Evaluation unit

castXpert LB 452

Operating Manual
47344BA2

Rev. No.: 04, 03/2015
Embedded Software as of vers. 1.3.0 (CU) and 1.3.0 (MU)

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1 About this Manual

1.1 Some Prior Remarks

The LB 452 Evaluation Unit (from now on referred to as EVU) is delivered to you by the manufacturer BERTHOLD TECHNOLOGIES GmbH & Co. KG in a complete and functionally reliable condition.

This manual demonstrates to you how to:

- Assemble/Install the EVU
- Establish the connections to the power supply
- Build the measurement connections
- Carry out the measurements
- Apply software settings
- Install the extension module (optional)
- Carry out maintenance
- Fix errors
- Disassemble
- Dispose of the device

You must read through the entire manual. We have tried to compile for you all information for safe and proper operation.

However, should questions arise which are not answered in this manual, please refer to BERTHOLD TECHNOLOGIES GmbH & Co. KG.

1.2 Structure of the Manual

This manual has been divided into chapters. The order of the chapters should help you to familiarise yourself quickly and properly with the operation of the EVU.

1.3 Validity of the Manual

The manual is valid from the delivery of the system to the user until its disposal. Modification services are not carried out by the manufacturer BERTHOLD TECHNOLOGIES GmbH & Co. KG.

1.4 Copyright

This manual contains copyright-protected information. None of the chapters may be copied or reproduced in any other form without prior authorisation from the manufacturer.

1.5 Target Group

This manual is directed at qualified specialist personnel who are familiar with handling electrical and electronic assemblies as well as with communication and measuring techniques.

Specialist personnel refers to those who can assess the work assigned to them and recognise possible dangers through their specialist training, knowledge and experience as well as knowledge of the relevant regulations.

1.6 Notation

In this manual the following notations are used to state the software interface and the operation:

Identifier	Meaning	Example
Quotation mark	Field in the software interface	"Calibrating"
Vertical line	Path specification	Settings | Option/Display
Pointed brackets	Keys and buttons	<Update>
Round brackets	Image reference	Connect the plug (Fig. 1, Pos. 1).

In the software description, the term "clicking" is used if a process is to be activated. This also refers to the pressing of a button (key) or an area on the touch display if a mouse is not used for controlling.

1.7 Symbols Used

The safety instructions point out possible dangers to you and instruct you on the operation. They apply to the whole document.

Danger

Possible consequences: Death or serious injury!

Points out a direct threat of danger. If the danger is not avoided, death or serious bodily injury are the consequences.

- Possible consequences are described.

➤ Measures for prevention are described.

Warning

Possible consequences: Serious injuries!

Points out a possibly dangerous situation. If the situation is not avoided, death or serious bodily injury could result.

- Possible consequences are described.

➤ Measures for prevention are described.

Caution

Possible consequences: Mild or moderate injury!

Points out a possibly dangerous situation. If the situation is not avoided, minor or moderate bodily injury could occur.

- Possible consequences are described.

➤ Measures for prevention are described.

Attention

Possible consequences: Material damage!

Points out a situation which could result in the event of material damage if the instructions have not been observed.

- Possible consequences are described.

➤ Measures for prevention are described.

Note

Points out helpful information on the product or on handling.

2 Safety

2.1 Proper use

The LB 452 evaluation unit (EVU) measures the fill level along with the GAMMAcast detectors and a compatible radiation source and it may only be used for this purpose.

The following constitutes proper use:

- Adhering strictly to the instructions and operation sequences and not undertaking any different, unauthorised practices which could endanger your safety and the operational reliability of the EVU!
- Observing the given safety instructions!
- Carrying out the prescribed maintenance measures or having them carried out for you!

2.2 Improper use

Danger

Danger to life from electric shock!

The installation may only be carried out by a qualified electrician.

- Electric shock.

➤ Please adhere to the relevant safety regulations.
➤ Only carry out maintenance work when the device is free of voltage.
➤ Only open the device when free of voltage.

Attention

Injuries to person and material damage!

In the event of improper use, there is a threat of danger to

- the health of the user.
- the efficient working of the evaluation unit (EVU).
- the functional reliability of the EVU.

➤ Observe the instructions from the Proper Use section.

Improper Use (Continued)

- If the EVU is used in a way which is not described in the present manual, the EVU's protection is compromised and the guarantee claim becomes invalid.
- BERHOLD TECHNOLOGIES GmbH & Co. KG only accepts liability for / guarantees the correspondence of the EVU to its published specifications.

Avoid the following circumstances:

- Failing to observe the instructions on safety, operation, maintenance and disposal given in the manual.
- Failure to observe the operating instructions for "47344BA1" RVU and the "48452BA1" GAMMAcast detectors.
- Applying conditions and requirements which do not conform to those stated in the technical documents, data sheets, operation and assembly instructions and other specific guidelines of the manufacturer.
- Using the EVU in a damaged or corroded condition.
- Restructuring or changing the system components.
- The device is not approved according to IEC 61508 “Functional safety of safety-related electric/electronic/programmable electronic systems”.
- If the product is used in a way which is not described in the present manual, the device's protection is compromised and the warranty claim becomes invalid.
  BERTHOLD TECHNOLOGIES GmbH & Co. KG shall only accept liability for / guarantee the correspondence of the device to its publicised specifications.

2.3 Qualification of the Personnel

Note

A minimum requirement for all work on or with the product would be employees with general knowledge who are instructed by an expert or authorised person.

At different parts in this manual, reference is made to personnel with certain qualifications who can be entrusted with different tasks during the installation, usage and maintenance.

These three groups of people are:

- Those with General Knowledge
- Experts
- Authorised Persons

Qualification of the Personnel (Continued)

Those with General Knowledge

Note

Employees with general knowledge must always be guided by an expert at the very least. When dealing with radioactive substances, a radiation safety officer must also be consulted.

Employees with general knowledge must always be guided by an expert at the very least.

When dealing with radioactive substances, a radiation safety officer must also be consulted.

Those with a general knowledge are e.g. technicians or welders who can undertake different tasks during the transportation, assembly and installation of the shielding under the guidance of an authorised person. This can also refer to construction site personnel. The persons in question must have experience in the transportation and assembly of heavy component parts.

Experts

Experts are persons who have sufficient knowledge in the required area due to their specialist training and who are familiar with the relevant national health and safety regulations, accident prevention regulations, guidelines and recognised technical rules.

Expert personnel must be capable of safely assessing the results of their work and they must be familiar with the content of this manual.

Authorised Persons

Authorised persons are those who are either designated for the corresponding task due to legal regulations or those who have been authorised by BERTHOLD TECHNOLOGIES for particular tasks. When dealing with radioactive materials, a radiation safety officer must also be consulted.

3 Product Description

3.1 Description of the System

The evaluation unit (EVU) consists of a system board (CU Control Unit) with an ex-works pre-installed measurement module (channel 1).

The EVU can be distributed with up to 4 measurement modules (channels). This makes the simultaneous monitoring of 4 mould levels possible.

There is also the possibility of ordering the EVU customised with a pre-installed extension module or a fieldbus model or installing these modules yourself afterwards. Further information on the extension module can be found in chapt. 4.3.2 and on the fieldbus module in chapt.**Fehler! Verweisquelle konnte nicht gefunden werden.**.

You can connect the EVU to both radiometric detectors (GAMMAcast) and the electromagnetic measurement system (ECcast). When in doubt, the instructions refer to the GAMMAcast instructions. For specific information regarding ECcast, refer to the ECcast supplemental instructions.

3.2 Software

The field device is delivered with pre-installed software.

The revision status (version) of the software can be seen on the screen display when starting up the EVU or in the "Channel Setting" menu.

In this manual, the software is described with effect from version 1.3.0 (CU - control unit, system board) and 1.3.0 (MU - channel XY).

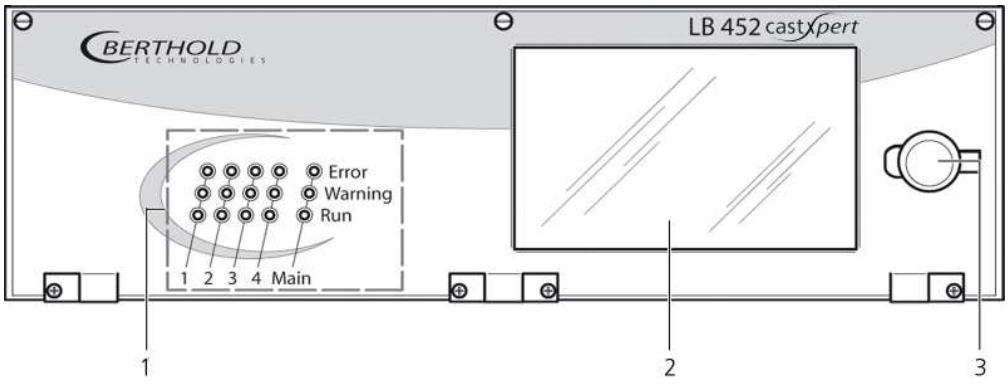
3.3 Power Supply

The EVU does not have an on and off switch with which the power supply can be switched on or off. Ensure that the current of the EVU can be simply disconnected via the external power supply.

3.4 Overview

3.4.1 Front View

On the front view of the EVU there are LEDs for displaying each operation mode, a 7'' touch display and a USB connection.



1 Operation mode indicators

2 7'' Touch display

3 USB connection for the connection of external devices, covered with a protective cap

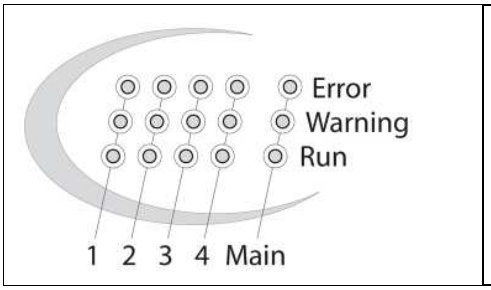
Fig.1 Back view of the EVU

3.4.2 Control Unit Indicators

The indicators in the "Main" section (control unit) indicate the operation mode of the EVU. The indicators "1 to 4"(Fig. 2) indicate the operation mode of each measurement channel. This shows which operation mode is active on each measurement channel.

If an error occurs at just one measurement channel (Error LED lights up), then the other measurement channels are not affected by this error.

The measurement of other channels continues.



Error	Lights up red in the event of a device error (chapt. 8.1 Error Search).
Warning	Lights up yellow if a warning is present.
Run	Lights up green in error-free operation

Fig. 2 Control Unit Indicators

Control Unit Indicators (Continued)

LED Error This LED (Fig. 2, Pos. 1) lights up if an error has occurred. The current measurement is retained. Check the device settings. All possible error reports are described in chapt. 8 Troubleshooting .

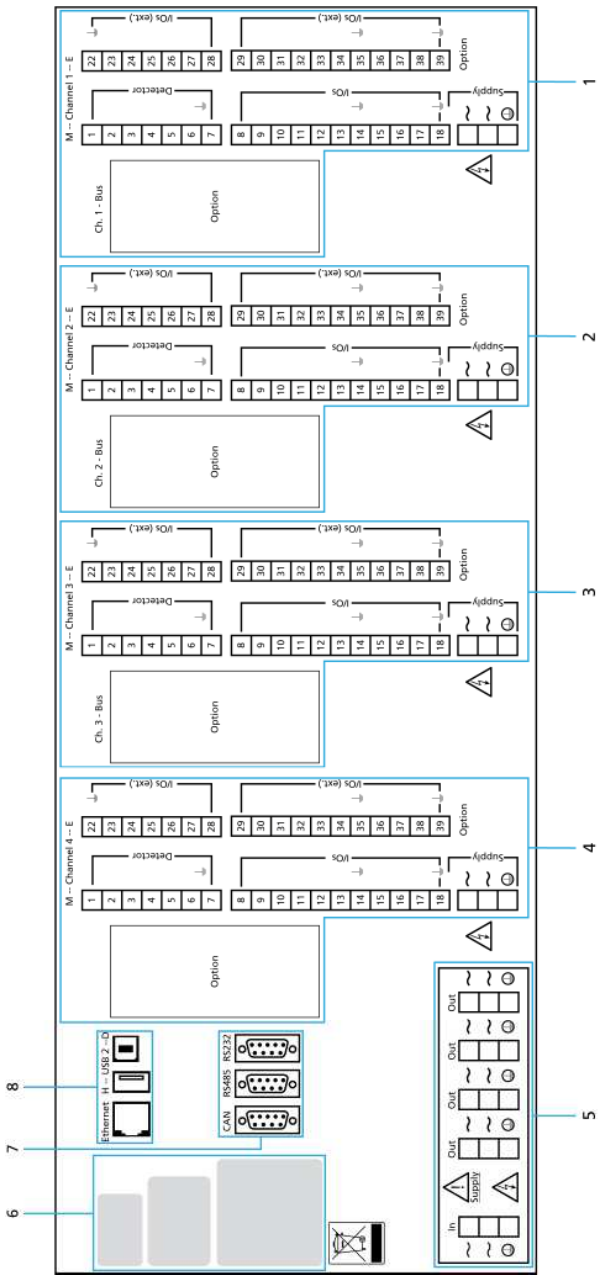
Warning LED This LED (Fig. 2, Pos. 2) lights up if calibration is being carried out or if the device is in test mode or if any other warning message is present. The current measurement is retained. All possible error reports are described in chapt. 8 Troubleshooting .

Run LED This LED (Fig. 2, Pos. 3) lights up if the device is in operation and fault-free. The current measurement is carried out.

3.4.3 Back View

The following connections are located on the back of the EVU:

- EVU power supply
- Power supply of channels 1 to 4
- Measurement inputs from the GAMMAcast detector for the channels 1 to 4
- Ethernet port for the data transmission via the LAN connection
- USB ports for the external USB devices



1 Slots for channel 1
2 Slots for channel 2
3 Slots for channel 3
4 Slots for channel 4
5 External power supply of the device (in) and power supply of the channels 1-4 (out)
6 Type plates
7 Serial ports (unused)
8 Ethernet and USB ports

Fig. 3 Back view of the EVU

3.5 Radiometric Measurement System

3.5.1 Functional Principle

The measurement system functions on the principle of the radiometric measuring method. Here, the weakening of gamma rays by fluid metal in the mould is used in order to (Fig. 4, No. 1) measure the fill level in the mould.

The EVU evaluates the electrical signal generated by the GAMMAcast detector and continually measures the fill level of the mould of a casting plant. Here, the fill level of up to 4 strands can be individually measured at the same time.

Note

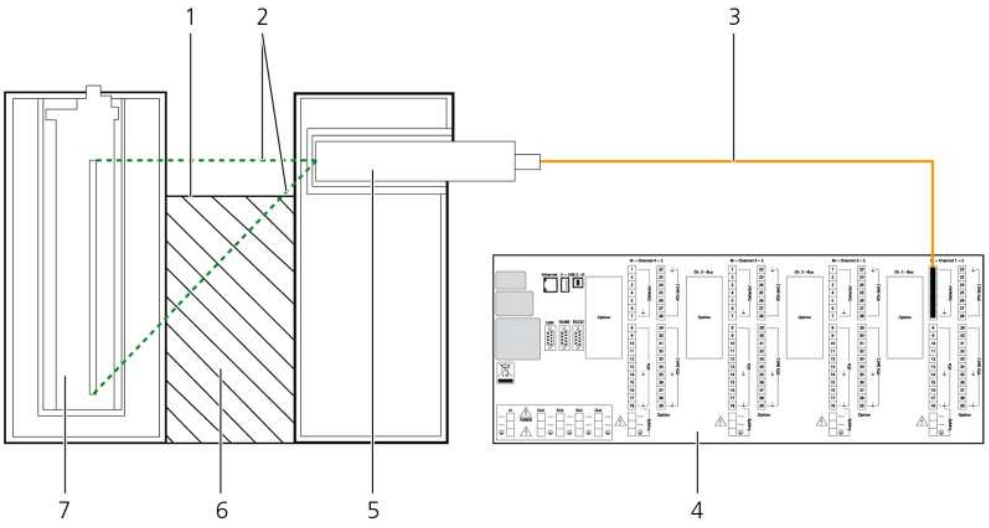
Notes for the use of casting powder

If casting powder is used for the casting process, note that the height of the casting powder layer is partially measured via the mould level of the measurement device. This means that the mould level appears to be somewhat higher than that corresponding to the actual mould level. The magnitude of this deviation depends on the height of the casting powder layer, the bulk density of the casting powder (granulate has a lesser disruptive effect) and the casting format. The error is constant and is only a few millimetres for a desired uniform allocation of casting powder and lesser casting powder layer for metallurgical reasons.

3.5.2 Measurement System Components/Measurement Setup

The measurement system is made up of the following components:

- LB 452 castXpert evaluation unit (EVU)
- Detector from the GAMMAcast series
- Radiation Source/Mould Level Shielding



1 Fill level
2 Beam path
3 Measurement line for channel 1
4 Evaluation unit, back view
5 Detector
6 Fluid metal in the mould
7 Radiation source (in shielding)

Fig. 4 Measurement Set-up

Measurement System Components/Measurement Set-up (Continued)

Note

Further information on the functional principle of the detectors can be found in the manual on the GAMMAcast detectors.

Each active measurement channel consists of at least one basic module. This is indispensable for operating the EVU.

The following modules can also be installed in the EVU:

Extension Module	Offers an extra current output, a pulse input for digital inputs and 2 alarm relays
Fieldbus Module	For transmitting measurement-related data via an RS-485 port (Profibus DP) or an RJ-45 Ethernet port (Profinet IO)

Further instructions on the extension module can be found in chapt. 4.3.2 and on the fieldbus module in chapt. 4.4.

4 Start-Up

The Start-Up chapter explains how to:

- install the device
- use a terminal box
- configure the current output on the basic module or on the extension module
- communicate via the fieldbus module
- install an SD Card

4.1 Installation of the Evaluation Unit (EVU)


Danger

Danger to life from electric shock!

The installation may only be carried out by a qualified electrician.

- Electric shock.

➤ Please adhere to the relevant safety regulations.
➤ Only carry out maintenance work when the device is free of voltage.
➤ Only open the device when free of voltage.


Attention

Damage to the device or wrong measurement results!

Error in the calibration or in the setting of parameters.

- Wrong measurement results.
- Losses of production.
- Damage in the system.

➤ In general, we would recommend that you have the start-up carried out by the service of the company BERTHOLD TECHNOLOGIES.


Note

When operating the EVU, you must adhere to the manual "Mould Level Shieldings".


Note

BERTHOLD TECHNOLOGIES recommends building a separate power connection for each measurement channel (Fig. 3).

Installation of the Evaluation Unit (EVU) (Continued)

The advantages of a separate power connection for each measurement channel are:

Functional reliability in the event of surges or short circuits	Each measurement channel is supplied by its own voltage source.
Redundancy	If there is a fault in the power supply for one strand, the other measurements can still be carried out without interference.

1. Install the EVU in a 19" rack (not included in delivery contents).
2. Connect the external power supply to the EVU (Fig. 5).

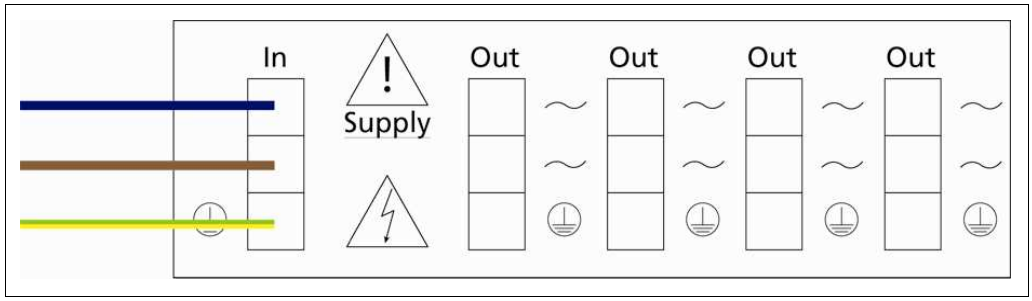


Fig. 5 External power supply for the AWE

3. Connect the power supply (Out) with the corresponding channel (Fig. 6) or connect the individual measurement channels with an external power supply (recommended) (Fig. 7).

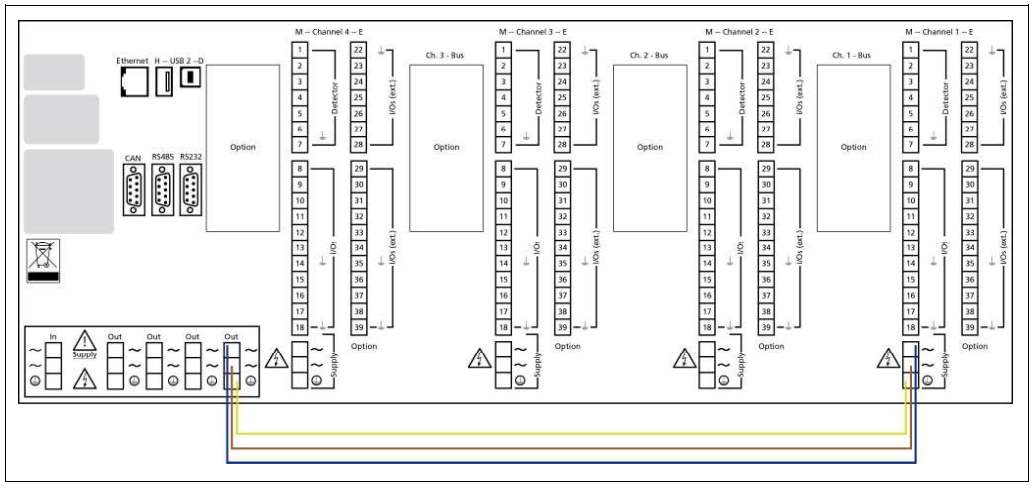


Fig. 6 Internal Power Supply of the Measurement Channel via the EVU, Measurement Channel 1 as Example

Installation of the Evaluation Unit (EVU) (Continued)

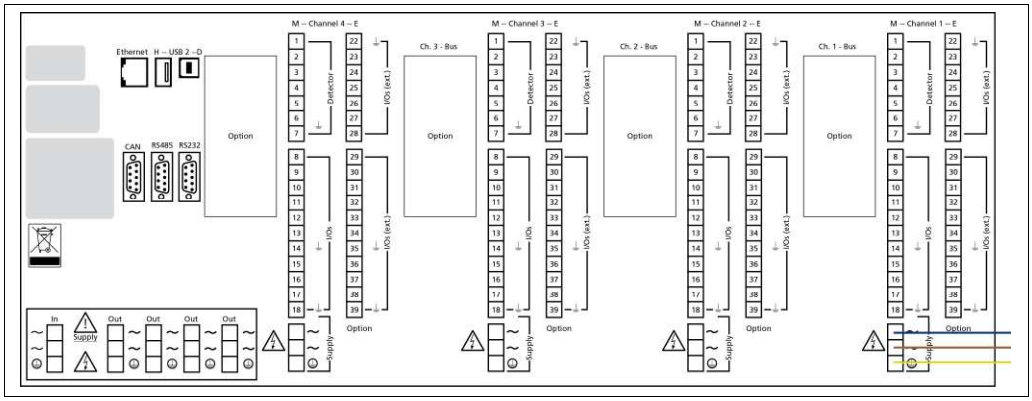


Fig. 7 External Power Supply of the Measurement Channel, Measurement Channel 1 as Example

4. Connect the GAMMAcast detector to a terminal box or directly to the EVU with the special cable (in accordance with the local conditions). Connect the EVU to the terminal box if needed.
5. Configure the current output for the primary signal (chapt. 4.3) and connect the current output loop (chapt. 11.5).
6. Connect the error relay (chapt. 11.5).
7. Connect the alarm relays (chapt. 11.6), if you have installed an extension module.
8. Connect the digital inputs (chapt. 11.5 and 11.6).
9. Insert the radiation source into the mould or into the casting shielding inside the mould.
10. Carry out calibration and set the required parameters for operation (chapt. 7.2). Configure the function of the outputs also (chapt. 7.3).

Note

You can find the procedure for carrying out full calibration and setting the necessary parameters in chapter 7.2. The setting of inputs and outputs is explained in chapter 7.3 .

4.2 The Use of a Terminal Box

Install the terminal box in close proximity to the mould in a protected but easily accessible place.

The GAMMAcast detectors and the EVU are to be connected via the terminal box. This connection is to be made with a standard 6–wire shielded cable (6 x 0.5 mm²) with a maximum length of up to 1000 m.

As required, the terminal box can be ordered with a plug-in connector (Id. no. 34787, Fig. 8) or for open ends (Id. no. 07005, Fig. 9).

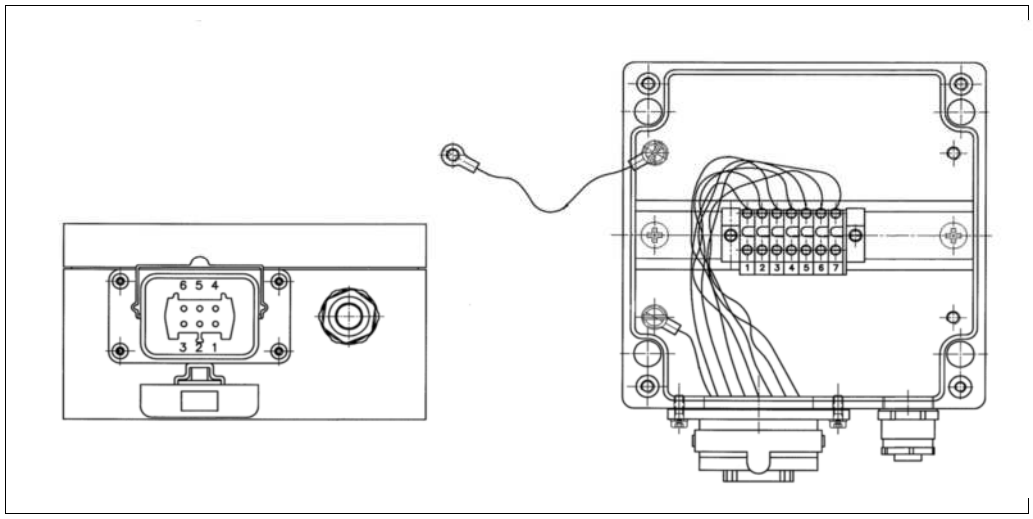


Fig. 8 Terminal Box for GAMMAcast Detectors with Plug-In Connector (Id. no. 34787)

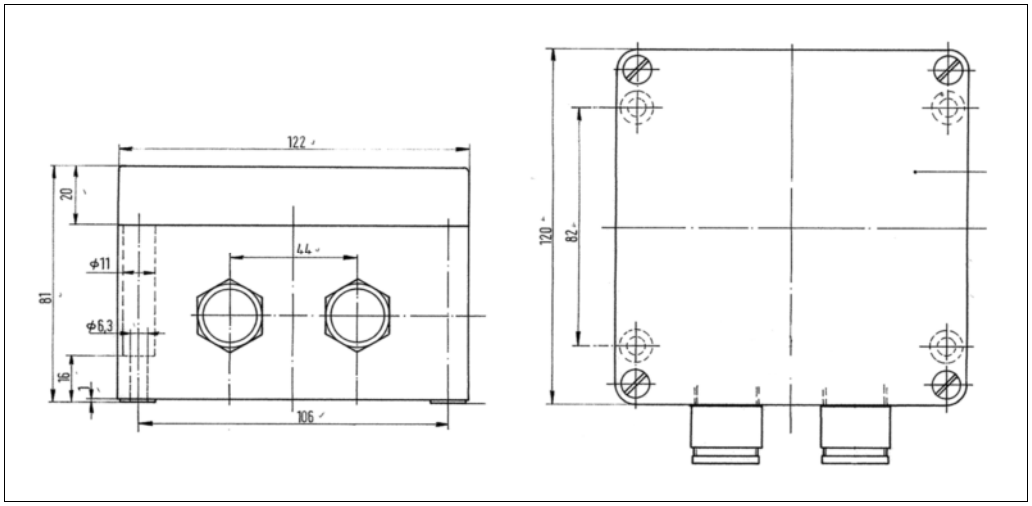


Fig. 9 Terminal Box for GAMMAcast Detectors with Open Ends (Id. no. 07005)

4.3 Configuring the Current Output


Danger

Danger to life from electric shock!

The installation may only be carried out by a qualified electrician.

- Electric shock.

➤ Please adhere to the relevant safety regulations.
➤ Only carry out maintenance work when the device is free of voltage.

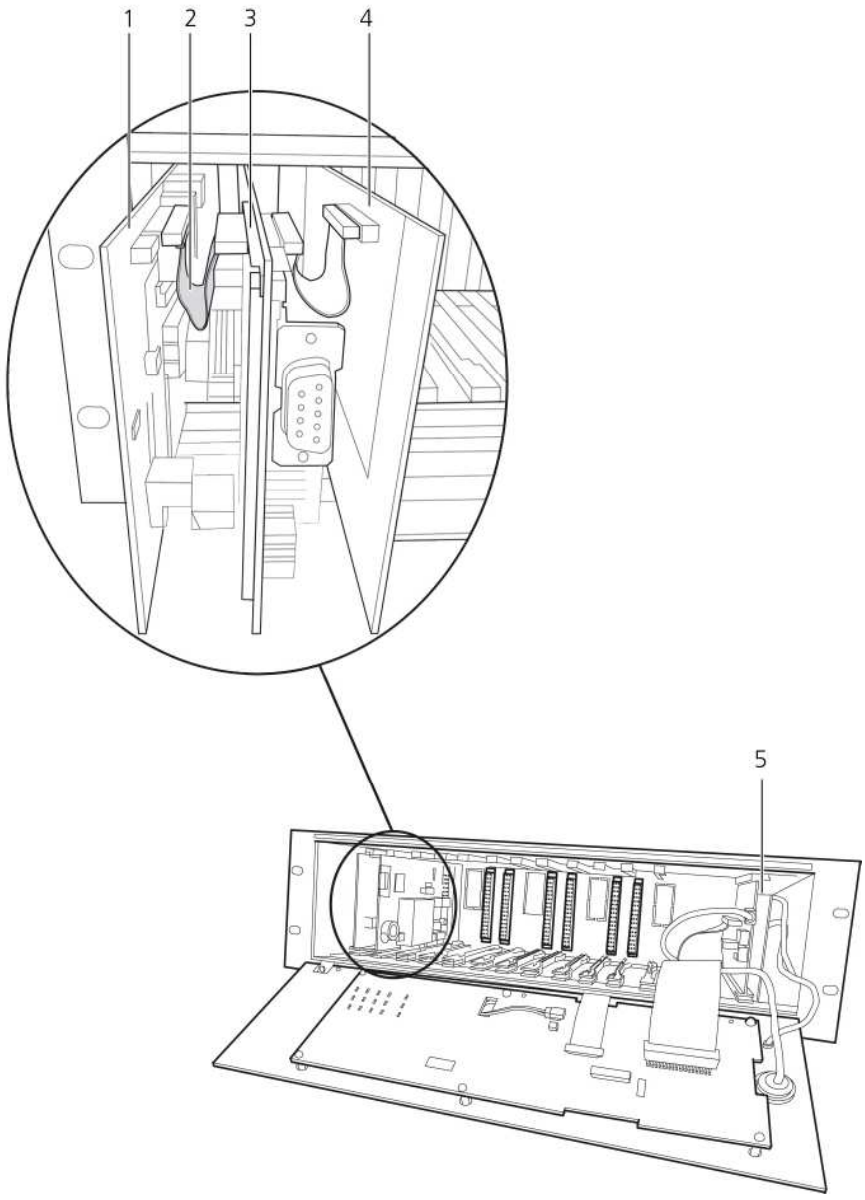
You can assign the current outputs to two different modes. In order to do so, you must configure the current outputs at the changeover switches on the basic and extension modules.

In source mode, the current output is active and in sink mode, the current output is passive.

Source Mode (Active Current Output)	**Sink Mode** (Passive Current Output)
Meaning: The EVU supplies the current loop (factory setting)	**Meaning:** An external power supply supplies the current loop.
Max. Impedance: 500 Ω Min. Impedance: 120 Ω	Minimum impedance: 120 Ω **Max. 24 V_{AC} / Min. 12 V_{DC}** Max. Impedance at 12 V: 250 Ω Max. Impedance at 24 V: 500 Ω

4.3.1 Configuring the Current Output on the Basic Module

Before you start to configure the current outputs, get an overview of the installed modules.



1 Extension module
2 Flat ribbon cable
3 Basic module
4 Bus module
5 System board (control unit) with SD card slot

Fig. 10 Overview of the Installed Modules

Configuring the Current Output on the Basic Module (Continued)

Approach the configuration of the current output as follows:

Danger

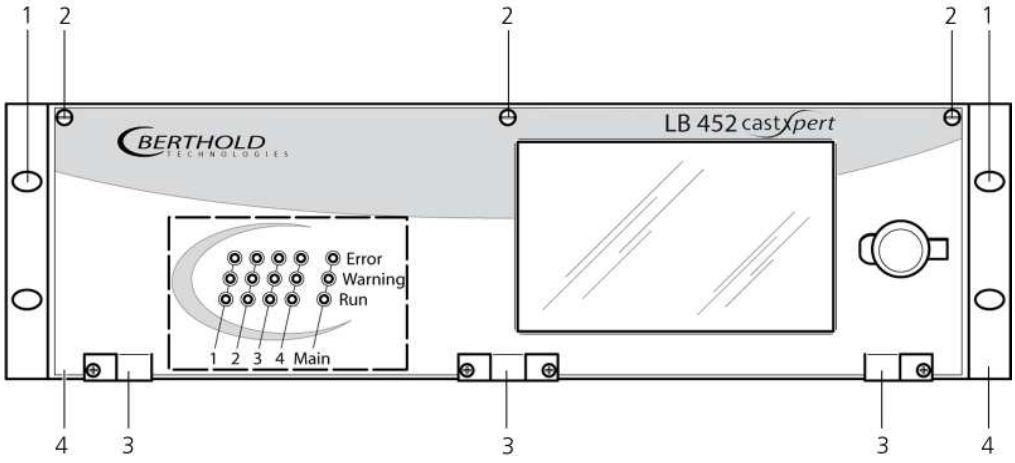
Danger to life from electric shock!

The installation may only be carried out by qualified electricians.

- Electric shock.

➤ Only open the device when free of voltage.

1. Disconnect the EVU voltage.
2. Loosen the three screws (Fig. 11, Pos. 2) on the front panel



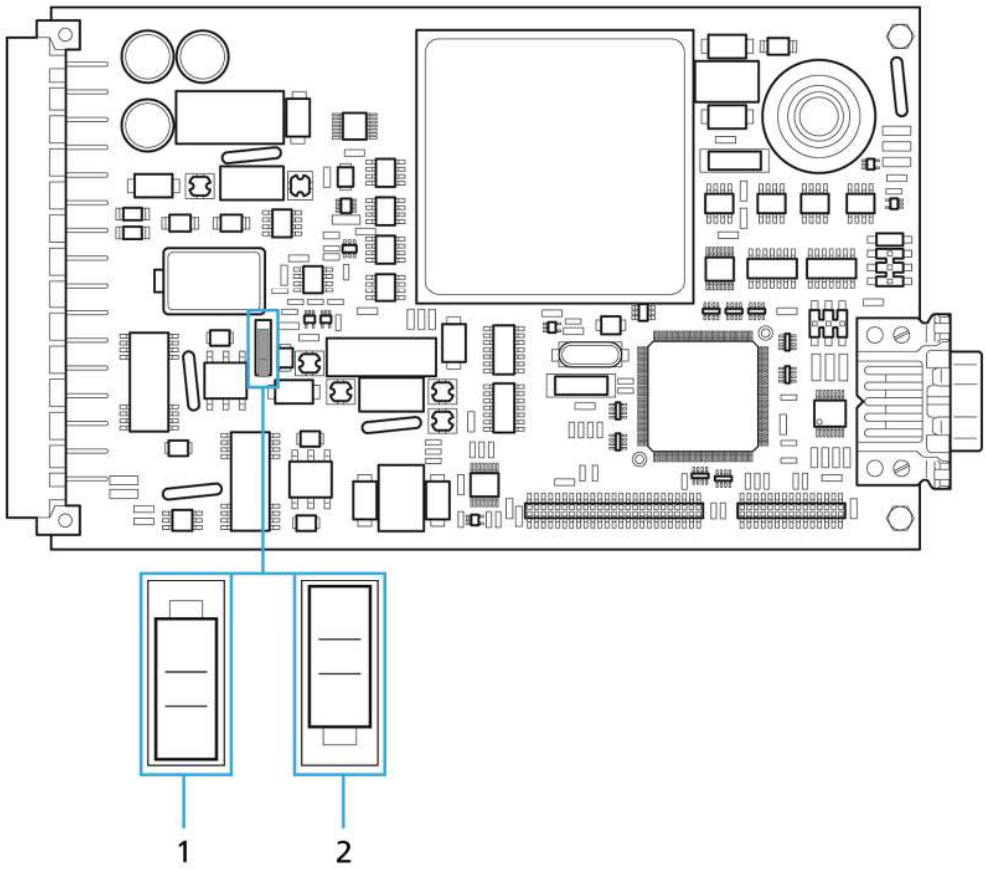
1 Opening for fixing screws
2 Screws
3 Hinges
4 Angle bracket

Fig. 11 Assembly Front View

3. Fold down the front panel.
4. Pull all modules (Fig. 10, Pos. 3) of the measurement channel out **at the same time** and remove the flat ribbon cable(s) if needed (Fig. 10, Pos. 2).

Configuring the Current Output on the Basic Module (Continued)

5. Set the desired position at the changeover switch (Sink Mode (Fig. 12, Pos.1) or Position Source Mode (Fig. 12, Pos. 2).



1 Basic Module, changeover switch – Position **Sink Mode**

2 Basic Module, changeover switch – Position **Source Mode** (factory setting)

Fig. 12 Switching on the Basic Module Current Output at the Changeover Switch

6. Connect the module with the flat ribbon cable again.
7. Push all the modules (Fig. 10, Pos. 3) of the measurement channel in again **at the same time**.
8. Fold the front panel up again.
9. Tighten the screws again.

