# Installation Instructions and Techn. Documentation

**Electronic tank monitoring devices with data messaging**
**Tankspion LX-NET / LX-Q-NET / e-litro T NET**
**Tankspion LX-GSM / LX-Q-GSM / e-litro T GSM**
**Tankspion LX-EDGE / LX-Q-EDGE**


Content: Page:



**For LX-(Q)-Edge**
**everything is analogous as with LX-(Q)-GSM**

**For e-litro T NET**
**everything is analogous as with LX-NET**

**For e-litro T GSM**
**everything is analogous as with LX-GSM**

Firmware since 06-2023: Version V8.0(+)

## GENERAL

The electronical tank content display device of LX-Serie is to be used for monitoring of tank levels in pressureless liquid tanks.

This documentation is to be used for the LX-(Q)-Edge, LX-(Q)-GSM and LX-NET / LX-Q-NET.

**For the „Edge"-devices, everything is the same as for the „GSM"-version.**

Beside the liter monitoring several other functions are available, in most cases with an extra module or adaptor. These functions are temperature measuring, data transmission or bindung to facility management systems.

The devices LX-GSM and LX-NET provide an output relay. It operates automatically depending on the tank filling level. Besides it can be operated by remote control (telecontrol). The relay is able to control an alert unit, to switch a magnetic valve or to protect a pump from running dry. The relay has opening and closing contacts for switching two separate current circuits.

Level probe:

Die Geräte-Sets LX-GSM und LX-NET werden jeweils mit 1 Tankmesssonde geliefert.

The LX-GSM and LX-NET sets are provided with 1 level probe each.
The LX-Q-GSM and LX-Q-NET types offer 4 measuring inputs for up to 4 level probes. They monitor the individual content of each tank and total stock.
1" and 1½" tank screw connections are included for installing the measuring probe.

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.

## Device types:

The Q (quadro) device types provide 4 measuring inputs but no output relay.
The other device types provide only 1 measuring input and one output relay.

**LX-Edge + LX-GSM + LX-NET:**

These sets are usually delivered with one standard measuring probe.

**„Q"-device types:**

These „Quadro"-sets are presented usually without measuring probes. 1 up 4 measur probes are to be connected.

**LX-Edge + LX-GSM + LX-Q-GSM:**

These devices report the stocks via mobile data network messages.

(A) Either in SMS mode. A conventional mobile phone SIM card has to be used for this purpose.

(B) Or in MQTT mode with „Edge" via IoT protocol to the OilView logging server. At (B) the MQTT SIM card is usually already inserted at the factory. And the communication parameters are set. (B) is the technically newer variant. The MQTT SIM card is included in scope of delivery.

In 'SMS' operating mode, a target mobile number is set as the SMS target ( #T=... ).
In 'MQTT' operating mode or optionally also with 'SMS' combined with OilView connection, the device reports all telegrams to the www.oilview.de system. With this system the devices can be conveniently parameterized and events and alarms can be managed.

**LX-NET + LX-Q-NET:**

These device types have a LAN jack (RJ45) for direct Ethernet connection.
Inside your intranet the browser gets a HTML data page from the device. For calling the data page from Internet the router port must be forwarded.
Data binding to www.oilview.de web server is available too.

## MOUNTING INSTRUCTIONS

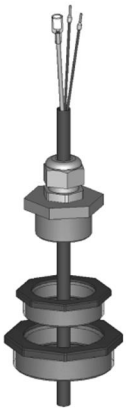
Only qualified persons are allowed to install the measuring probe and to connect the display device. Follow the regulation for each liquid, especially for the risk of water pollution and for flammable liquids.
Condition for proper operation of measuring device is a professional installation. Follow the 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 securety 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 steal 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 1ñT pipe collar with a 1ñnipple 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.

