



USER GUIDE

CAPACITIVE LEVEL SENSOR (CLS) WITH ALARMS

This level sensor is an innovative capacitive sensor, protected by an international patent valid (EU Pat.N. 1657533)

The Capacitive level sensor (from this point on referred to as CLS) is the evolution of the classic level sensors with movable float. Protected by an invention patent, it exploits the variation in capacity as the height of the liquid level in the tank varies. Its strengths:

- Absence of moving parts, therefore greater reliability.
- Greater precision in measurements.
- Minimum power consumption.
- Operation mode can be set through configuration jumpers, 4 different combinations are available.
- Presence of 2 alarm outputs, with current protection.
- Temperature range 0°C - 70°C.
- High resolution in level measurement (>1000 steps on a 36cm probe).
- Output with accuracy +/- 1% (depending on tank and fuel condition).
- High accuracy.
- Tested on Mercury, Yamaha, Osculati, Vetus, Uflex and NMEA2000 instruments (with converter).
- Self-powered on the sensor line (**Patented**). Note: Some instruments may not provide adequate power; for these cases the terminal is provided for power.



Depending on the model (see Technical Specifications table) it is suitable for measuring the level of **fuel**, **clear fresh water or black water** contained in a tank.

It is available in different sizes (from 10 to 100 cm and on request up to 240cm) and works with 12V or 24V power supply.

It is compatible with most of the instruments on the market today:

- **3-180 Ω (resistive type EU)**
- **240-33 Ω (resistive type US)**
- **300 – 10 Ω resistive**
- **4-20 mA (current loop referred to ground)**
- **NMEA 2000 (with converter)**

It has two active alarm outputs: vacuum alarm (active when the reserve level is reached) and full alarm (active when the maximum level is reached)

It is IP68

Available models:

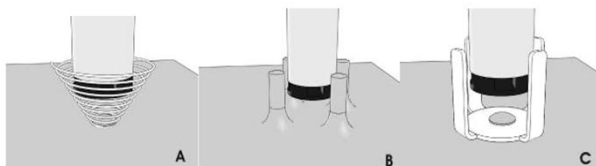
Model	Code	Output	Alarms (min 20% and max 80%)
CSL for fuel	PCHG2AXXX	3 – 180 Ω	Yes
		240 – 33 Ω	
		300-10 Ω	
		4-20mA	
CSL for white and black water	PHWG2AXXX	3 – 180 Ω	Yes
		240 – 33 Ω	
		300-10 Ω	
		4-20mA	

XXX= dimensions in cm (see table "Technical Specifications")

INSTALLATION INSTRUCTIONS

Before proceeding with the installation, it is necessary to verify that:

- The no-load voltage of the indicator instrument is between 5 and 18Vdc; in the case of connection to the external power supply the voltage must be between 12 and 24Vdc
- the indicator tool to be used is among the compatible ones indicated in the **Technical Specifications** table on the back of this manual.
- The tank holes are compatible with the flange, bivalent (SAE flange 5 holes and threaded fitting BSPP 1" 1/4) a minimum distance is guaranteed between the bottom of the tank and the lower end of the CLS (see **Technical Specifications** table).
- For CLS models whose probe length exceeds 50cm, it is recommended that the lower end of the sensor be properly attached to the bottom of the tank. Pic.1 below offers some tips for the correct attachment of the CLS sensor to the bottom of the tank.



Pic. 1

GUARANTEE

The warranty covers only product defects and is limited to its repair or replacement.

For full conditions see: http://www.sic-divisione-elettronica.it/sic_ita/scheda_prod.php?Cat=12&Cod=229

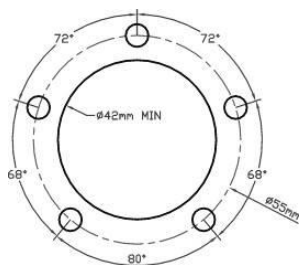
It is the installer's responsibility to verify the compatibility of the capacitive sensor with the instrument before installation in order to ensure correct operation in compliance with the instructions in this manual.

PRECAUTIONS

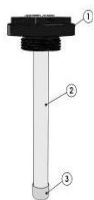
Connect the CLS sensor only after it has been installed on the tank.

Maximum absorption of the alarm device, when connected, must be lower a 150 but. If absorption exceeds this limit, it is necessary to adopt the circuit with proposed relay in the following examples. Exceeding the current limit results in disabling for protection of CLS sensor for 30 seconds. Persistent overload condition can damage CLS sensor. The terminal placed at the lower end of the pipe absolutely must not be removed.

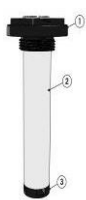
TECHNICAL CHARACTERISTICS



Pic. 4



Pic. 2



Pic. 3

Technical Specifications	
Max absorbed current	max 100 mA
Working temperature	0°C ... 70 °C
Compatible tools (see Code)	3-180 Ω (resistive type EU) 240-33 Ω (resistive type US) 300 – 10 Ω resistive 4-20 mA (current loop referred to ground)
Maximum alarm load	Max 2 X 150 mA
Connections	5 x Faston 6.35mm: GND = mass of the plant S = sender Batt += power In 5 – 32V (not necessary when connected to an analog or low-impedance instrument) A1 = low level alarm (max 150mA open manifold) A2 = high level alarm (max 150mA open collector)
Code XXX=probe length (10 to 100 cm) CH= Fuel HW=White/black water	PCHG2AXXX, PHWG2AXXX E.g. The PHWG2A025 model can be used for white and black water, has a probe length of 25cm and is compatible with instruments and indicators of the 4 ranges above (3).
Recommended minimum distance from tank bottom	1 cm: tank / tank H<30 2 cm: tank/tank 30<H<60 3 cm: tank/tank H>60

The choice of materials used guarantees a highly reliable product resistant to corrosion of the liquid for which it is intended to be used (see table **Technical specifications**).

