Installation and operating instructions

DLT2 Continuous Water Level Transmitter

for use with the level probe: EC 8

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# Safety instructions

## 1. Risks and Safety Precautions

### 1.1 General safety instructions

1. **Avoidance of risks to persons and property**
   - Only use the device supplied in accordance with the intended planning.
   - Do not carry out extensions and modifications to the device without our approval.
   - Observe accident prevention regulations and system-specific safety instructions.
   - Read and observe fitting and operating instructions.
   - The device must only be fitted and put into operation by appropriate trained persons.

2. **Limitations of use**
   - The device must only be used in accordance with the details in these operating instructions or for the parameters agreed in the supply contract (see data plate) and the application.
   - Approval for this device loses its validity if changes not authorised by us have been made.
   - The safety of the whole boiler system into which this device is fitted lies in the responsibility of the installer of the system.
   - If this device is inserted incorrectly the function/protection expected from this device may be impaired.

3. **Avoidance of risks and damage**
   - Disseminate the assembly and operating instructions to the departments responsible for “goods in, transport, assembly, commissioning and maintenance”.
   - If this device is passed on to third parties these assembly and operating instructions in the relevant language of the country must accompany it.
   - Assembly work on the device should only be carried out by trained staff specially commissioned and only with the current disconnected.
   - Read and observe the assembly and operating instructions carefully and keep them in a safe place.
   - **Take note of and follow the safety instructions printed in bold and highlighted in the individual sections!**
   - When transporting, avoid e.g. knocks and putting down heavily, this can lead to damage.
   - For intermediate storage ensure that the storage location is suitable for the device.
   - The storage location must be dry and the device secured against damage.
   - This device must **not** be used in areas at risk of explosion.
4. Symbols
In these assembly and operating instructions, safety instructions are specially marked with the following symbols:

![Danger](image)

means that if they are not observed there is risk to life and / or significant damage to property may occur.

![Caution](image)

means that attention is particularly drawn to technical requirements.

1.2 Exclusion of liability
IGEMA GmbH Mess- und Regelsysteme will assume no liability if the above-mentioned regulations, instructions and safety precautions are not noted and followed.
2. Contents of the packaging

1 DLT2 evaluation unit
1 set of installation and operating instructions

3 Proper use

The DLT2 continuous water level transmitter is intended for use in combination with the EC 8 level probe as level transmitter for the output of an output current proportional to the fill level in the boiler (4 mA .. 20 mA).

The requirements of EU Directive 2014/68/EU, of the standards DIN EN 12952-11 and DIN EN 12953-9, and also DIN EN 61508-1/-2/-3, DIN EN 61326-1/-3-2 and DIN EN 61010-1 und Water level 100 have been taken into account.

The DLT2 has been specially developed for use in steam boilers or condensate tanks. Measuring the water level is carried out via the EC 8 probe (see corresponding assembly and operating instructions) which is fitted in the boiler or mounting flange.

The device contains no safety function and must not be used for safety-relevant functions.

The DLT2, as also the EC 8 probe, carries out periodic self-testing.

4. System Description

4.1 Function

The DLT2 continuous water level transmitter works in conjunction with the IGEMA EC 8 level probe on the basis of the capacitive fill level method of measurement.

The capacity of the condenser from measuring electrode, measuring electrode protective tube and the stacked dielectric formed of fluid and steam changes with each change of the fluid level in the tank. The IGEMA EC 8 measuring probe carries out the measurement of this capacity continuously by means of a high-frequency measurement signal and transfers the result to the DLT2.

The DLT2 evaluates the measurement signal and outputs the analogue current signal 4 mA .. 20 mA corresponding to the level.

The evaluation device supplies power to the level probe, which can be fitted in the boiler, and evaluates its signal.

It is expected that because of the non-linear boiler geometry the fill level (water quantity / volume) does not behave in a linear way to the fill depth / fill level!
4.2 Control unit

- Seven segment display;
- 2 control LEDs, arranged on the right vertically;
- 4 control buttons, arranged on the left vertically;

LED 1 (green) POWER flashes if power supply of evaluator or probe is faulty
LED 2 (yellow) MENU flashes or lights up in menu mode

When the evaluator and the probe are working correctly, the fill level in % of the range set appears in the display: e.g. 018 (18%).

