RS232 TYPE SENSOR

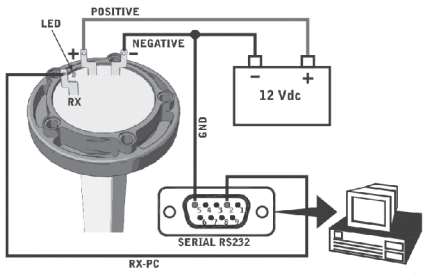

Fig. 9

Models of SDL PCHS1XXX and PHWS1XXX are equipped with an interface that allows the transmission of information (level of liquid in the tank) on standard RS232 at 9600bit/s (No Parity, 1 stop bit).
The transmitted package is composed of the following 8 fields:

	Name	Lenght (Bytes)	Value / Comment
1	Preamble	1	0x81, unless otherwise agreed with the customer
2	Lenght	2 (Word)*	8 (length of the field Data in Byte)
3	Session	1	0, unless otherwise agreed with the customer
4	Destination	1	199, unless otherwise agreed with the customer
5	Source	1	0, unless otherwise agreed with the customer
6	ID	2 (Word)*	0, unless otherwise agreed with the customer
7	Data	8	Liquid Level in %
8	CRC	2 (Word)*	Calculated started from the field following the Preamble up to the Data filed included. See algorithm.

Never connect directly the terminals of the serial interface to the battery cables!

Note:
****) The fields of the Word type (2 byte) contains the two byte inserted in reverse order.***

RS422 - RS485 TYPE SENSOR

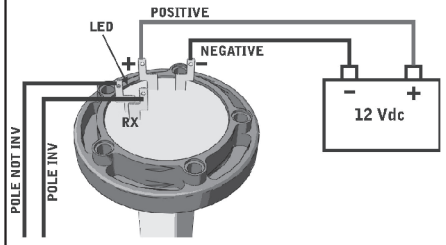

Fig. 10

Models of SDL PCHS2XXX and PHWS2XXX are equipped with an interface that allows the transmission of information (level of liquid in the tank) on standard RS485 or RS422 at 9600bit/s (No Parity, 1 stop bit).
The transmitted package is transmitted once per second and is composed of the following 8 fields:

	Name	Lenght (Bytes)	Value / Comment
1	Preamble	1	0x81, unless otherwise agreed with the customer
2	Lenght	2 (Word)*	8 (length of the field Data in Byte)
3	Session	1	0, unless otherwise agreed with the customer
4	Destination	1	199, unless otherwise agreed with the customer
5	Source	1	0, unless otherwise agreed with the customer
6	ID	2 (Word)*	0, unless otherwise agreed with the customer
7	Data	8	Liquid Level in %
8	CRC	2 (Word)*	Calculated started from the field following the Preamble up to the Data filed included. See algorithm.

Never connect directly the terminals of the serial interface to the battery cables!

Note:
****) The fields of the Word type (2 byte) contains the two byte inserted in reverse order.***

Algorithm for calculating the CRC

The procedure for calculating the CRC is as follows:

```
uint16_t     crc_ccitt_update   (uint16_   crc, uint8_t   data)
{
    data ^= lo8 (crc);
    data ^= data << 4;

    return((((uint16_t)(data   << 8)    hi8 (crc))^
(uint8_t)(data   >>  4)    ((unit16_t) data << 3));
}
```

and is used in the following way:

```
uint16_t calculate_crc uint8_t *data, uint16_ datalen)
{
    uint16_t 1;
    uint16_t crc;

    // Initialize the crc variable
    crc = 0xffff;

    // Call the crc update function for each byte in the
    //data
    for (i=0;  i<datalen;  i++)
        crc = crc_ccitt_update (crc, data[i]);

    return(crc);
```

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Rev. 20111027

USER'S MANUAL

CAPACITIVE LEVEL SENSOR WITH ALARM

Available Models:

