TriOS

xylem



TriBox3

Manual

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1 General information

1.1 Introduction

Welcome to TriOS. We are delighted that you have chosen our TriBox3 controller.

The TriBox3 is a measurement and control unit for all TriOS sensors. The controller has four sensor interfaces that support RS-232 and RS-485. In addition to Modbus RTU, various other protocols are available. A built-in valve enables the use of compressed air cleaning for the sensors. The TriBox3 also offers a USB port and the option of connecting to a network via a WLAN or Ethernet interface.

Furthermore, six freely configurable outputs (4 .. 20 mA) are available to integrate the TriBox3 into other data acquisition systems. An integrated relay can be used to trigger alarms or control external devices. The low power consumption, a robust aluminum housing and a range of interfaces make it suitable for all applications in the environment and drinking water monitoring, as well as in waste water treatment plants and many other areas.

In this manual you will find all the information about the TriBox3 that you need for commissioning and use. The technical specifications and dimensions can be found in chapter 7.

Please note that the user is responsible for complying with regional and national regulations for the installation of electronic devices. Any damage caused by incorrect use or unprofessional installation is not covered by the warranty.

All sensors and accessories supplied by TriOS Mess- und Datentechnik GmbH must be installed and operated in accordance with TriOS Mess- und Datentechnik GmbH specifications. All parts have been designed and tested according to international standards for electronic instruments. The device complies with international standards for electromagnetic compatibility. Please use only original TriOS accessories and cables to ensure smooth and professional use of the devices.

Read this manual carefully before using the device and keep it for future reference. Before using the sensor, make sure that you have read and understood the safety precautions described below. Always ensure that the sensor is operated correctly. The safety precautions described on the following pages are intended to ensure problem-free and correct operation of the device and the associated accessories and to prevent you, other persons or devices from being harmed.

NOTICE

If translations differ from the original German text, the German version is binding.

Firmware updates

This manual refers to firmware version 1.5.6 and higher. Version 1.5.4 is used for the TriBox3 variant EGCWA. Updates include troubleshooting and new functions and options. Devices with older firmware versions may not have all the functions described here.

Copyright notice

All contents of this manual, in particular texts, photographs and graphics, are protected by copyright. Unless expressly indicated otherwise, the copyright lies with TriOS Mess- und Datentechnik GmbH. Persons who violate the copyright are liable to prosecution in accordance with § 106 ff of the Copyright Act and will also be warned and liable to pay compensation.

1.2 Health and safety instructions

This manual contains important information on health and safety regulations. This information is marked in accordance with the international specifications of ANSI Z535.6 (“Product safety information in product manuals, instructions and other collateral materials”) and must be followed. The following categories are distinguished:

⚠ DANGER

Danger / Will cause serious injury or death

⚠ WARNING

Warnings / May cause serious injury or death

⚠ CAUTION

Caution / May cause moderate injury

NOTICE

May lead to material damage

Tip / Useful information

Electromagnetic waves

Devices that emit strong electromagnetic waves can influence the measurement data or cause the sensor to malfunction. Avoid operating the following devices in the same room as the TriOS sensor: cell phones, cordless phones, transceivers or other electrical devices that generate electromagnetic waves.

1.3 Warning notices

Warning symbols

Also observe all signs and markings attached to the device. Failure to do so may result in personal injury and/or damage to the device.

	This symbol is a warning triangle. Follow all safety instructions that follow this symbol to avoid possible injury. It refers to information in the safety instructions in the operating instructions.
	This symbol indicates that there is a risk of electric shock and/or death from electric shock.
	This symbol notices that the marked part must be connected to a protective earth conductor. If the instrument does not have a mains plug on a cable, connect the protective earth to the protective earth conductor terminal.
	This symbol notices that devices must be disposed of in accordance with EU Directive 2002/96/EC - WEEE (Waste Electrical and Electronic Equipment). Old electrical appliances can be returned to the manufacturer for disposal.

General notices:

- Never put damaged products into operation. Therefore, after receiving the delivery, inspect the device for any transport damage.
- Read the operating instructions carefully before starting any installation or maintenance work.
- Ensure that the mains connection cable is undamaged. Make sure that there are no heavy objects on the mains connection cable and that it is not kinked. Ensure that the mains connection cable does not run close to hot surfaces.
- If cables are damaged, they must be replaced with original parts by TriOS Mess- und Datentechnik GmbH customer support.
- Stop operation if excessive heat is generated (i.e. more than lukewarm). Switch off the controller immediately and disconnect the mains connection cable from the power supply. Please contact your dealer or TriOS customer support.
- Never attempt to disassemble or modify any part of the controller unless expressly described in this manual. Inspections, modifications and repairs may only be carried out by the device dealer or by TriOS authorized and qualified specialists.
- Devices from TriOS Mess- und Datentechnik GmbH comply with the highest safety standards. Repairs to the devices must be carried out by TriOS Mess- und Datentechnik GmbH or an authorized TriOS workshop. Incorrect, improper repairs can lead to accidents and injuries.

NOTICE

TriOS does not guarantee the plausibility of the measured values. The user is always responsible for monitoring and interpreting the measured values.

