Capacitive level meters CLM–36

- **For continuous level measurement of liquid and bulk-solid materials**
- **Direct mounting into containers, silos, vessels, basins, reservoirs, etc**
- **Easy and quick connecting by connector**
- **Continuous adjustment of initial capacity**
- **Version for usage in explosive areas, high temperature performance**
- **Current (4 ÷ 20 mA) or voltage (0 ÷ 10 V) output**

Capacitive level meters CLM® are designed for continuous level measurement of liquids, powders and bulk-solid materials in vessels, tanks, sumps, containers, silos, etc. CLM consists of the stainless steel housing with electronic module and the measuring electrode. Type of measuring electrode is defined by kind of use and type of measured media.

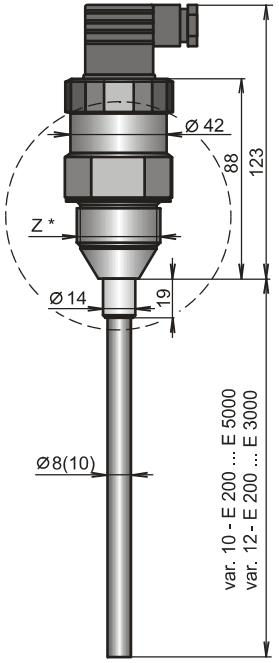
Sensitivity (SPAN) and initial capacity compensation (ZERO) can be fluently set. CLMs are offered in version (N) for non-hazardous environments or (Xi) version to explosive areas up to zone 0 or zone 20, high temperature performance and several types of process coupling are also available.

Features of variants

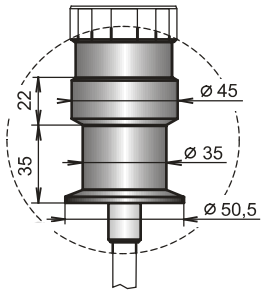
- ***CLM–36_ _–10–_–_*** ***with uncoated rod electrode*** for level measurement of non-conductive liquids (oils, diesel, petrol) and powder or bulk-solid materials (flour, sand, cement, plastic granulates, etc.).
  Max. length 5 m.
- ***CLM–36_ _–12–_–_*** ***with fully (FEP) coated rod electrode*** for level measurement of water and conductive liquids incl. wasted liquids in metallic vessels, concrete sumps, reservoirs, etc., better behaviour against aggressive media, lower adhesion to some complicated media, chemical resistance.
  Max. length 3 m.
- ***CLM–36_ _–20–_–_*** ***with uncoated rod electrode and reference tube*** for accurate level measurement of clean non-conductive liquids (oils, diesel, petrol). By means of reference tube the output signal does not depend on the dimensions and shapes of a vessel.
  Max. length 3 m.
- ***CLM–36_ _–22–_–_*** ***with fully FEP coated rod electrode and reference tube*** for accurate level measurement of conductive liquids. Main use is for measurement in plastic vessels or tanks. Impossible to use for waste and high viscosity liquids and bulk-solid materials.
  Max. length 3 m.
- ***CLM–36_ _–30–_–_*** ***with uncoated stainless steel rope electrode and uncoated weight*** for level measurement of bulk-solid materials (grains, sand, flour, cement, etc.).
  Max. length 20 m.
- ***CLM–36_ _–31–_–_*** ***with uncoated stainless steel rope electrode and uncoated weight*** (addition dynamic anchorage) for higher silos.
  Max. length 20 m.
- ***CLM–36_ _–32–_–_*** ***with fully coated rope electrode*** (rope insulation FEP, weight insulation PTFE), for level measurement of electrically conductive and non-conductive liquids
  Max. length 20 m.
- ***CLM–36_ _–40–_–_*** ***with two coated electrodes*** (rode insulation FEP, head fully PTFE), for level measurement of aggressive liquids. Performance for non-explosive areas only.
  Max. length 2 m.

