

Used materials		
sensor	**variant**	**standard material ***
Wetted parts		
Housing	all types exept Tri-Clamp variant Tri-Clamp	stainless steel W.Nr. 1.4301 (AISI 304) stainless steel W.Nr. 1.4404 (AISI 316L)
Rod electrode	all types exept CPC-C – 35_– 20, 30, 40	stainless steel W.Nr. 1.4404 (AISI 316L)
Rope electrode	CPC-C – 35_– 50	stainless steel W.Nr. 1.4401 (AISI 316)
Reference tube	CPC-C – 35_– 40, 41	stainless steel W.Nr. 1.4301 (AISI 304)
Insulating bushing	CPC-C – 35_– 20, 21, 22, 30, 31, 40, 41, 52 CPC-C – 35_– 50	PTFE PPS + GF40
Electrode coating	CPC-C – 35_– 21, 25, 31, 41, 52 CPC-C – 35_– 22	FEP PFA
Weight	CPC-C – 35_– 50	stainless steel W.Nr. 1.4301 (AISI 304)
Non-wetted parts		
Rod electrode	CPC-C-35_-21, 22, 25, 31, 41	stainless steel (W.Nr. 1.4404 (AISI 316L))
Weighted rope electrode	CPC-C-35_-52	stainless steel (W.Nr. 1.4301 (AISI 304L))
Cable gland	CPC-C – 35_–_ _–A CPC-C – 35_–_ _–B CPC-C – 35_–_ _–D CPC-C – 35_–_ _–V CPC-C – 35_–_ _–H	stainless steel W.Nr. 1.4571 (AISI 316 Ti) / NBR plastic PA / NBR nickel-plated brass / PA / rubber CR / NBR plastic PA / NBR plastic PA / NBR
Connector M12	CPC-C – 35_–_ _–C	nickel-plated brass / PA
Ending	all types	stainless steel W.Nr. 1.4301 (AISI 304)

* It is always necessary to verify the chemical compatibility of the material with the measured medium. You can also choose another type of material after agreement.

Process connection		
type	**size**	**marking**
Pipe thread	G 1"	G 1
	G 3/4"	G3/4
Metric thread	M27x2	M27
	M30x1,5	M30
Taper pipe thread	NPT 3/4	NPT
Jointless connection (Tri-Clamp)	ø 34 mm	Cl34
	ø 50,5 mm	Cl50

Working areas and area classification (EN 60079-0, EN 60079-10-1(2))	
CPC-C-35N	Basic performance for non-explosive atmospheres.
CPC-C-35NT	High-temperature basic performance for non-explosive atmospheres.

Temperature resistivity			
variant	**temperature tm**	**temperature tp**	**temperature ta**
CPC-C-35N-20, 30	-40 °C ... +300 °C	-40 °C ... +85 °C	-40 °C ... +85 °C
CPC-C-35N-21, 22, 25, 31, 40, 41, 52	-40 °C ... +200 °C	-40 °C ... +85 °C	-40 °C ... +85 °C
CPC-C-35N-50	-40 °C ... +250 °C	-40 °C ... +85 °C	-40 °C ... +85 °C
CPC-C-35NT-20, 30,	-40 °C ... +300 °C	-40 °C ... +200 °C	-40 °C ... +85 °C
CPC-C-35NT-21, 22, 25, 31, 40, 41, 52	-40 °C ... +200 °C	-40 °C ... +200 °C	-40 °C ... +85 °C
CPC-C-35NT-50	-40 °C ... +250 °C	-40 °C ... +200 °C	-40 °C ... +85 °C

Note: For the correct operation of the level sensor, none of the here provided temperature ranges may be exceeded (tp, tm or ta).
The here-mentioned temperatures are visually explain in Fig.

