



Continuous Water Level Transmitter

DLT2 / DLT3 with overflow protection
for use with the level probe: EC 8



Product philosophy

Thank you for placing your trust in IGEMA and deciding in favour of one of our high-quality products.

For more than 100 years, measuring and control systems have been developed, produced and sold worldwide under the IGEMA brand name.

“Steam is our passion” and we offer you the entire programme for the safe and economic operation of your plants, especially in the steam and condensate sector.

Please read the installation and operating instructions carefully to ensure a safe and reliable operation.

In addition to the information on installation and operation, you will also find important information on maintenance, care, safety and value retention of your measuring and control system.



Table of contents

- 1. Important safety instructions 5**
 - 1.1 Symbols used in these instructions 5
 - 1.2 Intended use of the device 6
 - 1.3 Safety at work 7
 - 1.4 Safety instructions for this device 8
 - 1.5 Exclusion of liability 8

- 2. Contents of the packaging 9**

- 3. Proper use 9**

- 4. System Description 9**
 - 4.1 Function 9
 - 4.2 Control unit 10
 - 4.3 Error messages 11

- 5. Assembly and Installation 11**
 - 5.1 Installation dimensions and descriptions 11
 - 5.2 Installation 12
 - 5.3 Electrical connection 12
 - 5.3.1 Schematic diagram 13
 - 5.3.2 Assignment plan evaluator 13
 - 5.3.3 Cable evaluator - probe 14
 - 5.3.4 Connecting the probe 14
 - 5.3.5 Power interface 4 mA .. 20 mA 14

Table of contents (cont.)

- 6. Configuration via menu 15**
 - 6.1 Basics 15
 - 6.2 Diagram 15
 - 6.3 Numerical entry 16
 - 6.4 Password input - example 16
 - 6.5 Programming of min. and max. level 16
 - 6.6 Programming of the overflow protection (DLT3) 17

- 7. Technical Data 18**
 - 7.1 Device data 18
 - 7.2 Maximum ratings of outputs 18
 - 7.3 Data plate 19

- 8. Fault analysis and rectification 19**

- 9. Declaration of Conformity 21**

1. Important safety instructions

KEEP THESE INSTALLATION AND OPERATING INSTRUCTIONS IN A SAFE PLACE!

Commissioning as well as maintenance and repair work may only be carried out by qualified persons in compliance with the installation instructions given in this operating manual. The correct installation, commissioning, maintenance and operation of the device presupposes that the person in charge is familiar with measurement and control systems and complies with the general installation and safety instructions. In addition, the correct and intended use of tools and the handling of safety devices must be ensured. Unqualified persons must not be assigned the above tasks!

IGEMA GmbH accepts no liability for damage to property or personal injury caused by unqualified persons or by failure to observe these installation and operating instructions. If no sufficiently qualified person can be found, IGEMA GmbH can be commissioned with the installation/maintenance.

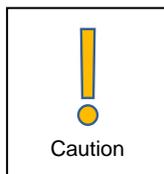
1.1 Symbols used in these instructions

In the following installation and operating instructions, safety instructions are marked with the following symbols:

 Danger	This symbol and signal word refer to a potentially hazardous situation which could result in death or injuries if ignored.
 Caution electrical voltage	This symbol and signal word indicate live parts with an immediate danger of death from electric shock.
 Caution hot	This symbol with a signal word indicates a potentially hazardous situation that can result in severe burns and scalds all over the body.

 <p>Caution</p>	<p>This symbol and signal word refer to a potentially hazardous situation which could result in personal injury, property and environmental damage if ignored.</p>
 <p>Caution</p>	<p>This symbol and signal word refer to a potentially hazardous situation which could result in damage to the equipment if ignored.</p>
 <p>Info</p>	<p>This symbol indicates useful information and recommendations as well as measures that will prolong the value of your measuring and control system.</p>

1.2 Intended use of the device



Use these installation and operating instructions, the identification on the data plate (see 7.3) and the technical data sheet to check whether the device is suitable for the intended use/application. The device complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

The device may only be used to indicate fill levels on containers.

