Start-up + Operation

Electronic pneumatic tank measurement system

of the series e-litro®

e-litro + e-litro duo	SW-Version V5.xx
e-litro net	SW-Version V5.xx
e-litro gsm	SW-Version V5.xx

for tank sizes up to max. 10,000 liter

e-litro® sets

Installation and mounting

For installation and mounting of the devices mentioned above please follow the conditions of the respective manual. The startup is performed after the successful mounting.

The displaying devices of the e-litro® series are applicable for liquid level measurements of tanks operated unpressurized. Maximum display value: 10,500 liters
The liquid level is indicated at the LCD display. The instrument versions **net** and **gsm** are able to retransmit the displayed data and the present status (data transfer via RDT).
The devices of the **e-litro** series are equipped with a power plug for 230V sockets.

The transducer (sensor) is connected to the measuring input of the **e-litro** displaying device. Usually the transducer is the electronic-pneumatically measuring LITRO-Sensor: A level measurement sensor with a measurement range of 0-25 kPa (0-250 mbar) for relative hydrostatic pressure.

Measuring input: 4-20 mA analog signal, 2-wire principle with sensor supply of 20V dc.
Measuring input clamp 1 = plus, white (or red)
Measuring input clamp 2 = minus, brown (or black)

In principle other transducers with 4-20 mA signal could also be connected to the **e-litro** displaying devices.

e-litro duo: The displaying device **e-litro duo** is equipped with a second measuring input for a second LITRO-Sensor optionally (Sensor 2). In case of battery tanks with equal geometry the fullest and the emptiest tank can be monitored with the 2 sensors.
(Not possible with **net** or **gsm** version; these devices can be used with only one LITRO-Sensor.)

Control elements and display

First determine the container data and then enter data into the device menu.
The programming is described in the following pages.

To setup the displaying device the lid has to be twisted off. Perform the device setup once at the initial startup. After startup the device operates in displaying mode while the lid is closed.

By pressing the [Enter] button the displaying mode changes to menu mode.
With menu item 'Exit' (step 0 or 7 or 8) the programming mode is left and the normal displaying mode is active.

Display panel
2 x 16 characters are displayed in a two-line LCD display. The display is equipped with a background lightning for best readability at all lightning conditions.

Control keys
For device setup use the 3 little blue pushbuttons located on the electronic base plate:
[+]   [Enter]   [-]

Language
Select the operation language in menu step 18.
Use the pushbuttons [Enter]   [+] [+] [+] . . .   [Enter] for navigation and selection.

Device setup and Programming

Press [Enter] to open the menu. The menu offers the menu steps 1 … 7.
Menu steps 9 … 24 offer special advanced options.

Only one level sensor can be connected to the instruments **e-litro net** / **e-litro gsm**.
Using the **e-litro** displaying device either one or two LITRO-Sensors can be connected.
Two sensors = **duo**-solution.
Shape and size of the tank or container has to be entered only once.
This applies for both the **e-litro** and the **e-litro duo.**

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

Input function: *Menu functions*	*Description*	*Device type*
0. Exit	Entering the programming mode. **Proceed with [+].** Also leaving the programming with [Enter] at the Exit item.	all
1. Measuring probe	Setting up the measuring range of the level sensor: The LITRO-Sensor is preset to 250mbar. Measuring range: max. oil tank height: water column: **250 mbar** (3.00 m) (2.50 m) If a different level sensor to the LITRO-Sensor is used, the respective measuring range has to be entered in mbar. If 'by calibration' is displayed, a calibration was done via menu item 10/11 'Trim height/Trim volume'.	(all) **Do not enter the level or tank height here. Enter mbar referring to sensor label.**
2. Liquid	Selection of measuring liquid (specific weight of the liquid): Heating oil, water, diesel oil, bio diesel oil, rapeseed oil, motor oil, lubrication oil, waste oil, other liquids after consultation. Do not use AdBlue, palm oil, A1-media. Or enter the 'Density value' in xxx kg / m^3. Use [+] [-]. If the density value of the liquid is unknown calibrate the device via menu item '10.Trim height' If 'by calibration' is displayed, a calibration was done via menu item 10/11 'Trim height/Trim volume'. In that case the parameter 'Liquid' (resp. density) is not relevant.	all