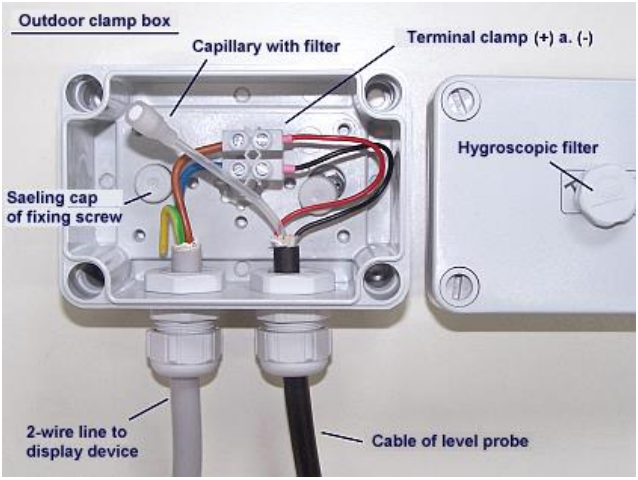
- Zero-point calibration is normally not required..
- If necessary unlock the suction pipe, switch on the oil burner and check the functions.

## Probe box:

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

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

Tecson part no.: 12080



## ELECTRIC INSTALLATION

**Interconnection of measuring probe to display device**

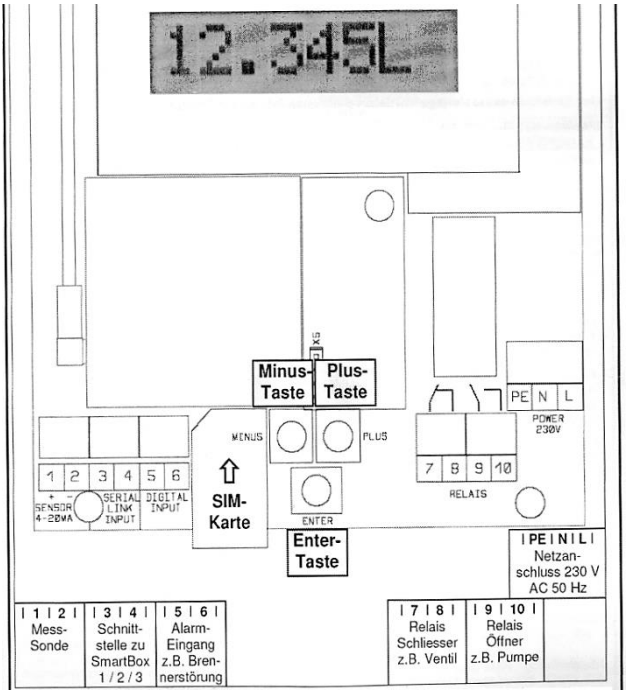
| | | |
|---|---|---|
| Probe supply: | Low-voltage DC | |
| Connection: | Connect the 2-wire probe cable as follows:<br>Red(+) => clamp 1 , Black (-) => clamp 2. | *Refer to the figure on the following page.* |
| Air capillary: | The air capillary must have ventilation to atmosphere. The end of the probe's cable and the air capillary must be protected against humidity. | *The capillary in the probe's cable must have ventilation. The capillary filter stays attached!* |
| 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 mm². 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). | *Refer to probe instructions.* |
| Shielding: | Near to power lines it is recommended to use a shielded probe signal line. (Cable shielding has to be grounded.) | |

**Supply voltage:**

| | | |
|---|---|---|
| Voltage: | AC 230 V, 50 Hz | |
| Clamps: | PE (protective conductor), N (neutral conductor), L (phase).<br>Cable is not included in scope of delivery. | *<u>Caution:</u><br>Do never connect device type DC 24V or 12V to 230V.* |