Fill levels above the two calibration points (0% and 100%) are still displayed in certain limits. The 4 mA..20 mA output follows the fill level / display, however only up to a value of 2.4 mA or 21.5 mA. Further out of range values are no longer represented.

4.3 Error messages

Errors of evaluator and probe are displayed in the 7-segment display flashing, number-coded and 3-digit.

For any error the relay (contacts 3, 4, 5) goes into the safe power off state (contact 3 – 4 closed) (see 5.3.2). The power output can be routed via this relay or error signalling can be connected.

If an error occurs the 4 mA..20 mA output jumps to 0 mA within under 3 s

For analysis and error correction see Chap. 8.
5. Assembly and Installation

The device is supplied in a plastic plug-in housing for fitting into switch cabinets. The housing is designed for quick fitting with a spring catch for the DIN EN 50022 standard 35 mm carrier rail and for screw fixing on a mounting plate.

5.1 Installation dimensions and descriptions

1. Screws for snap fastening
2. Holes, ø 4.3 mm
3. Fixing screws
4. Snap fastening
5. Holder
6. Cable feedthrough
7. Hood
5.2 Installation

Ensure protection class in accordance with current regulations

- With snap fastening for standard DIN EN 50022 35 mm carrier rail
  Fix device on standard carrier rail by means of the snap fastening (4).
  Release fixing screws (3) and pull hood (7) from holder (5).

- Without snap fastening
  Release fixing screws (3) and pull hood (7) from holder (5).
  Release screws (1) and remove snap fastening (4). Drill through the marked point (2) in the
  holder (5) with ø 4.3 mm drill bit.
  Fit holder (5) on base plate with two M4 screws.

5.3 Electrical connection

The device terminal strip is live during operation!!
Before working on the device disconnect it from the mains!!

The device must be protected mains-side by the operator with a max. T M 2A fuse!

If inductive consumers are connected, voltage peaks occur when switching off.
For this reason connected inductive consumers (e.g. contactor) must be
provided additionally with an RC circuit: e.g. 0.1µF / 100Ω.
5.3.1 Schematic diagram

Steam boiler with probe with probe electronics

4-core lead (supply and data)

evaluation device

5.3.2 Assignment plan evaluator

max. T M 2A
to be attached by the operator

Extra relay

4 mA .. 20 mA

Probe connection

In normal operating condition relay contacts 3 and 5 (error signalling OFF) are closed.
5.3.3 Cable evaluator - probe

For the cable a 4-core, twisted, shielded cable (4 x 0.5mm² or 4 x 0.75mm²) (e.g. UNITRONIC® PUR CP (TP), 4 x 0.5mm² // option: IGEMA item no. 35-10058 or LEONI SeaLine L MFHCH-FE90 2x2x0.75) must be used. The side for connection to the evaluator must be assembled with end sleeves and the side for connection to the probe with a socket (GDME 3011 4-pole).

The shield is to be fitted over a large area in the distribution cabinet on the earthing point.

**Connection layout:**

<table>
<thead>
<tr>
<th>Evaluator</th>
<th>socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>+24V</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>CANH</td>
</tr>
<tr>
<td>12</td>
<td>CANL</td>
</tr>
</tbody>
</table>

The total length of the lead must be a maximum of 250m.

When installing care must be taken that, depending on the cable used, the UV protection is ensured on the installation side if necessary. The cable must not come into contact with heat-conducting parts.

5.3.4 Connecting the probe

The probe is equipped with a plug connector (GSP 4-pole). It is connected to the evaluator via the cable.

| 1 | CANH |
| 2 | CANL |
| 3 | +24V |
|   | GND  |

5.3.5 Power interface 4 mA .. 20 mA

For the 4 mA .. 20 mA power interface a shielded data line (e.g. LIYCY 0.5mm²) is to be used.

The load must be max. 5000Ω.
6. Configuration via menu

6.1. Basics
The menu of the DLT2 is divided into two main levels:

Main level 1 | Main level 2

The menu is brought up by pressing the "OK" key. While the operator is in the configuration menu, the associated yellow LED flashes or lights up.

