

# Installation Instructions and techn. Documentation

## Tank-Spion Digital LX-2 / LX-2-R / LX-Q

**LX-2** Tank monitoring device with level meas. probe.

**LX-2-R** With additional relay control functions.

**LX-Q** With 4 measuring inputs for up to 4 level probes



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## LABELING



Safety examination EN 61010-1 (2011)  
EMV examination: EN 61000-6-2 (2006)  
and EN 61000-6-4 (2011)

For Conformity Declaration refer to 'www.tecson.de'  
at menu item 'Documentation -> CE Declaration'.

## GENERAL

The tank content display device LX-2 or LX-2-R is to be used for monitoring of tank levels in pressureless liquid tanks. Additional functions to liter displaying are e.g. temperature measuring, data transmission or linking to facility management systems.

The LX-2-R type provides two additional output relays, e.g. for controlling an alert unit, for switching magnetic valve or for dry protection of the pump. For each of those relays opening and closing outputs are available.

### Level probe:

The LX-2 and LX-2-R sets are provided with 1 level probe each.

The LX-Q type offers 4 measuring inputs for up to 4 level probes. The LX-Q is ideal for sites with several tanks standing close together.

Monitoring: Individual content of each tank and total stock.

The level probe can be mounted by standard with a 1" or 1½" screw thread. For mounting in plastic tanks a grommet and a PG-screwing is provided.

Electric supply: 230V AC.

A special type of the monitoring device for DC 24V or DC 12V can be delivered.

The monitoring device has a LCD display by 2 x 16 characters.

The indicated values are not calibrated for billing purposes.

For the intended operation and to adhere the warranty the following instructions for mounting and use are to be followed and to be handed over to the user.

## MOUNTING INSTRUCTIONS

Only qualified persons are allowed to install the measuring probe and to connect the display device. Follow the regulation for each liquid, especially for the risk of water pollution and for flammable liquids.

Condition for proper operation of measuring device is a professional installation. Follow the technical rules for planning, construction and operation of the entire facility.

Additionally follow the rules of preventions of accidents by the government safety organizations and the instructions of mounting and operation of the storage tanks too.

- Condition for proper operation is a pressureless storage tank. The tank must have proper ventilation. Oil tanks and gasoline tanks must be equipped with a level limiter.
- The cable entry in the tank has to be made watertight and vapor tight appropriately.
- The measuring probe and display device are not security devices. They do not replace the level limiter of a tank.
- Installation of the display device in explosive zones is not permitted.  
Ask for an EEx-probe with Zener barrier. The tank level probe must be mounted inside the tank with a cable protection pipe.
- 230V AC: The display device is connected to the power supply. Operating is only permitted with closed box lid.
- Type 230V AC :  
The display device is connected to the power supply system and may normally only to be used with box cover closed.
- Type 12V / 24V DC:  
As a special model this device type is supplied by a low voltage power supply of 24 V (DC 20V-28V) or 12V (DC 11V-15V).

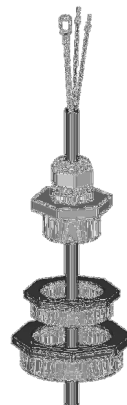
In case of inappropriate installation you lose any warranty.

## MOUNTING OF LEVEL PROBE

- In case of cellar steel tanks or subgrounded tanks use the included screwing joint for mounting the measuring probe.
- If an old fuel gauge was used dismount it and use the tank screwing port.
- Subgrounded tanks normally provide an idle screwing port. Dismount the dummy screwing.
- If there is no other appropriate opportunity the measure probe can be installed in the bearing pipe. We recommend the use of a 1" T pipe collar with a 1" nipple for the head of the bearing pipe.  
The cable of the measuring probe comes out of the T pipe collar on the side. Occasional bearing for control parallel to the cable of the measuring probe is still possible.

### Mounting:

- Switch off the oil burner and lock the suction pipe if necessary.
- Clear the screwing port of the tank.
- Put the cable of the probe through the screwing joint. Put the measuring probe into the tank.
- Mount the screwing joint with PTFE sealing tape.
- Sink the measuring probe down to the ground of the tank. Fix the cable with the PG screwing. The measuring probe may optionally lay or stand on the ground of the tank.
- Zero-point calibration is normally not required..
- If necessary unlock the suction pipe, switch on the oil burner and check the functions.



