# Capacitive level meter CLM–40

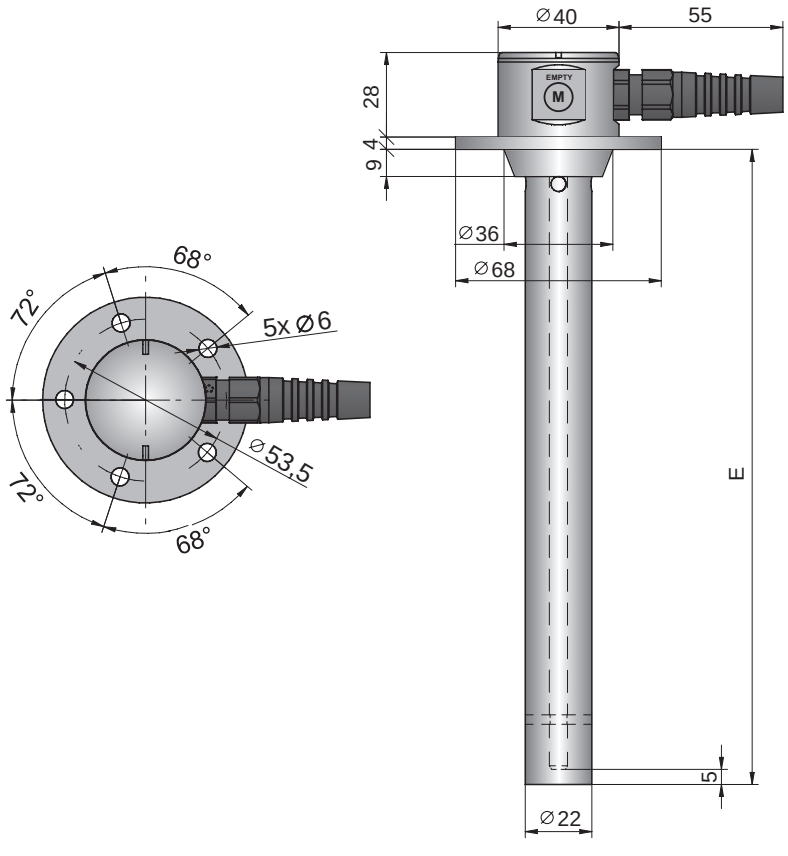
- **For continuous level measurement of diesel fuel in trucks, building machines, locomotives, etc.**
- **Direct mounting into a tank through the 5-hole flange**
- **Arbitrary electrode length (max. 1 m)**
- **Possibility of shortening electrodes to the desired length**
- **Current (4 ... 20 mA) or voltage (0 ... 10 V) output, or communication protocol CAN**
- **Setting by means of magnetic pen**

**Capacitive level meter CLM®** is intended for continuous measurement of the level of fuel (diesel). It consists of a measuring electrode and the electronics housing to which is firmly attached the cable. The electronic part converts the capacity to the current or voltage signal. For accurate measurements independent on the tank shape is the rod electrode placed inside the reference tube. The level meter has no setting elements, neither mechanical moving parts and so its installation is very simple. The production of its electrodes is possible in any length in the range from 100 to 1000 mm, so that the level meter can go through entire height of the tank. Mounting of the tank level meter is done by using 5-hole flange (SAE).