## CONNECTION CLAMPS

If LX-GSM and LX-NET



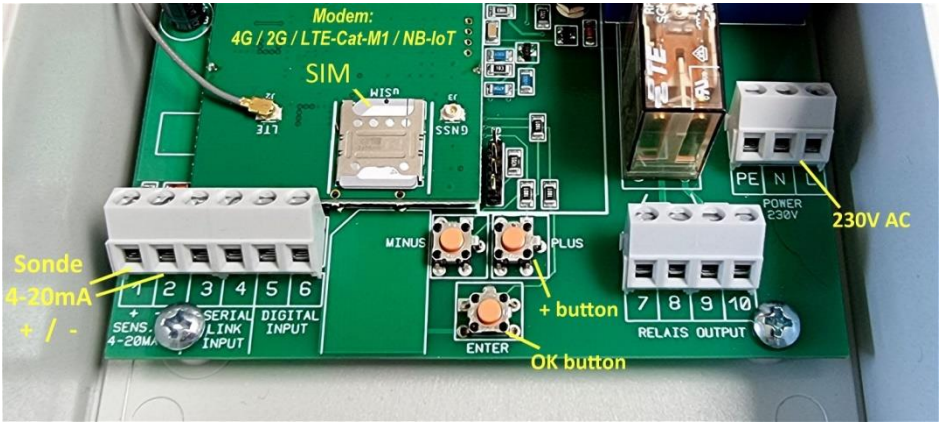

**Relay connection:**

The LX-GSM and LX-NET devices do have a double output relay. By this relay two separate electric circuits can be switched simultaneously, e.g. a signalling device on/off and an electric valve off/on too.
Under initial conditions the relay contacts 7-8 are closed and relay contacts 9-10 are opened.
In case of event the relay operates so both contact pairs switch over. Then contacts 7-8 do open and 9-10 do close.

At power outage or when the device goes out of order then the relay is under initial condition. in

| | *Inital state* | *Event state* |
|---|---|---|
| **Relay output** | Contact 7 - 8 links<br>Contact 9 - 10 opened | Contact 7 - 8 opened<br>Contact 9 - 10 links |
| **Schaltspannung** | Max. 250 V AC | |
| **Voltage** | Max. 3,5 A | |
| **Steuerfunktion** | 1. Function setting on the device under menu item ñ7. Relay".<br>2 (a) Remote control for LX-GSM:<br>(Only) with an SMS connection, then using the SMS command #S<br>2 (b) Remote control at LX-NET:<br>By calling up the device using a browser (IP) on the Config page. | |

## For LX-(Q)-GSM:




Clamps and SIM and push-buttons on LX-GSM device

### DEVICE MESSAGES / DEVICE PARAMETERS

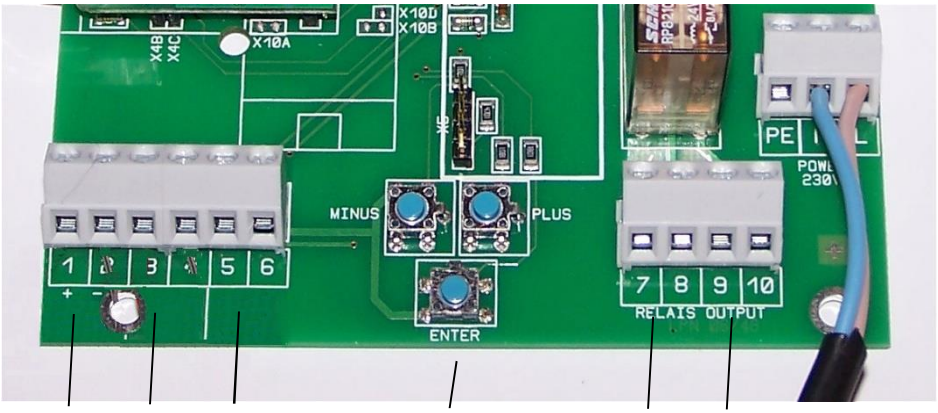
If the device is connected to OilView, also with the use of the app, everything is configured and managed in the OilView system, including the alarm forwarding.
In this case, there is no need for manual configuration using SMS commands.

