

# LITRO-Sensor

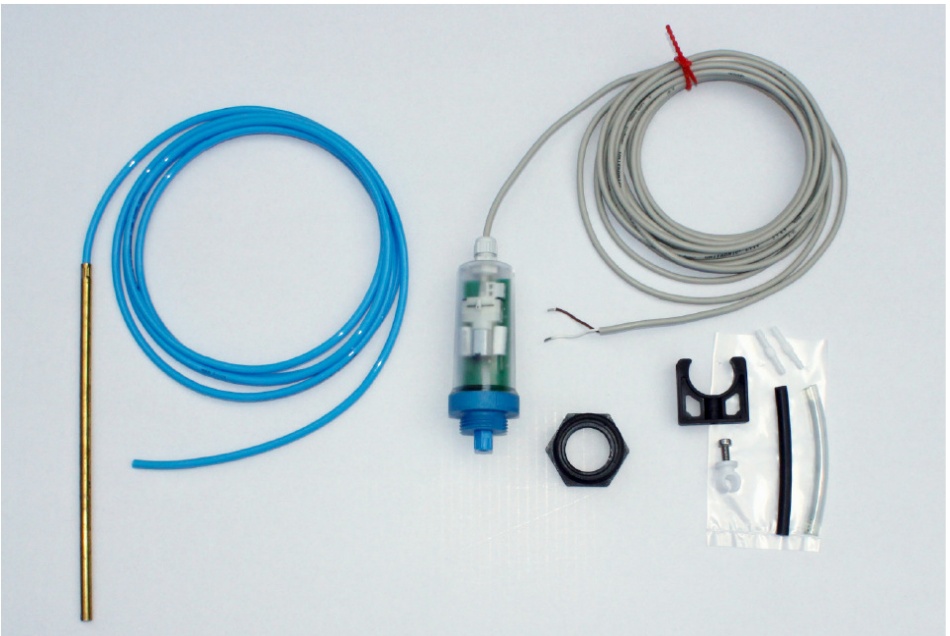
## Electronic pneumatic liquid level sensor

### Sensor principle und installation

- Measuring range: 0 - 250 mbar (0 - 25 kPa; up to 2.50 m water level)
- Signal: 4 - 20 mA (2-wire principle) / compatible with submersible probes
- Universal installable tank liquid level sensor for oil tanks and cisterns.

#### CONTENT:

1. Basics and connection
2. Function principle
3. Installation at indoor tanks
4. Installation at buried tanks
5. Bubbling pipe from sensor to buried tank
6. Initial charging
7. LED flashing status RED / GREEN
8. Technical data
9. Maintenance



## 1. Basics and connection:

The LITRO-Sensor is designed for liquid level measuring of liquids like oil and water. It uses the bubbling-through method with a hydrostatic pressure measurement placed outside the tank. The LITRO-Sensor automatically and autonomously controls the required bubbling-through process.

The sensor permanently transmits an electrical signal of 4-20mA, usually in combination with an **e-litro** reader. The sensor is also suitable for displaying devices like the Smartbox or the LX series or other measuring inputs with a two-wire principle, e.g. SPC.

The LITRO-Sensor performs a hydrostatic level measurement, i.e. the level pressure is relatively measured to the atmospheric pressure. Accordingly the measured tank needs to be ventilated and therefore permanently operated non-pressurized. In combination with oil tanks the LITRO-Sensor is installed within the fuel depot room on top or nearby the tank.

The sensor is connected to the reader using a white or blue wire for '+' and a brown or black wire for '-'. The sensor uses the electrical power supply from the 2-wire measurement signal and permanently transmits the measuring signal to the displaying device respectively the remote monitoring. The measuring hose gets periodically bubbled through by the LITRO-Sensor.

The weighted measuring hose needs to be placed to the tank bottom and may be cut to the required length. It gets periodically and automatically bubbled through by the LITRO-Sensor. An already existing measurement line to the tank might also be used. The LITRO-Sensor may also be connected to a pre-existing copper pipe by using hose connectors.