1.4 User and operating requirements

The TriBox3 was developed for use in industry and science. The target group for operating the controller is technically experienced specialist personnel in companies, sewage treatment plants, waterworks and institutes.

The application often requires the handling of hazardous substances. We assume that the operating personnel are familiar with the handling of hazardous substances due to their professional training and experience. In particular, the operating personnel must be able to correctly understand and implement the safety markings and safety instructions on the packaging and in the package inserts of the test kits.

1.5 Intended use

The TriBox3 is intended for the control and measurement data acquisition, processing and storage of supported sensors. Its use is described in this manual. Please observe the technical data of the controller. Any other use is considered improper.

According to current scientific knowledge, the device is safe to use if it is handled in accordance with the instructions in this manual.

NOTICE

Damage caused by improper use is excluded from the warranty.

1.6 Disposal instructions

At the end of its service life or useful life, the device and its accessories can be returned to the manufacturer (see address below) for disposal in an environmentally friendly manner. Proof of prior professional decont-

amination must be provided in the form of a certificate. Please contact us before returning the device for further details.

Address of the manufacturer:

TriOS Mess- und Datentechnik GmbH
Bürgermeister-Brötje-Str. 25
26180 Rastede
Rastede, Germany
Phone: +49 (0) 4402 69670 - 0
Fax: +49 (0) 4402 69670 - 20

1.7 Certificates and approvals

The product meets all requirements of the harmonized European standards. It therefore fulfills the legal requirements of the EU directives. TriOS Mess- und Datentechnik GmbH confirms the successful testing of the product by affixing the CE mark (see appendix).

1.7.1 Type approval of the TriBox3 in EGCWA

The TriBox3 in the EGCWA version, installed in the EGC Water Analyzer, has marine certification in accordance with IMO regulations MEPC.340(77). The EGC Water Analyzer is certified by: DNV, ABS, ClassNK, KR and CCS.

2 Introduction

TriBox3 is a stationary measuring and control unit for all sensors from TriOS Mess- und Datentechnik GmbH and selected sensors from other manufacturers.

The system supplies power to the sensors and stores all measured values, which can be displayed in different ways (numerical or graphical output). In addition, the TriBox3 takes over the entire measurement sequence control as well as the measured value monitoring.

A potential-free relay output (changeover contact) can be used for external control tasks. The relay switches when a freely adjustable limit of a measurement parameter is exceeded or undershot, allowing an alarm or external devices such as pumps or similar to be activated.

A compressed air system can be installed for cleaning the optical sensors. For this purpose, a compressed air valve is installed in the TriBox3, which can switch at adjustable intervals and then trigger a compressed air purge in combination with a compressed air source.

In combination with nano-coated disks used in most optical sensors from TriOS Mess- und Datentechnik GmbH, this provides a very effective anti-fouling strategy.

Protection against water jets (IP65) enables operation in humid environments with suitable installation and extends the range of applications.

The measured values are displayed on a large TFT color display (resolution 800x480 pixels) and stored internally on an SD card. The stored measured values can be exported using a USB stick and then further processed in a spreadsheet. Six integrated analog outputs (4 .. 20 mA) allow the TriBox3 to be integrated into a PLC or other control systems.

The device is operated via a capacitive touch display, which enables navigation through the menu structure. The user can make all settings directly on the device.

2.1 Product identification

All TriOS Mess- und Datentechnik GmbH products are provided with a product label that clearly shows the product designation.

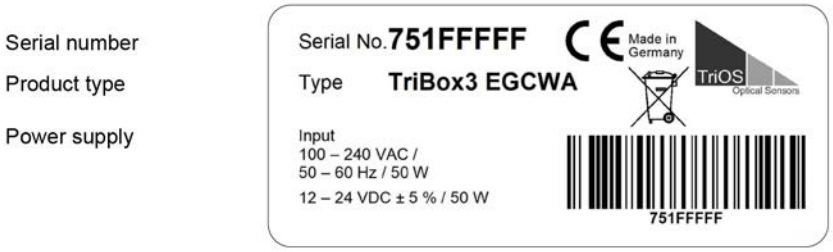
There is also a type plate on the device with the following information, which you can use to clearly identify the product:

TriBox3

Serial number
Product type
Power supply



TriBox3 for EGCWA



The nameplate also contains the product barcode, the TriOS Optical Sensors logo and the CE quality mark.

Please note that the specifications given here are for illustrative purposes only and may vary depending on the product version.

