HORN TECALEMIT

Installation Manual

LevelMaster

Item-No.: 224 000 000, 224 000 200, 224 000 400,
224 100 000, 224 200 000, 224 000 100

Translation of the original operating manual

Important!

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.

The instruction manual consists of two documents:

Document no.	Title
441385102	Installation Manual
441385103	Operating Manual

Copyright

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Table of content

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

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.

Hydraulics

⚠ Only persons with special knowledge and experience with hydraulic systems may carry out work on hydraulic parts and equipment. All lines, hoses and screw joints should regularly be checked for leaks and visible external damage. Any damage must be rectified immediately. Any oil spurting out can cause injuries and fire.

The relevant safety regulations for the product must be followed when handling oils, greases or other chemical substances!

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 spare parts made by the manufacturer may be used.

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.

2 Technical description

2.1 Product description / Appropriate use

The LevelMaster measures the current filling level of each connected tank and calculates, under consideration of the entered tank parameters, the current volumes in the tank. Various tank forms and parameters can be entered in the LevelMaster. The system allows the setup of four alarm thresholds, two minimum and two maximum volumes per sensor. If a threshold falls below or exceeds the current volumes, an alarm signal is triggered. A wide ranging selection of filling level probes offers the customised solution to almost any problem in the area of filling level measurements and monitoring. Up to eight tanks can be monitored on one unit and up to 64 tanks for the extension with slave units. A special equipment feature is the optional remote data transmission with a direct PC connection, GSM or landline to the filling level display and parameterisation using the PC program with a compatible modem. The working principle for the filling level display is the measurement of the hydrostatic pressure of the medium in the tank.

2.2 Product versions

Item-No.	Product
224 000 000	LevelMaster
224 200 000	LevelMaster incl. analog modem
224 100 000	LevelMaster incl. GSM modem without Sim card
224 000 200	LevelMaster with direct PC connection RS 232
224 000 400	LevelMaster with direct PC connection RS 422
224 000 100	LevelMaster slave unit (expansion unit)

2.3 technical data

Electrical supply	230V AC 50/60Hz ± 10%
Power consumption	15VA
Temperature (operating)	-10°C to 50°C
Temperature (storage)	-20°C to 70°C
Display	2 x 16 LCD / 8mm
Keyboard	16 buttons
Switch output	Alarm contact max. 230V AC - 8A
Failure sensor	Input current of < 2 mA and > 22mA causes the failure display „Fail“
Suspension	Fixing with 3 bolts max. 3.5 mm; see Fig ill. 1. View of back.on page 9
Dimensions	212mm x 195 mm x 105 mm ((approx.).

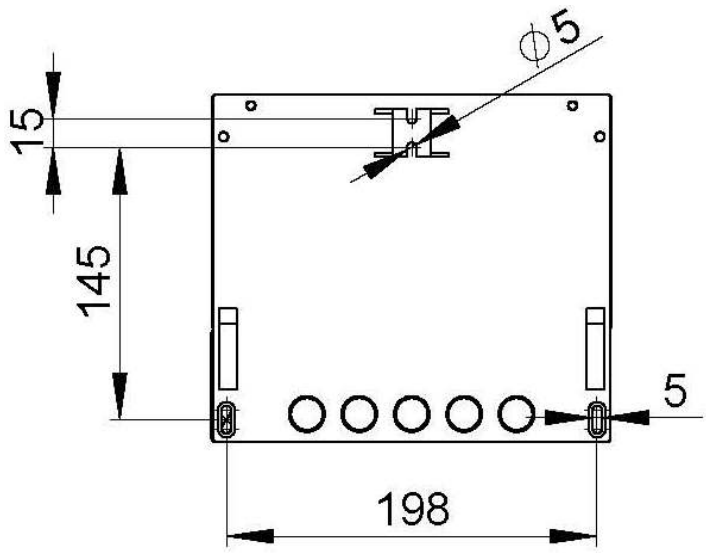
2.4 Level probes

Item-No.	Product	Model
224 010 000	Level probe 200 mbar 0,5%	For max tank height approx.. 2 m, cable leng 5,0 m
224 020 000	Level probe 300 mbar 0,5%	For max tank height approx.. 3 m, cable leng 5,0 m
224 050 000	Level probe 500 mbar 0,5%	For max tank height approx.. 5 m, cable leng 7,0 m
224 010 006	Level probe 200 mbar 0,5% Explosion-proof design	For max tank height approx.. 2 m, cable leng 5,0 m, incl. explosion-proof barriers with Serto process connection for 12 mm stainless steel pipe as a cable guide
224 020 006	Level probe 300 mbar 0,5% Explosion-proof design	For max tank height approx.. 3 m, cable leng 5,0 m, incl. explosion-proof barriers with Serto process connection for 12 mm stainless steel pipe as a cable guide
224 050 006	Level probe 500 mbar 0,5% Explosion-proof design	For max tank height approx.. 5 m, cable leng 7,0 m, incl. explosion-proof barriers with Serto process connection for 12 mm stainless steel pipe as a cable guide

2.5 Accessories

Item-No.	Product	Model.
224 060 000	Protective box for explosion-proof barriers, up to 4 off	Housing for explosion-proof barriers with ex-proof level probes, installation outside the explosive atmospheres
224 070 000	1" mounting set for standard level probes	For 1"-screw joint on the tank cap, not for explosive atmospheres
224 070 009	1"-mounting set for level probes ex-proof	For 1"-screw joint on the tank cap, for explosive atmospheres
On request	1 m cable extension	Extension of the level probe connection cable by 1 m, max. 200 m, delivery time on request
224 061 000	IP 66 terminal box with breathable filter	For extension of the level probe connection cable with commercial control cable, e.g. 2 X 0.5 sq mm
224 070 004	Stainless steel pipe as a cable guide, 2.3 m	12 mm stainless steel pipe as a cable guide for level probe 200 mbar, Ex-proof
224 070 005	Stainless steel pipe as a cable guide, 3,4 m	12 mm stainless steel pipe as a cable guide for level probe 300 mbar, Ex-proof
224 070 006	Stainless steel pipe as a cable guide, 5,4 m	12 mm stainless steel pipe as a cable guide for level probe 500 mbar, Ex-proof
256 200 010	Manufacturing of the complete ex-proof level probe	Installation of the stainless steel pipe as cable guides (without level probe and stainless steel pipe), please provide tank height, only cost of mounting