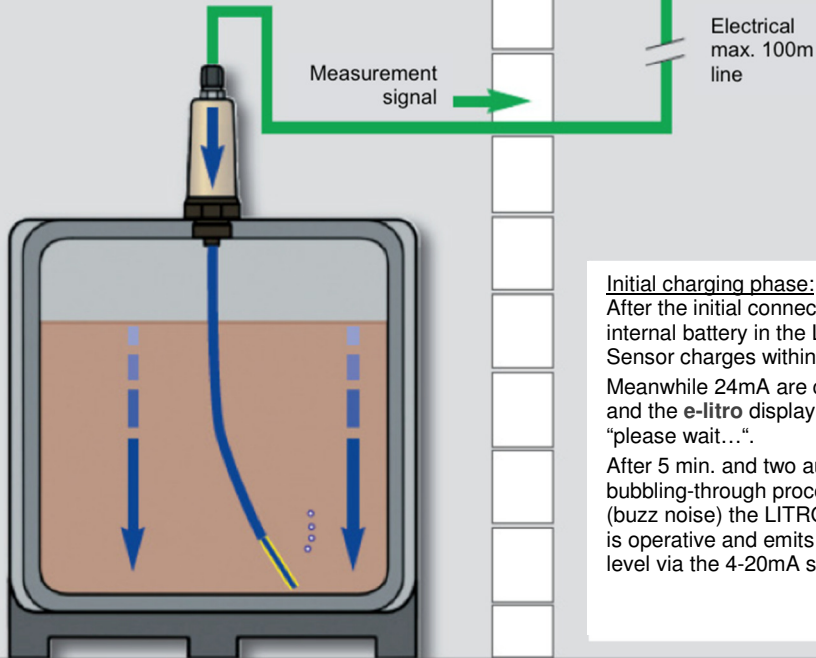


## 2. Function principle:

The innovative LITRO-Sensor uses a pneumatic and electrical measuring principle. With a short pumping action the integrated micropump presses air into the measuring hose which is placed at the tank bottom. Thereby the liquid is pressed out of the weighted measuring hose until the air bubbles out (bubbling-through method).

At the other side of the measuring hose the hydrostatic back pressure is detected in a permanent measurement by the LITRO-Sensor. The back pressure is equivalent to the liquid level.

The LITRO-Sensor automatically detects any changes in the measured values and causes short pumping intervals if necessary. This is indicated by a short buzz of the micropump and status LED flashing in the sensor.



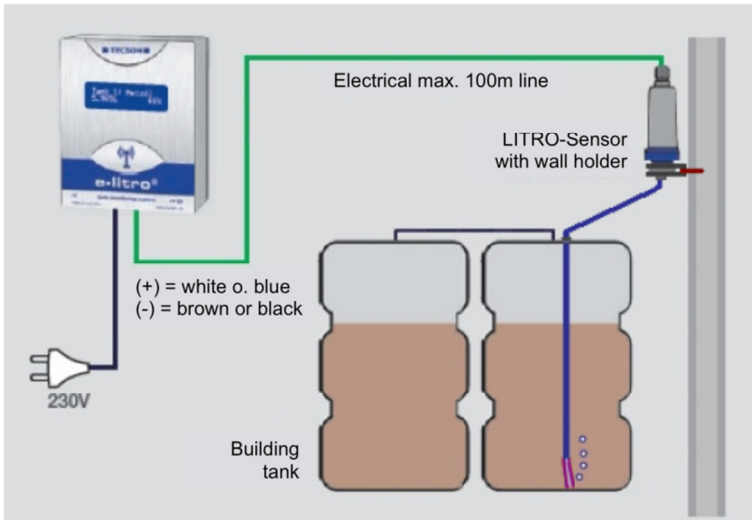
### Initial charging phase:

After the initial connection the internal battery in the LITRO-Sensor charges within 5 min. Meanwhile 24mA are charging and the e-litro display shows: "please wait...".

After 5 min. and two automatic bubbling-through procedures (buzz noise) the LITRO-Sensor is operative and emits the liquid level via the 4-20mA signal.

