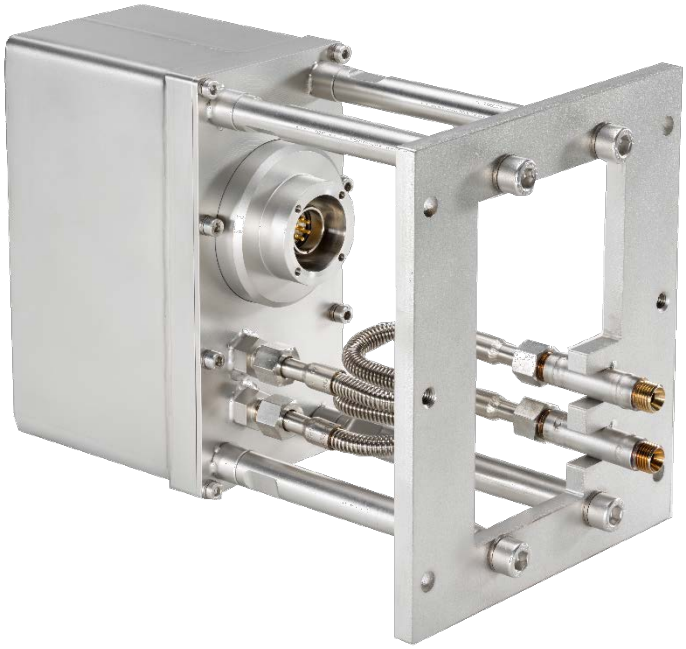
BERTHOLD

SMS group
SMS Concast AG



Detector
CONGAUGE LB 6755

Operating Manual
65055BA2

Rev. No.: 01, 05/2022
Embedded Software as of version 1.0.0

Process Control

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Operating Manual

Technical Information

1 General Information

1.1 Applicable Documents

This manual contains the following document:

- Technical Information, Id. No.65055TI

1.2 Conformity

The company BERTHOLD TECHNOLOGIES GmbH & Co. KG hereby declares in its sole responsibility that the design of this product in the distributed form complies with relevant EU directives stated in the original declaration of conformity.

This statement shall become void in the case of unauthorised changes or improper use.

1.3 Approvals and Certificates

For approvals and certificates, please refer to the document “Technical Information”.

1.4 About this Operating Manual

The product is handed over to you by the manufacturer Berthold Technologies GmbH & Co. KG (hereinafter referred to as Berthold) in a complete and functionally reliable condition.

This operating manual illustrates how to:

- set up/install the product
- establish the connections to the power supply
- perform measurements
- apply software settings
- install accessories
- fix errors
- disassemble the product
- dispose of the product

Read these instructions thoroughly and completely before working with the product. We have tried to compile all information for safe and proper operation for you.

However, should questions arise which are not answered in this operating manual, please contact Berthold.

Store the instructions where they are accessible for all users at all times.

Storage Place

This operating manual as well as all product-related documentation relevant to the respective application must be accessible at all times near the device.

Copyright

1.4.1 Validity of the Operating Manual

The operating manual is valid from the delivery of the Berthold product to the user until its disposal. Version and release date of this operating manual can be found in the bottom of each page. Modification service is not performed by the manufacturer Berthold.

The manufacturer reserves the right to make changes to this operating manual at any time without stating reasons.

NOTICE

The current revision of this operating manual replaces all previous versions.

Target Group

This operating 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.

1.4.2 Structure of the Operating Manual

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

Representation

Identifier	Meaning	Example
Quotation mark	Field in the software interface	"Calibrating"
Vertical line	Path specification	Settings | Selection
Pointed brackets	Keys and buttons	<Update>
Round brackets	Image reference	Connect the plug (fig. 1, item 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.

Symbols Used

NOTICE

If this information is not observed, deterioration in the operation and/or property damage may occur.

IMPORTANT

Sections marked with this symbol point out important information on the product or on handling the product.

Tip

Provides tips on application and other useful information.

General warning symbol

Warning symbol electrical shock

Warning symbol explosion hazard

Structure of Warnings

⚠ Signal Word

Source and consequence
Explanation, if required
▶ Prevention
In case of emergency

- **Warning symbols:** (warning triangle) draws attention to the hazard.
- **Signal word:** indicates the severity of danger.
- **Source:** specifies the type or source of danger.
- **Consequence:** describes the consequences of non-compliance.
- **Prevention:** states how one can avoid the hazard.
- **In case of emergency:** specifies which actions are required in the event of the occurrence of risk.

In this manual, warning instructions before instructions for action refer to risks of injury or damage to property. The hazard-prevention measures described must be observed.

⚠ DANGER

Indicates an **imminent**, major hazard, which will certainly result in serious injuries or even death if the hazard is not avoided.

⚠ WARNING

Indicates a **potential** hazard, which can result in serious injuries or even death if the hazard is not avoided.

⚠ CAUTION

Refers to a **potentially dangerous** situation, which can result in medium or minor physical injuries or damages to property, if it is not avoided.

2 Safety

2.1 Proper Use

The CONGAUGE LB 6755 detector is used in connection with a suitable evaluation unit provided by Berthold and a corresponding source of radiation to measure the radiation intensity occurring during a radiometric measurement. The following constitutes proper use:

- If you strictly follow the instructions and courses of action and do not perform any unauthorised actions that would endanger your safety and the operational reliability of the device!
- If you observe all specified safety instructions!
- If you perform the prescribed maintenance measures or have them performed!

2.2 Improper Use

⚠ WARNING

Injuries to persons and material damage!

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

- The health of the user.
- The efficient operation of the device.
- The functional reliability of the device.

▶ Observe the instructions from the Proper Use section.

▶ Adhere to the relevant safety regulations.

In case of emergency perform the required preliminary measures and contact emergency services immediately.

- If the product is used in a way which is not described in the present operating manual, the device's protection is compromised, and the warranty claim becomes invalid.
- Berthold shall only accept liability for / guarantee the correspondence of the device to its publicised 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 the castXpert LB 452 unit or castXpert calibration rig.
- Applying conditions and requirements which do not conform to those stated in the technical documents, data sheets, operating manuals and assembly instructions and other specific guidelines of the manufacturer.
- Using the CONGAUGE LB 6755 detector in damaged or corroded condition.
- Restructuring or changing the system components.

NOTICE

Detectors are not qualified according to IEC 61508 “Functional safety of electrical/electronic/programmable electronic safety-related systems”.

2.3 Qualification of the Personnel

NOTICE

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 operating manual, reference is made to groups of people with certain qualifications who can be entrusted with different tasks during installation, operation and maintenance.

These three groups of people are:

- Employees with General Knowledge
- Experts
- Authorised Persons.

Employees with General Knowledge

NOTICE

Those with a 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 electricians who can undertake different tasks during the transportation, assembly, and installation of the device under the guidance of an authorised person. This can also refer to construction site personnel.

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

Authorised Persons

Authorised persons are those who are either designated for the corresponding task due to legal regulations or have been approved by Berthold for certain activities.

2.4 Operator's Obligations

The operator of the devices must regularly train his personnel in the following topics:

- Observation and use of the operating manual and the legal provisions.
- Intended operation of the devices.
- Observation of the plant security instructions and the operating instructions of the operator.
- Regular monitoring/maintenance of the devices.

3 Product Description

The CONGAUGE LB 6755 detector converts the received gamma radiation into electrical impulses. The pulse rate emitted at the output of the CONGAUGE detector to the evaluation unit is proportional to the impinging radiation intensity.

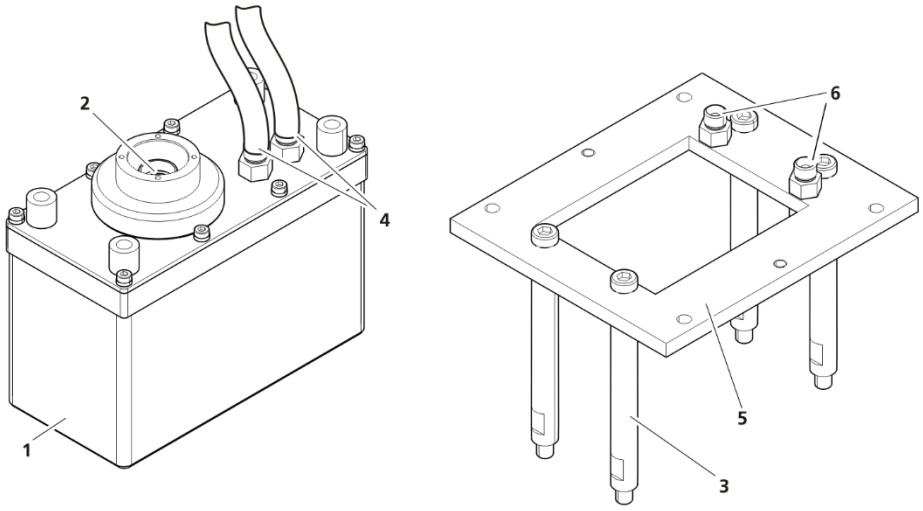
The detector described herein has multiple scintillation counters that, in connection with a suitable evaluation unit, determine the radiation intensity occurring during a radiometric measurement.

The CONGAUGE LB 6755 detector can measure the fill level of metal and casting powder thickness in a mould continuously and simultaneously.

3.1 Overview

The CONGAUAGE LB 6755 detector has been designed with the option to mechanically retrofit installations of the GAMMAcast LB 6752 detector from Berthold. For this purpose, four extension bars, two extension hoses, and a mounting flange are utilized (mechanical adaptor kit).

For new installations of the CONGAUGE LB 6755 detector, these extension parts are not necessary reducing the mechanical footprint considerably.



1 Stainless steel housing with water cooling hoses
2 PlugProtect plug-in connection
3 Extension bars (allows for the same mechanical dimensions as the LB 6752)
4 Extension hoses (allows for the same mechanical dimensions as the LB 6752)
5 Mounting flange
6 Connections for water cooling

Fig. 1 Detector and mechanical adaptor kit.

The CONGAUGE LB 6755 detector consists of the following main components:

- Stainless steel housing
- Mounting flange
- Electronics with integrated CPU
- 5 x scintillator modules with crystals and silicon photomultipliers
- Water cooling system
- Connection cable with heat protection hose and PlugProtect plug-in connection.

The following components are optional and for retrofitting a GAMMAcast LB 6752 detector installations:

- Extension bars
- Extension hoses

Scintillator

The CONGAUGE LB 6755 detector is a scintillation counter with ten crystals and silicon photomultipliers. Two crystals are mounted in the same aluminium housing forming a scintillation module, and in total 5 scintillation modules are stacked in each detector.

Connection Cable

The plug-in connection "PlugProtect" protects the transition between the detector and the connection cable against moisture penetration. The heat protection hose covering the connection cable protects it against too high temperatures.

The connection cables are commonly connected to a terminal box. For this purpose, a variant with HeavyCon plug or open ends can be used. The terminal box is connected to the castXpert LB 452.

Water Cooling System

The CONGAUGE detector is equipped a water-cooling system integrated into the housing to protect the electronics and the scintillators from overheating.

3.2 Symbols Used on the Device

Observe the operating manual

Please observe the instructions in this operating manual.

Protective earth connection

At this position, connect the protective earth conductor (PE).

AC voltage

The device is operated with alternating voltage and may only be connected with an alternating voltage source.

No domestic waste

The electric product must not be disposed of in domestic waste.

3.3 Storage

Keep device in a dry (no condensation), dark (no direct sunlight) and clean room. Stay within the temperature range for storage.

4 Installation

4.1 General Instructions

The applicable national regulations of the country of use have to be observed. Repair and maintenance on the devices may only be performed by experts (see chapter 2.3). In case of doubt, the complete device must be returned to Berthold for repair.

⚠ WARNING

Danger to life by explosion!

CONGAUGE detectors are not explosion-proof.

- The CONGAUGE detectors must not be used in systems in which explosive gases or vapours may form.

NOTICE

The applicable national regulations of the country of use have to be observed!

Only mounting accessories approved by Berthold should be used for installation of the devices. The device should only be operated if firmly installed.

4.2 Unpacking / Scope of Delivery

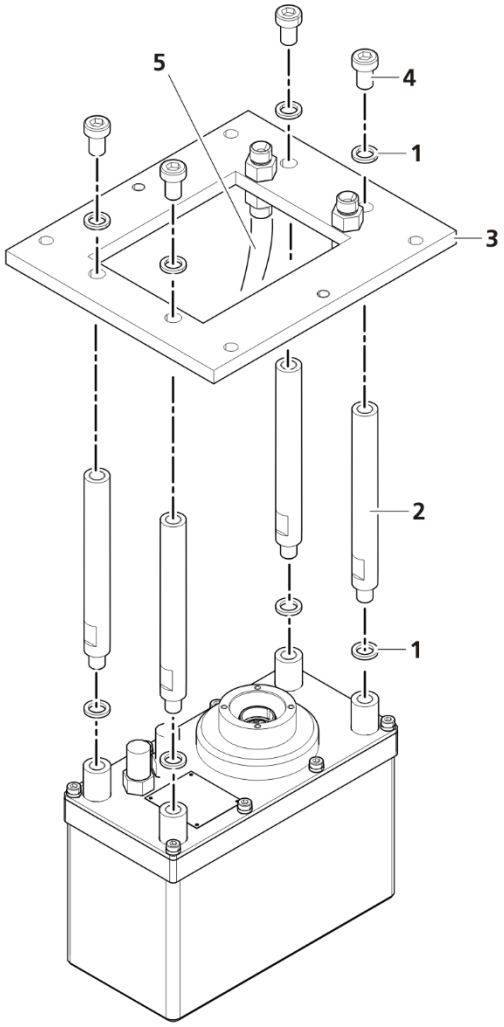
The product will be delivered completely configured according to the purchase order. Check your delivery for completeness and damage according to your order. Please report missing, defective or incorrect parts immediately.

4.3 Installation of the Detector

Mount the CONGAUGE detector to the outside or inside of the mould. If required, connect the water-cooling system.

Replacing GAMMAcast LB 6752 with CONGAUGE LB 6755

To prepare for an easy retrofit, a mechanical adapter (Id. no. 66784) kit is offered. With the use of this adapter kit, the CONGAUGE LB 6755 detector gets the same mechanical dimensions as the GAMMAcast LB 6752-11 detector.



1 Washer 4x
2 Extension bars 4x
3 Mounting flange
4 Hex socket screw 4x
5 Water hoses 2x

Fig. 2 Detector and mechanical adaptor kit.

4.4 Water Cooling System Connection

The CONGAUGE LB 6755 detector is equipped with a water-cooling system. Please make sure that the water is drained at the highest point, as shown in Fig. 3 to avoid internal air bubbles. If the extension bars are to be used, please make sure to first connect the water hose close to position of the extension bars before the other water hose is connected. The reverse order will not offer enough space for the spanner.

NOTICE

Damage from poor water quality!

When using water that does not have the same quality as drinking water, the water-cooling system and the CONGAUGE LB 6755 detector may be damaged due to deposits of dirt particles. Reduced cooling possibility occurs.

- Only water that has the same purity as drinking water may be used as coolant.
- Please observe the minimum cooling water requirement of the CONGAUGE LB 6755 detector (see document “Technical Information”).

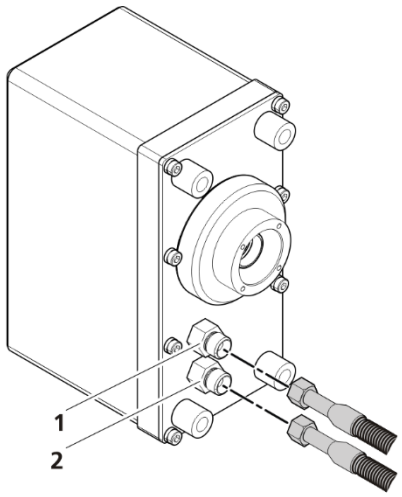
NOTICE

Damage from overheating!

If the cooling water flow is shut off too early, the admissible temperature of the CONGAUGE detector may be exceeded.

If the water is left in the water-cooling system when there is a risk of frost, this may cause mechanical damage to the water-cooling system.

- Keep the cooling water flowing as long as necessary.
- Drain the water-cooling system when there is a risk of frost.



1 Water cooling outlet
2 Water cooling inlet

Fig. 3 Water cooling system connection.

Insert the CONGAUGE LB 6755 detector with water cooling system into the cavity in the mould that corresponds to the detector.

5 Electric Installation

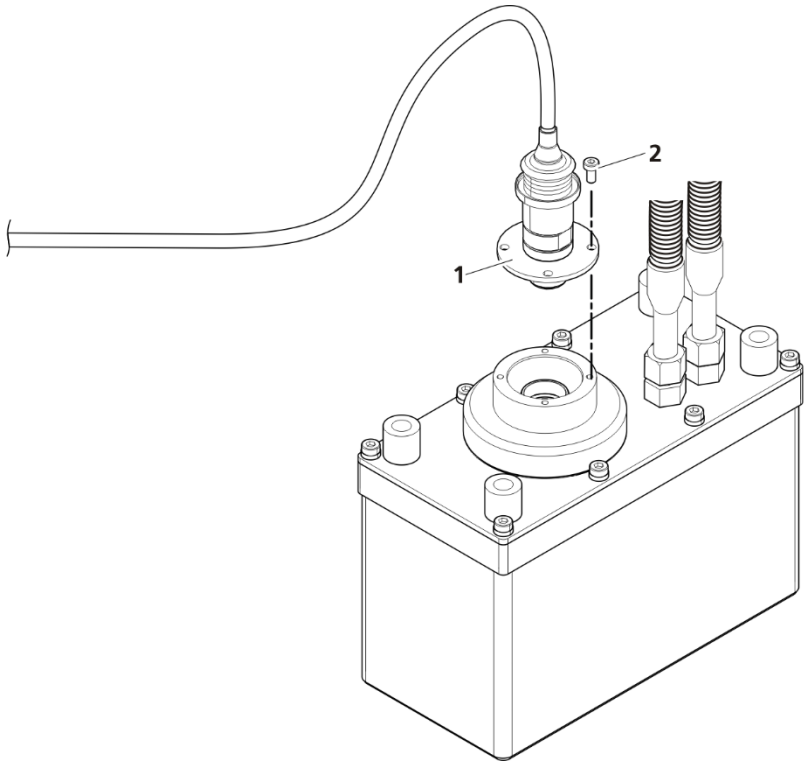
⚠ DANGER

Danger to life from electric shock!

- The installation may only be carried out by a qualified electrician.
- Please adhere to the relevant safety regulations.
- During installation and servicing on the hardware as well as during wiring of the detector, the measuring system, connected relay contacts and all inputs and outputs must be de-energised.

In case of an electric shock, carry out first aid measures and immediately call an emergency service.

Insert the Plug-in connection cable with heat protection hose in the connector socket of the detector. Screw the plug connector with 4 hexagon socket screws. Observe connection diagrams in the document "Technical Information" for connection to the evaluation unit LB 452 / junction box.



1 Plug connector
2 Hex socket screws

Fig. 4 Connecting the detector cable to the detector.

The CONGAUGE detectors LB 6755 and the LB 452 evaluation unit (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 1 000 m. As required, the terminal box can be ordered for open ends (Id. no. 07005, Fig. 5, Pos. 1) or with a plug-in connector (Id. no. 34787, Fig. 5, Pos. 2).