3 Mounting the LevelMaster



ill. 1 View of back

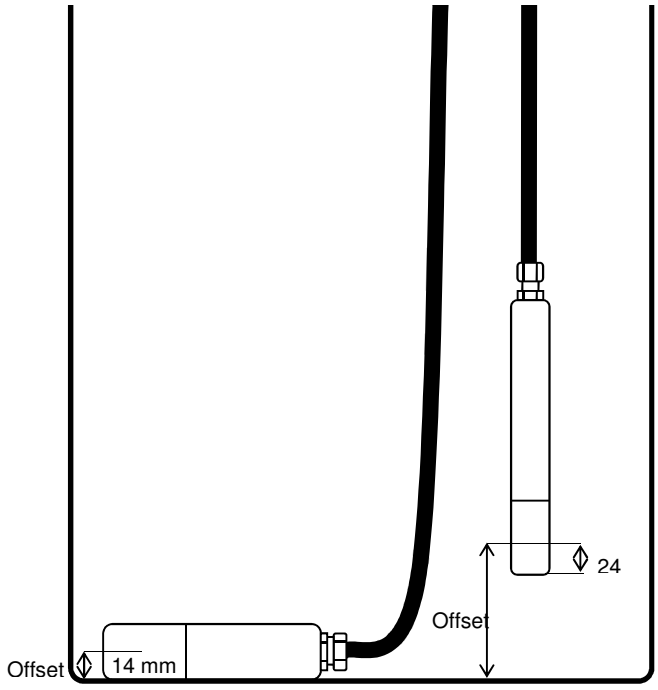
☛ **The unit is not suitable for installation outdoors.**

Fixing should take place on an even, extensively vibration-free base, e.g. on a solid wall. The circumferential clearance to electrical lines that are connected to consumers with high start-up currents (e.g. compressors) must be at least 30 cm.

4 Sensor installation

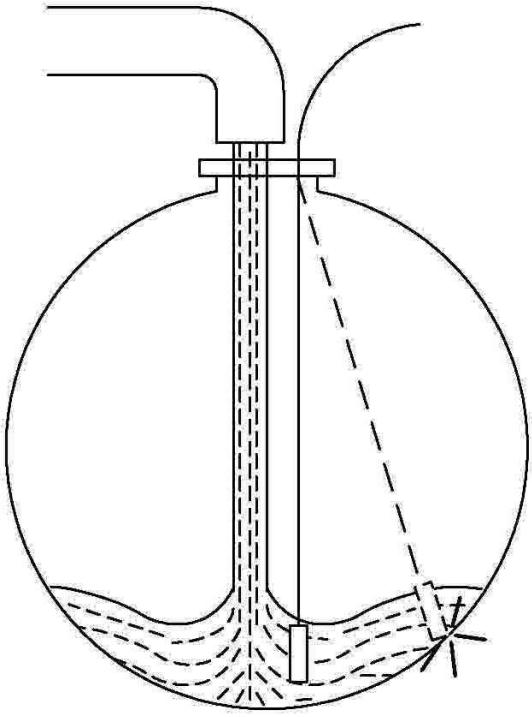
The sensor should be positioned lying at the lowest point in the tank so that the effective installation height (offset) is approx. 11mm above the bottom of the tank (see sketch). In particular cases it can be necessary to position the sensor hanging above the bottom of the tank. The offset for this tank must then be entered into the corresponding input mask. If there is a difference between the level read off and detected then the offset can be corrected accordingly.

☛ **Zero point compensation may only be carried out if the sensor is outside the liquid.**



ill. 2 Offset

Ensure that the sensor does not oscillate during installation. A protective pipe with bleeding hole on the upper end is to be foreseen if the sensor is installed near a filling or suction line.