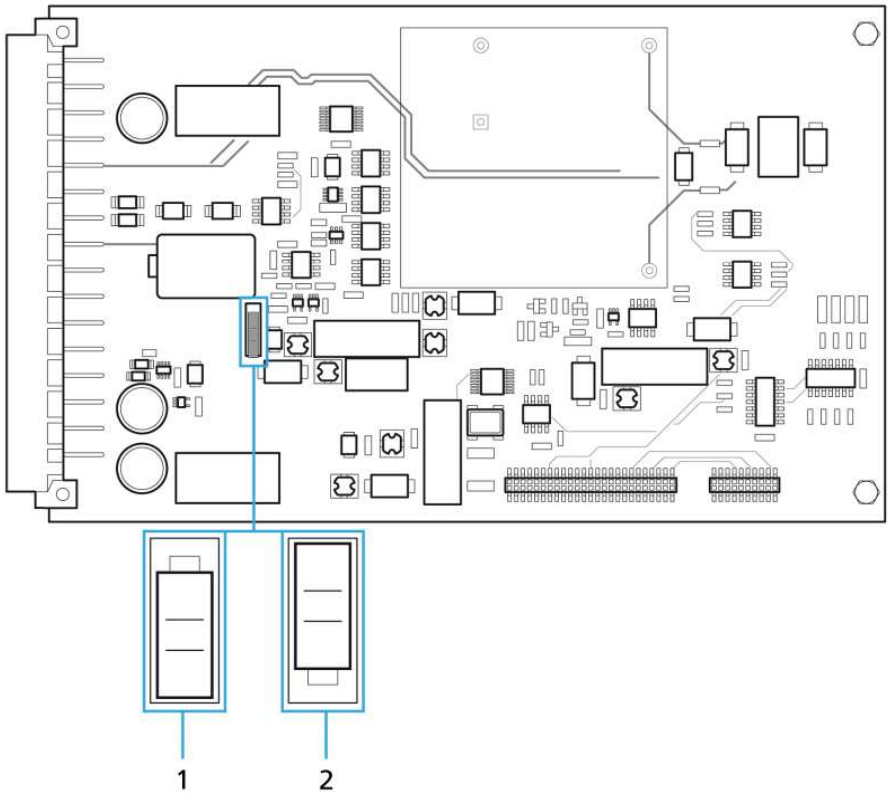
Note

Ensure that the position at the changeover switch on the basic module and on the extension module is the same!

➤ Use **the same** current output configuration on the basic and extension modules.

4.3.2 Configuring the Current Output on Extension Module

1. Disconnect the EVU voltage.
2. Loosen the three screws on the front panel (Fig. 11, Pos. 2).
3. Fold down the front panel.
4. Pull all modules (Fig. 10, Pos. 3) of the measurement channel out **at the same time** and remove the flat ribbon cable(s) if need be (Fig. 10, Pos. 2).
5. Set the desired position at the changeover switch (**Sink Mode** (Fig. 13, Pos.1) or Position **Source Mode** (Fig. 13, Pos. 2).
6. Connect the module with the flat ribbon cable again if need be.
7. Push all the modules (Fig. 10, Pos. 3) of the measurement channel in again **at the same time**.



1 Extension module, changeover switch **Sink Mode**

2 Extension module, changeover switch **Source Mode** (factory setting)

Fig. 13 Extension Module, Setting the Current Output at the Changeover Switch

8. Fold the front panel up again.
9. Tighten the three screws again.

4.4 Data Definition Profibus DP

Cyclic Output Data

Variable name	Description	Type	Size
Mould Level	**Current Mould Level** unit: %/mm/inch (selectable)	Float	32 Bit
Detector Raw Value	**Current Detector Raw Value** unit: GAMMAcast - Pulses per Second (CPS) ECcast – Millivolt (mV)	Float	32 Bit
Detector Temperature	**Current Detector Temperature** Unit: °C/°F (selectable)	Float	32 Bit
Calibration Index	**Currently used calibration [0 ... 7] (decimal)** (Calibration curve, alarm thresholds, time constant, etc.)	Byte	8 Bit
System Status	System Status. This field contains binary coded information: **Bits 0-2: Main state of the system** Bit 0; 0x1 (1): RUN/MEASUREMENT RUNNING Bit 1; 0x2 (2): STOP Bit 2; 0x4 (4): ERROR **Bit 3: Warning** Bit 3; 0x0 (0): NO WARNING Bit 3; 0x1 (1): WARNING **Bits 4-11: Stop condition** Bit 4-11; 0x00 (0): Not in STOP state Bit 4; 0x01 (1): No detector found Bit 5; 0x02 (2): Detector Offline Bit 6;0x04 (4): Test Mode Bit 7;0x08 (8): Calibration running Bit 8;0x10 (16): Full Adjustment running Bit 9;0x20 (32): Empty Adjustment running **Bits 12-19: Alarms** Bit 12-19; 0x00 (0) No alarm running Bit 12; 0x01 (1): Detector Over Temperature Bit 13; 0x02 (2): Min. Fill Level Bit 14; 0x04 (4): Max. Fill Level Bit 15; 0x08 (8): Gating mode (time constant) Bit 16; 0x10 (16): Trim Adjust Up running [only ECcast] Bit 17; 0x20 (32): Trim Adjust Down running [only ECcast] **Bits 20-31: Error number** A 12 Bit unsigned integer number representing the number of the actual error Error# < 1000: LB 452 error Error# > 1000: Detector error	Unsigned Integer	32 Bit
			136 Bit = 17 Bytes

Cyclical Input Data

Variable Name	Description	Type	Size
Calibration Index	**Currently used calibration [0 ... 7] (decimal)** (Calibration curve, alarm thresholds, time constant, etc.)	Byte	8 Bit
Function Actuation	By writing a number in this field functions on the EVU can be actuated: 0x0 (0) Idle (do nothing) Bit 0; 0x1 (1): Empty Adjust Bit 1; 0x2 (2): Full Adjust Bit 2; 0x4 (4): Trim Adjust Up (One Step) [only ECcast] Bit 3; 0x8 (8): Trim Adjust Down (One Step) [only ECcast] Bit 4; 0x10 (16): Start Automatic Calibration [only ECcast] Bit 7; 0x80 (128): Acknowledge Actual Error	Unsigned Integer	32 Bit
			40 Bit = 5 B


Note

Only cyclic data will be transferred.


Attention

Device is not working correctly!

Fieldbus Module Data is not being received.

- ➤ Install the driver (GSD file) into the control centre in order to be able to receive the fieldbus module data!
- ➤ Check the Profibus ID (Profinet IP address)

The fieldbus module can be distributed in the following versions:

Version 1: RS-485 port (Profibus DP) or

Version 2: RJ-45 Ethernet port (Profinet IO) (planning stage)

4.5 Mounting an SD Card


Attention

Material damage to the device or the system!

System crashes.

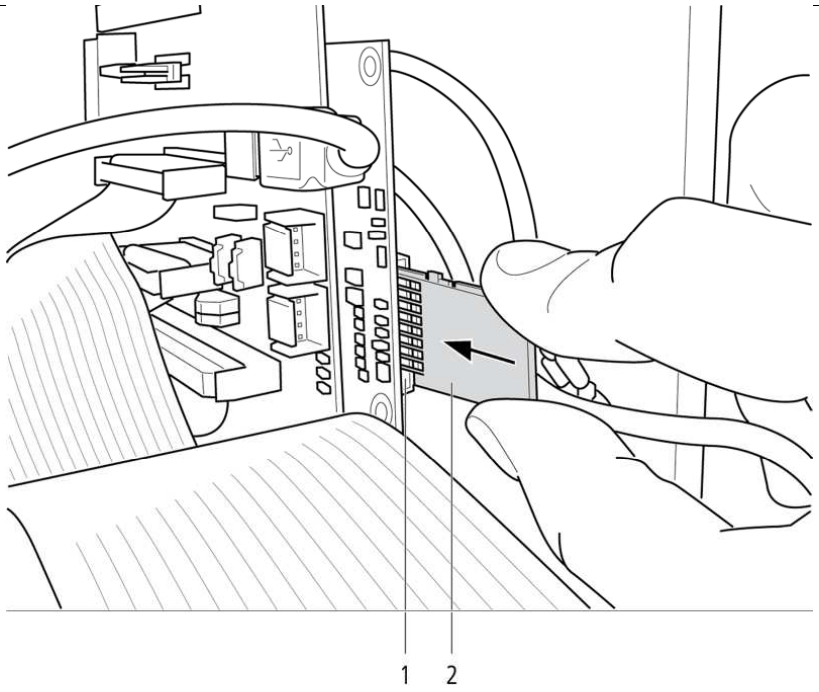
- ➤ Never install or remove an SD card while in running operation.

You have the possibility of saving data, error reports and adopted settings on an SD card. In order to do so, you must install an SD card in the control unit.

For the saving of data, see chapt. 6.3.2 and 6.4.

Approach the installation of the SD card as follows:

1. Disconnect the EVU voltage.
2. Loosen the screws on the front panel (Fig. 11, Pos. 2) and fold down the front panel.



1 Control unit with SD card slot

2 SD Card

Fig. 14 Control Unit, Installation of the SD Card

3. Push the SD card (Fig. 14, Pos. 2)) into the SD card slot (Fig. 14, Pos. 1) on the control unit until the SD card snaps into place.
4. Fold the front panel up again and tighten the three screws.

5 Operation of the Software

In this chapter, the operation of the software and the different setting options of the EVU are explained.

The EVU does not have a separate on and off switch. As soon as the energy supply is connected, the system and the EVU start up.

During the start-up process, the start screen with the version number of the installed software is shown on the display (Fig. 15, Pos. 1).

1 Display of the installed EVU software version

Fig. 15 Software Display Screen when Switching on the EVU

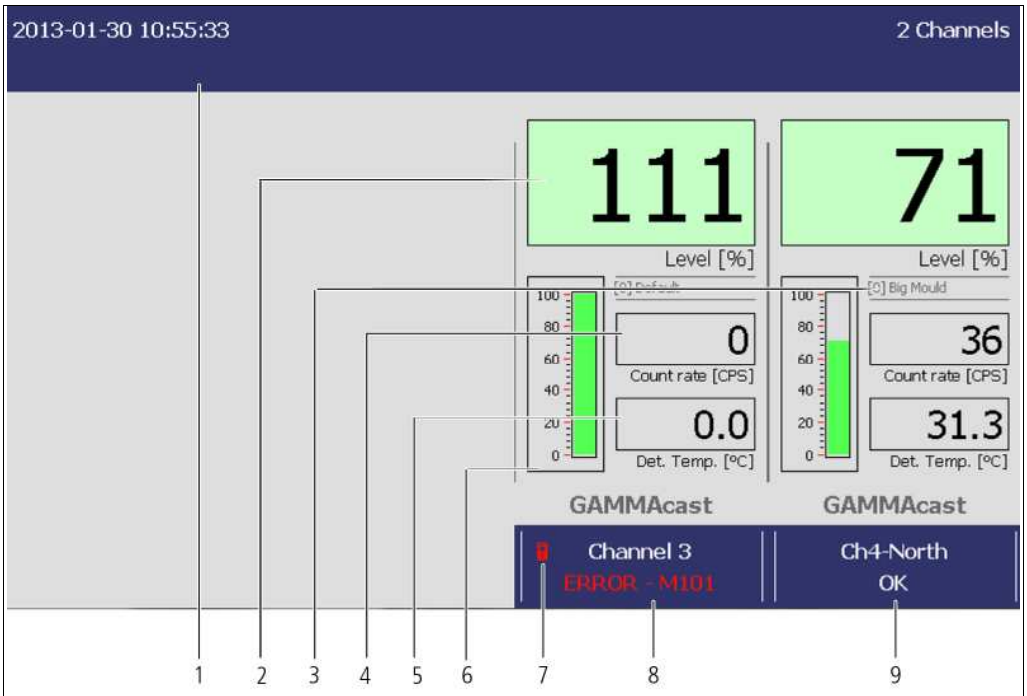
5.1 Overview of the Standard Display

If the system is fully loaded and running, the start page of the measurement system is displayed (Fig. 16).

The display varies depending on which measurement channels are installed. For example, two measurement channels are shown in Fig. 16.

Note

As soon as several detectors are connected to the individual measurement channels, these are automatically represented on the standard display.



1 Button to navigate the menu system
2 Digital display of count rate (cps)
3 Active calibration curve
4 Digital display of the fill level
5 Display the detector temperature
6 Graphical display of the fill level
7 Alarm status
8 Error display with additional display
9 Button to navigate to the "Channel Overview" menu

Fig. 16 Standard display of the EVU

Click on the top blue bar (Fig. 16, Pos. 1) to reach the system menu (chap. 6 „The System Menu“).

Under the display for the measurement channels, there is a button that leads to its respective "Channel Overview" menu (see chapt. 7 "Channel Overview" Menu Menu) .

Positions 2 to 9 give you a view of graphical information for the fill level (Fig. 16, Pos. 6), of the detector temperature (Fig. 16, Pos. 5), of the fill level (Fig. 16, Pos. 2) and the count rate (Fig. 16, Pos. 4).

In case of failure, the error number is displayed (Fig. 16, Pos. 8). All castXpert LB 452 error messages have the identifier "M" and all GAMMAcast LB 67xx error messages have the identifier "D".

In addition, the following additional information is displayed:

- Identification of the measurement channel (Fig. 16, Pos. 9)
- Identification of the calibration curve (Fig. 16, Pos. 3)
- Alarm status (Fig. 16, Pos. 7)

5.2 Operation of the EVU

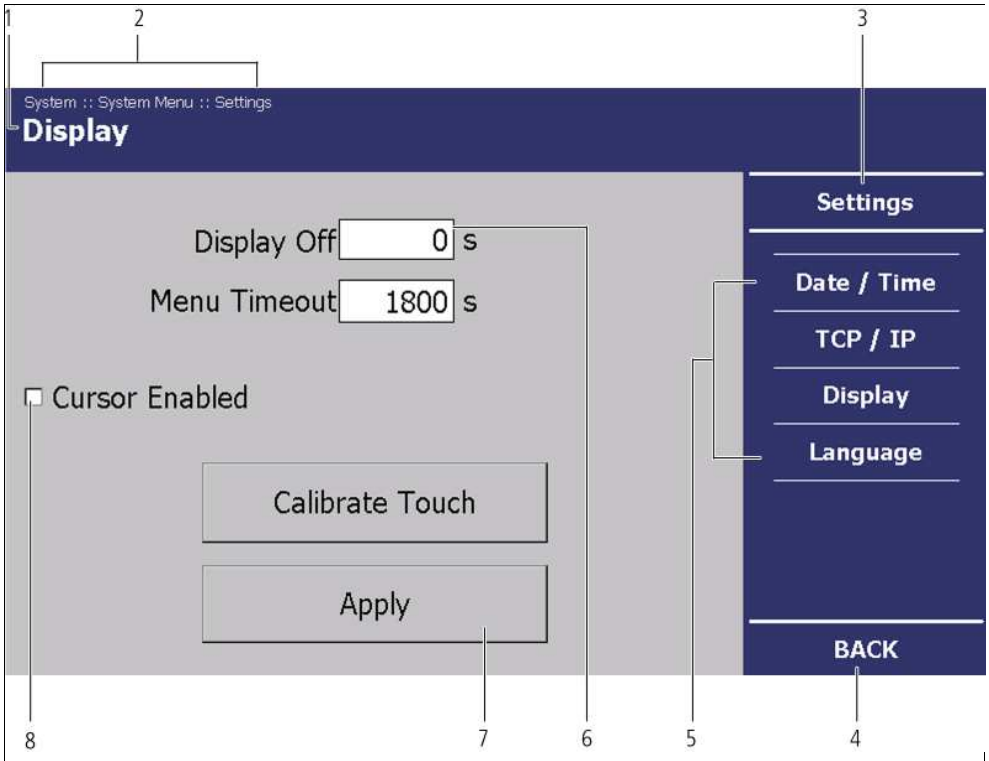
The following figures display the structural framework of the EVU (Fig. 17) and the input options (Fig. 18).

Operation Options:

- Via the touch display.
- With a mouse and a keypad which are connected at the USB port on the front panel (Fig.1, Pos. 3).
- With a mouse and a keypad, if the EVU is operated via remote control software.

Note

If you would like to connect more than one USB device to the EVU, then use a USB hub.

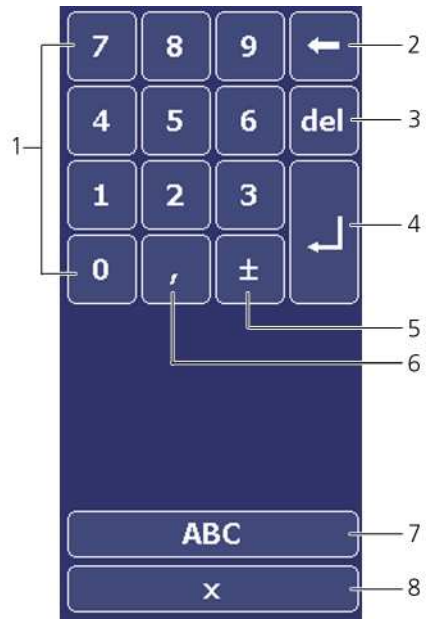


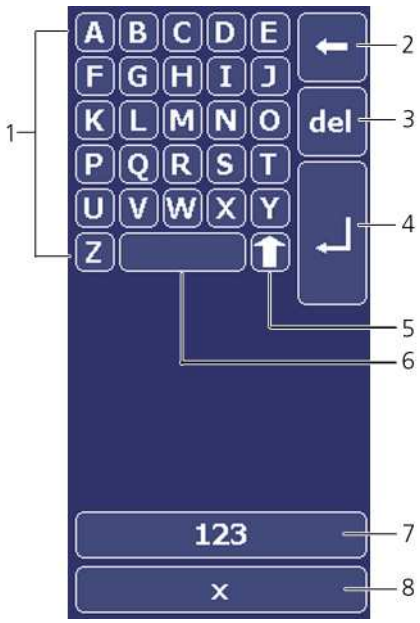
1 Display of the current menu/submenu
2 Display of the menu structure
3 Display of the menu
4 Button for reaching the respective higher level in the menu
5 Buttons for the submenus
6 Input field for entering values via the touch display or the PC keypad
7 Button for "Channel Overview" menu
8 Check boxes

Fig. 17 Overview of a Menu with Buttons and Input Fields

Operation of the EVU (Continued)

As soon as you click on an input field , the numeric keypad or the keypad is automatically displayed on the touch display.





1	Numeric keypad	1	Keypad
2	Deletes space before the cursor	2	Deletes space before the cursor
3	Deletes space after the cursor	3	Deletes space after the cursor
4	Enter - Confirm the input	4	Enter - Confirm the input
5	Input of negative values	5	Shift - Switch between upper/lower case letters
6	Enter comma	6	Space button
7	Switch to keypad	7	Switch to numeric keypad
8	Close numeric keypad	8	Close keypad

Fig. 18 Numeric Keypad and Keypad

6 The System Menu

In the system menu you can make system settings which apply to all measurement channels.

The system settings do not affect the measurement!

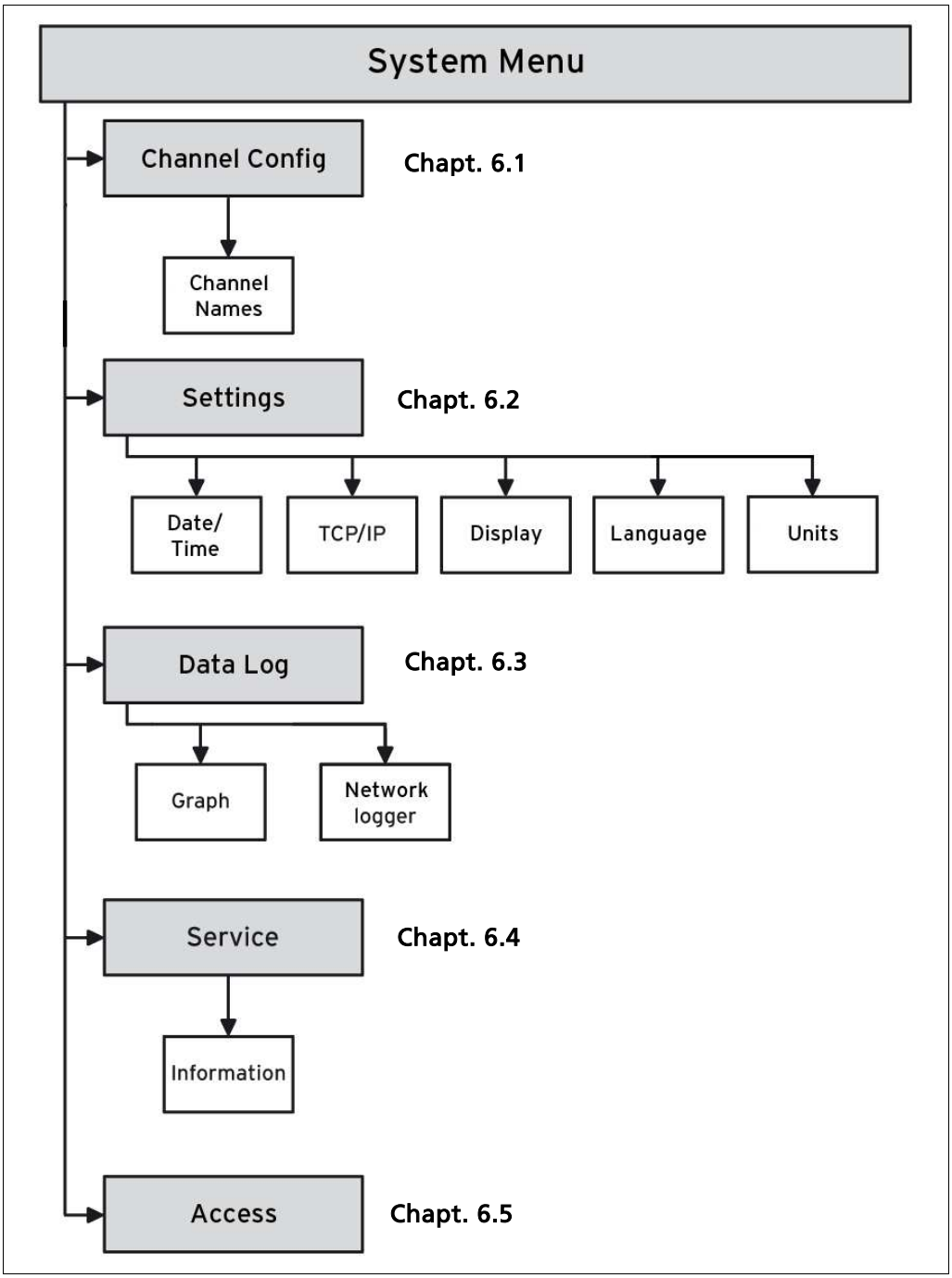
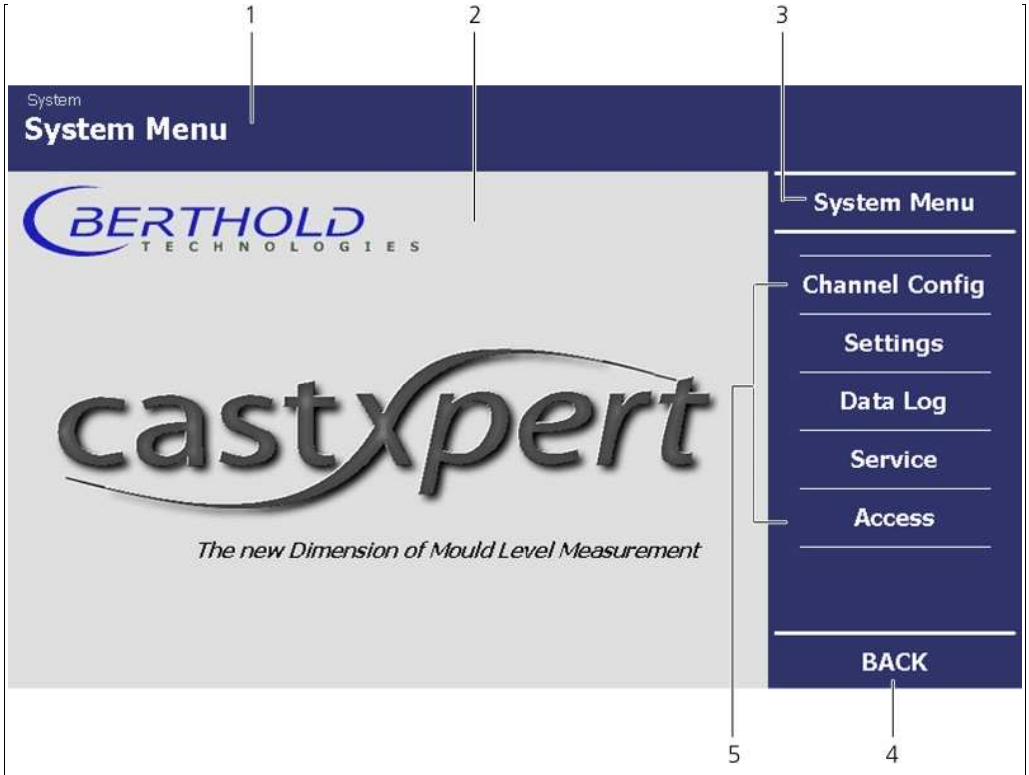


Fig. 19 Menu Structure of the System Menu

System Menu (Continued)

To reach the system menu, click on the top blue bar on the standard display (Fig. 16, Pos. 1).

⇒ The System Menu (Fig. 20) is opened.



1 Heading of the main menu
2 Start screen of the system menu
3 Display of the current submenu
4 Button for reaching the respective higher level in the menu
5 Buttons for the submenus

Fig. 20 System Menu, Start Page

In the system menu, you can make the following settings:

Channel settings	Setting of the channel assignment and the measuring method.
Settings	General settings like time, date and language.
Data Log	Setting of the log intervals and data export.
Service	Carrying out of updates for the evaluation unit, the measurement unit and the detectors.
Access Level	Allocation of user rights and passwords.

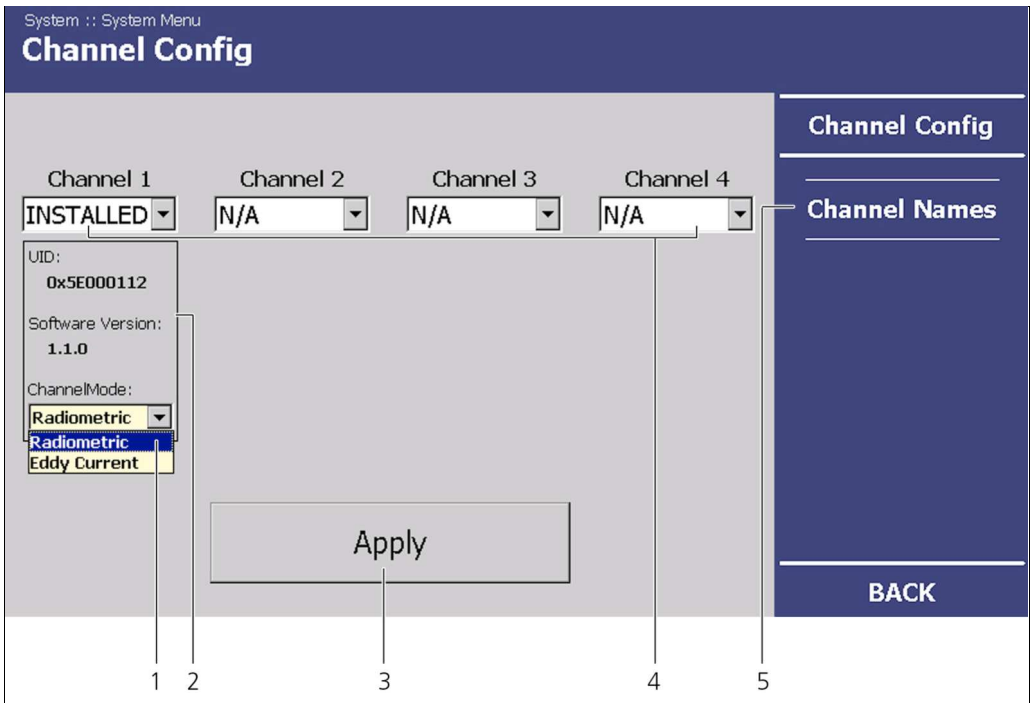
6.1 Channel Setting

In the channel setting submenu, you can set the channel assignment (Fig. 21, Pos. 4) and the measurement method (channel mode) for the different GAMMAcast detectors.

Attention

Measurement not possible!

- There are two methods of measurement. Set the method according to the detectors you are using:
- **Radiometric** in conjunction with the GAMMAcast detectors, which are based on the radiometric method.
- **Eddy Current** in conjunction with the ECcast detectors, which are based on the eddy current measurement method.



1 Drop-down menu for the channel mode (measurement method)
2 Display of the software version and serial number of the measurement channel
3 Apply button for saving the settings
4 Drop-down menus for the channel assignment
5 Channel settings menu button

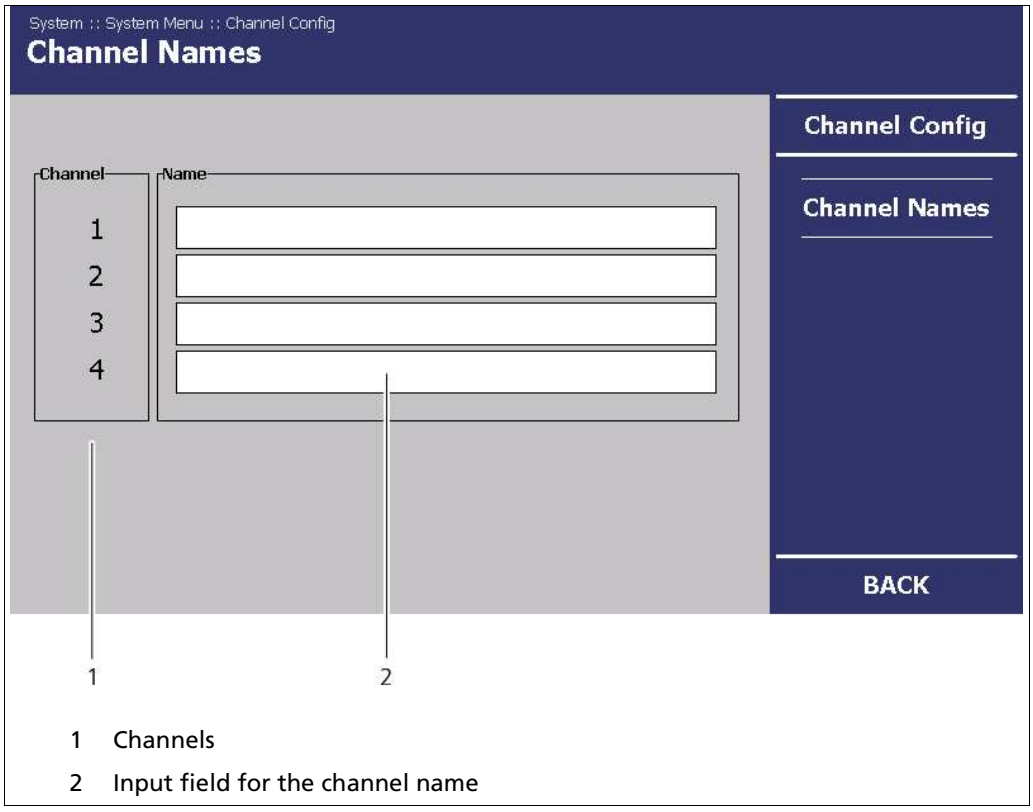
Fig. 21 System menu, Channel Settings

In the menu <Channel Settings> in the drop-down menu "Channel Mode" set the measurement method for the detectors used to **Radiometric** or **Eddy Current** (Fig. 21, Pos. 1).

6.1.1 Channel Names

A name can be assigned to each of the four measurement channels. This name is imported into the standard display and is used for all service files when they are exported.

Click in the System menu on <Settings | Channel Settings | Channel Names> in order to assign a name to a channel.



1 Channels

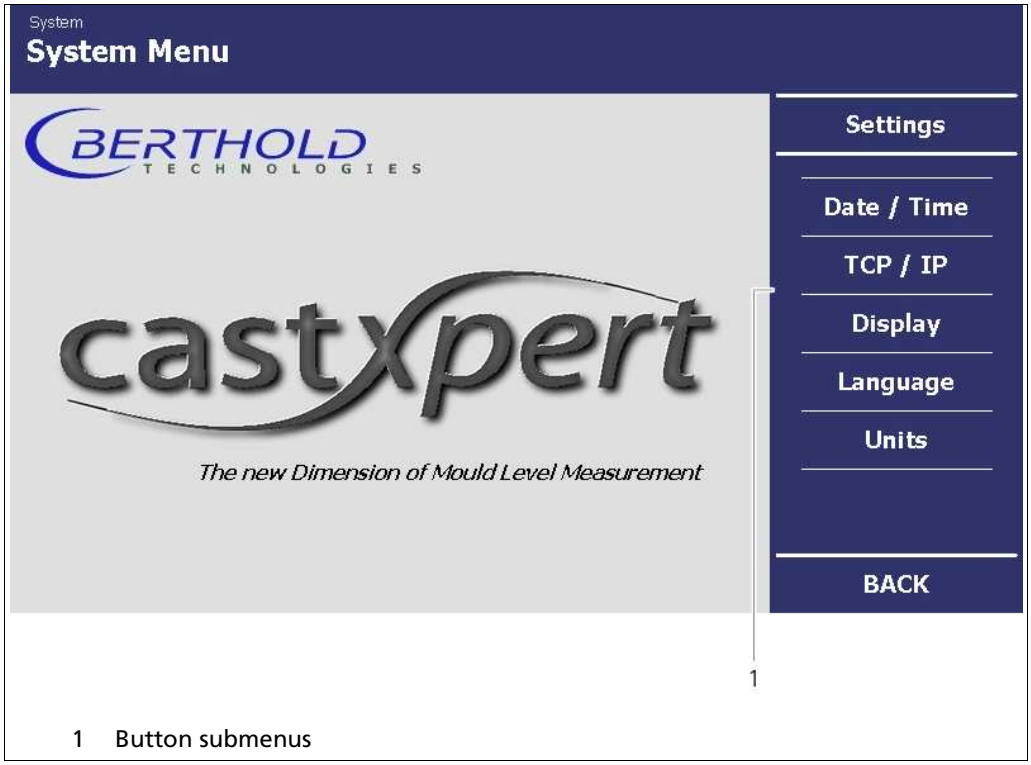
2 Input field for the channel name

Fig. 22 System Menu, Channel Settings

6.2 Settings

In the System Menu, click on <Settings> (Fig. 20, Pos. 5), in order to reach the Settings submenu.

⇒ The submenu **Settings** is opened (Fig. 23).



1 Button submenus

Fig. 23 System menu, Settings

In the <Settings> submenu, you have the following settings options:

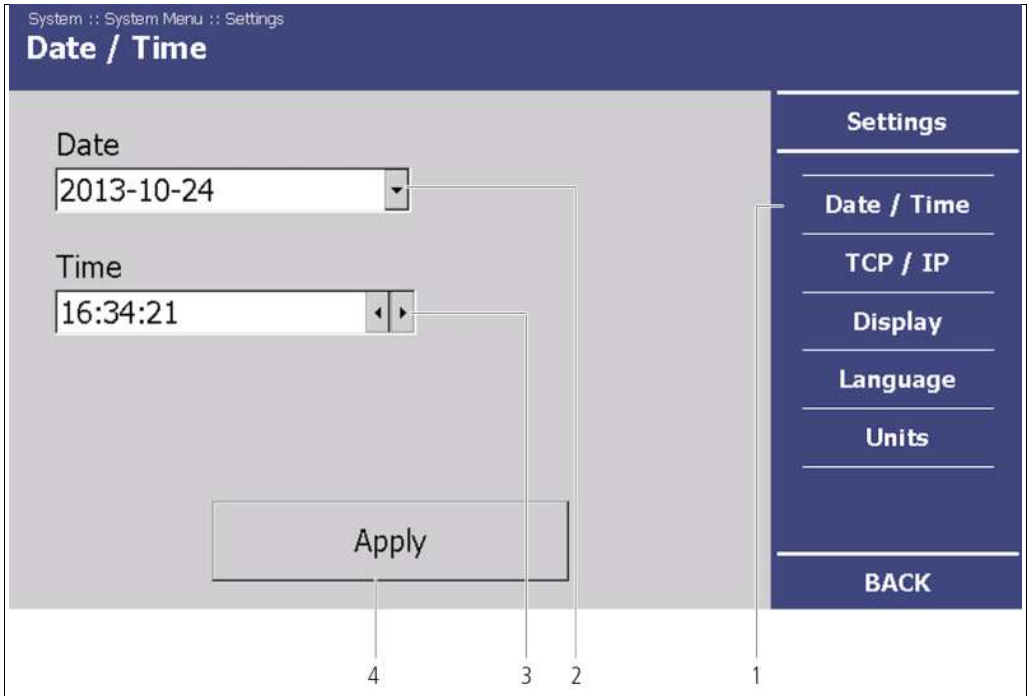
- Setting the date/time
- Applying and viewing network settings
- Display Setting
- Setting the language
- Setting the units

6.2.1 Setting the Date/Time

Note

The date and time must always be set correctly so that all records (log files) have the right metadata.

