

Initial Setup and Operation

of Tank Monitoring Devices of 'Tank Spion LX' series

LX-2 / LX-2-R
LX-Q
LX-NET / LX-Q-NET
LX-GSM / LX-Q-GSM

software version V4.30 or higher
 software version V4.32 or higher
 software version V4.32 or higher
 software version V4.30 or higher



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Device setup and probe mounting

Concerning installation and mounting as well as regulations and operation please consult the corresponding device documentation.

The initial setup is to be carried out after completed mounting.

For the programming of the device the subsequent description is to be followed. Ascertain the holding tanks data beforehand. Enter them in the menu input steps.

To enter the menu mode from the display mode press the [Enter] push button.

To exit the programming confirm menu item 'Exit' (step 0 or 7 or 8).

So you will return to the general display mode.

Control elements and display

The monitoring devices of the LX-series are for tank content measurement and if applicable for data forwarding or transmission.

The setup of the device has to be completed once during the initial setup. After the initial setup the device operates in the display mode with closed cover.

Display panel

For device types of V4.xx the LCD-display consists of 2 rows of 16 characters.

The displays background lighting is green for the best readability at all lighting conditions.

Depending on the number of linked tanks or measuring devices the following display is resulted:

One tank:

Tank/Liquid	
Liter	Percent

Two tanks:

Liter-T1	Liter-T2
Perc.-T1	Perc.-T2

Three / four tanks:

Liter-T1	Liter-T2
Liter-T3	Liter-T4

For more than one tank the display of the single tanks can be set up additionally to the standard display above. Refert to menu item '14.Show tanks'.

For example as alternating display :

Tank-1 Name	
Liter	Percent

Tank-2 Name	
Liter	Percent

Total (L)	
Single% T1,T2,T3,T4	

Pushbuttons

The setup is to be carried out by three little blue pushbuttons: [+] [Enter] [-]

They are placed on the electronic PCB between the connecting clamps.

Language

The menu operating language is selectable in menu item 18 by pressing buttons

[Enter] [+] [+] [+]... [Enter] ...









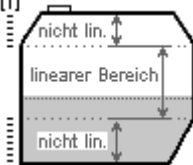
Setup / Programming

To enter the setup menu press the [Enter] pushbutton.
 The setup menu consists of the basic menu items 1 to 7.
 The specific menu items 9 to 24 contain extra adjustments.

To the device types LX-Q-NET and LX-Q-GSM more than one measuring probe can be linked for displaying. In this case the number of the tank is requested before the menu is entered.
 Enter the number of the tank by pressing [+] / [-].
 The following parameter adjustments refer to this tank number.

Press [+] to navigate to a particular menu item. Enter the parameterization of a particular menu item by pressing [Enter] and confirm the selected the value.