DIMENSION DRAWINGS

version with rod electrode
CLM–36_ _-10-_-_
CLM–36_ _-12-_-_

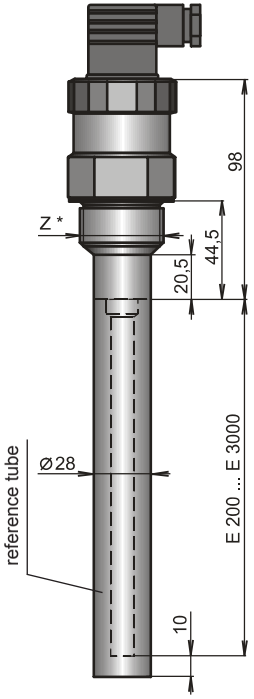


var. M, G - housing with threads



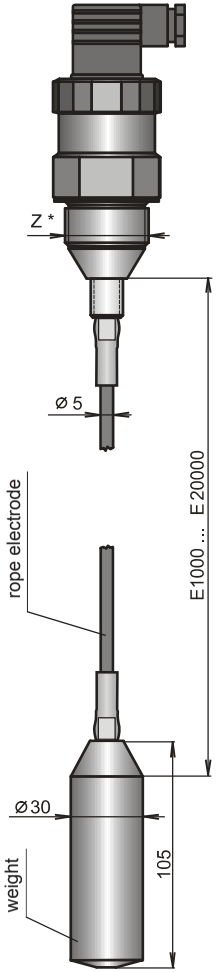
var. CI - housing with Triclamp coupling

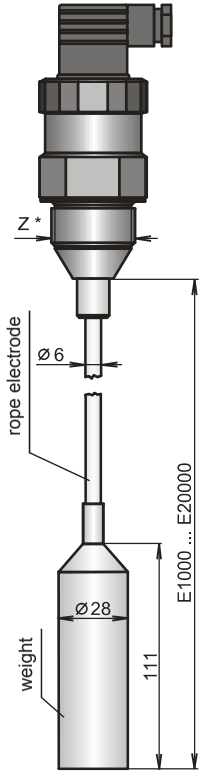
version with rod electrode and reference tube
CLM–36_ _-20-_-_
CLM–36_ _-22-_-_



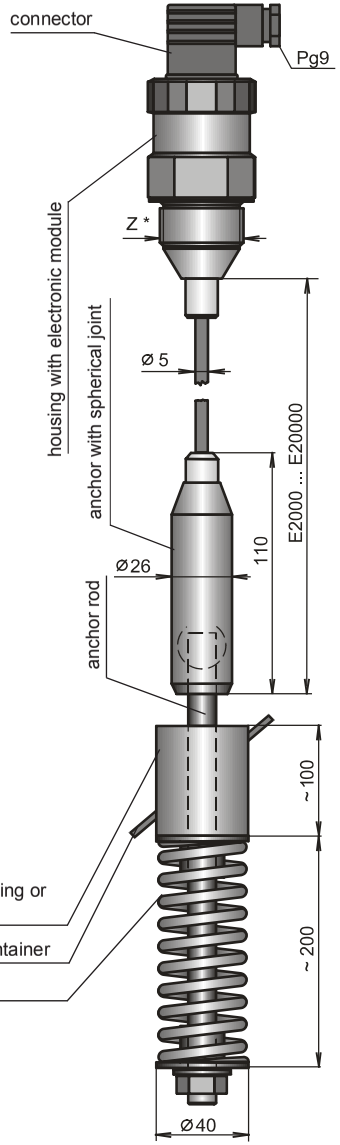
Z* - var. M - metric thread M-36x2
- var. G - thread G1“