3. Tank shape		Selection of the shape of the holding tank: **Alternatively** just 1 special tank geometry can 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. Horizontal cylinder/ tubular container. Typical tank shape for outdoor tanks and buried steel tanks.	
	Ball-shaped	<u>Spherical</u> tank. Ball-shaped buried tank. Common buried plastic tanks (GRP).	
	Oval	<u>Oval</u> cellar tank. Typical shape of GRP plastic tanks.	
	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.	
	With excavation	Plastic tank with large cavity. Excavation in the middle of the tank's body. (No ring bandages)	
	Cyl. > 50m^3	Not applicable with e-litro displaying devices.	
	Bearing chart <u>Value input</u> by an existing <u>bearing chart</u> of the tank	<u>Reference table:</u> Basic value table with up to 15 pairs of values 'cm => liter' for the non-linear areas 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 area: Enter several value pairs. Linear region: Enter only begin and end pairs.	Unsymmetrical or other tank shape [i] non-linear linear Area non-linear Individual tank shape
	Steel tanks	<u>Steel tank</u> or <u>battery tank group</u>: Linear side panels, with <u>hemicycles</u> at top and bottom.	
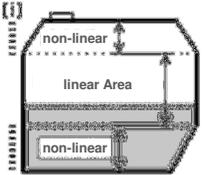
Input function: Menu functions	Description	Device type
4. Tank volume	Enter the tank's volume by [+] [-]. (100% value) Default is 0 L. This value <u>must</u> be entered. <u>Attention, in case of an existing bearing chart</u>: Please use the pair of values for 100% for tank volume and tank height from the table. For a 10m^3 buried tank values may be e.g. 10,250 l and198.5 cm.	Maximum volume: 10,000 liter Clearance display function is only available with an e-litro special edition.
4 b Clearance display	Clearance display desired? Yes / No Clearance is the empty space between the liquid level and the filling limit.	
4 c (Filling limit in %)	In case of Y (yes) setup the filling limit in % as a reference value (position of the limit indicator; commonly 95%.)	
5. Tank height	Enter the interior height of the 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. For a 10 m^3 buried tank with d = 2 m a potential value could be 198.7 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. In addition there is no remote signaling of the relay state. - active Effect: The relay operates depending on the content. - on Makes the relay energize (fix ON). - off Makes the relay release (fix OFF). Example <u>switching point setup for 'active'</u> (with hysteresis): On 10% - Enter relay's energizing point by + / - Off 15% - Enter relay's releasing point by + / - If both values are set to 0% the relay switching function is disabled.	e-litro gsm e-litro net
7. Relay 2 or Exit	Settings for relay 2 are analogous to '6. Relay 1', see above.	Not for 'e-litro' series
8. Exit	Press [Enter] to leave the setup mode (parameterization).	all
Menu point 9 – 24	Steps 9 – 24 contain special settings.	all

After entering/setup of step 1 to 7 the <u>standard programming is completed</u>.
By confirming the 'Exit'-step the device returns automatically to the usual display mode and the present tank content is shown. Mount the device 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 - **250 mbar**.
Device **e-litro**:

Menu option	Setting / Selection
1. Measurement sensor	250 mbar
2. Fluid	Heating oil
3. Tank shape	Linear
4. Tank volume	6000 liter
5. Tank height	165.0 cm
7. Exit [Enter]	Display mode => ... 4550 l ... 76 %

Example 2 Buried tank, cylindric horizontal, for 10,000 liter diesel,
Inner height 1.59 m, (filling level 54 cm), LITRO-level sensor 0 - **250 mbar**
Device **e-litro gsm** with SIM card:

Menu option	Setting / Selection
1. Measurement sensor	250 mbar
2. Fluid	Diesel oil
3. Tank form	Cylindric horizontal
4. Tank volume	10020 l (ref. <u>exact value from bearing chart</u>)
5. Tank height	159.0 cm (ref. <u>exact value from bearing chart</u>)
6. Relay 1	Deactive
7. (Exit)	Go forward to next step with [+]
. . .	...
15. Modem	PIN: xxxx - Enter the PIN code of the SIM-card
. . .	...
19. Exit [Enter]	Display mode => ... 1280 l ... 13 %

Example 3 Fountain, 2.25 m maximum water level from ground (current level 1,90 m),
20m bubbling-through pipe to the fountain. **Display in m of water level.**
Device **e-litro net** . Relay 1 has to protect the pump against running dry.

