



Operating manual

LevelController TS

Item-No.: 225 300 210, 225 310 200, 225 400 200, 225 510 200

Translation of the original operating manual The operating manual is always to be read before commissioning the equipment. No warranty claim will be granted for faults and damage to the equipment arising from insufficient knowledge of the operating manual.

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1. Safety instructions

The device is a state of the art piece of equipment and has been constructed according to recognised safety specifications. It is nevertheless possible that use of the device will present hazards to the operator or to third parties, or may damage the device or other property. It is therefore essential to act in accordance with these safety instructions, and in particular with those sections identified as warnings.

Warning notices and symbols

In the operating manual, the following signs are used for highlighting important information.

Special information for economical use of the equipment.

- Special information or "dos and don'ts" for damage prevention.
- / Information or "dos and don'ts" for the prevention of damage to persons or equipment.

Appropriate use

- The device may only be used if it is in perfect condition, and then only for its intended purpose, in compliance with all safety regulations, with an awareness of the potential risks, and according to the operating manual. Any faults that may impair the safety must be rectified immediately.
- The device and its components are only to be used for handling the liquids listed and the purpose described. Using the machine for any other purpose would constitute inappropriate use. The manufacturer is not responsible for any loss arising as a result of this, the risk for this is borne only by the operating company.

Organisational measures

This operating manual should always be kept readily available at the site of operation! Each person concerned with the assembly, commissioning, maintenance and operation of the equipment must have read and understood the entire operating manual. It is essential that the type plate and the warning notices attached to the device are observed, and are maintained in a fully readable condition.

Qualified personnel

The operating, maintenance and assembly personnel must be appropriately qualified for their work. The areas of responsibility, competences and supervision of the personnel must be precisely regulated by the operating company. If the personnel do not have the required knowledge, they must be trained and instructed. The operating company must also ensure that the contents of the operating manual are properly understood by the personnel.

Waters protection



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The device has been designed to handle water hazardous substances. The regulations on the operating place (e.g. Water Resources Act WHG, = ordinance on installations for handling of substances hazardous to water VAwS) must be adhered to.

Maintenance and Service



According to the regulations of the water resources law only authorized services may work on devices for flammable and/or water endangering substances. During such works, appropriate tools are to be used (avoid sparking). Before any kind of work on the device, all fuel lines are to be completely emptied and aerated. Do not make any changes. Modifications or additions to the device which may affect the safety cannot be carried out without consent of the manufacturer. Exclusively genuine

Electric power



Work on the electrical equipment may only be carried out by a qualified electrician or by trained persons under the guidance and supervision of a qualified electrician according to electro-technical guidelines. Machine or system components, on which inspection, maintenance or repair work is to be carried out must be de-energised.

spare parts made by the manufacturer may be used.

Important



The information contained in this Operating Manual also applies for the basic model without GSM module, just the GSM-related indications and functions are not possible or not available.

2. Technical Description

2.1. Description

The LevelController TS is used for measurement, display and transfer of liquid level data. The information can be displayed either in litres or in cm. The results of the measurements can be transferred regularly via SMS to a mobile phone or a Web server. The measurement is carried out using a level sensor with a 4-20 mA output. For custom via immersion probe with 0.5 - 4.5 V output. The LevelController TS has two alarm inputs.

2.2. Product versions:

225 300 210	LevelController TS with battery supply
225 310 200	LevelController TS with mains supply and alarm contacts
225 400 200	LevelController TS with battery supply, fault alarm inputs and GSM
225 510 200	LevelController TS with mains supply, alarm contacts, fault alarm
	inputs and GSM

2.3. Technical data

Dowor supply for	2201/ E0 Hz Dower consumption < 11/A		
Power suppry for	230V, 50 HZ, POWER COnsumption < 1VA		
model with power			
supply unit:			
Power supply for	Processor: Lithium-battery with a service life > 10		
battery-operated model:	years		
	GSM-Modem: 4 x 1.5 Volt high performance NiCd cells		
	(included in delivery)		
	(included in derivery)		
Display:	LC-display with 5 characters, character height 16 min		
Keyboard:	2 membrane keys		
Temperature range:	-10°C - +50°C,		
	max. air humidity 95% not condensing		
Accuracy:	Usually better than 1%, depending on level sensor		
Alarm input:	Two inputs for alarm messages, configurable as		
(optional)	normally open or normally closed contacts (shutter or opener)		
Alarm output: (only 230	Potential-free relay as two-way contact. Max. switching		
V AC version)	3A 230 V AC at $cos_{0} = 1$ with alarm activated or de-		
	activated		
Data Kasalli	Integrated CCM module		
Dala recall:			
Materials in touch with	Depending on level sensor		
the measured substance:			
Measurements (approx.):	122 mm x 120 mm x 60 mm (W x H x D)		
Drotoction class			

2.4. Accessories

The following items can be ordered as accessories depending on the application:

	Item-No.
Level probe, 200mbar, for max tank height approx. 2m, cable length 5m	224 010 000
Level probe, 300mbar, for max tank height approx. 3m, cable length 5m	224 020 000
Level probe, 500mbar, for max tank height approx. 5m, cable length 7m	224 050 000
Level probe, 1000mbar, for max tank height approx.10,8m, cable length 15m	224 091 000
Level probe, Explosion-proof design, 200mbar, for max tank height approx. 2m, cable length 5m	224 010 006
Level probe, Explosion-proof design, 300mbar, for max tank height approx. 3m, cable length 5m	224 020 006
Level probe, Explosion-proof design, 500mbar, for max tank height approx. 5m, cable length 7m	224 050 006
External antenna for LevelController, approx. 3 m cable length	225 600 000
Mounting set, for 1"-screw joint on the tank cap	224 070 000
IP 66 terminal box with breathable filter For extension of the level probe connection cable	224 061 000
Data retrieval via Web server for one year (see point 11.)	225 400 001

3. Start-up

3.1. Level probe

• A level sensor suitable for the medium is to be used.