version with rope electrode
CLM–36_ _-30-_-_ **CLM–36_ _-32-_-_**

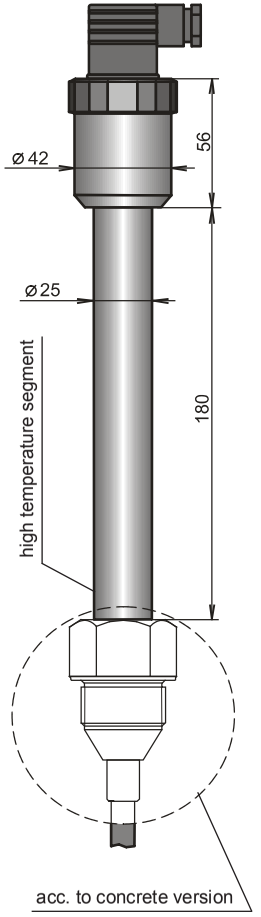




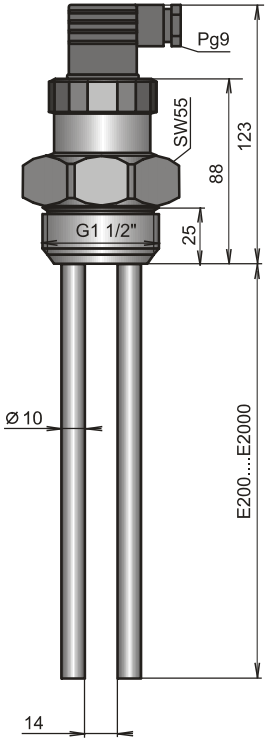
version with rope electrode with anchor
CLM–36_ _-31_-_



high temperature performance
CLM–36_T-_ _-_-_



version with two coated electrodes
CLM–36N-40-G-_



Technical specification

Supply voltage: CLM–36N(T)-_ _-_-I CLM–36N(T)-_ _-_-U CLM–36Xi(T)-_ _-_-I	9 ÷ 36 V DC 16 ÷ 36 V DC 9 ÷ 30 V DC
Current output Voltage output	4 ÷ 20 mA 0 ÷ 10 V
Max. internal values of Xi version	Ui = 30 V DC; Ii = 132 mA; Pi = 0,99 W; Ci = 370nF; Li = 0,9mH
Sensitivity ranges	20, 30, 50, 100, 150, 300, 500, 1000 pF
Initial capacity regulation ratio	min. 1:2
Nolinearity	max. 1 %
Temperature error	max. 0,05% / K
Voltage error for I-output and U-output	max. 0,3 µA/V a 0,1 mV/V
Internal resistance / electric strength (electrode - housing)	1 MΩ / 250 V AC
Coupling capacity / electric strength (housing - supply leads)	var. N : 51 nF / 250 V AC var. Xi : 26 nF / 500 V AC
Allowed temperature range in zone 0, var. Xi (EN 50284)	-20 to +60°C
Allowed pressure range in zone 0, var. Xi (EN 50284)	0,8 to 1,1 bar (0,08 to 0,11 MPa)
Protection class: - housing - connector GDM 2009 (I-output), GDM 3009 (U-output) - connector GAN-DADE 7A (I-output), GAN-DAEE 7A (U-output)	 IP 67 IP 65 (standard) IP 67 (optional)
Max. load (serial) resistance for I-output (U = 24 V)	R_{max} = 750 Ω
Max. load current of voltage output	R_{min} > 1 kΩ
Weight of the housing:	ca. 0,5 kg
Weight of high temperature performance NT, XiT:	ca. 1 kg

Temperature and pressure durability

variants / performance	*operation temp. range (on electrode)*	*ambient temp. range t_a on housing version N*	*version Xi*	*max. oper. press. for t_a = -40 to +20°C*	*max. oper. press. for t_a = -40 to +85°C*
CLM–36_ _-10, 20-_-_	-40 to +200°C	-40 to +85°C	-40 to +75°C	3 MPa	1 MPa
CLM–36_ _-12, 22-_-_	-40 to +120°C	-40 to +85°C	-40 to +75°C	3 MPa	1 MPa
CLM–36_ _-30	-40 to +200°C	-40 to +85°C	-40 to +75°C	1 MPa	0,5 MPa
CLM–36_ _-31, 32-_-_	-40 to +120°C	-40 to +85°C	-40 to +75°C	1 MPa	0,5 MPa
CLM–36_ _-40-_-_	-40 to +120°C	-40 to +85°C	–	0,1 MPa	0,1 MPa