<u>Input function:</u> <i>Menu</i> <i>main functions</i>	<u>Description</u>	<u>For which</u> <u>type of</u> <u>device</u>																														
Preselection of tank number i	For more than one linked tank / measuring probe: select 'Tank number 1' ... up to 'Tank number 4'.	LX-(Q)-GSM LX-(Q)-NET LX-2 (-R)																														
1. Measure probe	<p>Setup range of the level probe:</p> <table border="1"> <thead> <tr> <th>range:</th> <th>max.height of oil tank</th> <th>Water column</th> </tr> </thead> <tbody> <tr> <td>100 mbar</td> <td>1,25 m</td> <td>1,00 m</td> </tr> <tr> <td>150 mbar</td> <td>1,85 m</td> <td>1,50 m</td> </tr> <tr> <td>200 mbar</td> <td>2,50 m</td> <td>2,00 m</td> </tr> <tr> <td>250 mbar</td> <td>3,00 m</td> <td>2,50 m</td> </tr> <tr> <td>400 mbar</td> <td>4,90 m</td> <td>4,00 m</td> </tr> <tr> <td>500 mbar</td> <td>6,00 m</td> <td>5,00 m</td> </tr> <tr> <td>1000 mbar</td> <td>12,0 m</td> <td>10,0 m</td> </tr> <tr> <td>2000 mbar</td> <td></td> <td>20,0 m</td> </tr> <tr> <td>5000 mbar</td> <td></td> <td>50,0 m</td> </tr> </tbody> </table> <p>Or 'Set mbar', for specific measuring range of the probe</p> <p>If 'by calibration' is displayed, 'Trim height' or 'Trim volume' has been executed in menu item 10/11 (probe not relevant).</p>	range:	max.height of oil tank	Water column	100 mbar	1,25 m	1,00 m	150 mbar	1,85 m	1,50 m	200 mbar	2,50 m	2,00 m	250 mbar	3,00 m	2,50 m	400 mbar	4,90 m	4,00 m	500 mbar	6,00 m	5,00 m	1000 mbar	12,0 m	10,0 m	2000 mbar		20,0 m	5000 mbar		50,0 m	(all) LX-2 LX-2-R LX-Q LX-GSM LX-Q-GSM LX-NET LX-Q-NET
range:	max.height of oil tank	Water column																														
100 mbar	1,25 m	1,00 m																														
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500 mbar	6,00 m	5,00 m																														
1000 mbar	12,0 m	10,0 m																														
2000 mbar		20,0 m																														
5000 mbar		50,0 m																														
2. Liquid	<p>Selection of measuring liquid (specific weight of the liquid): <u>Heating oil</u>, water, diesel oil , bio diesel oil, RME/FAME, rapeseed oil, palm oil, motor oil, AdBlue, regular gasoline, premium gasoline, ...</p> <p>Or enter the 'Density value' in <u>xxx</u> kg / m³. Use [+] [-].</p> <p>If the density value of the liquid is unknown calibrate the device via menu item '10.Trim height'</p> <p>If 'by calibration' is displayed, 'Trim height' or 'Trim volume' has been executed in menu item 10 / 11. In that case parameter 'Liquid' and the density is not relevant.</p>	all																														

3. Tank shape	Selection of the shape of the holding tank: A special geometry of the tank can alternatively be setup by a 'Bearing chart' for liter conversion.	all
	Linear Default: <u>Linear</u> tank. Rectangular tank; vertical cylinder; steel cellar tank.	
	Cylindric horiz <u>Cylindric</u> tank (<u>alternative</u> : Cyl. > 50m ³). Horizontal cylindric tank, up to 45 m ³ . Typical tank shape for outdoor tanks and subgrounded steel tanks.	
	Ball-shaped <u>Spherical</u> tank. Ball-shaped subgrounded tank; common subgrounded plastic tanks (GRP).	
	Oval <u>Oval</u> cellar tank. Typical shape of GRP tanks and single-walled tank	
	Convex <u>Convex</u> plastic tank, mostly as a battery. Slightly bellied tank shape	
	Concave <u>Concave</u> plastic tank, mostly as a battery. Cave-bellied tank shape.	
	Holed plastic Plastic tank with large cavity. Hollow in the middle of the tank's body. (No ring bandages)	
	Cyl. > 50m ³ Large <u>cylindric</u> outdoor tank with volume of <u>50.000</u> up to <u>100.000</u> liter. (<u>alternative</u> : 'Cylindric horiz.' - see above).	
Bearing chart (for input) <u>Value input</u> by a existing <u>bearing chart</u> for the tank	Reference table: Basic value table with up to 15 pairs of values 'cm => liter' for the non-linear regions of the tank. Step 4 (Tank volume) and Step 5 (Tank height) have to be set up beforehand. Value pairs for 0% (0.0 cm => 0 L) and 100% (tank height => volume) are already set and do not have to be entered again. Index [1] xxx.x cm => xxxx L Index [2] cm => L Index [n] cm => L Non-linear region: Enter several value pairs. Linear region: Enter only begin and end pairs.	Unsymmetrical or other tank shape. (i)  Individual tank shape