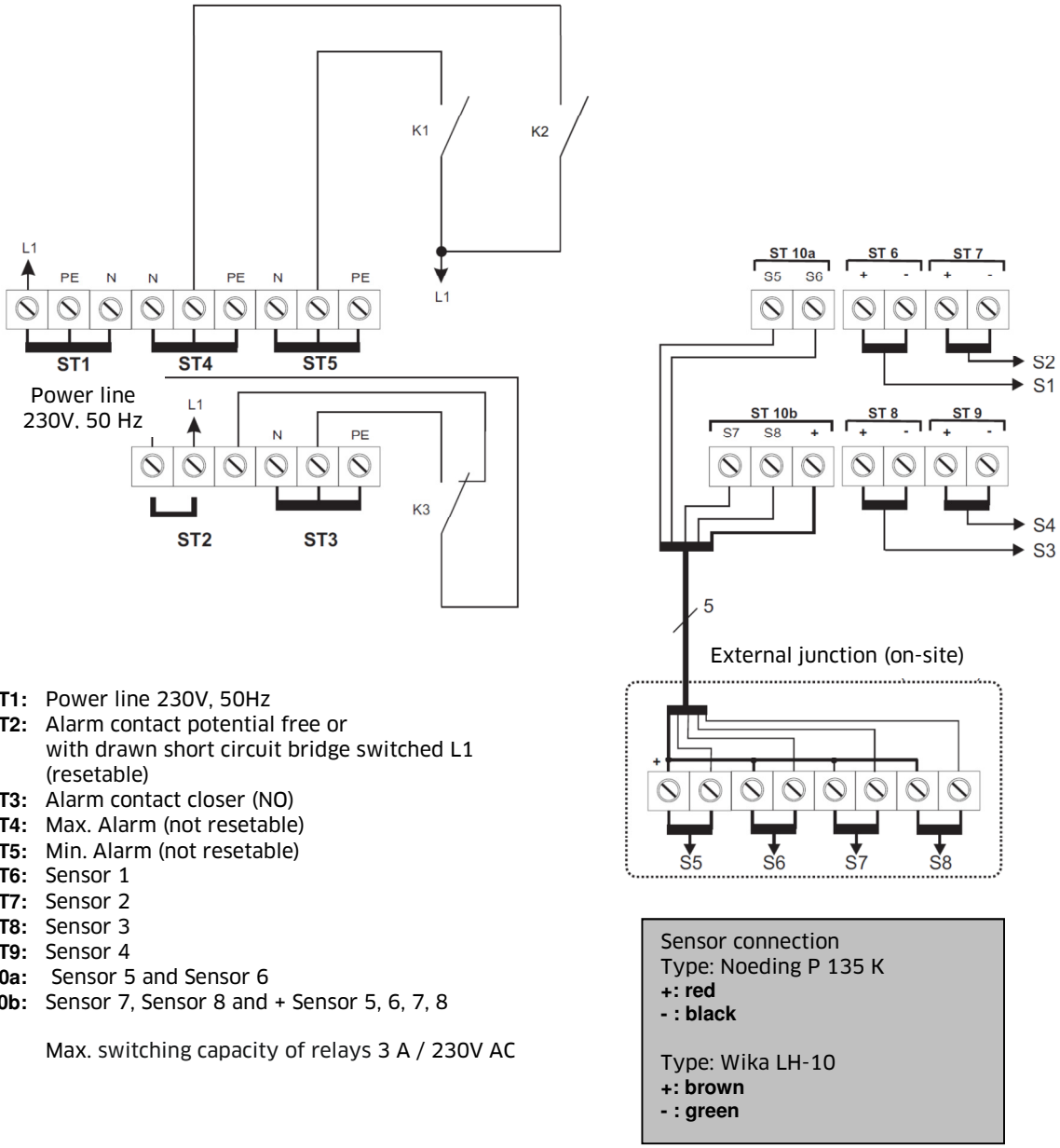


ill. 3 Pendulum movement

4.1 Connecting the sensors to the LevelMaster

The connection terminals are accessible after dismantling the lower protective hood.

Attention: Before dismantling protective hood, switch off unit!



ST1: Power line 230V, 50Hz
ST2: Alarm contact potential free or with drawn short circuit bridge switched L1 (resetable)
ST3: Alarm contact closer (NO)
ST4: Max. Alarm (not resetable)
ST5: Min. Alarm (not resetable)
ST6: Sensor 1
ST7: Sensor 2
ST8: Sensor 3
ST9: Sensor 4
ST10a: Sensor 5 and Sensor 6
ST10b: Sensor 7, Sensor 8 and + Sensor 5, 6, 7, 8

Max. switching capacity of relays 3 A / 230V AC

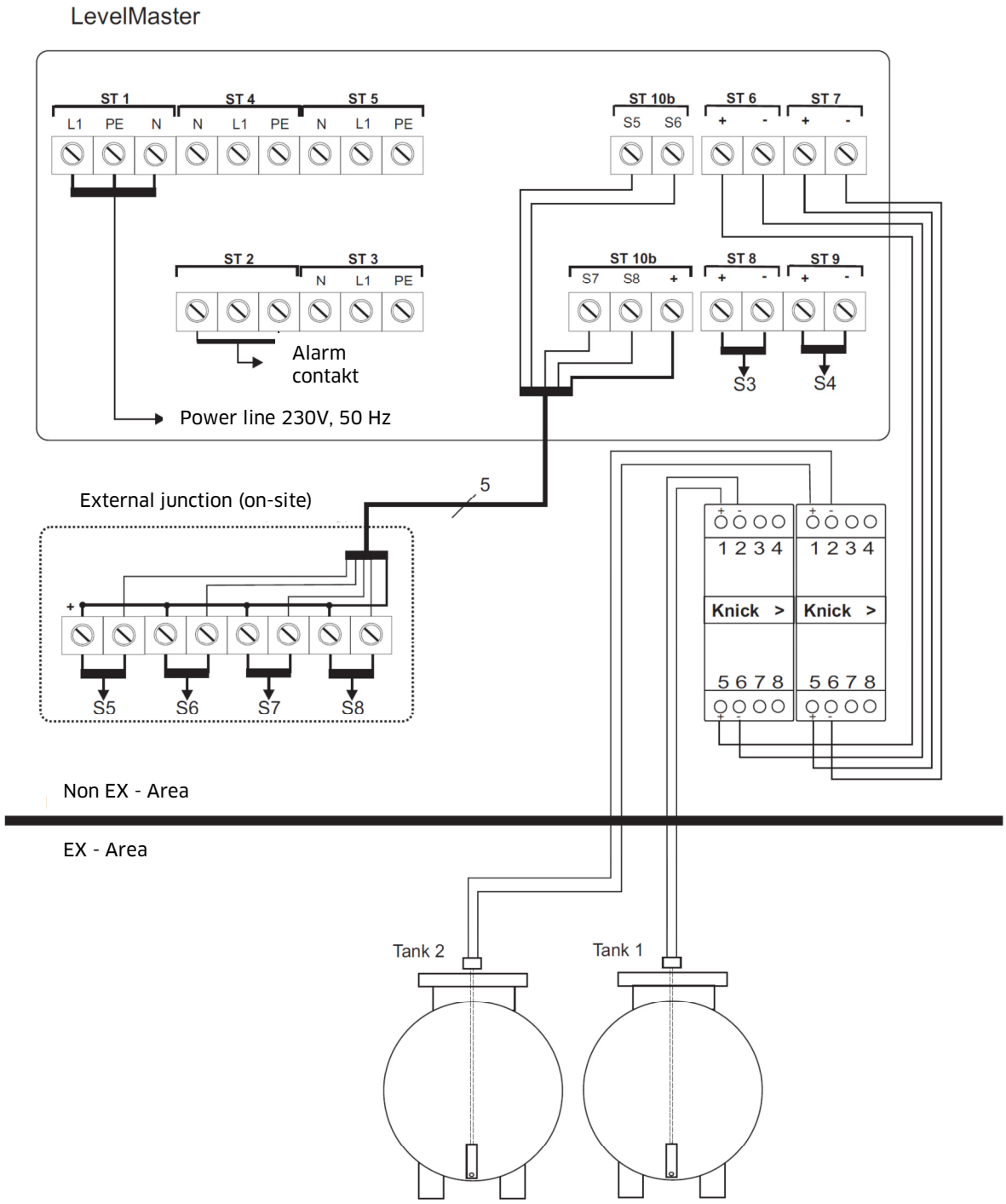
Sensor connection
Type: Noeding P 135 K
+: red
- : black

Type: Wika LH-10
+: brown
- : green

ill. 4 LevelMaster wiring diagram

4.2 Additional note for explosion-proof sensor design

The sensors for use in explosive environments, type Y943, may only be operated in combination with a passive supply isolator, type KNICK WG25 A7. The passive supply isolator must be mounted outside the explosive environment. One supply isolator is required per sensor.