The LevelController TS is to be assembled outside the tank. The level sensor is to be inserted inside the tank via a suitable screw joint. The sensor body is installed horizontally or suspended (preferable) in the tank according to *Fig. 1*. The max. cable length is approx. 200 metres for sensors with 4-20 mA outputs and approx. 10 metres for sensors with 0.5 – 4.5V outputs.

In order to avoid damage to the sensor by oscillating motions due to filling procedures with large mechanical handling capacity, the sensor must be fixed, e.g. by a protective pipe (Fig. 2).

The connection line on the pressure sensor must be guided outside because a capillary is contained in the line through which the pressure sensor receives the reference pressure(atmospheric pressures).



3.1.1. Marking the immersion probe

You can mark the immersion depth of the immersion probe with the 1-ear clamp provided. Slide the 1-ear clamp onto the probe cable before you connect it to the LevelController. Clip the 1-ear clamp to the required position.



Fig. 3. Positioning the filling level sensor in the tank

3.2. Assembly



The unit has four drill holes and can mounted to the wall with screws.

US Liter Fig. 5. Display

The display consists of a five-digit, seven segment display and the symbols US and Liter. If the filling level is shown in liters, the word "liter" appears on the display.

3.4. Insertion of the SIM Card, Probe Connection, Power Supply

Unscrewing the cover of the casing provides access to the telemetry unit integrated in the cover. Insert an activated SIM card into the SIM card holder (push down and open up holder).

The battery-operated LevelController is supplied with a enclosed lithium battery (uninserted). The mignon cells for the GSM modem have been inserted.

The enclosed batteries are not rechargeable and the use of rechargeable batteries is not allowed!

The LevelController with integrated power supply unit is to be connected to a 230V/50 Hz power supply. Only trained and qualified staff should be allowed to establish the connection.



Either a 4 -20 mA or a 0.5V - 4.5V level sensor can be used.

Fig. 6. SIM card holder, connectors power supply, level probe

After insertion of the battery / connection to power supply, the version number of the programme of the LevelController is displayed.

(Example)

Afterwards, the missing operating parameters can be entered in the respective input masks.

3.5. Connection of Alarm Inputs and Outputs

Refer to section 6.2.10 page 23 for connection of the alarm inputs. Refer to section 6.2.11 page 24 for connection of the alarm outputs.

3.6. Entry of Numbers with Several Digits

In several menus, it is necessary to enter multidigit numbers. These numbers are entered using the keys ,**Change**⁴ and ,**Enter**².

The ,**Change**' key is used to change between the characters ,0' to ,9', , J' and ,-' in the utmost right position of the display.

,**Enter**⁴ confirms the input of the character at the utmost right position. The displayed number moves to the left (if the maximum number of digits to display has not yet been reached). No more than the last five digits of a number are displayed, a point between the second and the third digit indicates that more digits have been entered on the left of the displayed digits.

The sign ,^J confirms the input.

The sign ,-' moves the displayed number towards the right (deleting).

Example: Entry of the number 120:

0	Strike , Change' once to obtain:
1	Strike , Enter' once to obtain:
10	Strike , Change' twice to obtain:
12	Strike , Enter' once to obtain:
120	Strike , Enter' once to obtain:
.1200	Strike , Change' ten times to obtain:

.120

Strike ,Enter' to confirm the number 120.

Note: In many menus it is possible to abort the entry striking ,**Change**' and ,**Enter'** simultaneously.

4. Entry of Operating Parameters

4.1. Entry of the PIN Code for the SIM Card

If the inserted SIM card requires the entry of a PIN code, the display shows:



Strike **,Enter'** to switch to a menu for entering a four-digit PIN code to log on the SIM card to the net.

Enter the PIN code using the ,Change' and ,Enter' keys (as explained above).

Then the LevelController will try to log on to the GMS net. This might take some seconds. The display shows:



If the logon was successful, the received field strength is displayed:



Legend field strength:

0 .. 31 low .. high 99 not definable

To ensure a failure free data transfer, the field strength value should be at least 10. If the field strength is too low, the positioning of the device should be changed or an external antenna (optional accessory) should be installed.

Strike **,Enter'** to log off the GSM modem from the net or after 30 seconds the GSM modem will automatically log off the network. The display shows:



In case of problems during the logon or logoff process, the device displays an error code for approx. two seconds, compare *Annex B.*

4.2. Entry of Level Probe and Tank Parameters

4.2.1. Sensor type

The sensor type is requested, if no tank parameters are available yet (commissioning):

SEnSr

It is possible to switch from one sensor type to another with the "**Change**" key after confirming with the "**Enter"** key:



The following numbers stand for the different sensor types:

Number	Sensor type		
1	4 – 20 mA, 200 mbar		
2	4 – 20 mA, 300 mbar		
3	4 – 20 mA, 500 mbar		
4	4 – 20 mA, 1000 mbar		
5	0,5V - 4,5V, 400 mbar		

The sensor type selected must be the same as the level sensor that is connected.