<u>Input function:</u> <u>Menu</u> <u>main functions</u>	<u>Description</u>	<u>For which</u> <u>type of</u> <u>device</u>
4. Tank volume	Enter the tank's volume by [+] [-]. (100% value) Preadjustment is 0 L . The value <u>must</u> be entered. In case of tanks > 1.000.000 <i>units</i> see menu item 12 too. <u>Attention:</u> If a bearing chart is available, please utilise total value. For a buried tank of ~100 m ³ it may be e.g. 100 600 liters.	all
5. Tank height	Enter the interior height of the holding tank in millimeters: e.g. 249.0 cm <u>Attention:</u> If a bearing chart is available it is recommended to take the max. value pair out of the chart. E.g. in case of a 100 m ³ subgrounded tank the exact value could be 288 cm.	all
6. Relay 1 or Exit	Switching function of relay 1: deactive /active / on / off - deactive Effect: The relay does not operate depending on the contents. No relay state is displayed or comes with the messages. - active Effect: The relay operates depending on the contents level. - on Makes the relay operate (fix ON). - off Makes the relay release (fix OFF). Example: <u>Switching point setup for 'active'</u> (with hysteresis): On 10% <input type="checkbox"/> Enter relay's operating point by + / - Off 15% <input type="checkbox"/> Enter relay's releasing point by + / - On +35°C <input type="checkbox"/> Enter relay's operating point by + / - Off +45°C <input type="checkbox"/> Enter relay's releasing point by + / - The relay is without switching function, if both values are set to 0% and the temperature switching points are set to 0°C.	LX-2-R LX-GSM LX-NET
7. Relay 2 oder Exit	Inputs for relay 2 are analog to '6. Relay 1', see above.	LX-2-R
8. Exit	Press [Enter] to leave the setup mode (parameter input).	all
Menu items 9 – 24	Steps 10 – 25 contain special settings.	all

After entering and setup of step 1 to 7 the standard programming is completed.
The device returns automatically to the usual display mode by confirming step '8.Exit'.
The display shows the present content of the tank.

Mount the device's cover after completing the initial setup!

Programming examples

Example 1 Cellar welded heating oil tank for 6000 L of heating oil, linear steel tank.
Interior height 165 cm, (current level: 125 cm) level probe 0 - **200 mbar**
Device LX-2-R: Relay 1 is to operate when rest stock is 500 liter (8%):

<u>Menu item</u>	<u>Input</u>
1. Measuring probe	200 mbar
2. Liquid	Heating oil
3. Tank shape	Linear
4. Tank volume	6000 Liter
5. Tank height	165.0 cm
6. Relay 1	Active => On = 8% ; Off = 10%
7. Relay 2	Deactive
8. Exit [Enter]	Display mode => ... 4550 L ... 76 %

Example 2 Subgrounded tank, cylindric horizontal, for 100600 liter of diesel oil,
Interior height 2.88 m, (current level 54 cm), level probe 0 - **250 mbar**
Device LX-GSM with SIM card:

<u>Menu item</u>	<u>Input</u>
1. Measuring probe	250 mbar
2. Liquid	Diesel oil
3. Tank shape	Cyl. horizontal > 50.000 L
4. Tank volume	100600 L (<u>exact value of bearing chart</u>)
5. Tank height	288.0 cm (<u>exact value of bearing chart</u>)
6. Relay 1	Deactive
7. (Exit)	Go on to the next step by pressing [+]
...	...
15. Modem	PIN: xxxx - Enter the PIN code of the SIM-card.
...	...
19. Exit [Enter]	Display mode => ... 12 800 L ... 13 %

Example 3 Font, 7,50 m max. water level from ground (present level 4,20 m)
Probe TDS-6131 (measuring range 0-1000 mbar), **display in m of water column.**
Device LX-2-R. Relay 1 has to protect the pump against running dry (switch off):