2.2 Scope of delivery

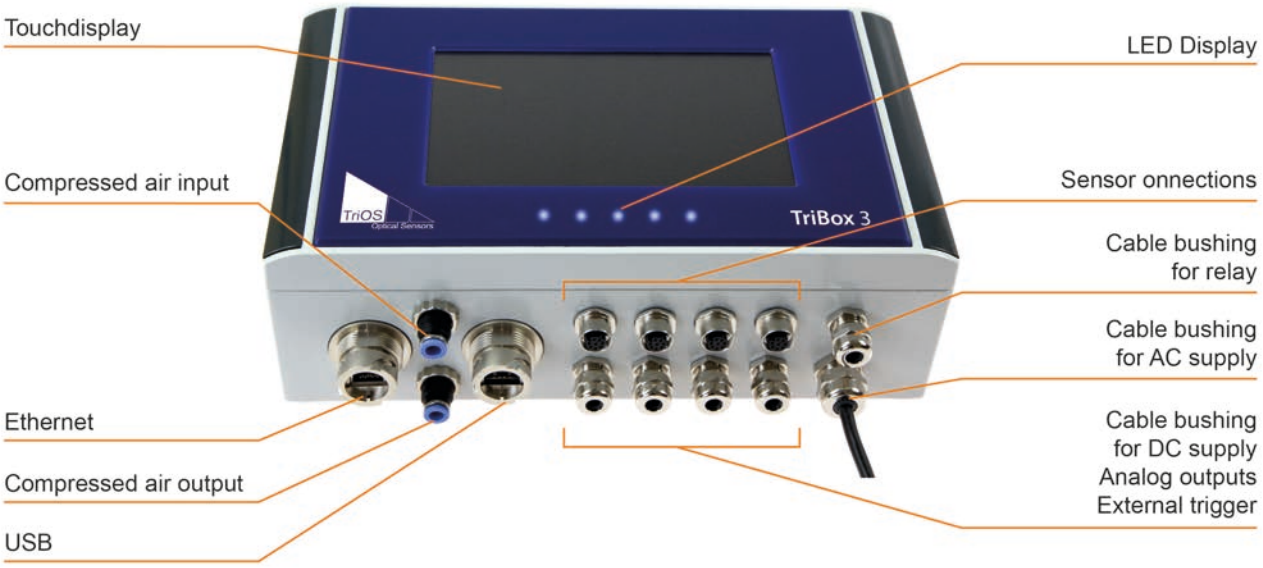
The delivery includes the following components:

- TriBox3 with installed mains connection cable, earthed plug for operation in dry rooms
- Operating instructions
- Accessories (if applicable)

Keep the original packaging of the device for possible return shipment for maintenance or repair purposes.

2.3 Product structure

The following figure shows the structure and the main interfaces of the TriBox3.



2.4 Control elements

2.4.1 Display

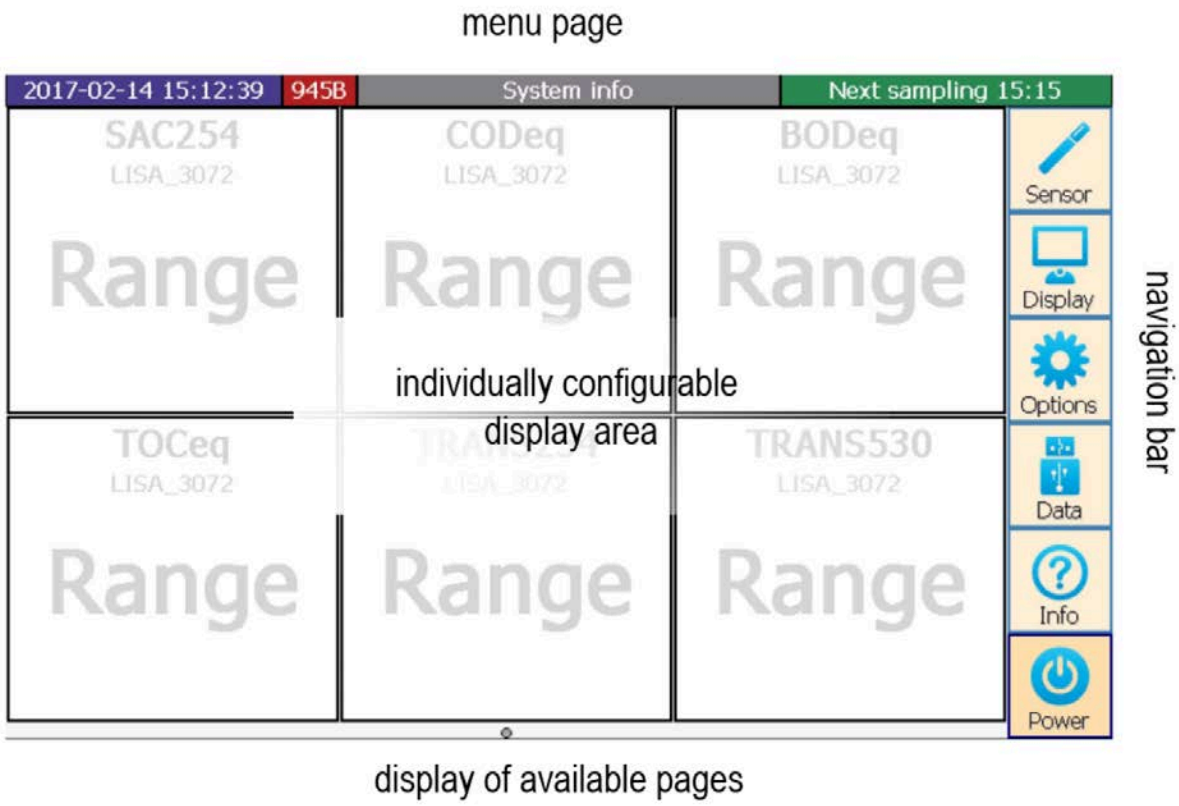
The TriBox3 has a capacitive touch display with a resolution of 800x480 pixels. The display is not controlled by pressure, but by touch or a light tip. It can be operated with bare fingers or special touch pens.