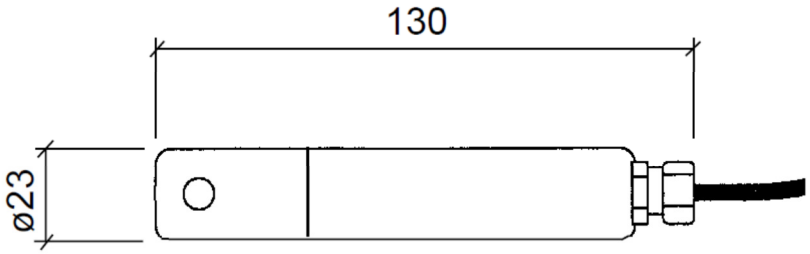
ill. 5 Connection plan for LevelMaster with passive repeater transmitter (example for two tanks)

4.3 Sensor technical data

(For information only; for details see sensor data sheet)

Range:	0 ... 200mBar (0-2m water column) 0 ... 300mBar (0-3m water column) 0 ... 500mBar (0-5m water column)
Combined linearity and hysteresis error:	Typ 0,2% (max. 0,3%) of upper limit of effective range.
Dimensions:	See Fig. below
Cable length:	approx. 5m / 8m für 500mBar / optionally longer
Output: current loop:	4 ... 20mA
Temperature range:	See sensor data sheet
Medium-affected materials:	High-grade steel 1.4571, ceramic(s), FPM (Viton), PE

! **If necessary examine material compatibility.**



ill. 6 Sensor

Please note:

The cable contains a small capillary within it that enables pressure compensation betweenthe atmosphere and the internal sensor. Therefore:

! **Do not bend the sensor cable.**

! **An extension using a suitable cable is possible. The connection has to be made in a ventilated terminal box. A suitable terminal box with pressure equalisation element is to be foreseen for outdoors, page 8.**

5 External Alarm

The system has an alarm contact. The contact is closed on reaching a minimum or maximum level, failure of a sensor or the device being switched off. The contact be used to connect an external alarm system (siren, flashing light...).

6 Important Comments

When entering tank data all dimensions must be expressed in mm. Density must be entered in g/ l (grams / litre). Density values are normally entered in kg /l. These values must be multiplied by 1000 to give g/ l (grams / litre). Please check whether your parameter entries are correct using the indicated maximum volumes. The volumes indicated here must agree with your tank data sheet. The display shows the floating mean value of the measured levels in order to prevent fluctuation of the displayed value. As a result it is a few seconds until the display shows new, stable values during filling or emptying processes. If a sensor fault signal appears, please check whether the sensor cable is connected correctly (polarity, connections) or change the sensor if necessary.

! **Do not forget to return to the main menu after parameter entry. The LevelMaster does not operate in management mode!**

! **Do not forget to enter the correct density; otherwise the level cannot be computed correctly.**

! **The LevelMaster can only function properly with correct setting up.**

! **The tanks must have atmospheric compensation, otherwise the LevelMaster will not measure correctly.**

7 Configuration of the LevelMaster

☛ **If there is a PC connection or a modem (both optional) the LevelMaster can be easily configured with the PC programme *LevelControl*. All settings can also be made directly at the device.**

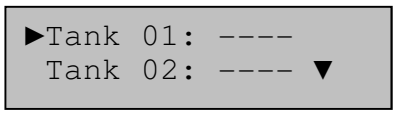
Information on the PC program LevelControl can be found in section ill. 10, page 26.

7.1 Procedure when manually configuring at device

turn on device

After turning on the LevelMaster, a function test is started (display test, display of programme version, memory test). When turned on, the LevelMaster is automatically in the operating mode tank content level.

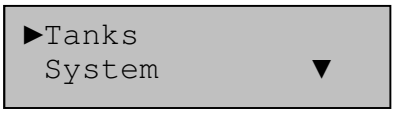
Display (ex):



press ‚EXIT' key

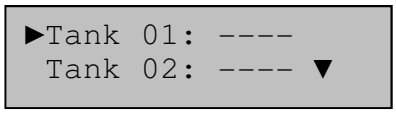
the LevelMaster switches into operating mode management operation (see page 30, menu structure management operation)

Display:



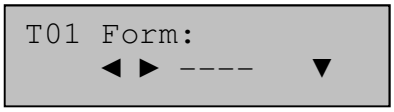
press ‚ENT' key

Display:



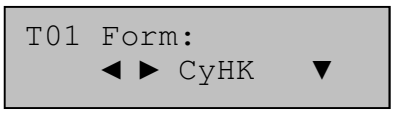
with keys ‚▼' and ‚▲' select tank and confirm with ‚ENT'

Display (ex):



with keys ‚◄' and ‚►' select form (ex Cylinder horizontal etc.)

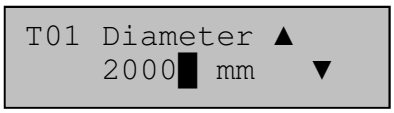
Display (ex):



Confirm with ‚▼' key

input diameter (ex)

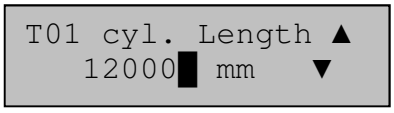
Display (ex):



Confirm with ‚▼' key

input cylindrical length (ex)

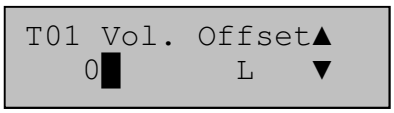
Display (ex):



Confirm with ‚▼' key

input volume offset

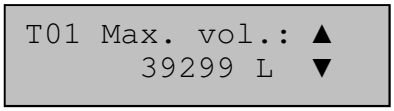
Display (ex):



Confirm with ‚▼' key

maximal volume is displayed

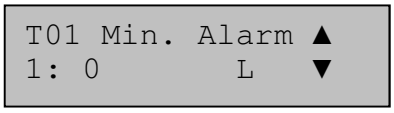
Display (ex):



Confirm with ‚▼' key

input Minimum Alarm 1

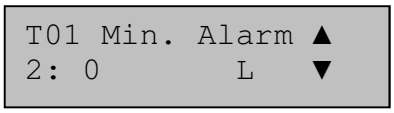
Display (ex):



Confirm with ‚▼' key

input Minimum Alarm 2

Display (ex):



Confirm with ‚▼' key

input Maximum Alarm 1

Display (ex):

```
T01 Max. Alarm ▲
1: 9999999 L   ▼
```

Confirm with ‚▼' key

input Maximum Alarm 2

Display (ex):

```
T01 Max. Alarm ▲
2: 9999999 L   ▼
```

Confirm with ‚▼' key

input density of medium
if necessary see last delivery note

Display (ex):

```
T01 Density:    ▲
    860 g/L     ▼
```

Confirm with ‚▼' key

input sensor type
Sensor span in mBar

Display (ex):

```
T01 Sensor type▲
    200 mBar   ▼
```

Confirm with ‚▼' key

input sensor offset
effective mounting height of the sensor in relation to tank floor, see ill. 3

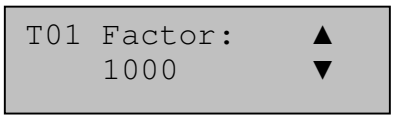
Display (ex):

```
T01 Offset:     ▲
    11   mm     ▼
```

Confirm with ‚▼' key

input calibration factor of sensor
attention: the works setting should not be modified!