If the device is not connected to OilView and works via SMS communication, refer to the attached additional documentation:

**ñMessages, Commands and Parametersñ**

## For LX-(Q)-NET:

### LX-NET connection clamps:




Probe | Serial-Link-In | Digital-In (Alarm) **Pushbuttons** Relay conttact pairs 230V supply

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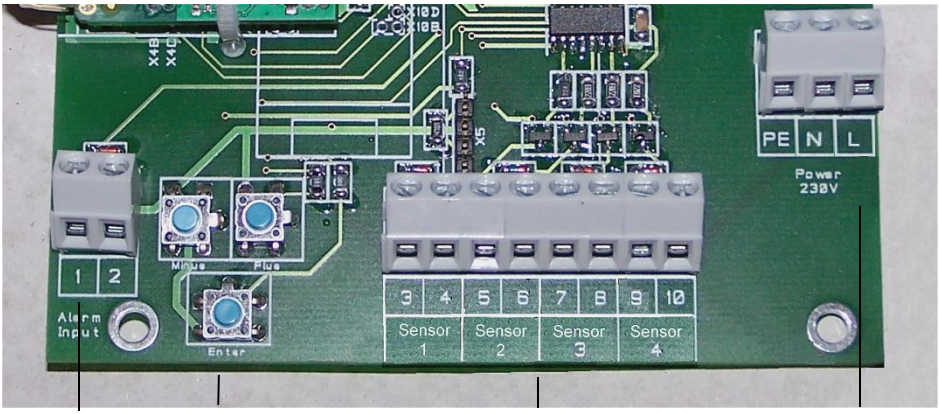
### LX-Q-NET connection clamps




Alarm input | **Pushbuttons** Measuring probes 1 ( to 4 ) 230V supply

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## 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 Ä1. Measur probeñ
- 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 Ä8. Exitñ
- 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 öPlusôbutton.

**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.

If there is a suspicion of a discrepancy, 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 ñ9.Offset probeò and if applicable to the setup ñ10.Trim heightñ

**New level probe:**

In case mounting of a new level probe it is necessary reset to ñdefault valuesò in step ñ9. Offset probeñ

## For LX-NET / LX-Q-NET :

### NETWORK CONNECTION

| | |
|---|---|
| **Netzwork connection:** | The LX-(Q)-NET device has a directly connectivety to LAN/Ethernet network with 10 / 100 Mbit TCP/IP protocol.<br><br>Inside the housing you find the RJ45 jack for connecting a CAT-5 network cable. The plug of the network cable has to be pushed through the inlet at bottom side of the housing. |
| **Additional documentation:** | See documentation ñ**Devices with network bindung**ñ<br><br>The LX-(Q)-NET supports DHCP protocol. The device should get a fixed IP. The network parameter setup has to be done at menu item ñ15.Networkñ<br>After that and after parameter setup at your network router the device can be called directly by a browser, via entering the device IP address in the address line of your browser. |

**Remote controlling of the relay:**

The LX-NET device supports a remote control function for the relay.

Since version V3.42 respectively V4.02 the output relay can be operated by remote commands from browser at the ôCONFIGôpage of the LX-NET device.


Deactive = No switching
Active = State depends on level.
On = Makes the relay operate (fix).
Off = Makes the relay release state (fix).

## BROWSER ACCESS

**Show content in browser:**

Entering the IP address in your browsers address line the device will be called:

**Parameter setup via Browser:**

Clicking the „CONFIG“button opens a next page in the browser.
Here you can setup serveral parameters for the device.


**Password:**

The inital passwort for config access at the device is: **tank**
The password is changeable here.
It is recommended to store an individual device password.