## ELECTRIC INSTALLATION

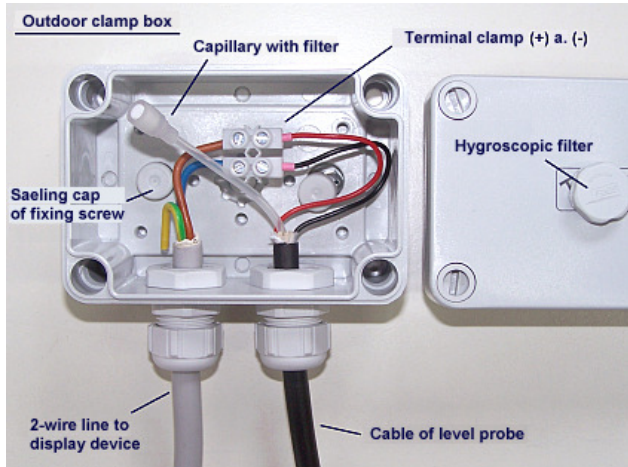
<p><b>Interconnection of measuring probe to display device</b></p> <p>Probe supply: Low-voltage DC</p> <p>Connection: Connect the 2-wire probe cable as follows: Red(+) =&gt; clamp 1 , Black (-) =&gt; clamp 2.</p> <p>Air capillary: The air capillary must have ventilation to atmosphere. The end of the probe's cable and the air capillary must be protected against humidity.</p> <p>Extension: The cable of the probe can be extended up to 100 m, e.g. with NYM or YR (damp location) or NYY (soil). Line diameter at least 2 x 0.4 mm<sup>2</sup>. In case of cable extension in a manhole pit or outdoors it is recommended to use a waterproof clamp box with special air pressure ventilation (accessories).</p> <p>Shielding: Near to power lines it is recommended to use a shielded probe signal line. (Cable shielding has to be grounded.)</p> <p><b>Supply voltage:</b></p> <p>Voltage: AC 230 V, 50 Hz</p> <p>Clamps: PE (protective conductor), N (neutral conductor), L (phase). Cable is not included in scope of delivery.</p>	<p><i>Refer to the figure on the following page.</i></p> <p><i>The capillary in the probe's cable must have ventilation. The capillary filter stays attached!</i></p> <p><i>Refer to probe instructions.</i></p> <p><b>Caution:</b> <i>Do never connect device type DC 24V or 12V to 230V.</i></p>
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## Probe box :

To be used

- outdoors
- in manhole pit (buried tanks)
- in damp locations.

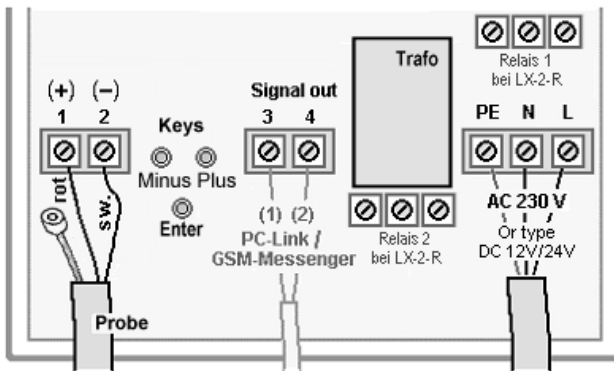
The probe box must be water-tight and ventilated (for pressure balance of the hydrostatic level probe).



## LX-2-R : Relay connection

The LX-2-R type has two relays for controlling external electric circuits or for alert signaling.

Under initial conditions the contacts of relays 6-7 and 9-10 are closed; relays 5-6 and 8-9 are opened. Refer to inscription on PCB inside the device.