NOTICE

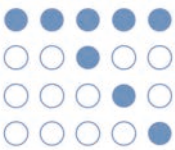
Using sharp or pointed objects to operate the touch display can damage the display.

In addition to the fixed operating elements on the right and at the top, the main screen can be configured individually. The measured values, spectra and the device configuration of the TriBox3 can be shown or mapped by the user via various displays.

The various displays can be selected by swiping or tapping on the touchscreen.



2.4.2 Status LED



flashing in maintenance mode
Active power supply for the sensor (see chapter 3.4.4)
Measurement active
Flushing active

3 Commissioning

This chapter covers the commissioning of the controller up to the first function test. Please pay particular attention to this section and follow the safety instructions to protect the product from damage and yourself from injury.

Before putting the controller into operation, make sure that all connections are connected correctly.

3.1 Power supply

Connect the power supply cable to a professionally installed earthed socket. The device has internal glass tube fuses to protect against overload.

⚠ DANGER

Risk of fatal electric shock!
When replacing a defective fuse, first pull out the mains plug and only use fuses of the same type.
Before putting the device back into operation, ensure that the fault has been completely rectified.

⚠ DANGER

Danger to life due to electric shock!
A residual current circuit breaker with a maximum ignition current of 30 mA must be used.
Overvoltage protection should be used for outdoor installations.

⚠ CAUTION

The controller/power supply unit is supplied with a mains connection cable that is only intended for use in a dry environment. For outdoor operation, this must be replaced with a suitable connection cable.

Fuses

The following fuses are used in the Tribox3:

Fuse F1	1A, 250 V, slow-blow, 5x20 mm; item no. 00P100009
Fuse F2 and F3	4A, 125 V, fast-acting, SMD without holder; art. no. 00P100008
Fuse F4 to F15	1A, 125 V, fast, SMD without holder; item no. 00P100007

The TriBox3 requires a fused power supply within the voltage range of 100 VAC to 240 VAC with a mains frequency of 50 Hz to 60 Hz. The power supply must be fused in accordance with the locally applicable safety standards.

TriBox3 is supplied with a mains connection cable, which can be replaced with a customer-specific alternative if required (see chapter 4.2.1). TriBox3 can alternatively be supplied with 12 - 24 VDC (see chapter 4.2.2).

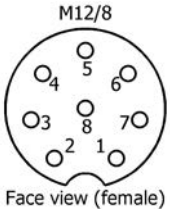
⚠ DANGER

The device has a housing earthing (protective conductor), which must be connected to earth potential for operation with low voltage. A protective earth conductor is recommended for operation with 12 - 24 VDC.

3.2 Sensor interfaces



The TriBox3 is equipped with four female M12 sensor interfaces. The interfaces support RS-232 and RS-485 and can be set to the serial TriOS protocol, Modbus RTU and other special protocols.



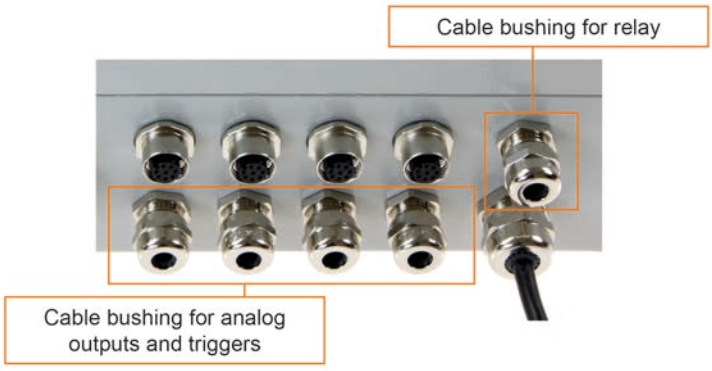
1. RS-232 RX / RS-485 A
2. RS-232 TX / RS-485 B
3. do not connect
4. do not connect
5. do not connect
6. +12 VDC
7. ground
8. +24 VDC

NOTICE

The designations of the data lines are seen from the TriBox3. For example, RS-232 RX is the receive line and RS-232 TX is the transmit line of the TriBox3.

3.3 Outputs

The TriBox3 has six analog outputs. The four cable glands at the bottom left of the picture are not used as standard, whereas the bottom right cable gland is intended for the mains connection cable and therefore also has a larger cross-section. The mains connection cable is already fitted here on delivery. The upper right cable gland is intended for the relay.



3.4 Menu

After installation, the TriBox3 can be put into operation by switching on the mains voltage.

3.4.1 Main menu

The main menu can be seen in the navigation bar on the right-hand edge of the display. The navigation bar is always visible, regardless of the submenu, so that you can switch between the menu items at any time.