1. In the System Menu | Settings, click on <Date/Time>, to reach the Date/Time submenu (Fig. 23, Pos. 1).

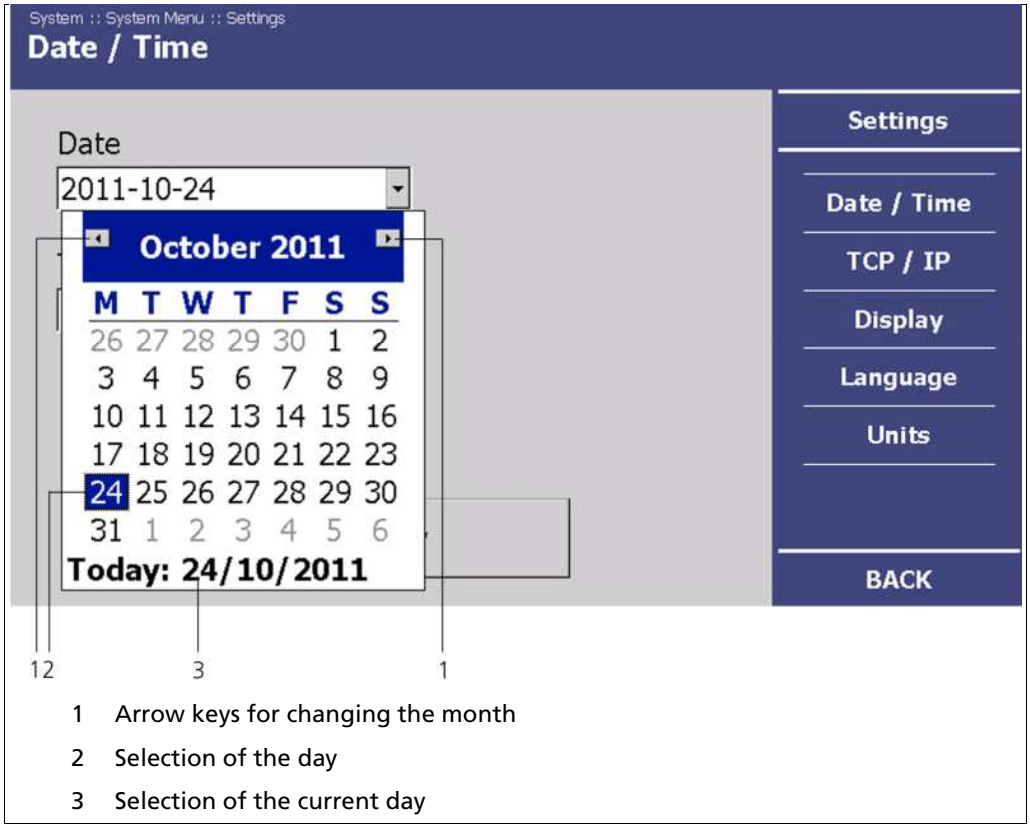


1 Date/Time submenu button
2 Calendar drop-down menu
3 Arrow keys for increasing or decreasing the time
4 Apply button

Fig. 24 System Menu, Settings - Date/Time

2. Click on the button drop-down menu (Fig. 24, Pos. 2), to change the date.
   ⇒ The calendar is "opened".

Setting the Date



1 Arrow keys for changing the month

2 Selection of the day

3 Selection of the current day

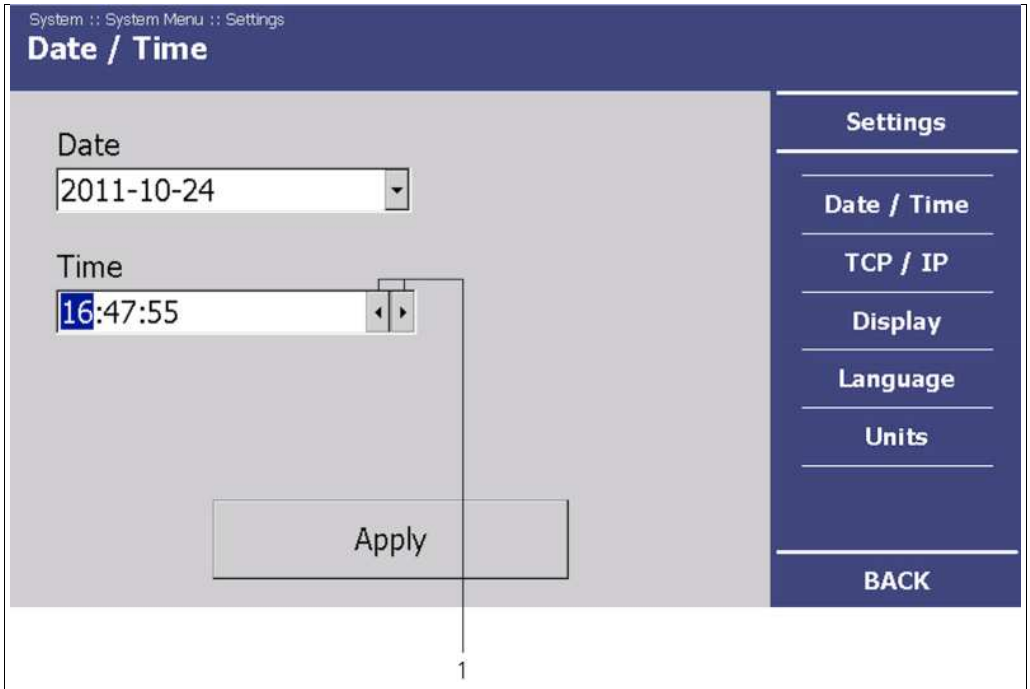
Fig. 25 System menu, Settings - Set Date

3. Set the month (Fig. 25, Pos. 1) by clicking on the arrow keys.
4. Set the day (Fig. 25, Pos. 2) by clicking on a number in the calendar. Alternatively, you can also set the current day by clicking on "Today" (Fig. 25, Pos. 3).

   ⇒ The date set is displayed (Fig. 25, Pos. 3).

Setting the Time

1. In the "Time" display field, click on (Fig. 26, Pos. 1) the time unit (hours, minutes, seconds), which you want to change.
2. Change the time by clicking on the arrow keys (Fig. 26, Pos. 1).



1 Arrow keys for changing the time

Fig. 26 System menu, Settings - Setting the Time

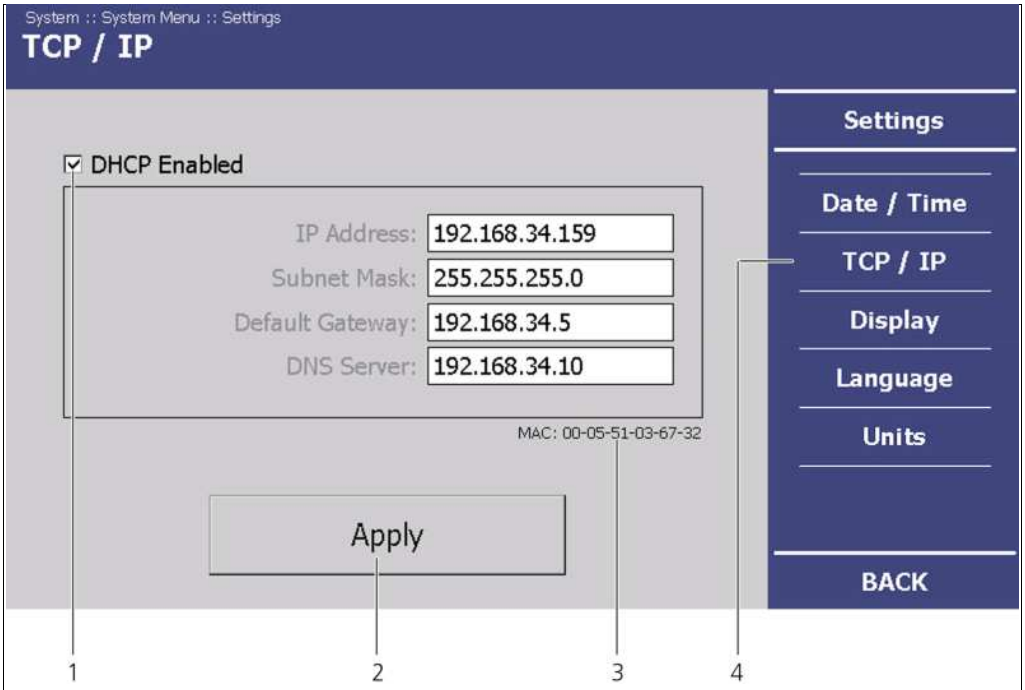
3. Click on <Apply>, to adopt the date and time settings.

Note

All settings applied must be confirmed by clicking on <Apply> , for the settings to become effective.

6.2.2 Applying Network Settings

In the network settings submenu, you can make changes to the network settings.



1 DHCP check box active
2 Apply button
3 Display of MAC address
4 TCP/IP submenu button

Fig. 27 System Menu, Settings - TCP/IP

Note

In the event of an automatic assignment of the IP address by a DHCP server, you can only look at the given IP address. A modification of the IP address is not possible.

On this site, you can also read the MAC address of the device (Fig. 27, Pos. 3).

Applying Network Settings (Continued)

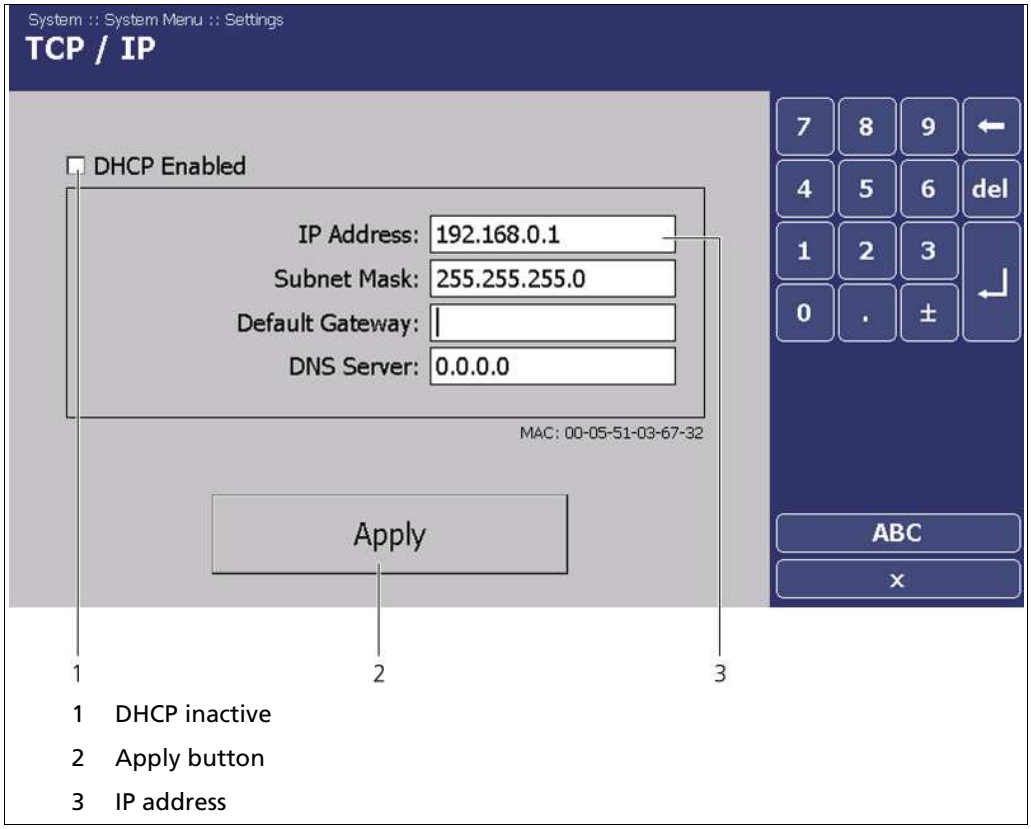
Note

No communication via the remote control software!

The EVU cannot be accessed via the RC software.

➤ If you have not put a tick next to <DHCP active> (Fig. 27, Pos. 1), then check your applied network settings!

In the System Menu | Settings click on <TCP/IP> (Fig. 27, Pos. 4), to change the network settings.



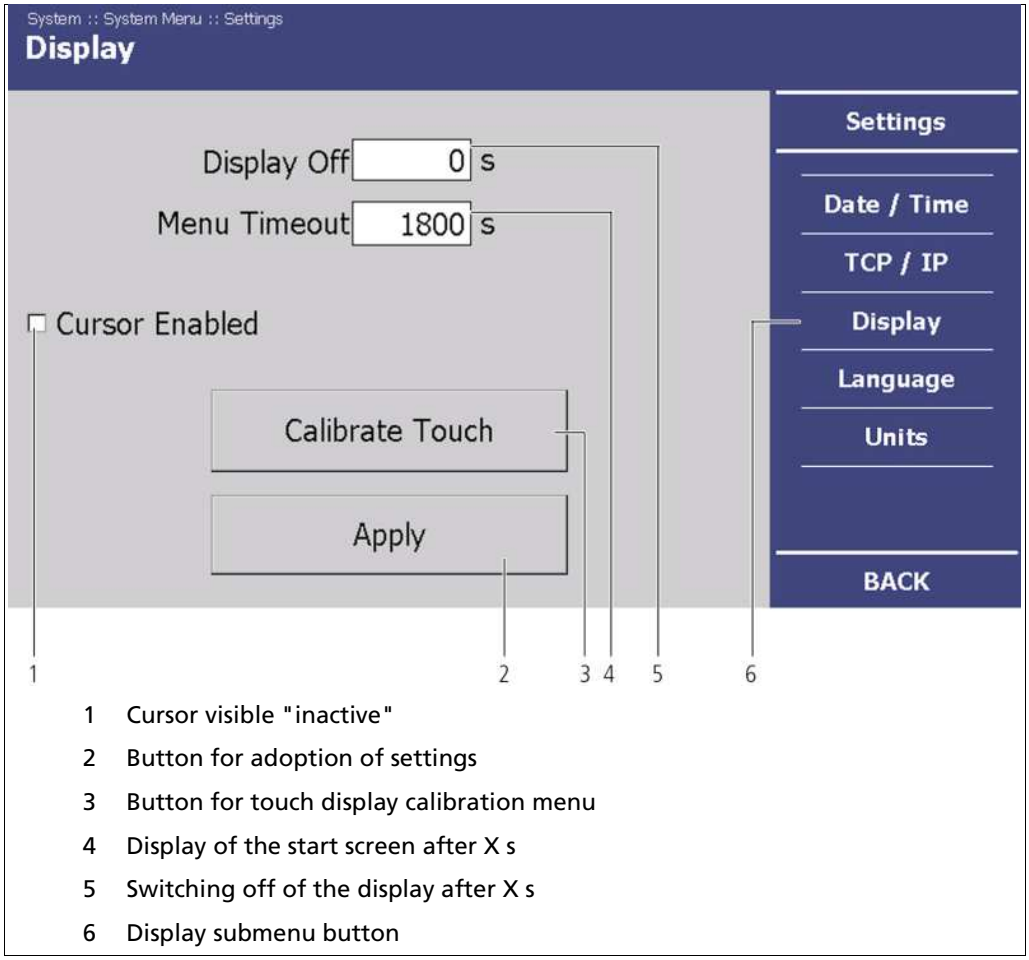
1 DHCP inactive
2 Apply button
3 IP address

Fig. 28 System Menu, Settings - TCP/IP

You can set the network address either manually or using DHCP (automatic assignment). Put a tick next to <DHCP active> in the check box (Fig. 27, Pos. 1).

1. Click on <Apply>, to adopt the changes (Fig. 27, Pos. 2).

6.2.3 Display



1 Cursor visible "inactive"
2 Button for adoption of settings
3 Button for touch display calibration menu
4 Display of the start screen after X s
5 Switching off of the display after X s
6 Display submenu button

Fig. 29 System Menu. Settings - Display

In the System menu | Settings click on <Display> (Fig. 27, Pos. 4), to make changes to the display or to calibrate the touch display.

In the <Display> submenu, you can make the following settings:

Display Off — Here, the turn-off time of the display can be entered. For a value of **0 s** the display is always active.

Menu Timeout — Here, it is possible to enter the time after which the menu should be left if the user has not made an entry.

Cursor Enabled — If the EVU is to be operated with a mouse, a tick must be put in the "Cursor visible" check box (Fig. 29, Pos. 1). The cursor is visible even if there is no mouse connected and the EVU is operated via the touch display.

Calibrate Touch — When the <Calibrate Touch> button is clicked, a menu for touch display calibration is opened.

Note

The following settings described "Switch off display", "Leave menu" and "Cursor visible" can all be applied at the same time.

This way, it is only necessary to restart the EVU once.

6.2.3.1 Calibrate Touch Display

Note

The calibration may only be carried out with direct skin contact. Take gloves or any other protective equipment off your hands.

1. Click on <Calibrate touch pad> (Fig. 29, Pos. 3).

   ⇒ The calibration screen opens (Fig. 30).

2. Press the middle of the displayed cross with your finger.

   ⇒ If you take your finger off the cross again, the cross jumps to the top left corner (Fig. 30).

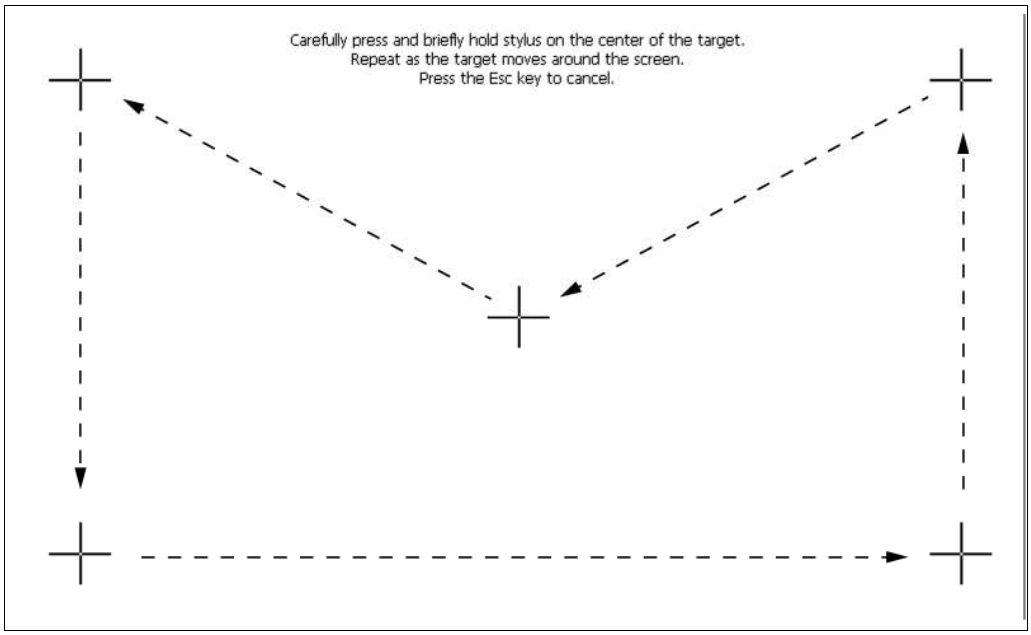


Fig. 30 System Menu. Settings - Display (Calibrate Touch Display)

3. Repeat the process until the cross is no longer displayed and the calibration is finished.

   ⇒ After successful calibration, the "Display" submenu is displayed.

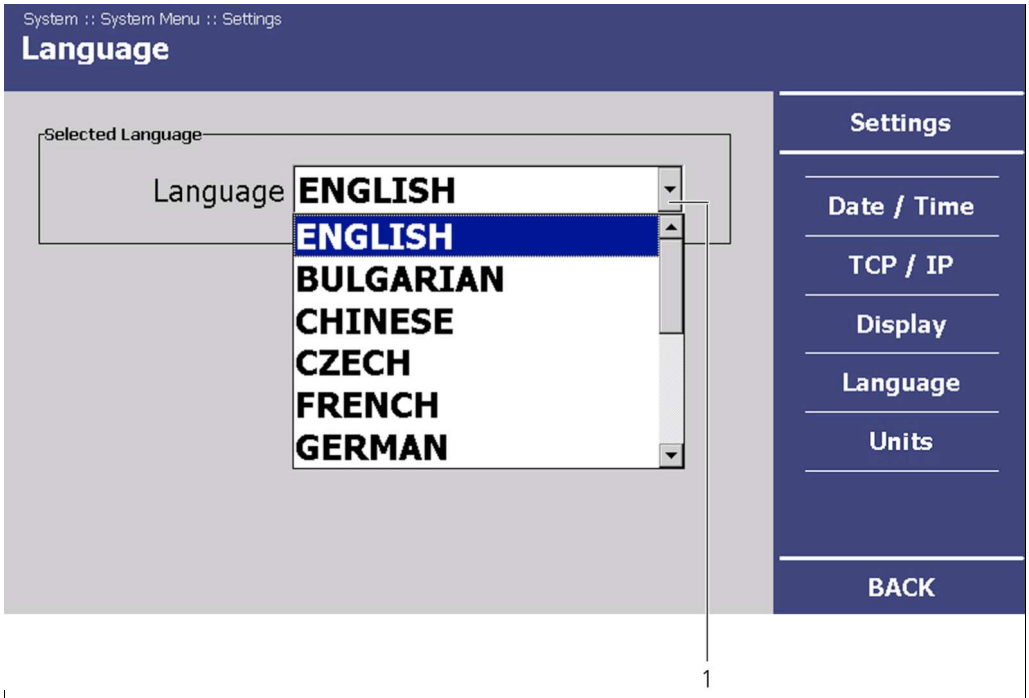
6.2.4 Setting Language

1. In the System Menu | Settings click on <Language>, to change the menu language. (Fig. 23, Pos. 1).
2. Click on the drop-down menu "Language" (Fig. 31, Pos. 2), to select the desired language.

   ⇒ The drop-down menu opens.
3. Click on the desired language to select this as the user interface language.

   ⇒ A confirmation message is displayed.
4. Click on <OK>, to restart the EVU.

   ⇒ The EVU restarts. The measurement remains unaffected by this.



1 Pop-up Menu Language

2 Language submenu button

Fig. 31 System Menu. Settings - Language

Setting Language (Continued)


Note

The standard languages Bulgarian, German, English, French, Italian, Portuguese, Romanian, Russian, Spanish, Czech and Hungarian are always installed.

These can be supplemented by the following languages:

Korean or

Chinese

The installation of these language packages is carried out using the control unit software update. Language files have the ending **.btw**. (Ex: **LB452CU_FontUpdate_.btw**)

See Control Unit Software Update (Chapt. 6.4.2).

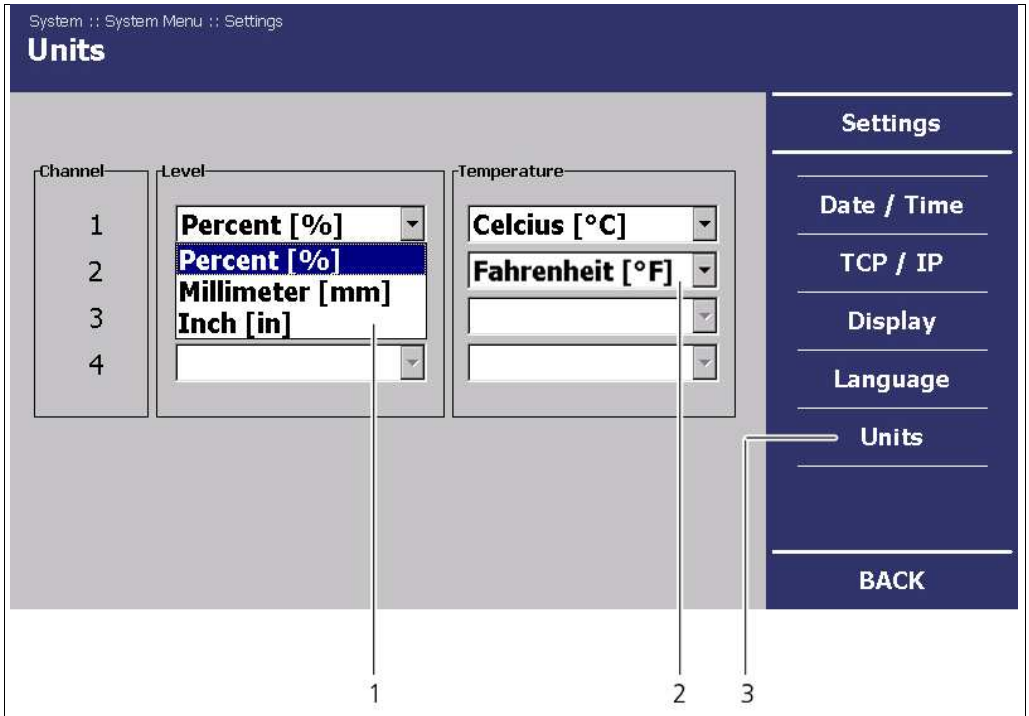
6.2.5 Setting Dimensions and Temperature Unit

1. In the System Menu | Settings click on <Units>, to change the measurement unit. (Fig. 32, Pos 3).
2. Click on the drop-down menu "Fill Level" (Fig. 32, Pos. 1), to select the desired measurement unit.

   ⇒ The drop-down menu opens.
3. Click on the desired measurement unit to select it.

   ⇒ The measurement unit is set.

Carry out the selection similarly for the temperature unit (Fig. 32, Pos. 2).



1 Pop-up menu Measurement Unit (Level)
2 Pop-up menu Temperature
3 Button Submenu Units

Fig. 32 System Menu, Settings - Units

Note

The assignment of unit length (mm or in) is mandatory, depending on whether the measurement is desired in mm or inches.

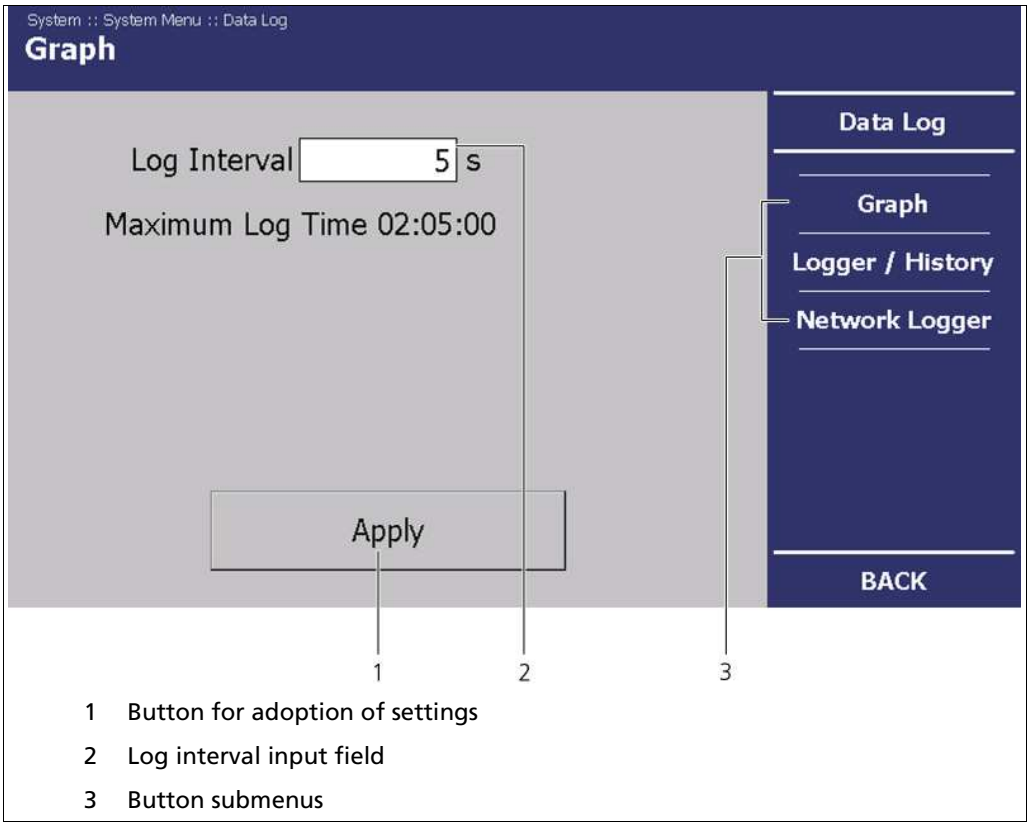
6.3 Data Log

In the System Menu, click on <Data Log> (Fig. 20, Pos. 5).

6.3.1 Graph

In the Graph submenu, the interval used for visualising the log data in the channel overview is set.

1. In the System Menu | Data Log , click on Graph (Fig. 33, Pos. 3).



1 Button for adoption of settings
2 Log interval input field
3 Button submenus

Fig. 33 System Menu. Settings - Data Log (Graph)

Graph (Continued)

Note

In the "log interval" input field, set the interval in which the log data is to be saved (Fig. 33, Pos. 2).

The smallest log interval which can be set is 0.5 s.

2. Click on the input field to set the log interval (Fig. 33, Pos. 2).

   ⇒ The numeric keypad opens (Fig. 18).

3. Set the desired log interval.
4. Click on the <Apply> button (Fig. 33, Pos. 1) to adopt the setting.

   ⇒ A confirmation message is displayed.

5. Click on <OK> to restart the EVU.

   ⇒ The EVU restarts.

6.3.2 Data Logger

Note

The Data Logger submenu only appears if an SD card has been installed in the control unit.

To install the SD card, see chapt. 4.5.

In the Data Logger submenu, you have the option of setting the log and to export or delete the measurement values (log data).

In the "Data Logger" submenu, it is possible to save the log data on an SD Card.

The data logger records the following measured values:

- Date and time
- Fill level (mould level)
- Count rate
- Temperature of the GAMMAcast detector(s)
- Active calibration curve
- System status

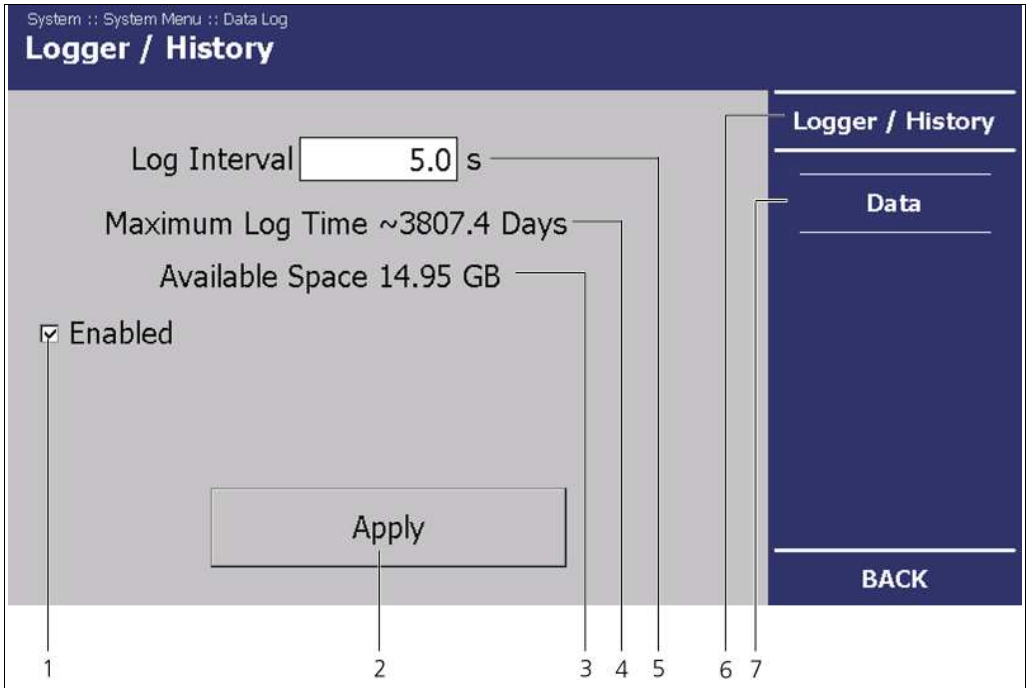
Note

The data log is saved in the main directory of the SD card in the form of a .txt file.

If the tick (Fig. 34, Pos. 1) is not set at "active", no log data is saved on the SD card.

Data Logger (Continued)

6. In the System Menu, click on Data Log | Data Logger (Fig. 33, Pos. 3) to reach the Data Logger submenu.



1 Data log check box active
2 Apply button
3 Display of the storage space available on the SD card
4 Display of data log recording time
5 Log interval input field
6 Data logger submenu
7 Data submenu

Fig. 34 System Menu, Data log - Data Logger

7. Activate the data log saving by putting a tick in the "Active" check box (Fig. 34, Pos. 1).
8. Click on <Apply> to initiate the data log saving (Fig. 34, Pos. 2).

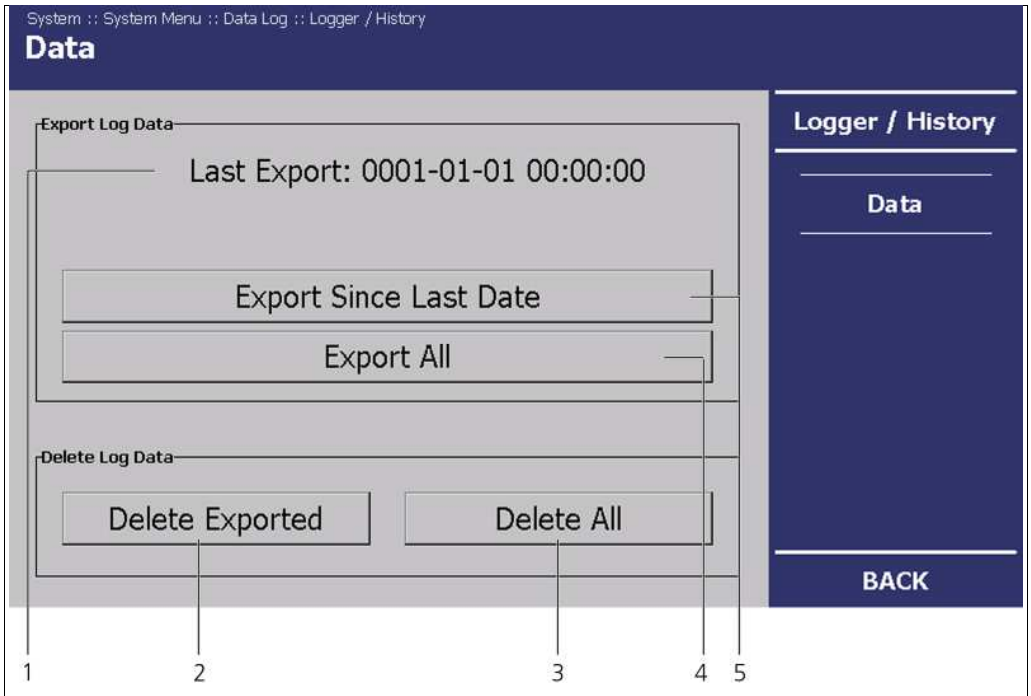
   ⇒ The data log is now activated and records the data on the SD card.

Data Logger (Continued)

Log Interval	Shows the log data saving interval (Fig. 34, Pos. 5)
Maximum Log Time	Shows the maximum log data saving interval depending on the set log interval and the SD card storage capacity (Fig. 34, Pos. 4).
Available Space	Shows the free storage capacity of the SD card (Fig. 34, Pos. 3).

6.3.2.1 Exporting measurements

In the System menu | Data log | Data logger, click on <Measurements> (Fig. 35, Pos. 7), to export the log data to the SD card or to delete it from the SD card.



1 Display of last measurements export
2 Button to delete last data log on the SD card
3 Button to delete all data logs on the SD card
4 Button for exporting all data
5 Button for exporting current data

Fig. 35 System menu, Data log – Data logger (Measurements)

Exporting Measurements (Continued)

In the "Measurements" submenu you can adjust the following settings:

Last export	Displays the date and time of the last export (Fig. 35, Pos. 1).
Export from last time onwards	Export of the current data log (Fig. 35, Pos. 5).
Export all	Exports the entire data log (Fig. 35, Pos. 4).
Delete export	Deletes the data log last exported on the SD card (Fig. 35, Pos. 2).
Delete all data	Exports all data logs onto the SD card (Fig. 35, Pos. 3).

6.3.3 Network Logger

In the System menu, click on Data log | Network logger (Fig. 33, Pos. 3).

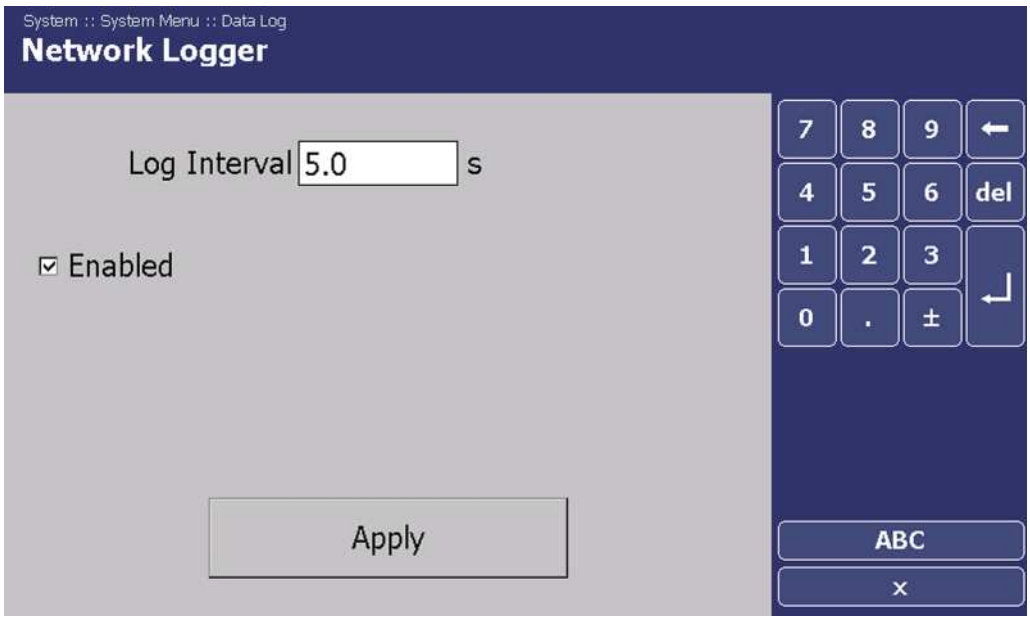


Fig. 36 System Menu, Data Log – Network Logger

Network Logger (Continued)

In the "Network Logger" submenu, you can transmit log data to a computer.