Maximum operational temperature for high temperature performance

temperature in coupling place	100°C	120°C	150°C	180°C
max. pressure	3,0 MPa	2,0 MPa	1,5 MPa	0,5 MPa

Used Materials

part of the CLM	*variants*	*standard material*	*optional (on request)*
housing	all types, except CLM–36_ _-40-_-_	St. steel W. Nr. 1.4301	St. steel W. Nr. 1.4571
			St. steel W. Nr. 2.4858 (Incoloy 825)
	CLM–36_ _-40-_-_	PTFE	–
insulating bushing	all types, except CLM–36_ _-40-_-_	PTFE	–
electrode	CLM–36_ _-10, 12, 20, 22, 40-_-_	St. steel W. Nr. 1.4301	St. steel W. Nr. 1.4571
	CLM–36_ _-30, 31-_-_	St. steel W. Nr. 1.4404	–
	CLM–36_ _-32-_-_	zinc steel rope	–
electrode coating	CLM–36_ _-12, 22, 32, 40-_-_	FEP	–
	CLM–36_ _-31-_-_	polyolefin (modifed PE)	PTFE
weight insulation	CLM–36_ _-32-_-_	PTFE	–
weight / anchor mechanism	CLM–36_ _-30, 31, 32-_-_	St. steel W. Nr. 1.4301	–
rreference tube	CLM–36_ _-20, 22-_-_	St. steel W. Nr. 1.4306	St. steel W. Nr. 1.4571

Working areas (acc. to EN 60079-14 and EN 50281-1-2)	
CLM–36N-_ _-_-_	performance for non-explosive areas
CLM–36NT-_ _-_-_	high temperature performance, for max. temperatures in coupling place 200°C
CLM–36Xi-_ _-_-_	performance for explosive areas (combustible dusts, gases or vapours) Ⓔx II 1 GD T 83°C EEx ia IIB T5 with IR[1)] (e.g. IRU-420) whole CLM in zone 0 and 20
CLM–36XiT-_ _-_-_	high temperature performance (max. 200°C) for explosive areas Ⓔx II 1/2 GD T 83°C EEx ia IIB T5 s IR[1)] (e.g. IRU-420) electrode part zone 0 and 20, housing zone 1 and 21

[1)] *Isolating repeater*

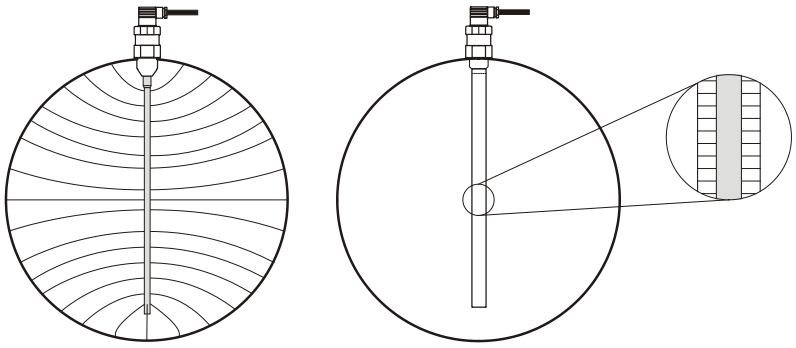
Process connection

CLM–36_ _-_ _-M-_ *thread process coupling M36x2*
CLM–36_ _-_ _-G-_ *thread process coupling G1" (CLM–36_ _-40-_-_ G1½")*
CLM–36_ _-_ _-Cl-_ *sanitary Triclamp process coupling*

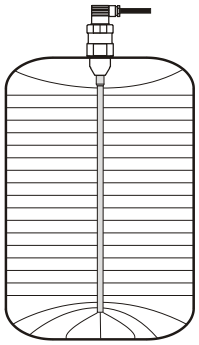
Installation

Level meters are designed to mounting in vertical position on the top lid of a tank or a container by means of welding flanges, stainless steel fixing nuts or Triclamp DN 32 coupling. When installed into metallic wall vessel it is not necessary to ground the housing of CLM. In the case of use in concrete basins or silos it is recommended to install the CLM on metallic bracket or auxiliary metallic construction electrically connected with the liquid (water), or connected with metallic armour of silo. In the case of measuring in glass or plastic vessels by CLM without the reference tube (electrode) it is necessary to build up an auxiliary electrode (metallic tape) on outer wall of a vessel and connect it with CLM housing (by screw located on the housing). Material of auxiliary electrode is necessary to choose in accordance with working environment or character of measured material. Orientation dimension drawings for mounting you can see below.