Code	Output	White Waters	Waste Waters	Fuel	Alarm 20%	Alarm 80%	RS 232	RS 422-485
PCHG2AXXX	3-180ohm or 240-33ohm	NO	NO	YES	YES	YES	NO	NO
PHWG2AXXX	3-180ohm or 240-33ohm	YES	YES	NO	YES	YES	NO	NO
PCHK2AXXX	3-90ohm	NO	NO	YES	YES	YES	NO	NO
PHWK2AXXX	3-90ohm	YES	YES	NO	YES	YES	NO	NO
PCHAMPXXX	4-20mA	NO	NO	YES	YES	NO	NO	NO
PHAMPXXX	4-20mA	YES	NO	NO	YES	NO	NO	NO
PWAMPXXX	4-20mA	NO	YES	NO	NO	YES	NO	NO
PCHVOLTXXX	0-10Vdc	NO	NO	YES	YES	NO	NO	NO
PHVOLTXXX	0-10Vdc	YES	NO	NO	YES	NO	NO	NO
PWVOLTXXX	0-10Vdc	NO	YES	NO	NO	YES	NO	NO
PCHS1XXX	RS232	NO	NO	YES	NO	NO	YES	NO
PHWS1XXX	RS232	YES	YES	NO	NO	NO	YES	NO
PCHS2XXX	RS422 or RS485	NO	NO	YES	NO	NO	NO	YES
PHWS2XXX	RS422 or RS485	YES	YES	NO	NO	NO	NO	YES

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

This level sensor is capacitive and very innovative, protected by an international Patent valid worldwide (EU Pat. N. 1657533).

According to the model (see Datasheet table)it is able to measure the **fuel, fresh water or waste water** level contained within a tank.
- Is available in many lengths (from 10 until 100cm and upon request until 200cm).
- Is available in several models compatible with gauges:
  - **3-180 Ohm (resistive of the VDO type), no-load voltage from the coil of the gauge: 5÷18Vdc (see Fig. 6)**
  - **240-33 Ohm (resistive of the Standard type), no-load voltage from the coil of the gauge: 5÷18Vdc (see Fig. 6)**
  - **3-90 Ohm (resistive type), no-load voltage from the coil of the gauge: 5÷18Vdc (see Fig. 6)**
  - **4-20 mA (in current), supply: 5÷18Vdc (see Fig. 7)**
  - **0-10 v (in voltage), supply: 12÷28Vdc (see Fig. 8)**
- In the above models, there i san active alarm output when the reserve and/or incoming filling of the tank is being reached.
- Is IP65 rated.
- No need for calibration.
- Has an accuracy of about 2%. In the specific models for fuel, for instance, pollution of the liquid caused by the presence of water in the fuel, can cause significant changes compared with the correct indication of the level.
- Is available in models with serial communications, such as:
  - **RS232 (Fig. 9), supply: 5÷18Vdc**
  - **RS422/RS485 (Fig. 10), supply: 5÷18Vdc**

INSTALLATION INSTRUCTIONS

S.I.E.M. Capacitive level sensor (from this point onwards referred to as SDL) represents the evolution of the classical level sensors with mobile float.
Its working principle is based on the capacity variation depending on the variation of the liquid level height and the advantages are obvious:
- No moving parts and organs, hence increased reliability
- More accurate measures
- Minimum current consumption
- For the resistive type of SDL, the feeding is supplied to the sensor by the gauge (see Fig. 6), avoiding then the direct connection of the sensor to the battery **(S.I.E.M. patent)**

Prior to installation, it is necessary to verify that:
- Unless otherwise specifically noted, the gauge to be used is 12Vdc powered (the PCHG2AXXX and PHWG2AXXX models can be used also with gauges 24Vdc powered, provided that the no-load voltage of the gauge between the "S" terminal and the "-" terminal (see Fig. 6) is between 2,5Vdc and 20Vdc).
- The gauge to be used is among those compatible ones listed in the **technical specifications table** reported in the back of this manual.

- The holes of the tank are compatible with the 5 holes on the SDL flange, of the international type (see Fig. 5)
- A minimum distance between the bottom of the tank and the bottom of the SDL is guaranteed (see **technical specifications table**)
- For those models of SDL which length of the probe is over 50cm it is recommended to fix properly the bottom end of the SDL to the bottom of the tank.

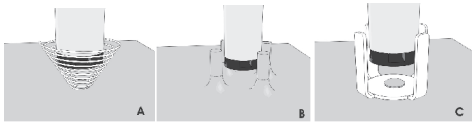

Fig. 1

In the following Fig. 1 are offered some suggestions for the correct fixing of the SDL to the bottom of the tank. If the latter is in metal, we recommended fixing it with the most suitable system to guarantee the electric isolation of the level sensor from the tank itself.

WARRANTY

The warrantly covers only product defects and is limited to its repair or replacement. For full terms, please see: http://www.sic-divisione-elettronica.it/sic_ita/scheda_prod.php?Cat=12&Cod=229
It is the installer's responsability to check the compatibility of the capacitive sensor with the instructions prior to installation to ensure proper operation in accordance with the instruction reported in this manual.