The plastic flange, resistant to hydrocarbons, is bivalent: it has 5 holes of \varnothing 4mm for the fixing screws, but also has thread for insert if present on the tank. There is both a flat gasket and an O-ring in the box, so you can assemble the CLS in both possible ways.

START UP AND USE

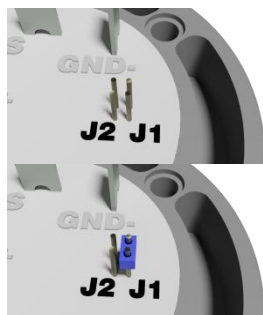
For installation on the tank follow the subsequent steps:

- 1) If not present, drill a hole with a diameter of \varnothing 42 mm necessary for inserting the capacitive CLS probe and 5 holes of \varnothing 4mm for the fixing screws, using the sensor flange as a template (see Fig. 4) for holes.
- 2) Interpose the supplied gasket between the flange and the tank, align the holes and fix everything with screws. **Pay particular attention to the alignment of the holes drilled and those on the sensor flange as they have a single position as per regulations.** Incorrect alignment may cause leakage of the liquid content.
- 3) Connect the sensor only after it has been installed on the tank. Never connect the S contact (sender) directly to the battery!
- 4) Select the desired reading range mode as shown in figures below. 4 combinations are possible.
- 5) Make the connection between the CLS and the gauge, paying close attention to polarity. To ensure correct installation, place the level sensor in the same direction as shown in figure 5 and identify the positive (BAT +) and negative (GND -) terminals. Then verify the correct working of CLS on the gauge.
- 6) After connection, please wait for the instrument stabilization for about 1 minute before reading the value.

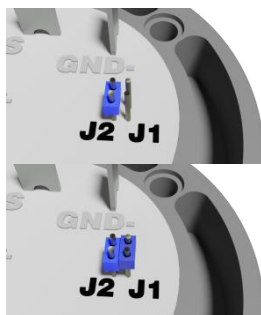


Pic. 5

Available reading ranges



EU mode
(3 – 180 Ω)



Modality
300-10 Ω



US mode
(240 – 33 Ω)



Current Mode
4-20mA

The operating mode is selected through the two jumpers according to the diagram shown above. Select the operation mode basing on the instrument to which it is connected.

IMPORTANT:

- **Select the mode with circuit off and battery disconnected!**
- **Never connect the S contact (sender) directly to the battery!**
- **The maximum absorption allowed for the alarm output is 150 mA; If the alarm device exceeds this absorption, use the relay circuit proposed in the following connection examples**

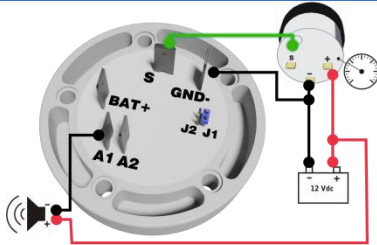
Connection examples

DISPOSAL INFORMATION

Pursuant to Article 13 DL 25/07/2005 n.151 dir. 2002/95/EC, 2002/96/EC. The symbol of the crossed-out bin indicates that the product at the end of its useful life must be collected separately from other waste. The equipment that has reached the end of its life must therefore be delivered to the appropriate separate collection centers for electrical and electronic waste. Adequate separate collection helps to avoid possible negative effects on the environment and health and promotes the reuse of materials.



Self-powered CSL sensor and n. 1 alarm



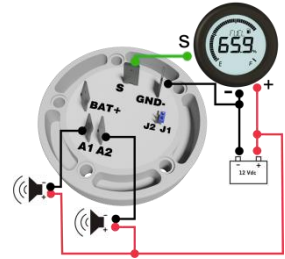
The negative pole of the alarm device must be connected to terminals A1 or A2 of the sensor

The positive pole of the alarm device must be connected directly to the 12Vdc battery and never to the S sensor terminals.

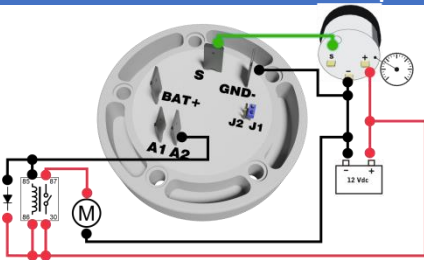
Self-powered CSL sensor and n.2 alarms

The negative pole of the alarm device must be connected to terminals A1 and A2 of the sensor

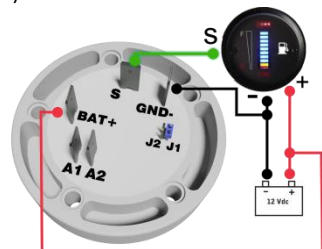
The positive pole of the alarm device must be connected directly to the 12Vdc battery and never to the S sensor terminals.



Self-powered CSL sensor with relay Alarm



Use this connection if the alarm device absorbs more than 150mA (e.g., emptying pump activated by overflow alarm)



Use this connection if the power supplied by the instrument is not sufficient to power the sensor. Alarm outputs are not indicated in this example; Please refer to the previous examples.

International Patent - Made in Italy

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