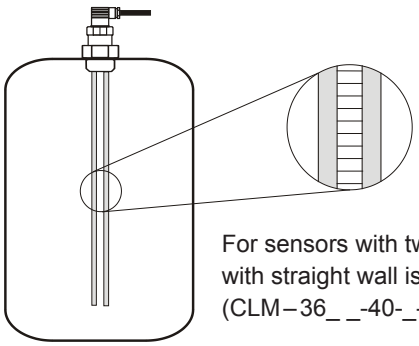
Influence of the tank shape to linearity of measured capacity



In curved tanks (most frequently horizontal cylinder) capacity change during measurement of electrically nonconductive material is nonlinear. Linearity is done by the use of reference tube (CLM-36_ _-20, 22-_). Linearization can be done also by reference electrode (CLM-36_ _-40).



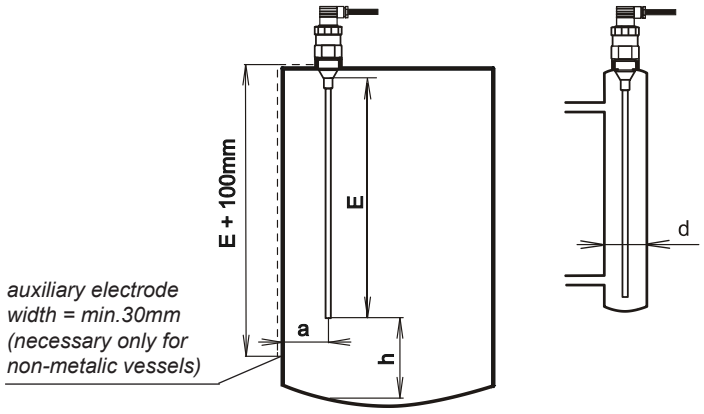
In the tank with straight wall and with the sensor placed parallel with the wall is the capacity change linear



For sensors with two electrodes in the tank with straight wall is the capacity change linear (CLM–36_ _-40-_-_).

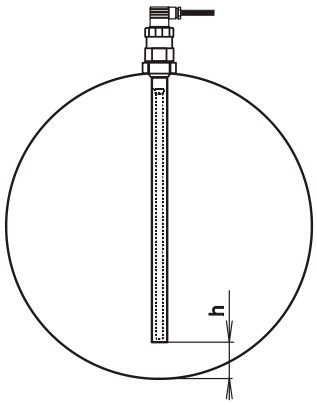
Mounting recommendation

CLM–36_ _-10, 12-_-_ ***installation in metallic or non-metallic vessels***



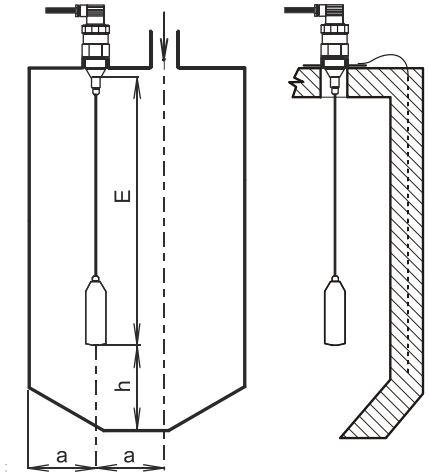
E - the length of electrode - the lower end of the electrode has to be dipped min. 20 mm below the lowest measured level
h - the distance from the bottom - min. 50 mm
a - the distance from the wall - min. ca. E/20
d - the diameter of auxiliary tube vessel - min. 40 + E/20