Note

The fill level signal transmitted via the Ethernet is intended only for quality assurance purposes. Process regulation is not possible with this signal.

1. Set the desired log interval.
2. Activate the transmission of data via Ethernet, by placing a check mark in the selection box "Active".
3. Click on the <Apply>button to send the data via Ethernet.

   ⇒ The data can be received on the network computer.


Note

The computer must be on the same network as the EVU.


Note

If the data are to be read out directly via TCP/IP, please contact the manufacturer.

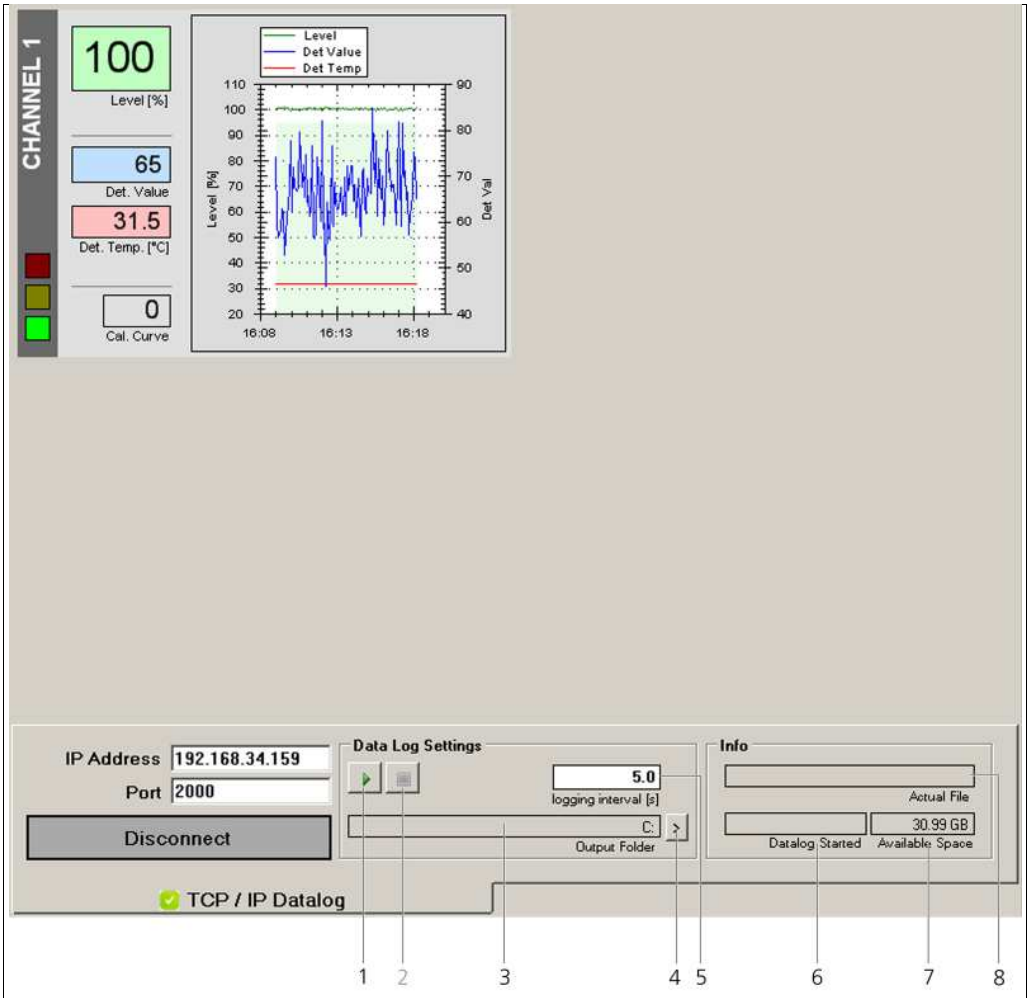
6.3.3.1 Use of the Software "Data Log Viewer"

With the separately delivered software "Data Log Viewer" from BERTHOLD TECHNOLOGIES, the visualisation and saving of the log data on a computer is possible.

1 Display of the calibration curve
2 Display of the fill level
3 Display of the detector value (count rate (cps))
4 Display of GAMMAcast detector temperature
5 Display of the system status (similar to EVU display elements) (Fig. 2)
6 IP Address and port input field
7 Connect button - Connecting the EVU

Fig. 37 Start Page, Data Log Viewer Software

6.3.3.2 Establishing Connection and Saving Data Log



1 Button for starting data log recording
2 Button for stopping data log recording
3 Display of log data storage location
4 Button for selecting storage location
5 Display of the log interval
6 Display of the time of the last save
7 Display of the storage space available on the hard drive
8 Display of the data log file name

Fig. 38 Start Page, Data Log Viewer Software (dial-up)

Establishing Connection and Saving Data Log (Continued)

1. Enter the EVU IP address in the input field (Fig. 37, Pos. 6).
2. Click on <Connect>to establish a connection (Fig. 37, Pos. 7).
3. Click on the <Select Saving Location> (Fig. 38, Pos. 4) to specify a storage location.
4. Click on the <Start Data Log Recording> button (Fig. 38, Pos. 1) to record the data log.

   ⇒ The data log starts.

Note

In order to be able to use the data log viewer, the tick in the check box in the "Network Logger" submenu (chapt. 6.3.3) must be set to "active". Otherwise, the visualisation and saving of the measurement data is not possible.

Note

The Data Log Viewer software is not suitable for parameterising the device. The use of this software is intended for quality assurance purposes. Process regulation is not possible with this signal.

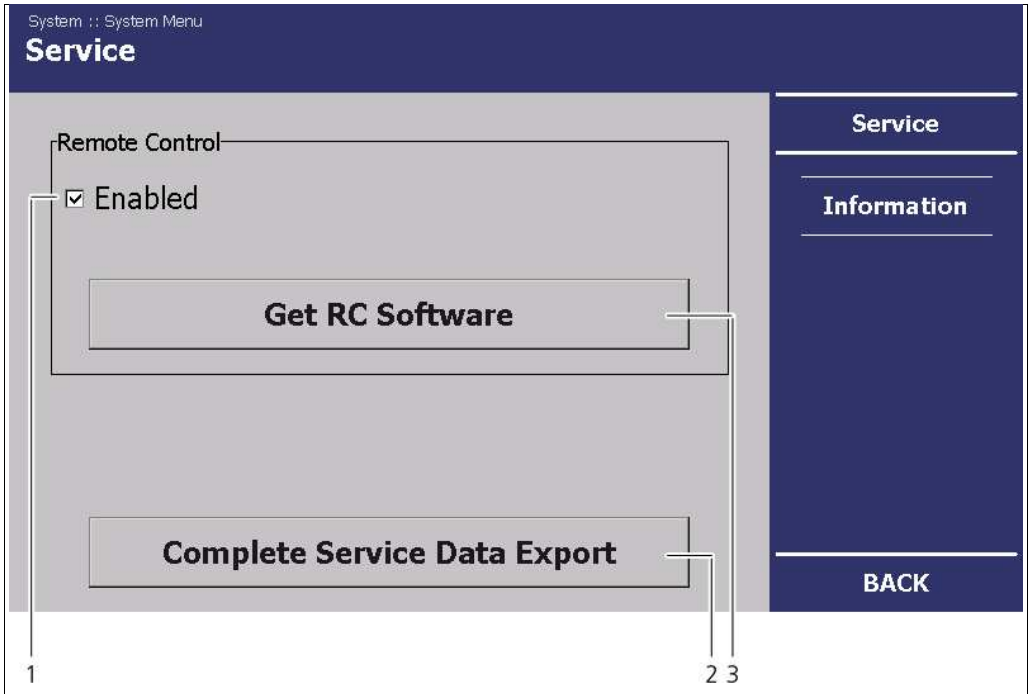
6.4 Service Submenu

In the Service Submenu you can adjust the following settings and read information:

- Downloading of the **Remote Control Software** (RC Software)
- Carrying out of Updates for:
  - the control unit
  - the measurement of channels
  - the detectors
- Exporting the **complete service data**

In the System menu, click on <Service> (Fig. 20, Pos. 1), to reach the <Service> submenu.

⇒ The Service submenu opens.



1 Remote Control check box active
2 Button for complete export of service data
3 Button to download RC software

Fig. 39 System Menu, Service

Service Submenu (Continued)

1. Stick the USB stick into the USB port of the front panel (Fig.1, Pos. 1).

   ⇒ The two buttons appear with black lettering and are active.

6.4.1 Remote Control Software

Note

The check mark must be set to "Active" in order for the Remote Control to function (Fig. 39, Pos. 1).

1. Click on "Download RC Software“ in order to download the RC software from the EVU to the USB stick (Fig. 39, Pos. 3).

   ⇒ The file **LB452RemoteControl.exe** is downloaded from the EVU and saved in the main directory of the USB stick.

2. Take the USB stick from the USB port and stick the USB stick into a USB port of the computer on which you would like to install the RC software.
3. Summon the main directory of the connected USB flash drive.
4. Click on **"LB452RemoteControl.exe"** to start the program.

   ⇒ The program starts (Fig. 40).

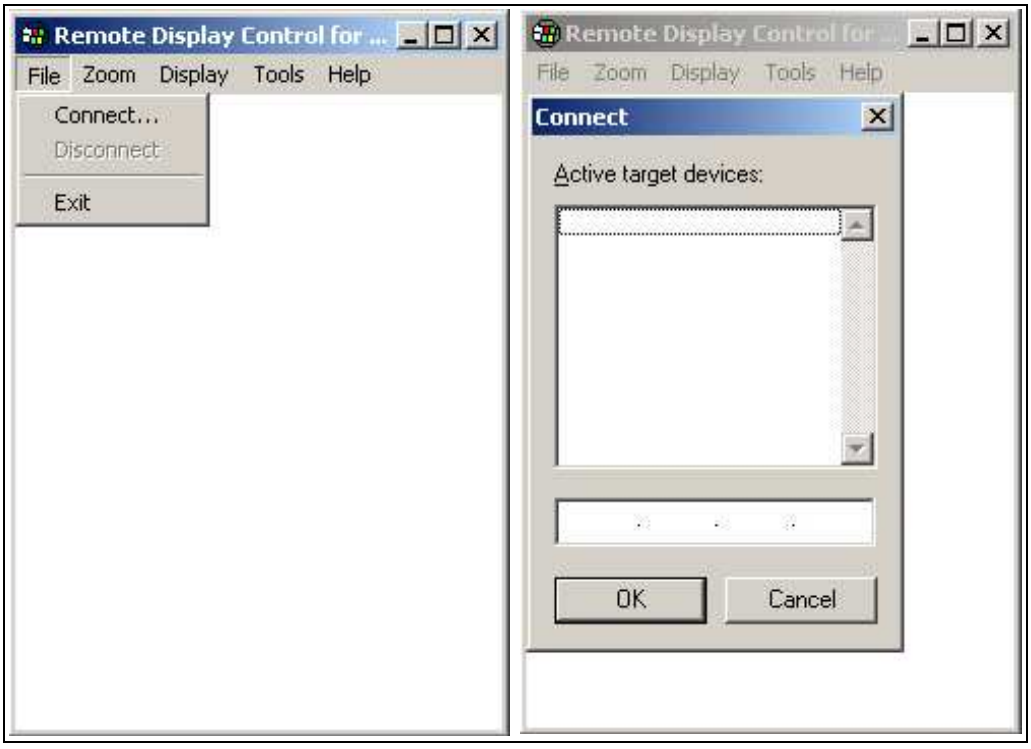


Fig. 40 Establish connection to the EVU using the RC software

Remote Control Software (Continued)

5. Click on the <File> tab then on <Connect...>to establish a connection to the EVU.

   ⇒ A new window "Connect" opens (Fig. 40).

6. Enter the EVU IP address into the input field. You can find out where you can read the IP address in chapt. 6.2.2.
7. Click on <OK>.

   ⇒ The connection to the EVU is established.

6.4.2 Export Complete Service Data

1. Click on "Complete Service Data Export" to load the service data on the USB stick (Fig. 39, Pos. 2).

   ⇒ The service data of all installed measurement channels and connected detectors are downloaded from the EVU and saved in the main directory of the USB stick.

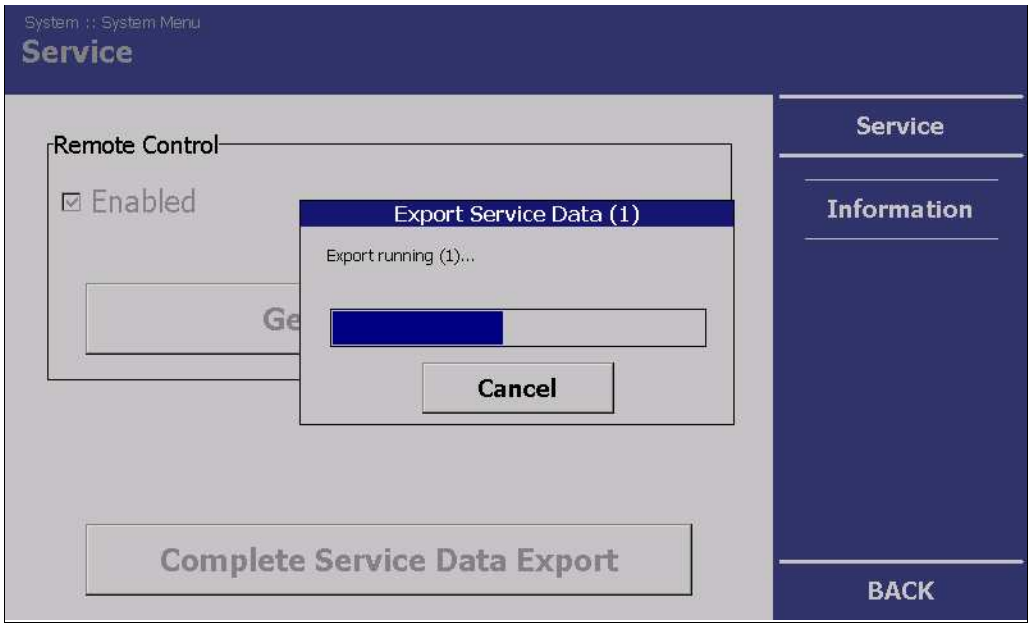


Fig. 41 System Menu, Service - Export of the service data

6.4.3 Software update

In the "Information" submenu, information about the installed modules and the software installed on them is given. All updates are carried out via this page.

Note

Data loss during the measurement!

The measurement is interrupted during a software update.

➤ Only carry out software updates when the measurement is not currently being used for process control.

Note

Malfunction!

Devices are not recognised!

The software versions of the LB 452 control unit, the LB 452 measurement channels (measurement unit) and the GAMMAcast detectors must be compatible with one another; otherwise the components will not be recognised by the system.

➤ Please adhere to the prescribed sequence of the updates:

1. LB 452 Control Unit (EVU)

2. LB 452 Measurement Channels

3. GAMMAcast Detectors

➤ Control unit (CU) and measurement channels (MU) must have the same software version.

Note

Malfunction!

Before software which has a version number greater than 1.0.2 can be installed on the EVU, the software version 1.0.2 must be installed.

Note

Settings are deleted!

If the first or second figure of the version of an update changes (e.g. from version 1.0.1 to version 1.1.0), the settings are lost.

➤ Before the update, carry out a back-up of the measurement channel settings (chapt. 6.4.2, Fig. 41) and then import the backed-up settings after a successful software update.

Note

The update files must be located in the main directory of the USB flash drive.

The following information is also visible:

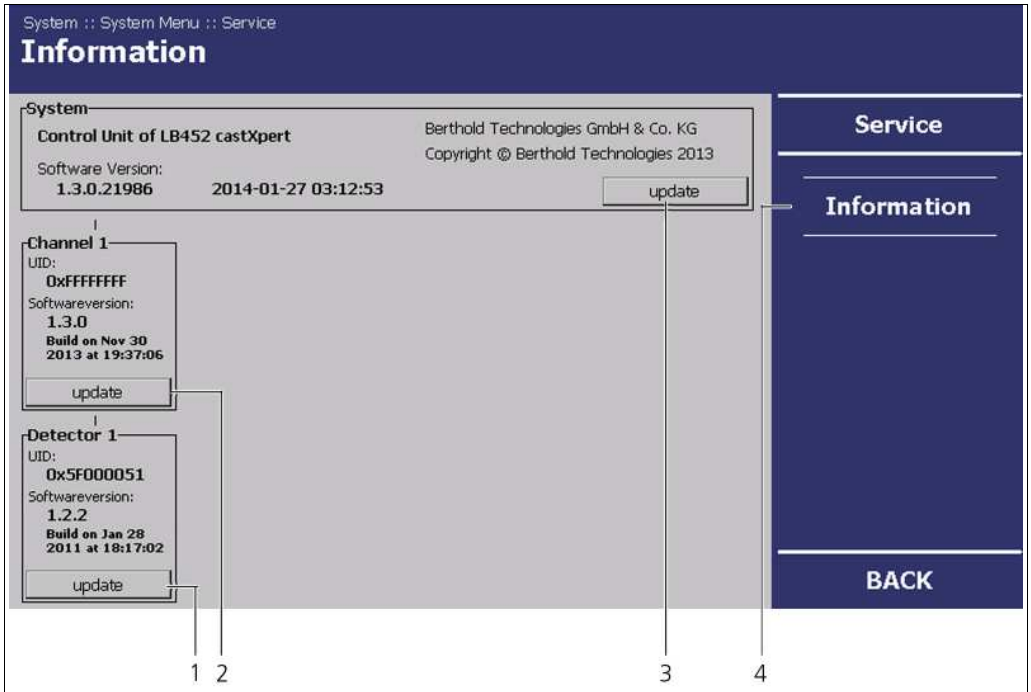
Software version	The software version and publication date of the update.
UID	Serial number of the measurement channels and the GAMMAcast detector(s)

6.4.3.1 Software Update Control Unit

Note

Update files for the control unit begin with **LB452CU** and end with **.btw**.

1. Connect the USB flash drive with files to be installed to the USB port of the front panel (Fig.1, Pos. 3).
2. In the System menu click on Service | Information. (Fig. 42, Pos. 4)

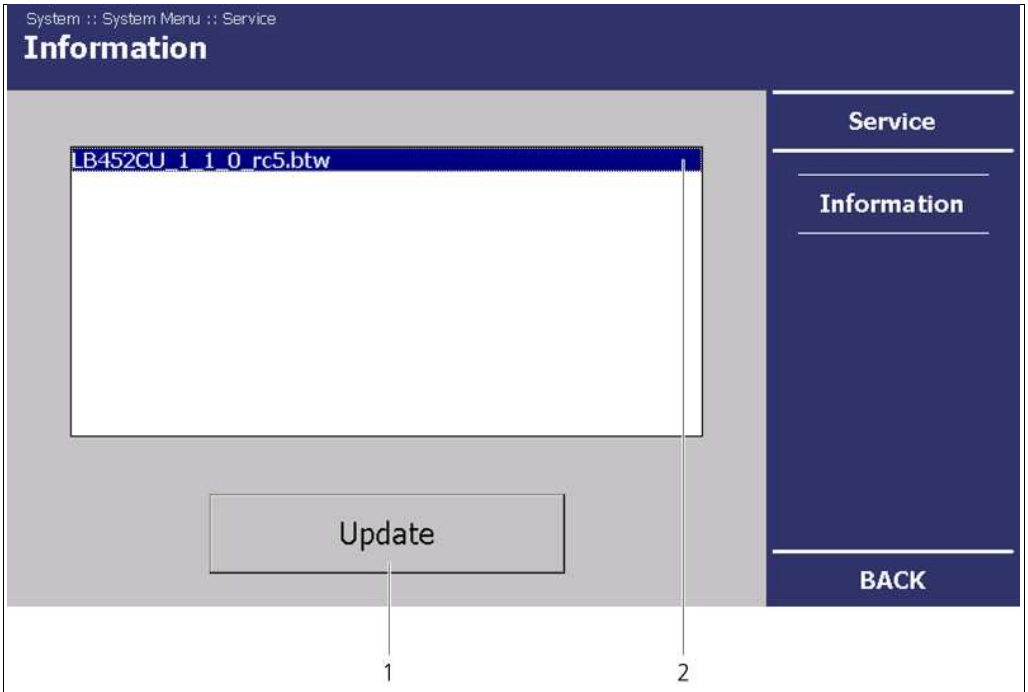


1 Button for GAMMAcast detector update
2 Button for measurement channels update
3 Button for control unit update
4 Information button

Fig. 42 System menu, Service – Information

3. Click on <update> (Fig. 42, Pos. 3), to carry out a control unit update.
   ⇒ Update files are displayed on the USB stick.

Software Update Control Unit (Continued)



1 Button for control unit update

2 Display update file

Fig. 43 System Menu, Service - Information (Control unit update)

4. Select the appropriate update file (Fig. 43, Pos. 2).
5. Click on <Update> (Fig. 43, Pos. 1).

   ⇒ A confirmation message opens.
6. Click on <OK>in the confirmation message.

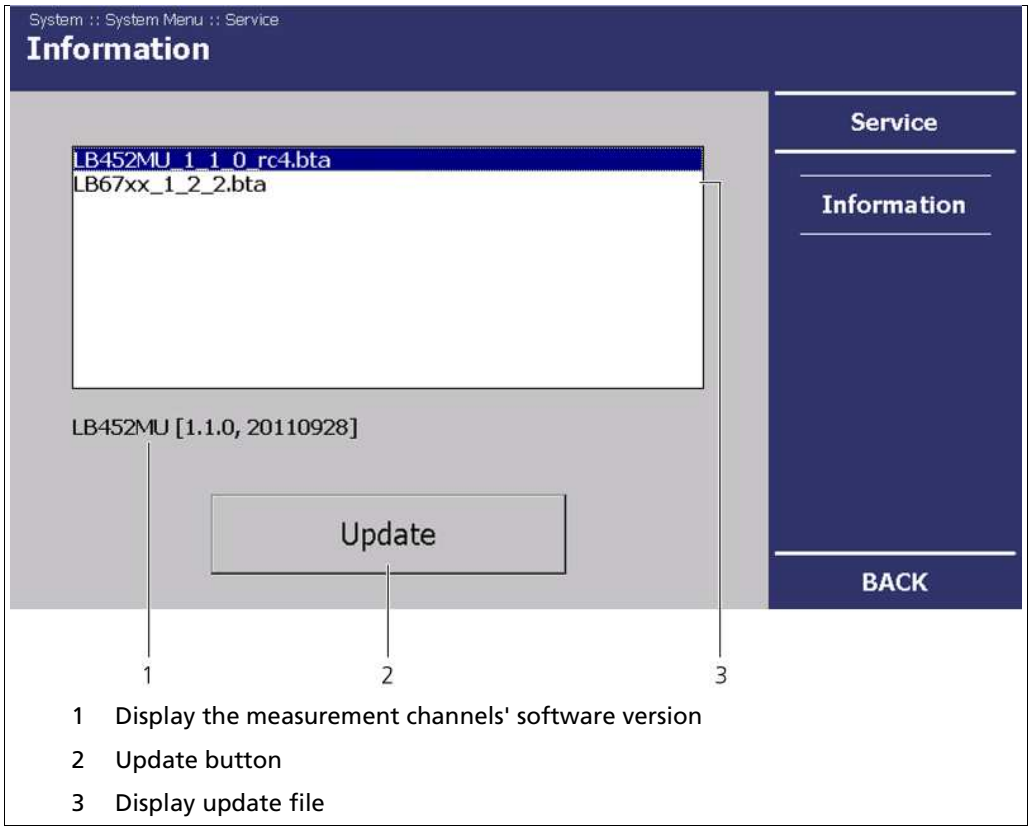
   ⇒ The software update is carried out.

   ⇒ The EVU is then restarted.

6.4.3.2 Measurement Channels Software Update

Note

Update files for the measurement channels start with **LB452MU** and end with **.bta**.



1 Display the measurement channels' software version
2 Update button
3 Display update file

Fig. 44 System Menu, Service - Information (Measurement channels update)

1. In the System menu click on Service | Information (Fig. 42, Pos. 4).
2. Click on <Update> (Fig. 42, Pos. 2), to carry out a measurement update.
   ⇒ Update files are displayed on the USB flash drive.
3. Select the appropriate update file (Fig. 44, Pos. 3).
4. Click on <Update> (Fig. 44, Pos. 2).
   ⇒ A confirmation message opens.
5. Click on <OK>in the confirmation message.

Software Update Measurement Channels (Continued)

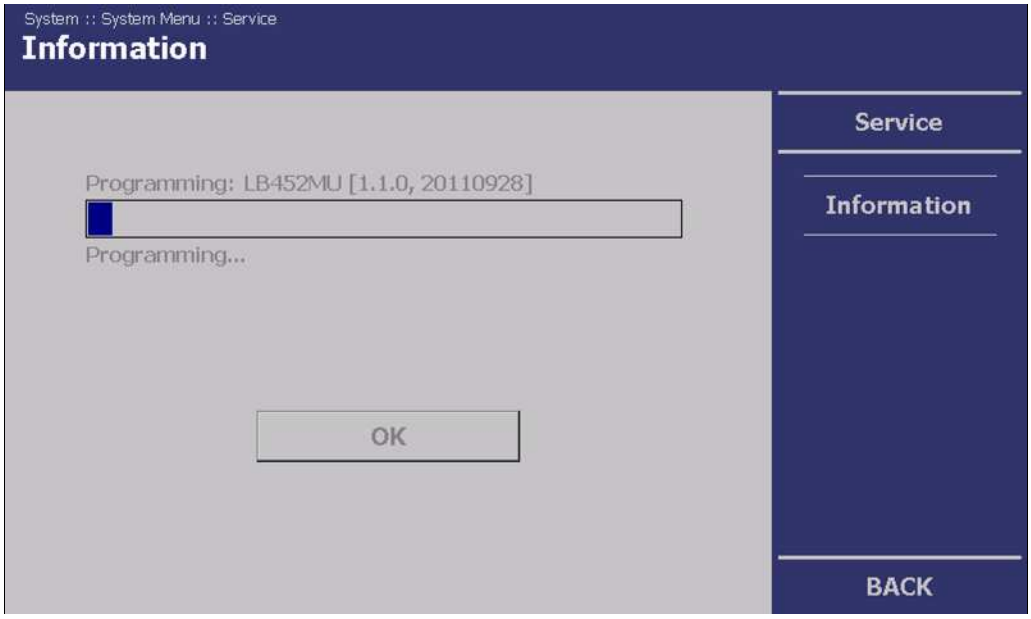


Fig. 45 System Menu, Service - Information (Measurement channels update)

⇒ The software update is carried out.

⇒ After a successful update, the message "Programming finished" appears.

6. Click on <OK>to finish the update process.

⇒ The measuring channel then restarts afterwards.

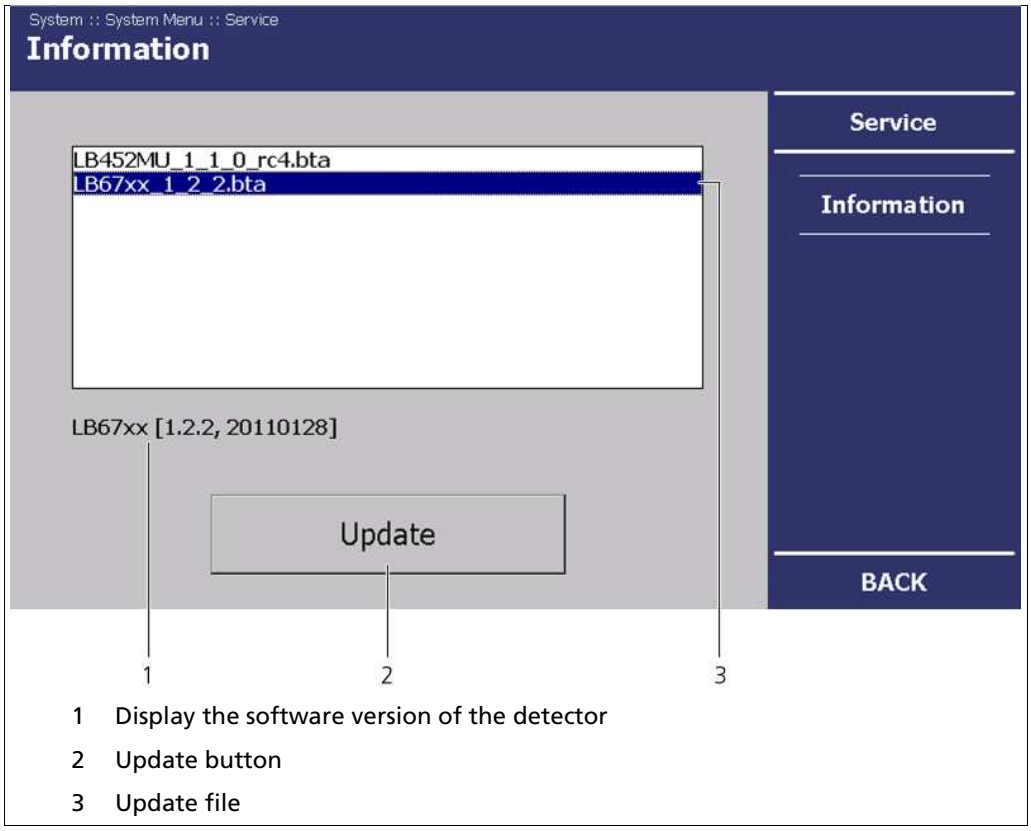
Note

During an update where the first or second digit of the version changes, it is necessary to reset the measurement channel to factory settings (chapt.6.1).

6.4.3.3 GAMMAcast Detectors Software Update

Note

Update files for the GAMMAcast detectors start with **LB67XX** and end with **.bta**.



1 Display the software version of the detector
2 Update button
3 Update file

Fig. 46 System Menu, Service - Information (GAMMAcast detector update)

1. Click on Service | Information (Fig. 42, Pos. 4).
2. Click on <Update> (Fig. 42, Pos. 1), to carry out the GAMMAcast detector update.

   ⇒ The update files of the USB stick are displayed.

3. Select the appropriate update file (Fig. 46, Pos. 3).

Software Update GAMMAcast Detectors (Continued)

4. Click on <Update>.
   ⇒ A confirmation message opens.
5. Click on <OK>in the confirmation message.
   ⇒ The software update is carried out (Fig. 45).
   ⇒ After a successful update, the message "Programming finished" appears.
6. Click on <OK>to finish the update process.

Note

If the first or second figure of the version of an update changes, the detector must be reset to its factory settings (see manual "48452BA1", chapt. 6.3.5).

6.5 Access Level

In the Access Level submenu, you can set the user rights via the user levels and assign passwords. The system can be protected by a password against unauthorised changes. Password entry takes place via the <Access Levels>submenu.

The following user levels are available to you:

User Level Basic	You can see all important data but cannot make any changes.
User Level Standard	You can change all data necessary for operation (e.g. filter, calibration).
User Level Admin	This user level is only intended for system administrators of the company BERTHOLD TECHNOLOGIES.
Automatic log out	The access level Standard is automatically reset to Basic if the system jumps back to the start screen or the display switches off (see times in the menu "System menu | Settings | Display" chapt.6.2).

Access Level (Continued)

Attention

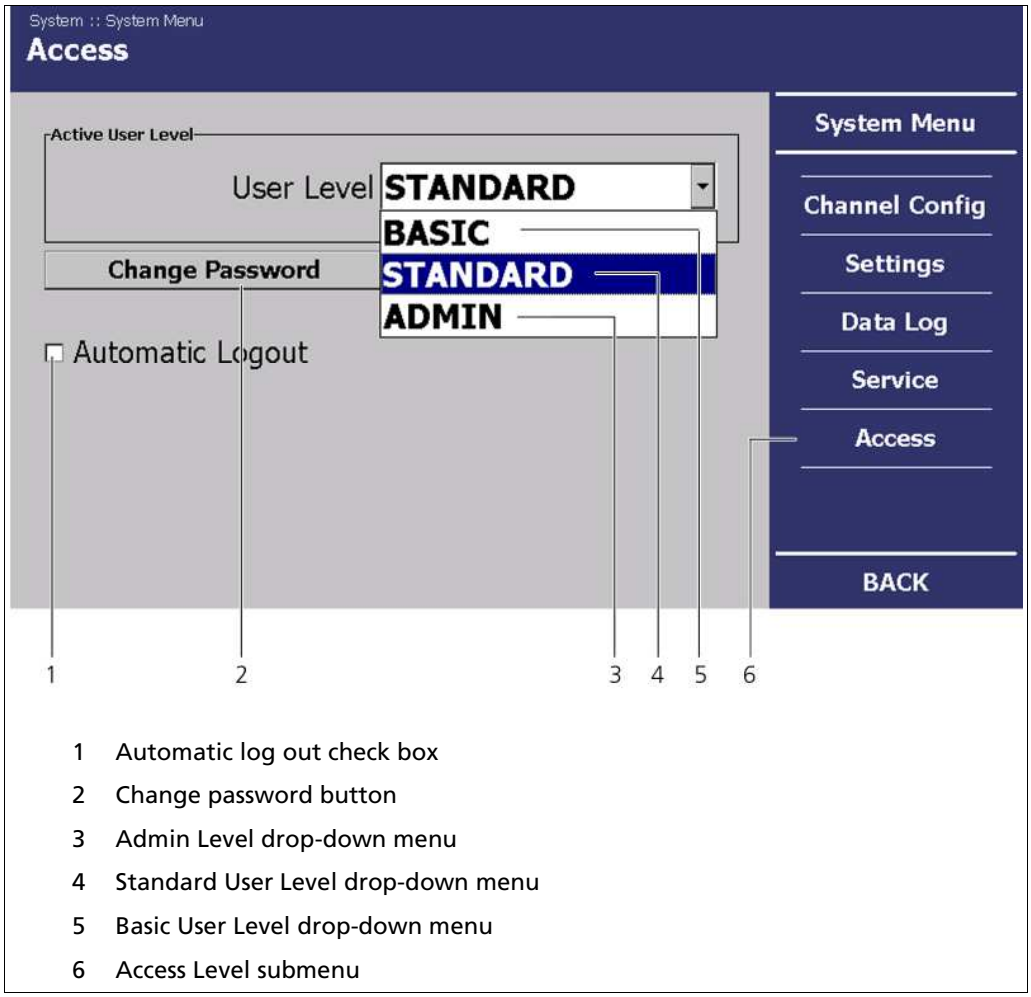
Damage to the device!

Damage due to incorrect operation!

Incorrect measurement and calibration parameters can be set through unauthorised inputs. These can possibly lead to production losses and damage in the system.

➤ Protect the measurement system against unauthorised inputs with a password.

1. In the System Menu, click on <Access Level> (Fig. 20, Pos. 5).



1 Automatic log out check box
2 Change password button
3 Admin Level drop-down menu
4 Standard User Level drop-down menu
5 Basic User Level drop-down menu
6 Access Level submenu

Fig. 47 System Menu, Access Level

2. Select Standard in the drop-down menu of the "User Level" field (Fig. 47, Pos. 5).
3. Click on <Change Password> (Fig. 47, Pos. 2).

Access Level (Continued)

4. Click in the "Password" input field to create a password or to change it.

   ⇒ The keypad opens.

5. Enter a password and confirm your entry with ENTER.
   (Fig. 18, Pos. 4).
6. Click on <OK>to finish the password entry.

7 "Channel Overview" Menu

In the channel overview, you can set values relating to the measurement task.

In Fig. 48, the menu structure of the "Channel Overview" menu is represented.