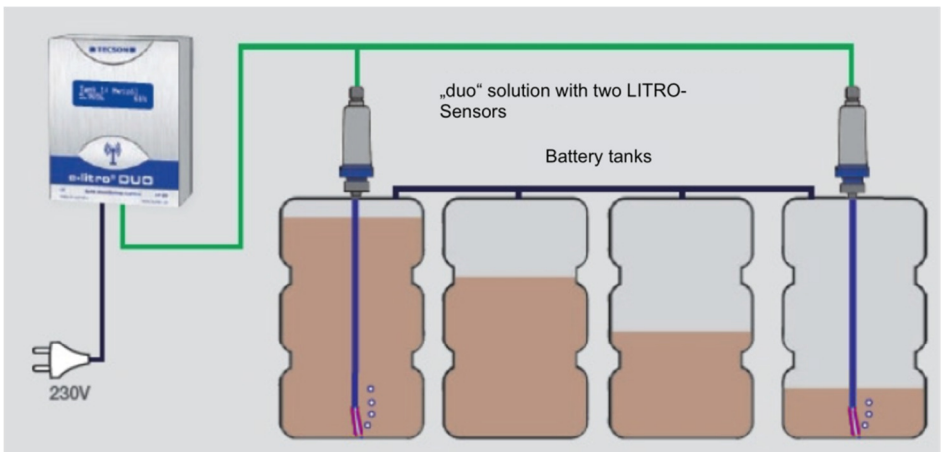
### 3. Installation at indoor tanks:

- Insert the measuring hose into the tank. The brass base should have contact to the bottom of the tank. It is recommended to add half a meter of hose into the tank, so the brass base lays down at the tank bottom.
- Cut the bubbling-through pipe to the required length and mount it to the LITRO-Sensor.



#### NOTIFICATION + WARNING:

The blue bubbling-through hose has a brass base and ends at the container bottom. When taking off the bubbling-through hose from the LITRO-Sensor do not drop the hose. There is a risk of liquid running out!



Directly screw the LITRO-Sensor on top of the tank if possible. Screw-in thread is G1" or G1.5".