4.2.2. Tank - Form

If no tank parameters are available (first start up), at first the form of the tank is asked for:



Strike ,Enter' to confirm and strike ,Change' to select one of the possible tank forms:



Number	Shape of tank	Description
1	cuboid, upright cylinder	e.g. customized steel tanks, cistern tank
2	lying cylinder	typically buried tank
3	sphere	spherical tank
4	oval	typical "conventional" fuel oil tank made of steel or synthetic material
5	cell tank	synthetic tank with curved surface for stiffening
6	hemisphere	hemispheric synthetic tank with plane base

The figures represent the following tank forms:

Select the tank form and confirm with ,Enter'.

4.2.3. Tank - Maximum Volume

Now the maximum tank volume is asked for:



Strike **,Enter'** to confirm and enter the maximum volume in litres with a maximum of 5 digits.

Note: for several linked tanks, the total volume of all tanks must be entered.



Use the keys ,Change' and ,Enter' to enter the maximum volume (as described above).

1000

(Example)

4.2.4. Tank - Maximum Fill Height

Now the maximum fill height of the tank is asked for:

HEigh

Confirm with **,Enter'** and enter the maximum fill height in cm with a maximum of 3 digits.



Use the keys , Change' and , Enter' (as decribed above).



Confirm the entry to terminate the entry of tank parameters. A measurement is initiated and the current fill height is displayed in cm.

4.2.5. Density of medium

Then the correct density of the medium has to be input. The default setting is the density of heating oil.



After confirmation with the "**Enter"** key a menu appears in which the density value can be input to a max. of four decimal places in g/L.

If you do not know the density, initially enter 860 and calculate the density as described in section 6.2.5.

The input is made as before with "Change" and "Enter".



Typical Density values [g/L]		
Fuel oil / Diesel:	860	
Water:	1000	
AUS 32 (Urea):	1090	

The parameter input is complete after confirmation of the value. A measurement is started and the actual level is displayed in cm. Now the LevelController is ready to operate.

5. Measuring and Display of Tank Fill Level

The tank filling level is displayed either in cm or litres. If litres is selected, the word "Liter" is displayed below the tank fill level. Strike the **,Change'** key to switch between litres and cm.

The battery operated device does not measure continuously, i.e. the display shows the level at the last measurement! For showing the actual level, a measurement can be started by pressing the "Enter" key. Otherwise the measurement value is updated every 15 minutes. The mains connected device measures continuously.

Pressing ,**Enter'** for approx. 2 seconds initiates a measurement with data transfer to the programmed mobile phone numbers (if these have already been programmed, compare *6.2.12f Phone numbers for messages* or *9.1.2 Configuration Commands*).

5.1. Switching to Management Mode

Strike the keys **,Change'** and **,Enter'** simultaneously to switch from the measuring and display mode to the management mode.

6. Management Mode

In the management mode, different system configurations for the LevelController can be made. Furthermore, the data transfer via SMS can be tested.

If no key is pressed for a period longer than 5 minutes, the display automatically switches back to the measuring and display mode.

6.1. Input of a Management Code (optional)*



Confirm with **,Enter**'. Enter a code of a maximum of four digits for access to the management mode.

LevelController is supplied without a management code. The management code can be created subsequently under *6.2.6 Creating a Management Code*.

When the keys **,Change'** and **,Enter'** are pressed simultaneously or a false code is entered, the device automatically switches back to the measuring and display mode.

6.2. Submenus in the Management Mode

SEnSr (Evam

(Example)

Several submenus are available in the management mode. Select the submenu using **,Change'**, strike **,Enter'** to confirm the selection and to switch to the desired submenu.

For an overview of the menu structure see Annex A.

6.2.1. "SEnSr" Sensor type

The selected sensor type can be changed afterwards. It must be the same as the level sensor that is connected.

SEnSr

It is possible to switch from one sensor type to another with the "**Change**" key after confirming with the "**Enter**" key:



The following numbers stand for the different sensor types:

Number	Sensor type		
1	4 - 20 mA, 200 mbar		
2	4 - 20 mA, 300 mbar		
3	4 - 20 mA, 500 mbar		
4	4 – 20 mA, 1000 mbar		
5	0,5V – 4,5V, 400 mbar		

6.2.2. "PAr t" Adjust Tank Parameters



The tank parameters "form", "maximum volume" and "maximum height" can be changed subsequently. The first menu asks for the form of the tank:

Fornn

Strike ,Enter' to display the entered tank form. Strike ,Change' to change the tank form:



(Example=

The figures represent the following tank forms:

Number	Shape of tank	Description	
1	cuboid,	e.g. customized steel tanks, cistern tank	
	upright Cylinder		
2	lying cylinder	typically buried tank	
3	sphere	spherical tank	
4	oval	typical "conventional" fuel oil tank made of steel or	
		synthetic material	
5	cell tank	synthetic tank with curved surface for stiffening	
6	hemisphere	hemispheric synthetic tank with plane base.	

Select the tank form and confirm with **,Enter**'. Now the maximum tank volume is asked for:

Uol

Strike ,Enter' to display the maximum tank volume in litres. Edit as described above.