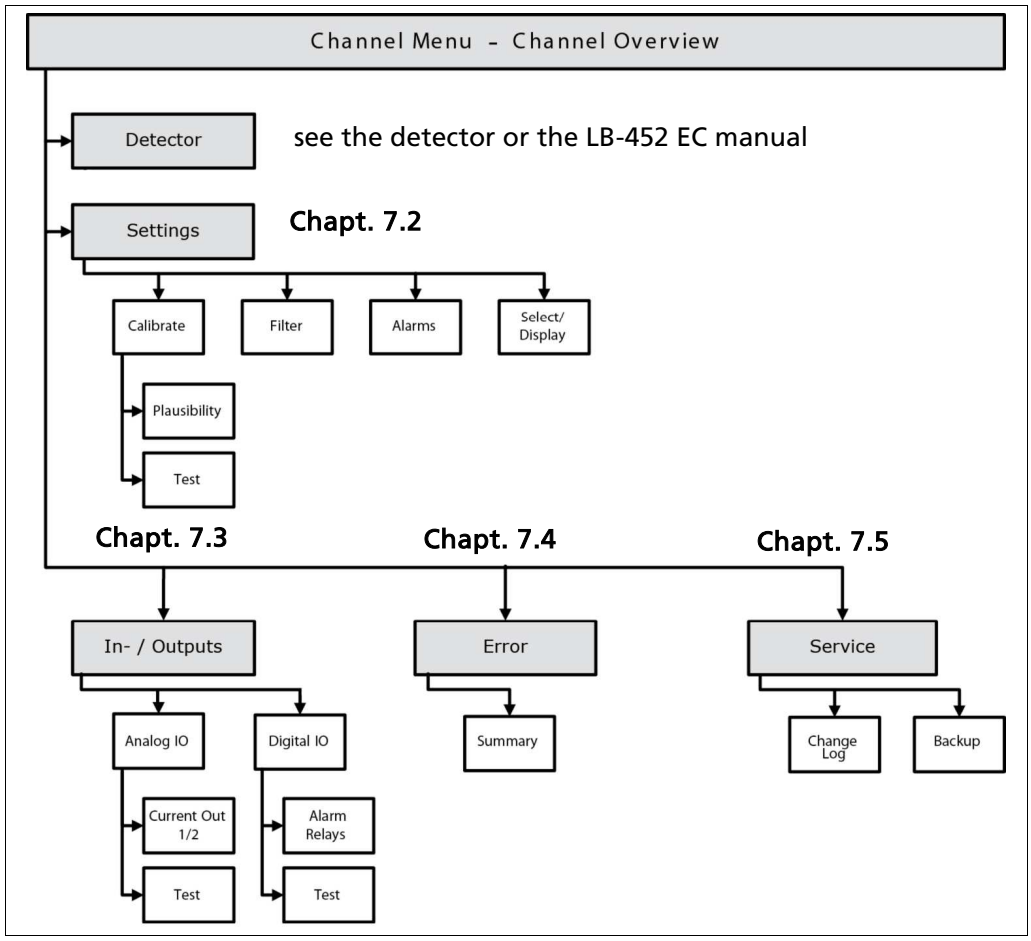
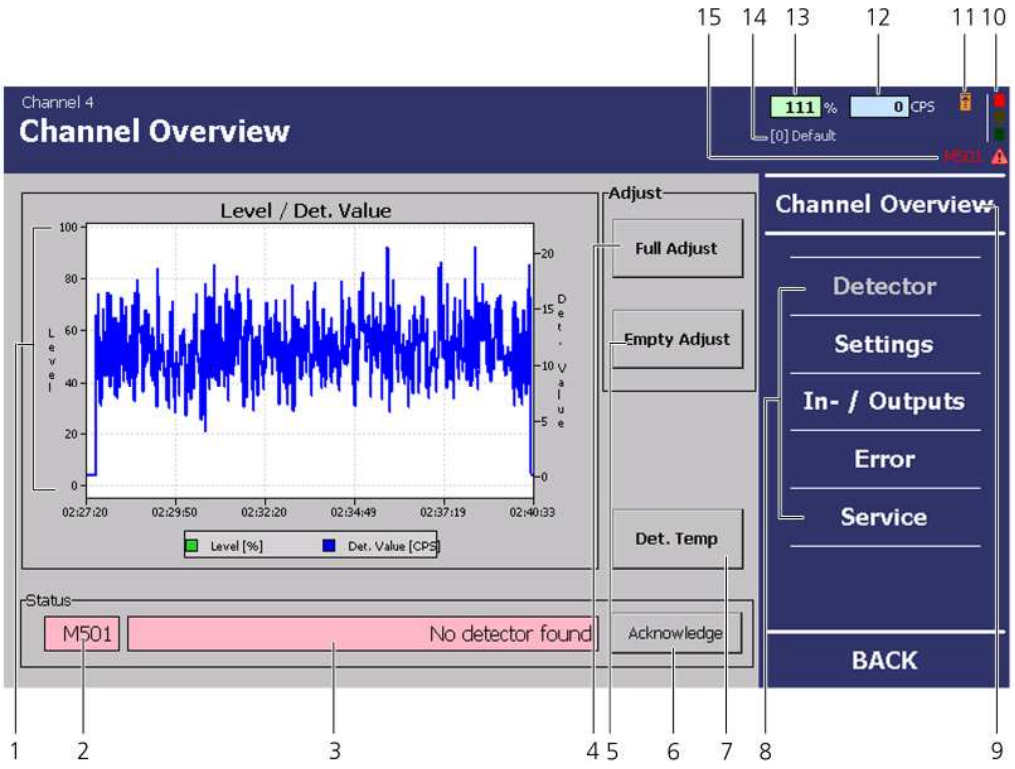


Fig. 48 "Channel Overview" menu structure

"Channel Overview" Menu (Continued)

Click on <Channel XY> in the standard display (Fig. 16, Pos. 1) to reach the "Channel Overview" menu.



1 Display of the detector value and the calibration curve in time progression
2 Display of the error code
3 Display of the error message
4 Full adjustment button
5 Empty adjustment button
6 Confirm error code and message
7 Detector temperature button
8 Button submenus
9 Display of the menu
10 Status LED
11 Display alarm status
12 Quick display of current raw value
13 Quick display of current fill level
14 Name of the active calibration curve
15 Display error number

Fig. 49 Menu "Channel Overview"

"Channel Overview" Menu (Continued)

"System Status" Display Field:

The "System Status" display field shows you the current status of the EVU. All castXpert LB 452 errors have the prefix "M", all GAMMAcast LB67xx errors the prefix "D". The error code (Fig. 49, Pos 2) and error text (Fig. 49. Pos. 3) are displayed here. For troubleshooting, see chap. 8:

- Display field highlighted in red = an error has occurred
- Display field highlighted in yellow = a warning has occurred
- Display field highlighted in green = no error (Fig. 49, Pos. 3)

Fill Level/Detector Value or Fill Level/Detector Temperature

The measured count rate (detector value - IPS) and the fill level are represented in the graph. By pressing the <Det.-Temp.> button (Fig. 49, Pos. 7), the detector temperature is displayed as opposed to the count rate.

Display Field "Alarm Status"

Start-up		Indicates that the start-up time constant is used (see chapt. 7.2.2).
Max. Alarm		Indicates that a max. fill level alarm is applied (see chapt. 7.2.3).
Min. Alarm		Indicates that a min. fill level alarm is applied (see chapt. 7.2.3).
Temperature		Indicates that a temperature alarm is applied when the set alarm threshold in the Menu Detector | Temperature is exceeded (see detector manual).

"Channel Overview" Menu (Continued)

Troubleshooting

The error number (or warning) is displayed on each side of the channel menu above right under the status indicator (red/orange) is displayed.

If you click on the error number, a pop-up message appears. Here you can confirm/acknowledge the error.

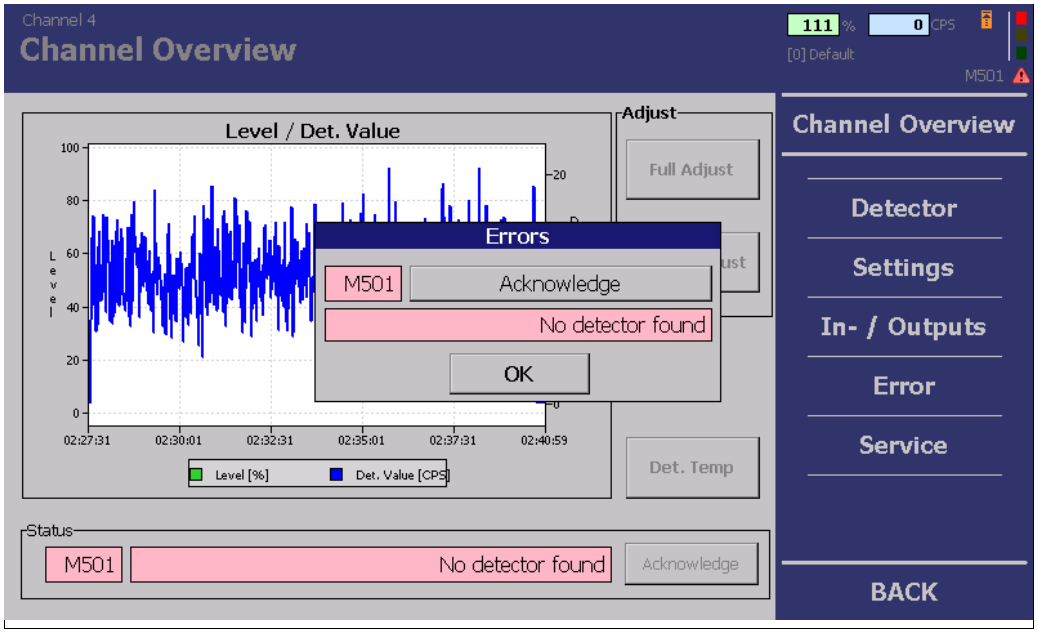


Fig. 50 Error display

The "Channel Overview" menu offers the following setting options:

Detector	Settings for the detector (see detector manual)
Settings	General measurement-related settings
In/Outputs	Settings for the analogue and digital power outputs
Error	View and confirm error codes and error messages
Service	Export of service data and reset of the settings

7.1 Empty and full adjustment

The measuring system must be adapted to the specific environmental conditions before the start of casting. This is done via an empty and full adjustment. Follow this sequence before the start of every casting:

- Empty adjustment (always necessary)
- Full adjustment with cold block (recommended)


Note

BERTHOLD TECHNOLOGIES recommends that the adjustment mode be set to **"dynamic"** (Fig. 55, Pos. 5) if only an empty adjustment is carried out before casting.

If both an empty and a full adjustment are carried out, the recommended mode is "fixed".

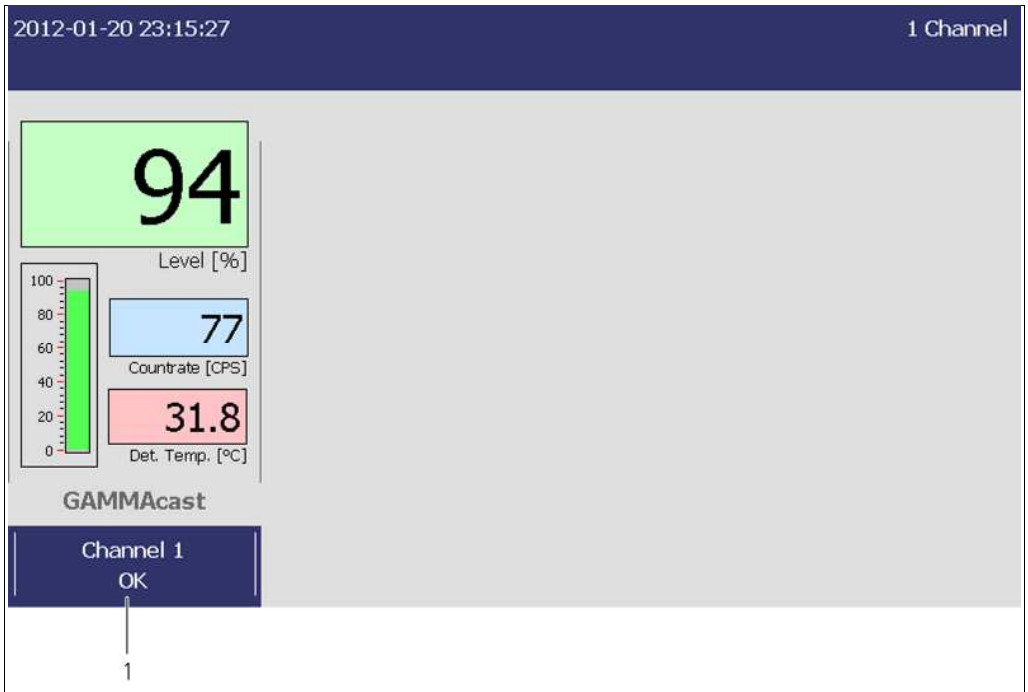
For the full calibration, a metal mould filled with liquid metal must be simulated. This is done by inserting a cold block into the mould, made from steel for example.

To avoid measurement errors, the cold block must fill the beam path exactly (as would be the case with liquid metal). If the cold block is inserted in such a way that it does not cover the entire beam path, radiation which was not weakened by the steel can sometimes reach the GAMMAcast detector through the gap. This will cause a too high count rate to be measured for the 100% point. In this case, too high a steel level will be displayed during casting.

For the empty adjustment, the recommended count rate from the detector is measured when the mould is empty.

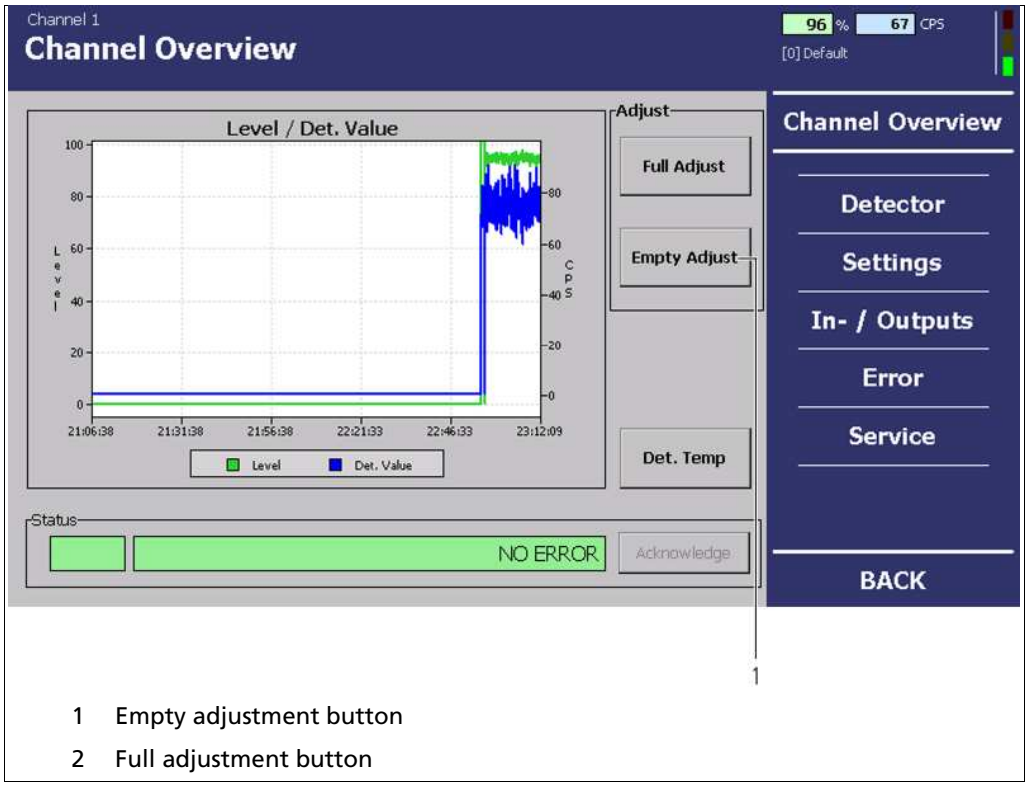
1. Click on the button<Channel XY> in the standard display (Fig. 51, Pos. 1) to reach the "Channel Overview" menu.

   ⇒ The "Channel Overview" menu (Fig. 52) opens.



1 Button for "Channel Overview" menu

Fig. 51 Start page with a channel



1 Empty adjustment button

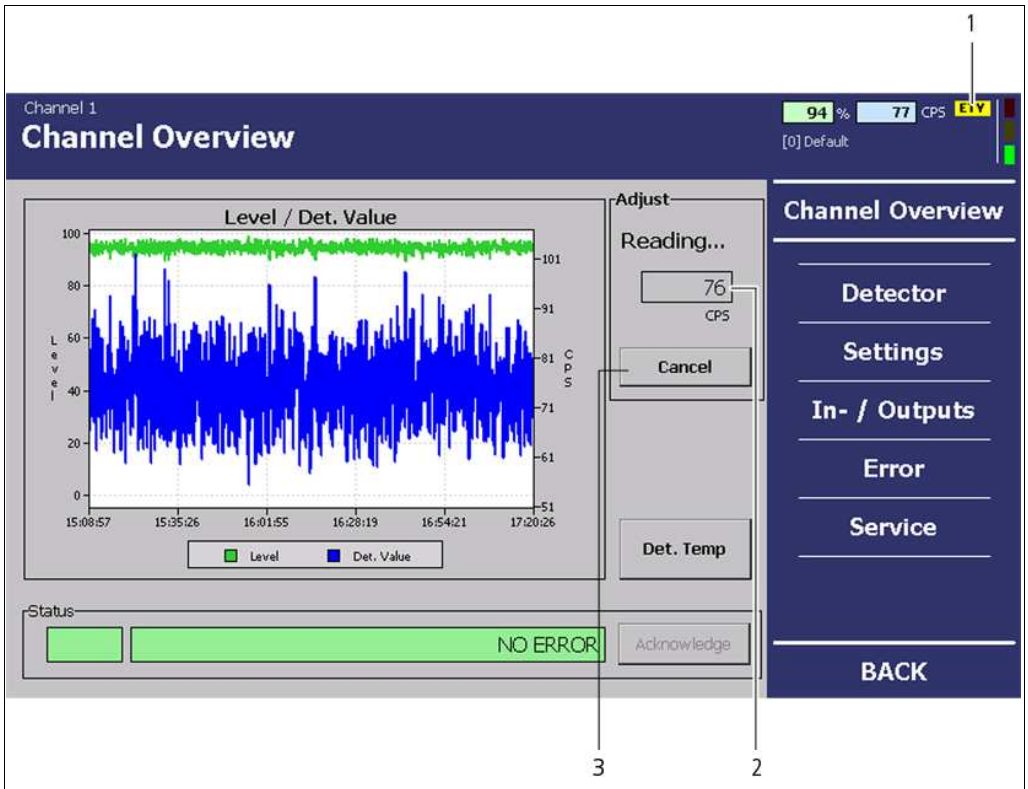
2 Full adjustment button

Fig. 52 Menu "Channel Overview", Adjust

Empty and Full Adjustment (Continued)

1. Click on <Empty Adjustment> to carry out an empty adjustment (reading in the 0% value) (Fig. 52, Pos. 1). Alternatively, you can close digital input 1. In this case, no confirmation message opens and the empty adjustment can be started directly from the casting platform.
2. If a full adjustment (100% value) is carried out, click on <Full Adjustment> (Fig. 52, Pos. 2). Alternatively, you can close digital input 2. In this case, no confirmation message opens and the empty adjustment can be started directly from the casting platform.
3. Click on <OK> in the confirmation message.

   ⇒ The current count rate is read in (Fig. 53, Pos. 2). The duration of the full adjustment depends on the settings applied in the menu Settings | Calibration | Plausibility . Further information on the settings can be found in chapt. 7.2.1.3 in the "Plausibility" submenu. You can cancel the full adjustment and the reading of values by clicking on the <Cancel> button (Fig. 53 Pos. 3). **Manual cancelling is not recommended.**



1 Display field stop condition
2 Display of the values which are read
3 Cancel button

Fig. 53 Menu "Channel Overview", Adjustment - Reading in the values

Empty and Full Adjustment (Continued)

Display field "Stop Condition"

TST	The device is in test mode
FUL/ETY	A calibration routine is running in the device: FUL: Full adjustment ETY: Empty adjustment

Note

The evaluation unit is in the "empty adjustment" mode as long as the abbreviation **"ETY"** is displayed and is in "full adjustment mode" as long as the abbreviation **"FUL"** is displayed (Fig. 53, Pos. 1).

Do not adjust any EVU settings while the empty adjustmentis taking place.

Note

While the device is in test mode or in a calibration routine, the current output is switched to the error mode. The behaviour in error mode can be set under "In/Outputs | Analogue IO | Current Output".

7.2 Settings

The following information can be seen in the "Settings" submenu:

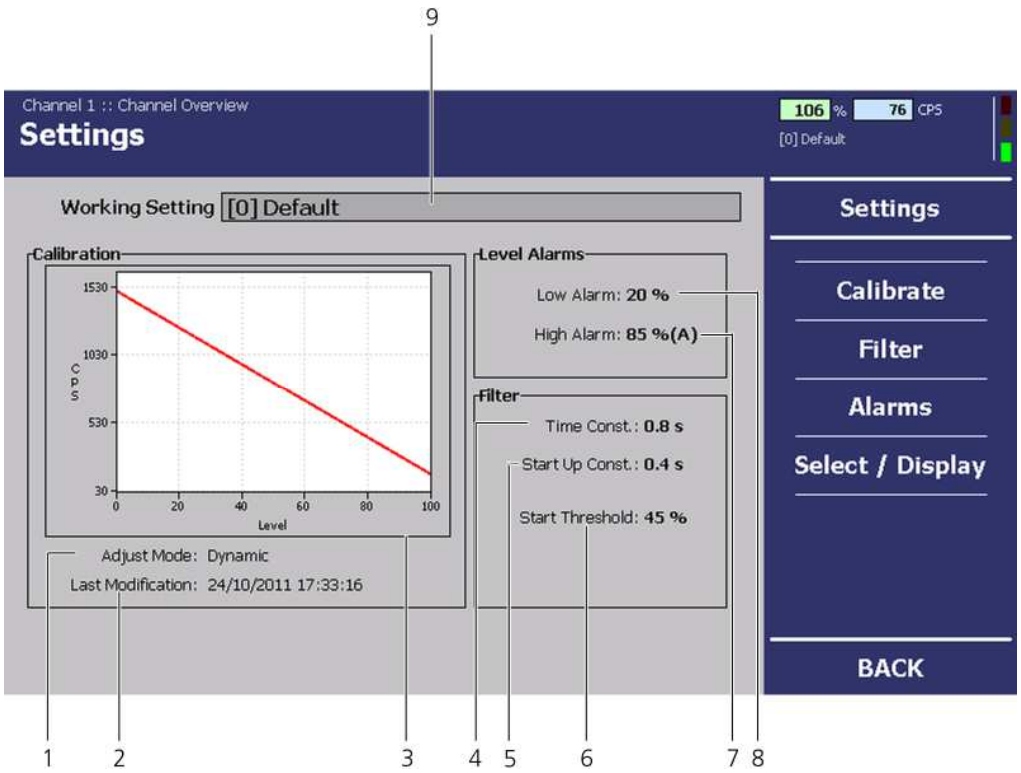
Active Settings	Display of the selected calibration curve and settings (Fig. 54, Pos. 9)
Calibration	Display of adjustment mode (Fig. 54, Pos. 1) Display of the latest change to the calibration settings (Fig. 54, Pos. 2) Display of the calibration curve (Fig. 54, Pos. 3)
Fill level alarm	Fill level alarm display (Min.) (Fig. 54, Pos. 8) Fill level alarm display (Max.) (Fig. 54, Pos. 7)
Filter	Display of the time constant (Fig. 54, Pos. 4) Display of the start-up time constant (Fig. 54, Pos. 5) Display of the start-up threshold (Fig. 54, Pos. 6)

In the "Settings" submenu, you can adjust the following settings:

Calibration	Changing of the calibration curve(s)
Filter	Changing of the filter settings (time constant and start-up time constant) and the start mode (start threshold and start hysteresis)
Alarms	Setting of the alarm threshold before the minimal fill level of the mould is reached **(Low Alarm)** Setting of the alarm threshold before the maximum fill level of the mould is reached **(High Alarm)**
Option/Display	Selection of the calibration curves (in case several have been created) and display of the settings (fill level alarm and filter settings)

Settings (Continued)

In the "Channel Overview" menu, click on <Settings> (Fig. 49, Pos. 8), in order to reach the "Settings" submenu.

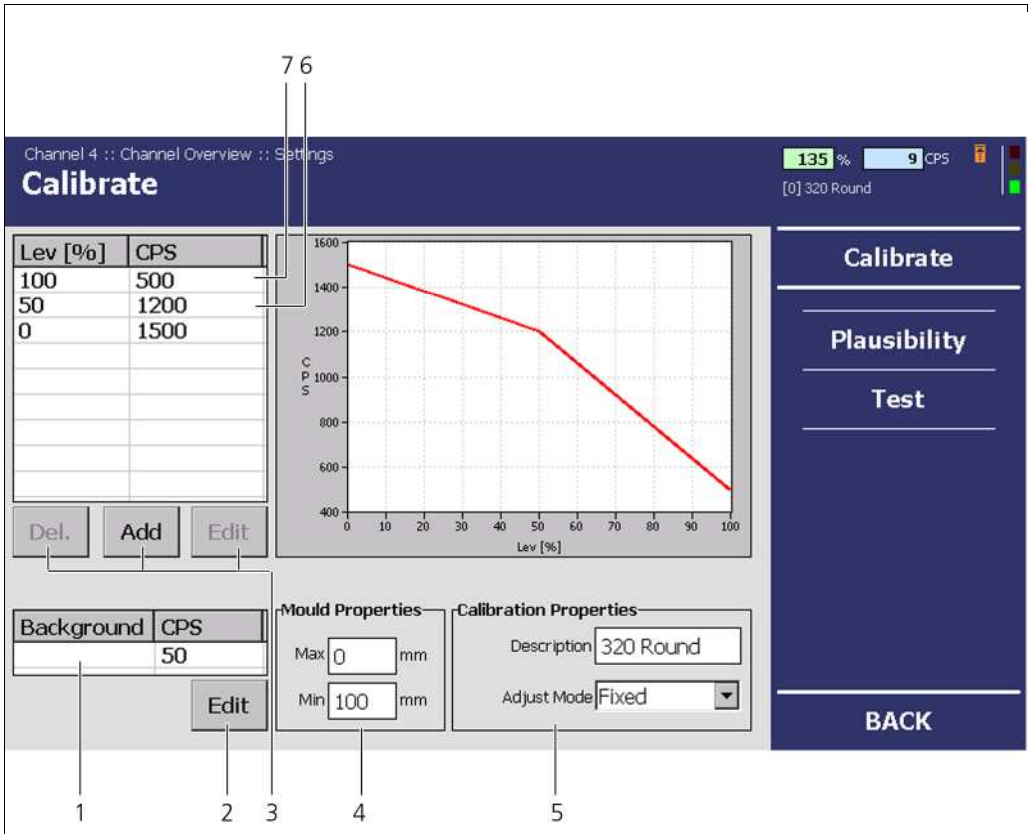


1 Display of the adjustment mode
2 Display of the latest changes to the calibration
3 Display of the calibration curve
4 Display of the time constant
5 Display of the start-up time constant
6 Display of the start threshold
7 Display of the maximum fill level alarm
8 Display of the minimum fill level alarm
9 Display of the current calibration settings (calibration curve)

Fig. 54 "Channel Overview" Menu, Settings

7.2.1 Calibration

In the "Channel Overview" menu, click on Settings | Calibration (Fig. 54) in order to reach the "Calibration" submenu.



1 Display of the background level
2 Button for changing the background level
3 Button for deleting, adding or changing a calibration point
4 Measurement range input field
5 Entry and display of properties
6 Display of the calibration point - Fill level 50%
7 Display of the calibration point - Fill level 100%

Fig. 55 "Channel Overview" Menu, Settings - Calibration

The calibration submenu serves for the adaptation of the measurement system to the relevant environmental conditions like e.g. the thickness of the mould, the actual radiation activity or the adaptation of the background radiation (background level). The background radiation can vary from location to location.

You can also carry out a multi-point calibration. This is indispensable for operation with an activity-optimised radiation source (AOS) for factoring in the varying rises of the calibration profile between 0% - 50% and 50% - 100%, also leading to increased accuracy with commonly designed sources of radiation.

Calibration (Continued)

The following information can also be seen:

Display of the calibration points — Fig. 55, Pos. 6 and 7

Curve description — Display of calibration curve description (Fig. 55, Pos. 4)

Adjustment mode — The adjustment mode adjusts the calibration to the changed environmental conditions (e.g. change of the mould or the source).

Two different modes are available for calculating the new calibration curve (Fig. 55, Pos. 5):


Note

BERTHOLD TECHNOLOGIES recommends that the calibration mode be set to **"dynamic"** (Fig. 55, Pos. 5) if only an empty calibration is carried out before casting.

If both an empty and a full calibration are performed, the recommended mode is "fixed".

Dynamic	Fixed
In the dynamic adjustment mode, the 100% value is mathematically interpolated using the newly read 0% value during an empty adjustment and the whole calibration is adjusted accordingly.	In the fixed adjustment mode, the 0% value is read anew during an empty adjustment. However, the 100% value remains unaltered. The points in between are adjusted accordingly.

Background Level — The background level indicates the natural background radiation if no radiation source is installed.

Measurement Range — Assignment of the 0% and 100% values for the fill level measurement, if the unit for measuring the fill level is a unit length (mm or inch). The setting can be performed under <System menu | Settings | Units>.

7.2.1.1 Adding and Changing Calibration Points

For correct calibration, at least two points (usually 0% and 100%) are required.

An empty mould and a mould with a cold block are usually used to determine the count rate at 0% or 100% fill level.

In order to increase the accuracy of the measurements, the natural background radiation (background level) can be offset.

A multi-point calibration is always possible for increasing the accuracy of measurements and for factoring in any profile non-linearities if needed. When using an activity-optimised radiation source (AOS), this is **indispensable**. In this case, you must also calculate a calibration point at a fill level of 50%.

The activity-optimised radiation source (AOS) enables the increasing of accuracy in the upper part of the measurement range - where a higher level of accuracy contributes to an improvement in quality.

An increase in accuracy can be achieved through optimised-activity distribution without an increase in radiation activity being necessary for this. On the other hand, if the current measurement accuracy is retained, the radiation activity can be significantly reduced.

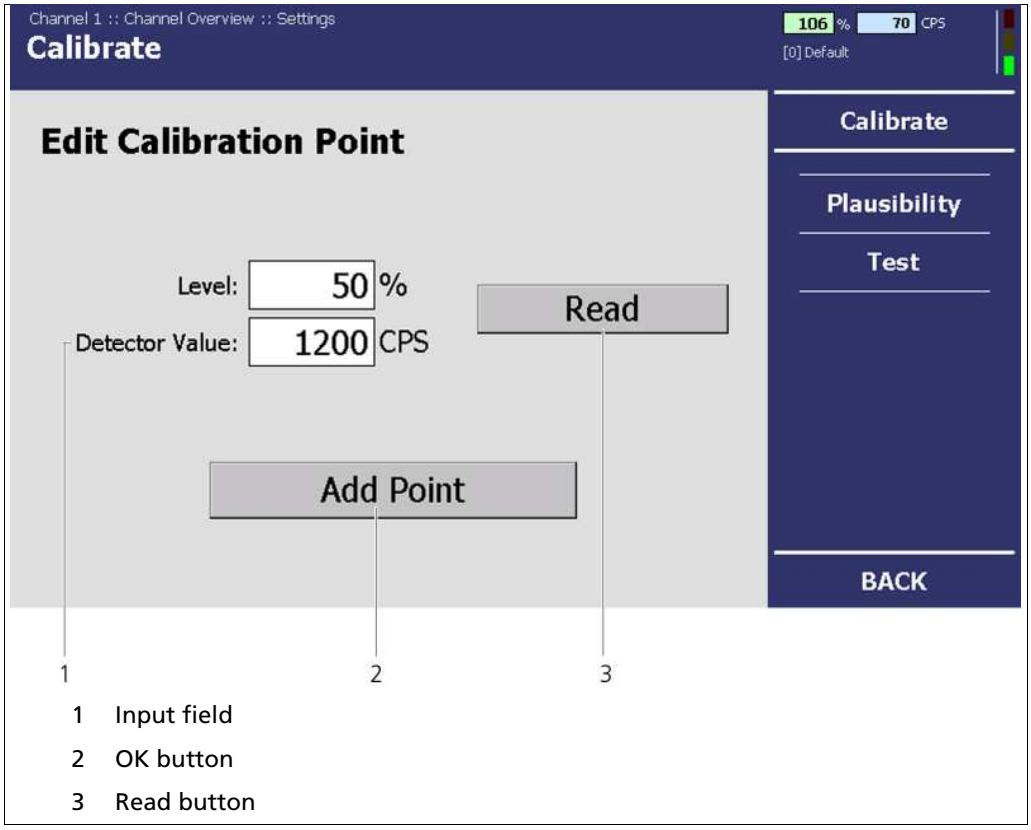
Note

If it is not possible to use a cold block which simulates a fill level of 50%, then use the count rate which was used in the reading of the AOS. You can find this in your documents.

1. In the "Channel Overview" menu click on Settings | Calibration (Fig. 54).
2. Mark the pair of values to be changed (calibration point) by clicking on the corresponding field (Fig. 55, Pos. 7).
3. Click on <Change> (Fig. 55, Pos. 2) or on <New> (Fig. 55, Pos. 3) if an additional point should be added.

   ⇒ The input field "Adapt Calibration Point" opens (Fig. 56).

Adding and Changing Calibration Points (Continued)



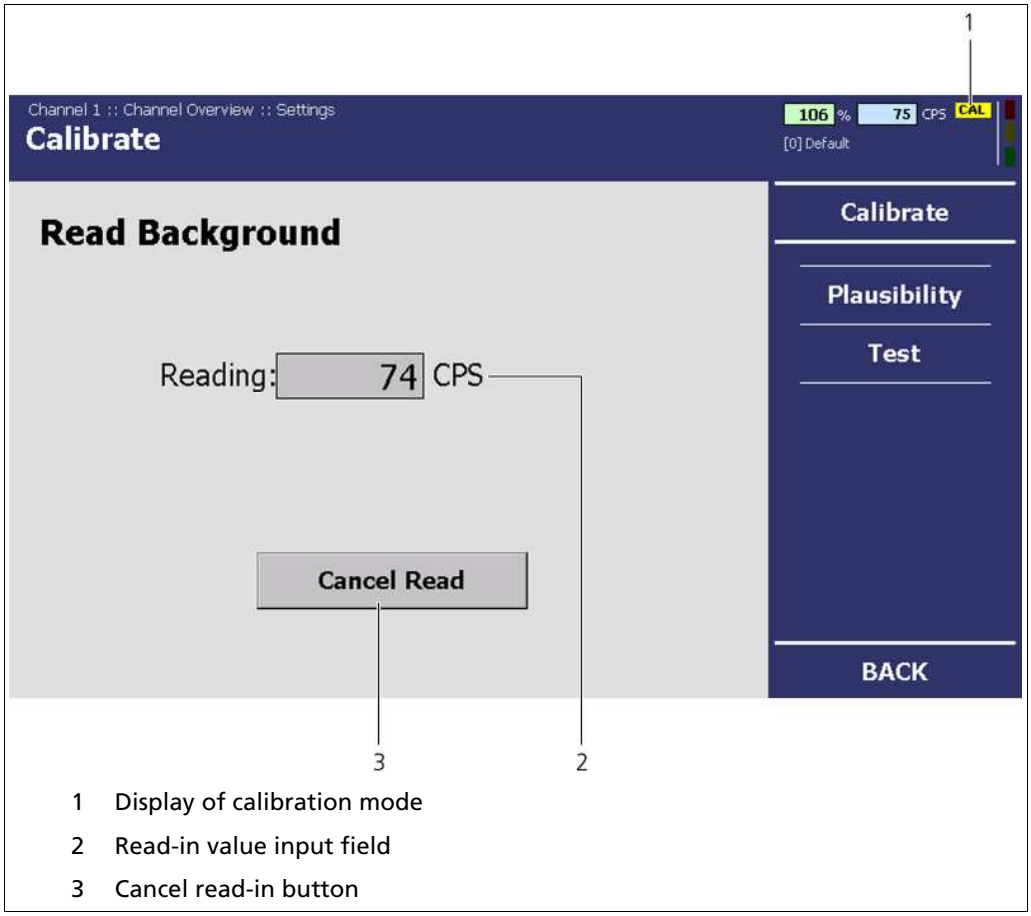
1 Input field
2 OK button
3 Read button

Fig. 56 System Menu, Settings - Calibration (Adapt Calibration Point)

4. When you add a new point, click on the input field "Fill Level" (Fig. 56, Pos. 1) and enter the corresponding fill level (e.g. 50% or 100 mm).
5. Click on <Read in> (Fig. 56, Pos. 3) to read in a new calibration point or enter the count rate into the "Detector Value" input field manually (Fig. 56, Pos. 1).

   ⇒ By clicking on <Read in>, the calibration point is automatically read in (Fig. 57). The duration of the read-in process depends on the settings applied in the menu Settings | Calibration | Plausibility. Further information on the settings can be found in chapt. 7.2.1.3 in the "Plausibility" submenu.

Adding and Changing Calibration Points (Continued)



1 Display of calibration mode
2 Read-in value input field
3 Cancel read-in button

Fig. 57 System Menu, Settings - Calibration (reading in calibration point)

⇒ The EVU is in "Calibration (CAL)" mode (Display in Fig. 57, Pos. 1), as long as calibration is being carried out.

⇒ The calibration point is automatically created and the current calibration curve displayed.

Note

Carry out the calibration of the mould level in the same way for 100%.

Note

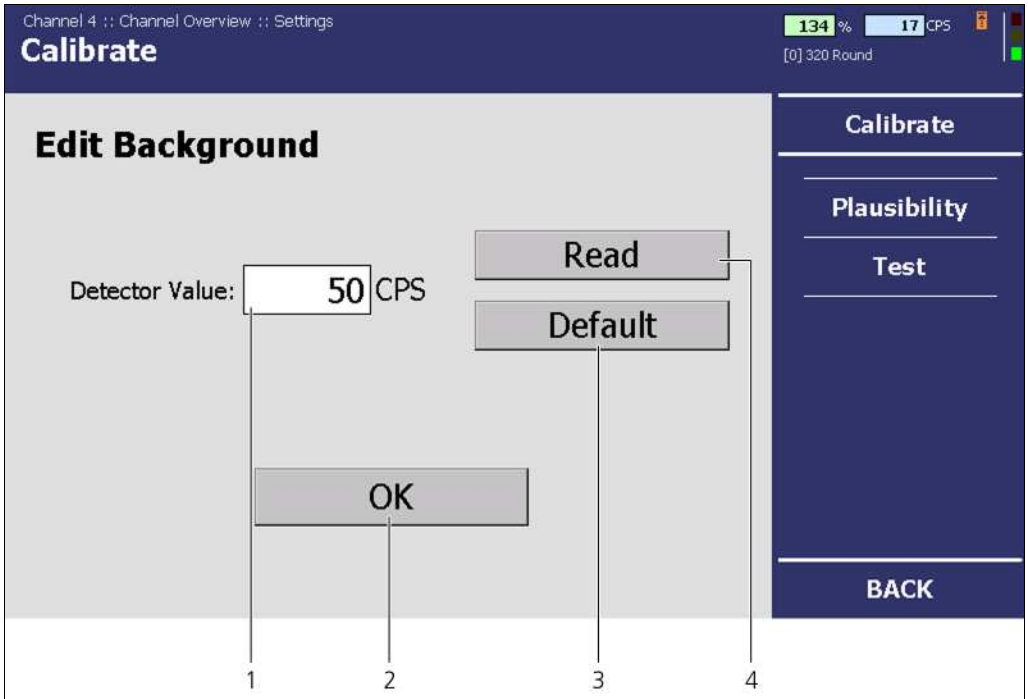
Ensure that the calibration curve is strictly monotonically increasing. If not, correct the points or delete them by clicking on the <Del>button (Fig. 55, Pos. 3).

Up to 20 calibration value pairs can be entered.