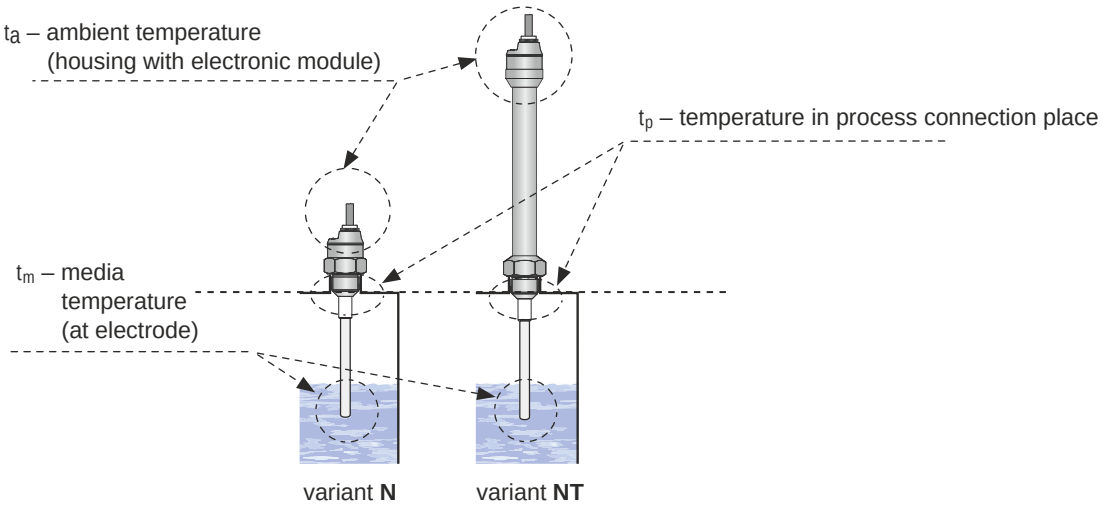


Illustration of areas for temperature measurement

Table of default settings	
4 mA (0 V)	capacitance of the electrode system in free space
20 mA (10 V)	capacity 1 nF (± 20 %)

This setting cannot be used directly for level measurement, but it is always necessary to make the settings according to chapter 9. In special cases (e.g. when using a reference electrode), the sensor settings can be agreed with the manufacturer.

Pressure resistivity

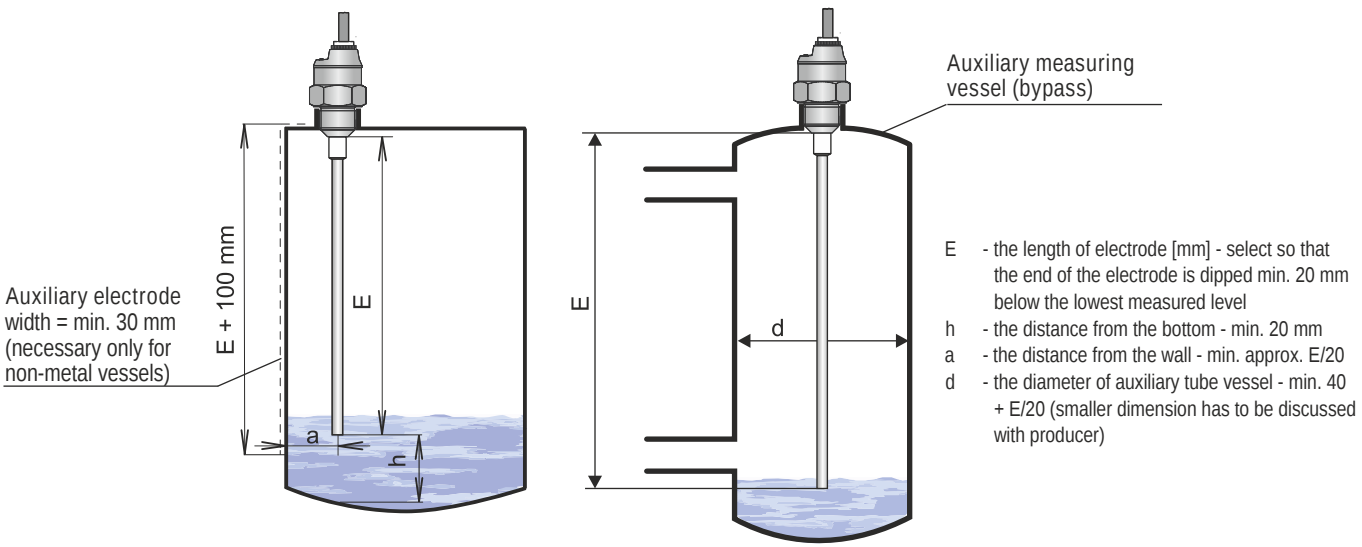
variant	max. operating pressure for temperature tp				
	Up to 30 °C	Up to 85 °C	Up to 120 °C	Up to 150 °C	Up to 200 °C
CPC-C-35N-20, 30	5 MPa (50 bar)	2,5 MPa (25 bar)	–	–	–
CPC-C-35N-21, 22, 31, 40, 41	5 MPa (50 bar)	2,0 MPa (20 bar)	–	–	–
CPC-C-35N-25	8,0 MPa (80 bar)	6,0 MPa (60 bar)	–	–	–
CPC-C-35N-50	0,1 MPa (1 bar)	0,1 MPa (1 bar)	–	–	–
CPC-C-35NT-20, 30	5 MPa (50 bar)	2,5 MPa (25 bar)	1,5 MPa (15 bar)	1 MPa (10 bar)	0,5 MPa (5 bar)
CPC-C-35NT-21, 22, 31, 40, 41	5 MPa (50 bar)	2,0 MPa (20 bar)	1,5 MPa (15 bar)	1 MPa (10 bar)	0,1 MPa (1 bar)
CPC-C-35NT-25	8,0 MPa (80 bar)	6,0 MPa (60 bar)	4,0 MPa (40 bar)	3,0 MPa (30 bar)	2,0 MPa (20 bar)
CPC-C-35NT-50	0,1 MPa (1 bar)	0,1 MPa (1 bar)	0,1 MPa (1 bar)	0,1 MPa (1 bar)	0,1 MPa (1 bar)
CPC-C-35NT-52	1 MPa (10 bar)	0,5 MPa (5 bar)	0,2 MPa (2 bar)	0,2 MPa (2 bar)	–