Note: for several linked tanks, the total volume of all tanks must be entered.



(Example)

Now the maximum fill height of the tank is asked for:

HEigh

Strike ,Enter' to display the maximum fill height in cm. Edit as described above.

120^J

(Example)

After the maximum fill level has been confirmed, the entry of tank parameters is finished.

6.2.3. "ZEro" Level probe zero point adjustment

ZEro

Important: The level probe has to be outside of the fluid!

Strike two times, **Enter**⁴ to carry out the zero point adjustment. The adjustment takes ca. 5 seconds.

6.2.4. "OFFSt" Height-Offset Sensor Headf

OFFSt

The head of the sensor should be positioned lying on the lowest point of the tank. This results in an automatic offset of 1cm (default setting). If the head must be positioned higher, the distance from the bottom in cm must be entered as offset.



The content level can only be measured if it is above the position of the sensor head. Content levels below the sensor head are displayed as 0 cm!

A typical indication of a false height-offset is the difference between the displayed and the actual height, the displayed height remaining constant independent of the tank content level.

6.2.5. "CAlib" Density calibration



In case the displayed level differs from the actual level, it is possible to input a density value which corrects the display. This may be necessary for liquids that deviate from standard heating oil (860 g/l).

Prerequisites: The sensor head is correctly positioned in the tank. If it is suspended higher in the tank, the sensor offset has been adjusted!

A typical sign of an incorrect density value is a deviation between the displayed and actual heights, which increase when the tank is more full.

A new density value is calculated with:

Value	-Value V	\sim	Fillheight _{displayed}
v and new	- vane _{old}	~	Fillheight _{actual}

0850J

(Example)

Typical Density [g/L]		
Fuel oil / Diesel:	860	
Water:	1000	
AUS 32 (Urea):	1090	

6.2.6. "CodEn" Creating a Management Code

CodEn

In order to avoid that unauthorized persons can get access to the management mode and change system configuration settings, it is possible to protect the management mode with a code of a maximum of four digits.



If "0" is entered, the management mode can be freely accessed without entering a code (default setting).

6.2.7. "Pin" Entry of the PIN Code for the SIM Card



Here the PIN Code for the SIM Card can be displayed and changed subsequently, if necessary.

0817^J (Example)

If a false pin number has been entered, an error message will be generated at the next logon try, see Annex B.

6.2.8. "PAr F" Parameters for Generating Automatic Content Messages



The LevelController automatically generates level messages, which are sent as an SMS to one or two GSM mobile telephone numbers. The consumption intervals (e.g. every 100 litres), the time difference for the messages as well as a min. and max. level, above or below which in any case a one time message will be sent, can be input here. For mains connected devices, the min. and max. Thresholds can be used for triggering the alarm signal.

StEP

Strike **,Enter'** to confirm. The increment of consumption is displayed in litres and can be edited:

100 (Example)

The message interval menu then follows:

dAYS HourS or

You can select the input in days or hours with the "Change" key.

The message interval is displayed after confirmation with the "**Enter**" key and can be edited.



Then the minimum content below which a message will be generated is asked for:



Strike **,Enter'** to confirm. The minimum content in litres is displayed and can be edited:



The menu for the max level, at which a level message is automatically generated once it is exceeded, follows next:



The max. level is displayed in litres after confirmation with the "**Enter"** key and can be edited:



The input of the automatic level message parameters is complete once the max. level is confirmed.

"PAr U" Parameter message for unforeseen emptying / filling



6.2.9.

In addition to the automatically generated level messages the LevelController can also emit a message in case of unforeseen emptying and filling. A time interval (e.g. 30 mins.) and quantity difference (e.g. 500 litres) can be input for this. The LevelController emits a level message if a larger volume is removed or filled in the set time interval.



The time interval is displayed in mins. after confirmation with the "**Enter"** key and can be edited:

The quantity difference menu then follows:

diFF

The quantity difference is displayed in litres after confirmation with the "Enter" key and can be edited.

500J (Example)

6.2.10. "A In" Alarm inputs (optional)

The LevelController P has two alarm inputs, which can be configured here and used for SMS fault messaging.

A In

Strike **,Enter'** to confirm. Strike **,Change'** to switch between the different possibilities of configuration:



The following numbers represent the following configurations:

Number	Configuration
0	No alarm input
1	Input 1: shutter
	Input 2: shutter
2	Input 1: opener
	Input 2: opener
3	Input 1: shutter
	Input 2: opener

The input which has been configured as shutter, creates an alarm message when the open contact is closed. If the input is configured as opener, the alarm message is created when the contact switches from closed to open.

Confirm the selected configuration with ,Enter'.



Fig. 7. Alarm inputs

6.2.11. "Par A" Parameter Alarm output (optional)



The LevelController **with mains connection** has a potential-free configurable alarm output (relay). The battery operated device does not have this output. The alarm output configuration and the min. and max. thresholds used for triggering the alarm output signal can be set:



It is possible to switch from one configuration to another with the "**Change**" key after confirming with the "**Enter"** key:



(Example)

The following numbers stand for the different configurations:

Number	Alarm status
0	No alarm output
1	Mode A: Min. Alarm
2	Mode A: Max. Alarm
3	Mode A: Min or Max Alarm
4	Mode B: Min. Alarm
5	Mode B: Max. Alarm
6	Mode B: Min or Max Alarm

Mode **A** means that the relay energises once the alarm status is activated. No alarm is activated in case of a power failure. (Fig. 8)

Mode **B** means that the relay deenergises once the alarm status is activated. Alarm is activated in case of a power failure. (Fig. 9)

Confirm the selected configuration with ,Enter'.