7.2.1.2 Setting of the Background Level

1. Click in the "Channel Overview" menu | Settings | Calibration (Fig. 54, Pos. 2).

   ⇒ The "Background Level" menu opens (Fig. 58).



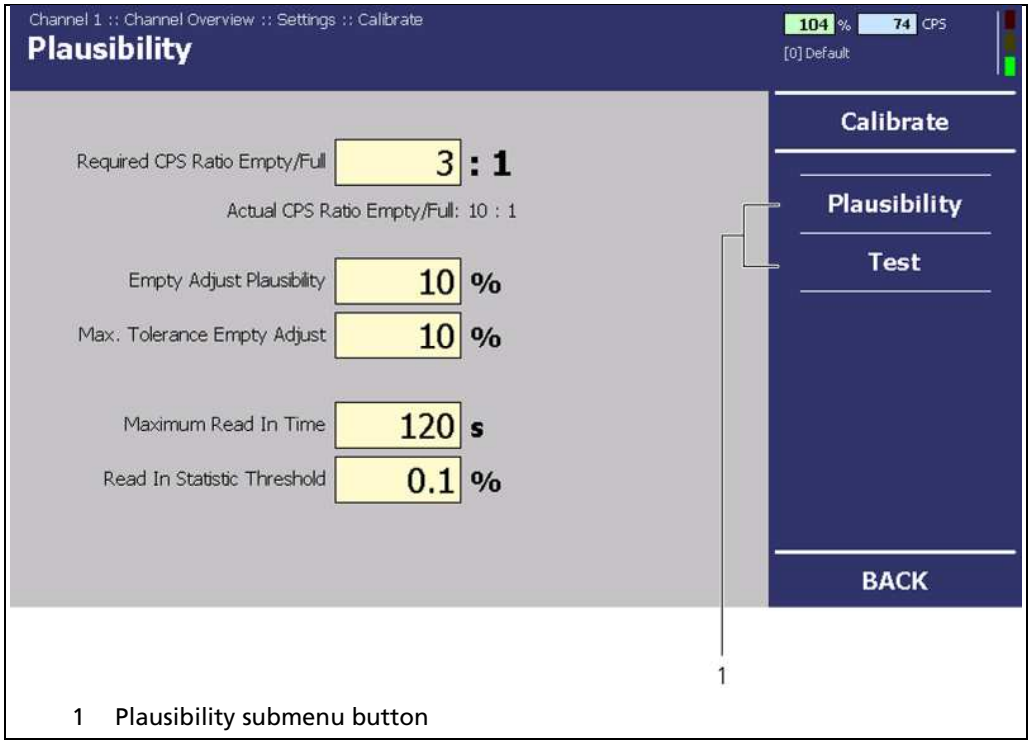
1 Background radiation input field
2 Apply button
3 Standard button
4 Read in button

Fig. 58 "Channel Overview" Menu, Settings - Calibration (Background Level)

2. Remove the radiation source from the GAMMAcast detector. Otherwise, the measuring of the background radiation is disrupted.
3. Click on <Read in> (Fig. 58, Pos. 4) to read in the background level or click on <Standard> (Fig. 58, Pos. 3), to use the standard value of 50 cps (preset).
4. Confirm your entry by clicking on <OK> (Fig. 58, Pos. 2).

7.2.1.3 Plausibility

In the "Channel Overview" menu click on Calibration | Plausibility (Fig. 59, Pos. 1).



1 Plausibility submenu button

Fig. 59 "Channel Overview" Menu, Settings - Calibration (Plausibility)

In the "Plausibility" menu, the applied settings can be examined. If the settings are not plausible, an error is triggered. You have the following setting options:

Min. empty/full ratio	If the ratio of the empty count rate to the full count rate is smaller than the ratio entered, an error is triggered.
Maximal Tolerance Empty Adjust	If the newly read in count rate for 0% fill level differs from the value of the last adjustment by more than the percentage given, an error is triggered.
Maximal Tolerance Full Adjust	If the newly read in count rate for 100% fill level differs from the value of the last adjustment by more than the percentage given, an error is triggered.

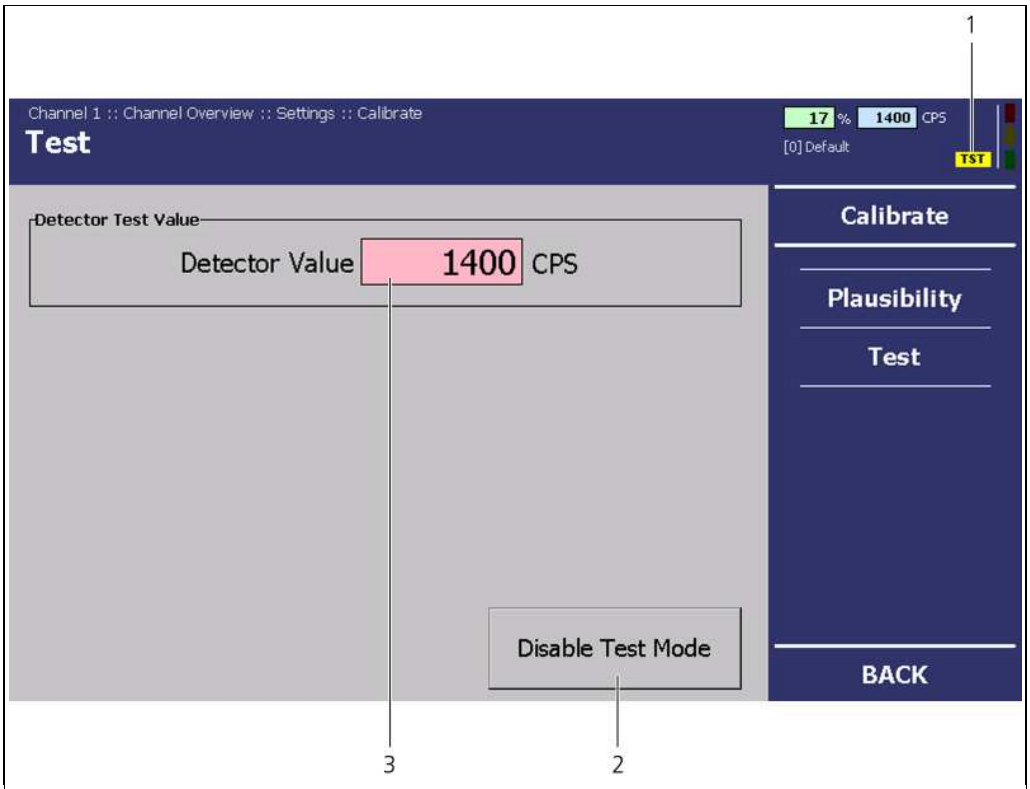
Plausibility (Continued)

Maximum Read-in time	Maximum time waited when reading in a count rate during calibration or an adjustment. A minor average value error results if the time is longer.
Read-in Statistic Threshold	The reading in of a count rate during calibration or an adjustment is cancelled as soon as this statistical variation limit of the count rate is fallen short of.

7.2.1.4 Test

In the "Channel Overview" menu click on Settings | Calibration | Test (Fig. 59, Pos. 1).

In the "Test" submenu, you can enter a test count rate (Fig. 60, Pos. 3) which is used instead of the count rate of theGAMMAcast detector to calculate the fill level. As long as this test count rate is in effect, the background of the input field will be shown in red. The calculated fill level is displayed (Fig. 60, Pos. 3).



1 Display of the test mode
2 End test mode button
3 Detector value input field

Fig. 60 "Channel Overview" Menu, Settings - Calibration (Test)

Test (Continued)

1. Click in the input field (Fig. 60, Pos. 3).
   ⇒ The numeric keypad opens (Fig. 18).
2. Enter a test count rate.
3. Confirm your entry by clicking on "Enter".
   ⇒ The test mode is started (Fig. 60, Pos. 1).
4. Click on <End test mode>to end the test.

Note

The current output switches to the fault current (see chapt. 7.3.1).

Note

The test count rate ends automatically after 5 minutes. If the test count rate is to be activated again, the value must be entered in the input field again.

7.2.2 Filter

In the "Channel Overview" menu, click on Settings | Filter (Fig. 54, Pos. 4).

Fig. 61 "Channel Overview" Menu, Settings - Filter

Filter (Continued)

In the "Filter" submenu, you can set the time constants for filtering the gross count rate and settings for the start mode.

The Setting of Two Different Time Constants:

The setting of the time constant helps to balance out statistical variations, mainly from the statistical nuclear decay of the radionuclide. A large filter time leads to a calmer signal but also to a slower reaction of the fill level signal to physical fill level changes.

The time constant entered as start-up time constant works within the fill level range of 0% to the "start threshold" (here 45%). This switch-over point has a hysteresis which can also be adjusted freely (for an explanation of the hysteresis see chapt. 7.2.3).

In the remaining range, the value entered as "time constant" is used.

7.2.3 Alarms

Note

The submenu "Alarms" is only displayed if an extension module is installed.

In the "Channel Overview" menu click on Settings | Alarms (Fig. 54).

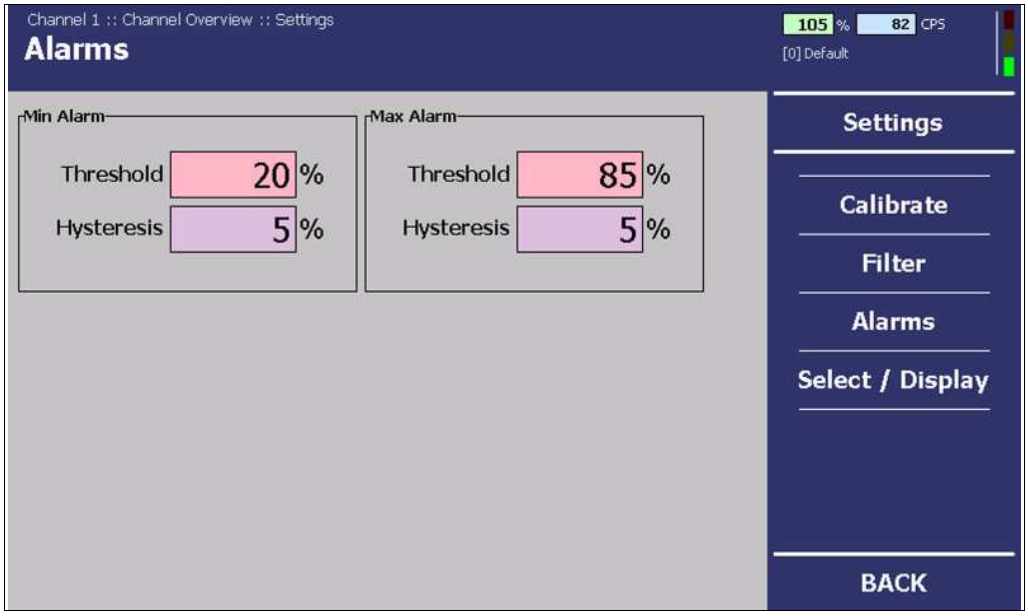


Fig. 62 "Channel Overview" Menu, Settings - Alarms

In the "Alarms" submenu, you can change the values for the fill level alarms (max. and min.) and the hysteresis of these. These values are required for the alarm relays on the extension module.

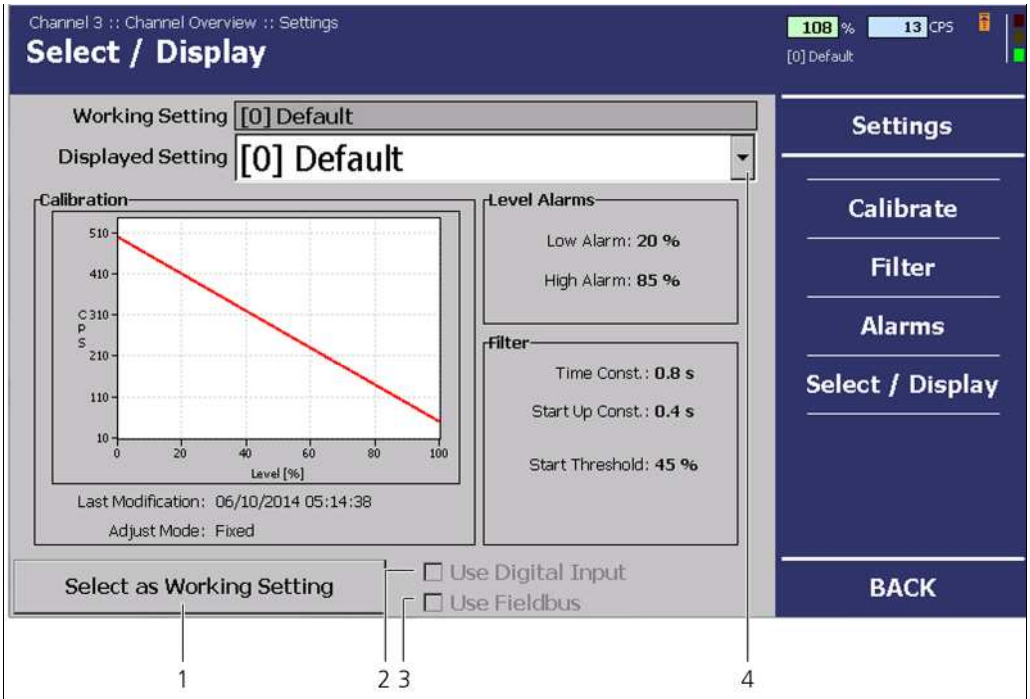
Hysteresis

Hysteresis is defined as the tolerance range of the alarm trigger which occurs at a predefined threshold of the fill level (e.g.: 20% and 85%).

- In the event of a **rising fill level,** the high alarm is triggered when a fill level of (here) 85% is exceeded. If the fill level falls again, then the alarm does not switch off again until the fill level falls below (here) 85% - 5% = 80%.
- In the event of a **falling fill level,** the low alarm is triggered when the fill level falls below (here) 20%. If the fill level rises again, then the alarm does not switch off again until the fill level exceeds (here) 20% + 5% = 25%.

7.2.4 Option/Display

In the "Channel Overview" menu click on Settings | Select/Display (Fig. 54).



1 Use setting button
2 "Use digital input" check box
3 "Use fieldbus" check box
4 Drop-down menu for selecting a calibration curve

Fig. 63 "Channel Overview" Menu, Settings- Select/Display

In the "Select/Display" submenu, you can view the applied calibration, fill level alarms and filter settings. You can also select calibration curves in the drop-down menu (Fig. 63, Pos. 3) as long as additional ones have been created.

1. Click on the button drop-down menu (Fig. 63, Pos. 3).
2. Select a calibration curve.
3. Confirm your entry by clicking on <Use Settings> (Fig. 63, Pos. 1).

Dig. Use input:	If there is a tick, then the selection of the calibration curves is converted to the digital inputs.
Use fieldbus:	If there is a tick, then the selection of the calibration curves is converted to the fieldbus module.

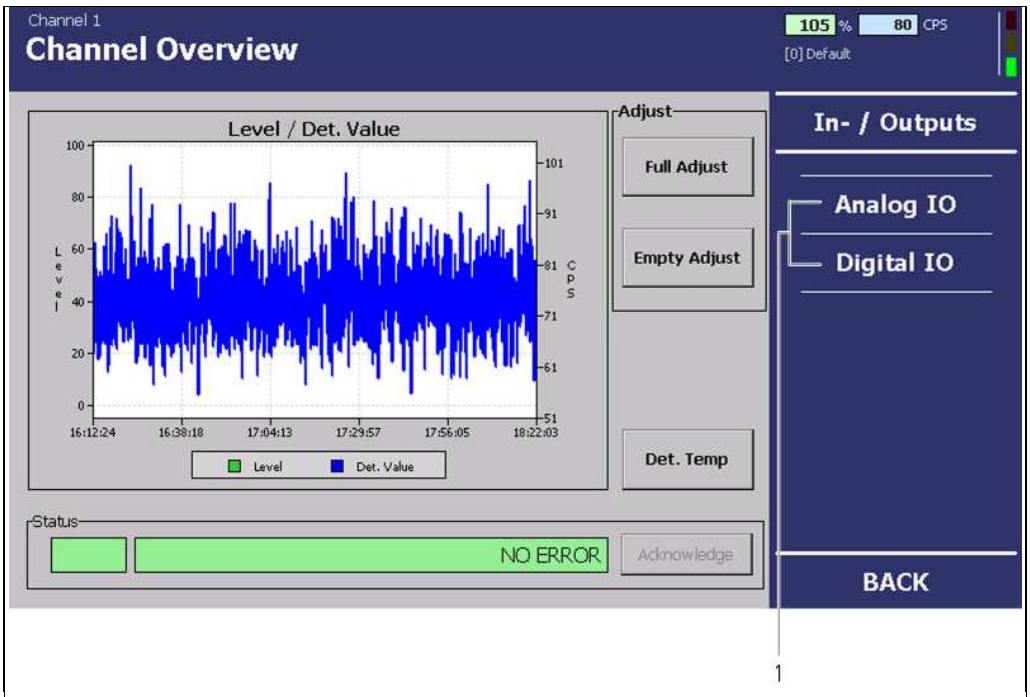
Select/Display (Continued)

The selection works through the digital inputs as is described in the following:

Select Calibration curve	Digital Input 3	Digital Input 4
0	open	open
1	closed	open
2	open	closed
3	closed	closed

7.3 In/Outputs

1. In the "Channel Overview" menuclick on <In/Outputs> (Fig. 49, Pos. 8).
2. Click on <Analogue IO> or <Digital IO> (Fig. 64, Pos. 1).



1 Use setting button

2 "Use digital input" check box

3 Drop-down menu for selecting a calibration curve

Fig. 64 "Channel Overview" Menu, Settings - In/Outputs

In/Outputs (Continued)

In the "In/Output" submenu, you can configure the analogue current outputs, the digital inputs, the alarm relays (only with the extension module) and the the fieldbus module (if installed).

The current output itself is continually monitored and reports malfunction via a redundant current path at a constant current of 24 mA.

7.3.1 Analog IO

You have the following setting options:

4 mA	Output value (e.g. fill level) at 4 mA
20 mA	Output value (e.g. fill level) at 20 mA
Error mode	The error mode defines the behaviour of the error relays in the event of an error.
Calibration of the Current Output/Current Outputs	If you find any discrepancies between the setpoint and the actual value of the current signal, then you can calibrate the current output again.


Note

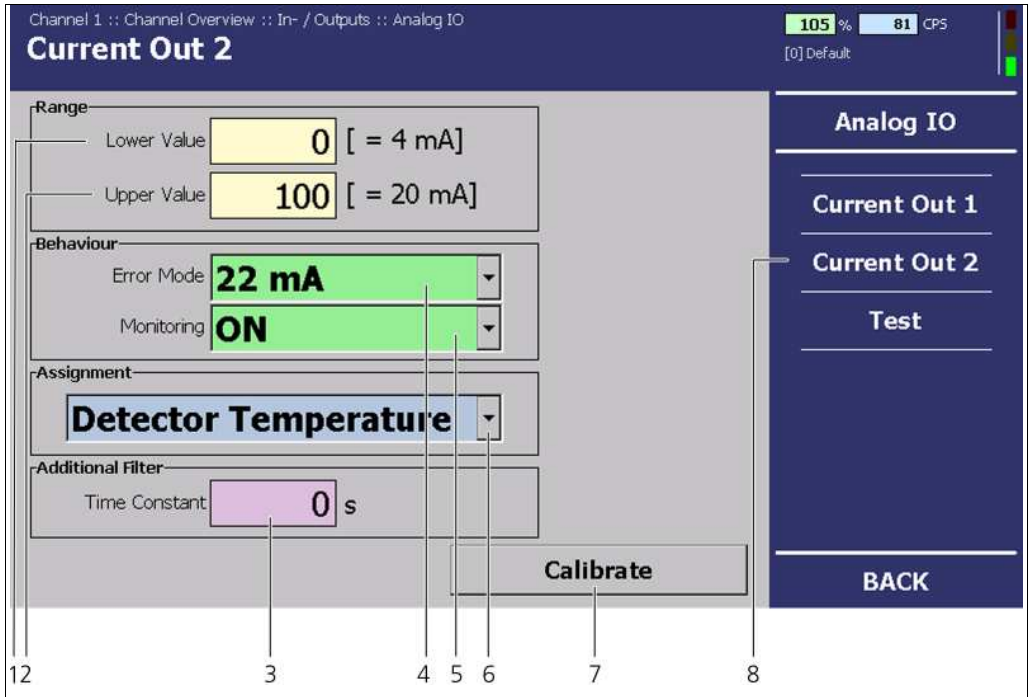
In order to calibrate the current outputs, you will need an ammeter (not included in the delivery contents), which is to be connected to the relevant current output.


Note

BERTHOLD TECHNOLOGIES recommends calibrating the current outputs whenever a module has been installed/replaced or if a software update has been carried out.

7.3.1.1 Setting of the Current Outputs

1. In the "Channel Overview" menu, click on e.g. In/Outputs | Analogue IO | Current Output 2 (Fig. 65, Pos. 8).



1 0% fill level input field
2 100% fill level input field
3 Time constant input field
4 Error mode drop-down menu
5 Monitoring drop-down menu
6 Assignment drop-down menu
7 Calibration button
8 Current output 2 submenu button

Fig. 65 "Channel Overview" menu, In/Outputs - Analogue IO (Current Output 2)

Setting of the Current Outputs (Continued)

You have the following options for configuring the current outputs:

Range

The current output signal is between 4 mA and 20 mA. The corresponding values (e.g. fill level) can be freely assigned.

Lower value:

The lower value is the value at a current output signal of 4 mA.

Upper value:

The upper value is the value at a current output signal of 20 mA.

Note

The value which is assigned to a current output signal of 4 mA must be smaller than the value which is assigned to that of 20 mA.

Behaviour

Error Mode:

Here, settings can be made concerning the way the current output is to behave if the EVU or the GAMMAcast detector reports an error. In the event of an error, the error relay is de-energised (see there), a message appears in the channel menu and the red measurement channel LED lights up. The current output also switches to error mode.

There is a choice between:

- Constant 2 mA
- Constant 22 mA
- Freezing the last measured value

Note

If the last measured value is frozen, a measurement system error cannot be seen in the process control system on the current output signal.

Note

As long as the device is in test mode or in a calibration routine, the current output is switched to the error mode.

Setting of the Current Outputs (Continued)

Note

Do not activate the "monitoring" (Fig. 65, Pos. 5) until the measurement has been fully wired. By doing so you will avoid the error alarm.

Monitoring

If the "monitoring" is activated, the current output will be monitored. Here, the output current is compared with the current which has run right through the conductor loop. In the event of a variation e.g. owing to an error in the hardware, too large a load or a disruption in the loop, an error message is triggered. The error relay is de-energised.

Additional settings options in an installed extension module for current output 2 are:

Note

The Current Output 2 submenu is only displayed when an extension module is built in.

Assignment (only for current output 2)

Fill Level:

The second current output also transmits the fill level. An additional time constant can be set (see below).

Detector Value:

The second current output also transmits the measured count rate (CPS value).

Detector temperature:

The second current output transmits the temperature measured in the detector.

Note

If the second current output is assigned to the detector temperature or the detector value (cps), it is particularly important to adhere to an appropriate setting of the current output values for 4 or 20 mA.

Additional filter (only for current output 2)

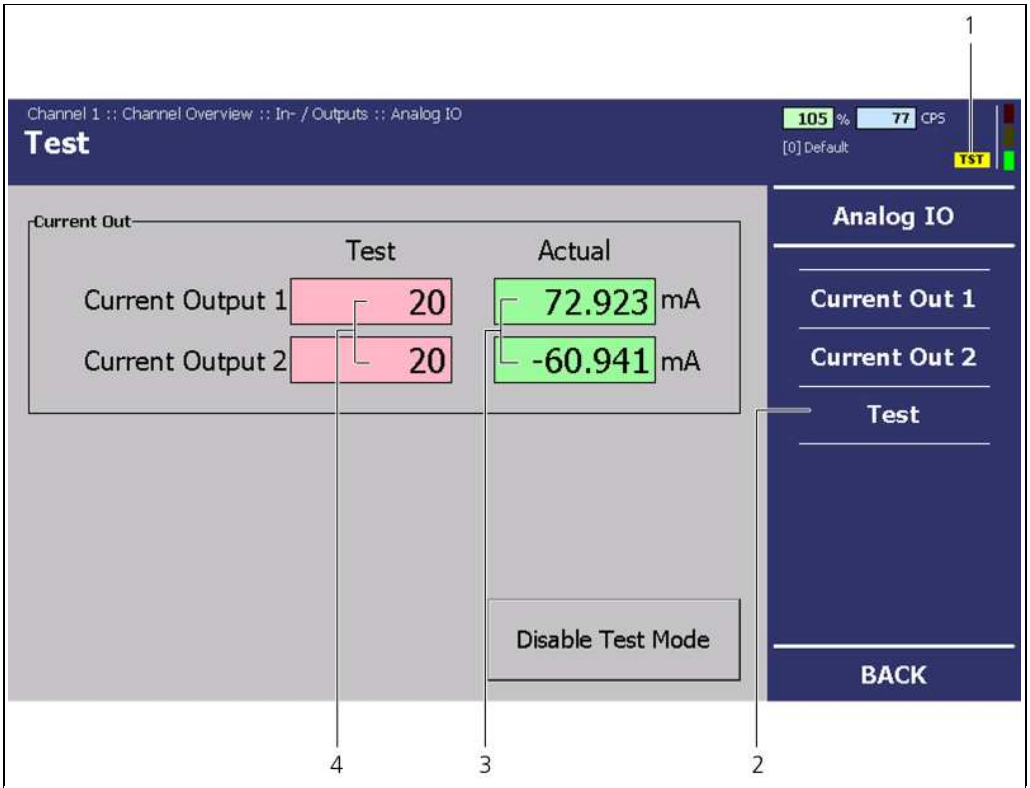
An additional filter time constant can be applied to the second current output. This is added to the time constant set under "Filter" in case fill level is selected. The signal is thereby smoother but slower as a result.

7.3.1.2 Calibration of the Current Outputs

1. Before calibrating the current outputs, connect an ammeter (not included in the delivery contents) to the relevant current output.
2. Click on <Calibration> (Fig. 65, Pos. 7).
   ⇒ A confirmation message opens.
3. Click on <Next>in the confirmation message.
   ⇒ The device switches to test mode.
   ⇒ A command prompt opens.
4. Click on the input field to enter a value for the 4 mA calibration point.
   ⇒ The numeric keypad opens (Fig. 18).
5. Enter the value transmitted by the ammeter.
6. Click on <Next>in the confirmation message.
7. Carry out the calibration for 20 mA calibration point in the same way.
   ⇒ A confirmation message with the notification "Calibration finished" opens.
8. Click on <Next> to finish the calibration.

7.3.1.3 Test

In the "Test" submenu, you can enter your own current value for the sake of the test
(Fig. 66, Pos. 4). As long as this test current is in effect, the background of the input field will be shown in red. In the "Actual" display field, the actual current is displayed. This value cannot be changed.



1 Display of the test mode
2 Test submenu button
3 Actual current display
4 Test current input field

Fig. 66 "Channel Overview" menu, In/Outputs - Analogue IO (Test)

1. In the "Channel Overview" menu click on In/Outputs | Analogue IO | Test (Fig. 66, Pos. 2).
2. Click in the input field (Fig. 66, Pos. 4).
   ⇒ The numeric keypad opens (Fig. 18).
3. Enter a test current and confirm your entry by clicking on "Enter".

Test (Continued)

If the entered value is accepted, the background of the input field will be shown in red. In the "Actual" field, the read-back current which is also used for the current output monitoring is displayed. If the conductor loop is not closed, no real measured value will be displayed.

⇒ The test mode is started (Fig. 66, Pos. 1).

4. Click on <End test mode>if you would like to end the test current.


Note

The test function ends automatically after around 5 minutes. If the test function is to be reactivated, the value must be re-entered.


Note

If only one current output is being tested, the other current output switches automatically to error mode.

7.3.2 Digital IO

In the Digital IO submenu, you can set the two different alarm signals for the alarm relays.

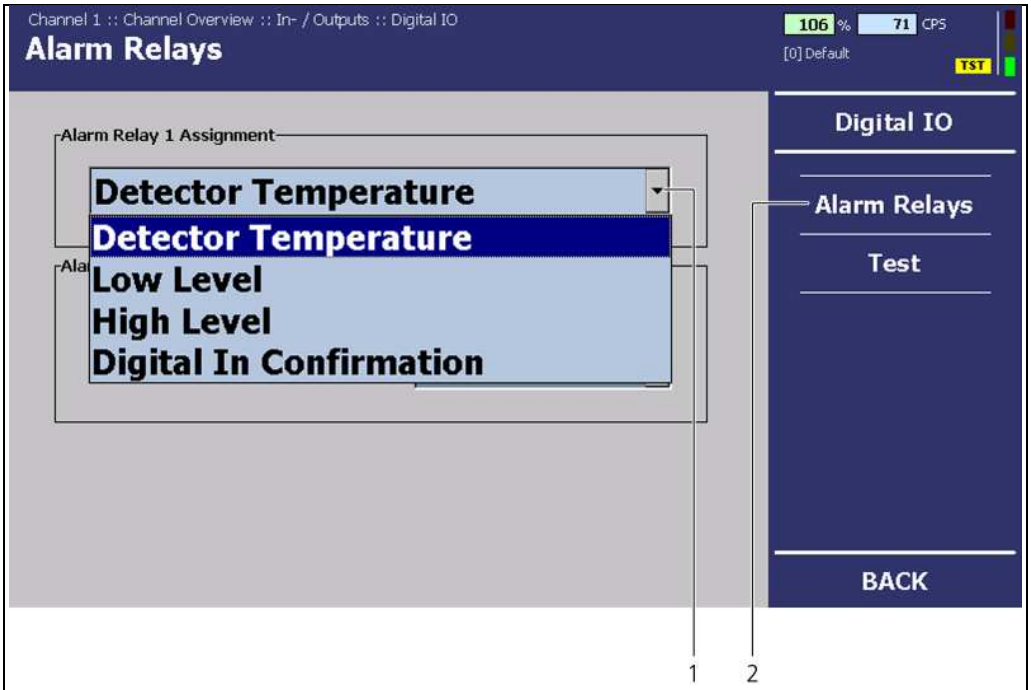
7.3.2.1 Alarm Relay


Note

The Alarm Relay submenu is only displayed if an extension module is installed.

Alarm Relay (Continued)

In the "Channel Overview" menu click on In/Outputs | Digital IO | Alarm Relay (Fig. 67, Pos. 2), to reach the Alarm Relay submenu.



1 Assignment of alarm relay 1 drop-down menu

2 Assignment of alarm relay 2 drop-down menu

Fig. 67 "Channel Overview" Menu, In-/Outputs - Digital IO (Alarm Relay)

The alarm relays 1 and 2 can be assigned to the following functions in the event of an alarm:

Detector temperature	The relay switches if the alarm threshold set in the Menu Detector | Temperature is exceeded (see detector manual).
Low level	The relay switches if the value set under Channel Overview | Settings | Alarms chapt. 7.2.3 **is fallen short of**.
High level	The relay switches if the value set under Channel Overview | Settings | Alarms chapt. 7.2.3 **is exceeded**.
Digital in confirmation	This relay switches if the digital input is switched.

Alarm Relay (Continued)

Note

The alarm relay 1 is a contact (SPDT).

The behaviour of alarm relay 1 can be freely configured ("CLOSED", i.e. switching to the normally-open contact or "OPEN", i.e. the normally-closed contact, in the case of an alarm).

Behavior for software versions earlier than 1.2.0:

The relay always closes in the event of an alarm, i.e. it switches on the normally open contact.

Note

Alarm relay 2 is a simple switch (SPST NO). The behaviour in the event of an alarm can be freely configured ("CLOSED" or "OPEN" in the case of an alarm).

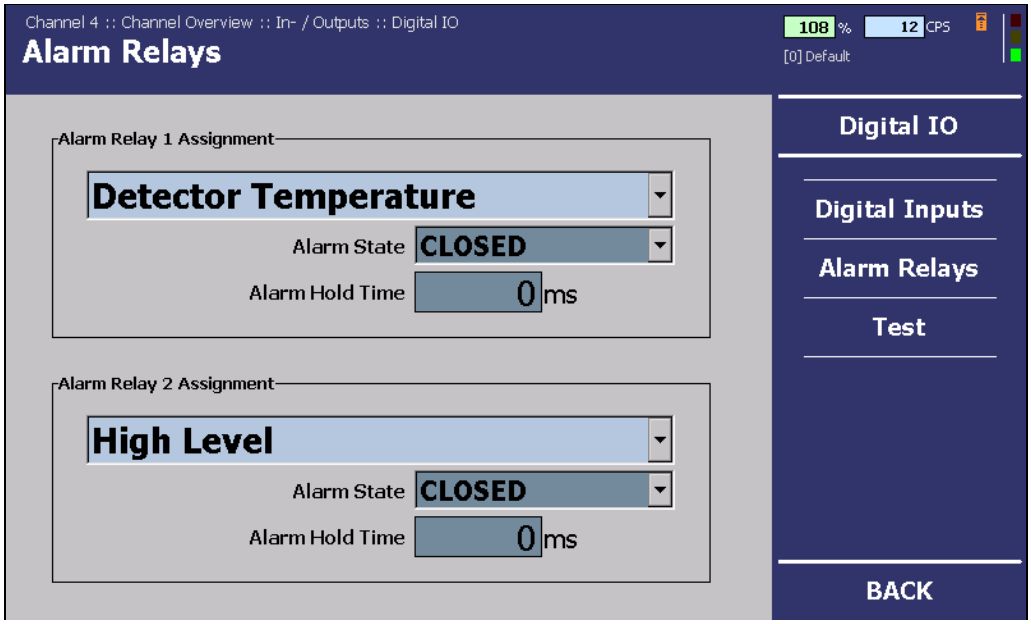


Fig. 68 "Channel Overview" Menu, In/Outputs - Digital IO (Alarm Relay)

Alarm Hold Time An alarm always lasts as long as the reason for the alarm is present, but not less than the specified time.

Note

If the EVU is disconnected from voltage, then both relays are de-energised, moving to their normally-closed contact.

Note

The error relay can not be configured. It always switches on during normal operation and switches off in the event of an error. To get the same behaviour for the alarm relays, both must be configured as "OPEN".

7.3.2.2 Test

In the "Test" submenu, you can change the states of the relay outputs for the sake of the test.

Green background area = current state

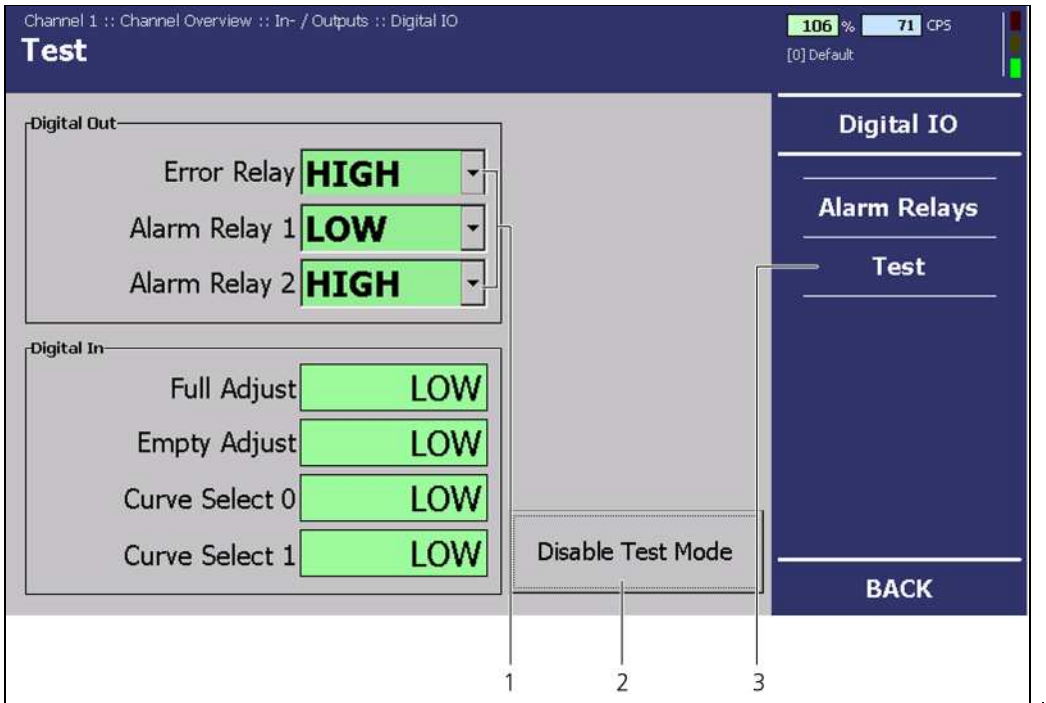
Red background area = manually switched state (test mode)

Note

The digital inputs cannot be configured.

Fig. 69 only informs of the switched state.

In the "Channel Overview" menu, click on In/Outputs | Digital IO | Test (Fig. 69, Pos. 3).



1 Drop-down menu

2 End test mode button

3 Test submenu button

Fig. 69 "Channel Overview" menu, In/Outputs - Digital IO (Test)

Test (Continued)

Digital Outputs	CLOSED= Relay energised OPEN= Relay de-energised
Digital inputs	CLOSED= Terminals connected OPEN = Terminals not connected

1. Click on the **"Error Relay" drop-down menu**, to switch the error relay manually (Fig. 69, Pos. 1).
2. Click on the **"Alarm Relay 1" drop-down menu** menu to switch the alarm relay manually (Fig. 69, Pos. 1).
3. Click on the **"Alarm Relay 2" drop-down menu** menu to switch the alarm relay manually (Fig. 69, Pos. 1).
4. Click on <End Test Mode> (Fig. 69, Pos. 2) if you would like to end the test mode.

Note

The test function ends automatically after around 5 minutes. If the test pulse rate should be re-enabled, the value must be re-entered.