INSTALLATION INSTRUCTIONS

- Level meters with coated electrode have protection cover at the end of electrode, which is necessary take down before mounting.
- Level meters mount in vertical position to upper lid of tank or reservoir by welding flange, fixing nut or Clamp flange.
- For mounting level meter to the metal tank or hopper, it is not necessary to ground the housing again.
- In case of installation in concrete sumps or silos, it is appropriate to install the level meter onto a metallic auxiliary construction (console, lid, etc.) and then connect with metal constantly submerged object, eventually with steel armouring.
- For level measurement of material in plastic and glass vessels by level meter without reference tube is necessary to connect grounding screw at housing with auxiliary electrode which is fixed in an appropriate manner to the outer casing of vessels (or at the inner wall). Material of auxiliary electrode must be selected with consideration for the working environment and properties of measured material.

Variants with rod electrode

CPC-C-35_-20, 21, 22, 25, 30, 31

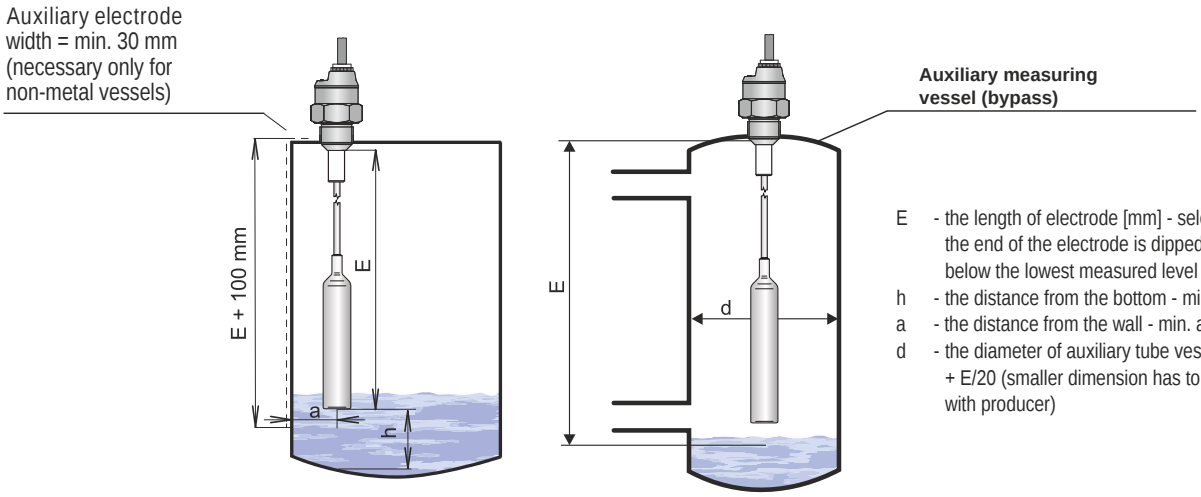


E - the length of electrode [mm] - select so that the end of the electrode is dipped min. 20 mm below the lowest measured level
h - the distance from the bottom - min. 20 mm
a - the distance from the wall - min. approx. E/20
d - the diameter of auxiliary tube vessel - min. 40 + E/20 (smaller dimension has to be discussed with producer)