## ERROR CODES

| Error code | Meaning |
|---|---|
| Error E 1 | Invalid value setup. |
| Error E 2 | Measuring value of the probe is too low !<br>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 probeÕs 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.<br>Make sure the probe is plunged!<br>Level height setup is too large (=> measuring value currently is too small).<br>You may execute again 9.Offset probe. Otherwise defect of probe! |
| Error E 7 | Current measuring value too small for set corresponding tank height or<br>tank volume. Make sure probe is plunged. |
| Error E 8 | Current measuring value (or mA) is too high. Check electrical connection and<br>check measuring range of the probe.<br>Switch 230V supply voltage off and on. Check setup steps 1 to 5.<br>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 ï The liquid level in the tank is too low for an exact calibration.<br>(Press OK to continue anyway.) |
| Error E12 | Yet no measurement data is received from the external tanks 2 ... 4. Wait 2 minutes. |
| Error E12 | Yet no measurement data is received from the external tanks 2 ... 4. Wait 2 minutes. |
| | |
| | The following messages can occur with the 'e-litro' devices: |
| Error **E13** | No pump pressure measurable. De-energize the device, then switch it on and wait for one pump cycle. If the E13 error remains, then the micropump is defective. Otherwise send in the LITRO probe or sensor box!<br>Do not open(!) because it cannot be repaired on site. Loss of warranty if opened! |
| Error **E14** | Charging voltage too low. Wait 3 minutes.<br>If necessary, de-energize the device for 10s. |
| Error **E15** | No data from the SensorBox.<br>Possibly the signal line to the SensorBox is connected wrongly. |
| Error **E16** | Implausible measurement pressure dropping in one of the tank measurement lines (check!). De-energize the device for 10s or acknowledge E16 with the OK button. Otherwise SensorBox is defective. |
| Error **E18** | **Error display during maintenance test:**<br>The internal test pressure has not been reached!<br>The SensorBox of the secu4 or the LITRO probe must be replaced! |

| | LX-(Q)-NET: Error-Messages at network communication |
|---|---|
| Error N1 | No network communication. A problem with the internal network module. The device automatically executes an internal ôResetôand retrys initial communications. Try disconnection of network plug, waité and remount the network plug. |
| Error N2 | Error at the network comm.. Check connections at device and network router... Check parameter setup at menu item ô15.Networkô..ôPingô etc.<br>Try to connect another network device at this network cable, e.g. a Laptop.<br>If it does not work please contact your network admin.<br>Error N2 only occours in case of a domain like www.oilview.de is entered for destination. In case of entering an individual dest-IP, no Error N2 messages will be shown.<br>Important: The destination adress must be a fixed IP address. Otherwise the device retrys sending again and again. Periodically ôSending...ô will be displayed caused by an unreachable destination IP address. |
| Sending | ôSendingôis shown in the display in case of current sending of a data message. The messageôs dest. can be setup as an IP addr. at menu item 15.Network => Dest. Periodically ôSending...ôwill be displayed caused by an unreachable destination IP address. The destination should be a fixed IP address. IP + Port should be setup in correct manner. |

| | LX-(Q)-GSM: Error msg. of GSM / IoT module / SIM card / Mobile network |
|---|---|
| Error M0 | Internal modem is inactivated!. Setup via Menu item 15 é .<br>With older devices, entering the PIN 0000 completely deactivates the modem. |
| Error M1 | Internal modem communication error.<br>The device automatically executes an internal restart and retries the function.<br>If the M1 error comes again disconnect and reconnect the device power.<br>If M1 error persists send the device to the manufacturer for checking / repairing. |
| Error M2 | SIM card is not inserted or not readable or defective. Check the SIM card in a phone. |
| Error M3 | PUK code must be entered. Wrong PIN has been entered three times, so itôs locked!<br>To unlock, the PUK must be entered using menu item 15.<br>In case of a device older than V7.00 insert the SIM card in a mobile phone and enter the PUK code to unlock it. |
| Error M4 | Prepaid credit is empty. Please recharge. |
| Error M5 | No mobile network available for the SIM card. (An external antenna could help.) |
| Error M6 | Disturbance or network error when sending SMS. |
| Error M7 | Mobile network dial-up failed or has been rejected. |
| Error M8 | Interlock is active! In case of too many failed network logins after 7 days only 1 dial-in trial will be performed on a daily basis for 255 days maximum.<br>To unlock, call menu item 15, ... 'Send SMS' and select Y.<br>If successful, this unlocks the transmission lock again.<br>If necessary, briefly de-energize the device once and repeat. |
| Error M9 | No destination mobile number has been set up.<br>#T command has not been sent or OilView connection has not yet been linked. |
| Error M10 | Device cannot establish an Internet / IoT connection. |
| Error M11 | Device cannot establish a connection/communication to the (IoT) MQTT broker. |
| Error M12 | The 'ping' test communication failed. |