Sensors and COM ports Display and settings



Display configuration



System settings



Export and import of data



Device information and support contact

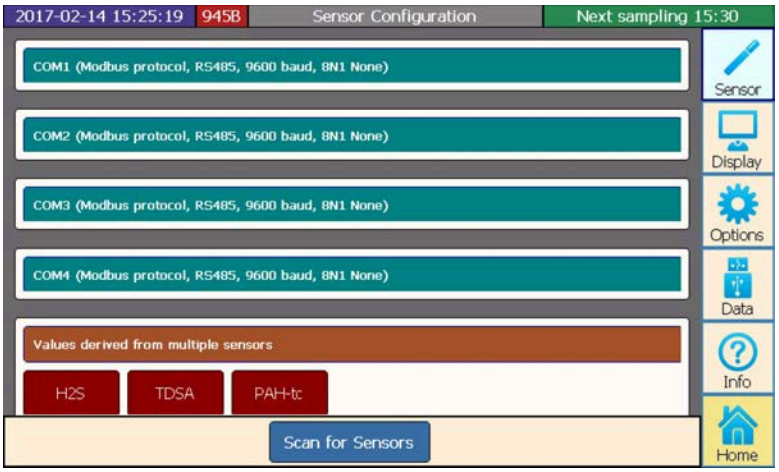


Switch off display or restart TriBox3

3.4.2 Sensor

The “Sensor” button opens a submenu in which the four COM ports are displayed - together with the connected sensors if applicable.

If no sensors are connected or have not yet been recognized by the TriBox3, the “Sensor” submenu looks as follows:

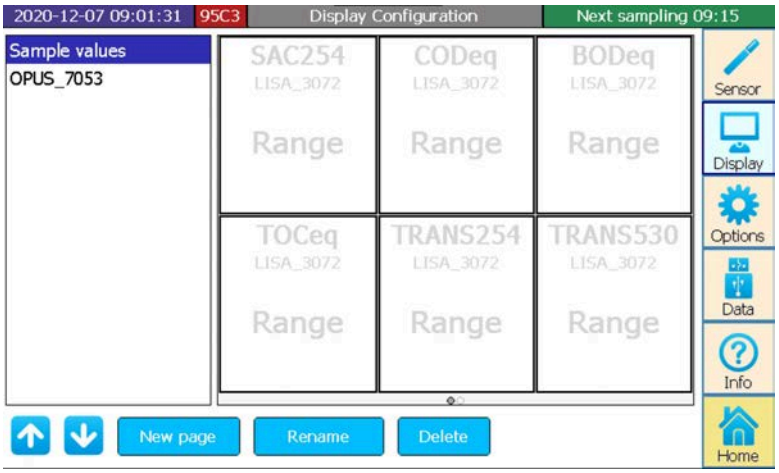


If a sensor is connected and not displayed on a COM port, pressure on the “Search sensors” button, at the bottom of the “Sensor” submenu, will trigger a device search on all COM ports.

If a connected sensor is not displayed after scanning the COM ports, the compatibility of the sensor and COM port settings must be checked (see Chapters 4.3 and 6.3.3).

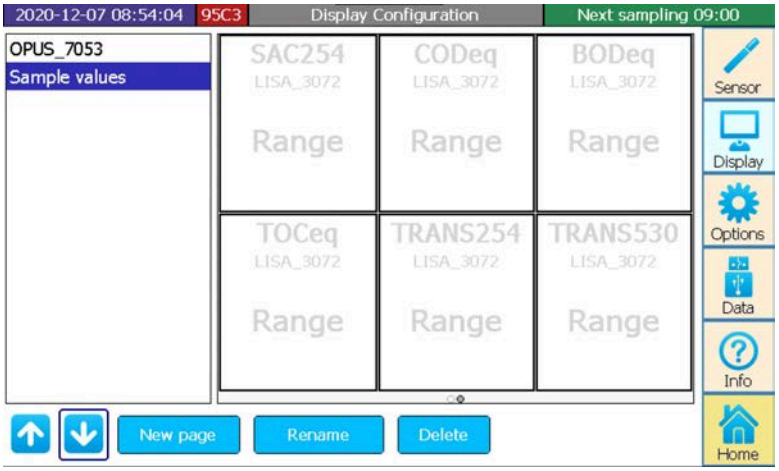
3.4.3 Display

The “Display” button opens a submenu that shows the already configured display screens and allows them to be reconfigured. It can also be used to create and configure new display screens.



For example, select “Sample values” and then press the up arrow to move this display in the overall sequence.

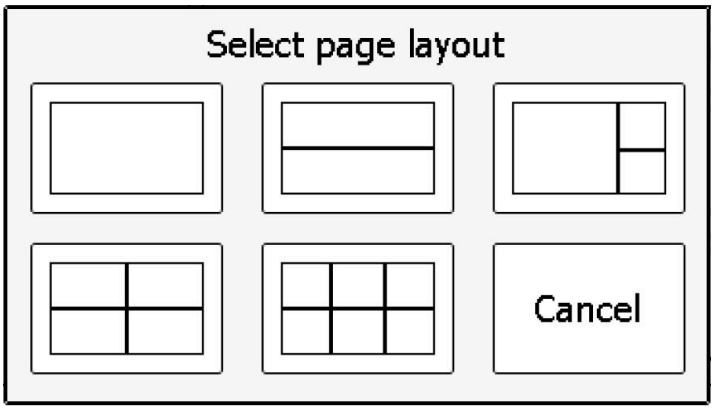
Change the position of a selected display in the overall sequence:



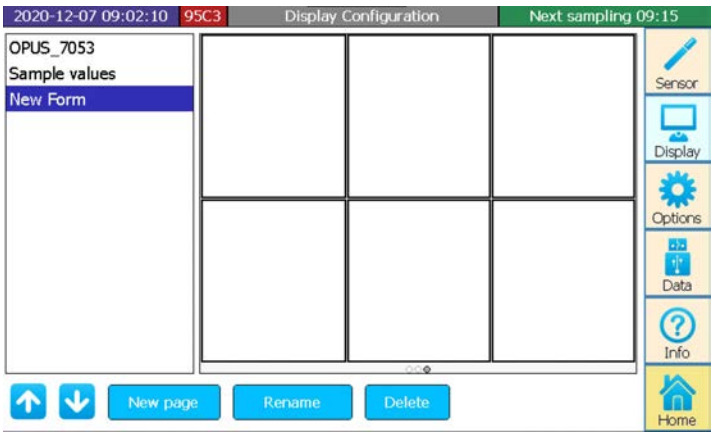
“Sample values” is already present when the device is commissioned.

New page Create a new display.

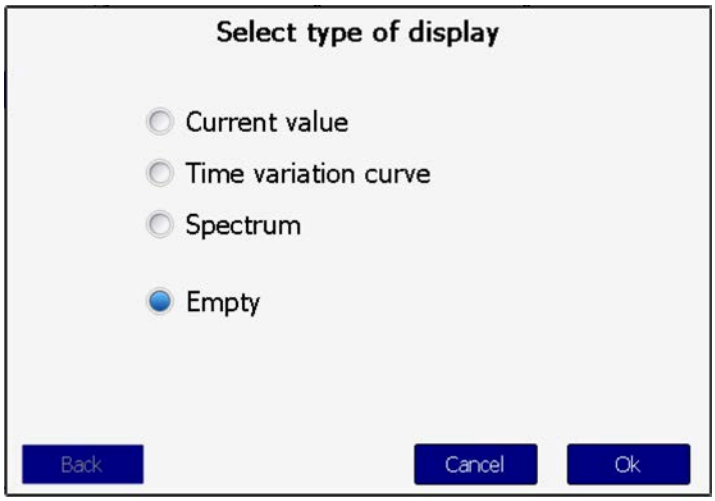
1. Select a page layout from the displayed options.



2. Tip into any field of the selected page layout.



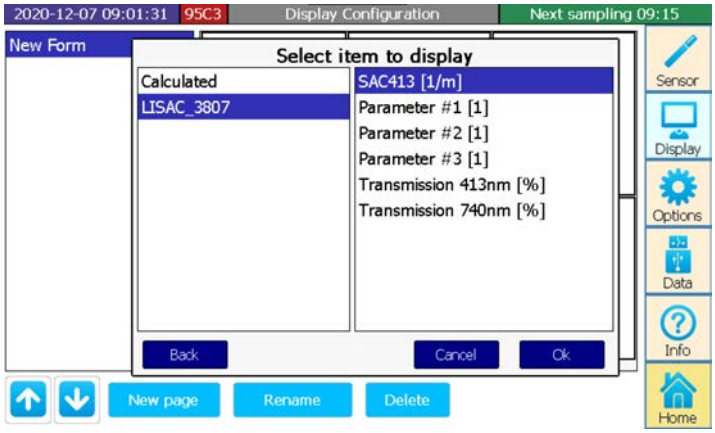
3. Select display values*: Current value, hydrograph (the values over a certain period of time) or a spectrum.



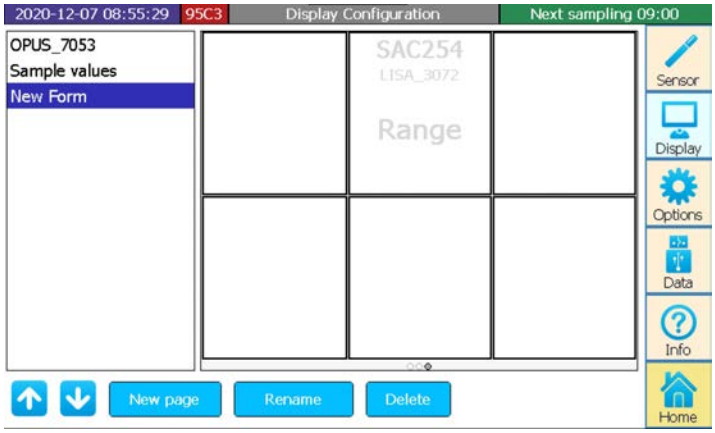
*Display values

Current value	Current measured value as a number (scaled value)
Hydrograph	Representation of the measured values over time
Spectrum	For spectral probes, display of the measured values over the wavelength