PRECAUTIONS

Connect the SDL sensor only after having installed it on the tank.
The maximum load allowed by the alarm system must be less than 100mA; alternatively, it is suggested to implement the circuit by a relay proposed in Fig. 2. If this limit is exceeded, the SDL enters the protection mode by going off for 30 seconds. The condition of persistent overload can damage the SDL.
The terminal of the SDL placed on the bottom end of the SDL for white waters and of the SDL for waste waters (see **(3)** in Fig. 3), as the terminal of the SDL for fuel (see **(3)** in Fig. 4) must not be removed in any way.

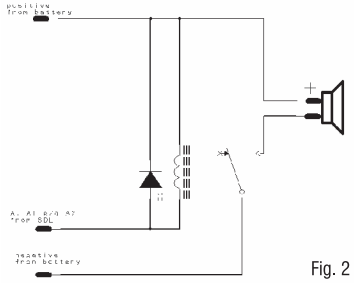
Fig. 2

START UP AND USE

For the installation on the tank, proceed as follows:
1) Make a 42mm diameter hole necessary to insert the probe of the capacitive SDL and 5 screw holes of ¢ 4mm for the fixing screws, using the sensor flange as a perforation template (see Fig. 5) for the holes.
2) Interpose between the flange and the tank the supplied gasket, align the holes and fix everything with screws.
3) The resistive type sensors **240-33 ohm** (PCHG2AXXX e PHWG2AXXX model) may become resistive type sensors **VDO 3-180 ohm** simply by cutting the JUMPER showed in Fig. 6.

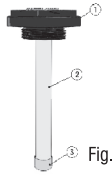
Fig. 3

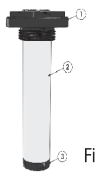
Fig. 4

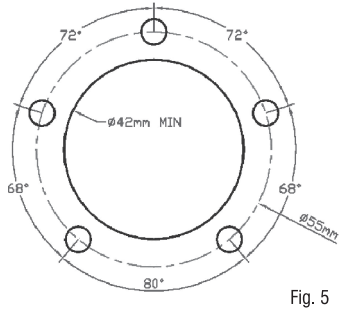

Fig. 5

4) Make the connection between the capacitive level sensor and the gauge respecting the polarity, then check the proper operation through visual inspection: 1) LED light turns on the flange in the 4-20mAmp, 0-10Vdc or the serial RS232, RS422 e RS485 models; 2)an incorrect indication of the gauge in resistive models (240-33 Ohm, 3-180 Ohm, 3-90 Ohm).
If the LED lights do not turn on (if present) or if there is a wrong indication on the gauge, it means there is probably an incorrect connection between the level sensor and the gauge. In this case, proceed by restoring all connections correctly.

TECHNICAL SPECIFICATION	
Maximum absorbed current	**Max 20mA**
Working Temperature	**0°C ... 60°C**
Compatible Gauges (see code)	**VDO (3-180 Ohm) Standard (240-33 Ohm) 3-90 Ohm 4-20 mA 0-10 Vdc**
Maximun load of the alarm	**< 100 mA**
Code (XXX = probe lenght from 10 to 100 cm) *CH = Fuel* *HW = white or waste Waters* *H = white Waters* *W = waste Waters*	**PCHG2AXXX (3-180ohm o 240-33ohm) PCHK2AXXX, PHWK2AXXX (3-90 ohm) PCHAMPXXX, PHAMPXXX, PWAMPXXX (4-20 mA) PCHVOLTXXX, PHVOLTXXX, PWVOLTXXX (0-10 Vdc) PCHS1XXX, PHWS1XXX (RS232) PCHS2XXX, PHWS2XXX(RS422 E Rs485) e.g.** the model PWAMP025 can be used with waste waters, the probe has a length of 25cm and is compatible with 4-20mA gauges
Recomended minimum distance from the bottom of the tank	**1 cm: tank/serbatoio H<30 2 cm: tank/serbatoio 30<H<60 3 cm: tank/serbatoio H>60**

TECHNICAL CHARACTERISTICS AND ASSEMBLY SCHEMES

RESISTIVE TYPE SENSOR

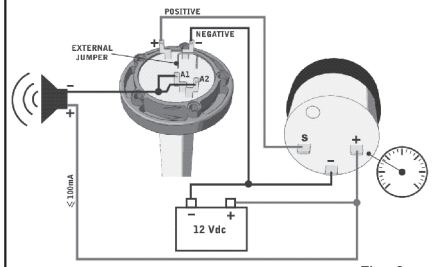

Fig. 6

Never connect directly a resistive type of sensor (Fig. 6) to the battery cables!