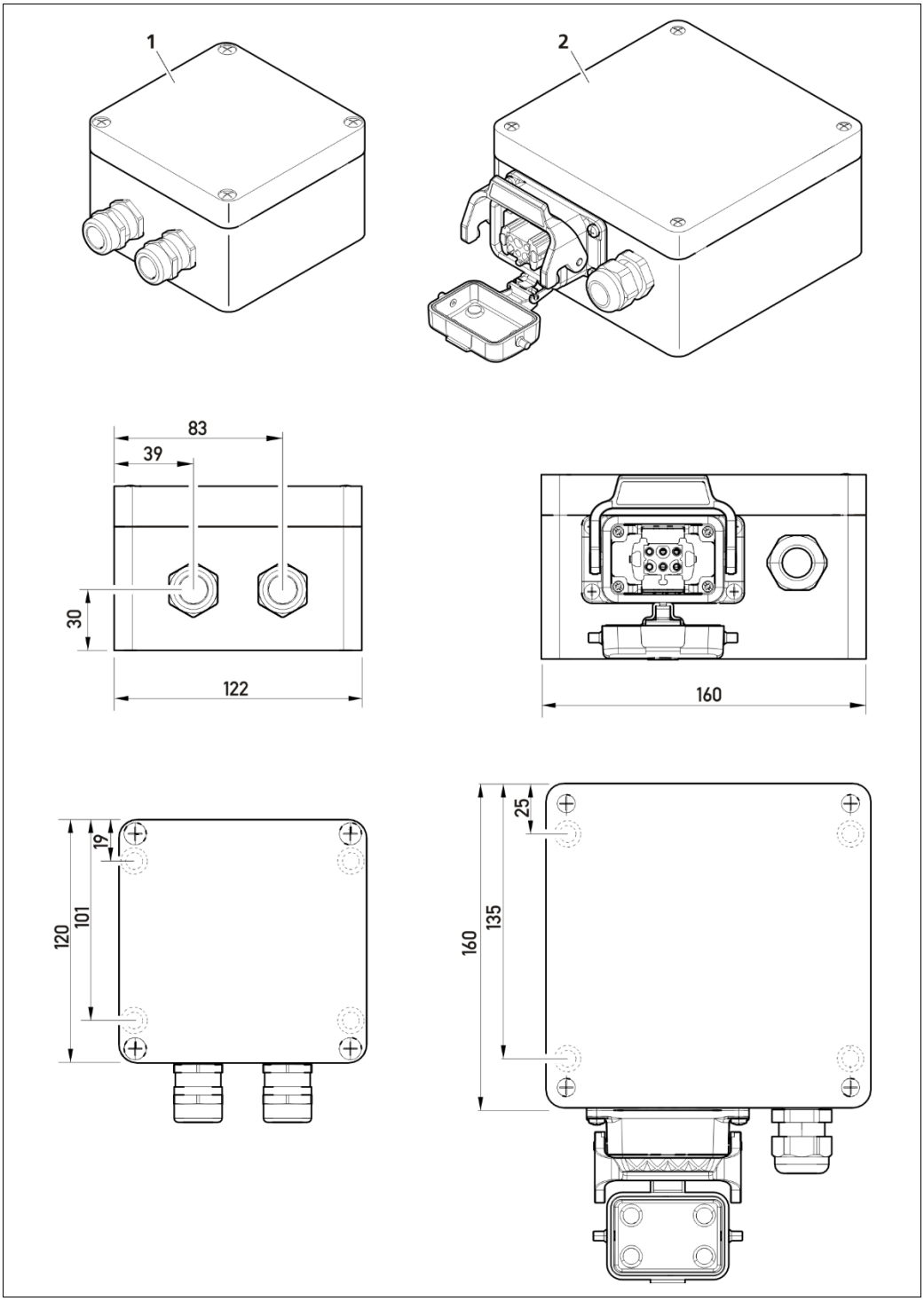


Fig. 5 Terminal boxes for detectors.

6 Use of the Software

To be able to access all functions of the CONGAUGE detector LB 6755, it is required to operate the detector via a castXpert LB 452 evaluation unit.

In this manual the software parts specific for the CONGAUGE detector LB 6755 are described (Fig. 6, grey marked) and the other general menus and setup of the software, are described in the castXpert LB 452 evaluation unit user manual.

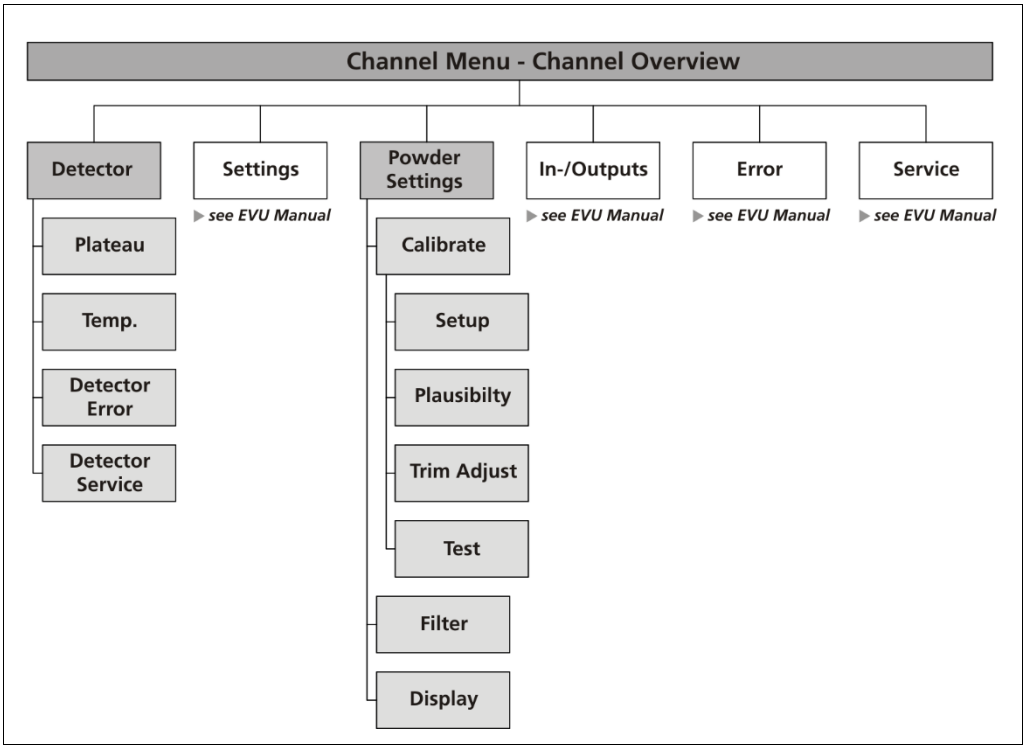
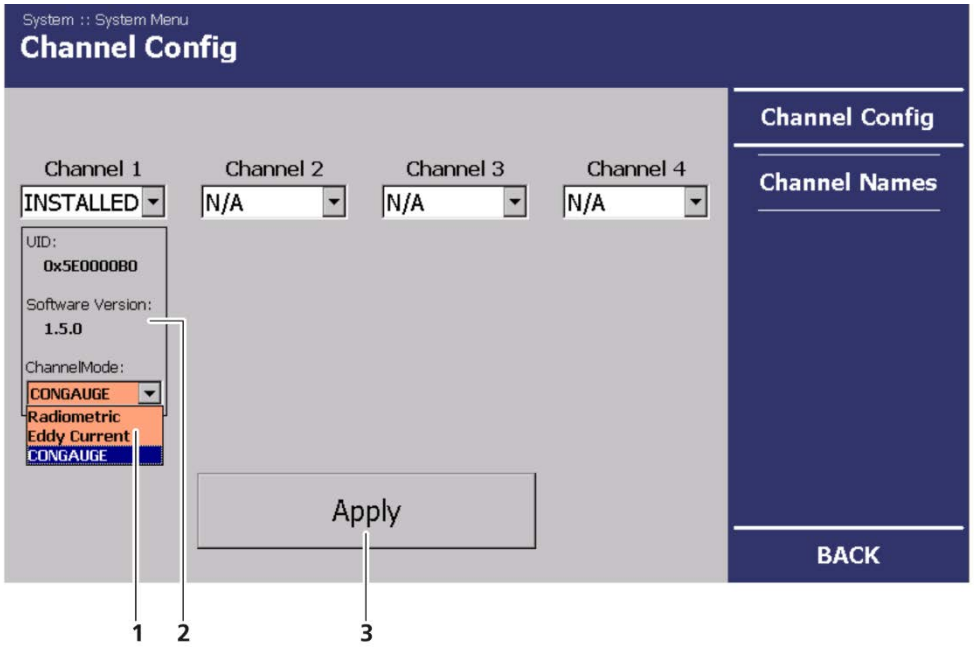


Fig. 6 Channel menu overview for the LB 452 software.

6.1 Operation via castXpert LB 452

Installation of the CONGAUGE Detector

When connecting the CONGAUGE detector LB 6755 to an installed measurement channel of the LB 452, the detector will automatically be detected and started.



1 Channel mode drop-down menu
2 Drop-down menu channel 1
3 Button <Apply>

Fig. 7 “Channel Config” menu

Proceed as follows in order to set up the measurement channel:

1. In the standard display, click on System | System Menu | Channel Configuration, in order to access the "Channel Config" submenu.

NOTICE

The channel modes “Eddy Current” or “Radiometric” are not admissible for the CONGAUGE detector LB 6755.

- ▶ In the drop-down menu, set the "Channel Mode" (measurement technique) to "CONGAUGE" (Fig. 7, Pos. 1).

2. In the drop-down menu below "Channel X" select “INSTALLED”.
3. In the drop-down menu "Channel Mode" select “CONGAUGE”.

IMPORTANT

Both the basic module and the extension module must be installed in the corresponding channel in the castXpert LB 452 for the CONGAUGE system to function properly.

- ▶ Make sure that the CONGAUGE detector LB 6755 is correctly connected (see chap. 5).

- ▶ The CONGAUGE detector LB 6755 is correctly installed and can be configured.

7 Detector Menu

In the figure below the schematic structure of the "detector menu" is displayed. In the "detector menu", you can carry out checks of the detector, make detector settings, and set the tripping limits of alarms for temperature exceeding.

You can also look into the error history, export service data, reboot the detector, or reset it to the factory settings.

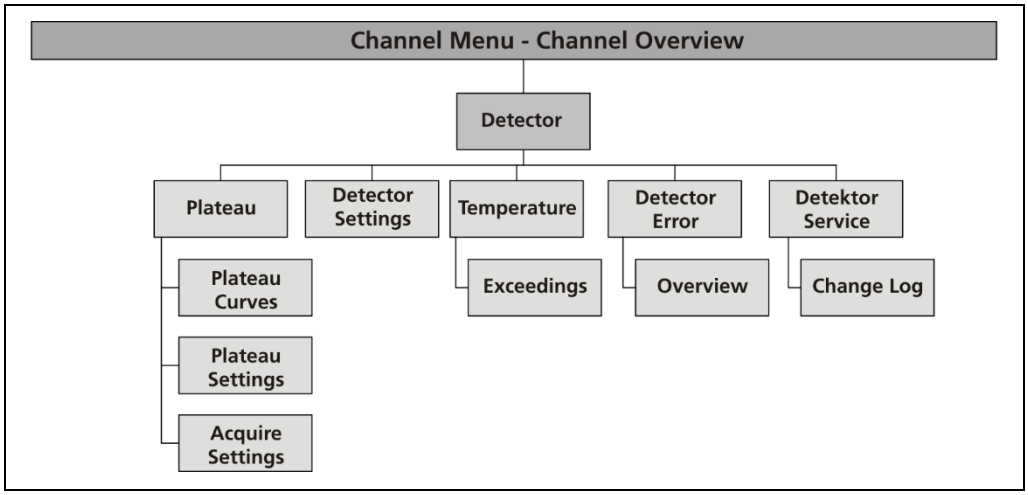


Fig. 8 Menu structure for the detector submenu.

1. In the standard display, click on the channel "Channel X" to which you had connected a CONGAUGE detector LB 6755.
   - ▶ The "Channel Overview" menu opens.

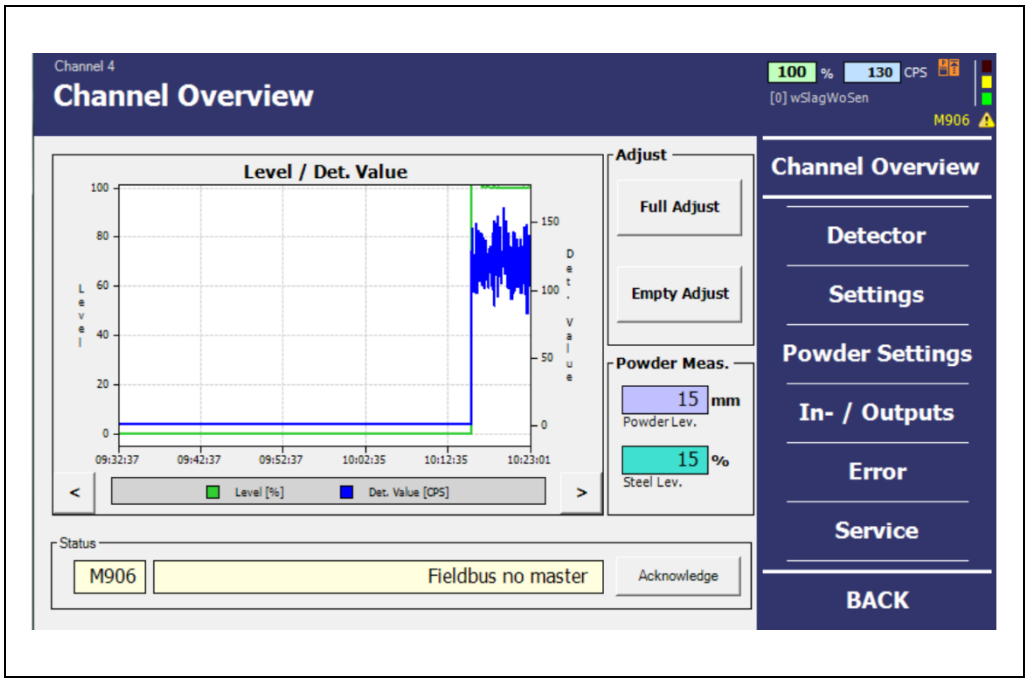
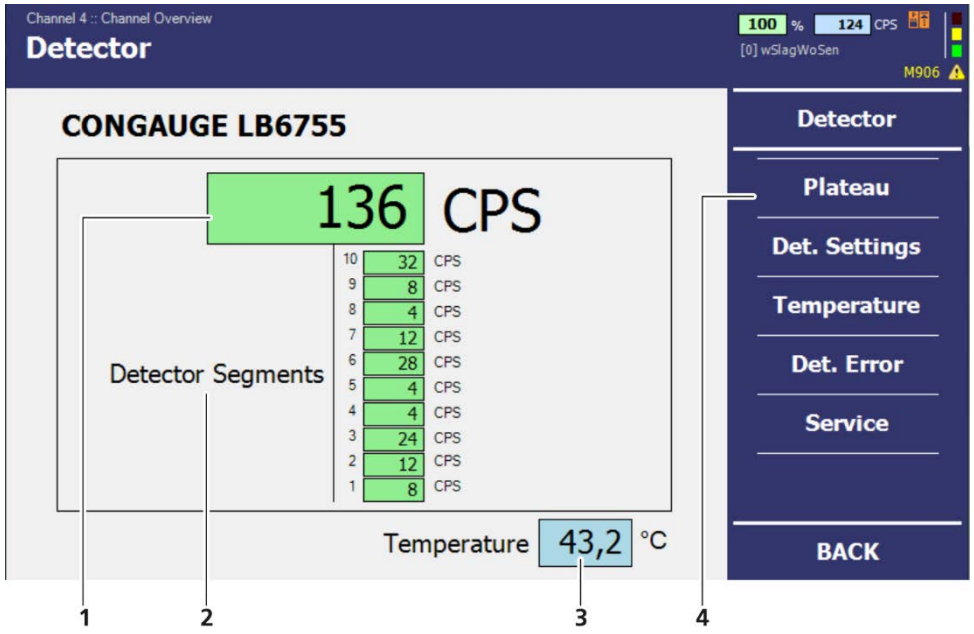


Fig. 9 "Channel Overview" menu

2. In the "Channel Overview" menu, click on <Detector> to access the "Detector"

submenu.

- The "Detector" submenu opens (Fig. 10).



1 Current count rate display field
2 Current count rate for each detector segment
3 Current temperature display field
4 Detector submenus

Fig. 10 “Detector" menu

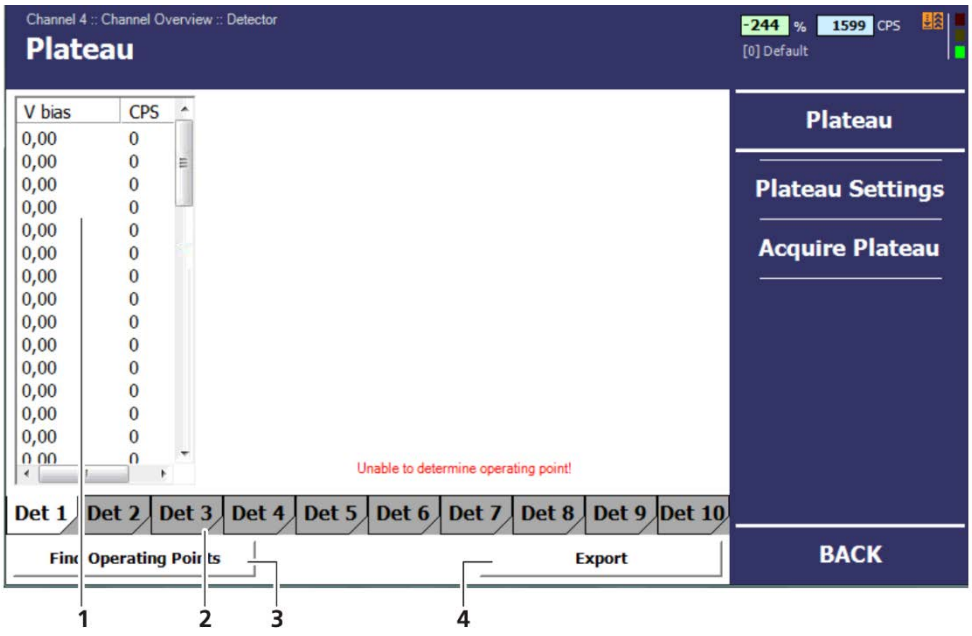
7.1 Plateau

During the plateau acquisition, the voltage required for the operation of the silicon photomultiplier (SiPM) is gradually increased. The pulse rate is measured after each increase.

IMPORTANT

For detectors from Berthold supplied with silicon photomultiplier technology, there is normally no need to manually find the operation point. The reason for this is that the detector automatically and constantly adjusts this point. However, it is still possible to do a plateau acquisition for each of the 10 segments for fault finding purposes.

The determined plateau curve is displayed in a diagram. When the voltage supply increases, the pulse rate will increase as well. This must result in the development of a clear plateau. Other damages to the scintillation counter can already be determined by means of a visual inspection, see chapter 9.



1 Table for bias voltage and counts per second for the selected detector
2 Tab for selecting a single detector segment (1 to 10)
3 Button to find operating point once the plateau has been acquired
4 Button to export plateau data for all detectors

Fig. 11 “Plateau” menu

1. In the menu Channel X | Channel Overview | Detector, click on <Plateau> (Fig. 10, pos. 4) to access the "Plateau" submenu.