## TECHNICAL DATA

**Display device**

| | | | |
|---|---|---|---|
| Supply voltage: | Type AC : 230 V 50 Hz (standard)<br>Type DC : 12V or 24V version | | |
| Power consumption: | <= 4 VA, typically 2 VA | | |
| Measuring input: | 4 - 20mA; $U_0$ ca. 20V | Resolution 12 Bit | Accuracy: ± 1 % |
| Output via plug-in adaptor:<br>(optional pug-in on mainboard) | | ï 0 - 5 V DC or<br>ï 4-20 mA 2-wire (passive)<br>ï M-Bus Adaptor<br>ï LINK Adaptor for serial data output to H-Protocol-Box | |
| Dimensions W x D x H | 208x130x60 [mm] | Box material: ABS<br>Protection Rating: IP 65 | |
| Relay at LX-NET<br>or LX-GSM | Double relay<br>opening / closing: | Relay switching voltage: max. 250 V AC<br>Relay switching current: max. 3,5 A | |
| Internal network module<br>at LX-NET / LX-Q-NET | Ethernet 10/100 Mbit<br>Connection RJ45 network socket. | | |
| Internal cellular modem<br>at LX-GSM / LX-Q-GSM<br>NB-IoT cellular modem<br>at LX-(Q)-Edge | Up to V7.0: 3G / 2G mobile network modem.<br>Since V7.1: 4G / 2G mobile network modem.<br>Since V8.0: 4G / NB-IoT narrow band (with fallback 2G).<br>The functionally suitable SIM card (GSM) or Data-SIM in case of öEdgeô device must be inserted and must be registered. | | |

**Measuring probe (standard)**

| | | | |
|---|---|---|---|
| Voltage: | $U_b$ of probe 12-30V-DC<br>*Measur. input of device: ~20V DC* | Protection Rating (probe):<br>IP 68 referring to IEC 529 | |
| Materials: | V4A ; POM; FPM; PUR (or PE) | Length of cable: 5-6m,<br>(5m units of extra length deliverable) | |
| Mounting orientation: | Vertically suspended, contact to ground of tank, or horizontal | | |
| Temperatur range: | Liquid temperature: 0 °C to + 60 °C, higher on request | | |

## LIQUIDS

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

## ACCESSORIES

| *Order no.* | *Component* | *Application* |
|---|---|---|
| 12080 | Clamp box IP 65, special, waterproof and ventilated | For extension of the probeôs cable (outdoors) or in the tankôs manhole pit. |
| 12064 | Output adaptor 0 - 5 V linear-ized / standardized | Retrofitable pluggable module. E.g. for facility management systems. |
| 12065 | Analoge output adaptor 4-20 mA, 2-wire passive | Retrofitable pluggable module. Current signal linearized / standardized. |
| 12171 | M-Bus adaptor | Retrofitable pluggable adaptor for MBus communication. Pluggable in tank monitoring devices. Additional input clamp for PT1000 temperature sensor. |
| 12038 | LINK adaptor (Serial link out) | Retrofitable pluggable adaptor for serial data output to H-Protocol-Box or GSM-Messenger. |
| | | |
| *OilView-Account* | Data base and front end www.oilview.de | Web server for oil tank content management. Ask TECSON. |
| *Smartphone APP* | ôoil-SmartViewôApp. Refer to https://www.tecson.de/oil-smartview-app.html | Content management of oil tanks by the tecson app. |

## LABELING

| | |
|---|---|
| CE | The manufacturer TECSON declares the compliance with the valid safety and test guidelines (CE Declaration).<br><br>For Conformity Declaration refer to website www.tecson.de at menu item ôDocumentationô |
| **Disposal:**  | After dismantling all parts need to be disposed properly with regard to their material.<br>Dismantled parts do not belong in the household refuse but to the local recycling yard |


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