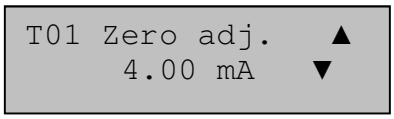
Display (ex):



Confirm with ‚▼' key

carry out zero point adjustment of the sensor by pressing the ‚ENT' key twice
attention: sensor must be out of fluid!

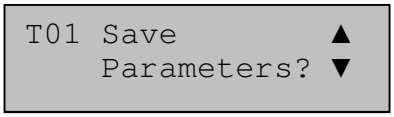
Display (ex):



Confirm with ‚▼' key

save tank parameters by pressing ‚ENT' key

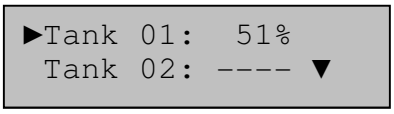
Display (ex):



Confirm with ‚▼' key

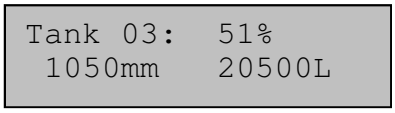
press ‚EXIT' key three times
the LevelMaster switches back to operation mode tank content level

Display (ex):



press ‚ENT' key
the LevelMaster switches into single tank display, exit with ‚EXIT'

Display (ex):



Further steps could be:

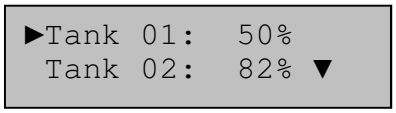
Setting up further tanks (see above)
Setting an access code for the management mode (see operating manual)
Setting modem settings (optional modem, see operating manual)

7.2 Device settings for PC direct connection

turn on device

after turning on the LevelMaster, a function test will begin (display test, display of programme version, memory test). When turned on, the LevelMaster is automatically in the operating mode tank content level.

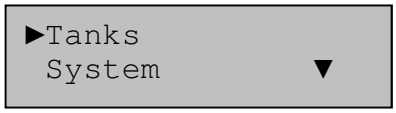
Display (ex):



Press ‚EXIT' key

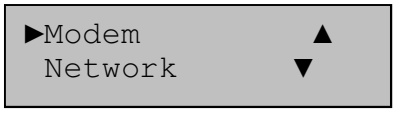
the LevelMaster switches in to operation mode management operation (see page 30, Menu structure Management mode)

Display:



Press ‚▼' key 2 x

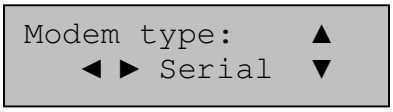
Display:



confirm with ‚ENT' key

With keys ‚◄' and ‚►' select modem type „Serial"

Display (ex):

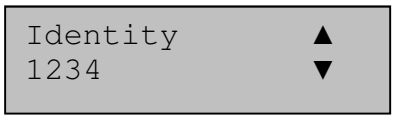


Confirm with ‚▼' key

enter device identity

Attention: the identity must correspond to the identity in the LevelControl PC programme!

Display (ex):



confirm with ‚ENT' key

press ‚EXIT' key 2 x
the LevelMaster switches in to the operation mode tank content level

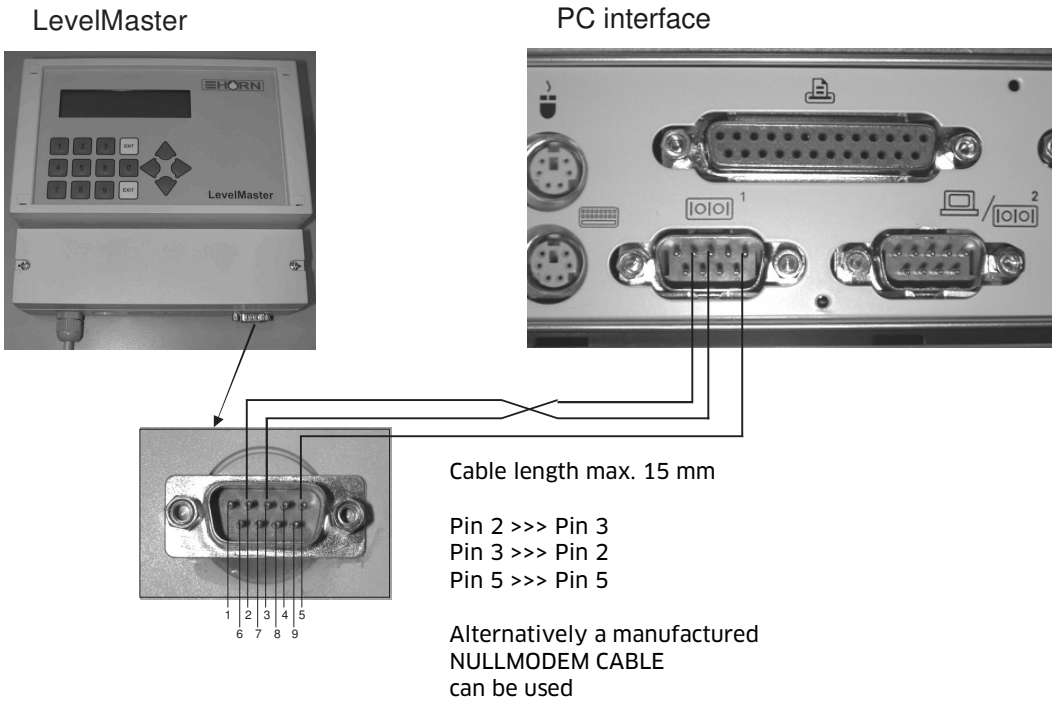
Display (ex):

```
►Tank 01:   50%
 Tank 02:   82% ▼
```