<u>Menu item</u>	<u>Input</u>
1. Measuring probe	1000 mbar
2. Liquid	Water
3. Tank shape	Linear
4. Tank volume	(Volume) Alternatively max. level 7,50 m 750.0 [] (enter by +/-)
5. Tank height	(Max.level) 750.0 cm (enter by +/-)
6. Relay 1	Active => 'On' for 99 % ; 'Off' for 10 % of the level.
7. Relay 2	Deactive
8. Exit [Enter]. . .	Go forward to next step by pressing [+]
12. Unit	Set display unit to 'm'.
13. Rounding	Automatically (keep setup).
14. Exit [Enter]	Display mode => ... e.g. ' 4.20 m 56 %'

Tank with interior mantle

In case of tank with interior mantle (e.g. horz. cyl. or cellar steel tank) correct the input values.
 Example: Mantle thickness ~ 0,5 cm to 1 cm => reduce interior height by ca. 2 cm

Volume 10 m³ => reduce volume by 3 %

Volume 20 m³ => reduce volume by 2.5 %

Volume 50 m³ => reduce volume by 2%

Volume 100 m³ => reduce volume by 1.5%

Setup special parameters

<u>Input function:</u> <u>Menu</u> <u>additional functions</u>	<u>Description</u>	<u>For which</u> <u>type of</u> <u>device</u>
Menu items 1 to 7	The menu items 1 to 7 are the basic setup of the devices. Some special settings like language or network parameters or others have to be set up via menu items 9 to 24.	all
9.Offset probe	Sub-menu a. ' Offset calibration ' (electrical zero point) b. 'Probe bottom gap' (position over ground) c. 'Bottom dead stock' (shall not be displayed) - ESC Exit this sub-menu. - Offset calibration: Stores signal value of probe's zero point. Probe must not be plunged. - Probe bottom gap: Distance x cm Standard is x = 0 cm , max = 99 cm - Bottom deadstock: <u>Succing</u> position over ground: y cm Standard is 0 cm , means total contents. y > 0 cm means dead stock height. - Default values: Resets all values back to standard 0.	all
10.Trim height	Input option for the reference height for calibration of probe and measurement device. It is usefull in case of unknown specific weight of the fluid. Enter the beared liquid level: xx.x cm (+ / - / Enter). After confirming with 'Calibrate: Yes', then in step 1+2 'by Calibration' will be displayed instead of a value. If this is done at a low tank filling level it is recommend to repeat this later again at a higher filling level. Also refer to 11.	all
11.Trim volume	Fine trimming of current liter value. Enter the beared liquid content as xxxx L (+ / - / Enter). Confirm with 'Calibrate: Yes'. If this is done at a low tank filling level it is recommend to repeat this later again at a higher filling level. Also refer to 10.	all

12.Unit	Choosable Units are: L (Liter), %, m, kg, t (Tons), IG (Imp.gallons), UG (US gallons). (+ / - / Enter). '%' or 'm' values are displayed with two decimal places.	all
13.Rounding	Automatically - Default setting for autom. rounding Without rounding - No rounding means highest resolution. Maybe wobbling values. A certain rounding is recommended => sedation. Or 2 / 5 / 10 / 20 / 50 / 100 [L] ist selectable.	all
14.Show tanks or Exit	- collective - Displaying tanks without shifting-over. Liters of tank 1 to n will be displayed together, see page 2. or otherwise - single / detailed - Displaying tanks with shifting-over. All connected tanks are shown in detail by shift-over one by one. L + % (+ temperature) are displayed. - +Sum Σ: Yes/No Liter stock of all tanks is displayed beside single tanks details; see p.2	(LX-GSM) LX-Q-GSM (LX-NET) LX-Q-NET
15.Network or 15. Modem	At LX-(Q)-NET : - DHCP . . . Sub-menu for network parameter setup like IP addresses, message destination and communication test. Please coordinate these settings with your network admin. See additional documentation 'network device connection'. ESC for sub-menu exit. At LX-(Q)-GSM: - Send SMS . . . A test SMS will be sent to the mobile number set by #T command. See additional documentation 'Messages, Commands a. Parameters'. PIN Shows the PIN No. of the SIM card. PIN = 0000 deactivates the internal GSM modem completely. ESC for sub-menu exit.	LX-NET LX-Q-NET LX-GSM LX-Q-GSM
16.Sort tanks / Clear tank	'ESC' / 'Tank n' Deletion of a registered tank: If device of LX-Q-... type detects a measure probe signal at the <u>next</u> input then this next tank no. will be registered. In this sub-menu it is possible to re-sort or to delete the registered tank numbers. Use + / - / Enter.	LX-GSM LX-Q-GSM LX-NET LX-Q-NET