If the configuration **,O**' is selected, no further entry is necessary. Otherwise, entry of the filling level for triggering the switch thresholds is required.

Anschlusspläne:



Fig. 8. Alarm output, mode A The normal status without alarm is illustrated

Mode B:





Then the minimum content below which a Min alarm will be generated ("Low-Level") is asked for (only configuration 1, 3, 4, 6):



Strike **,Enter'** to confirm. The minimum content in litres is displayed and can be edited:

307

(Example)

The menu for the level, at which a Max alarm level message is automatically generated ("High-Level") once it is exceeded, follows next (only configuration 2, 3, 5, 6):



Strike **,Enter'** to confirm. The maximum content in litres is displayed and can be edited:

150^J (Example)

The input of the alarm output parameters parameters is complete once the max. level is confirmed.

6.2.12. "tEL 1" Phone number 1 for SMS Messages



The LevelController generates automatic content messages, which are sent via SMS to one or two GSM mobile phone numbers. At this point of the menu, the first mobile phone number can be entered with a maximum of 16 digits.



If no phone numbers are entered at all, no messages are generated.

6.2.13. "tEL 2" Phone number 2 for SMS Messages



Same as for phone number 1.

0818^J (Example)

If no phone numbers are entered at all, no messages are generated.

6.2.14. "SnnSC" SMS Service Center (SMSC)



For sending out SMS messages, an SMS Service Center must be set up. The default setting on SIM cards is the Service Center of the GSM provider, but at this point of the menu it is possible to choose a different, for example cheaper, Service Center.

6.2.15. "FiELd" Display of Field Strength

FiELd

The receiving field strength of the GSM network is decisive for the reliability of the content messages. For displaying the field strength, the LevelController will try to log on to the GMS net. This might take some seconds. The the display shows:

Logon

If the logon was successful, the received field strength is displayed:



Legend field strength:

0 .. 31 low .. high 99 not definable

To ensure a failure-free data transfer, the field strength value should be at least 10. If the field strength is too low, the positioning of the device should be changed or an external antenna (optional accessory) should be installed.

Strike **,Enter'** to log off the GSM modem from the net or after 30 seconds the GSM modem will automatically log off the network. The display shows:



In case of problems during the logon or logoff process, the device displays an error code for approx. two seconds, compare Annex B.

Snd F

The actual content level (format see 7 *Automatic Content Level Messages*) is transferred to the entered phone numbers. For this purpose, the LevelController logs on to the GSM net. This might take some seconds. The display shows:

Logon

During sending, the display shows:

Con

After sending, the GSM modem logs off the net. The display shows:

LogoF

In case of problems during the logon or logoff process, the device displays an error code for approx. two seconds, compare Annex B.

6217	Snd S"	Sending System Configuration SMS	
U.Z. I/.	"Sila S	Schalling System contrigor actor Sins	



The system configuration data such as tank parameters, phone numbers for messages etc. (format see *9.1.1 Incoming Commands*) are transferred to the entered phone number(s). For this purpose, the LevelController logs on to the GSM net. This might take some seconds. The display shows:

Logon

During sending, the display shows:

Con

After sending, the GSM modem logs off the net. The display shows:

LogoF

In case of problems during the sending process, the device displays an error code for approx. two seconds, compare Annex B.

6.2.18. "rEC" Receiving SM

Many of the above mentioned settings and even more (see 9 *Communication*) can be transferred from any SMS-compatible mobile phone to the LevelController. Usually, these SMS messages are transferred to the LevelController after the automatically created messages.

At this point of the menu, such messages can be retrieved deliberately, e.g. for test purposes. For this purpose, the LevelController logs on to the GSM net. This might take some seconds. The display shows:



During receiving, the display shows:



If messages have been received, the display changes to:

Con 2

The figure after the text "Con" indicates the number of messages received. After successful receiving, the GSM modem logs off the net, the display shows:



In case of problems during the sending process, the device displays an error code for approx. two seconds, compare Annex B.

6.2.19. "init" Initialisation of All Parameters



Strike **,Enter'** to confirm. Enter the figure **"1**" and confirm to start the initialisation of the parameters of the LevelController. The device returns to the default configuration. The display shows:

Any other entry will be ineffective.

7. Automatic Content Messages via SMS

The LevelController regularly sends content messages to one or two GSM mobile phone numbers.

Preconditions: An activated SIM card with correct PIN has been installed and at least one mobile phone number has been entered (see 6.2.12f). The display format of the SMS is as follows:

Example	Description
LC0000113;	Device's serial number;
P1.50	Software-Version;
Tank Fa. Müller, Flensburg;	Identification text;
60cm;	Fill height in cm;
1250L;	Content in litres;
50%;	Content in %;
15,90EUR;	Card credit balance (just prepaid);
#1234	SMS counter;
F-15;	GSM field strength;

7.1. Unscheduled level messages via SMS

In addition to the automatically generated level messages the LevelController can also emit a message in case of unforeseen emptying and filling. A time interval (e.g. 30 mins.) and quantity difference (e.g. 500 litres) can be input for this, see also point. 6.2.9. The LevelController emits a level message if a larger volume is removed or filled in the set time interval.