turn device off and on again

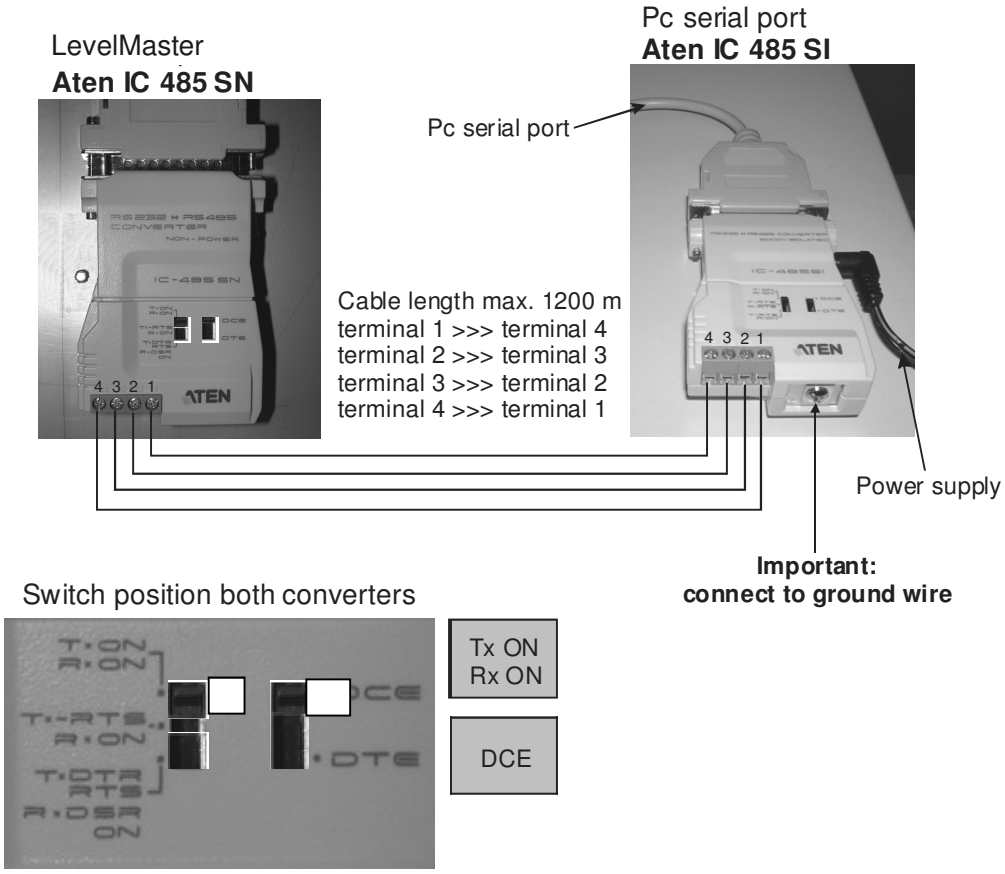
You can now configure the LevelMaster on the PC with the LevelControl program.
The LevelMaster must be connected with the PC for this - refer to the next step.
Information on the PC program LevelControl can be found in section ill. 10, page 26.

7.2.1 Connection alternative 1: serial over null modem cable



ill. 7 Wiring diagram for LevelMaster with zero modem cable

7.2.2 Connection alternative 2: Serial over converter set



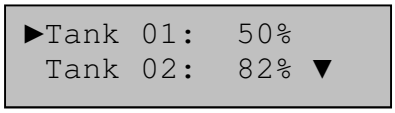
ill. 8 Wiring diagram for LevelMaster with converter set

7.3 Device settings for the PC connection over analog modem

turn on device

after turning on the LevelMaster, a function test will begin (display test, display of programme version, memory test). When turned on, the LevelMaster is automatically in the operating mode tank content level.

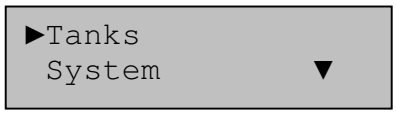
Display (ex):



press ‚EXIT' key

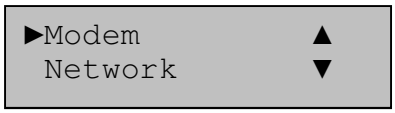
the LevelMaster changes in to operation mode management operation (see page 30, Menu structure Management mode)

Display:



press ‚▼' key 2 x

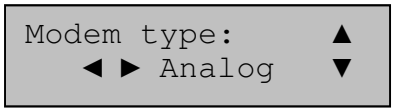
Display:



Confirm with ‚ENT' key

with ‚◄' and ‚►' keys, select modem type „Analog"

Display (ex):

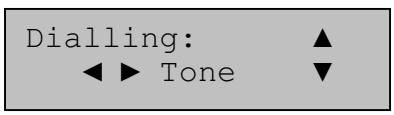


Confirm with , ▼'key

with ‚◄' and ‚►' keys, select dialling mode „Tone" or „Pulse"

the dial mode depends on the telephone system, normally dialling mode tone is used.

Display (ex):



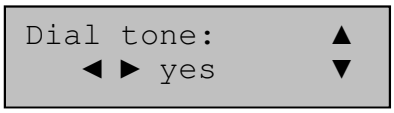
Confirm with ‚▼' key

3326

with keys ‚◄' and ‚►' select dial tone ‚yes' or ‚no'

the setting ‚no' may be necessary as dialling tone in private telecommunication systems without continuous tone.

Display (ex):



Confirm with ‚▼' key

enter device identity

Attention: the identification must correspond to the identification in the LevelControl PC programme!

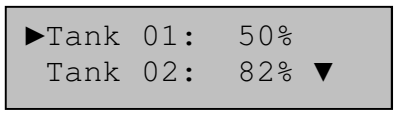
Display (ex):

Confirm with ‚ENT' key

press ‚EXIT' key 2 x

the LevelMaster switches back into operation mode tank content level

Display (ex):



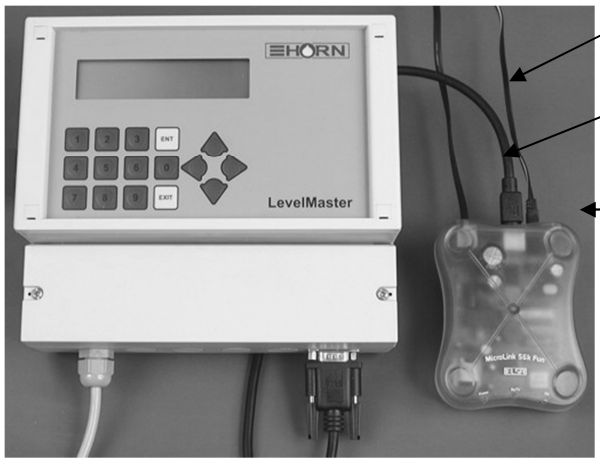
turn device off and on again

You can now configure the LevelMaster on the PC with the LevelControl program.

The LevelMaster must be connected with the PC for this - refer to the next step.

Information on the PC program LevelControl can be found in section 7.5, page 26.