CLM–36_ _-20, 22-_-_ ***variants with ref. tube***



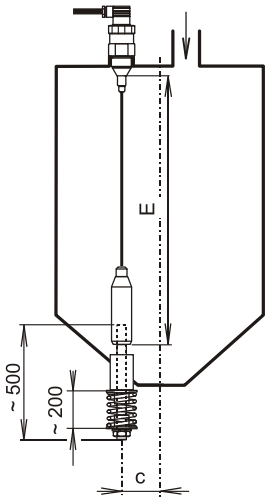
h - the distance from the bottom - min. 50 mm
- the distance from the wall - arbitrary

CLM–36_ _-30-_-_ ***installation in containers and silos***
CLM–36_ _-32-_-_ ***installation in deep vessels and sumps***



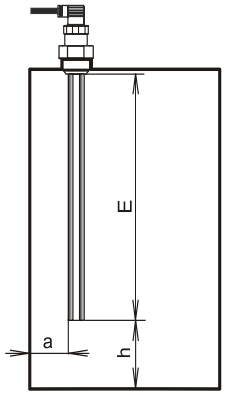
E - the length of electrode - the lower end of the electrode has to be dipped - min. 20 mm below the lowest measured level
h - the distance from the bottom - min. 100 mm
a - the distance from the wall - approx. the same as the distance from the inlet

CLM–36_ _-31-_-_ ***installation of rope electrode with anchor***



E - the length of electrode
c - the distance from the axis of the silo (has to be minimised)
- the length of the conduction rod ca. 500 mm
- the length of the press spring ca. 200 mm
- steel anchor welding cylinder or dust-tight bushing (to be welded into the conical bottom wall)

CLM–36_ _-40-G-_ ***non-metallic vessels and agressive liquids***

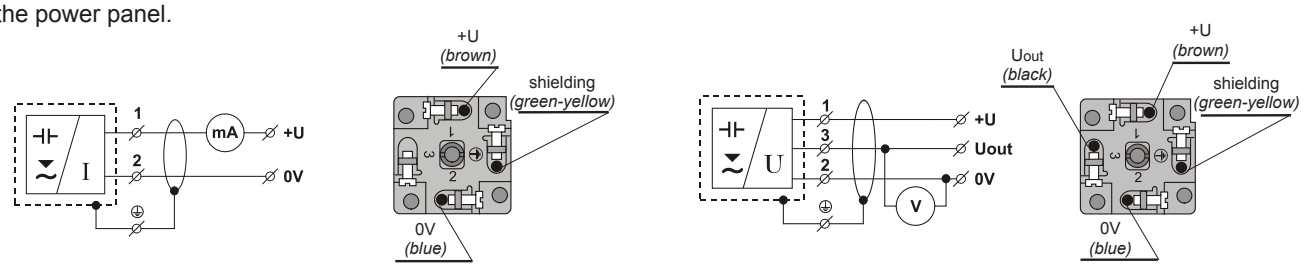


E - the length of electrodes - the lower end of the electrodes have to be dipped min. 20 mm below the lowest measured level
h - the distance from the bottom - min. 30 mm
a - the distance from the wall - min. cca E/20

Electrical connection

The CLM is designed to be connected to supply unit or to controller through cable with outer diameter 6 - 8 mm (recommended cross section of cores 0,5 - 0,75 mm²) by means of connector GDM (DIN 43650) which is included in delivery. The scheme and the inside of the connector are on pictures.

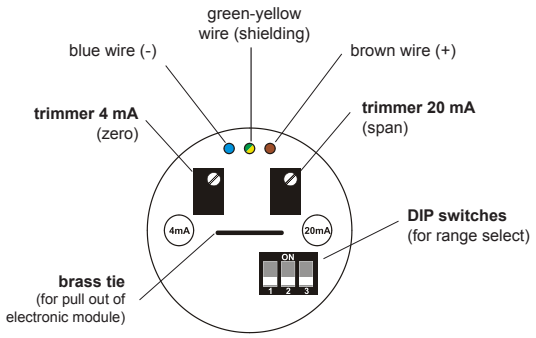
Shielded cable is necessary to use when the cable length is over 30 m. Connect shielding to the socket ⏚ shielding do not connect to the power panel.