Installation of level meters with rod electrode

Variants with insulated rope electrode

CPC-C-35_-52

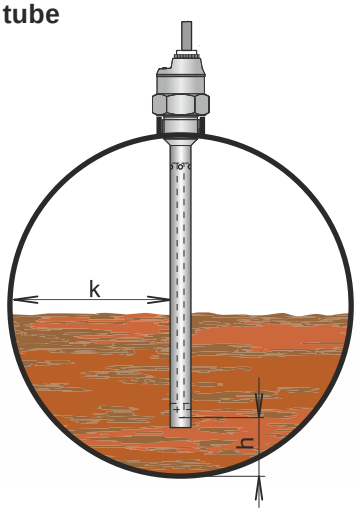


E - the length of electrode [mm] - select so that the end of the electrode is dipped min. 20 mm below the lowest measured level
h - the distance from the bottom - min. 20 mm
a - the distance from the wall - min. approx. E/20
d - the diameter of auxiliary tube vessel - min. 40 + E/20 (smaller dimension has to be discussed with producer)

Installation of level meters with insulated rope electrode

Variants with reference tube

CPC-C-35_-40, 41

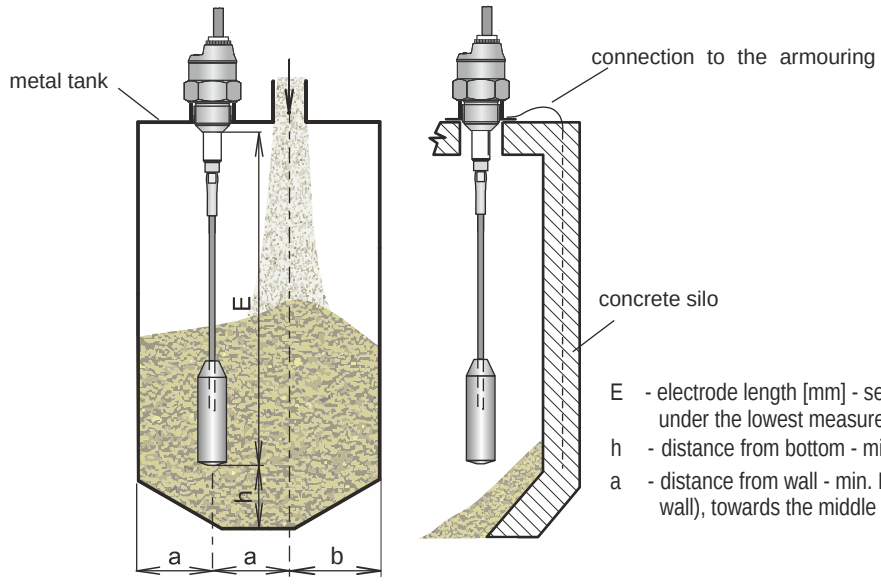


h - distance from bottom - min. 20 mm with regard to possibility of the presence of heavier fractions (water) in petroleum products
k - the distance from the wall - optional

Installation of level meter with reference tube

Variants with rope electrode

CPC-C-35_-50



E - electrode length [mm] - select so that the end of the electrode would be at least 20 mm under the lowest measured level
h - distance from bottom - min. 100 mm
a - distance from wall - min. E/20, otherwise select the largest (as far as possible from the wall), towards the middle between the wall and vertical drain

Installation of level meter with rope electrode

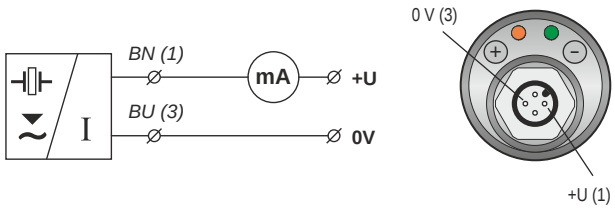
ELECTRICAL CONNECTION

The positive pole of the supply voltage (+U) is connected to the brown wire BN or pin connector no.1, the negative pole (0V) is connected to the blue wire BU or pin connector no. 3 and output voltage (Uout) to the black wire BK or pin connector no. 4.

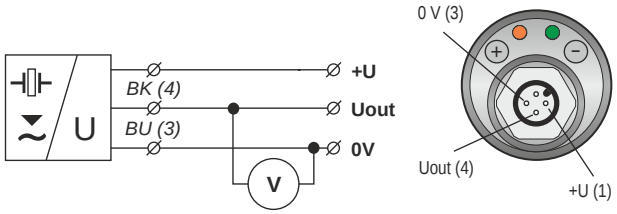
Wiring diagrams are provided in the figures.