7.3.1 Connection over analog modem



ill. 9 Wiring diagram for LevelMaster with landline modem

7.4 Device settings for PC connection over GSM modem

turn on device

after turning on the LevelMaster, a function test will begin (display test, display of programme version, memory test). When turned on, the LevelMaster is automatically in the operating mode tank content level.

Display (ex):

```
►Tank 01:  50%
 Tank 02:  82% ▼
```

press ‚EXIT' key

the LevelMaster changes in to operation mode management operation (see page 30, Menu structure Management mode)

Display:

```
►Tanks
 System        ▼
```

press ‚▼' key 2 x

Display:

```
►Modem         ▲
 Network       ▼
```

Confirm with ‚ENT' key

with ‚◄' and ‚►' keys, select modem type „GSM"

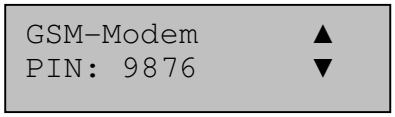
Display (ex):

```
Modem type:    ▲
  ◄ ► GSM      ▼
```

Confirm with ‚▼' key

enter SIM-PIN of the GSM modem SIM card

Display (ex):

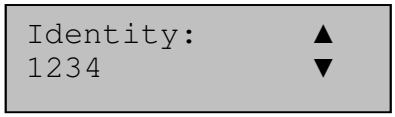


Confirm with , ▼' key

enter device identity

Attention: the identity must correspond to the identity in the LevelControl PC programme!

Display (ex):

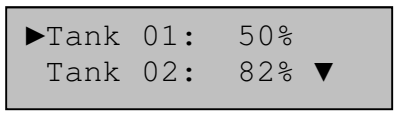


Confirm with ‚ENT' key

press ‚EXIT' key 2 x

the LevelMaster switches back in to operation mode tank content level

Display (ex):

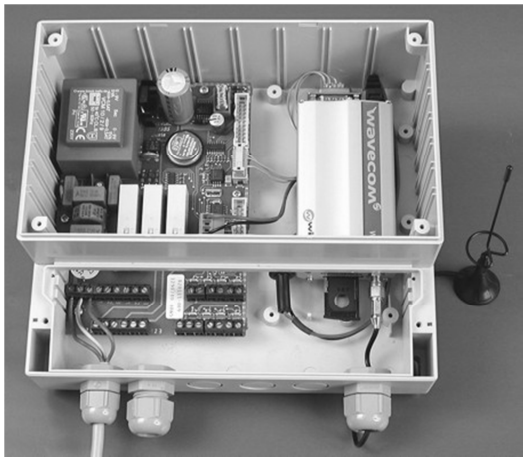


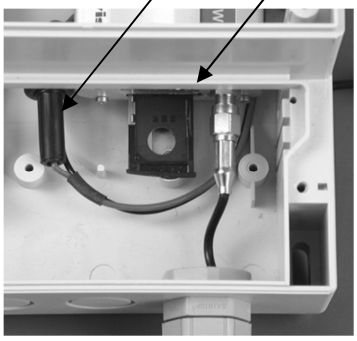
turn device off and on again

The LevelMaster must be connected with the GSM network for this - refer to next step.

Information on the PC program LevelControl can be found in section 7.5, page 26.

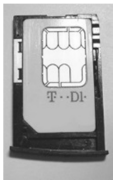
7.4.1 Insert the SIM card





fuse 2,5A

Press yellow button on the right of the drawer. Pull out drawer and insert SIM card (as in picture below), then push drawer back in.



ill. 10 Inner view of device with GSM modem and inserting SIM card

7.5 "*LevelControl" PC program*

The PC program LevelControl serves the purpose of simple configuration and call-up by the LevelMaster. A free COM port or a modem connection (analogue / GSM) is required for communication.

7.5.1 Procurement

The LevelControl program can be downloaded free of charge from our homepage www.tecalemit.de

The program is provided as an EXE and as a ZIP file.

The EXE file is a self-extracting file. The file is automatically unzipped after implementation. The installation files are available in the unzipped "LevelControl" folder. Select the ZIP file if your Firewall does not allow download of the EXE file. The ZIP file must be unzipped. After unzipping, you receive a "LevelControl" folder in which the installation files are provided.

7.5.2 Prerequisite

Operating system Win9x, ME, NT, XP, Vista

Approx. 10 MB free hard drive memory

The computer must have a free Com-Port or a modem.

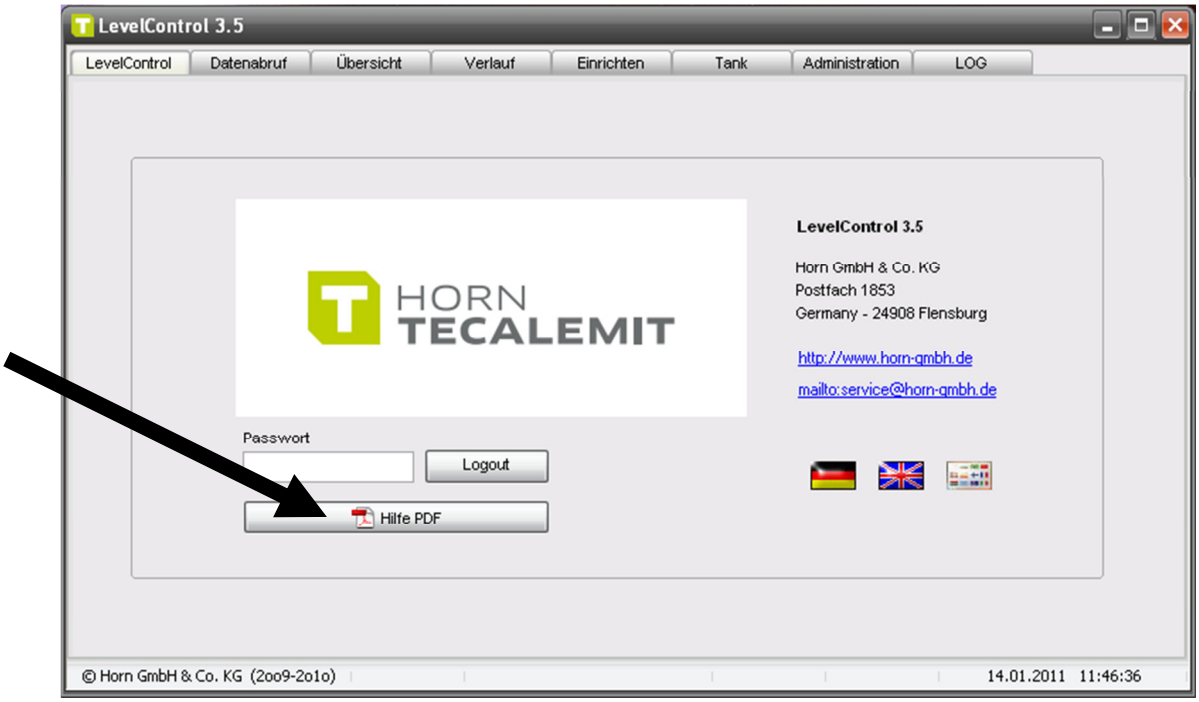
7.5.3 Installation

The 'Setup.exe' (double click) must be performed in the "LevelControl" folder for installation.