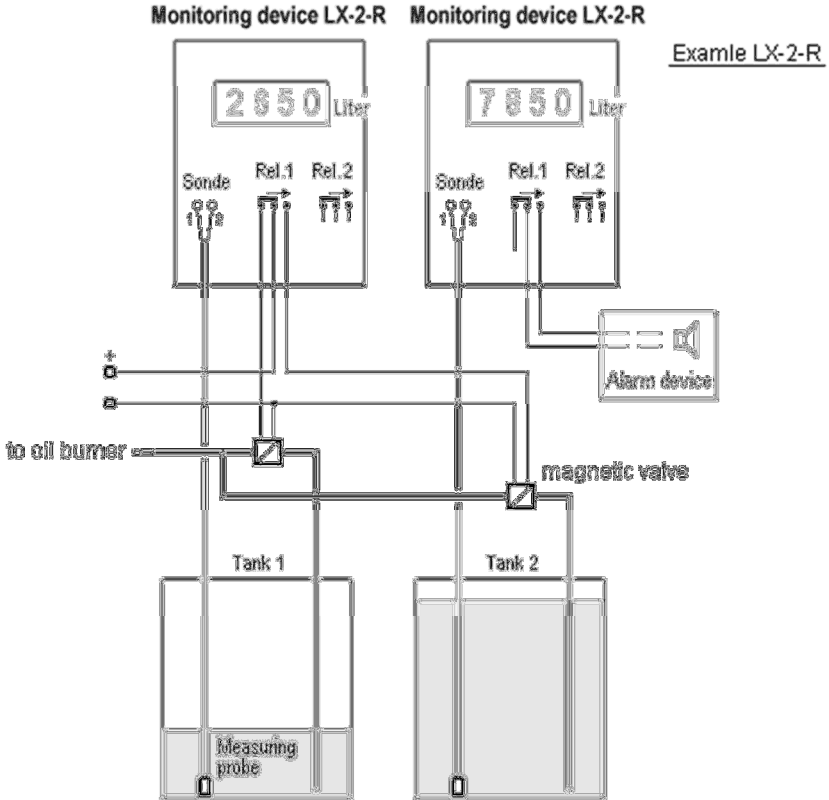


Relays under initial conditions in case of:

- breakdown of the device
- power outage
- fill level ( / temperature) above limit value

	<u>Initial state</u>	/	<u>Event state</u>	<u>Initial state</u>	/	<u>Event state</u>
Relay 1	Clamp 5 - 6 opened	/	Contact links	Clamp 6 - 7 linked	/	contact opens
Relay 2	Clamp 8 - 9 opened	/	Contact links	Clamp 9 - 10 linked	/	contact opens
Voltage	Max. 250 V AC					
Current	Max. 3,5 A					

# AUTOM. CHANGEOVER OF TANKS



## INITIAL SETUP

The initial setup is carried out after completed mounting.

Determine the tank data and enter them into the mode:

You find **3 push buttons** (blue) on the PCB positioned between the connection clamps.

- Press ENTER => Device enters the setup mode  
Displayed step „1. Measur probe“
- You can step through the menu items by pressing PLUS or MINUS.  
Press ENTER to step into a sub-menu.
- Press PLUS or MINUS for selection; press ENTER to confirm.
- After completing Step 7 you reach „8. Exit“.
- Press ENTER to exit the setup mode:  
The device returns to the display mode and shows the current stock.
- You find additional setup options in step 9 to 24, reachable by pressing PLUS.

## Setup / Programming :

You find the complete documentation of the setup in the enclosed leaflet,

refer to **Setup and Operation**

## FUNCTION CHECK

After fueling or once a year please check if the displayed liters are correct.

## MAINTANCE

It is recommended to check once year if the displayed liters are correct. For a simple check lift the level probe by the cable so that the probe is above the liquid level. In this state the device should display 0 liters (+tolerance). In case of large deviation we recommend to do an Offset calibration for the measuring probe again. Refer to the setup step "9. Offset probe" and if applicable to the setup "10. Trim height".

### **New level probe:**

In case mounting of a new level probe it is necessary reset to "default values" in step "9. Offset probe".

## ERROR CODES

Error E 1	Invalid value setup.
Error E 2	Measuring value of the probe is too low ! If current is less than 3.5 mA => Probe error.
Error E 3	Measuring value too high for probe offset/zero calibration. The probe must not be plunged! A probe's current above 4.5 mA is invalid as zero point.
Error E 4	Offset/zero calibration necessary for setup. Return to step 9 for calibration.
Error E 5	Set height is larger than tank height. (Wrong input.)
Error E 6	Current measuring value is too low as reference point. Make sure probe is plunged! Level height setup is too large (=> measuring value is too small). Execute again 9.Offset probe. Otherwise defect of probe!
Error E 7	Current measuring value too small for set corresponding tank height or tank volume. Make sure probe is plunged.
Error E 8	Current measuring value (or mA) is too high. Check electrical connection and check measuring range of the probe. Switch 230V supply voltage off and on. Check setup step 1 and 5. Execute again 9.Offset probe. Otherwise defect of probe.
Error E 9	Current value is 0 mA. Check probe connection (polarity) and electrical extension.
Error E10	Calibration error. Switch 230V supply voltage off and on. Else defect of probe.
Error E11	Warning – The liquid level in the tank is too low for an exact calibration. (Press OK to continue anyway.)