▶ The "Plateau" submenu opens.

2. Click on <Plateau Settings>, if you wish to change the pre-set values for the plateau acquisition.

7.2 Plateau Settings

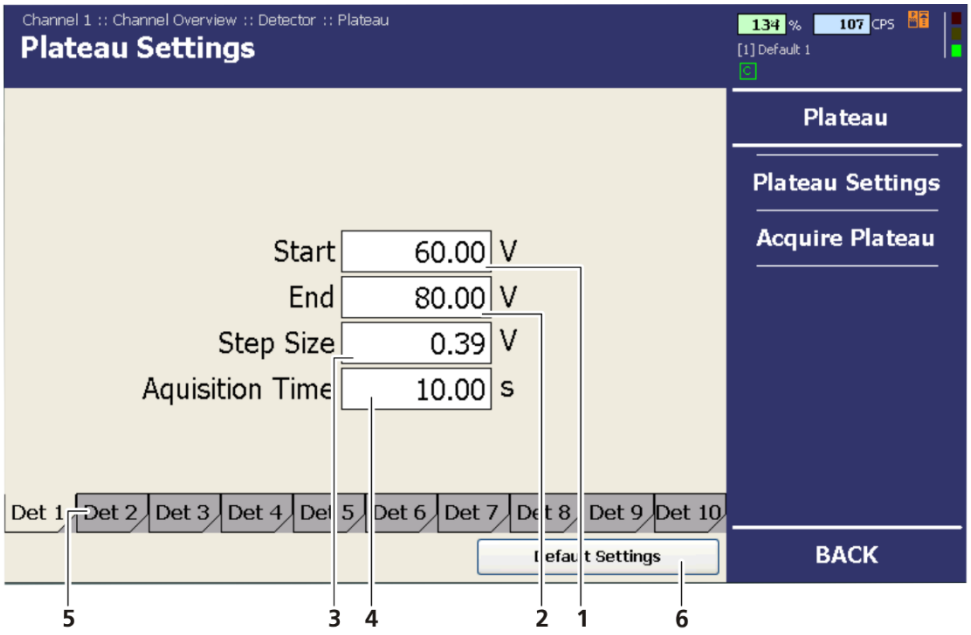
NOTICE

In the condition as supplied, the values in the submenu "Plateau Settings" are pre-set by Berthold.

- Only change these values after prior consultation with Berthold.

In the "Plateau Settings" submenu, you have the following settings options:

- Definition of the range of the plateau acquisition
- Refers to the step size (interval) between two measuring points
- Refers to the time that is used per measuring point for the counting of the count rate (CPS)



1 Voltage input field - start of the plateau recording
2 Voltage input field - end of the plateau recording
3 Input field for the voltage - step size (interval)
4 Voltage input field - acquisition time per interval
5 Detector segment selection tabs
6 Button <Default Settings> for resetting to default values

Fig. 12 "Plateau Settings" menu

7.2.1 Acquiring a Plateau

When acquiring a plateau, proceed as follows:

1. Position a Cobolat-60 test source at the front side of the detector or use the source of radiation built into the mould. When using the source of radiation, bring the lock of the shielding to the "OPEN" position.

NOTICE

- Please make sure that there is a constant distance between the source and the detector.
- Please make sure that there are no objects in the beam path.

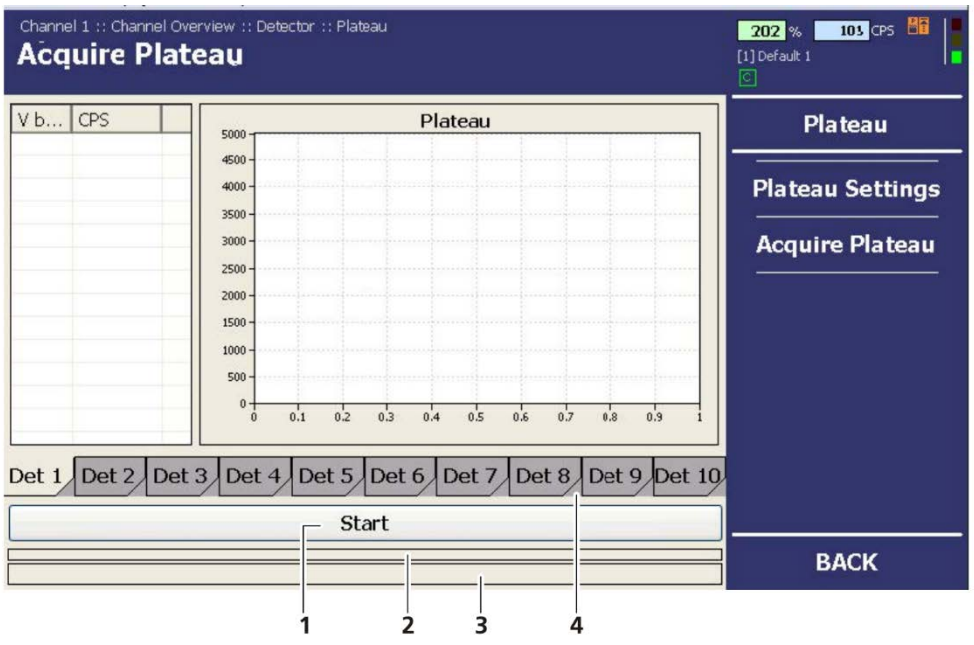
NOTICE

By acquiring a plateau, the CONGAUGE measurement of the mould level is interrupted.

- Make sure that there is no measurement in progress at the time of the plateau acquisition.

3. In the menu Channel X | Channel Overview | Detector, click on <Plateau> to access the "Plateau" submenu.
4. Click on <Acquire Plateau>.

- The "Acquire Plateau" submenu opens.

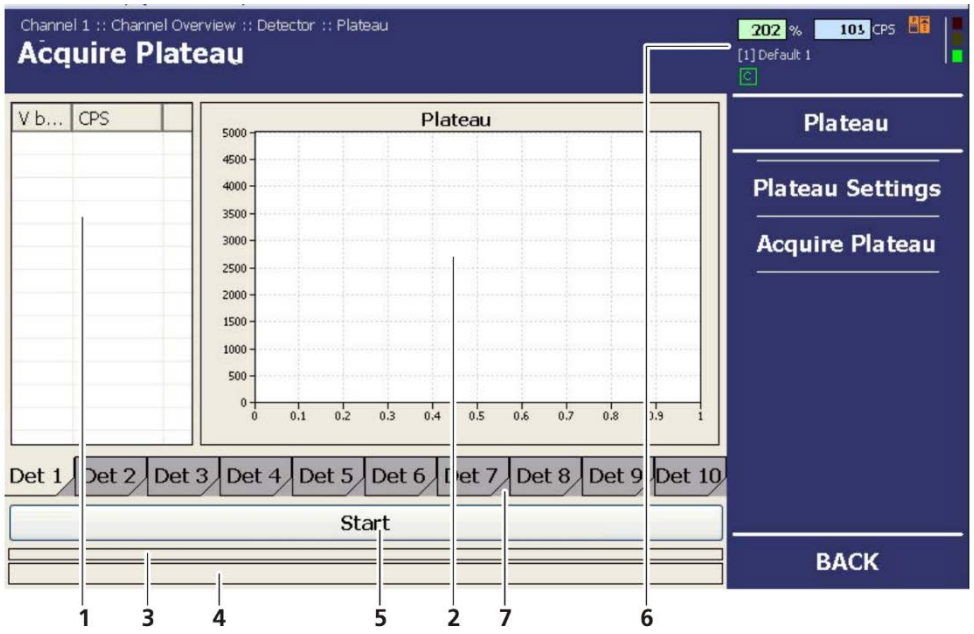


1 Button <Start>
2 Display bar for the acquisition time of the respective voltage
3 Display bar for the acquisition time of the plateau acquisition (overall)
4 Detector segment selection tab

Fig. 13 "Plateau (Acquire Plateau)" menu

5. Click on the button <Start> in order to acquire a plateau.
   - A confirmation message opens.
6. Confirm the confirmation message by clicking on <OK>.

- The EVU switches to "DET" mode. The current measurement is stopped.
- The plateau recording is started automatically. This process can take several minutes.
- The recorded values are read in and entered into the table and the plateau curve is drawn and automatically saved.



1 Table: Recorded count rate (CPS) for the respective voltage
2 Display of the plateau curve
3 Display bar for the acquisition time of the respective voltage
4 Display bar for the acquisition time of the plateau acquisition (overall)
5 Start / Stop button
6 Detector mode (DET) display
7 Detector segment selection tab

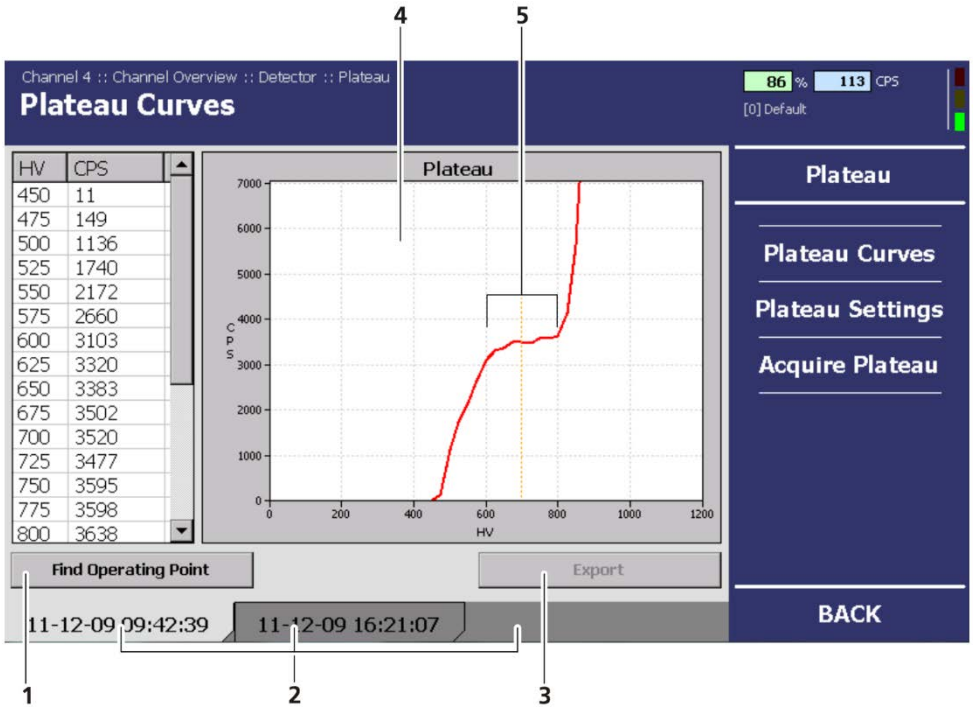
Fig. 14 “Plateau (Acquire Plateau)” menu

- When the acquisition is complete, a confirmation message opens. Confirming it will automatically search for and determine the operating point.
- The plateau recording is complete.

7.2.2 Plateau Curves

This menu offers you the following options:

- Display of different plateau curves. The tabs will only appear if you have already acquired several plateaus.
- Finding the operating point using the different plateau curves (if you have acquired several curves).
- Export of plateau acquisitions in tabular form (.txt file) onto a USB flash drive.



1 Button <Find operating point>
2 Tabs for the different plateau acquisitions
3 Button <Export>
4 Display of operating point
5 Plateau (flat section of the curve)

Fig. 15 "Plateau (Plateau Curves)" menu

1. In the menu Channel X | Channel Overview | Detector, click on <Plateau> to access the "Plateau" submenu.
2. Click on <Plateau Curves>.

▶ The "Plateau Curves" submenu opens (Fig. 15).

Finding the Operating Point

The operating point defines the value for the voltage for the operation of the silicone photomultipliers.

IMPORTANT

For detectors from Berthold supplied with silicon photomultiplier technology, there is normally no need to manually find the operation point. The reason for this is that the detector automatically and constantly adjusts this point. However, it is still possible to do a plateau acquisition for each of the 10 segments for fault finding purposes.

1. Click on the button <Find operating point> (Fig. 15, Pos.1) to create a new operating point.
2. Confirm the confirmation message by clicking on <OK>.
   - The operating point is automatically searched for and created.

Export (Plateau Acquisition)

Click on the button <Export> (Fig. 15, Pos.3) to export the data table of the plateau acquisition. The table containing the voltages (HV) and count rates (CPS) is stored in the main directory of the USB flash drive in the form of a txt. file.

7.3 Detector Settings

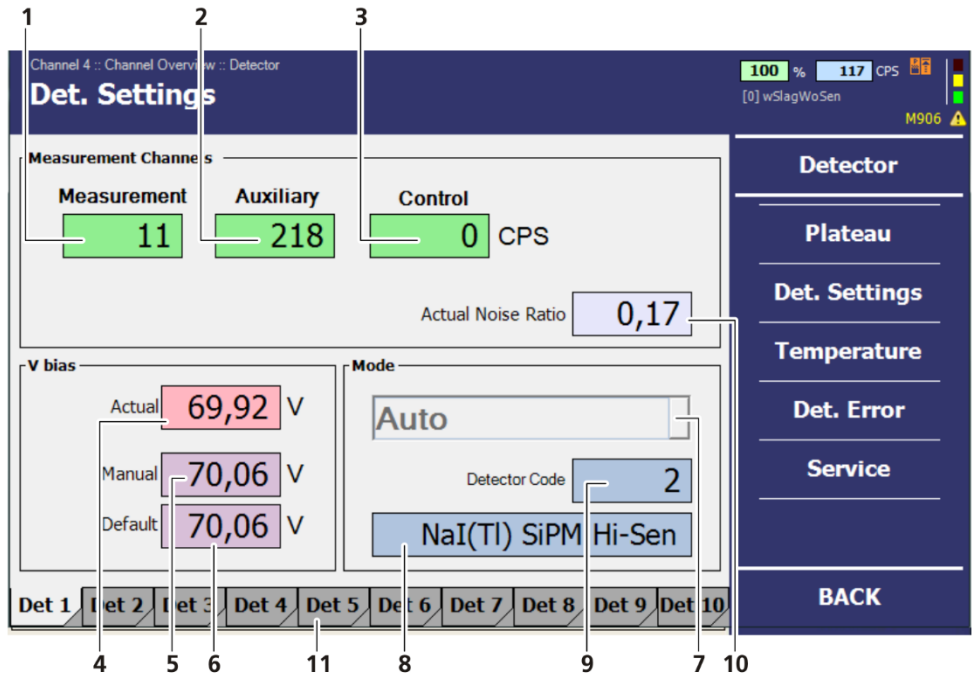
In the menu Channel X | Channel Overview | Detector, click on <Det. Settings> to access the "Detector Settings" submenu. This menu provides you with the following setting options:

- Mode
- Detector Code

NOTICE

Using the "Automatic" control mode is must for CONGAUGE LB 6755

▶ The CONGAUGE detector LB 6755 must be set in "automatic" mode.



1 Display field Count rate (CPS) of the measurement channel
2 Display field Auxiliary channel (CPS)
3 Display field Control channel (CPS)
4 Currently back measured voltage
5 In control mode "Manual" used target voltage
6 In control mode "Automatic" used starting value for the voltage
7 Menu “Control Mode”
8 Display field “Scintillator”
9 Input field “Detector code”
10 Display field “Actual Noise Ratio”
11 Detector segment selection tab

Fig. 16 “Detector Settings” menu

IMPORTANT

Actual Noise Ratio

If the level rises above a specified limit, a warning is triggered because the thermal noise is too close to the measurement threshold (Value range between 0 and 1).

Detector Code

NOTICE

The detector code has been pre-set by Berthold in the condition as supplied.

- Change the value only after consultation with Berthold.

Possible detector codes for CONGAUGE LB 6755 detectors:

2 = LB 6755; crystal: NaI(Tl) with SiPM Hi-Sen

3 = LB 6755; crystal: NaI(Tl) with SiPM Low-Sen

7.4 Temperature

NOTICE

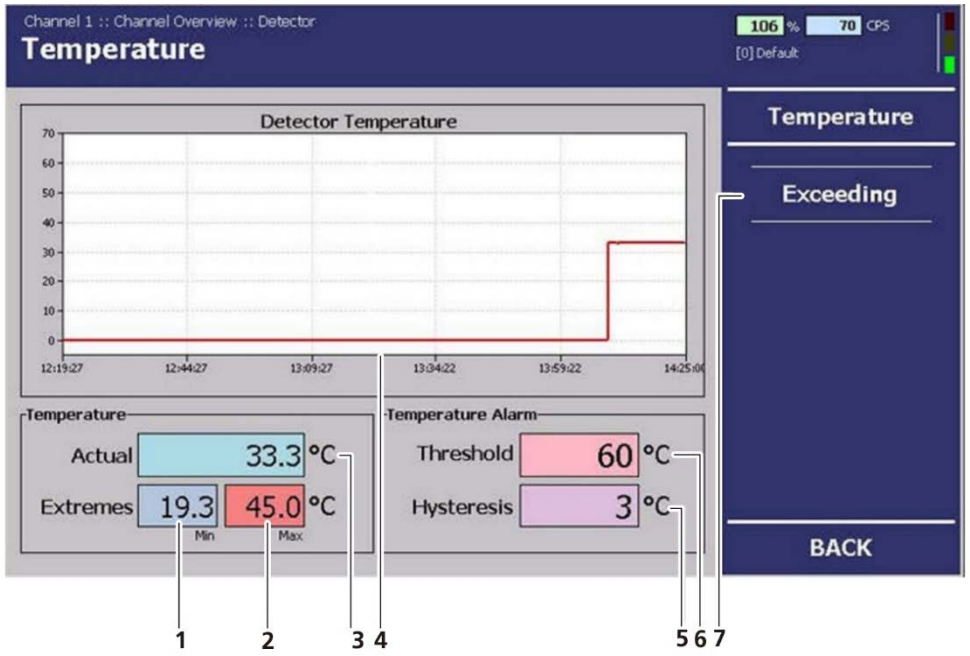
In the condition as supplied, the values for the threshold and the hysteresis have already been pre-set by Berthold. The maximum temperature specified in the technical data may not be exceeded.

- If the threshold is set too high, the temperature alarm might not be triggered even though the admissible temperature at the CONGAUGE detector LB 6755 has already been exceeded.
- Setting the threshold too high may cause damage to the scintillator of the CONGAUAGE detector LB 6755.

The "Temperature" submenu offers you the following options:

- **Actual:** Display of the current detector temperature.
- **Extremes:** Display of achieved maximum and minimum temperatures of the detector.
- **Threshold:** Setting the temperature (threshold) at which an alarm is to be triggered (see “EVU LB 452 castXpert, alarm relay).
- **Hysteresis:** Setting the hysteresis. When the temperature increases, the temperature alarm will be triggered once the set threshold temperature of (in this case) 60°C is exceeded. If the temperature falls again, the alarm does not switch off until the temperature falls below (in this case) 60°C - 3°C = 57°C.

In the **menu** Channel Overview | Detector, click on **<Temperature>** if you want to set the threshold and hysteresis for the temperature alarm of the CONGAUGE detector LB 6755.



1 Extremes display field (minimum temperature)
2 Extremes display field (maximum temperature)
3 Current temperature display field
4 Graphical display of temperature over the course of time
5 Input field for temperature alarm - hysteresis
6 Input field for temperature alarm - threshold
7 Button <Exceeding>

Fig. 17 “Temperature” menu

Exceeding

IMPORTANT

The temperature exceedings displayed in the "Exceeding" submenu do not depend on the set threshold temperature triggering the temperature alarm. The thresholds (60 °C, 65 °C, and 70 °C) used for this list are fixed-programmed.