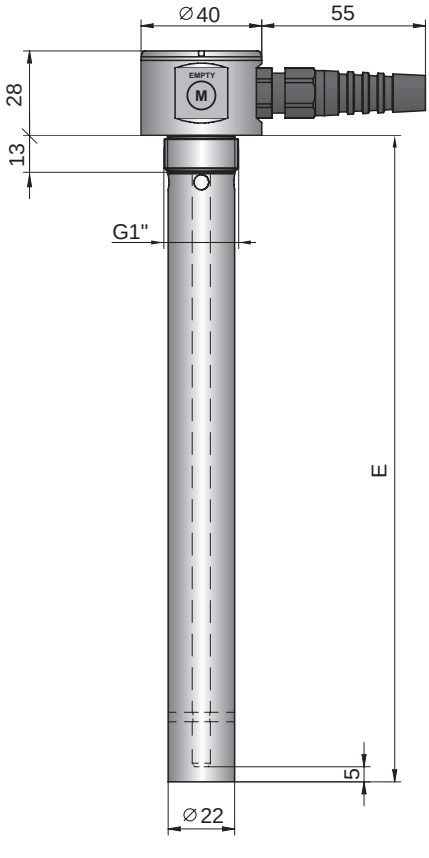
## Features of variants

**CLM–40N–40** **Uncoated rod electrode and reference tube** for level measurement of diesel fuel. Setting by means of magnetic pen. Possibility of shortening electrodes to the desired lenght in the range from 100 to 1000 mm.

## Dimension drawing




Variant "F5" – flange with 5 holes




Variant "G" – thread G 1“

## Technical specification

| | | |
|---|---|---|
| Supply voltage | CLM–40N–40–_–I<br>CLM–40N–40–_–U<br>CLM–40N–40–_–CAN | 9 ... 30 V DC<br>12 ... 30 V DC<br>9 ... 30 V DC |
| Type of Output | CLM–40N–40–_–I<br>CLM–40N–40–_–U<br>CLM–40N–40–_–CAN | 4 ... 20 mA (Limits 3,9 ... 20,5 mA)<br>0 ... 10 V (Limits 0 ... 10,2 V)<br>Protocol CAN SAE j1939 (FMS) |
| Current consumption | CLM–40N–40–_–I<br>CLM–40N–40–_–U<br>CLM–40N–40–_–CAN | 3,75 ... 20,5 mA<br>Max. 5 mA<br>Typ. 10 mA (Max. 16 mA) |
| Load resistance | CLM–40N–40–_–I<br>CLM–40N–40–_–U | $R_z \leq (U - 9) / 20,5$ [kΩ; V]<br>$R_z \geq 5$ kΩ |
| Nolinearity | | Max. 1 % |
| Temperature error | | Max. 0,05 % / K |
| Voltage error | | Max. 0,3 µA/V |
| Internal resistance / Electric strength (Electrode – Housing) | | 1 MΩ / 200 V DC |
| Coupling capacity / / Electric strength (Housing – Supply leads) | CLM–40N–40–_–I<br>CLM–40N–40–_–U<br>CLM–40N–40–_–CAN | 91 nF / 500 V DC<br>50 nF / 500 V DC<br>49 nF / 500 V DC |
| Coupling capacity / Electric strength (Electrode – Supply leads) | | 47 nF / 500 V DC |
| Protection class | | IP 68 |
| Ambient temperature range | | - 40 ... +85 °C |
| Cable | CLM–40N–40–_–I<br>CLM–40N–40–_–U<br>CLM–40N–40–_–CAN | PUR 2x1 mm²<br>PUR 3x0,75 mm²<br>PUR 2x2x0,25 mm², shielded |
| Process connection | CLM–40N–40–F5–_<br>CLM–40N–40–G–_ | Flange with 5 holes<br>Thread G 1“ |
| Cable gland | CLM–40N–40–_–_–V<br>CLM–40N–40–_–_–H | cable gland with spiral relief<br>cable gland for protective hose (AD 10,0) |
| Weight (exclude electrode) | | Approx. 0,3 kg |

## Material performance

| Sensor part | Standard material |
|---|---|
| Housing | stainless st. W. Nr. 1.4305 (AISI 303) |
| Cable gland | PA |
| Cable | cover PUR, individual wires PVC |
| Electrode | stainless st. W. Nr. 1.4301 (AISI 304) |
| Reference tube | stainless st. W. Nr. 1.4301 (AISI 304) |
| Process flange | stainless st. W. Nr. 1.4305 (AISI 303) |
| Insulating bushing | PA + GF30 |