With the "▲" or "▼" keys you can choose between the menu items of the respective level.

By pressing the "OK" key you will get to the next level down or confirm the input.

By pressing the "ESC" key you can get to the next level up or out of the menu without the current entry being saved (with OK confirmed entries are already saved and remain so).

Automatic menu exit after 2 minutes if no key operation is carried out (cf. "ESC").

6.2. Diagram

| --- 1. --- |
| - 1.1. | Temperature of the probe |
| --- 2. --- |
| - 2.1 | Password input |
| --- ---After valid password input------------ |
| - 2.2 | Programming of the min. level |
| - 2.3 | Programming of the max. level |
| - 2.4 | Programming of the damping* |
| - 2.5 | Tendency display** |

* The damping is a sliding mean value from the most recent measurements. The number can be selected from the range of 3 – 30 values. The factory setting is 5 values. The measurement frequency is approx. 1 measurement/s.
On putting into operation please check setting.

**The tendency display shows a numerical value (e.g. 25.1) which becomes smaller with rising fill level. It can be used for example to check whether the probe is immersed in the water.

The password is: 123 (The password is only for protecting the device from unwanted changes. It offers no protection from malicious changes.)
6.3. Numerical entry

The digits in the segment where the dot is flashing can be changed by the keys "▲" and "▼": The desired number is confirmed by "OK". Then the next place (segment with flashing dot) can be entered.

For multi-digit numbers the numbers move to the left and, if need be, out of the display.

6.4 Password input - example

Under the menu item 2.1. after confirmation with "OK" a “0 0. 0” appears.

Now in this example we enter the password 123. It starts in the middle. The middle digit can be changed and this is signalled by the flashing dot. With the "▲" key the 1. is selected. This is confirmed with "OK".

Display: → 1 0. 0

The decimal point of the middle digit continues to flash. Here again with "▲" you enter the next digit of the password (2) and confirm. Now on the display you will see a 1 20. and the right decimal point flashes. The grey field is the visible area of the display.

Display: → 120

The 3rd digit is a 3. It is set with "▲" and confirmed with "OK".

This completes the input. You are again in the corresponding submenu. The other submenu items are now enabled.

6.5 Programming of min. and max. level

For programming the minimum or maximum levels it is necessary to move to the fill level in the boiler (note thermal linear expansion!).

Go to the first fill level. It is unimportant whether you start with the min. or max. level.

Bring up the menu on the evaluator by pressing "OK". Select main menu 2. with the "▲" or "▼" keys and press the "OK" button twice. You are now in menu item 2.1.. Here enter the password “123” as in the description in Chap. 6.2.

Select the corresponding menu item (2.2. or 2.3.) for the fill level reached using the "▲" or "▼" keys and press "OK".

Wait the duration of the damping (see menu 2.4.) and then press the "OK" button.

Go to the other fill level and repeat the programming.

The measuring range can be individually set almost (Y-100) over the whole measuring probe length whereby the smallest permissible measuring range is 50 mm (see Installation and Operating Instructions EC 8).

The smallest permissible distance between the two limit levels is 50mm!

On changes to one limit level it is sufficient to move to it and to program the corresponding fill level (0% or 100%).
7. Technical Data

7.1 Device data

Manufacture in accordance with: EU Directive 2014/68/EU
applied standards: DIN EN 12952-11, DIN EN 12953-9, DIN EN 61508-1/-2/-3
                            DIN EN 61326-1, DIN EN 61326-3-2, DIN EN 61010-1
Other Technical Regulations: Water level 100 dated February 2010
Supply voltage: 230V AC (-15% +10%), 50/60Hz
Power consumption: 3VA
Data exchange: digital measurement value output
Electrical connection: 12-pole Screw terminal strip
Protection class IP40 in accordance with DIN EN 60529
(protection class IP54 is to be ensured in the boiler area)
Device fuse: 63 mA/T
Allowable ambient temperature: 0°C to 55°C
Supply voltage probe: short-circuit-proof, 24V / 2W
Self-test every 3sec
Service life probe: The service life of the probe depends on the operating conditions and state of the boiler water.
The total length of lead: max. 250m.
Electrical conductivity of the liquid: 0.5 μS/cm ≤ 10,000 μS/cm