In the menu Channel Overview | Detector | Temperature, click on <Exceeding> to access the "Exceeding" submenu. In the "Exceeding" submenu, you can see a tabular overview of the excessive temperatures.

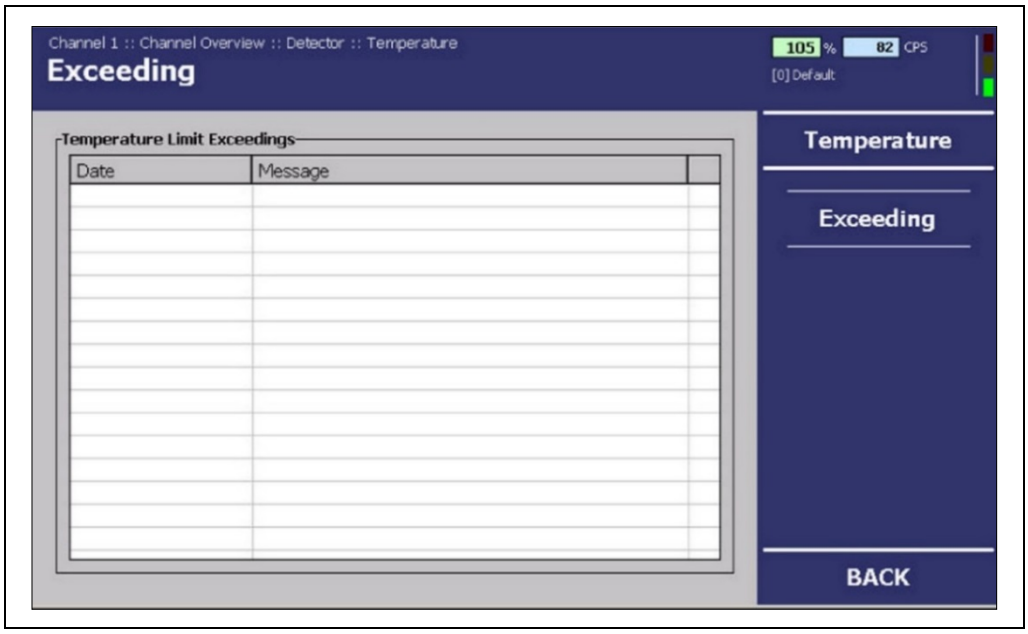
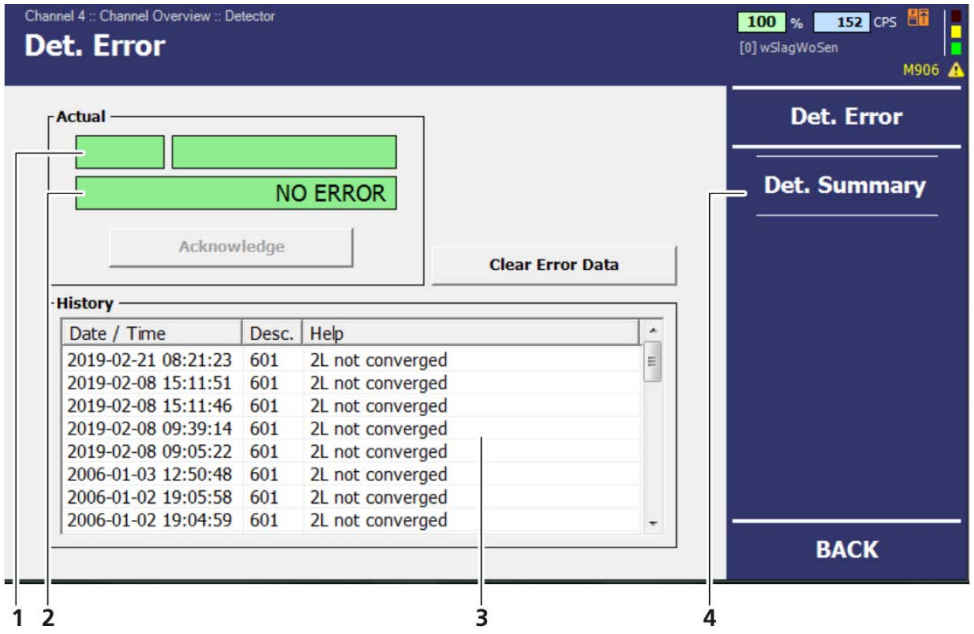


Fig. 18 “Temperature (Exceeding)” menu

7.5 Detector Error



1 Display of the current error code
2 Display of the error message
3 Display of the error history
4 Detector summary submenu

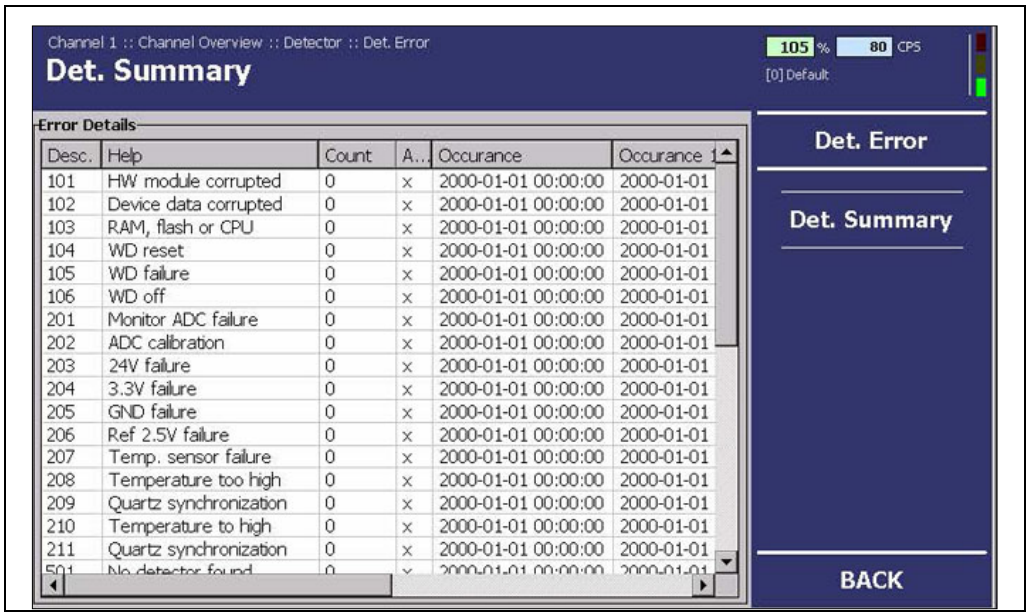
Fig. 19 “Detector Error” menu

In the menu Channel Overview | Detector, click on <Det. Error>. In the "Det. Error" submenu you can view the following information:

Actual Displays the current error message and the error code.

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

Overview



Desc.	Help	Count	A...	Occurance	Occurance 1
101	HW module corrupted	0	x	2000-01-01 00:00:00	2000-01-01
102	Device data corrupted	0	x	2000-01-01 00:00:00	2000-01-01
103	RAM, flash or CPU	0	x	2000-01-01 00:00:00	2000-01-01
104	WD reset	0	x	2000-01-01 00:00:00	2000-01-01
105	WD failure	0	x	2000-01-01 00:00:00	2000-01-01
106	WD off	0	x	2000-01-01 00:00:00	2000-01-01
201	Monitor ADC failure	0	x	2000-01-01 00:00:00	2000-01-01
202	ADC calibration	0	x	2000-01-01 00:00:00	2000-01-01
203	24V failure	0	x	2000-01-01 00:00:00	2000-01-01
204	3.3V failure	0	x	2000-01-01 00:00:00	2000-01-01
205	GND failure	0	x	2000-01-01 00:00:00	2000-01-01
206	Ref 2.5V failure	0	x	2000-01-01 00:00:00	2000-01-01
207	Temp. sensor failure	0	x	2000-01-01 00:00:00	2000-01-01
208	Temperature too high	0	x	2000-01-01 00:00:00	2000-01-01
209	Quartz synchronization	0	x	2000-01-01 00:00:00	2000-01-01
210	Temperature to high	0	x	2000-01-01 00:00:00	2000-01-01
211	Quartz synchronization	0	x	2000-01-01 00:00:00	2000-01-01

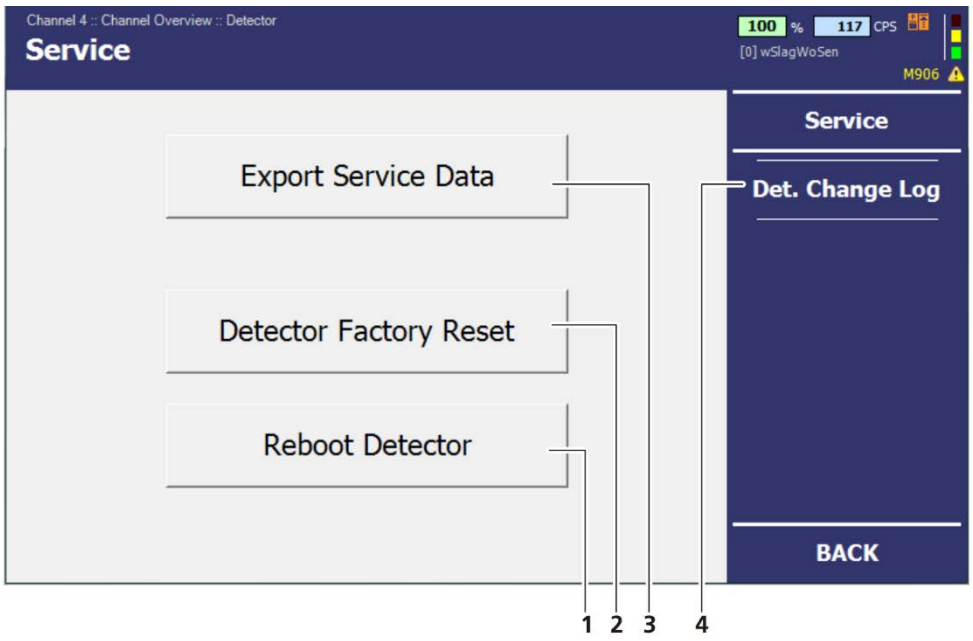
Fig. 20 "Detector Error (Summary)" menu

In the menu Channel Overview | Detector | Det. Error, click on <Summary> to access the "Summary" submenu. In the "Summary" submenu, you can find a detailed error list (Fig. 20).

7.6 Detector Service

The "Service" submenu offers you the following options:

- **Export service data**
  this button will only appear if you connect a USB flash drive to the EVU. The service data is stored in the main directory of the USB flash drive in form of txt files. Service data includes:
  - Change log
  - Temperature log
  - Error log
  - Production data
- **Detector factory reset**
  clicking on the button will reset all settings of the detector to the factory settings.
- **Reboot detector**
  clicking on this button will reboot the CONGAUGE detector LB 6755. No settings will be deleted in the process.



1 <Reboot detector> button
2 <Detector Factory Reset> button
3 <Export Service Data> button
4 Button for the detector change log submenu

Fig. 21 "Detector, Service" menu

7.6.1 Exporting Service Data

IMPORTANT

Already existing service data will not be overwritten since the file names contain the date and time of the export.

- Please note that all data contained in the .txt files is kept in English.

1. Connect the USB flash drive to the USB port of the EVU front panel (refer to EVU manual).
2. Click on <Export Service Data> (Fig. 21, Pos. 3), to save the service data on the USB flash drive.

- The data export starts automatically. During the export, the message "export running..." is displayed.

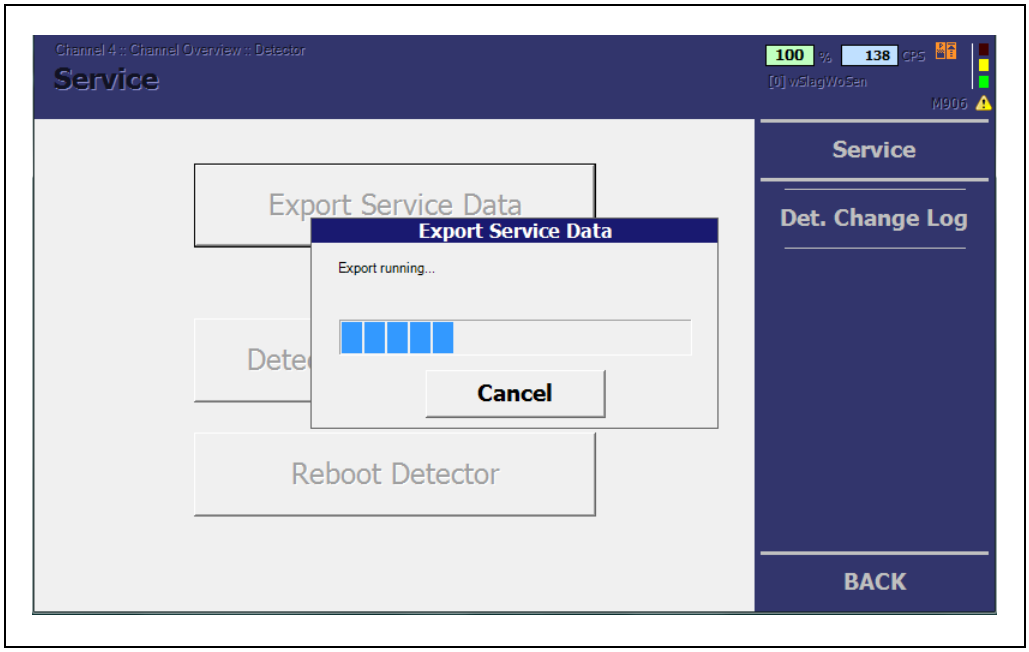


Fig. 22 "Channel Overview" menu, Detector, Service (Data export in progress)

Several .txt files are saved to the main directory of the USB flash drive (Change Log, Temperature Log, Error Log and System Data). If the process is complete, the display will switch back to the "Service" submenu.

7.6.2 Detector Factory Reset

IMPORTANT

When resetting the detector to its factory settings, all entered settings, for example the plateau acquisitions, will be lost and the measurement will be stopped.

Fig. 23 Warning message

1. Click on <Detector Factory Reset> (Fig. 21, Pos. 2) if you want to reset the CONGAUGE detector to its factory settings.
2. Confirm the warning message by clicking on <OK>.

- The EVU will switch to "Error" mode. The EVU will switch back to "Run" mode afterwards. The measurement system is operating again.
- The CONGAUGE detector has now been reset to its factory settings. A reboot of the EVU is not required.

7.6.3 Rebooting the Detector

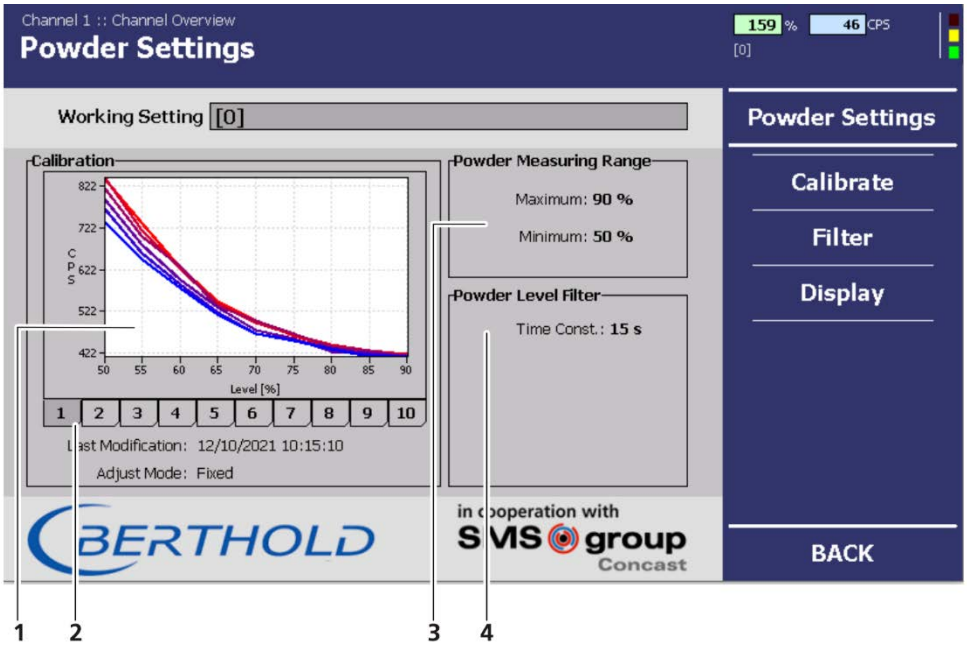
NOTICE

For safety reasons, you can manually reboot the CONGAUGE detector LB 6755 after an update. However, a reboot is automatically carried out after each update of the CONGAUGE detector, the EVU, or the channel.

1. Click on <Reboot detector> (Fig. 21, Pos. 1) in order to reboot the CONGAUGE detector LB 6755.
   - The warning window opens.
2. Confirm the warning message by clicking on <OK>.
   - The EVU will switch to "Error" mode for approx. 1 second. The EVU will switch back to "Run" mode afterwards. The measurement system is operating again.
   - The CONGAUGE detector is automatically rebooted; a reboot of the EVU is not required.

8 Powder Settings Menu

In the Powder Setting menu you set up everything related to powder measurement. Here you define the powder measuring range, filter constant for the powder level, the maximum powder level and powder calibrations parameters, etc.

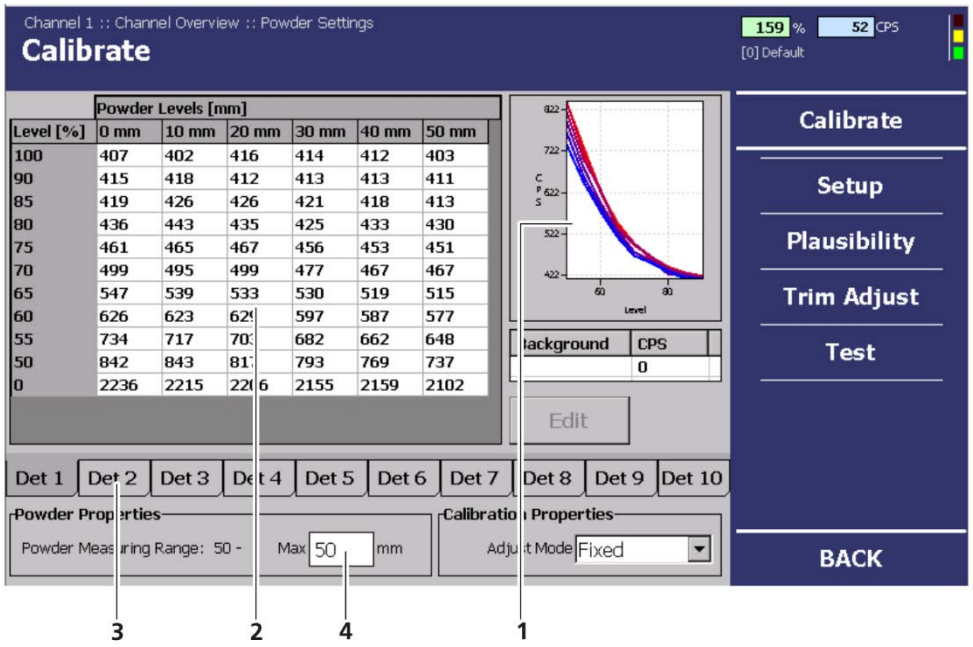


1 Calibrations curves for powder level for the detector segment selected
2 Tabs for switching between the ten different segments
3 Shows the range in the mold in which the powder measurement functionality is valid
4 Shows time constant used for the powder level measurement

Fig. 24 “Powder Settings” menu

8.1 Calibrate

The Calibrate menu, for powder, shows the calibration tables for at maximum five powder levels, and one steel only level, for all the detector segments.