7.3.2.3 Fieldbus

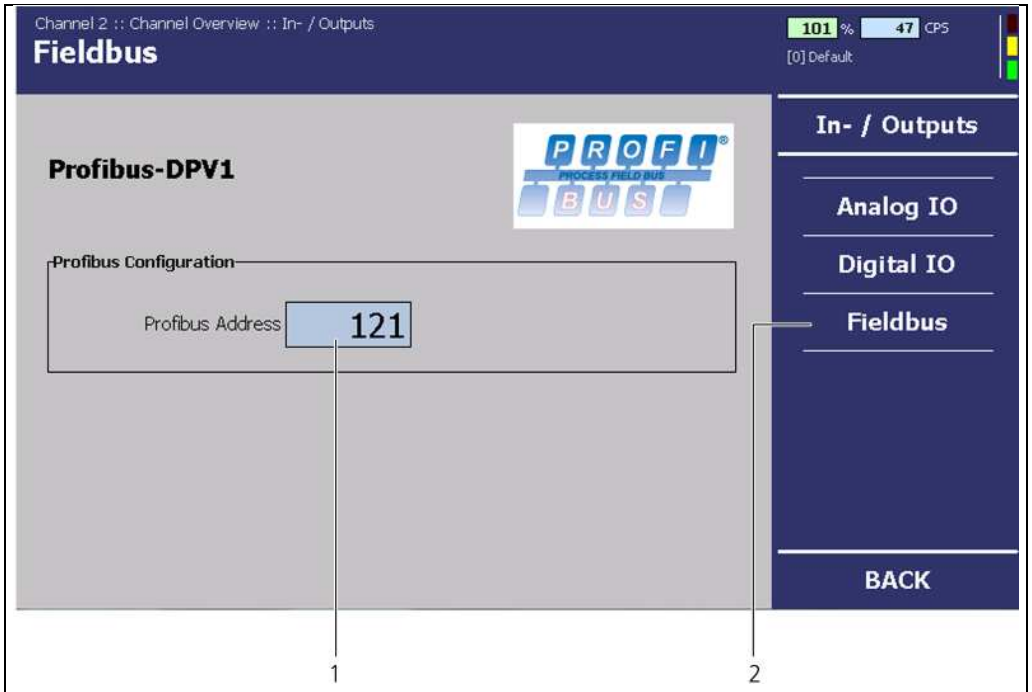
The "Fieldbus" submenu only appears if a Fieldbus module has been installed. For the installation of a Fieldbus module, see chapt. 9.1.2.

Note

To be able to use the Fieldbus module, you must install the provided GSD file in the process control system.

1. In the "Channel Overview" menu click on In/Outputs | Fieldbus(Fig. 70, Pos. 2).
2. Click in the "Profibus" input field: Address" (Fig. 70, Pos. 1).

   ⇒ The numeric keypad opens (Fig. 18).



1 Input field

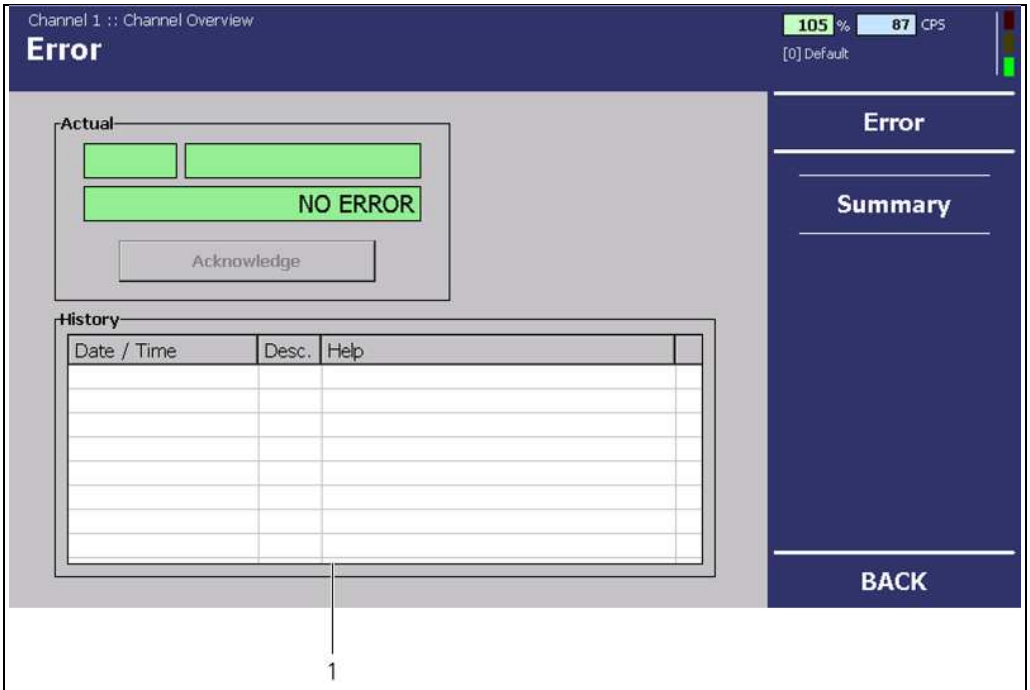
2 Fieldbus submenu button

Fig. 70 "Channel Overview" Menu, In/Outputs - Fieldbus

3. In the input field **„Profibus: Configuration"** enter the address of the bus device (Fig. 70, Pos. 2).

7.4 Error

In the "Channel Overview" menu, click on <Error> (Fig. 49, Pos. 8).



1 Display the error history

Fig. 71 "Channel Overview" Menu, Error

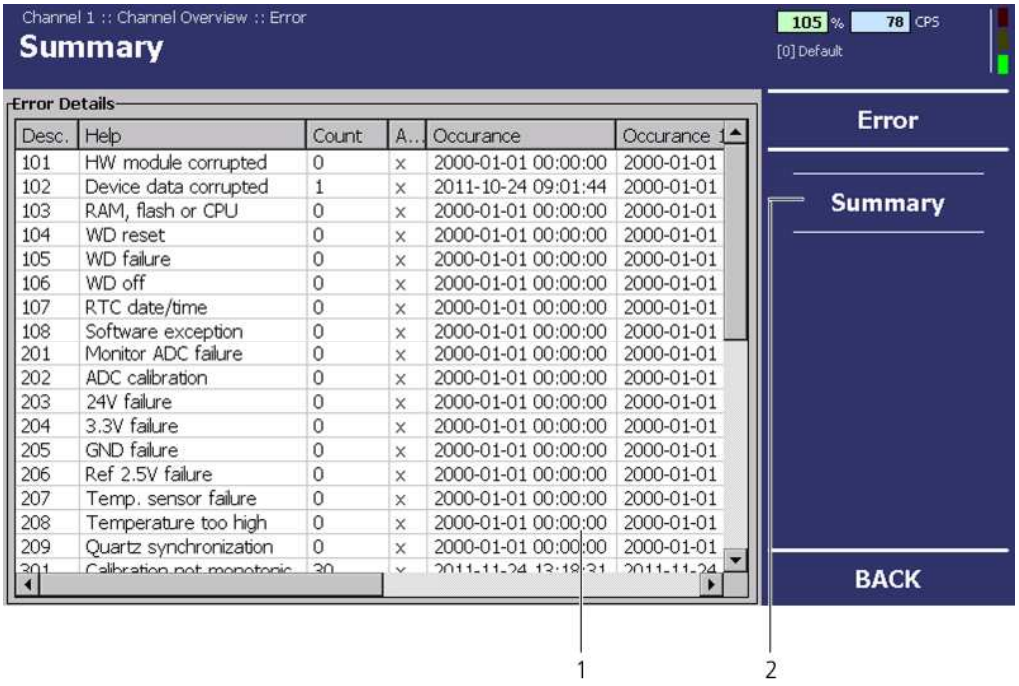
In the "Error" submenu, you can view the following information:

Current Displays the current error message and the error code.

History Displays the error history with the error message and the error codes.

7.4.1 Overview

In the "Channel Overview" menu, click on Error | Overview to reach the Overview submenu (Fig. 72, Pos. 2).



1 Display of the error details of the error messages

2 Overview submenu button

Fig. 72 "Channel Overview" Menu, Error Overview

In the Overview submenu, you can find a detailed error list (Fig. 72, Pos. 1).

7.5 Service

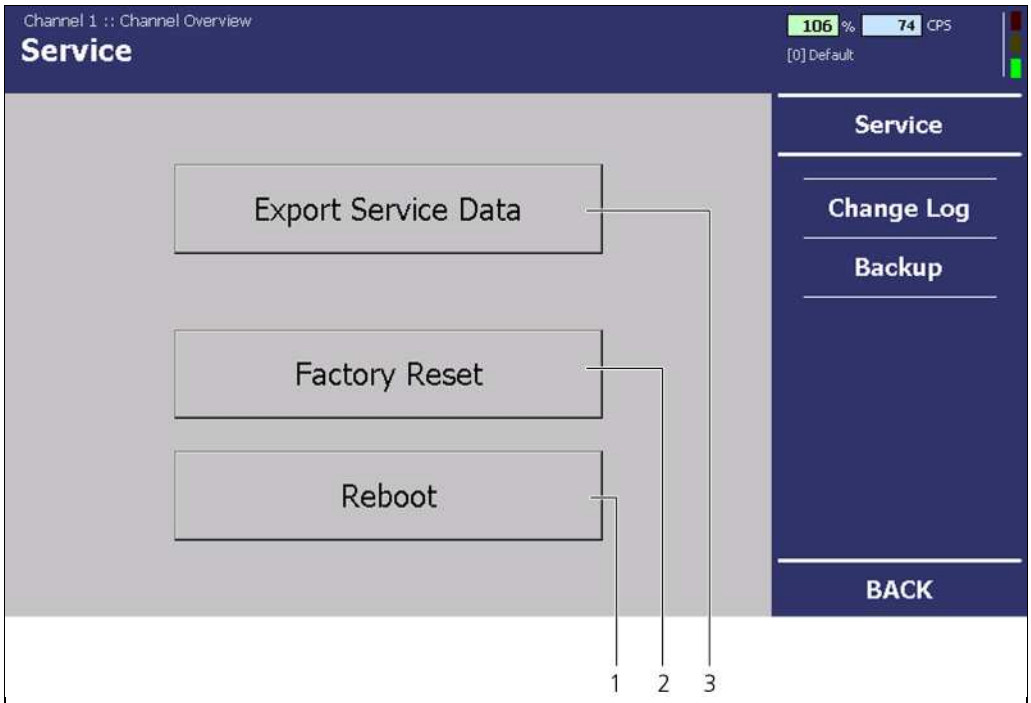
In the Service submenu you have the following options:

- Exporting service data onto a USB flash drive.

Service data includes:

- The change log
- The error log
- The production data
- Resetting of the channel settings to factory setting (calibrating, time constants, alarms thresholds, etc.)
- Restarting of the software (of the relevant measurement channel).

In the "Channel Overview" menu click on <Service> to reach the Service submenu (Fig. 49, Pos. 8).



1 Restart button
2 Reset settings button
3 Export Service Data button

Fig. 73 "Channel Overview" Menu, Service

7.5.1 Exporting Service Data

Note

The <Export Service Data> button becomes active if you connect a USB flash drive to the front panel.

4. Click on <Export Service Data> (Fig. 73, Pos. 3).

   ⇒ The warning window opens automatically.

5. Confirm the warning by clicking on <OK>.

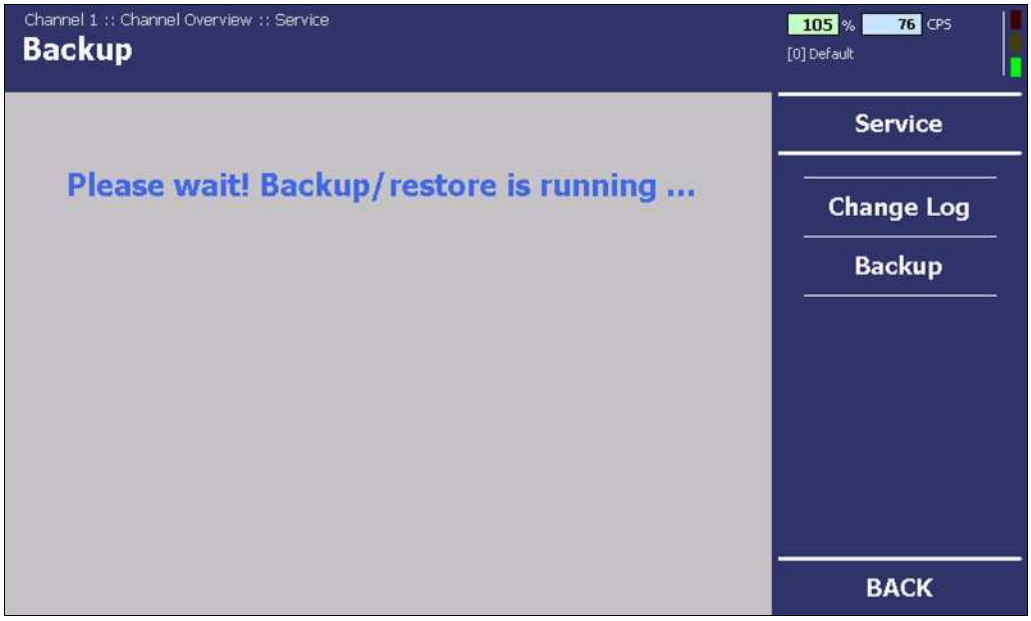


Fig. 74 "Channel Overview" Menu, Service - Backup/restore is running

⇒ The export of data starts (Fig. 74).

Attention

If you click on <Factory Settings> all applied settings will be reset.

The measurement is retained.

If you click <Restart> the measurement channel restarts.

The measurement of the relevant channel is then retained.

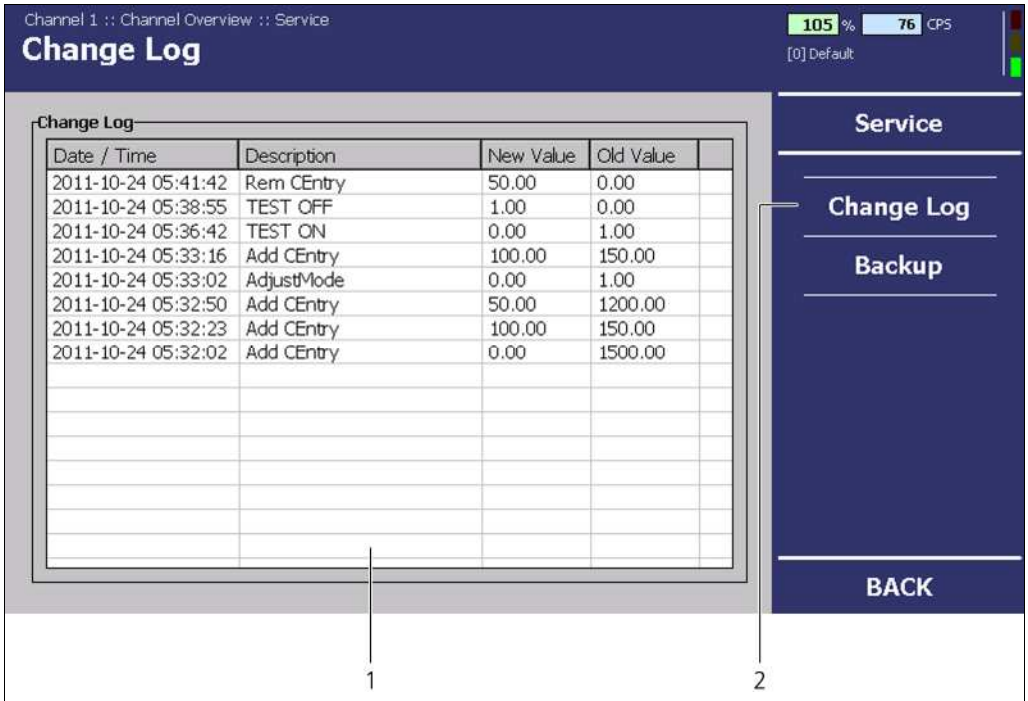
The measurements of the other measurement channels remain unaffected by this.

7.5.2 Change log

In the Change Log submenu you can view all the applied settings.

In the "Channel Overview" menu click on Service | Change log to reach the Change Log submenu (Fig. 75, Pos. 2)

⇒ The change log is displayed (Fig. 75, Pos. 1).



1 "Channel Overview" Menu service button

2 Display of the change log table

Fig. 75 "Channel Overview" Menu, Service- Change Log

7.5.3 Backup

The "Backup" submenu offers you the following options:

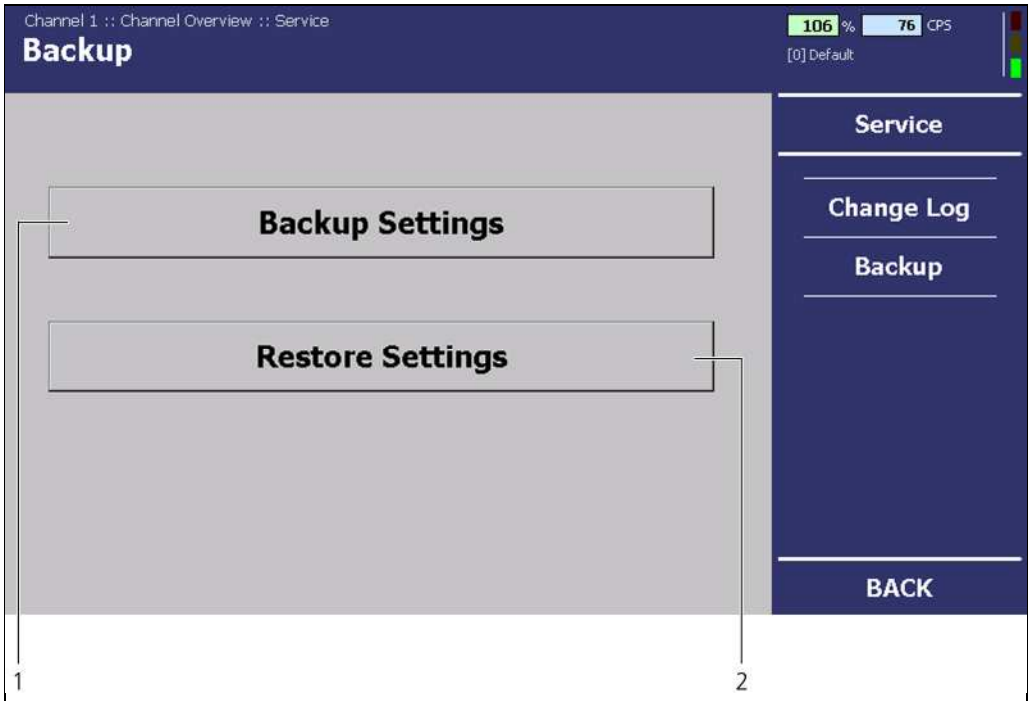
- Backing up the settings on a USB flash drive.
- Restoring of settings on a USB flash drive.

Note

Backing up the settings is always recommended to ensure quality and so original settings can be restored in the event of an emergency.

If several identical strands are being operated then it is recommended that a change to the settings is carried out in one single channel and then transferred by USB flash drive to the other channels.

In the "Channel Overview" menu click on Service | Backup



1 Backup settings button

2 Restore settings button

Fig. 76 "Channel Overview" Menu, Service - Backup

Note

The buttons <Backup Settings> and <Restore Settings> can only be selected if you have connected a USB-Stick to the front panel.

Backup (Continued)

6. Connect a USB flash drive to the USB port of the EVU front panel (Fig.1, Pos. 3).
7. Click on <Backup Settings> Fig. 76, Pos. 1).

   ⇒ A confirmation message with the command to wait opens.

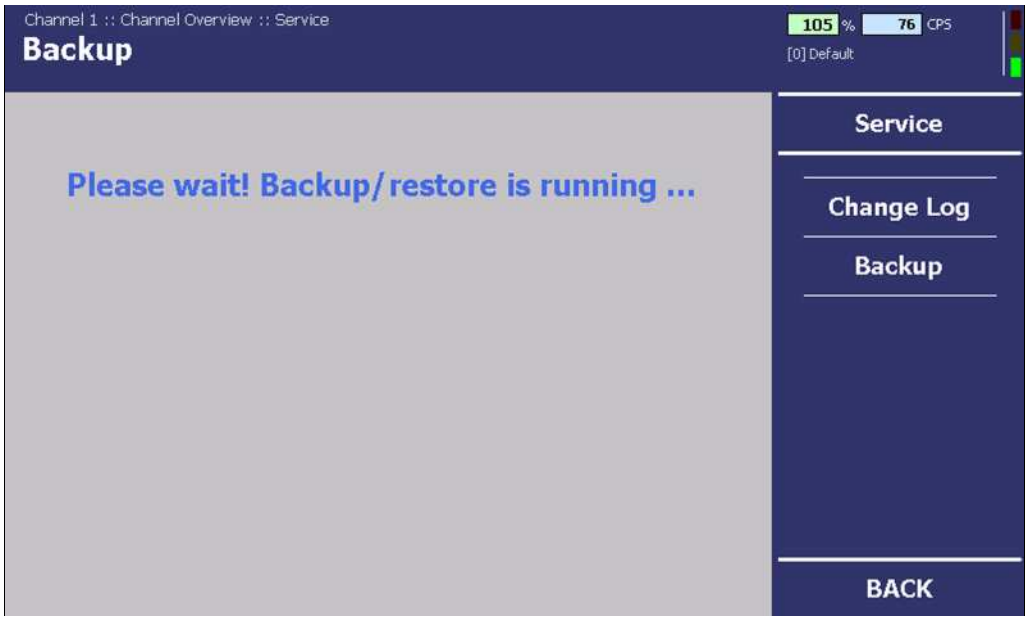


Fig. 77 "Channel Overview" Menu, Service - Backup/restore is running

   ⇒ A confirmation message opens after a successful backup.

8. After the backup/restore is finished, click on <OK>.

Note

All **data relevant to measurement** is backed up:
All calibrations
Filter constants
Alarm Thresholds

Restore

9. Connect a USB flash drive to the USB port of the EVU front panel (Fig.1, Pos. 3).
10. Click on <Restore Settings> (Fig. 76, Pos. 2).

    ⇒ A window for selecting files opens.

11. Select a file and begin the restoration.

    ⇒ A confirmation message with the command to wait opens.

    ⇒ A confirmation message opens after a successful restoration.

Note

The files with backed-up settings have **.dds** at the end. A .txt file is also exported which is solely for information purposes.

8 Troubleshooting

8.1 Error Search

Problem	Cause	Measure
No signal	EVU does not work	➤ Check power supply and fuses; is LED 1 blinking on the display?
No signal	Detector does not work	➤ Check the functioning of the detector
Count rate too low	Shielding not opened or not opened correctly	➤ Check lock and ensure it is in OPEN position
	Incorrect focus of the effective radiation on the detector	➤ Correct and optimise the alignment
	Objects in the beam path	➤ Offset irradiation level
	Source at the end of its usable life span	➤ Replace source
No or incorrect fill level display	Fill level value entry incorrect	➤ Check the calibration value and the fill level display
The fill level display deviates	Defect in detector	➤ Check detector
	Incorrect calibration	➤ Check calibration values
	Count rate too low (see above)	➤ Check source age and irradiation level, replace detector
No menus are displayed which are linked to the extension module.	Extension module defect	➤ Replace extension module
	Extension module is not correctly installed	➤ Check cable connection (flat ribbon cable) between the fieldbus module and the basic module ➤ Check whether the extension module is pushed in properly.
No data from the fieldbus module is being received in the control centre.	Fieldbus module defect	➤ Replace fieldbus module
	Fieldbus module is not correctly installed	➤ Check cable connection (flat ribbon cable) between the extension module and the basic module ➤ Check whether the extension module is pushed in properly.
No data is being received in the control centre via Ethernet	Transfer of the measurement data deactivated	➤ Activate the output of measurement data over the network (Data Logger menu | Network)

8.2 Error Codes of the Evaluation Unit

In the following tables you can find the EVU error codes which give you exact information on how to fix them. All castXpert LB 452 errors have the prefix "M", all GAMMAcast LB67xx errors the prefix "D".

The detector error codes can be seen in the "48452BA1" manual in chapt. 7.1.

8.2.1 System

Code	Text	Description	Correction	Class
101	HW module corrupted	Missing circuit board or incompatible test header	➤ Carry out software update ➤ Contact service	Error
102	Device data	Data inconsistency found	➤ Carry out factory reset	Error
103	RAM, Flash or CPU	Error in main memory Hardware error	➤ Contact service	Error
104	WD reset	The system has been reset by the watch dog (WD) Hardware error	➤ Contact service	Warning
105	WD failure	The watch dog (WD) was activated but the system was not reset Hardware error	➤ Contact service	Error
106	WD off	The debug jumper is sticking, the watchdog is disabled	➤ Remove debug jumper	Error
107	RTC date/time	Error in the actual time clock or invalid time	➤ Check the date and time settings ➤ Contact service	Warning
108	Software exception	Software exception	➤ Carry out software update. If the error still remains, contact the service.	Error

8.2.2 Main board

Code	Text	Description	Correction	Class
201	Monitoring ADC	The monitoring ADC (Analogue Digital Converter) has failed Hardware error	➤ Contact service	Error
202	ADC Calibration	Error while calibrating the ADC	➤ Contact service	Error
203	24 V failure	Faulty 24 V operating voltage Hardware error	➤ Contact service	Error
204	3.3 V failure	Faulty 3.3 V operating voltage Hardware error.	➤ Contact service	Error
205	GND failure	Measured GND value too large Hardware error.	➤ Contact service	Error
206	Ref 2.5 V failure	Faulty 2.5 V reference voltage Hardware error	➤ Contact service	Error
207	Temp sensor	Temperature sensor on CPU board failed Hardware error	➤ Contact service	Warning
208	Temperature too high	Temperature of the system is or was too high.	➤ Please ensure adequate cooling of the EVU	Warning
209	Quartz synchronization	One of the oscillation quartzes does not work correctly	➤ Contact service if error exists consistently	Warning

8.2.3 Application

Code	Text	Description	Correction	Class
301	Calibration not monotonic	Calibration curve not monotonic	➤ Check calibration table	Error
302	Background too high	Background count rate larger than smallest occurring calibration point	➤ Check calibration table ➤ Check background count rate	Error
303	Empty/Full ratio	Ratio between full and empty count rate too small	➤ Check calibration table ➤ Change required ratio on the plausibility page ➤ Ensure that there are no objects or residue in the beam path	Error
304	Empty adjust tolerance	Change outside of the plausibility limits during empty adjustment	➤ Check source ➤ Change plausibility limit ➤ Carry out the adjustment (twice) again. The error is automatically cleared	Error
305	Full adjust tolerance	Change outside of the plausibility limits during full adjustment	➤ Check source ➤ Change plausibility limit ➤ Carry out the adjustment (twice) again. The error is automatically cleared	Error
306	Count rate stability out of bounds	While reading in, the count rate is not constant and outside the statistical window	➤ Ensure that no other factors influence the count rate during the read in (e.g. disruptions in the beam path) ➤ Carry out the adjustment (twice, if needed) again. The error is automatically cleared	Error
307	Decay compensation	Error during decay compensation (disabled during casting - factory settings)	➤ Contact service	Error
308	Automatic calibration	Error during automatic calibration with a calibration unit	➤ Carry out calibration again ➤ To ensure that the measurement is carried out without interference	Error

8.2.4 GAMMAcast Control

Code	Text	Description	Correction	Class
501	No detector found	No compatible GAMMAcast detector found	➤ Connect a GAMMAcast detector ➤ Ensure the correct cabling is in place ➤ Carry out software update ➤ Contact service	Error
502	Detector communication	Communication error GAMMAcast - Disruption on the line	➤ Ensure the correct connection of the screen ➤ Replace cable ➤ Contact service	Warning
503	Detector internal error	GAMMAcast or ECcast in error state (Error details and confirmation in the GAMMAcast error menu)	➤ Operating Instructions GAMMAcast detector or ECcast system	Error
504	Detector internal warning	GAMMAcast or ECcast system in warning status (Error details and confirmation in the error menu of GAMMAcast)	➤ See operating instructions GAMMAcast detector or ECcast system	Warning
505	Detector temp too high	Detector temperature is/was too high	➤ Ensure sufficient cooling	Warning
506	Detector Raw Value	Variation discovered between the pulses received by the GAMMAcast and the pulses transmitted via the communication	➤ Check cabling ➤ Contact service	Error

8.2.5 Process Connection

Code	Text	Description	Correction	Class
701	Current output	Faulty current output on the basic module	➤ Calibrate current output ➤ Contact service	Warning
702	Current output loop open	Current output on the basic module not closed	➤ Check cabling on current output side	Warning
801	Current output	Current output faulty on extension module	➤ Calibrate current output ➤ Contact service	Warning
802	Current output loop open	Current output on the extension module not closed	➤ Check cabling on current output side	Warning
803	Temp sensor	Temperature sensor on the extension module failed Hardware error	➤ Contact service	Warning
901	Temp sensor	Temperature sensor on the fieldbus module failed Hardware error	➤ Contact service	Warning
902	Fieldbus setup	Error during the fieldbus module set-up process Hardware error	➤ Contact service	Error
903	Fieldbus Parameter	Error during parameter exchange with the fieldbus module Hardware error	➤ Contact service	Warning
904	Fieldbus module error	Internal fieldbus module error Hardware error	➤ Contact service	Error
905	Fieldbus module error	Internal serious exception in fieldbus module Hardware error	➤ Contact service	Error
906	No fieldbus	Fieldbus module has not found a master	➤ Check connection with the fieldbus master ➤ Ensure the correct installation of the fieldbus module	Warning

9 Maintenance

In the maintenance chapter, the installation of modules, the replacing of fuses and the cleaning of the EVU are described.

9.1 Installation of Modules


Danger

Danger to life from electric shock!

The installation may only be carried out by a qualified electrician.

Exposed live parts in the device interior.

➤ Never open the device before you have switched the voltage off!


Warning

Damage to the device!

Short circuit.

➤ Install the modules in the correct card slots.
➤ Please always observe the prescribed sequence when installing modules.


Note

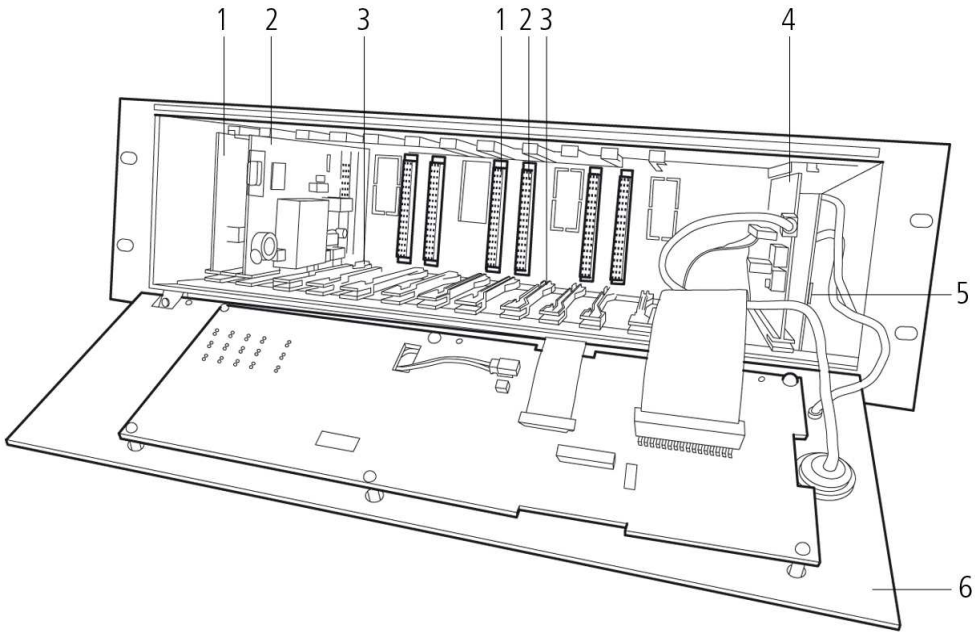
The EVU is delivered equipped, depending on the order. The installation of the modules is only necessary if:

- another measurement channel is to be fitted
- an existing measurement channel is to be supplemented with an extension and/or fieldbus module
- a defective module is to be replaced
- A software update is to be carried out

The following modules can be installed in the EVU:

- Basic module
- Extension module
- Fieldbus Module

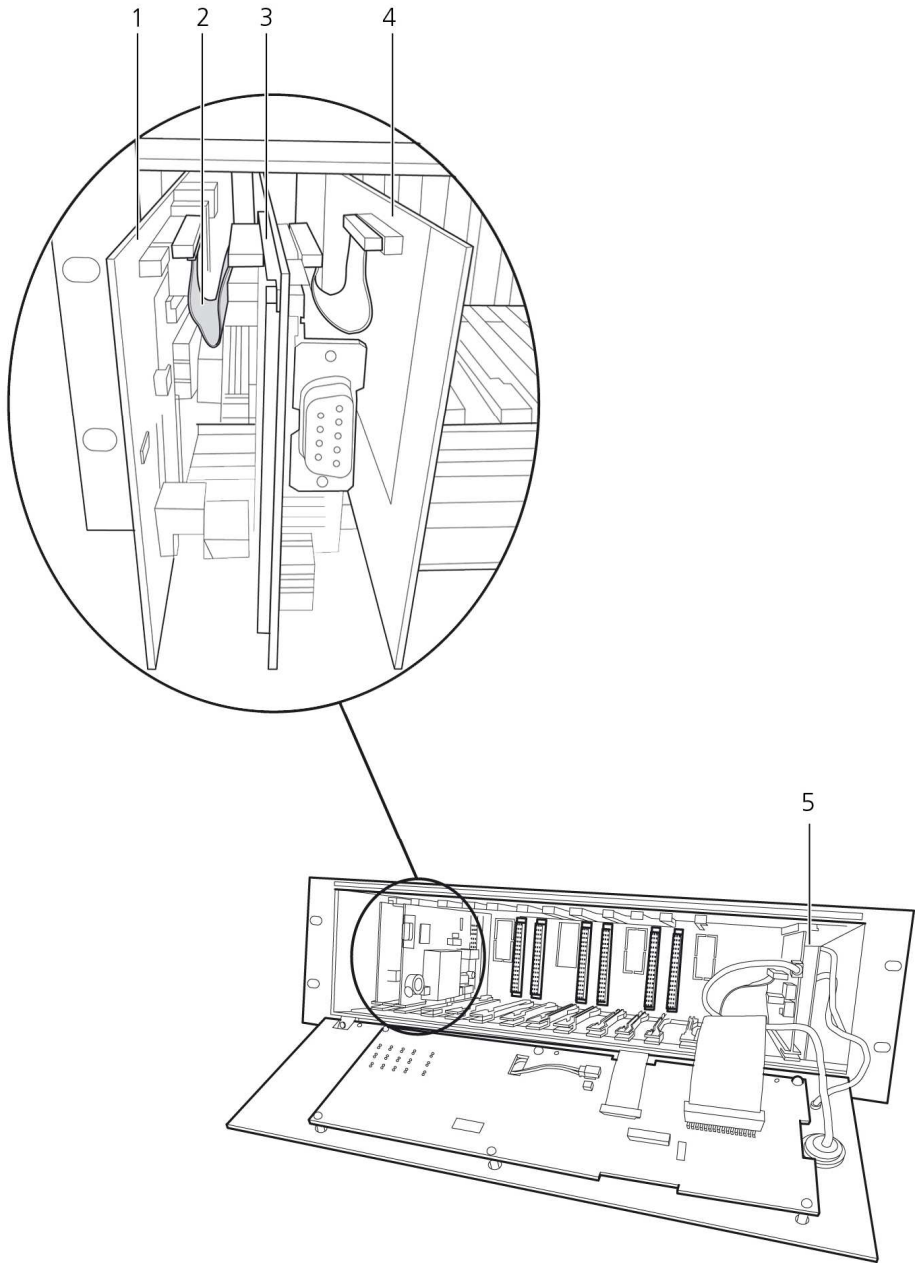
Installation of Modules (Continued)



1 Card slot with extension module
2 Card slot with basic module
3 Card slot for fieldbus module
4 Control unit with SD card slot
5 SD card slot
6 Front panel folded out

Fig. 78 Front view in the open device

Installation of Modules (Continued)



1 Extension module
2 Flat ribbon cable
3 Basic module
4 Bus module
5 System board (control unit) with SD card slot

Fig. 79 Overview of the Modules

9.1.1 Installation of the Basic Module/Extension Module

Attention

Damage to the device!

Short circuit

- ➤ Install the module in the correct card slot!
- ➤ Please always observe the prescribed sequence when installing modules!

Note

If an **extension module** is to be installed, it must be connected with the basic card via the flat ribbon cable **before** the installation.

Note

The slots are labelled with an adhesive strip with the module name on.

1. Disconnect the EVU voltage.
2. Loosen the screws (Fig. 11, Pos. 2) on the front panel.
3. Fold the front panel down.
4. Connect the extension module and the basic module with a flat ribbon cable before installation (included in delivery contents) (Fig. 70, Pos. 2).
5. Push in the extension module, basic module and fieldbus module if need be again at the same time until they have clicked into place.
6. Connect all the connection cables to the rear side (Fig. 3).
7. Fold the front panel up again.
8. Tighten the screws.
9. Switch on the EVU.

9.1.2 Installation of the Fieldbus Module

Attention

Damage to the device!

Short circuit

- ➤ Install the module in the correct card slot!
- ➤ Please always observe the prescribed sequence when installing modules!