Note: In case of strong ambient electromagnetic interference, paralleling of conductors with power distribution, or for the distri bution to distance over 30 m, we recommend using shielded cable.

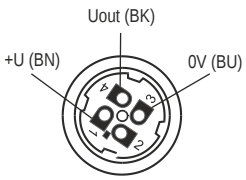
Level meters CPC-C-35 with type of cable outlet A, B, V or H are connected to assessing units permanently connected by PVC cable.
Level meters CPC-C-35 with connection method type C are connected to assessing units by means of a connector socket with compression cable (length 2 or 5 m), or by means of a connector socket without cable (see accessories), the connector is not part of the sensor. In this case the cable is connected to the inside pins of the socket according to figure 6. The recommended diameter of this cable is 4 to 6 mm (the recommended cross-sectional area is 0.25 to 0.5 mm²).



Connection diagrams and interior view of connector of level meter CPC-C-35 (variant - I)



Connection diagrams and interior view of connector of level meter CPC-C-35 (variant - U)



Inside of the connector socket (variant "C")

Legend:
(1...)– terminal numbers connector sockets
BN – brown
BU – blue
BK – black

Electrical connection can only be made when de-energized!

The source of the power voltage must comprise of a stabilised safe low power source with galvanic separation. In the event that a switch-mode power supply is used, it is essential that its construction effectively suppresses common mode interference on the secondary side. In the event that the switch-mode power supply is equipped with a PE safety terminal, it must be unconditionally grounded!

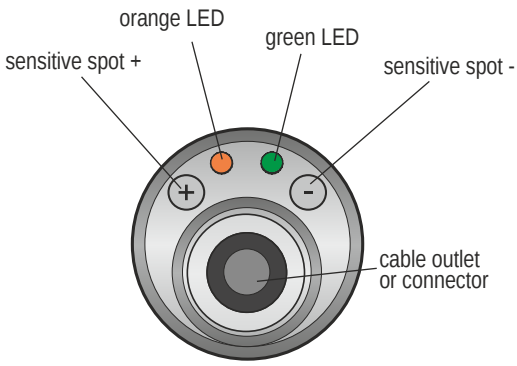
In the event that the level meter is installed in an outdoor environment at a distance greater than 20 m from the outdoor switchboard, or from an enclosed building, it is necessary to supplement the electrical cable leading to the level meter with suitable overvoltage protection.

In the event of strong ambient electromagnetic interference, paralleling of conductors with power distribution, or for distribution to distances over 30 m, we recommend using a shielded cable and grounding the shielding on the side of the power source.

SETTINGS

Settings of the measuring range are done by touching a magnetic pen to the pair of sensitive spot **"–"** and **"+"**. Sensitive spot **"–"** used for input to the setting mode for setting the limit 4 mA (0 V) and decreasing the set current (voltage). Upon reaching the re quired current (voltage) waits for a permanently illuminated orange LED, and by applying the magnetic pen to the sensitive area **"–"**, confirmation is performed of the set value. Sensitive area **"+"** is used for input to the setting mode for setting the limit setting 20 mA (10 V) and increasing the set current (voltage). Upon reaching the required current (voltage) it waits for a permanently illuminated orange LED, and by applying the magnetic pen to the sensitive area **"+"** confirmation is performed of the set value. The setting process is indicated by the orange LED "STATE". The green LED indicator "RUN" indicates correct function of level measurement.

You can find more information in the instruction manual.



Top view of level meter

FUNCTION AND STATUS INDICATION

LED indicator	*colour*	*function*
"RUN"	green	**Measuring function indicator** **flashing** – (repeats according to period of measuring approx. 0.5 s) – correct function of measuring the level **dark** – incorrect installation or malfunction. LED is also not illuminated in limit setting mode. **alternating flashing green and orange LED** – incorrectly set limits
"STATE"	orange	**Settings indication** **slow flashing** – indication of setting the lower limit **rapid flashing** – indication of setting the upper limit **permanent shine** – the level meter is prepared to confirm the limit setting by means of mag. pen **3x short flashes** – setting confirmation **simultaneous shine of green and orange LED** – during touching the mag. pen, when the limit setting is confirmed