The maximum values of the pressure and temperature range of the device must be checked before installation. If the maximum allowable operating values of the device are lower than those of the system on which it is to be installed, protective instruments for the device, such as pressure reducers or similar, must be provided to avoid limit situations. The device may only be used in accordance with the information in these installation and operating instructions or for the parameters and applications agreed in the supply contract. (see data plate, 7.3) The operator of the facility is obliged to familiarise himself on the compatibility of the medium and the device. In case of doubt, contact the relevant installation manager or site manager.

The correct installation position, alignment and flow direction of the device must be observed! Before installing the IGEMA product on boilers or containers, it is essential to remove all protective covers and, if necessary, the protective film from data plates.

1.3 Safety at work



Before installation or carrying out maintenance work on the device, safe access must be ensured and a secure working area with sufficient lighting must be defined and marked out. Always use lifting equipment for heavy loads!

Before starting any work, carefully check which liquids or gases are or have been in the pipeline. (flammable substances, irritating substances, substances hazardous to health) When opening or dismantling the device, residues of the medium can escape. Subsequent fumes are also possible in unpressurized and cold systems. Use designated PPE such as safety goggles and respiratory protection!

Special attention must be paid to the condition of the environment around the installation or maintenance site. Be aware of e.g.: potentially explosive atmospheres, lack of oxygen in tanks and pits, dangerous gases/liquids, extreme temperatures, hot surfaces, fire hazard (e.g. during welding) and moving machine and system components. Protect yourself from excessive noise by taking the required protective measures.

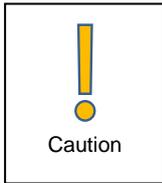
For all maintenance work or new installations, on new or existing boilers or vessels, it is imperative to check that the boiler or vessel has been depressurised and that the pressure has been safely reduced to atmospheric pressure. In principle, no system should be regarded as unpressurized even if indicated by pressure measuring devices such as pressure gauges or sensors. When releasing the pressure, make sure that no persons are in the release area. Carefully check whether you and/or other persons in the vicinity need PPE to protect yourself from external influences such as high and low temperatures, radiation, noise, danger to eyes, loose objects that can fall down or chemicals.

There is always a risk of injury when handling large and/or heavy equipment. Observe the load handling regulation as a minimum requirement for working with loads. Avoid handling the device with your own physical force, e.g. by lifting, pulling, carrying, pushing or supporting it, especially to prevent back injuries. Use lifting equipment to move heavy and bulky equipment in accordance with Article 1, Section 2 of the German Load Handling Regulation (LasthandhabV).



Under normal operating conditions the surface of the device can become very hot! Under the maximum operating conditions, the surface temperature can reach 240°C. After shutting off or, if necessary, shutting down the boiler, wait until the temperature has normalized to room level. To avoid the risk of burns and scalds, always use PPE including safety goggles!

1.4 Safety instructions for this device



These installation and operating instructions are an integral part of the device and must be forwarded to the responsible departments "Goods inward, Transport, Installation, Commissioning and Maintenance". They must be kept in such a way that the technical staff have access to these documents at all times. If the device is passed on to a third party, these installation and operating instructions must also be included in the national language of the third party.

Avoid shocks and hard contact during transport, as this can lead to damage. During intermediate storage, the device must be kept dry and secured against damage.

When servicing the unit, make sure to check for damage. There is a risk of cutting hands and arms!

When returning goods to IGEMA GmbH, the applicable safety and environmental laws according to GGVSEB [German ordinance on the national and international carriage of dangerous goods by road, rail, and inland waterways] must always be observed. If there are any risks to health or the environment due to residues or the device has a mechanical defect this must be indicated when returning the device and the necessary precautionary measures must be taken. If the returned goods are devices that have come into contact with or contain hazardous substances, a safety data sheet must be enclosed, and the goods must be clearly marked. In addition, the hazardous substance must be reported to the logistics service provider.

1.5 Exclusion of liability

IGEMA GmbH Mess- und Regelsysteme will assume no liability if the above regulations, instructions and safety precautions are not observed and followed. If they are not expressly listed in the installation and operating instructions, changes to an IGEMA device are carried out at the risk of the user.

2. Contents of the packaging

- 1 controller DLT2 or DLT3
- 1 set of installation and operating instructions

3. Proper use

The DLT2/DLT3 continuous 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).