Drill a 8mm hole if possible

Measuring pipe mounted in tank ventilation



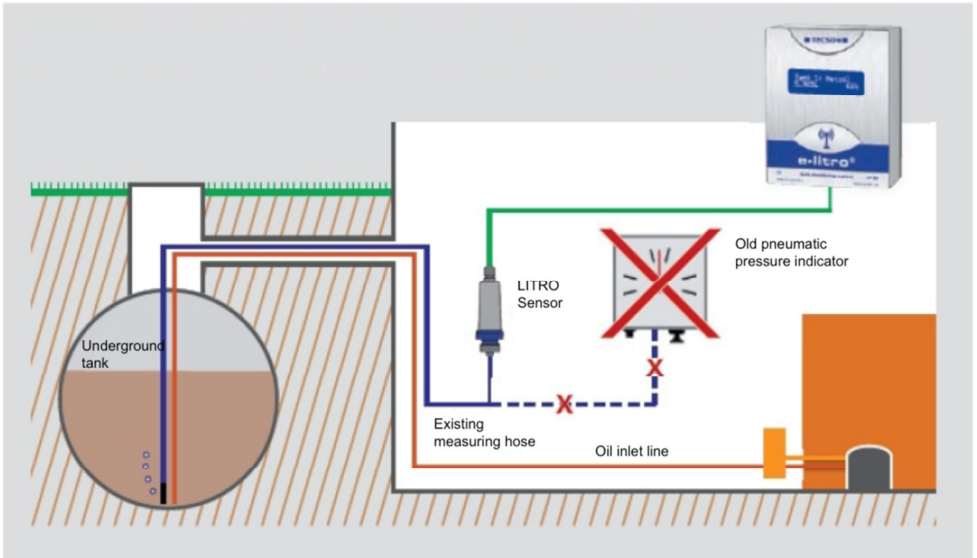
Mounting with wall holder



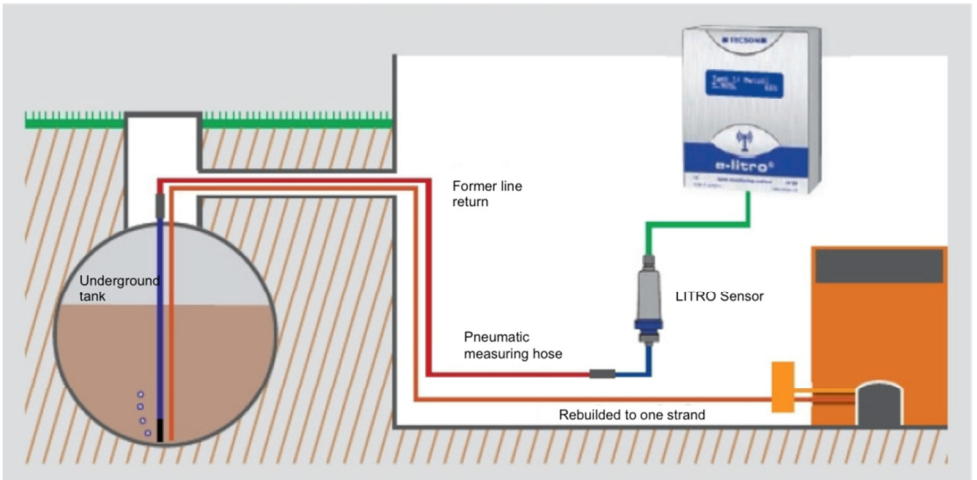
Mounting with oil pipe clip

#### 4. Installation at buried tanks:

- Refitting a pneumatic level indicator to a LITRO-Sensor:



- Refitting at a buried tank using a deactivated returning pipe (red) to the manhole pit:

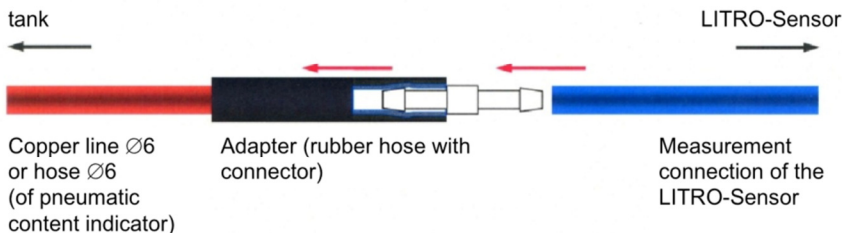


## 5. Bubbling-through pipe from sensor to buried tank:

Also refer to the figure on the previous page.

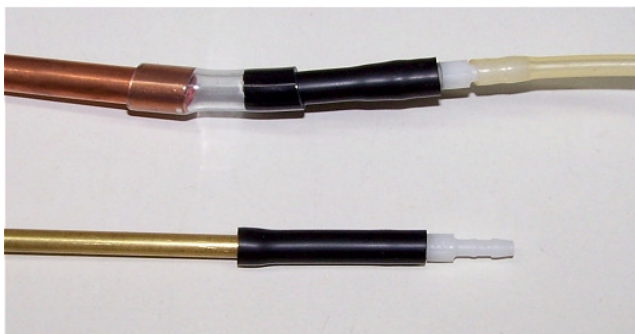
### I. Using an existing copper pipe to the oil tank / buried tank:

In many cases an existing brass pipe (CU 6mm) of a pneumatic level indicator can be used. Therefore a **tight connection** is essential.



### II. Using a former oil returning pipe:

After refitting to a 1-strand system the former returning pipe is now usable for the LITRO-Sensor as a pneumatic pipe. The connection from the 6mm tube diameter of the LITRO-Sensor to 8 or 10mm of a copper pipe can be realized in different ways. Tube pieces and connectors of different diameters can be used adequately.



#### Example:

Connection from CU 10mm or CU 8mm (external) to 6 mm hose of the LITRO-Sensor.

**Important:** The connections have to be tight, pressure resistant and dense!

## 6. Initial Charging:

<u>Start-up phase / Uniquely pre-charging phase of a few minutes</u>	
<b>Activation / Charging operation:</b>	<p><b>Wait for 5 min. after connecting the LITRO-Sensor!</b> (uniquely internal pre-charging phase of the internal rechargeable battery with 24mA signal).</p> <p>After the automatic bubbling-through processes (2 x buzzing of the internal micropump) the LITRO-Sensor emits the corresponding level signal as an analogue signal.</p>
<b>Operating status:</b>	<p>Status display with LED-flashing codes:</p> <p><b>Red-Green</b> = OK. New measuring value is present. New bubbling-through process will be executed soon. Please wait.</p> <p><b>Green n times</b> = OK-display.</p> <p><b>Red n times</b> = Error-flashing indication - Service Request!</p> <p><b>Green long</b> or <b>Red long</b> = Signalling a pressure decrease in the measuring hose in mbar (equivalent to the level decrease in cm).</p>
<b>Error status of LITRO-Sensor:</b>	<p><b>Red flashing indication: 2, 3, 5, 6 or 7 times.</b></p> <p>If after 3 bubbling-through processes the LED-flashing indication doesn't change to GREEN a system error has occurred. In this case please disconnect the LITRO-Sensor from the displaying device and reconnect after 10 seconds. Please also refer to the following page.</p> <p><b>Red flashing indication: 4 times.</b></p> <p>Please check measuring hose for blockages or sharp bends. Please also refer to the following page.</p>