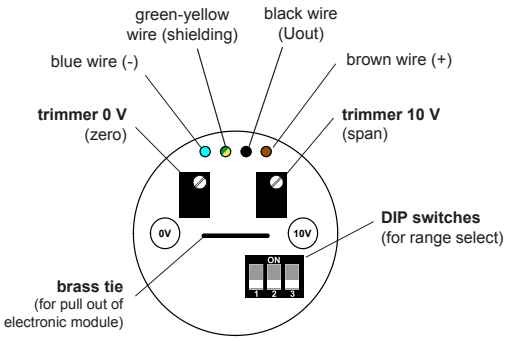
Connection scheme and inside of the connector socket

Adjustment elements

The adjustment of level meter is by DIP switches and two trimmers 4 mA and 20 mA (to set min. and max. level). These adjustment elements are placed under outlet nut of level meter. For detailed information please read at the instructions.



the top view on the internal electronic module for I-output (var. -I)



the top view on the internal electronic module for U-output (var. -U)

Order code

CLM–36 □□ □□ □ □ ▭

- ▭ length of electrode in mm: ***E****xxxx*
- □ type of output: ***I*** *- current (4 ÷ 20 mA),* ***U*** *- voltage (0 ÷ 10 V)*
- □ process connection: ***M*** *- thread M36x2,* ***CI*** *- Triclamp*
  G *- thread G1",* ***G*** *- thread G1½" for CLM–36N-40-_-_*
- □□ performance:
  - **N** *- normal - for non-explosive areas*
  - **Xi** *- explosion proof - intrinsically safe for hazardous (explosive) areas, only with I-output*
  - **NT, XiT** *- high temperature performance*
- □□ electrode performance:
  - ***10*** *- rod, uncoated*
  - ***12*** *- rod, FEP coated*
  - ***20*** *- rod, uncoated, with reference tube*
  - ***22*** *- rod, FEP coated, with reference tube*
  - ***30*** *- rope with uncoated weight*
  - ***31*** *- rope with uncoated weight and anchor*
  - ***32*** *- FEP coated rope, PTFE coated weight*
  - ***40*** *- two rods, FEP coated*

Correct specification examples

CLM–36N-10-G-I E1100
CLM–36Xi-20-M-I E900
CLM–36NT-12-M-I E1500
CLM–36Xi-30-M-I E12000
CLM–36N-32-G-U E6000
CLM–36N-12-CI-I E2000

Accessories

standard – included in the level meter price

- 1x of seal, other seals are on request (PTFE, Al, etc.)
- 1x connector socket
- 1x screwdriver for adjustment (each 5 pcs)
- distance element for rods longer than 50 cm (for CLM – 36N-40-_-_)

optional *(see datasheets "accessories")*

- connector with protection class IP 67 (GAN-DADE 7A) with 5 m cable (current output)
- connector with protection class IP 67 (GAN-DAAE 7A) with 5 m cable (voltage output)
- steel welding flange ON-36x2
- stainless steel welding flange NN-36x2
- stainless steel fixing nut UM-36x2

Safety, protections, compatibility and explosion proof

Level meter CLM-36 is equipped with protection against electric shock on electrode, reverse polarity, output current overload, short circuit and short time over voltages.

Electromagnetic compatibility is provided by conformity with standards: EN 55022/B, EN 61326-1, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6.
Explosion proof of CLM-36Xi is examined by FTZÚ-AO 210 Ostrava - Radvanice certificate No.: FTZÚ 02 ATEX 0235X.

version 04/2009

Dinel, s.r.o.
U Tescomy 249
760 01 Zlín, Czech Republic

Phone: +420 577 002 003
Fax: +420 577 002 007

www.dinel.cz
sale@dinel.cz