At the DLT3 an overflow protection according to EN 12953-6 can be activated.

The requirements of EU Directive 2014/68/EU, of the standards EN 61326-1, EN 61010-1, EN13445-1, EN 12952-11 and EN 12953-9 have been taken into account.

The DLT2/DLT3 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 does not have a safety function and must not be used for safety-related functions (limiter).

The DLT2/DLT3, as also the EC 8 probe, carries out periodic self-testing.

4. System Description

4.1 Function

The DLT2/DLT3 continuous 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/DLT3.

The DLT2/DLT3 evaluates the measurement signal and outputs the analogue current signal 4 mA .. 20 mA corresponding to the level.

DLT3:

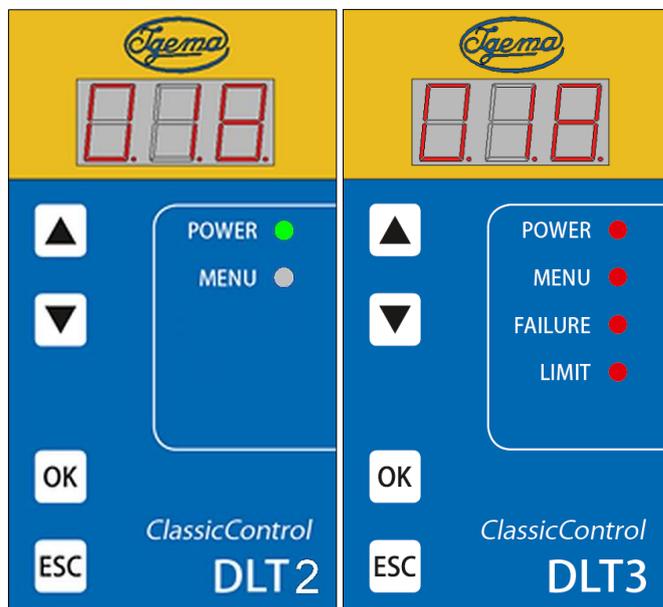
An overfill protection can be activated. Then a fill-level-limit (e.g. 70%) and a value for the return to normal operation (e.g. 65%) must be programmed.

The controller supplies 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;
- 4 control LEDs, arranged on the right vertically;
- 4 control buttons, arranged on the left vertically;

At DLT2 + 3:

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

Only at DLT3:

LED 3 (rot)	FAILURE	lights up if the device detects an electronics failure
LED 4 (grün)	LIMIT	lights up if overfill level is exceeded

When the controller 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

In the 7-segment display, errors of the evaluator and probe are shown flashing, number-coded and 3-digit.

In the event of any error, the relay (contacts 3, 4, 5) goes into the safe, currentless state (contacts 3 - 4 closed) (see 5.3.2). **The current output can be routed via this or an error signal can be connected.**

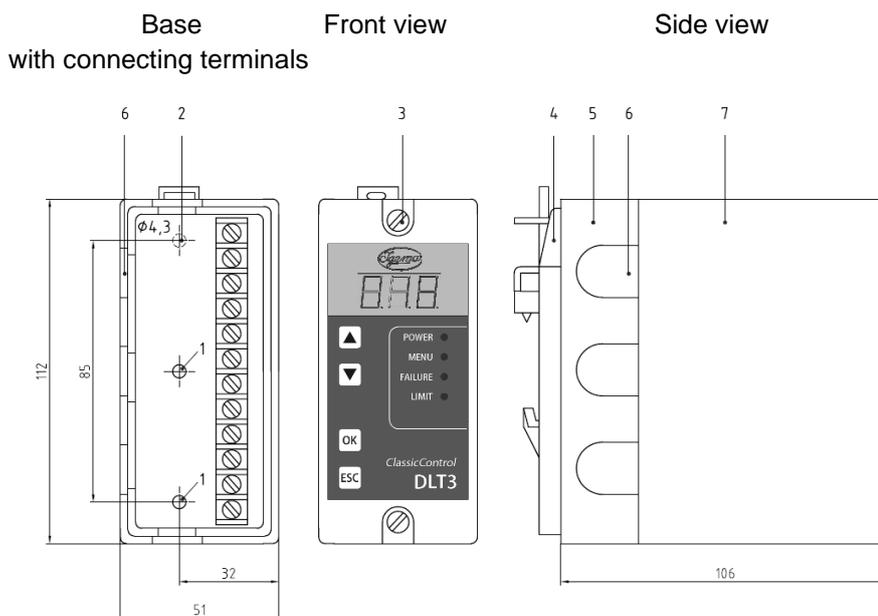
In the event of an error, the 4 mA .. 20 mA output jumps to 0 mA within less than 3 s