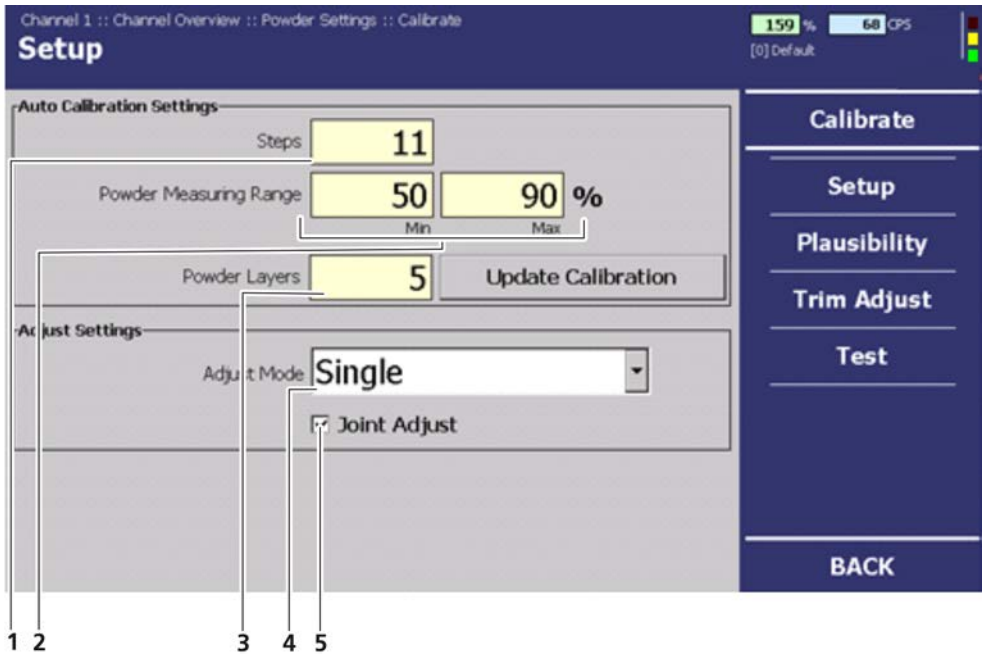


1 Calibration curves for powder levels, and one for steel level, for the segment selected
2 Calibration table showing five calibration curves for powder level and one for steel level for the segment selected
3 Tabs for switching between the ten detector segments
4 Maximum powder level for the measurement

Fig. 25 “Calibrate” menu

8.1.1 Setup

In this menu shows the parameter settings for the calibration of the powder level.

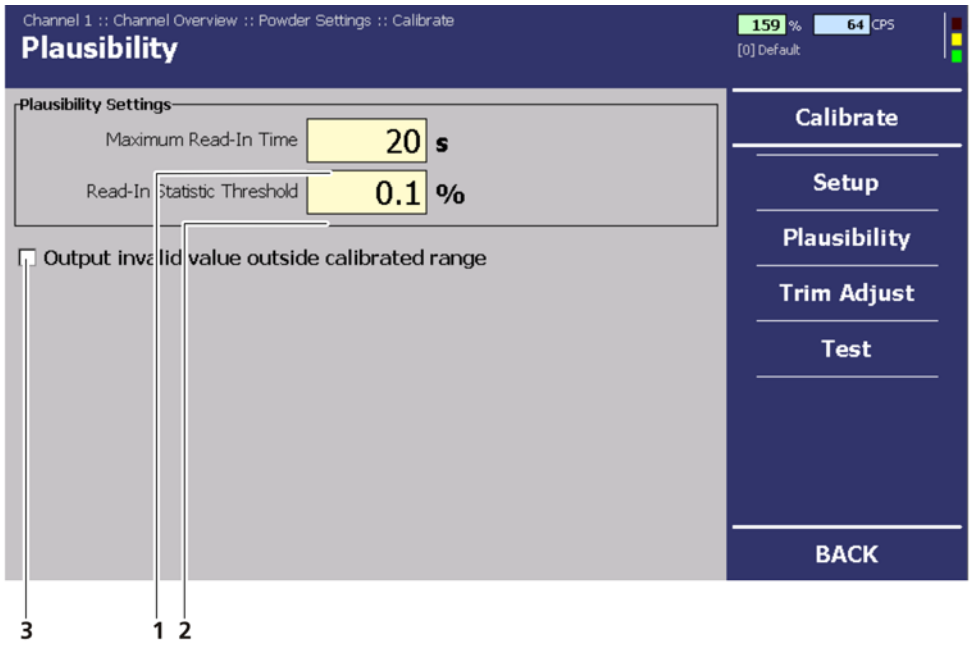


1 Number of calibration steps for each powder level
2 Range in which the powder measurement shall be calibrated and usable
3 Number of different powder layer thicknesses (powder plates) to use for calibration
4 Adjust mode for powder level
5 Check box for enabling powder adjust when normal steel level adjust is triggered

Fig. 26 “Setup” menu

8.1.2 Plausibility

In this menu shows the plausibility settings.

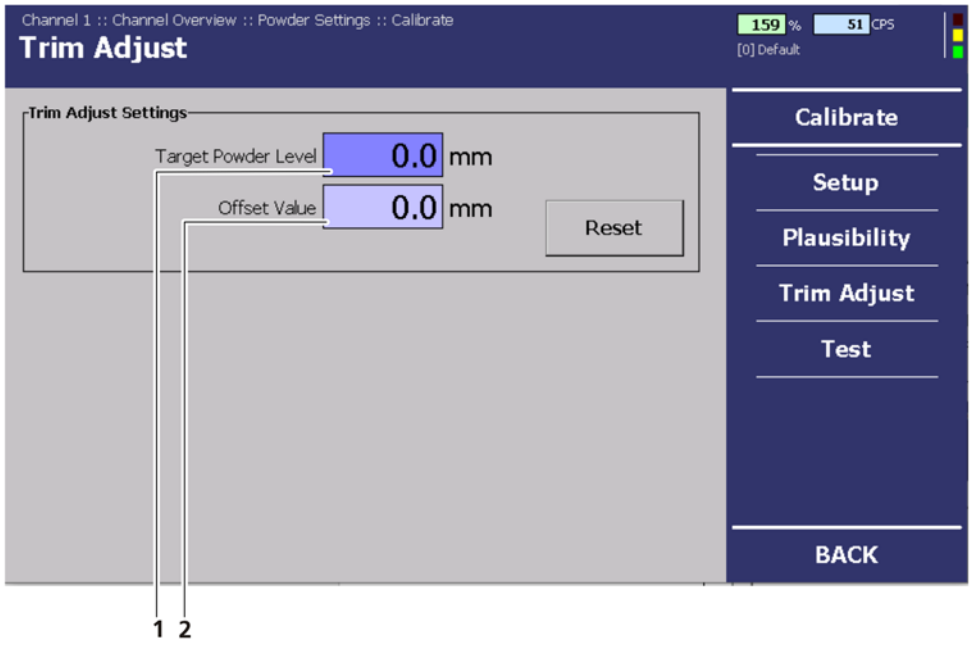


1 Maximum Read-In Time
2 Read-In Statistic Threshold
3 Checkbox "Output invalid value outside calibrated range"

Fig. 27 "Plausibility" menu

8.1.3 Trim Adjust

In this menu allows for trimming the measured powder level in case influenced by a submerged entry nozzle (SEN).



1 Measured powder level value
2 Offset between measured value and manually entered

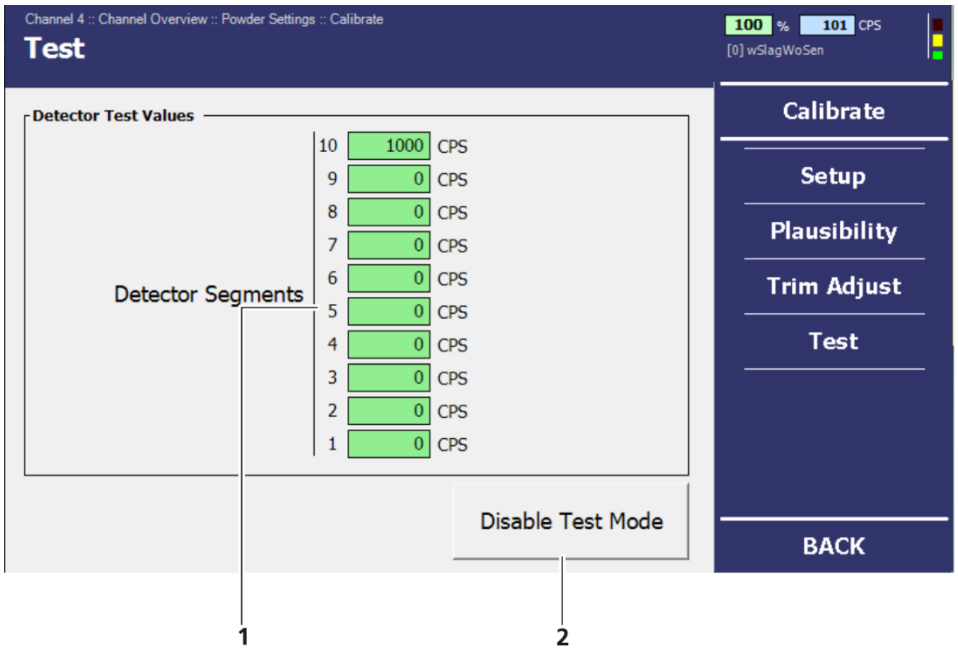
Fig. 28 "Trim Adjust" menu

In the first field, Target Powder Level, there is the actual powder level displayed, but can be manually altered to better fit the true value. Then the new trim offset will be calculated if possible. In the second field the trim offset is displayed and can also be edited.

Please not that this function does only allow for a negative offset since a SEN influence would increase the measured powder value.

8.1.4 Test

In the "Channel Overview" menu click on Settings | Calibration | Test. In the "Test" submenu, you can enter a test count rates which are used instead of the count rate of the CONGAUGE detector LB 6755 to calculate the fill level and powder level. As long as this test count rate is in effect, the background of the input field will be shown in red.



1 Fields showing detector values for each single scintillator
2 Button to disable Test mode

Fig. 29 "Test" menu

1. Click in the input field.
   - ▶ The numeric keypad opens.
2. Enter a test count rate.
3. Confirm your entry by clicking on "Enter".
   - ▶ The test mode is started
4. Click on <Disable test mode> to end the test.

NOTICE

The current output switches to the fault current.

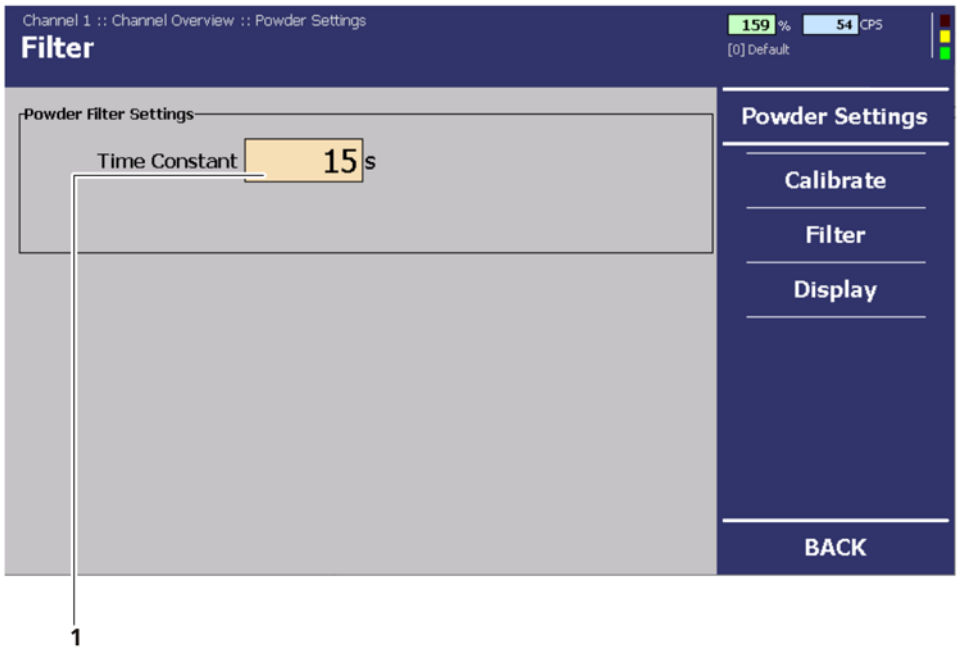
The test count rate ends automatically after 5 minutes. If the test count rate is to be activated again, the value must be entered in the input field again.

8.1.5 Filter

In this menu the time constants the powder level can be defined. Here a value of 10 to 30 s should allow for a the powder level value to be stable and responsive enough.

IMPORTANT

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.

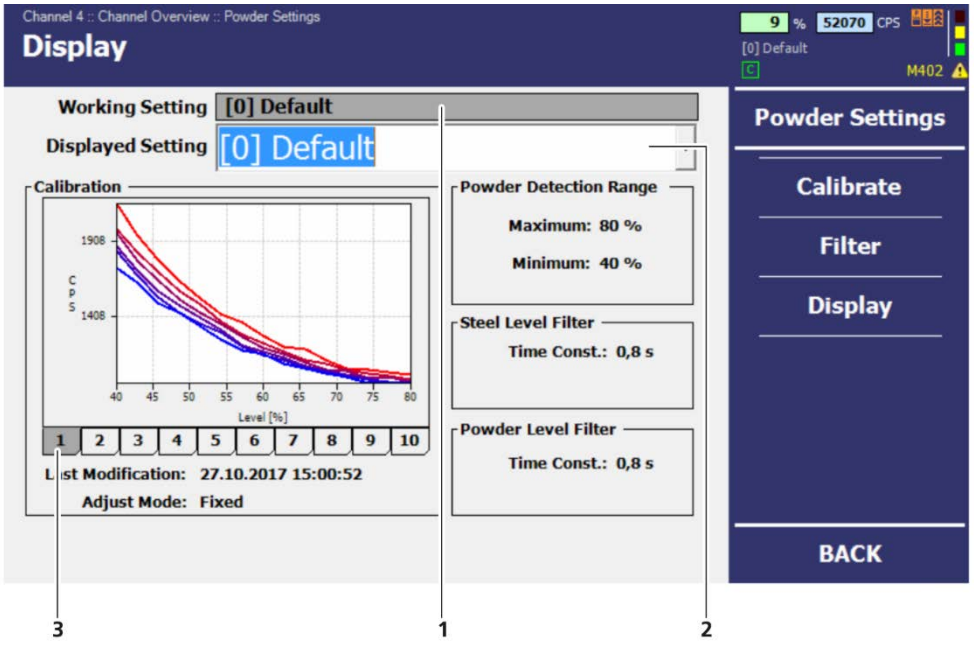


1 Time constant for the powder level

Fig. 30 "Filter" menu

8.1.6 Display

In this menu is possible to select what set of calibration curves that shall be used for the measurement.



1 Selected set of calibration curves
2 Drop-down menu for selecting set of calibration curve to use
3 Tabs for switching between the ten different detector segments

Fig. 31 “Display” menu

8.2 Error Codes

In the following tables you can find the error codes of the CONGAUGE detectors LB 6755 which provide you with information on how to fix the errors. For more information on the error correction of the EVU, please refer to the operating manual for the castXpert LB 452 unit.

Error codes are classified in

0 = Failure + Shutdown (reset or reboot required)
1 = Failure
2 = Function check
3 = Out of specification

8.2.1 Detector CONGAUGE LB 6755

Code	Text	Description	Correction	Class
101	HW module corrupted	Missing circuit board or incompatible test header.	▶ Carry out a software update. ▶ Contact service.	0
102	Device dataset failure	The application cannot find a suitable parameter set.	▶ Carry out factory reset. **Attention: All settings of the detector will be lost!**	0
103	RAM, Flash or CPU	Error in main memory, Hardware error.	▶ Contact service.	0
104	WD reset	The system has been reset by the watch dog (WD), Hardware error.	▶ Contact service.	3
105	WD failure	The watch dog (WD) was activated but the system was not reset, Hardware error.	▶ Check watchdog hardware.	3
106	WD off	The debug jumper is sticking, the watchdog is disabled.	▶ Remove debug jumper.	3

8.2.2 Detector Mainboard

Code	Text	Description	Correction	Class
200	Data Flow error	Operating system failure or no scheduled execution of the program.	▶ Contact service.	0
201	Monitor ADC failure	The calibration of the STM32F4 ANI during start-up failed. The reference voltages failed during operation.	▶ Contact service.	3
202	Temp sensor failure	The temperature sensor does not send any values. As a result, the falling below or exceeding the temperature limits cannot be plausibly recognized.	▶ Contact service.	3
203	Temperature too high	The internal temperature of the device has exceeded the upper limit. (T> 60 ° C)	▶ Check water cooling.	3

8.2.3 Detector Power Supply

Code	Text	Description	Correction	Class
300	Data Flow Error	Operating system failure or failure of the program to run properly.	▶ Contact service.	0
301	11 VDC not available	Internal 11V voltage is not applied or broken.	▶ Contact service.	1
302	5 VDC not available	Internal 5V voltage is not applied or broken.	▶ Contact service.	1
303	-5 VDC not available	Internal -5V voltage is not applied or broken.	▶ Contact service.	1
304	2.5 VDC not available	Internal 2.5V voltage is not applied or broken.	▶ Contact service.	1
305	1.2 VDC not available	Internal 1.2V voltage is not applied or broken.	▶ Contact service.	1
306	V_{in} out of range	Detector power voltage below 15V	▶ Contact service.	3
307	Power consumption too high	Detector power consumption above 7.5 W	▶ Contact service.	3
308	Temp. sensor	The temperature sensor does not send any values. As a result, the falling below or exceeding the temperature limits cannot be plausibly recognized.	▶ Contact service.	3

8.2.4 Impulse Control

Code	Text	Description	Correction	Class
400	Data flow error	Operating system failure or failure of the program to run properly.	▶ Contact service.	0
401	Data lost	The program is not running properly. The CPU did not read a count rate packet from the FPGA in time.	▶ Contact service.	1
402	FPGA access failure	CPU-FPGA communication interrupted. Proper execution of the program cannot be guaranteed.	▶ Contact service.	1
403	Pulse error	The pulse rates read out by the FPGA cannot be processed.	▶ Contact service.	1
404	Dead time compensation	Too high pulse rates.	▶ Contact service.	3

8.2.5 Application

Code	Text	Description	Correction	Class
600	Data flow error	Operating system failure or failure of the program to run properly.	▶ Contact service.	0
601	2L not converged	The 2 Level algorithm is not converting, a warning is issued.	▶ If it appears frequently, perform calibration / adjustment.	3
602	Init points violated	The algorithm corner points (InitPoints for ConstraintBox) were not initialized correctly	▶ Contact service.	1
603	Compensation failure	More than 1 detector or counting rate failure.	▶ Contact service.	1

8.2.6 Process Connection

Code	Text	Description	Correction	Class
700	Data flow error	Flow of data is disrupted or interrupted.	▶ Contact service.	0
701	Pulse output deviation	Pulse output does not correspond to measured count rate	▶ Contact service.	1
702	Pulse rate error	The pulse rate flow is disturbed or broken.	▶ Contact service.	1

8.2.7 Front End

The second digit (marked here with "x") corresponds to the number of the detector segment (0-9).