<u>Input function:</u> <u>Menu</u> <u>additional functions</u>	<u>Description</u>		<u>For which</u> <u>type of</u> <u>device</u>
17.Input/Output	Alarm-In : ...	Choose the function of the alarm contact input: - Deactive Defines the alarm input to not operating. - Opening If input contact opens for > 1 min. then alarm case will be entered. - Closing If input contact closes for > 1 min. then alarm case will be entered.	LX-GSM LX-NET
	Data-Out : ...	Defines the data output at the adaptor slot. Choosable are: - Output of single tank data T1 / T2 / T3 / T4 => Applicable for analog adaptor. - output of all tanks T1 – T4 => Data of all tanks sequentially go to the output, e.g. for a PC-Link output adaptor.	LX-Q LX-GSM LX-Q-GSM LX-NET LX-Q-NET
18.Language	Language : ...	'German' / 'English' / 'ESC' + / - / Enter	all
	Text : ...	(suggestion:) <i>Name Tank 1</i> Characters changeable by + / - / Enter (suggestion:) <i>Name Tank n</i> Characters changeable by + / - / Enter (suggestion:) <i>Alarm Name</i> Characters changeable by + / - / Enter	all
19.Exit	Press [Enter] for returning to the displaying mode.		all
20. LCD display	By factory setup the contrast of the LCD display is a hexadecimal value of e.g. 24 . Contrast: XX		all
21. Device info	Shows Software version : V4.10 (e.g.) Serial no. : Tank i: SN=1234 (i = tank no.) Offset + Gain : X0=2980 B=1268 (for tank i)		all
22.Test current	Testing function for the current mA value of the measuring probe: e.g. ADC = 28A0 = 4.00 mA In case measuring probe is plunged the value should be near to 4 mA. Tolerance range is 3.7 ... 4.3 mA. If out of tolerance range see menu item 9.Offset probe.		all

23. Test relay	Testing function for relay switching: Relay 1 = Off / On + / - / Enter Same for Relay 2 at device type LX-2-R. + / - / Enter	LX-2-R LX-GSM LX-NET
24. Reset	Resetting of the device software: - ESC : Leaves this sub-menu without execution. - Restart : New initialization of the device software but parameter setup is left unchanged. - Factory setting: Complete resetting of all parameters back to the original state of delivery.	all
25. Configuration	Internal controlling parameters. Sensitive! Don't change them. Exit with 'Cfg:0' [Enter]	all
26. Exit	Return to displaying mode...	all