For analysis and troubleshooting 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 quick fastening with spring catch
- 2 Holes, $\phi 4,3$ mm
- 3 Fixing screws
- 4 Quick fastening with spring catch
- 5 Base
- 6 Cable feedthrough
- 7 Hood

5.2 Installation



Ensure protection class in accordance with current regulations

- **With quick fastening with spring catch for standard DIN EN 50022 35 mm carrier rail**
Fix device on standard carrier rail by means of the quick fastening with spring catch (4).
Release fixing screws (3) and pull hood (7) from base (5).
- **Without quick fastening with spring catch**
Release fixing screws (3) and pull hood (7) from base (5).
Release screws (1) and remove snap fastening (4). Drill through the marked point (2) in the base (5) with \varnothing 4.3 mm drill bit.
Fit holder (5) on base plate with two M4 screws.

5.3 Electrical connection

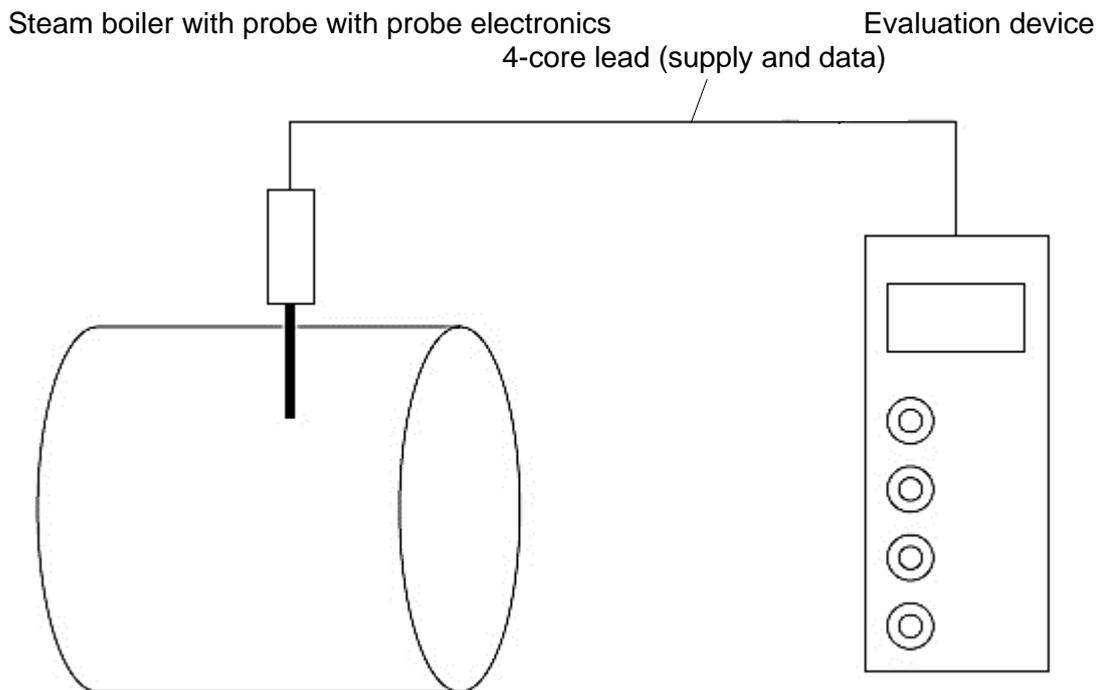


**The terminal strip of the device is live during operation!!
Before working on the device, disconnect it from the power supply!!**