This SMS has the following Format:

Example Explanation	
LC0000113;	Device serial number;
P1.50;	Software-Version;
Tank Fa. Müller, Flensburg;	Identification text;
PLUS 800L;	Filling (PLUS) / Emptying (MINUS)
60cm;	Actual level in cm;
1250L;	Actual level in litres;
50%;	Actual level in %;
15,90EUR;	Card credit (only prepaid)
#1234;	SMS counter;
F-15;	GSM field strength;

8. Alarm messages via SMS

The LevelController optionally disposes of two alarm inputs, which create and send alarm messages to the entered phone numbers when activated. For each alarm input, a different message text can be defined (see 9.1.2).

Preconditions: An activated SIM-card with correct PIN has been installed and at least one phone number has been entered (see 6.2.12f). The display format of the alarm SMS is as follows:

Example	Description
LC0000113;	Device's serial number;
P1.50;	Software-Version;
Tank Fa. Müller, Flensburg;	Identification test;
Alarm 1;	Alarm 1 or 2;
Brennerstörung;	Corresponding alarm text;
60cm;	Fill height in cm;
1250L;	Content in litres;
50%;	Content in %;
15,90EUR;	Card credit balance (just Prepaid)
#1234;	SMS counter;
F-15;	GSM field strength

9. Communication with the LevelController via SMS

Many functions of the LevelController can also be made use of via SMS commands using an SMS-compatible mobile phone.

The battery-operated LevelController logs on to the GSM network every two days to check whether commands have been received. This interval is independent of the adjusted messaging interval. Consequently, in the worst case, command SMS may reach the LevelController after two days only.

These system-related restrictions do not apply for the LevelController with integrated power supply unit which receives and reacts to SMS messages promptly!

9.1. Inquiry Commands and Configuration Commands

For SMS messages, a certain command format must be respected. For control characters, upper case and lower case letters are acceptable.

SMS messages are limited to 160 characters.

There are two different types of commands: inquiry commands and configuration commands. Inquiry commands are used to retrieve information about the content and about system configuration parameters, configuration commands are used to change the parameters of the LevelController.

9.1.1. Inquiry Commands

Inquiry commands consist of two components: control character and question mark. The response to the inquiry is sent to the **inquiring** mobile phone number, **not** to the phone numbers entered for automatic messaging!

The following inquiries can be made:

Inquiry	Answer (Example)	Description	
Content			
L?	LC000113;	Device's serial number;	
<i> ?</i>	P1.50;	Software-Version;	
	Tank Fa. Meier;	Identification text;	
	60cm;	Filling height in cm;	
	1250L;	Content in litres;	
	50%;	Content in %;	
	15,90EUR;	Card credit balance (just prepaid);	
	#1234;	SMS counter;	
	F-15;	GSM field strength;	
System configurati	ons		
5?	LC000113;	Device's serial number;	
5?	P1.50;	Software-Version;	
	T=2, 2500, 120;	Form and measurements of tank;	
	<i>P=200,15,500,2000;</i>	Parameters for automatic SMS messages	
	<i>U=15,200</i>	SMS parameters for filling. / emptying.	
	M1=01754126816;	Mobile phone number 1;	
	M2=01754126817;	Mobile phone number 2;	
	A1= Brennerstörung	Text Alarm messages 1	
	A2= Pumpe defekt	Text Alarm messages 2	
	#1234;	SMS counter;	
	F-15;	GSM field strength;	
System configurati	onsy		
<i>E</i> ?	LC000113;	Device's serial number;	
е?	P1.50;	Software-Version;	
	<i>E=8000, <u>xyz@abc.de</u>;</i>	Email Gateway and address;	
	#1234;	SMS counter;	
	F-15;	GSM field strength;	

The parameters are described in the following section.

9.1.2. Configuration Commands

Configuration commands consist of three components: control character, equals sign and parameter, example: $_{M1=01754126816}$ ^(*). If a command requires several parameters, these are separated by commas, example: $_{P=250,10,800,6000}$ ^(*)

Control	Function (example)	Description	
character			
M1, M2	Mobile phone number for	Two mobile phone numbers can be entered for	
m1, m2	SMS messages	receiving automatica	ally generated content messages.
-	(M1=01754126816)	-	
/	Form and	First param.:	tank form (see below)
Ζ	measurements of tank	Second param.:	max. tank content [litres]
		iniru param.:	max. IIII neight [CIII]
	(<i>1=2, 2500, 120</i>)		
	Parameters for automatic	First param.:	Interval [IItres] Mossage interval [days]
Þ	SIVIS ITTESSAGES		Message Interval [uays]
	(P=200 15 500 2000)		Message interval [hours]
	(, 200, 13, 300, 2000)	Third param ·	Min alarm level [litres]
		Fourth param.:	Max alarm level [litres]
		The sample comman	d works such that for every 200
		litres of level change or at the latest every 15 days an	
		in any case when the level goes 500 litres below or	
		2000 litres above a message is sent	
	(B-200 ch 500 2000)	In the second sample command a message is sent every	
	(P=200,811,300,2000)	six nours at the latest.	
U	Parameter for SMS	First param.:	Measurement interval [mins.] *
U	messaging when filling or	Second param.:	Quantity difference [litres]
	unforeseen emptying		
		The sample comman	d works such that a message is sent
	(U=30, 500)	as soon as more than	n 500 litres are filled or emptied
		within 30 mins.	
E	Email gateway and email	First param.:	Email gateway
е	address for SMS→ Email	Second param.:	Email address
	(E-8000 x)/z@abc.do)		
	(L=8000, Xy2@abc.de)	It is possible to ente	r an Email address with the
	T-D1 [.] F=8000	corresponding Email gateway (specific to the GSM	
	Vodafone D2: $F=3400$	provider), to which t	ther in addition to or instead of the
	$E_{+:}$ $E_{=7676245}$		
	02: E=6245	JIND ITTESSABE.	
1	Identification text	Text preceding conte	ent messages for the identification
i		of the tank, max. of 36 characters	
	(I=Tank Fa. Meier)		
A1, A2	Alarm text alarm inputs	Text used in alarm m	nessage when an alarm input is
a1, a2		activated, max. 15 cl	haracters.
	(A1=Brennerstörung)		