7.5.4 Configuration

Configuration of the LevelMaster with the LevelControl program is described in the assistance PDF.

Start the program and press the "assistance PDF" button; this opens the current instructions.



ill. 11 LevelControl start page

8 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.**

8.1 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.

9 Maintenance

Only suitable detergents for plastics may be used for cleaning the outside of the housing. Do not use solvents, fuels or similar under any circumstances!

10 Declaration of Conformity

HORN TECALEMIT

Konformitätserklärung
Declaration of Conformity

Hiermit erklären wir, dass die Bauart
We herewith declare that the construction type

Typ: *Type:*	**LevelMaster**
Bezeichnung: *Designation:*	**Füllstandsmessgerät** ***Level measurement device***
Artikel-Nr.: *Item No.:*	**224 000 000, 224 000 100, 224 000 200,** **224 000 400, 224 100 000, 224 200 000.**

in der von uns gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:
in the form as delivered by us complies with the following applicable regulations:

- Niederspannungsrichtlinie 2006/95/EG -
  Low voltage equipment 2006/95/EC

- EMV-Richtlinie 2004/108/EG
  Electromagnetic compatibility 2004/108/EC

Angewendete harmonisierte Normen:
Applied harmonised standards:

EN 55022 EN 61000-4

EG-Dokumentationsbevollmächtigter: Jörg Mohr Horn GmbH & Co. KG
EC official agent for documentation: Munketoft 42
24937 Flensburg

15.05.2012
Datum
Date

.....
i.V. Dipl.-Ing. Jörg Mohr
Entwicklungsleiter / *Engineering Manager*

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Munketoft 42
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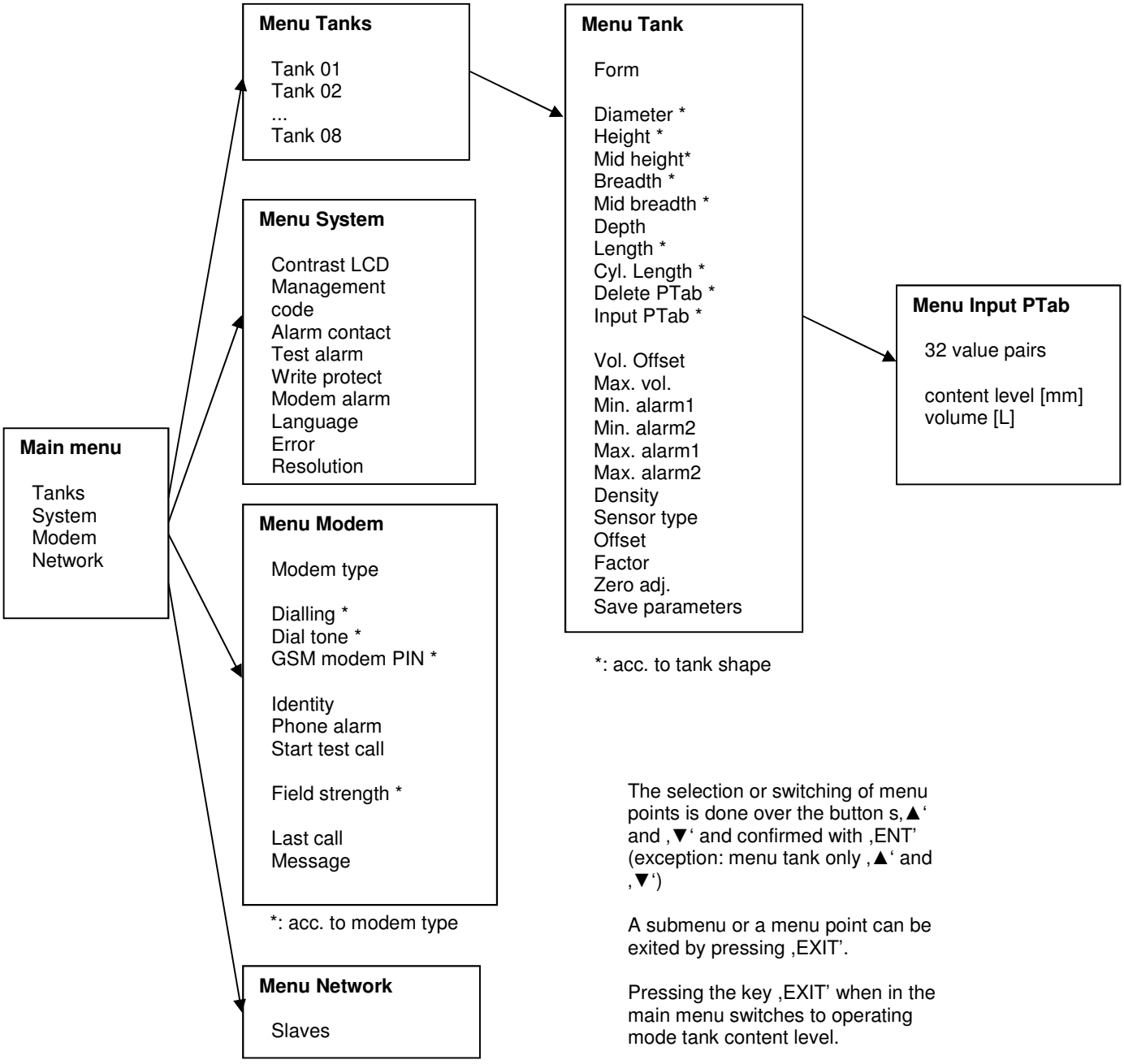
Amtsgericht Flensburg HRA 4264
USt-IdNr. DE813038919

11 Menu structure Management mode



The selection or switching of menu points is done over the button s‚▲' and ‚▼' and confirmed with ‚ENT' (exception: menu tank only ‚▲' and ‚▼')

A submenu or a menu point can be exited by pressing ‚EXIT'.

Pressing the key ‚EXIT' when in the main menu switches to operating mode tank content level.

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