4. Select the sensor and the parameter and confirm with OK.



5. The selected parameter of the selected sensor is displayed in the selected window.

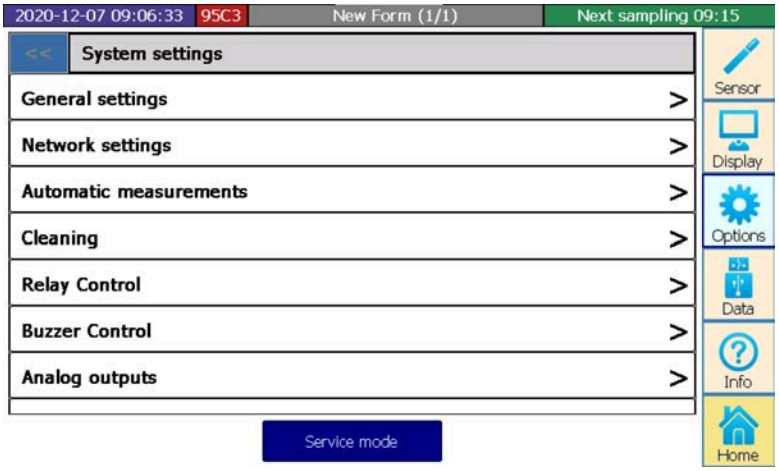


Rename — Rename the selected display.

Delete — Delete selected display.

3.4.4 Options

The “Options” button opens a submenu in which general settings can be made: Defining measuring and cleaning intervals, controlling relays and buzzers and configuring analog outputs.

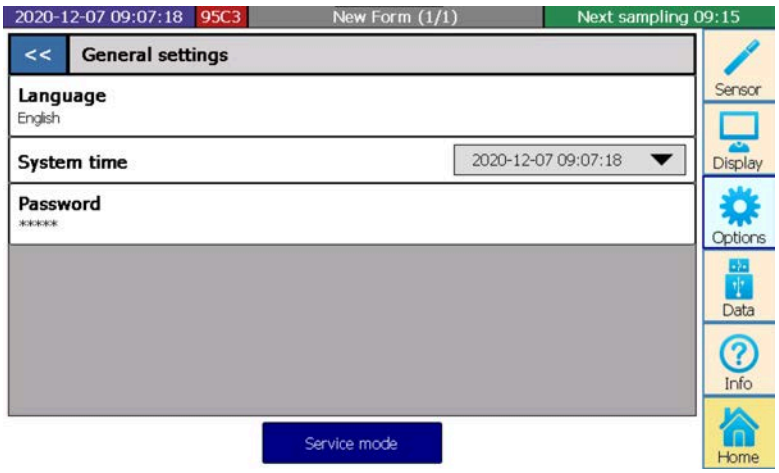


Maintenance mode

The TriBox3 can also be put into maintenance mode by pressing the “Maintenance mode” button. As long as the maintenance mode is active, all measured values and analog outputs are held at the last measured value to avoid fault alarms during cleaning or similar. There is no longer any automatic communication with the sensor (cleaning, relay, valve, etc.). Please refer to chapter 6.2.1.

General settings

The language and system time can be set under “General settings”. A restart is required after selecting the language.



The language, system time and password are set in the “General settings” sub-item.

Network

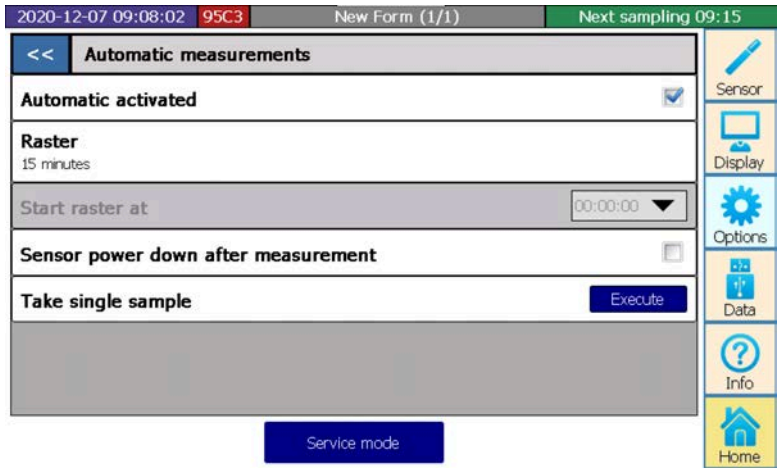
The “Network” sub-item is covered in chapter 5.5.

Automatic measurement

It is possible to configure the automatic measurements in the “Automatic measurements” sub-item.

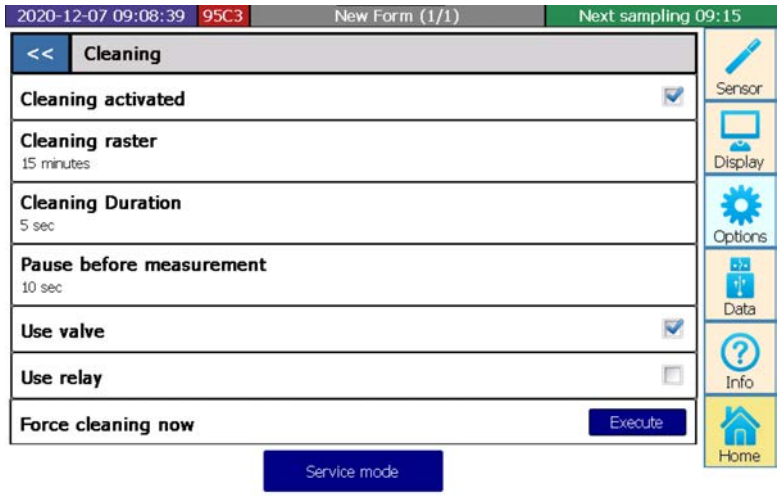
To use an automatic measurement interval, this must first be activated by ticking the box and a measurement grid must be set. For automatic measurement, automatic measurement must also be activated for the sensor (see section 4.3).