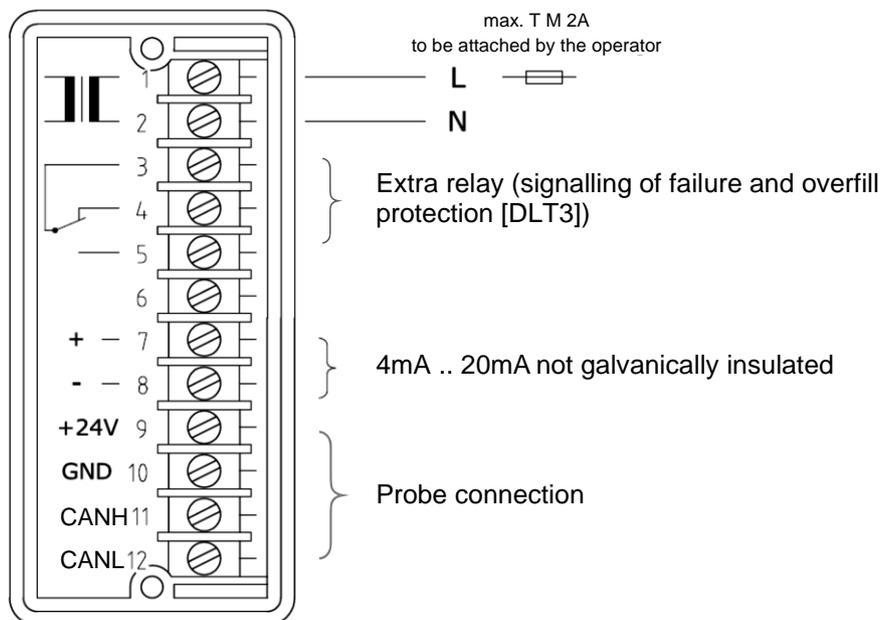
The device must be protected mains-side by the operator with a max. T M 2A fuse!
If inductive consumers are connected, voltage peaks occur when switching off. For this reason, connected inductive consumers (e.g. contactor) must be provided additionally with an RC circuit: e.g. 0.1 μ F / 100 Ω .

5.3.1 Schematic diagram



5.3.2 Assignment plan evaluator

DLT2/DLT3



In normal operating condition relay contacts 3 and 5 (error signalling OFF / no overflow) are closed.

5.3.3 Cable evaluator - probe

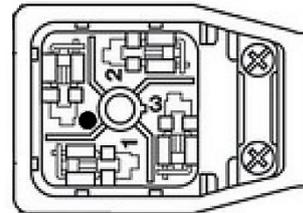
For the cable, a 4-core, twisted, shielded cable (4 x 0.5mm² or 4 x 0.75mm²) must be used. The side for connection to the evaluator must be assembled with end sleeves and the side for connection to the probe with a socket (GDME 3011 4-pole).

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

Connection layout:

Evaluator		Socket
9	+24V	3
10	GND	●
11	CANH	1
12	CANL	2

GDME 3011 4-polig



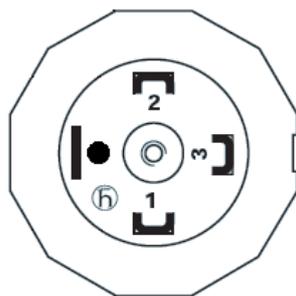
The **total length** of the lead must be a maximum of 250m.



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 may be max. 500Ω.