Note

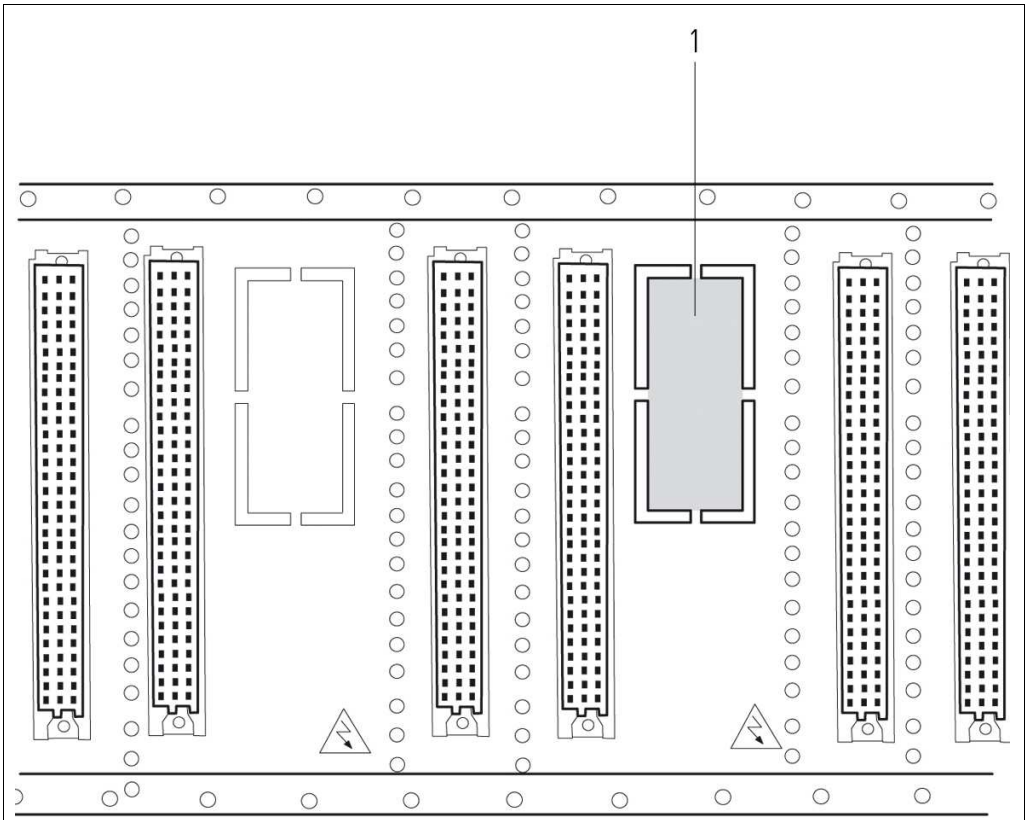
Device is not recognized!

Limited range of functions

- ➤ Carry out an EVU software update before installing the fieldbus module if the control unit software version is less than version 1.0.3!

1. Disconnect the EVU voltage.
2. Loosen the screws (Fig. 11, Pos. 2).
3. Fold the front panel down.
4. Remove any already-installed modules of the relevant measurement channel before installing the fieldbus module (Fig. 86).
5. Remove the metal cover on the rear side of the housing (Fig. 80, Pos. 1). The cover is already punched out and is held at three points. Loosen the hold points with light pressure (e.g. with a screw driver).

Fieldbus Module Installation (Continued)



1 Aperture on the main circuit board

Fig. 80 EVU LB 452, main circuit board

6. Separate and remove the four hold points of the aperture on the pre-punched, green main circuit board with a wirer cutter (Fig. 55, Pos. 1).
7. Connect the module with the flat ribbon cable again (included in delivery contents) (Fig. 70, Pos. 2).
8. Push in the basic module, fieldbus module and extension module if need be again **at the same time** until they have clicked into place.
9. Connect all the connection cables to the rear side (Fig. 3).
10. Fold the front panel up again.
11. Tighten the screws.
12. Switch on the EVU.
13. Install the GSD file in the control centre.

9.2 Replacing of Fuses

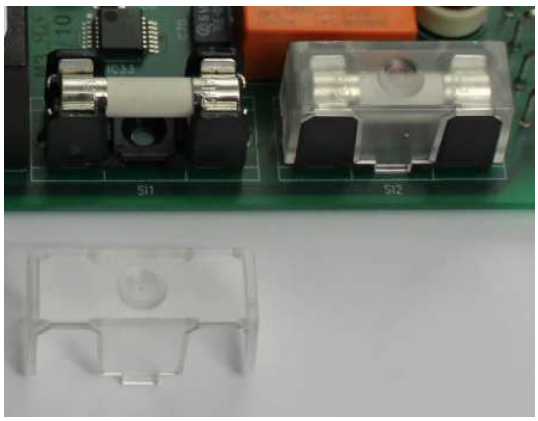
Attention

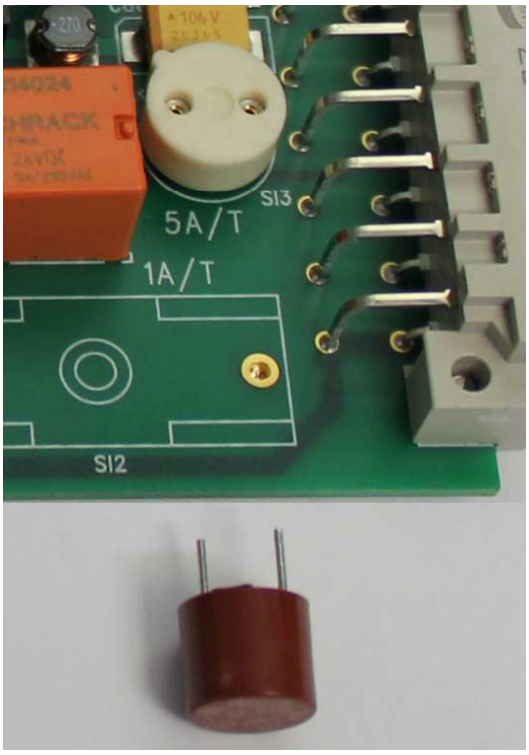
Damage to the device! Short circuit!

The modules can be damaged if the wrong fuses are used.

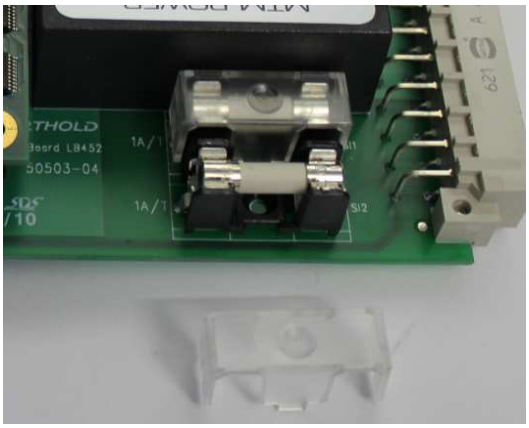
➤ Only use fuses which correspond to the fuses on the modules.

Two different types of fuses are used in the EVU. These fuse the individual modules and mains inlets:

<table>
<tr><td colspan="2"> 

Basic module</td><td colspan="2">The two mains fuses Si1 and Si2 on the basic module fuse the current input.
If there is a defect in one of the two fuses, no signal can be transmitted over the measurement channels.</td></tr>
<tr><td colspan="2" rowspan="2"> 
</td><td>Basic module</td><td>The 5 A fuse Si3 fuses the error relay.
If there is a defect in the fuses, the error relay does not work.</td></tr>
<tr><td>Extension module</td><td>The two 5 A fuses Si3 and Si4 fuse both alarm relays.
If there is a defect in the fuses, the alarm relay does not work.</td></tr>
</table>

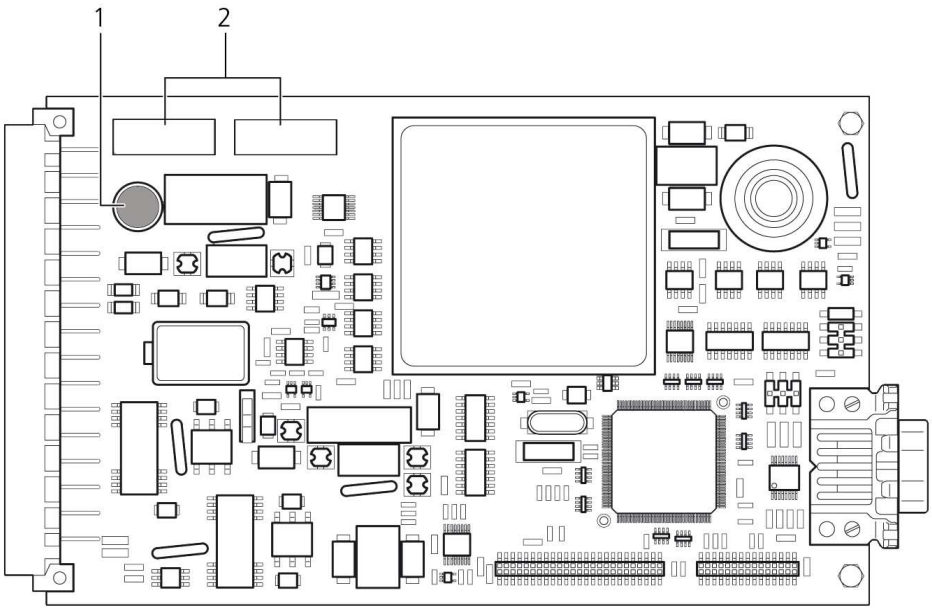
Replacing of Fuses (Continued)

 System Board	The two **mains fuses Si1** and **Si2** on the system board fuse the power supply unit. If there is a defect in the fuses, no power is supplied to the EVU.

9.2.1 Replacing of Basic Module Fuse

1. Disconnect the EVU voltage.
2. Loosen the three screws on the front panel (Fig. 11, Pos. 2).
3. Fold the front panel down.
4. Pull out the basic module and if need be the extension module and/or fieldbus module (Fig. 10, Pos. 3) carefully.
5. Remove the flat ribbon cable, if needed, (Fig. 10, Pos. 2) from the extension module and/or the fieldbus module
6. Pull carefully on the fuse (Fig. 81, Pos. 1) until the top part is fully removed.
7. Remove the plastic covering from the fuses (Fig. 81, Pos. 2).
8. Take the fuses out carefully.

Replacing of Basic Module Fuse (Continued)



1 Fuse

2 Fuse with plastic covering

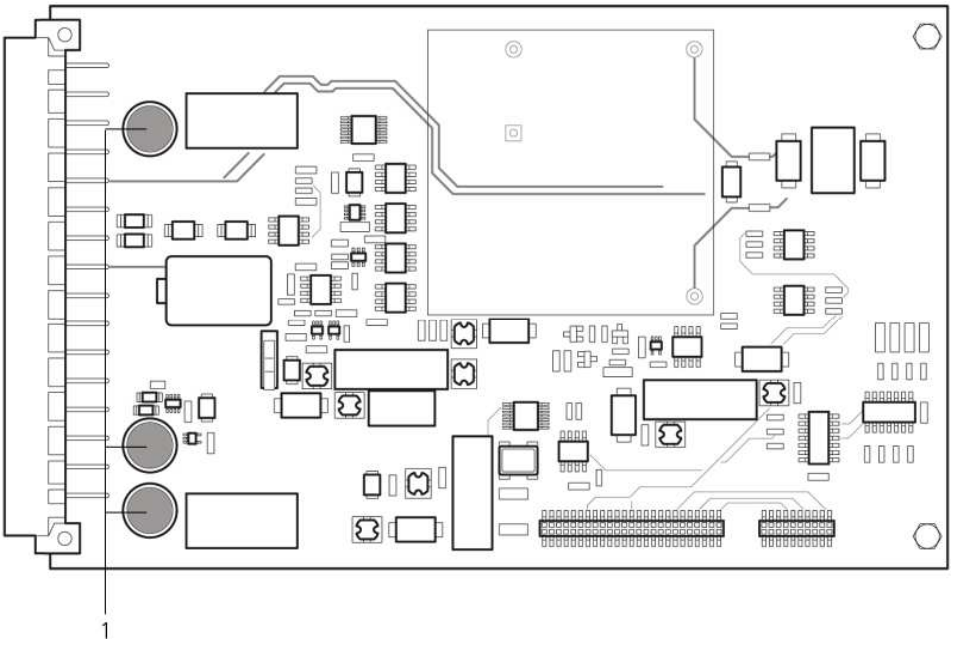
Fig. 81 Basic module fuses

9. Fit the new fuses into the basic module with the contacts and the cavities provided.
10. Connect the basic module if need be to the extension or fieldbus module with flat ribbon cables.
11. Push the module into the EVU again.
12. Fold the front panel up again.
13. Tighten the screws again.

9.2.2 Replacing of Extension Module Fuse

1. Disconnect the EVU voltage.
2. Loosen the three screws on the front panel (Fig. 11, Pos. 2).
3. Fold the front panel down.
4. Pull the extension module and the basic module out (Fig. 10, Pos. 3) carefully.
5. Remove the flat ribbon cable (Fig. 10, Pos. 2) from the extension module and the basic module.
6. Pull carefully on the fuses (Fig. 1, Pos. 1) until the top part is fully removed.

Replacing of Extension Module Fuse (Continued)



1 Fuses

Fig. 1 Extension Module Fuses

7. Fit the new fuses into the extension module with the contacts and the cavities provided.
8. Connect the extension module to the basic module again with the flat ribbon cable.
9. Push the module into the EVU again.
10. Fold the front panel up again.
11. Tighten the screws again.

9.3 Cleaning


Attention

Damage to the touch display!

Solvents and abrasive agents can damage the touch display.

➤ Only clean the touch display with a wet cloth.

- Only clean the EVU with a dry cloth or a dusting brush.
- Only clean the front panel and the touch display with a wet cloth.

10 Decommissioning


Danger

Danger of death by electric shock

Decommissioning may only be carried out by qualified electricans..

- ➤ All relevant safety regulations have to be observed.
- ➤ Decomissioning may only be carried out if the device has been de-energised.
- ➤ Only open the device when it is de-energised.
- ➤ In case of an electric shock, carry out first measures and immediately call an emergency service..

Follow this sequence for decommissioning:

1. Remove all cables from the rear side of the housing.
2. Remove the connection cables between the EVU and the GAMMAcast detector.
3. Remove all externally connected devices (e.g. USB stick, SD card, etc.).
4. Dismount the EVU from the 19" rack.

10.1 Disposal of Measurement System


Caution

Toxic!

The product contains electronic components containing toxic substances that are harmful to health.

- ➤ Disposal is to be carried out in accordance with the disposal regulations via a disposal expert.

If the device is to be decommissioned, have it disposed of according to legal regulations (e.g. RL 2002/96/EC) by a specialised waste management company.

11 Technical Information

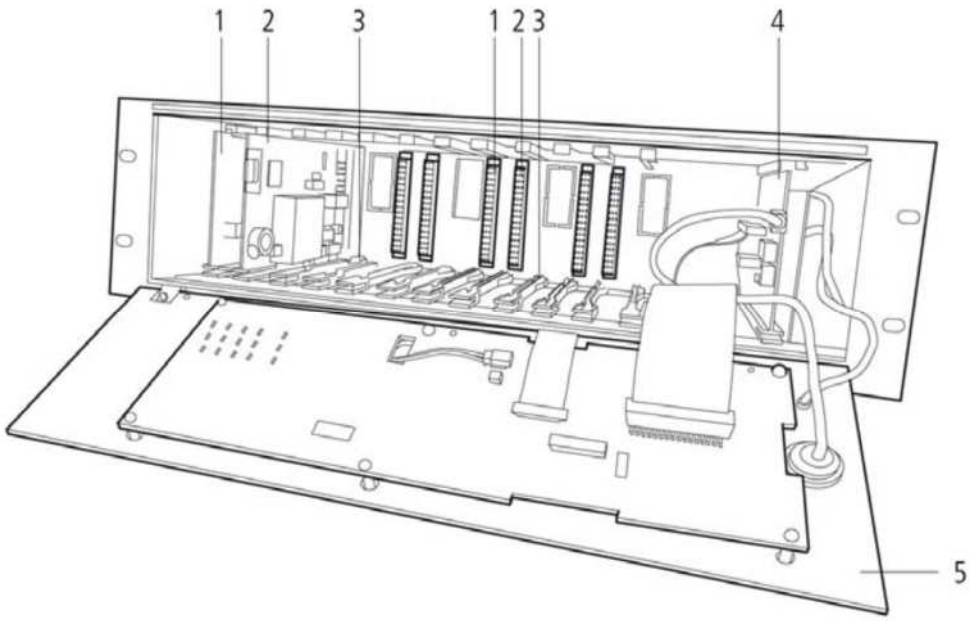
11.1 castXpert LB 452: Technical Data

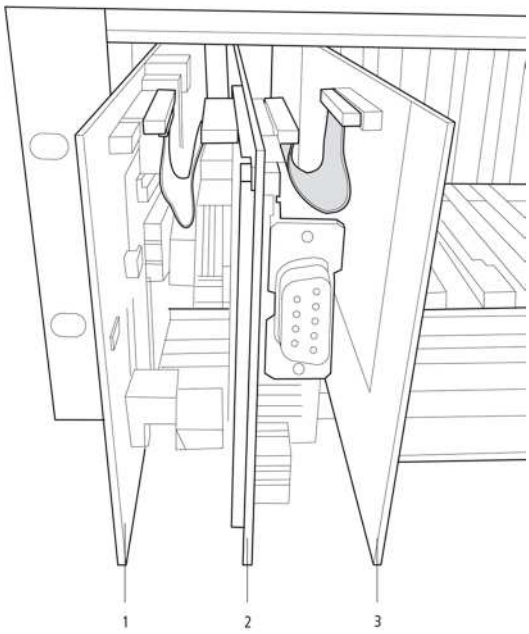
Mechanical Design	
Frame	19" Rack, 3 HE Operating unit with 7 inch colour display and touch screen
Max. Assembly	4 measurement channels
Weight	approx. 4-6 kg depending on assembly
Degree of protection	IP 20
Connections	USB port for the connection of USB storage devices or external devices Keyboard Ethernet (RJ-45 standard socket) Control unit operating voltage output (90-264 VAC, 50/60 Hz) 4 operating voltage outputs (to provide voltage for measurement channels)
Power consumption	Control unit equipped with a measurement channel: approx. 30 W Every additional measurement channel: approx. 15 W
Operating-temperature	0 ... + 50 °C
Storage temperature	-20 ... +70 °C
Control unit	Control of the display Configuration of measurement channels Fuses: 2 x (Si1 and Si2) 1A/T/250 V according to IEC60127-2/1
Each Measurement Channel	
Basic Module (required)	CPU with separate power supply unit and connection (90-264 VAC, 50/60 Hz) Detector connection 4-20 mA current output (fill level) with option of activating current output signal monitoring (can be switched on and off): Potential-free Switchable source (max. Impedance 500 Ω) or sink (max. DC 24 V, 500 Ω; min. DC 12 V, 250 Ω) mode Adjustable fault current in the event of an error: 2 mA, 22 mA or freezing of last value 2 digital inputs: Floating, for external empty and full adjustment Relay output for error signalling: Single pole double throw (SPDT), max. AC 33 V, DC 46 V, 5 A, non-inductive Fuses: 2 x (Si1 and Si2) 1A/T/250 V according to IEC60127-2/1 1 x (Si3) 5A/T/250 V according to IEC60127-3

Extension-Module (Option)	4-20 mA current output with option of activating current output signal monitoring: potential-free Switchable source (max. Impedance 500 Ω) or sink (max. DC 24 V, 500 Ω; min. DC 12 V, 250 Ω) mode Adjustable fault current in the event of an error: 2 mA, 22 mA or freezing of last value Can be configured for: Fill level (additional time constant, freely adjustable) Detector temperature Detector count 2 digital inputs: potential-free, for ext. Choice of up to 4 calibration curves 2 relay outputs for alarm signalling: Alarm relay 1: Single pole double throw (SPDT) Alarm relay 2: Single pole single throw, normally open (SPST NO) Max. of 33 VAC, 46 VDC, 5 A for each, non-inductive Can be configured for alarm signals: Max. level Min. level Detector temperature Digital input confirmation Pulse output: Detector pulses looped, max. 12 V amplitude Fuses: 2 x (Si3 and Si4) 5A/T/250 V according to IEC60127-3 1 x (Si5) 50 mA/T/250V according to IEC60127-3
Bus Module (Option)	GSD file is provided. Transmission of the following data: Cyclic output data: Fill level, detector value (CPS), Detector temperature, currently selected calibration curve, system status (RUN/ERROR/WARNING/STOP) Cyclic input data: Error confirmation, calibration curve, full and empty adjustment Profibus DP: Complete Profibus DPV1 Slave according to IEC 61158 Automatic Profibus baud rate recognition (9,600 bit/s - 12 Mbit/s) Standardised Profibus RS-485 port Integrated isolation with DC/DC converter and opto-coupler Profibus connection via 9-pole D-Sub socket Profinet IO (planning stage): Complete Profinet IO device implementation (Slave) with RT classification Fast Ethernet transfer 100 MBit/s in full duplex operation Integrated isolation Profinet IO connection via RJ45 standard socket

Entire System	
Software	Data entry via touch screen Operating languages: Bulgarian, Chinese (option), German, English, French, Italian, Korean (option), Portuguese, Romanian, Russian, Spanish, Czech, Hungarian Cycle time: 0.005 s (5 ms) Two time constants for filtering the raw signal: Lower measurement range: Fast reaction Upper measurement range: Calm signal Change-over point freely definable Plausibility checks for avoiding adjustment errors Minimum empty/full count rate ratio Max. deviation from last adjustment Calibration: Stores up to 8 different calibrations Exact or multi-point calibration as frequency polygon (e.g. for AOS-source) Two adjustment modes Factoring in of the natural background radiation Access to detector control and service (depending on detector connected) Test mode: Current outputs, digital in/outputs, calibration Password protection against unauthorised changes to the settings Data log on internal storage (SD) card or via Ethernet: Separately for each measurement channel Smallest log interval: 0.5 s Date/time, pulses, fill level, detector temperature, error status, Index of the active calibration curve Export of data to USB storage device: Data log, error log, change log Export and import of all measurement channel settings using USB storage device Software update (control unit, measurement channel, detector) using USB storage device

11.2 castXpert LB 452: Inside Overview



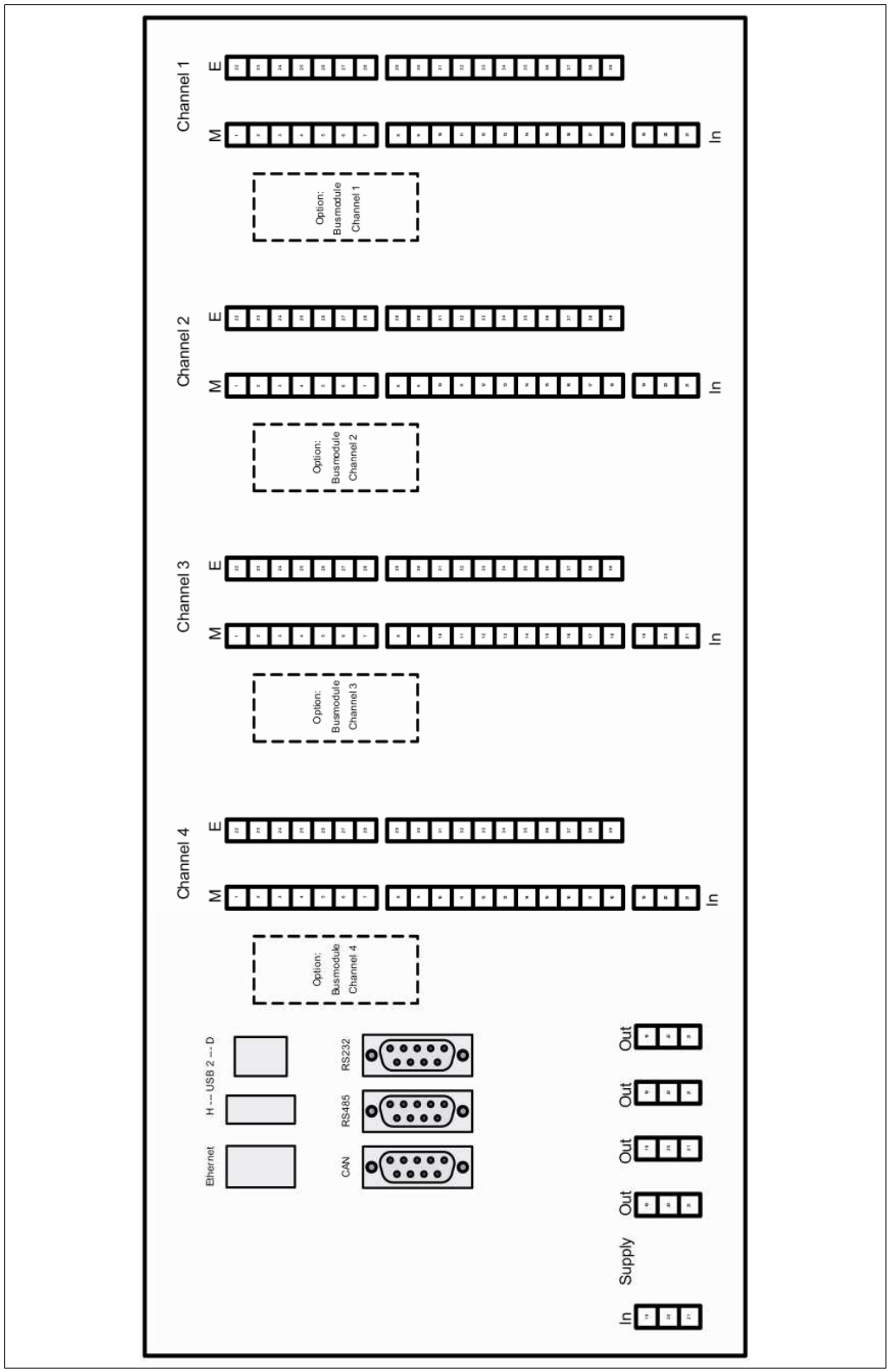


1	50502-01-S	Extension Module
2	50498-01-S	Basic Module
3	53799-S	(Card slot for) bus module
4	53772-S	System board (control Unit) with SD Card slot
5	53779-S	Front panel with display

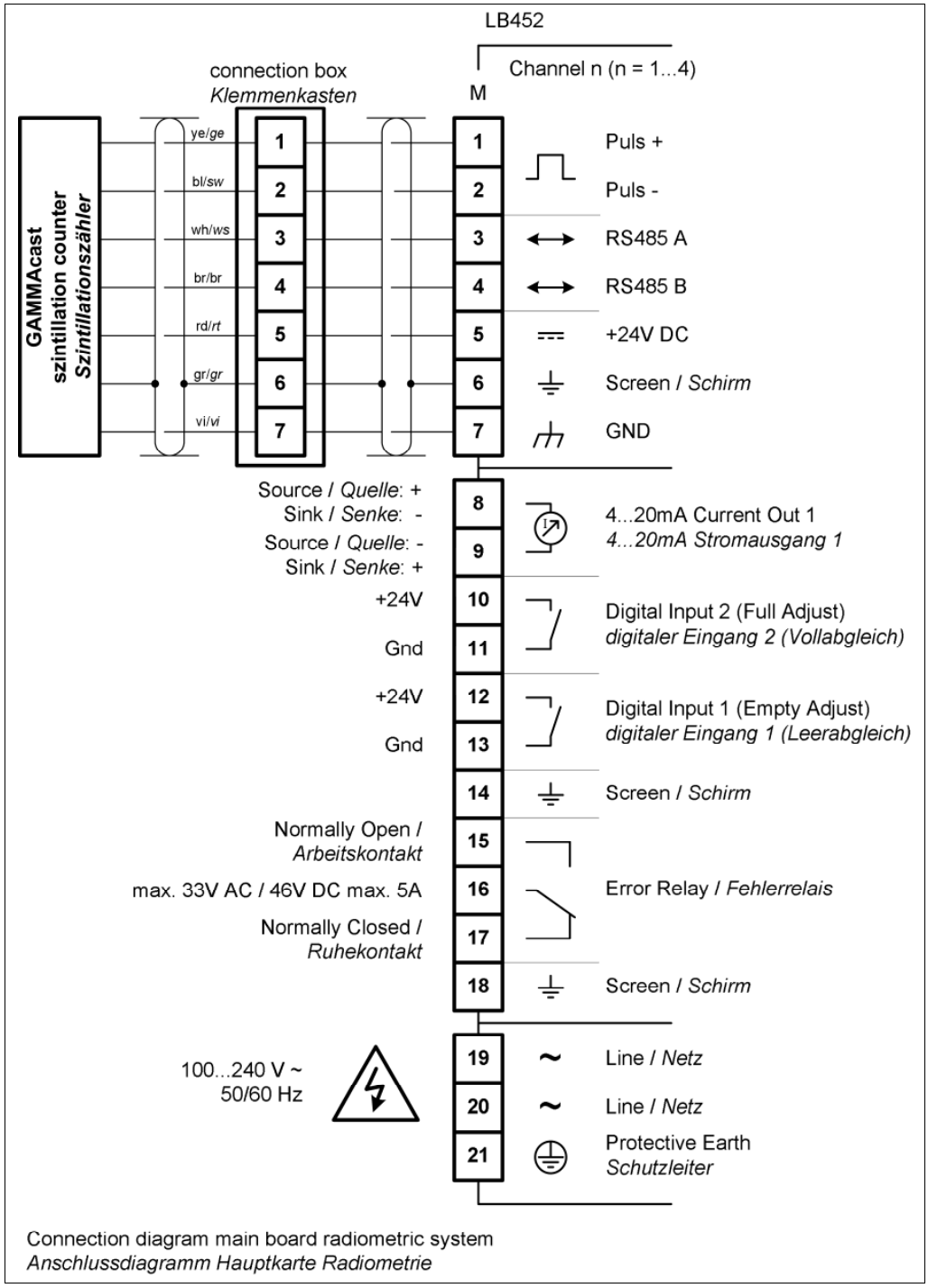
11.3 castXpert LB 452: Replacement Parts List

Replacement parts castXpert LB 452	
53779-S	Front panel with display for castXpert LB 452
53772-S	System-control unit for castXpert LB 452

11.4 castXpert LB 452 Connections: Rear Overview

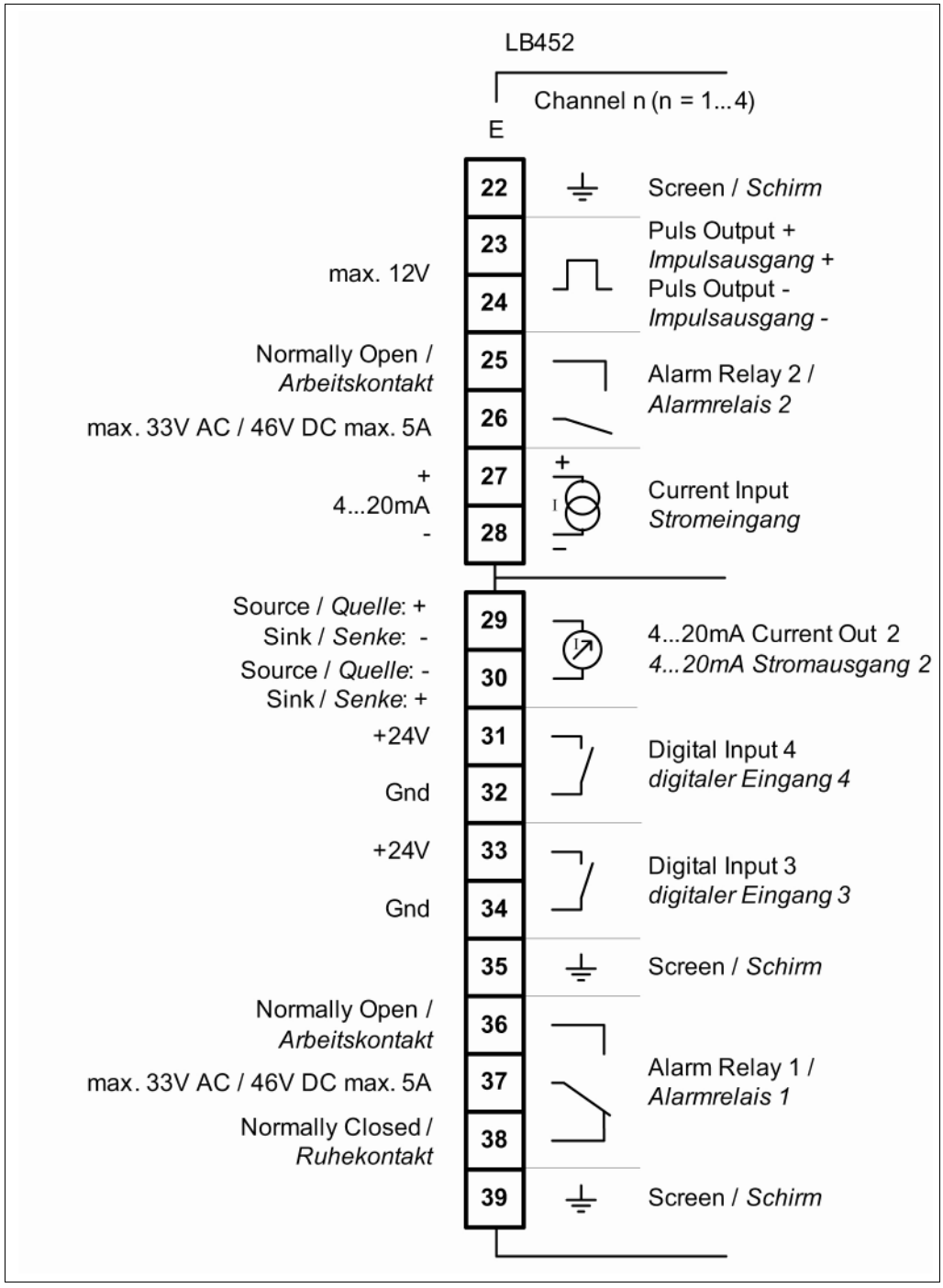


11.5 castXpert LB 452 Connections: Measuring channel base module



Connection diagram main board radiometric system
Anschlussdiagramm Hauptkarte Radiometrie

11.6 castxpert LB 452 Connections: Measurement Channel Extension Module



11.7 Data Definition Profibus DP

Cyclic Output Data

Variable name	Description	Type	Size
Mould Level	**Current Mould Level** unit: %/mm/inch (selectable)	Float	32 Bit
Detector Raw Value	**Current Detector Raw Value** unit: GAMMAcast - Pulses per Second (CPS) ECcast – Millivolt (mV)	Float	32 Bit
Detector Temperature	**Current Detector Temperature** Unit: °C/°F (selectable)	Float	32 Bit
Calibration Index	**Currently used calibration [0 ... 7] (decimal)** (Calibration curve, alarm thresholds, time constant, etc.)	Byte	8 Bit
System Status	System Status. This field contains binary coded information: **Bits 0-2: Main state of the system** Bit 0; 0x1 (1): RUN/MEASUREMENT RUNNING Bit 1; 0x2 (2): STOP Bit 2; 0x4 (4): ERROR **Bit 3: Warning** Bit 3; 0x0 (0): NO WARNING Bit 3; 0x1 (1): WARNING **Bits 4-11: Stop condition** Bit 4-11; 0x00 (0): Not in STOP state Bit 4; 0x01 (1): No detector found Bit 5; 0x02 (2): Detector Offline Bit 6;0x04 (4): Test Mode Bit 7;0x08 (8): Calibration running Bit 8;0x10 (16): Full Adjustment running Bit 9;0x20 (32): Empty Adjustment running **Bits 12-19: Alarms** Bit 12-19; 0x00 (0) No alarm running Bit 12; 0x01 (1): Detector Over Temperature Bit 13; 0x02 (2): Min. Fill Level Bit 14; 0x04 (4): Max. Fill Level Bit 15; 0x08 (8): Start-up mode (time constant) Bit 16; 0x10 (16): Trim Adjust Up running [only ECcast] Bit 17; 0x20 (32): Trim Adjust Down running [only ECcast] **Bits 20-31: Error number** A 12-bit unsigned integer number representing the number of the actual error Error# < 1000: LB 452 error Error# > 1000: Detector error	Unsigned Integer	32 Bit
			136 Bit = 17 Bytes

Cyclical Input Data

Variable Name	Description	Type	Size
Calibration Index	**Currently used calibration [0 ... 7] (decimal)** (Calibration curve, alarm thresholds, time constant, etc.)	Byte	8 Bit
Function Actuation	By writing a number in this field, functions on the EVU can be actuated: 0x0 (0) Idle (do nothing) Bit 0; 0x1 (1): Empty Adjust Bit 1; 0x2 (2): Full Adjust Bit 2; 0x4 (4): Trim Adjust Up (One Step) [only ECcast] Bit 3; 0x8 (8): Trim Adjust Down (One Step) [only ECcast] Bit 4; 0x10 (16): Start Automatic Calibration [only ECcast] Bit 7; 0x80 (128): Acknowledge Actual Error	Unsigned Integer	32 Bit
			40 Bit = 5 B

12 Declaration of Conformity

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EC-Declaration of Conformity

We, hereby declare under our sole responsibility that the design of the following products / systems / units brought into circulation by us comply with the relevant EC regulations.

This declaration loses its validity should modifications or unsuitable and improper use take place without our authorisation.

Description: ***Continuous Casting Level Measurement System castXpert***

Type: ***LB 452-XX***

	EC-Regulation and Reviews	Standards and Norms	
EMC	2004/108/EC	EN 61326-1	2006-05
		EN 61000-3-2	2006
		EN 61000-3-3	1995 +A1:2001 +A2:2005
		EN 61000-4-2	1995 + A1:1998 + A2:2001
		EN 61000-4-3	2002
		EN 61000-4-4	2004
		EN 61000-4-5	1995 +A1:2000
		EN 61000-4-6	2003
		EN 61000-4-8	1993 + A1:2000
		EN 61000-4-11	2004
		Namur NE21	2004
Low Voltage Directive	2006/95/EC	EN 61010 Part 1	2002-08

This declaration is issued by the manufacturer

BERTHOLD TECHNOLOGIES GmbH & Co. KG
Calmbacher Str. 22, D-75323 Bad Wildbad, Germany

released by

Dr. Wilfried Reuter
Technical Director
Bad Wildbad, 4th of May, 2010

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