ORDER CODE

CPC-C-35□□ – □□ – □ – □ – □ – **E** □□□ – **K** □□□

cable length in [m]

electrode length in [mm]

performance:
N : normal
NT : high temperature

type and performance of electrode:
20 : rod, uncoated, length 0.1 ... 2 m
21 : rod, coated (FEP), length 0.1 ... 2 m
22 : rod, coated (PFA), length 0.1 ... 2 m
25 : like 22, but higher pressure and mechanical resistance at high temperatures
30 : rod, uncoated, length 0.1 ... 3 m
31 : rod, coated (FEP), length 0.1 ... 3 m
40 : rod, uncoated with ref. tube, length 0.1 ... 1 m
41 : rod, coated (FEP) with ref. tube, length 0.1 ... 1 m
50 : rope with weight, uncoated, length 1 ... 6 m
52 : rope with weight, coated (FEP), length 1 ... 10 m

connection method:
A : short stainless steel gland (+ cable length)
B : plastic threaded cable gland (+ cable length)
C : connector (socket not included with sensor, recommended type - see accessories)
D : metal dust proof terminal (+ cable length)
V : plastic cable gland with spiral (+ cable length)
H : plastic cable gland for protective hose (+ cable length)

type of output:
I : current (4...20 mA)
U : voltage (0...10 V)

process connection:
G1 : pipe thread G 1”
G3/4 : pipe thread G 3/4”
M27 : metric thread M 27x2
M30 : metric thread M 30x1.5
NPT : pressure thread NPT 3/4
CI34 : Tri-clamp (ø 34 mm)
CI50 : Tri-clamp (ø 50,5 mm)

CORRECT SPECIFICATION EXAMPLES

CPC-C-35N–20– M27–I–B–E200–K5

(**N**) normal performance; (**20**) uncoated cylindrical electrode; (**M27**) process connection by thread M27; (**I**) output current; (**B**) plastic threaded cable gland; (**E200**) electrode length 200 mm, (**K5**) cable length 5 m

CPC-C-35N–21–G3/4–U–C–E580

(**N**) normal performance; (**21**) coated bar electrode (FEP); (**G3/4**) process connection by thread G3/4”; (**U**) output voltage; (**C**) connector; (**E580**) electrode length 580 mm

CPC-C-35N–40–M30–I–H- E900

(**N**) normal performance; (**40**) uncoated rod electrode with reference tube; (**M30**) process connection by thread M30; (**I**) output current; (**H**) cable gland for protective hose; (**E900**) electrode length 900 mm

CPC-C-35NT–22– CI50–U–A–E200–K5

(**N**) high-temperature performance; (**22**) coated bar electrode (PFA); (**CI50**) process connection Tri-clamp (ø 50,5 mm); (**U**) output voltage; (**A**) short stainless steel gland; (**E200**) electrode length 200 mm, (**K5**) cable length 5 m

ACCESSORIES

1 x magnetic pen	included in the price		
1 x seal (asbestos free) *	included in the price		
cable (over the standard length 2 m)	at extra cost	PVC 3 × 0,5 PVC 2 × 0,75 blue	
connector socket	at extra cost		
normal steel welding flange or stainless steel welding flange	at extra cost		
protective hose (for type of cable outlet H)	at extra cost		
stainless steel fixing nut	at extra cost		
various types of seals (PTFE, Al, etc.)	at extra cost		
auxiliary plate electrode	at extra cost		

** Pressure resistance - see the table in the accessories datasheet in the „seals and gaskets".*

SAFETY, PROTECTIONS AND COMPATIBILITY

The level sensor is equipped with protection against electric shock on the electrode, reverse polarity, output current overload, short circuit and against current overload on output.

Protection against dangerous contact is provided by low safety voltage according to EN 33 2000- 4- 41. Electromagnetic compatibility is provided by conformity with standards EN 55022 / B, EN 61326-1, EN 61000-4-2 to -8.

A declaration of conformity was issued for this device in the wording of Act No. 90/2016 Coll., as amended. Supplied electrical equipment matches the requirements of valid European directives for safety and electromagnetic compatibility.

PACKINGS, SHIPPING AND STORAGE

The CPC-C-35 device is supplied packaged in a cardboard box that protects it against mechanical damage.

When handling and during transport, it is necessary to prevent impacts and falls.

The CPC-C-35 electrical device must be stored in dry enclosed areas with humidity up to 85%, free of aggressive vapours at temperatures between -10°C and 50°C, and must be protected against the e ects of weather.