Error codes / error display

Message	Meaning
Error E 1	Invalid input value.
Error E 2	Measuring value of the probe is too small ! If current is less than 3.5 mA => Probe error.
Error E 3	Measuring value is too high for zero-point calibration or offset calibration. - The probe must not be plunged ! Probe's current higher than 4.5 mA indicates a problem with the probe.
Error E 4	Call step '9.Offset probe' and do the calibration once. Then retry settings.
Error E 5	Height input is larger than tank height. (Wrong input.)
Error E 6	The measuring value is too small for reference. Make sure the probe is plunged. Settled height is too large (or means the measuring value is too small for setting). Execute step '9. Offset'. If it doesn't work check the probe current (mA) !
Error E 7	The current measuring value is too small for the corresponding tank height or the volume input value. Make sure the probe is plunged.
Error E 8	The current measuring value (or mA) is too high. Check electrical connection and check the measuring range of the probe. Switch 230V supply off and on. Check input steps 1 to 5. Execute the zero-point calibration again (=> '9.Offset probe'). Otherwise change the measuring probe.
Error E 9	The current value is 0 mA. The probe's connection could be broken. Check probe connection (polarity) and extension. Measure the voltage at the probe (red to black).
Error E10	Calbration error. Switch off and on the 230V supply voltage and retry. Otherwise the probe is working not properly.
Error E11	Warning – The liquid level in the tank is too low for an exact calibration. (Press [Enter] to continue anyway.)
Error E12	Yet no measurement data is received from the external tanks 2 ... 4.

For device type LX-NET / LX-Q-NET:

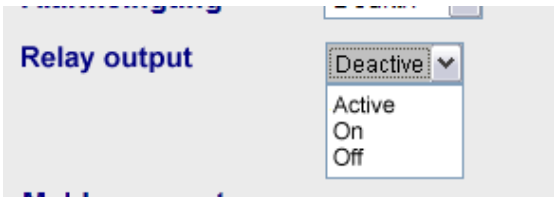
Info/Error-Messages at network communication

Error N1	<p>No network communication. A problem at the internal network module. The device automatically executes a 'Reset' for the internal network module and retrys initial communications. Try disconnection of network plug, wait... and remount the network plug.</p>
Error N2	<p>Error at the network communication. Check the connections at the device and at the network router... Check parameter setup at menu item '15.Network'... Check the function '15.Network > Test > Ping: Yes' ... Try to connect another network device at this network cable, e.g. a Laptop. If it does not work please contact your network admin. Error N2 only occurs 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. Important: The destination address must be a <u>fixed</u> IP address. Otherwise the device retrys sending again and again. Periodically 'Sending...' will be displayed caused by an unreachable destination IP address.</p>
Sending ...	<p>'Sending' is shown in the display in case of current sending of a data message. The message destination can be setup as an IP address at menu item '15.Network => Dest. ...' Periodically 'Sending...' will 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.</p>

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 'CONFIG' page 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).

For device type LX-GSM / LX-Q-GSM:

Error messages of GSM module / SIM card / Mobile network

Error M0	GSM modem is inactivated. Entering PIN => 0000 deactivates the modem completely.
Error M1	Internal communication error. The device automatically execute an internal reset and retrys communication with the internal modem again.
Error M2	SIM card is not inserted or is not readable or is defective. Please check the SIM card in a mobile phone.
Error M3	PUK code must be entered. Wrong PIN has been entered three times so the SIM card is locked. Insert that SIM card in a mobile phone and enter the PUK code to unlock it.
Error M4	Prepaid is empty. Please recharge the prepaid.
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	Network logon failed or has been rejected.
Error M8	Interlock is activ! In case of lots of failed network logon trials the device will retry logon only once a day. This mode operates for 255 days. By pushing the [Enter] button the device does one logon trail to mobile network again. In case of successfully sending an SMS the interlock is removed.
Error M9	No destination mobile number has been set up. #T command has not been sent or OilView connection has not yet been linked.

Relay remote control:

The LX-GSM device supports a remote control function for the relay.
Since version V3.40 respectively V4.00 the output relay can be operated by #S remote commands send by SMS.
See additional documentation for GSM device parameterization.

Maintenance:

It is recommended to check once a year if the displayed values are correct. Two practical check options are:
- Lift the probe above the liquid level. Then check if ~ 0 L is displayed.
- Check the cm value displayed in Step '10.Trim height' (without trimming!).
In case of deviation it is recommended to recalibrate the measuring probe by step '9.Offset probe' and if necessary step '10.Trim height'.

New measuring probe:

In case of replacement of the level probe it is recommended to call menu item '9.Probe offset' and execute the item 'Default values' !

Manufacturer:

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