Code	Text	Description	Correction	Class
1x00	Data flow error	Operating system failure or no scheduled execution of the program.	▶ Contact service.	0
1x01	No pulses received	No count rate in the measuring or control channel	▶ Contact service.	3
1x02	Median failure	The count rate could not be recorded from the median filter.	▶ Contact service.	3
1x03	ADC/DAC Error	The calibration of the MEAS_TH_SET and CTRL_TH_SET channels of DAC1 during start-up failed. These threshold voltages failed during operation.	▶ Contact service.	1
1x04	$V_{threshold}$ deviation	The difference between the actual and set threshold voltage in the measurement / control channel is higher than 0.05 V.	▶ Contact service.	3
1x05	V_{BIAS} limited	The bias voltage has reached its upper limit ($Bias_{max}$ = $Bias_{Hamamatsu}$ + dTemperature + dSafety)	▶ Contact service.	3
1x06	V_{BIAS} deviation	The difference between the set and actual value of the generated HV voltage is higher than 0.1 V.	▶ Contact service.	3
1x07	I_{MON} - Warning	PMT will operate in the permissible range with a continuous current higher than 0.5 mA.	▶ Contact service.	3
1x08	I_{MON} - Alarm	PMT is operated with a continuous current higher than 100 mA in the impermissible range.	▶ Contact service.	-
1x09	Noise Ch. - Warning	The ratio between the count rates in the noise edge and measurement channel exceeds the warning value.	▶ Contact service.	3
1x10	Noise Ch. - Error	The ratio between the count rates in the noise edge and measurement channel exceeds the alarm value.	▶ Contact service.	3
1x11	Noise Ch. - CPS	The count rate for the noise edge detection is below or exceeds the permissible limits.	▶ Contact service.	-
1x12	Temp. Sensor Failure	The temperature sensor does not work	▶ Contact service.	3

1x13	Temperature - Warning	The higher of the two measured electronics temperatures exceeded the limit of + 75° C. The lower of the two measured electronics temperatures fell below the -35 °C limit. A hysteresis of 1 °C is applied around this specified limit.	▶ Contact service.	3
1x14	Temperature - Alarm	The higher of the two measured electronics temperatures has exceeded the limit of +85 °C. The lower of the two measured electronics temperatures fell below the -40 °C limit. A hysteresis of 1 °C is applied around this specified limit.	▶ Contact service.	3
1x15	Plateau recording failure	The count rate cannot be used for the application calculations.	▶ Start / repeat plateau recording.	2

9 Maintenance

Malfunctions of the CONGAUGE detectors LB 6755 can be caused by mechanical or thermal overloading. These malfunctions do not always result in a complete failure of the CONGAUGE detectors.

9.1 Replace SiPM-crystal Module

⚠ DANGER

Danger to life from electric shock!

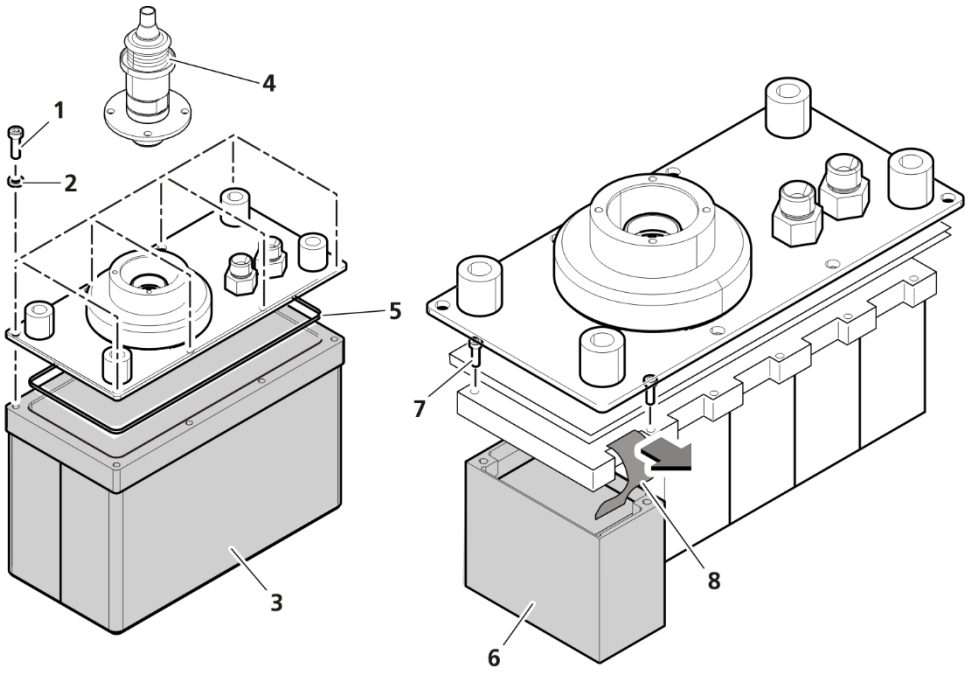
The replacement of the modules may only be carried out by a qualified electrician.

- Please adhere to the relevant safety regulations.
- De-energize the detector

In case of an electric shock, carry out first aid measures and immediately call an emergency service.

Replacing the SiPM crystal module is carried out in the following cases:

- Conspicuous instability by thermal, mechanical overstressing or bright light.
- Error in the Plateau recording (short or too steep plateau).



1	Hex socket screw	5	O-ring
2	Washer	6	SiPM-crystal module
3	Housing	7	Hex socket screw
4	Connection cable	8	Circuit board connector

Fig. 32 Replace SiPM-crystal module

1. De-energize the detector CONGAUGE LB 6755 by pulling off the plug at the detector. Remove the connection cable (Fig. 32, Pos.4).

2. Loosen the hex socket screws (Fig. 32, Pos.1) and remove the housing (Fig. 32, Pos.3) and the O-ring (Fig. 32, Pos.5).
3. Unplug the circuit board connector at the electronic part (Fig. 32, Pos.8).
4. Loosen screws (Fig. 32, Pos.7) and remove SiPM-crystal module (Fig. 32, Pos.6).
5. Replace and screw (Fig. 32, Pos.7) SiPM-crystal module (Fig. 32, Pos.6) and plug the circuit board connector (Fig. 32, Pos.8).
6. Refit the O-ring (Fig. 32, Item 5) and screw the housing on (Fig. 32, Item 5).

▶ The replacement was carried out.

10 Decommissioning

⚠ DANGER

Danger to life from electric shock!

- Decommissioning may only be carried out by a qualified electrician.
- Please adhere to the relevant safety regulations.
- During installation, decommissioning, and servicing on the hardware as well as during wiring of the detector, the measuring system, connected relay contacts and all inputs and outputs must be de-energised.

In case of an electric shock, carry out first aid measures and immediately call an emergency service.

Follow this sequence for decommissioning:

1. Remove the connection cable from the CONGAUGE detector.
2. Remove the CONGAUGE detector LB 6755 from the mould.
3. If required, remove the CONGAUGE detector LB 6755 from the water-cooling system.

- If required, dispose of the detector at a specialist waste management company.

10.1 Disposal

If the product has been used, you can dispose of it through a waste management company in accordance with the statutory provisions.

⚠ CAUTION

Toxic!

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

- The device is to be disposed of according to applicable legal regulations exclusively by a specialised waste management company.

Modifications due to technical advancement reserved.

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BERTHOLD

SMS group
SMS Concast AG

CONGAUGE LB 6755

Radiometric Detector for Steel and Powder Level Measurement for Continuous Casting
Radiometrischer Detektor für Stahl- und Gießpulverhöhenmessung für Strangguss

Technical Information
Technische Information

65055TI
Rev. No.: 01, 05/2022

1. Functional Description

CONGAUGE LB 6755 is a modern, high-tech radiometric detector, utilizing first-class sensing technology to continuously and simultaneously measure both the liquid steel level and the thickness of the casting powder. CONGAUGE LB 6755 has been designed in cooperation with SMS Concast and enables for controlling of automatic feeders for casting powder.

1.1. Product Highlights

- Measures the steel level and the powder thickness simultaneously.
- Ten individually digitally controlled scintillators in an array configuration.
- Highly sensitive scintillation technology.
- State-of-the-art SiPM technology.
- Automatic calibration rig for steel and powder level calibration offered.
- Mechanically fully backward compatible with the GAMMAcast LB 6752 detector (using mechanical adapter).
- Backward compatible with the castXpert LB 452 control unit.

SiPM Technology

The superior SiPM technology replacing the conventional Vacuum Photomultiplier Tube (PMT), is characterized by a very small and compact design. With improved ruggedness, low power consumption, not affected by electromagnetic stirrers or breaks, no degradation, and built-in redundancy, the SiPM technology is ideal for demanding mould level applications.

1. Funktionsbeschreibung

Der CONGAUGE LB 6755 ist ein moderner radiometrischer High-Tech-Detektor, der mithilfe erstklassiger Sensortechnologie kontinuierlich und gleichzeitig den Flüssigstahlgehalt und die Dicke des Gießpulvers misst. Der Detektor CONGAUGE LB 6755 wurde in Zusammenarbeit mit SMS Concast entwickelt und ermöglicht die Steuerung von Gießpulver-Zuführautomatiken.

1.1. *Produkthighlights*

- *Misst gleichzeitig den Stahlgehalt und die Gießpulverdicke*
- *Zehn individuell digital gesteuerte Szintillatoren in Array-Konfiguration*
- *Hochempfindliche Szintillationstechnologie.*
- *Modernste SiPM-Technologie*
- *Automatische Kalibrieranlage für Stahl- und Pulverfüllstandskalibrierung angeboten*
- *Mechanisch vollständig abwärtskompatibel mit dem Detektor GAMMAcast LB 6752 (unter Verwendung eines mechanischen Adapters).*
- *Abwärtskompatibel mit der Steuereinheit castXpert LB 452*

SiPM Technologie

Die überlegene SiPM-Technologie, die die herkömmliche Vakuum-Photomultipliertechnologie (PMT) ersetzt, zeichnet sich durch ein sehr kleines und kompaktes Design aus. Mit erhöhter Robustheit, geringem Stromverbrauch, ohne Beeinträchtigung durch elektromagnetische Rührer oder Bremsen ist die SiPM-Technologie mit integrierter Redundanz ideal für anspruchsvolle Kokillen-Anwendungen.

2. Technical Data

2. Technische Daten

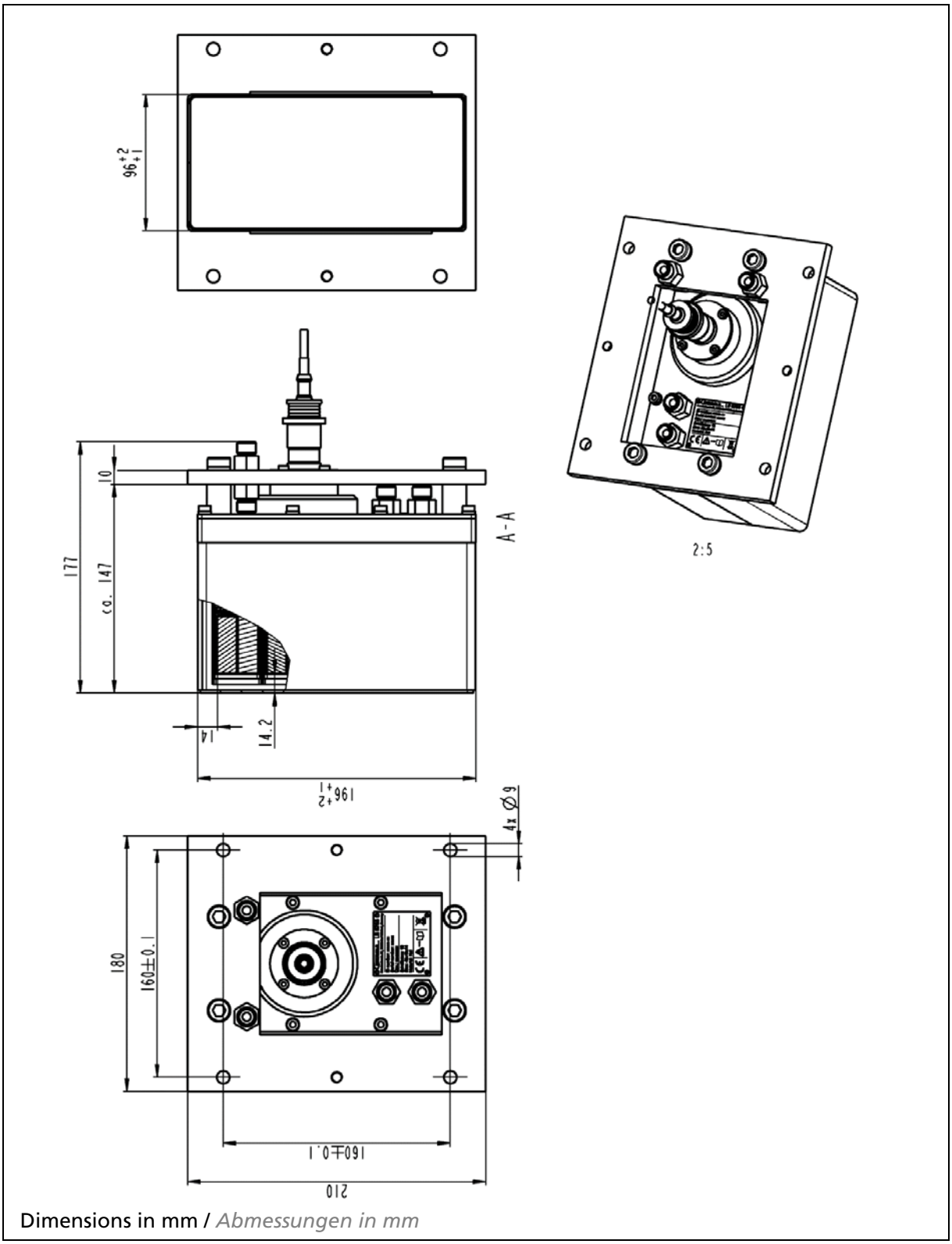
Mechanical Data *Mechanische Daten*	
Housing Material *Gehäusematerial*	Stainless steel 1.4301 (ANSI 304) *Edelstahl 1.4301 (ANSI 304)*
Scintillator *Szintillator*	10 x NaI(Tl)-crystals; 40 mm x 45mm x 14mm
Admissible operating temperature (ambient temperature) *Zulässige Betriebstemperatur (Umgebungstemperatur)*	-20…+55°C (-4…131°F)
Storage temperature *Lagertemperatur*	-20…+70°C (-4…158°F)
Water cooling system *Wasserkühlsystem*	Connection: G1/4" female adapter with 60° sealing cone. Max. pressure: 6 bar Cooling water quality requirement: Drinking water quality (or filtered operating water without suspended matter) Water inlet temperature of max. 50°C and minimum flow of 20 l/h. *Anschluss: G1/4" Anschlussadapter mit 60 ° Dichtkegel.* *Max. Druck: 6 bar* *Anforderung an die Kühlwasserqualität: Trinkwasserqualität (oder gefiltertes Betriebswasser ohne Schwebstoffe)* *Wassereintrittstemperatur von max. 50 °C und Mindestdurchfluss von 20 l / h.*
Protection class *Schutzklasse*	IP 66 / IP 67
Connection *Verbindungen*	Detector – terminal box and/or detector – evaluation unit: Special connection cable with PlugProtect connector (straight or angled by 90°) with open ends or HeavyCon plug Terminal box – evaluation unit: 6-wire, shielded (6 x 1.5 mm²), max. length 500 m *Detektor - Anschlussbox und / oder Detektor - Auswerteeinheit:* *Spezielles Verbindungskabel mit PlugProtect-Stecker (gerade oder um 90 ° abgewinkelt) mit offenen Enden oder HeavyCon-Stecker* *Anschlussbox - Auswerteeinheit: 6-adrig, geschirmt (6 x 1,5 mm²), max. Länge 500 m*
Weight *Gewicht*	approx. 11 kg (Including adapter flange and hoses) *ca. 11 kg (einschließlich Adapterflansch und Schläuche)*

Electric Data *Elektrische Daten*	
Power Supply *Stromversorgung*	24 (18…36) VDC, ≤ 6 W
Output Signals *Ausgangssignal*	Digital (RS485) and analogue pulse output *Digitaler (RS485) und analoger Impulsausgang*
Cable *Kabel*	6 wires, max. 1.5 mm², shielded, length max. 150 m *6 Drähte, max. 1,5 mm², geschirmt, Länge max. 150 m*
Evaluation *Auswertung*	All relevant detector data logged in the detector and readable the evaluation unit (LB 452) *Alle relevanten Detektordaten werden im Detektor protokolliert und von der Auswerteeinheit (LB 452) gelesen.*

Performance *Leistung*	
Internal Cycle Time *Interne Zylkuszeit*	5 ms standard steel level 500 ms for powder level *5 ms Standardstahlhöhe* *500 ms für Gießpulverhöhe*
Gain *Gain*	Each scintillator is individually gain stabilized, meaning no temperature or aging effect *Jeder Szintillator wird einzeln stabilisiert, es treten keine Temperatur- oder Alterungseffekte auf*
Damping *Dämpfung*	0.1 … 99 s
Stability *Stabilität*	At constant count rate ≤ 1% *Bei konstanter Zählrate ≤ 1%*
Approvals *Zulassungen*	Temperature, vibration, and shock. CE certification Temperatur, Vibration und Schock. CE-Kennzeichnung
Max. Count Rate *Max. Zählrate*	250000 CPS without dead time correction *250000 CPS ohne Totzeitkorrektur*
Redundancy *Redundanz*	Fourfold calculation of the level value and result verification for maximal performance. A scintillation module failure is automatically detected and compensated for. *Vierfache Berechnung des Höhenwerts und Ergebnisüberprüfung für maximale Leistung. Ein Ausfall des Szintillationsmoduls wird automatisch erkannt und kompensiert.*