Menu option	Setting / Selection
1. Measurement sensor	250 mbar
2. Fluid	Water
3. Tank form	Linear
4. *Tank volume*	(Volume) Calculate approximately and enter.
5. *Tank height*	Set fountain max. level alternatively to 225 cm.
6. Relay 1	Active => 'On' at 99 % ; 'Off' at 10 % of level.
6. (Exit)	Go forward to next step with [+].
. . .	
12. Unit	Set display unit to 'm'.
13. Rounding	Automatic (keep setup).
14. Exit [Enter]	Display mode => ... e.g. '1.90 m 84 %'

Tank with interior mantle

In case of a tank with interior mantle (e.g. horz. cyl. or cellar steel tank) correct the input values.

Example: Mantle thickness: ca. 5 – 10 mm:
=> Enter '5.Tank height':   reduce height by ca. 20 mm
=> Enter '4.Tank volume':   reduce volume by ca. 3 %

Special settings

Input function: Additional functions	Description	Device type
Menu items 1 to 7	The menu items 1 to 7 are the basic setup of the devices. Some special settings, e.g. language, 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>Sucking</u> position over ground: y cm
	             Standard is **0 cm**, means total contents.
	             y > 0 cm means dead stock height
	             which doesn't occur in the liter displaying
	 - **Default values**: Resets all values back to standard 0.
		all
		
		 Do not execute with e-litro

10. Trim height	Input option for the reference height for calibration of probe and measurement device. It is useful in case of unknown specific weight of the fluid. Enter the current liquid level: **xx.x** cm (+ / - / Enter) and confirm with **YES** / no. If this is done at a low tank filling level it is recommend to repeat this later again at a higher filling level.	all
11. Trim volume	Fine trimming of current liter value. Enter the current liquid content as **xxxx** L (+ / - / Enter) and confirm with **YES** / no. If this is done at a low tank filling level it is recommend to repeat this later again at a higher filling level.	all
12. Unit	Adjustable units are: **l** (liter), %, m, kg, t (tons), IG (Imperial Gallons), UG (US-Gallons) as well as pressure units mbar and kPa. [+ / - / Return] 'l' or 'kg' values are displayed with a separator point for values over 1000. '%' or 'm' values are displayed with two decimal places.	all
13. Rounding	**Automatically** - Default setting for automatic rounding Without rounding - No rounding means highest resolution.	all

		Unsteady, wobbling values may occur. 2 / 5 / 10 / 20 / 50 / 100 [L] are selectable	
14. Show tanks or Exit	**- Collective** or otherwise - Single/detailed - +Sum Σ: Yes/No	- Displaying tanks without shifting-over. Liter values of tank 1 to n will be displayed together. - Displaying tanks with shifting-over. All connected tanks are shown in detail by shift-over one by one. L + % are displayed. Liter stock of all tanks is displayed beside single tanks details.	Only for e-litro gsm e-litro net
15. Network or	**e-litro net** :	- DHCP . . . Sub-menu for network parameter setup like IP address, message destination and communication test. Please coordinate these settings with your network admin. See additional documentation 'network device connection'.	Only for e-litro net
15. Modem	**e-litro 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 completely deactivates the internal GSM modem.	Only for e-litro gsm
16. Delete tank	'ESC' / 'tank n'	Deletion of a registered tank from display. Here you may re-sort or delete the registered tank numbers. (+ / - / Return)	Only for e-litro gsm e-litro net

Input function: Additional functions	Description			Device type
17.Input/Output	**Alarm-In:** . . .	Choose the function of the alarm contact input:		Only for e-litro gsm e-litro net
		- **Deactive**	Defines the alarm input to be '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.	
	Data-Out: . . .	Defines the data output at the adaptor slot.		Only for e-litro gsm e-litro net

		The available options 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.		