## 7. LED flashing status RED / GREEN:

<u>State of operation / Flashing indication Green and Red</u>	
<b>Event display:</b>	
No LED-flashing of the LITRO-Sensor	Wait! Charging-phase, if properly connected.
<b>Parallel flashing</b> with 1 sec. interval. Impact: new pumping-/measurement operation in progress.	Bubbling-through is proceeding. Please wait!...
<b>Parallel-flashing</b> with 3 sec interval: Bubbling-through process was not successful. Please wait for next pumping procedure.	Bubbling-through process will execute again. Please wait for next pumping cycle (buzzing).
<b>Status indication Green flashing: <u>Green LED</u> = OK indication</b>	
<b>Green 1 x</b> - short flashing every 5 sec.	OK indication - Recharging after a bubbling-through process.
<b>Green 2 x</b> - short double flashing every 5 sec.	OK indication - Recharging <u>just before a new bubbling-through process.</u>
<b>Green 3 x</b> - short triple flashing every 5 sec.	OK indication - The LITRO-Sensor is ready and is working properly.
<b>Green for long - every 20 sec. 1 x long flashing</b>	<u>Control indication</u> of pressure holding. Control indication of hose leakage. The Green-duration in seconds is corresponding to the pressure leakage in mbar (≈cm).
<b>Error indication Red flashing: <u>Red LED</u> = Error indication</b>	
<b>Red 1 x</b> - short flashing every 5 sec.	Error Red 1: System leakage. Check bubbling-through pipe and all connections!
<b>Red for long - every 20 sec. 1x long flashing</b>	<u>Control indication</u> of pressure holding, Control indication of hose leakage. The Red-duration in seconds is corresponding to the pressure leakage in mbar (≈cm).
<b>Red 2 x</b> - short double flashing every 5 sec.	Error Red 2: No pressure at pumping process LITRO-Sensor is defective. (I = 4mA)
<b>Red 3 x</b> - short triple flashing every 5 sec.	Error Red 3: Low pressure. Depression in tank or internal defect of LITRO-Sensor. (I = 4mA)
<b>Red 4 x</b> - short 4-time flashing every 5 sec.	Error Red 4: Pressure too high. Measuring hose has blockage or sharp bend. Or fluid level is higher than measurement range (signal >= 22mA).
<b>Red 5 x</b> - short 5-time flashing every 5 sec.	Error Red 5: Miscellaneous internal failure: Internal electronic error ( I = 24 mA)
<b>Red 6 x</b> - short 6-time flashing every 5 sec.	Error Red 6: The internal charging process doesn't reach the target voltage ( I = 4 mA)
<b>Red 7 x</b> - short 7-time flashing every 5 sec.	Error Red 7: The sensor is not calibrated or has lost its calibration ( I = 24 mA)