3. Dimension Drawings

3. Maßzeichnungen

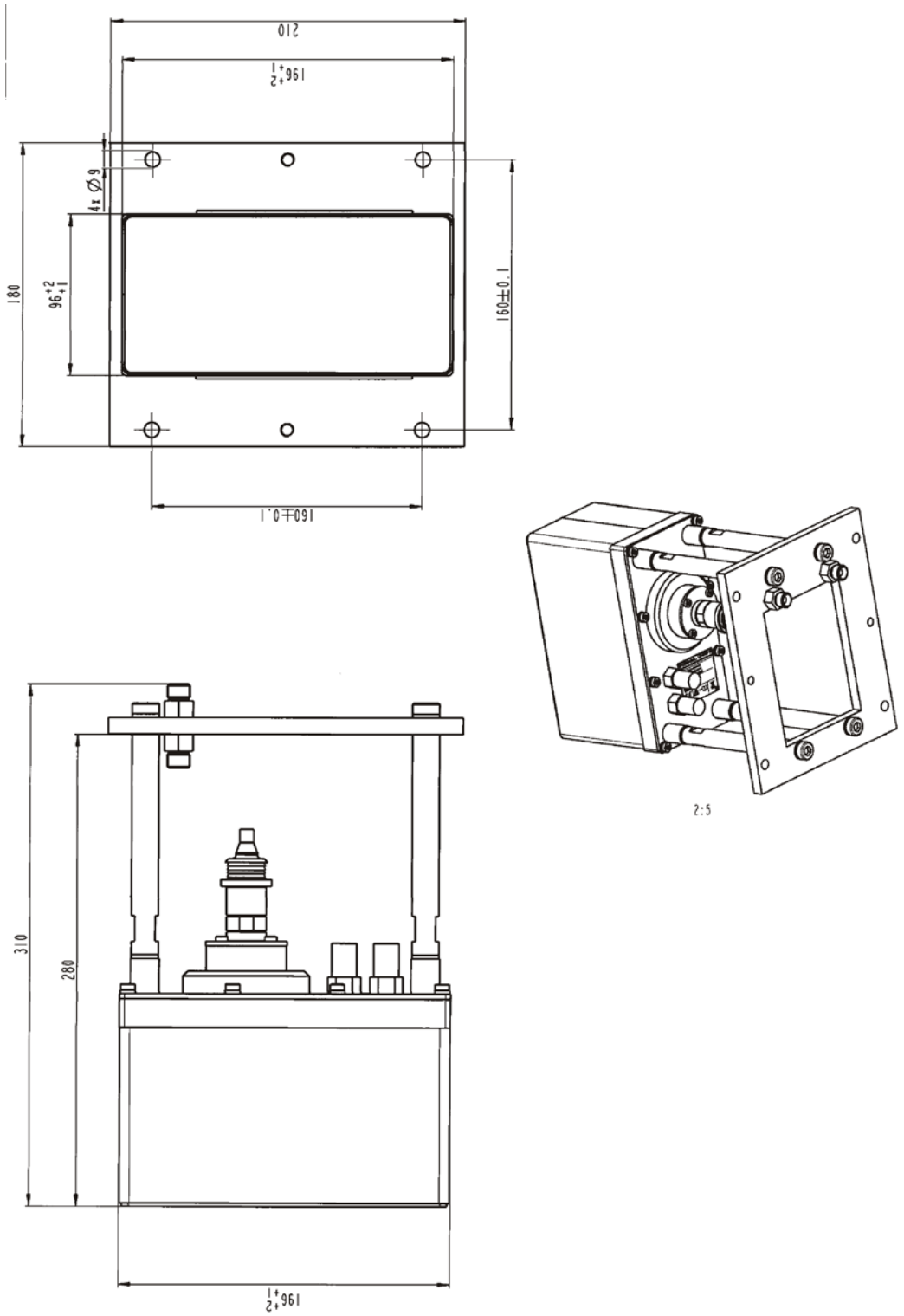


Dimensions in mm / *Abmessungen in mm*

TI-Fig. 1 Mechanical dimensions for the CONGAUGE LB 6755 detector
Mechanische Abmessungen für den Detektor CONGAUGE LB 6755

3.1. CONGAUGE LB 6755 Detector with adapter kit (66784)

3.1. *CONGAUGE LB 6755 Detektor mit Adapterset (66784)*



Dimensions in mm / *Abmessungen in mm*

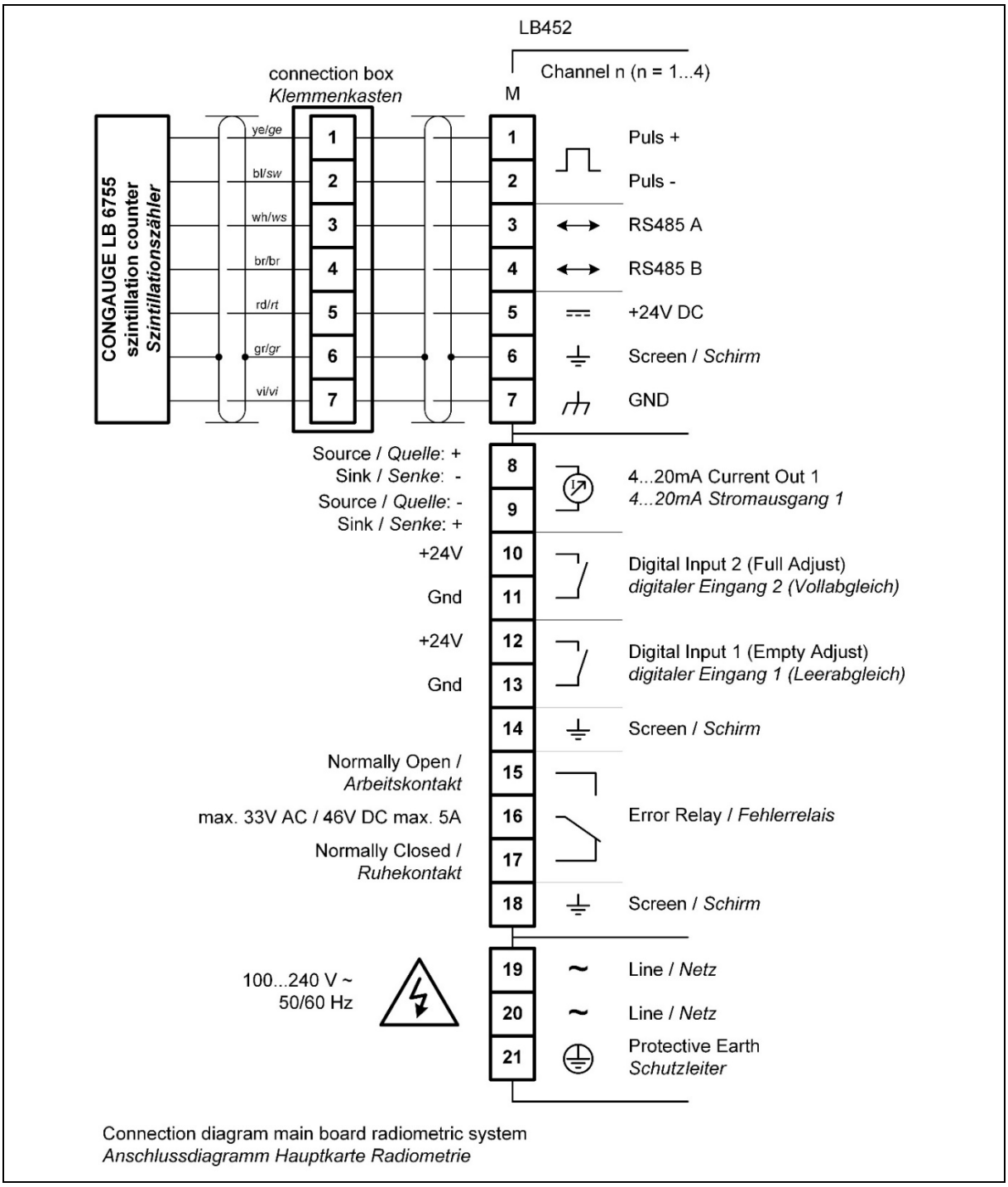
TI-Fig. 2 Dimensions for the CONGAUGE LB 6755 detector with adapter kit (66784) to be used for retrofitting a GAMMAcast LB 6752-11 detector.
Abmessungen für den Detektor CONGAUGE LB 6755 mit Adapterset (66784) zur Nachrüstung eines Detektors GAMMAcast LB 6752-11.

4. Connections

4. Verbindungen

4.1. Connections to castXpert LB 452 Main Board

4.1. *Anschlüsse an die Hauptplatine castXpert LB 452*

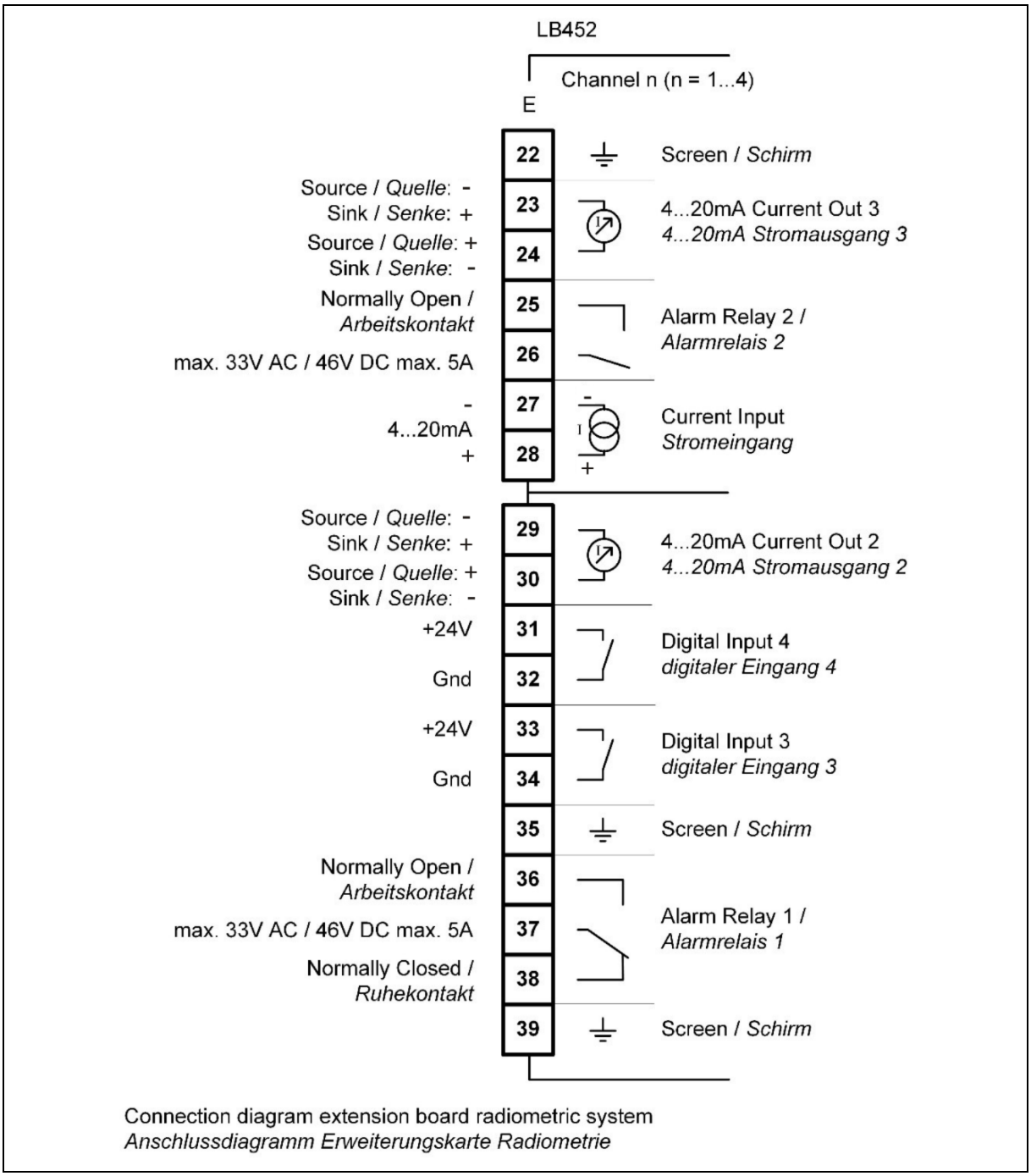


Connection diagram main board radiometric system
Anschlussdiagramm Hauptkarte Radiometrie

TI-Fig. 3 Electrical connections channel board for the EVU castXpert LB 452.
Elektrische Anschlüsse der Kanalplatine für die AWE castXpert LB 452

4.2. Connections to castXpert LB 452 Extension Board

4.2. *Verbindungen zum castXpert LB 452 Erweiterungsmodul*



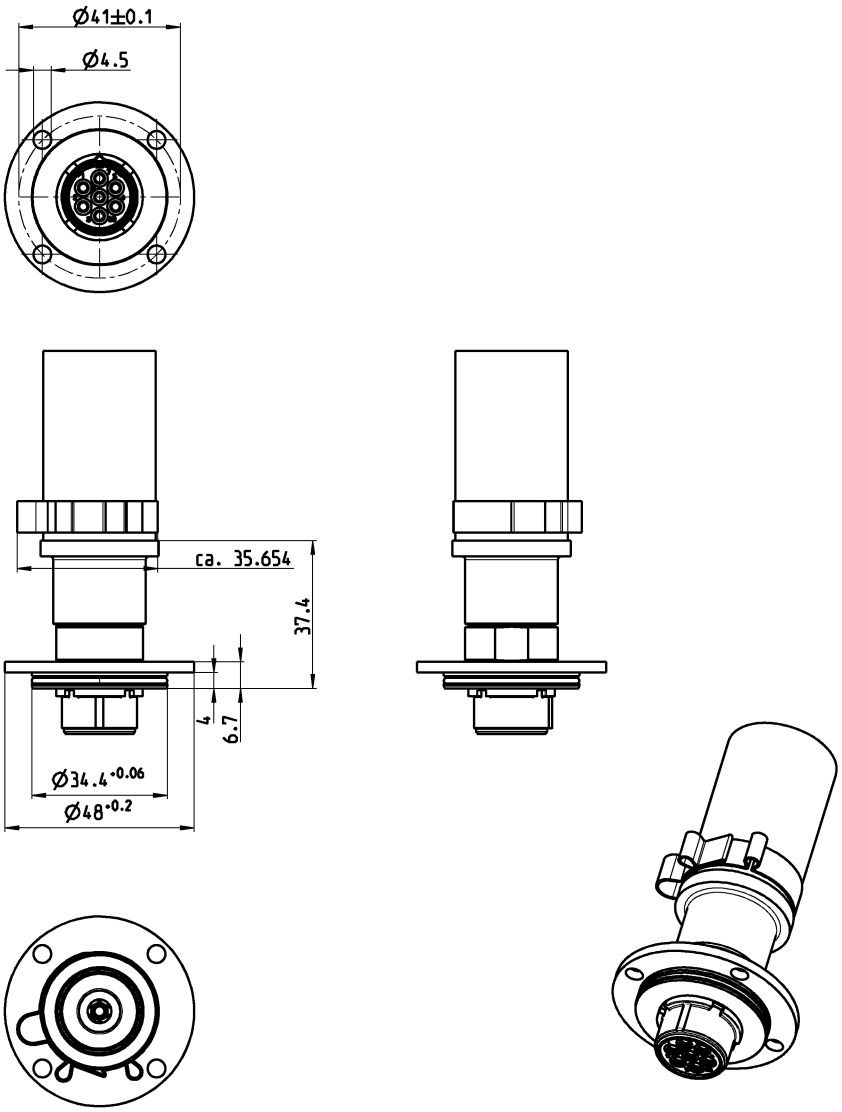
TI-Fig. 4 Electrical connections to the extension board for the castXpert LB 452
Elektrische Anschlüsse das Erweiterungsmodul für die AWE castXpert LB 452

5. PlugProtect Plug-in Connections

5. PlugProtect-Steckverbindungen

5.1. PlugProtect Plug-in Connection, Straight

5.1. *PlugProtect-Steckverbindung, gerade*

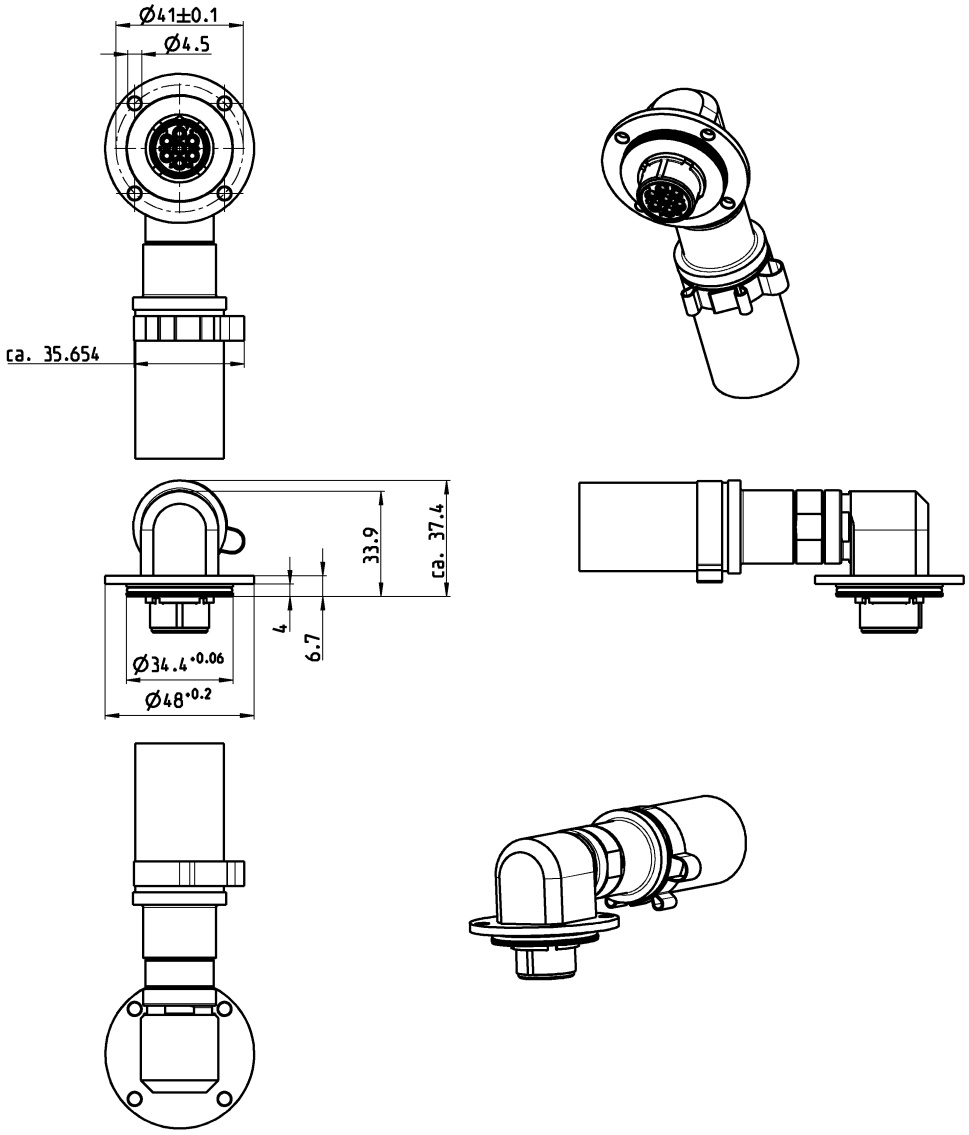


Dimensions in mm / *Abmessungen in mm*

TI-Fig. 5 Dimensions for PlugProtect plug-in connection, straight
Abmessungen der PlugProtect-Steckverbindung, gerade

5.2. PlugProtect Plug-in Connection Angled 90°

5.2. *PlugProtect-Steckverbindung 90° abgewinkelt*



Dimensions in mm / *Abmessungen in mm*

TI-Fig. 6 Dimensions for PlugProtect plug-in connection, angled
Abmessungen der PlugProtect-Steckverbindung, abgewinkelt