## TECHNICAL DATA

### Display device

Supply voltage:	Type AC : 230 V 50 Hz Type DC : 12V or 24V version	Power consumption: <= 2 VA
Measuring input:	4 - 20mA ; $U_0 = 20V$	Resolution 10 Bit. Accuracy: $\pm 1 \%$
Output via plug-in adaptor: (optional pug-in on mainboard)		<ul style="list-style-type: none"> <li>▪ 0 - 5 V DC or</li> <li>▪ 4-20 mA 2-wire (passive)</li> <li>▪ M-Bus Adaptor</li> <li>▪ LINK Adaptor for serial data output to PC-Link or H-Protocol-Box</li> </ul>
Dimensions W x D x H (Version LX-Q)	120x120x50 [mm] 208x120x60 [mm]	Box material: ABS Protection Rating: IP 65
Relay output LX-2-R :		Relay switching voltage: max. 250 V AC Relay switching current: max. 3,5 A

### Measuring probe (standard)

Voltage:	$U_b$ of probe 12-30V-DC <i>Measur. input of device: ~20V DC</i>	Protection Rating (probe): IP 68 referring to IEC 529
Materials:	V4A ; POM; FPM; HD-PE	Cable length: 5m (or 10m / 15 m / etc.)
Mounting orientation:	Vertically suspended, contact to ground of tank, or horizontal	
Temperatur range:	Liquid temperature: 0 °C to + 45 °C, higher on request	

## LIQUIDS

Liquids at ambient temperature and not aggressive towards wetted probe material			
<b>Heating oil</b>	<i>DIN 51603-1</i>	<b>Water</b>	
<b>Diesel oil</b>	<i>DIN EN 590</i>	<b>Glycerin</b>	
<b>Bio diesel oil</b>	<i>DIN EN 14214</i>	<b>Glycol</b>	
<b>Petroleum</b>	<i>After consulting !</i>	<b>Carbamide solution</b>	<i>e.g. AdBlue (DIN 70700)</i>
<b>Plant oil</b>	<i>After consulting !</i>		
<b>Motor oil</b>	<i>Used oil after consulting only!</i>	<b>Gasoline</b> flash point < 55°C	<i>Only with EEx-probe and Zener barrier!</i>
<b>Other</b>	<i>On request !</i>		

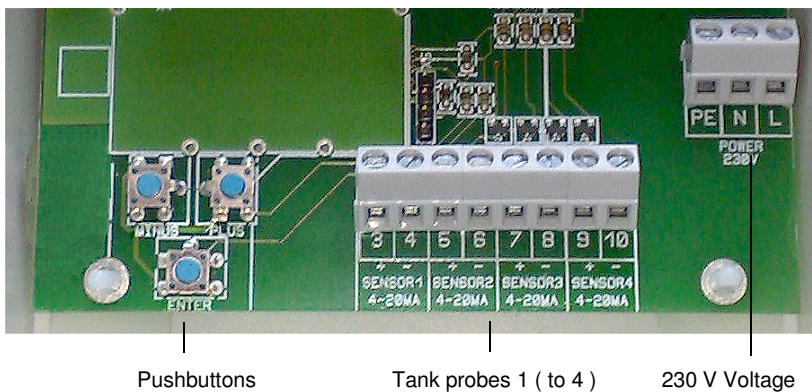
## ACCESSORIES

Order no.	Component	Application
12080	Clamp box IP 65, special, waterproof and ventilated	For extension of the probe's cable (outdoors) or in the tank's manhole pit.
12064	Output adaptor 0 - 5 V linearized / standardized	Retrofitable pluggable module. E.g. for facility management systems.
12065	Analog-output adaptor 4-20 mA, 2-wire passive	Retrofitable pluggable module. Current signal linearized / standardized.
12036 12037	PC-Link Lite PC-Link Extended (‘LINK output adaptor’ is needed!)	Add-on set for data transmission to a PC. Software for displaying and interpretation, incl. automatic generating of email messages.

## DEVICE TYPE LX-Q



Connections and clamps at Tank-Spion Quadro LX-Q :



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