**In case of an error please power-off the sensor for 10 seconds. Check the measuring hose.**

**If you cannot fix a Red-Error 2,3,5,6,7 repairing on-site is not possible.**

**In this case please send the LITRO-Sensor directly to the manufacturer TECSON for further inspection!**

**In case of Red-Error 4 do not send back the sensor. The fault should be fixed on-site.**

## 8. Technical specifications:

<b>Function principle:</b>	Bubbling-through sensor with hydrostatic level measurement
<b>Measurement range:</b>	0 - 25 kPa = 0 - 250 mbar up to 2.5 m water column and max. 2.90 m oil column.
<b>Electrical signal:</b>	4 - 20 mA, two-wire principle. The electrical measurement line of the probe can be extended up to 100m. Initial pre-charging phase: 24mA (loading time: max. 5 min.) Auxiliary voltage: 10 - 28 V dc, permanently applied!
<b>Measurement precision:</b>	The LITRO-Sensor supplies measurements with a deviation of less than 1 – 2 % of 250 mbar.  Reproducibility / variance: - typical: +/- 0,5 cm - absolute deviation: < 2 cm
<b>Reaction time:</b>	In the operating status the measurement interval is 2 s. During tank refilling or fast draining automatic bubbling-through processes are performed in short intervals.
<b>Electrical connection line:</b>	Ready for use with 6m two-wire cable: - white (or blue) = plus (Kl.1) - brown (or black) = minus (Kl.2). Cable extension up to 100m is uncritical. At risk of electrical disturbances caused by switching currents a shielded cable should be used.
<b>Bubbling-through pipe:</b>	Tube length including brass weight: 3.25 m, to be shorted, d = 6mm, If applicable: Sealing grommet can be used for 8 mm borehole. Pipe to be extended up to 40m for buried tanks (also refer to additional set with 20m PUR-tube + connector).
<b>Fluid applicability:</b>	All oils up to the normal viscosity. Not for EEx-Zone. All watery solutions, except AdBlue. Other liquids on request.
<b>Sensor protection class:</b>	Housing protection class of the LITRO-Sensor is IP30. Not applicable for wet room operation. Environmental temperature from 0 to +40 °C. In case of higher Fluid temperatures use a longer hose for more distance.
<b>Connection / Access:</b>	The LITRO-Sensor is equipped with a G 1 A thread, plus reducing ring for G1.5 A. Alternatively an 8mm borehole can be drilled through the mounting plate of the armature of plastic tanks.
<b>Delivery contents:</b>	LITRO-Sensor unit... - with 6 m cable (to be extended up to 100m) - with 3.20 m measuring hose, weighted. (to be shorted or to be extended up to 40m). - Including universal mounting accessories for steel tanks, plastic tanks and buried tanks.

## 9. Maintenance

<b>Maintenance:</b>	<p>The manufacturer recommends an annual accuracy check of the displayed measurements. For a simple check the bubbling-through pipe can be pulled up, so that the end of the measuring hose is above the liquid level. In this condition 0 litres should be displayed. Tolerance from the target value is &lt; 2%.</p> <p><b>Error case of the LITRO-Sensor :</b></p> <ul style="list-style-type: none"> <li>- power off the LITRO-Sensor for 10 seconds an retry.</li> <li>- check the measurement hose to the tank.</li> </ul> <p>On-site repairing of the LITRO-Sensor is <u>not impossible</u> in case of Error Red 2, 3, (not 4,) 5, 6, 7 referring to table at page 9.</p> <p><b>In that case please send the LITRO-Sensor <u>directly to the manufacturer TECSON</u> for further inspection!</b></p>
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<b>Sets and item numbers:</b>	<table> <tr> <td><b>LITRO-Sensor</b></td> <td>without displaying device</td> <td>Art.No. 13023</td> </tr> <tr> <td><b>Additional set for buried tanks</b></td> <td>20m measuring hose + accessories</td> <td>Art.No. 13026</td> </tr> </table> <p>Displaying devices for LITRO-Sensor: (Set incl. Litro-Sensor)</p> <table> <tr> <td>e-litro</td> <td>Art.No. 13032</td> </tr> <tr> <td>e-litro duo ( = e-litro with 2 sensors )</td> <td>Art.No. 13033</td> </tr> <tr> <td>e-litro gsm</td> <td>Art.No. 13601</td> </tr> <tr> <td>e-litro net</td> <td>Art.No. 13701</td> </tr> </table> <p><u>Data output / Data transfer:</u></p> <p>For serial data output a 'Link output adaptor' is needed:  'LINK Output Adaptor' plug-in module Art.No. 12038</p> <p><b>Alternative:</b>  Also a plug-in module for an analog output signal can be used.</p>	<b>LITRO-Sensor</b>	without displaying device	Art.No. 13023	<b>Additional set for buried tanks</b>	20m measuring hose + accessories	Art.No. 13026	e-litro	Art.No. 13032	e-litro duo ( = e-litro with 2 sensors )	Art.No. 13033	e-litro gsm	Art.No. 13601	e-litro net	Art.No. 13701
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### NOTES:

<p><b>LITRO-Sensor</b> without displaying device</p> <p>Art-Nr. 13023</p>	<p><b>TECSON GmbH &amp; Co. KG</b> Wulfsfelder Weg 2a D-24242 Felde Germany</p>	<p>Tel. (+49) 4340 / 402530 Fax (+49) 4340 / 402529 <a href="http://www.tecson.de">www.tecson.de</a> / <a href="mailto:info@tecson.de">info@tecson.de</a></p>
<p><b>CE</b></p>	<p>Declaration of conformity</p>	<p>Please refer to the CE-declaration of the manufacturer at <a href="http://www.tecson.de">www.tecson.de</a> among menu item 'Dokumentation'</p>



Fig.

**LITRO-Sensor**  
with 3m measuring hose,  
to be shorted or extended