18.Language + Names	**Language:** . . .	'**German**' / 'English' / 'ESC' + / - / Enter		all

	Names: . . .	(Name suggestion:) Tank 1: *abcdef*
		            Choose letters with + / - / Enter
		 (Name suggestion:) Tank 2: *xyz*
		            Choose letters with + / - / Enter
		 (Name suggestion:) Name Alarm: Alarm-A
		            Choose letters with + / - / Enter
				all

19.Exit	Press [Return] to return to the displaying mode.			all
20. LCD Display	By factory setup the contrast of the LCD display presert: Contrast: xx (xx is a hexadecimal value)			all
21. Device-info	Shows Software version : V5.10 (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 signal of the
	 measuring probe: e.g. ADC = 28A0 = 4.00 mA
	
	   If the bubbling-through pipe is not 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.
				all

23. Test relay	Testing function for relay switching: Relay 1 = **Off** / On + / - / Enter	Only for e-litro gsm e-litro net

24. Reset	Resetting 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 reset of all parameters back to
	                    the original factory settings.
		all

25. Configuration	Protected area: Exit with: 'Cfg:0' [Enter]	all
26. Exit	Return to the displaying mode	all

Error messages / Error indication

Display: '**heating oil: Wait..**'

This notification indicates that the connected LITRO-Sensor is in power charging mode.
It should disappear after 1 to max. 5 min. and the normal tank level should be displayed.
Normally the LITRO-Sensor indicates this status with a red-green parallel blinking too.
In case the display status remains unchanged for more than 10 min, please unplug the
power plug for at least 10 sec.

Error code	Meaning
Error **E 1**	Invalid input value.
Error **E 2**	Signal 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 ! The probe current of 4.5 mA or higher indicates a problem with the probe (LITRO-Sensor).
Error **E 4**	Measured value is implausible. Perform menu item '9.Offset probe'.
Error **E 5**	Height input is larger than tank height. (Wrong input.)
Error **E 6**	The measured value is too small for reference. Make sure the probe is plunged. Or settled height is too large (or the measuring value is too small for setting). Perform step '9. Offset probe'. Otherwise probe error.
Error **E 7**	The measured value is too small for the configured tank height or tank volume. Make sure the probe is plunged.
Error **E 8**	Using the LITRO-Sensor wait until the loading phase after the initial start is completed (max. 5min.). Otherwise the sensor is not connected properly. Plus (=blue or white or red) => connect to clamp 1. The second display row shows the signal current. A value larger than 22mA (e.g. 25mA) indicates a clogged or bent measurement line to the buried tank. Please blow through or replace preferably with the blue bubbling-through pipe of the e-litro set. As a test the bubbling-through pipe can be disconnected from the LITRO-Sensor. E8 should disappear with the next pumping action.

Error **E 9**	The current value is 0 mA. The probe's connection could be broken. Check probe connection (polarity) and extension.
Error **E10**	Calibration error. Switch off and on the 230V supply voltage and retry. Otherwise the probe is not working properly.
Error **E11**	Warning – The liquid level in the tank is too low for an exact calibration. (Press [Enter] to continue anyway.)
Error **E12**	No measurement data is received yet from the external tanks 2 ... 4.

For device type **e-litro net**

Info/Error-Messages at Network communication

Error **N 1**	No network communication. A problem at the internal network module. The device automatically executes a 'reset' for the internal network module and retries initial communications. Try disconnection of network plug, wait… and reconnect the network plug.
Error **N 2**	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 administrator. Error N2 only occurs in case of a domain like '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 retries sending again and again, caused by an unreachable destination IP address.
Sending ...	'Sending' is displayed if a data message is currently in process of sending. The message destination can be setup as an IP address at menu item '15.Network => Dest. ...' Periodical 'Sending...' will be displayed caused by an unreachable destination IP. The destination should be a fixed IP address. IP + Port should be setup correctly.