6. Configuration via menu

6.1 Basics

The menu of the DLT2/DLT3 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 menus 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**
```

Nur DLT3:

- | - 2.6. |- Activation Overfill protection: 0 0 1 Overfill protection activ
- | - 2.7. |- Return level (%)
- | - 2.8. |- Overfill limit level (%) / LIMIT

* 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. 2 5. 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 digit 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 2 0. 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. 6.4.

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%).

6.6 Programming of the overflow protection (DLT3)



**The overflow level cannot be below the level of the return value!
The return value cannot be above the overflow level!**

Activate the programming menu by pressing „OK“. Switch to main menu 2. via the buttons „▲“ or „▼“ and press button „OK“ 2 times. You have reached menu item 2.1.. Enter password (123) as per chap. 6.4.

Switch to menu item “Activation Overflow protection” (2.6.) via the buttons „▲“ or „▼“ and press „OK“.

Change the value „0 0 0.“ to „0 0 1.“ (buttons „▲“ or „▼“) and press „OK“.

Choose menu item “Overflow limit level (%) / LIMIT” (2.8.) via the buttons „▲“ or „▼“ and press „OK“.

Display: → 0X.XX (The grey area is the viewable area of the display / X means a value of 0-9)

The buttons „▲“ (value of return level) or „▼“ (100%) are a quick way to set the starting point for the LIMIT. After pressing „OK“ the display is 0XX.X .

Enter the desired LIMIT value e.g. „075“ for 75% and press „OK“. You reach the last digit via „OK“.

Choose menu item „return level (%)“ (2.7.) via the buttons „▲“ or „▼“ and press „OK“.

Display: → 0X.XX (The grey area is the viewable area of the display / X means a value of 0-9)

The buttons „▲“ (0%) or „▼“ (value of overflow limit) are a quick way to set the starting point for the return level. After pressing „OK“ the display is 0XX.X .

Enter the desired return level e.g. „070“ for 70% and press „OK“. You reach the last digit via „OK“.



The return level is the value at which the DLT3 return to normal operation and thus the output relay returns into the normal operation mode (relay contacts 3 and 5 closed).

7. Technical Data

7.1 Device data

Manufacture in accordance with:	EU-Directive 2014/68/EU
applied standards:	EN 13445-1, EN 61326-1, EN 61010-1 EN 12952-11, EN 12953- 9
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 bis 55°C
Supply voltage probe:	short-circuit-proof, 24V / 2W
Self-test	alle 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

7.2 Maximum ratings of outputs

Power interface (not galv. insulated)	Output current	4 mA .. 20 mA	
	Load	max. 500 Ω	
Limit and Failure relay	Switching voltage (max.)	250 VAC	24 VDC
	Switching current (max.)	4 A ohmic	4 A
	inductive / higher loads: use contactor		

7.3 Data plate

Type DLT2		CE
Build 2016	Art. Nr. 20-10020	
230V 50/60Hz 	3,0 VA	IP 40
0°C < T _{amb} < 55°C		0,5 - 10.000 µS / cm
S/N 16123456	24V DC 2W	
* Production monitored		
<small>IGEMA GmbH Mess- und Regeltechnik D-48163 Münster Made in Germany</small>   <small>See installation instructions!</small>		

Type DLT3		CE
Build 2016	Item no. 20-10022	
230V 50/60Hz 	3,0 VA	IP 40
0°C < T _{amb} < 55°C		0,5 - 10.000 µS / cm
S/N 16123456	24V DC 2W	
* Production monitored		
<small>IGEMA GmbH D-48163 Münster Made in Germany</small>   <small>See installation instructions!</small>		

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.

Evaluation device malfunctions:

Error code	Cause	Remedial Action
000	Fault in the ADC converter	Replace device
001	Malfunction of the 24-volt supply voltage of the evaluation device	Replace device
002	Malfunction in the probe supply voltage	Check data cable for fault ; Replace device
005	Extra relay faulty	Replace device
8.8.8. (flashing)	Segments in display faulty	Replace device

Probe malfunctions:

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

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

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



The flashing code „120“ is active if the level limit is passed. This is not considered an error code. The 4 mA .. 20 mA output stays at its level equivalent value.

120	fill level exceeded	fill level above limit	reduce liquid level
-----	---------------------	------------------------	---------------------



This high-quality IGEMA product was designed, manufactured and tested with the application of the QM System guidelines in accordance with DIN EN ISO 9001:2015.

If the device supplied indicates transport damage or gives cause for complaint in spite of our final quality control please contact our SERVICE department on telephone +49 2501 92424-0 by return.

9. Declaration of Conformity



Declaration of Conformity

Declaration of Conformity in accordance with the EU-Directives

2014/35/EU,
2014/30/EU

The Company:
IGEMA GmbH
Antwerpener Str. 1
48163 Münster
Germany

declares as manufacturer, that the product:

„ClassicControl // Continuous Water Level Transmitter“
as pressure accessory

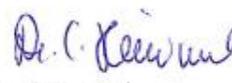
Product type:
„DLT2“ or „DLT3“ with the probe
EC 8
complies with the directives.

Applicable standards:

EN 61326-1
EN 61010-1
EN 13445-1

Münster, 05. 09. 2017


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