Resistive sensors (PCHG2AXXX and PHWG2AXXX models) are equipped with a jumper (see "External Jumper" in Fig. 6) useful for the choice of working with **STD 240-33 ohm** gauges (intact jumper) or with **VDO 3-180 ohm** gauges (cut jumper). It is also available a model compatible with **3-90 ohm** gauges (model PCHK2AXXX e PHWK2AXXX).
The models of SDL of type sensor are equipped with 2 alarm outputs (A1 e A2) actives, the first when the level of liquid contained into the tank is less than 20% and the second active if the level exceeds 80% of the capacity of the tank.
Note: The maximum absorption allowed for the alarm outputs is 100mA each; alternatively, it is suggested to implement the circuit with relays as proposed in Fig. 2.
NOTE: The negative terminal of the alarm device must be connected to terminals A1 and/or A2 of SDL sensor. The positive terminal of the alarm devise must be connected directly to the 12Vdc battery terminals and never to the terminals of the SDL sensor.

4-20 Ma CURRENT SENSOR

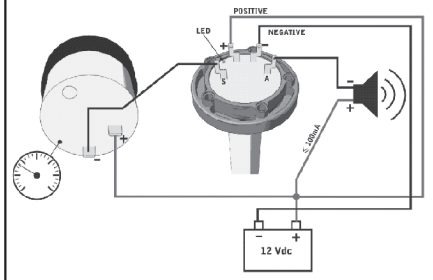

Fig. 7

Model of SDL PCHAMPXXX specifically meant for fuel and model PHAMPXXX specifically meant for white waters are equipped with an alarm output (A) active when the level of liquid contained into the tank is less than 20% of the capacity of the tank; while for the SDL model PWAMPXXX specifically meant for the waste waters the alarm (A) is active if the level exceeds 80% of the capacity of the tank.
On request, there is also a model with alarm active when the level of fuel drops by 5% in less than 5 minutes. This alarm is, for example, used to report the theft of fuel from the tank.
Note: The maximum absorption allowed for the alarm outputs is 100mA each; alternatively, it is suggested to implement the circuit with relays as proposed in Fig. 2.
Note: The negative pole of the alarm device must be connected to the A terminal of the sensor. The positive pole of the alarm device must be connected directly to the 12Vdc battery and never to the terminals of the SDL sensor.
Note: The terminal (S) of the level sensor must be connected to the negative pole of the gauge and never directly to the positive pole of the battery.

0-10 Vdc TYPE SENSOR

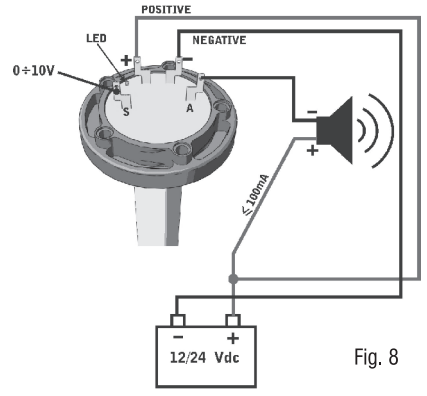

Fig. 8

Model of SDL PCHVOLTXXX specifically meant for fuel and model PHVOLTXXX specifically meant for white waters are equipped with an alarm output (A) active when the level of liquid contained into the tank is less than 20% of the capacity of the tank; while for model of SDL PWVOLTXXX specifically meant for waste waters the alarm (A) is active if the level exceeds 80% of the capacity o the tank.
On request, there is also a model with alarm active when the level of fuel drops by 5% in less than 5 minutes. This alarm is, for example, used to report the theft of fuel from the tank.
Note: The maximum absorption allowed for the alarm outputs is 100mA each; alternatively, it is suggested to implement the circuit with relays as proposed in Fig. 2.
The negative pole of the alarm device must be connected to the A terminal of the sensor. The positive pole of the alarm device must be connected directly to the 12Vdc battery and never to the terminals of the SDL sensor.
Note: the output 0-10Vdc of the SDL sensor is the terminal (S) (see Fig. 8)