Number	Shape of tank	Description
1	cuboid, upright cylinder	e.g. customized steel tanks, cistern tank
2	lying cylinder	typically buried tank
3	sphere	spherical tank
4	oval	typical "conventional" fuel oil tank made of steel or synthetic material
5	cell tank	synthetic tank with curved surface for stiffening
6	hemisphere	hemispheric synthetic tank with plane base

Tank forms, command ,T':

When a configuration command is received, it is executed and an SMS with the new system configurations is generated and sent to the mobile phone number which sent out the command.

9.1.3. Card credit, SMS counter and field strength

The card credit in euros (only prepaid cards, if available from the network provider) and the SMS counter reflect the status **before** sending the SMS. The card credit is reduced by the cost of one SMS when the SMS is received and the counter increased by one. The field strength is shown in the format as described in point 6.2.15.

9.1.4. Chaining Commands

It is possible to chain several inquiry and configuration commands in one SMS. They will be processed one after another.

Example: "M1=01754126816 M2=01754126817 L?".

It is possible, but not necessary to put blanks between the parameters and commands.

10. Default Settings, Value Ranges

For some parameters, standard values have been set for the device before su	uppl	p	p))))))))	p	ŗ	1))	3	ρ	ρ	þ)	ρ	ρ	r	r	r	r	r	r	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ŗ	ľ	I	I	ľ	I	I	J	J	U	ι	;	5	ŝ		5	e	e	-(r)	С	(f	<u>,</u>	e)()	b	Ł	!	Э](C	i	V	ł١	e	16	С		9	e	1	h	t		r	С	f		51	se	5	n	e	96)(b	l	e	/(۱١	а	h	ł	5	22	e	J	ι	l	a	а	1	V	١		d	(r	9	ĉ	ł	C	1	r	I	а	t	t	;†	S	ŝ	1	,	5,	5	S	<u>r</u> :	r	J	2	e
---	------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	--	---	---	---	----	---	---	---	---	---	----------	---	----	---	---	---	---	---	----	---	---	---	----	---	----	---	--	---	---	---	---	---	--	---	---	---	--	----	----	---	---	---	----	----	---	---	---	----	----	---	---	---	---	----	---	---	---	---	---	---	---	---	---	--	---	---	--	---	---	---	---	---	---	---	---	---	---	---	----	---	---	---	---	----	---	---	------------	---	---	---	---

Parameter	Default value	Value range (Min – Max))
SIM-Pin	-	0000 - 9999
Tank form	-	1 - 6
Tank max-volume	-	0 - 99.999 liters
Tank max. fill height	0 cm	0 - 999 cm
Management code	0 (no code)	0 - 9999
Height offset sensor	1 cm	0 - 99 cm
Density value	860 g/L (fuel oil)	100 - 2000 g/l
Messaging interval (I)	10,000 litres	50 - 10,000 litres
Messaging interval (days /	2 days	1 - 99 days 1 - 99 hours
Volume Min message	0 litres	0 - 99,999 litres
Volume Max message	99,999 litres	0 – 99,999 litres
Filling / emptying measurement interval.	60 mins	2 – 99 mins (mains) 30 – 99 mins (batt.)
Filling / emptying quantity difference.	1000 litres	100 -9999 litres
Alarm inputs configuration	0 (inactive)	0 - 3
Alarm output configuration	0 (inactive)	0 - 6
Volume Min alarm	0 Litre	0 - 99.999 Litre
Volume Max alarm	99.999 Litre	0 - 99.999 Litre
Phone number 1 for SMS Messages	-	Max. 16 characters
Phone number 2 for SMS	-	Max. 16 characters
SMSC	-	Max. 16 characters
Identification text	Horn GmbH & Co. KG	Max. 36 characters
Text Alarm 1	Disturbance 1	Max. 15 characters
Text Alarm 2	Disturbance 2	Max. 15 characters

11. Data Recall via Internet "levelmaster.net"

The connection to the web server of the company Horn GmbH & Co. KG offers a safe and easy way to record, display and evaluate content levels with the LevelController. The customer must have nothing but internet access and a browser. Additional services such as messaging to several participants via Email are available here.

For more information on, see www.levelmaster.net

12. Service

The LevelController TS was also developed with the aim of enabling operation with the minimum maintenance costs. This can be achieved if you operate this fuel pump according of this operating manual. However, if you should require further assistance, please contact the HORN service department.