6. Cable Connections

6. Kabelverbindungen

Technical data for cable connections *Technische Daten für Kabelverbindungen*	
Connections *Verbindungen*	At the detector: PlugProtect with straight plug or plug angled by 90° At the terminal box: open cable ends or HeavyCon plug *Am Detektor: PlugProtect mit geradem Stecker oder um 90° abgewinkeltem Stecker* *Am Klemmenkasten: offene Kabelenden oder HeavyCon-Stecker*
Cross section *Querschnitt*	6-wire, shielded (6 x 0.5 mm²) *6-Draht, abgeschirmt (6 x 0,5 mm²)*
Material *Material*	Internal cable: Core insulation and cable jacket: FEP 6Y Heat protection hose: Special Hypalon® mixture *Inneres Kabel: Kernisolation und Kabelmantel: FEP 6Y* *Hitzeschutzschlauch: Spezielle Hypalon®-Mischung*
Temperature range *Temperaturbereich*	Internal cable: • Ambient temperature: -100°C to +205°C • Conductor: up to +180°C Heat protection hose: • 140°C permanent • up to 700°C for short periods • Flame-resistant at 800°C for short periods (approx. 20 sec.), self-extinguishing, hardly inflammable *Inneres Kabel:* • *Umgebungstemperatur: -100 °C bis + 205 °C.* • *Leiter: bis + 180 °C.* *Hitzeschutzschlauch:* • *140 °C permanent* • für kurze Zeit bis zu 700 °C. • *Flammwidrig bei 800 °C für kurze Zeit (ca. 20 Sek.), Selbstlöschend, kaum brennbar*
Resistance *Beständigkeit*	Internal cable: • absolute ozone-resistant and weather-proof • very well resistant to acids, alkalis, solvents, oil and petrol Heat protection hose: • resistant to ageing and chemicals • UV-resistant, ozone-resistant and weather-proof *Inneres Kabel:* • *absolut ozonbeständig und wetterfest* • *Sehr gut beständig gegen Säuren, Laugen, Lösungsmittel, Öl und Benzin* *Hitzeschutzschlauch:* • *beständig gegen Alterung und Chemikalien* • *UV-beständig, ozonbeständig und wetterfest*
Lengths *Längen*	Total cable length: 5 m, 10 m, 15 m or 20 m Length of heat protection hose: 3 m or in cable length (not 20 m) *Gesamtkabellänge: 5 m, 10 m, 15 m oder 20 m* *Länge des Hitzeschutzschlauchs: 3 m oder in Kabellänge (nicht 20 m)*

6.1. Lengths and Variants
6.1. *Längen und Ausführungen*

Straight connection, open ends *Gerade Verbindung, offene Enden*		
3 m heat protection hose *3 m Hitzeschutzschlauch*	5 m anaconda protection hose *5 m Anakonda-Schutz-schlauch*	Heat protection hose in cable length *Hitzeschutzschlauch in Ka-bellänge*
52592-050 (5 m)	65416-050 (5 m)	55249-050 (5 m)
52592-100 (10 m)	65416-100 (10 m)	55249-100 (10 m)
52592-150 (15 m)		55249-150 (15 m)
52592-200 (20 m)		

90° connection, open ends *90° Anschluss, offene Enden*		
3 m heat protection hose *3 m Hitzeschutzschlauch*	5 m anaconda protection hose *5 m Anakonda-Schutz-schlauch*	Heat protection hose in cable length *Hitzeschutzschlauch in Ka-bellänge*
52593-050 (5 m)		55250-050 (5 m)
52593-100 (10 m)		55250-100 (10 m)
52593-150 (15 m)		55250-150 (15 m)
52593-200 (20 m)		

Straight connection, HeavyCon plug *Gerade Verbindung, HeavyCon-Stecker*		
3 m heat protection hose *3 m Hitzeschutzschlauch*	5 m anaconda protection hose *5 m Anakonda-Schutzschlauch*	Heat protection hose in cable length *Hitzeschutzschlauch in Ka-bellänge*
52594-050 (5 m)	65417-050 (5 m)	55067-050 (5 m)
52594-100 (10 m)	65417-100 (10 m)	55067-100 (10 m)
52594-150 (15 m)		55067-150 (15 m)
52594-200 (20 m)		

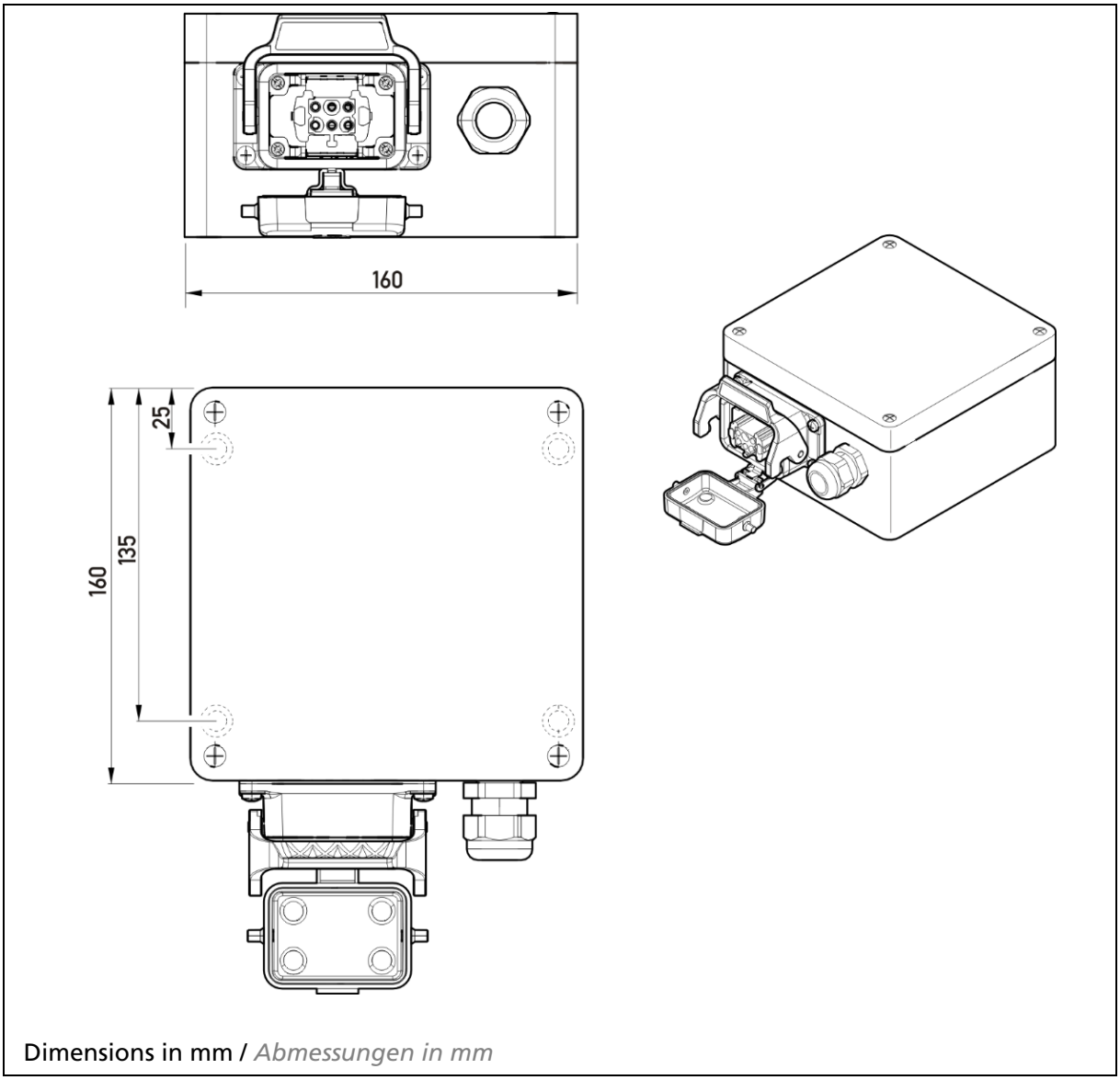
90° connection, HeavyCon plug *90° Anschluss, HeavyCon Stecker*		
3 m heat protection hose *3 m Hitzeschutzschlauch*	5 m anaconda protection hose *5 m Anakonda-Schutz-schlauch*	Heat protection hose in cable length *Hitzeschutzschlauch in Ka-bellänge*
52595-050 (5 m)		55252-050 (5 m)
52595-100 (10 m)		55252-100 (10 m)
52595-150 (15 m)		55252-150 (15 m)
52595-200 (20 m)		

7. Connection Terminal Box for CONGAUGE Detectors

7. Verbindung Anschlussbox für CONGAUGE-Detektoren

7.1. Terminal Box with Plug-in Connection (34787)

7.1. *Anschlussbox mit Steckverbinder (34787)*

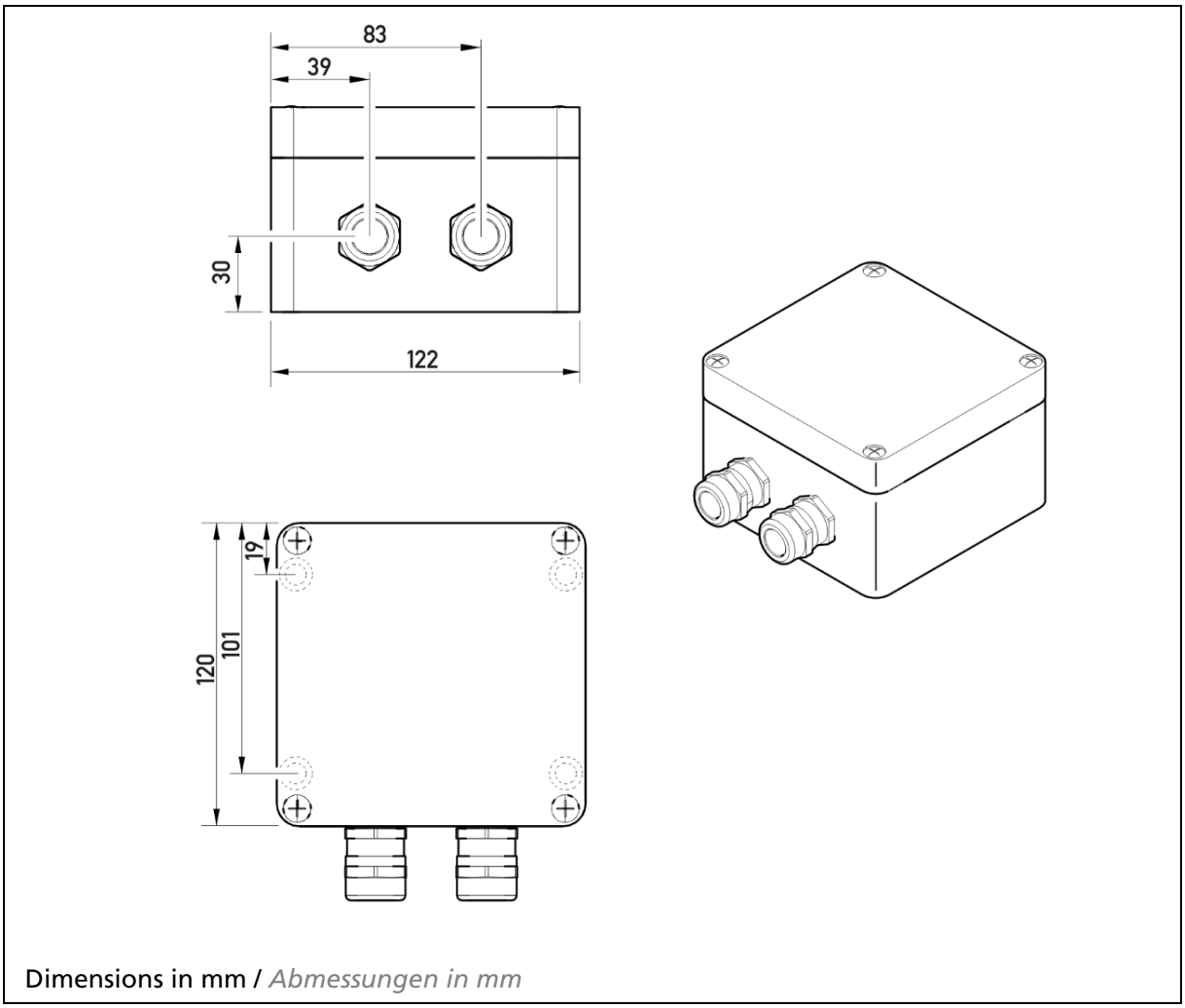


Dimensions in mm / *Abmessungen in mm*

TI-Fig. 7 Dimensions for terminal box with connector
Abmessung für Anschlussbox mit Steckverbinder

7.2. Terminal Box for Open Cable Ends (07005)

7.2. Anschlussbox für offene Kabelenden (07005)



Dimensions in mm / *Abmessungen in mm*

TI-Fig. 8 Dimensions for terminal box for open ends
Abmessung für Anschlussbox für offene Kabelenden

8. Replacing GAMMAcast LB 6752-11 with CONGAUGE LB 6755

In order to prepare for an easy retrofit, a mechanical adapter (66784) kit is offered. With the use of this adapter kit the CONGAUGE LB 6755 detector gets the same mechanical dimensions as the GAMMAcast LB 6752-11 detector. The adapter kit contains:

- 4 x extension bars
- 2 x water hoses
- 4 x lock rings

8. Ersetzen von GAMMAcast LB 6752-11 durch CONGAUGE LB 6755

Für eine einfache Nachrüstung des LB 6755 ist ein mechanischer Adapter (66784) erhältlich. Mit diesem Adapterset erhält der CONGAUGE-Detektor LB 6755 die gleichen mechanischen Abmessungen wie der Detektor GAMMAcast LB 6752-11. Das Adapterset enthält:

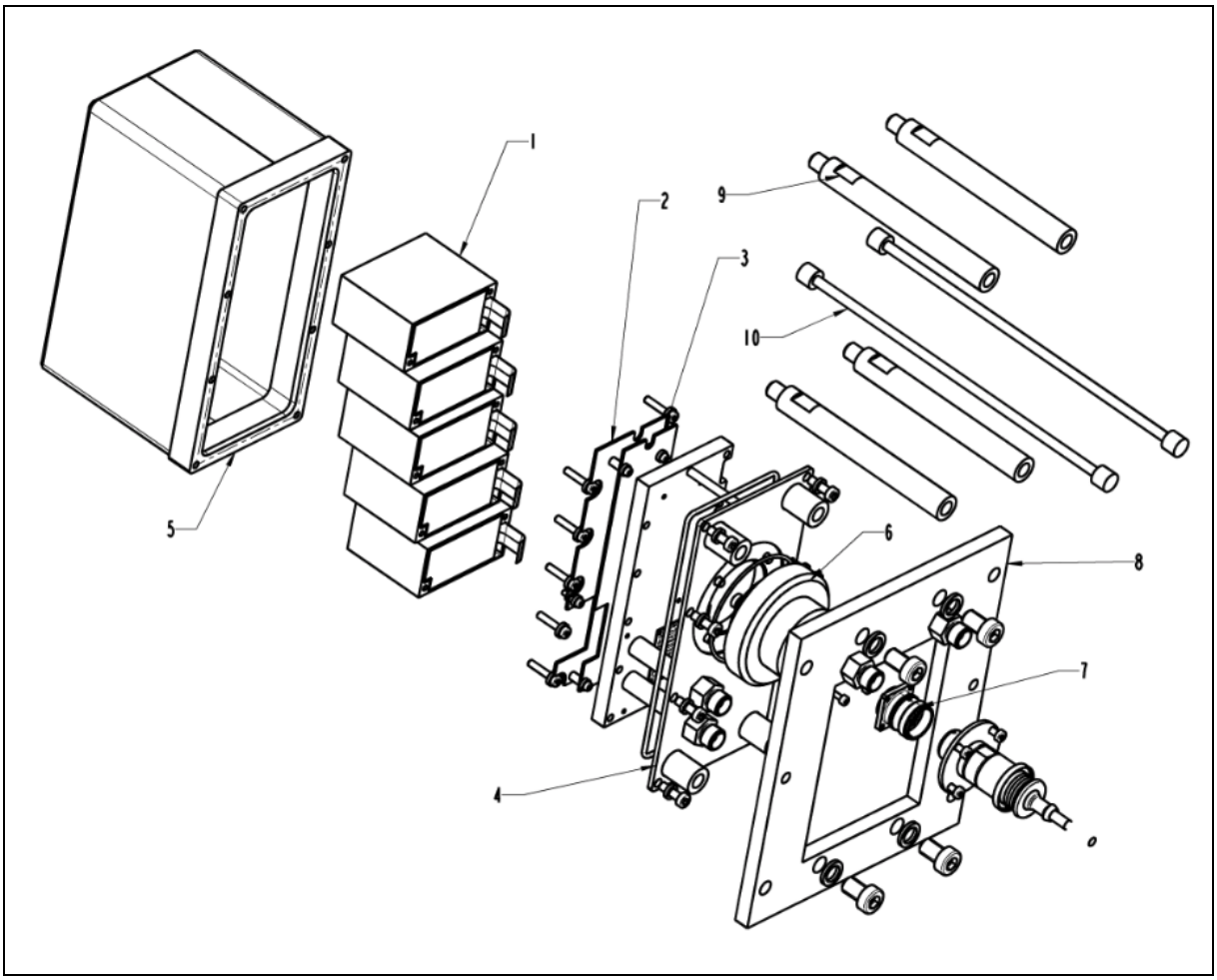
- *4 x Verlängerungsstangen*
- *2 x Wasserschläuche*
- *4 x Sicherungsringe*

9. Spare Parts

9. Ersatzteile

9.1. CONGAUGE LB 6755

9.1. *CONGAUGE LB 6755*



TI-Fig. 9 Exploded view with spare parts numbered
Explosionszeichnung mit nummerierten Ersatzteilen

Spare parts for CONGAUGE LB 6755 *Ersatzteile für CONGAUGE LB 6755*		
Item *Pos.*	ID	Description *Beschreibung*
1	66821-S	SiPM-Frontend module *SiPM-Frontend Modul*
2	65057-S	CPU-FPGA Board
3	65059-S	I/O-Board
4	66813-S	Sensor back and interior mechanics *Sensor und innere Bauteile*
5	66805-S	Sensor housing *Sensorgehäuse*

6	66966-S	Connector block *Anschlussblock*
7	66213-S	Electrical connector *Anschlussbuchse*
8	66780-S	Mounting plate *Montageplatte*
9+10	66784-S	Adapter kit for retrofitting a LB 6752-11 detectors *Adapterset zur Nachrüstung LB 6752-11 Detektoren*

9.2. GAMMAcast Cables

9.2. *GAMMAcast-Kabel*

Spare parts for cables all with PlugProtect connectors for GAMMAcast detectors; no heat protection, cable ends cut flat ***Ersatzteile für Kabel*** *alle mit PlugProtect-Anschlüssen für GAMMAcast-Detektoren; Kein Hitzeschutz, flache Kabel-enden*	
ID	Description *Beschreibung*
58802-050-S	Straight connector, 5 m cable *Gerader Steckverbinder, 5 m Kabel*
58802-100-S	Straight connector, 10 m cable *Gerader Steckverbinder, 10 m Kabel*
58802-150-S	Straight connector, 15 m cable *Gerader Steckverbinder, 15 m Kabel*
58802-200-S	Straight connector, 20 m cable *Gerader Steckverbinder, 20 m Kabel*
58803-050-S	90° connector, 5 m cable *90° Steckverbinder, 5 m Kabel*
58803-100-S	90° connector, 10 m cable *90° Steckverbinder, 10 m Kabel*
58803-150-S	90° connector, 15 m cable *90° Steckverbinder, 15 m Kabel*
58803-200-S	90° connector, 20 m cable *90° Steckverbinder, 20 m Kabel*

Technical information are subject to change without prior notice.
Technische Informationen können ohne vorherige Ankündigung geändert werden.

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