7.2 Maximum ratings of outputs

<table>
<thead>
<tr>
<th>Power interface</th>
<th>Output current</th>
<th>Max. 4 mA . 0.2 mA galv. Isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Load</td>
<td>max. 500 Ω</td>
</tr>
<tr>
<td>Extra relay*</td>
<td>Switching voltage</td>
<td>max. 250 V AC</td>
</tr>
<tr>
<td></td>
<td>Switching current</td>
<td>max. 4 A resistive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 0.75 A inductive cos Φ 0.5</td>
</tr>
</tbody>
</table>

*During switching operations the load profile of the relay is to be observed! For large loads: use contactor!
Relay used: Schrack V23592-A1024-A301
7.3 Data plate

8. Fault analysis and rectification

The device terminal strip is live during operation!!
Before working on the device disconnect it from the mains!!

In operation various error states are indicated in the display. These error codes can be assigned to possible causes of error with the following tables.
Every error code (except “8.8.8”) causes the extra relay to be switched off.
The 4 mA .. 20 mA output then jumps to 0 mA within under 3 s

**Evaluation device malfunctions:**

<table>
<thead>
<tr>
<th>Error code</th>
<th>Cause</th>
<th>Remedial Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>Fault in the ADC converter</td>
<td>Replace device</td>
</tr>
<tr>
<td>001</td>
<td>Malfunction of the 24 volt supply voltage of the evaluation device</td>
<td>Replace device</td>
</tr>
<tr>
<td>002</td>
<td>Malfunction in the probe supply voltage</td>
<td>Check data cable for fault; Replace device</td>
</tr>
<tr>
<td>005</td>
<td>Extra relay faulty</td>
<td>Replace device</td>
</tr>
<tr>
<td>8.8.8.</td>
<td>Segments in display faulty</td>
<td>Replace device</td>
</tr>
<tr>
<td>(flashing)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Probe malfunctions:**

If the probe electronics report a malfunction, this will also be displayed.

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Cause</th>
<th>Remedial Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Fault in the probe hardware</td>
<td>e.g. broken cable, hardware fault</td>
<td>Replace probe</td>
</tr>
<tr>
<td>103</td>
<td>Calibration error</td>
<td>0% or 100% not calibrated or wrong way round; calibrated measuring range too small</td>
<td>Repeat calibration</td>
</tr>
<tr>
<td>105</td>
<td>Probe temperature too high, occurs with $T_{\text{probe}} \geq 105^\circ \text{C}$</td>
<td>Ambient temperature of probe probably too high</td>
<td>Heat insulation measures on the flange must not be carried out on the electronic part</td>
</tr>
<tr>
<td>106</td>
<td>Connection problem fault</td>
<td>e.g. broken cable, connections wrong way round</td>
<td>Check wiring</td>
</tr>
</tbody>
</table>

**9. Warranty**

**Warranty**

We accord a warranty period of 24 month on our products. A condition for that is appropriate treatment according to these installation and operating instructions. The warranty for wear and spare parts is restricted to material defects and construction faults. Level probes are wearing parts and do not form part of the warranty.
10. Declaration of Conformity

Declaration of Conformity

Declaration of Conformity in accordance with the EU-Directives

2014/35/EU,
2014/30/EU

The Company:
KabMA GMBH
Antwerpener Str. 1
48163 Münster
Germany

declares as manufacturer, that the product:
„ClassicControl // Continuous Water Level Transmitter“
as pressure accessory
Product type:
„DLT2“ with the probe
EC 8
complies with the directives.

Applicable standards:
EN 61010-1: 2010
EN 61326-1: 2006-10; EN 61326-3-2: 2008

Münster, . . .

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This high-quality IGEMA product was designed, manufactured and tested with the application of the QM System guidelines in accordance with DIN EN ISO 9001:2000.

If the device supplied indicates transport damage or gives cause for complaint in spite of our final quality control please contact our SERVICE department by return.
Telephone 0241-5687-0.