## Installation and recommendations

- Level meters are installed in vertical position. Mounting of the tank level meter is done by using 5-hole flange (SAE). Distance from the wall may be arbitrary and distance from the bottom is recommended min. 10 mm.
- Under the flange of the level, it is necessary to put in the **rubber gasket** resistant to petroleum products (see. Accessories).
- On the area of contact seals the tank flange is applied **silicone sealant** resistant to petroleum products. It is recommended to apply sealant Gasket seal from SOUDAL or Loctite 5922
- The sensor is mounted with screws M5 5. Recommended **tightening torque** of **5.5 Nm** for the bolts of material type 8.8 (8G).
- Measurement range sensor is adjusted by applying a magnetic pen on sensitive pads (see Instructions). Measuring the level of **other media** (biodiesel, oil, etc.) **must be consulted with the manufacturer** (readjustment of the level meter).
- The level meter can be also used for **similar applications** in stationary tanks, containers, etc

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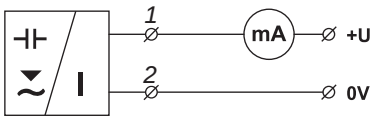
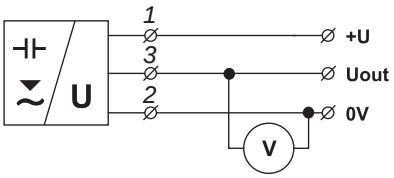
## Electrical connection

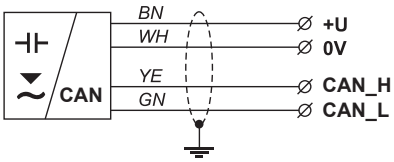
The level meter is designed to be connected to processing (display) units through PUR cable. Cable glands may be in design “V” with a spiral relief in case of increased mechanical wear on the cable or in variant “H” with cable gland for protected hoses. Wiring diagrams are shown in the following pictures.




*Level meter with current output connection (I)*




*Level meter with voltage output connection (U)*




*Level meter with CAN line output connection*

*Wiring colours:*

*1,2,3 – Nr. of cable*
*BN – Brown*
*BU – Blue*
*WH – White*
*YE – Yellow*
*GN – Green*
*– Cable shield*

## Areas of application

**Capacitive level meter CLM®** is intended for continuous measurement of the level of fuel (diesel) in tanks of trucks, construction and agricultural machinery, locomotives etc. After consultation with the manufacturer can be used for measuring and other non-conductive liquids (eg .: biodiesel, oil, etc.).

## Order code

**CLM – 40N – 40 – □ – □ – □ E □** cable □ ——— *cable length in m*

*electrode length in mm*

**Connection method:**
V – *plastic cable gland with spiral*
H – *plastic cable gland for protective hose*

**Type of output:**
I – *current (4 ... 20 mA)*
U – *voltage (0 ... 10 V)*
CAN – *digital line CAN SAE j1939*

**procesní připojení:**
F5 – *flange with 5 holes*
G – thread *G 1“*

## Correct specification examples

CLM–40N–40–F5–I–V E1000
(N) performance to normal area; (40) rod electrode with reference tube; (F5) flange with 5 holes; (I) current output (4 ... 20 mA);
(V) cable gland; (E1000) length of electrode 1000 mm

CLM–40N–40–G–CAN–H E800
(N) performance to normal area; (40) rod electrode with reference tube; (G) thread G 1“; (CAN) digital line CAN;
(H) cable gland for protective hose; (E800) length of electrode 800 mm

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## Accessories

***Standard – included in the level meter price***

- magnetic pen MP-8
- free-to-download programme Basic Scada Fuel meter (pro verzi CAN)

***Optional – for extra charge***

- extra cable (over the standard length 2 m)
- rubber seal CLM-40 5 otv NBR (for flange with 5 holes)
- converter UCC-011 (for version CAN)
- protective hose (for version with connector H)

## Safety, protections and compatibility

Level meter CLM–40 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.

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