Service Hotline +49 1805 900 301 (0,14 €/Min: on the German landline network, Mobile telephone max. 0,42 €/Min.)

service@tecalemit.de

13. Disposal

The device is to be emptied completely and the liquids properly disposed of in case it is taken out of service. The equipment is to be disposed of properly when taken permanently out of service:



Return old metal for recycling.
Return plastic parts for recycling.
Return electronic waste for recycling.

The water legal regulations are to be followed.

13.1. Return of batteries

Batteries must not be disposed of with the domestic waste. Batteries can be returned free of charge via a suitable collecting point or to the dispatch stores. Consumers are legally obliged to return used batteries.

Batteries that contain harmful substances are marked with a crossed out dustbin (see above) and the chemical symbol (Cd, Hg or Pb) of the heavy metal that is decisive for the classification as containing harmful substances:

- 1. "Cd" stands for cadmium.
- 2. "Pb" stands for lead.
- 3. "Hg" stands for mercury

14. Declaration of conformity

			G	HORN TECALEMIT
	Konfo Declara	ormitätser ation of Co	klärung Sonformity	
Hiermit erklären w <i>We herewith decla</i>	rir, dass die Baua are that the cons	art truction type		1
Typ: <i>Type:</i>		LevelContro	ller TS	
Bezeichr Designa	nung: <i>tion:</i>	Füllstandsm Level measu	lessgerät Irement device	
Artikel-N Item No	Nr.: . <i>:</i>	225 300 210 225 400 220); 225 310 200); 225 510 200	
in der von uns geli entspricht: <i>in the form as deli</i>	ieferten Ausführ ivered by us com	ung folgenden	einschlägigen Bes following applicab	timmungen <i>le regulations:</i>
- Niederspannun Low voltage eq	gsrichtlinie 200 uipment 2006/9	6/95/EG 9 <i>5/EC</i>		
- EMV-Richtlinie Electromagneti	2004/108/EG c compatibility .	2004/108/EC		
Angewendete harn Applied harmonise EN 60204-1	monisierte Norm ed standards:	en:		
EG-Dokumentatior EC official agent fo	nsbevollmächtigt or documentation	er: Jörg Mo n:	hr Horn GmbH Munketoft 4 24937 Flen	I & Co. KG 12 sburg
14.10.2010 Datum <i>Date</i> E	i.V. Dipl: Entwicklungsleiter	Ing. Jörg Mohr / Engineering M	anager	
HORN GmbH & Co. KG T + Munketoft 42 F + D-24937 Flensburg info Germany ww	-49 461 8696-0 -49 461 8696-66 o@tecalemit.de ww.tecalemit.de	Geschäftsführer: Jürgen Abromeit Torsten H. Kutschinski	Commerzbank AG BLZ 215 400 60 Konto-Nr. 2476000	SWIFT COBADEFFXXX IBAN DE33215400600247600000 Amtsgericht Flensburg HRA 4264 USt-IdNr. DE813038919

Annex A Menu Structure Management Mode

	SEnSr		Sensor type 4-20 mA / 0,5 - 4,5 Volt
	PAr t		Adjust tank parameters
		L Corren	Taalufarra
		Fornn	I ank form
		HEigh	Maximum volume Maximum fill beight
		TILIGH	
	Zero		Zero point adjustment
·	OFFSt		Height offset sensor head
	Calib		Calibration sensor
	↓ CodEn		Enter management code
	Pin		PIN code for SIM-card
	Par F		Parameters for autom. content messages
		StEP	Messaging interval in I
		dA YS	Messaging Interval
		max	Volume Max message
		max	Volume Max message
	Par U		Parameter Filling / Depleting message
		Ļ	
		intEr	Intervall / minutes
		diFF	Volume difference
	+ A In		Alarmianute (antional)
	Par A		Parameter alarm output (optional)
		A Out	Configuration alarm output
		Lo	Volume Min alarm (Low level)
		Hi	Volume Max alarm (High level)
	↓ _ ↓		
	tEL 1]	Mobile phone number 1 SMS
	tEL 2		Mobile phone number 2 SMS
	SMSC		SMS-Service-Center
	FiELd		Display field strength
	Snd L		Sending out content SMS
	↓ Snd S		Sending out system configuration SMS
	rEC		Receiving SMS
	↓ in:!4		biticlication of perspectars
			initialisation of parameters

Annex B Error Messages

Error messages are displayed in the following format: ",E - 01" (example). They primarily refer to the GSM module and the measuring transducer.

Error	Description	Remedy
E-01	No SIM-card inserted	Switch off device (remove battery) and insert
		SIM card in card holder
		see 3.4
E-02	Wrong or missing SIM PIN	Enter correct SIM PIN
		see 6.2.7
E-03	Failed login onto GSM network	Activate card
		Change positioning,
		use external antenna
E-04	Wrong SIM-PIN entered for	Insert SIM-card in cell phone, enter PUK, enter
	three times	correct SIM PIN into LevelController
	Error GSM module	Notify customer service
E-05	Error in sending out SMS	Recharge prepaid card credit balance
		Change positioning,
		use external antenna
		Wrong SMSC set up
		see. 6.2.14
E-06	No mobile phone number	Enter mobile phone number for SMS messages
	entered	see 6.2.12f
		see 9.1.2
E-20	Level probe signal low	Check level probe cable
		Check probe connection and probe type
E-21	Level probe signal too high	Check probe connection and probe type



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