XML-Data:	Via browser or program call the device with command **ip-address** / **xml**

Relay remote control:

Telecontrol / Teleswitching via relay of the **e-litro net** device:

The relay can be operated by remote commands from the browser at the 'config'-page.
Please refer to the additional device parametrization.
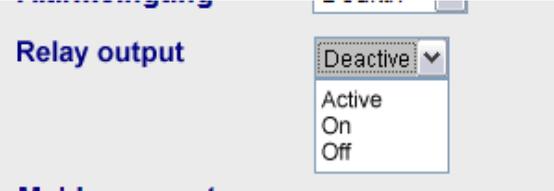
Deactive = No switching

Active = State depends on level

On = Makes the relay operate (fix)

Off =Makes the relay release state (fix)

For device type **e-litro gsm**

Error messages GSM module / SIM card / Mobile network

Error **M 0**	GSM modem is inactivated. Entering PIN => 0000 completely deactivates the modem.
Error **M 1**	Internal communication error. The device automatically executes an internal RESET and retries communication with the internal modem again.
Error **M 2**	SIM-card is not inserted, is not readable or is defective. Please check the SIM-card using a mobile phone.
Error **M 3**	PUK-code must be entered. Wrong PIN has been entered three times, SIM-card is locked. Insert that SIM-card in a mobile phone and enter the PUK-code to unlock it.
Error **M 4**	No credit on the prepaid account.
Error **M 5**	No mobile network available for the SIM-card. (An external antenna could help.)
Error **M 6**	Network or other failure during sending procedure.
Error **M 7**	Mobile network registration not completed yet.
Error **M 8**	Interlock is active! In case of too many failed network logins only 1 dial-in trial will be performed on a daily base for 255 days maximum. The [Enter] button activates the device for another logon trial. In case of a successful sending the interlock will be removed.
Error **M 9**	No destination mobile number configured yet. #T command or OilView-connection not done yet.

Relay- **remote control:**	Telecontrol / Teleswitching via relay of the 'e-litro gsm' device: The relay can be operated by #S-commands. Please refer to the additional device parametrization.

Electrical connections: e-litro / e-litro duo

e-litro electronic board

Clip contact number:

1: LITRO-Sensor input **(+)** (red, white, blue)

2:   dito **(–)** (black, brown)

3: Data input **(+)** for a second LITRO-Sensor

   (in case of using unit type 'e-litro duo', otherwise keep it free)

4:   dito **(–)**

At right hand side: AC 230 V supply

 Slot for adaptors:
M-BUS ; 0-5 V outlet ; 4-20 mA outlet ; Link adaptor

Electrical connections: e-litro net / e-litro gsm

Electronic board:

Clip contact number:

1: LITRO-Sensor input **(+)**   (red, white, blue)

2:   dito **(–)**   (black, brown)

3: Data Input for remote signalling of further measurement unit(s) **(+)**
otherwise keep it free

4:   dito **(–)**

5: Input 1 for an alarming contact. Closing contact bridging 5 to 6.

6: Input 2 for an alarming contact.

7 + 8: Relay output: Opening contact (normal status is closed)

9 + 10: Relay output: Closing contact (normal status is open)

At right hand side: AC 230 V supply

Maintenance and Article numbers

Maintenance:	It is recommended to check the correctness of the displayed values once per year. Therefore lift the bubbling-through pipe up until it is located above the liquid level. In this state 0 liter should be displayed. (Tolerance: < 2 % from the final value).

Sets / **part numbers:**	**e-litro**	Art-Nr. 13032
	e-litro duo (= e-litro with 2 sensors)	Art-Nr. 13033
	e-litro gsm	Art-Nr. 13601
	e-litro net	Art-Nr. 13701
	LITRO-Sensor without displaying unit	Art-Nr. 13023
	Buried tank 20 m measuring hose	
	accessory set + accessories	Art-Nr. 13026

Notices:

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CE	The producer conformity certificate is located at www.tecson.de under menu item 'Documentation'.	