In addition, the voltage at the COM port can be switched off after each measurement to save energy and individual measurements can be triggered. If this function is activated, the middle LED in the sensor's power supply lights up.



Cleaning

In the “Cleaning” sub-item, it is possible to determine the cleaning intervals.



Relay control

The sub-item “Relay control” is covered in chapter 5.3.

Buzzer control

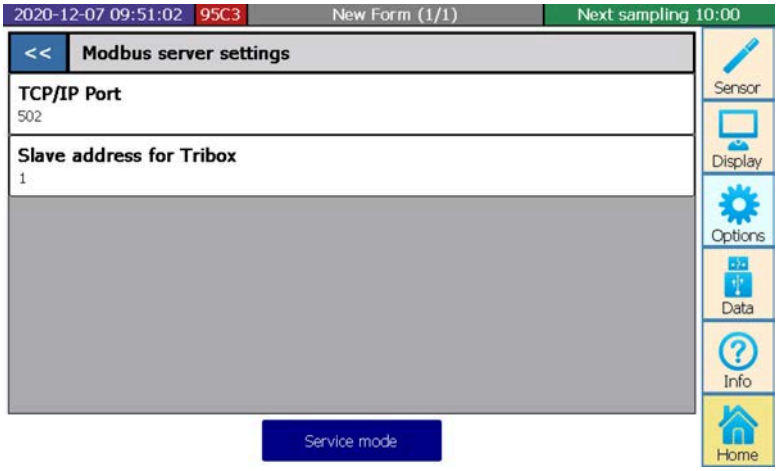
The sub-item “Buzzer control” is dealt with in section 5.3.

Analog outputs

The sub-item “Analog outputs” is covered in chapter 5.2.

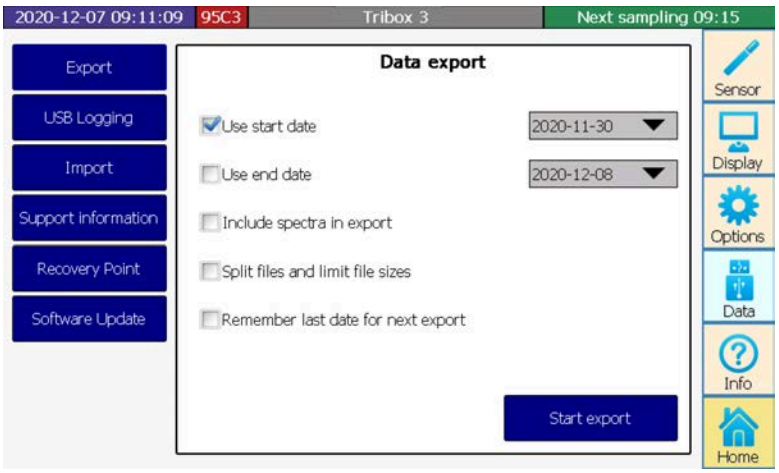
Modbus server settings

The TCP/IP port and the slave address of the Tribox can be changed under “Modbus server settings”. Detailed information on using the Modbus server mode can be found in chapter 5.4.



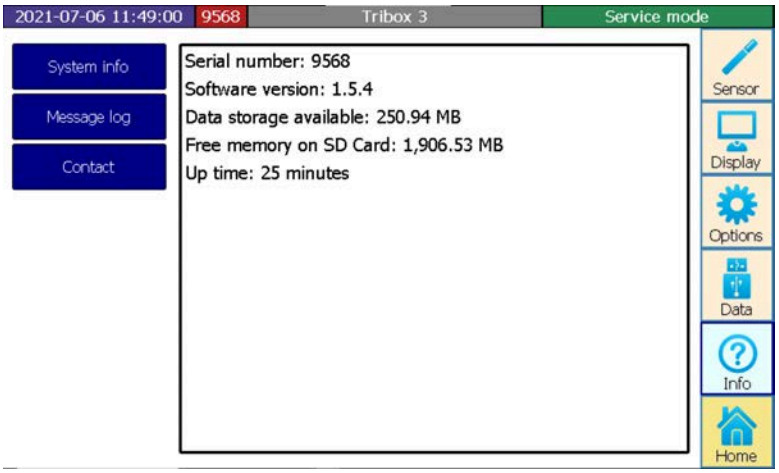
3.4.5 Data

You can find more information on the “Data” menu item in chapter 5.1



3.4.6 Info

The “Info” button opens a window with the system information, messages and contact details of the nearest contact person for problems or general inquiries. Before contacting the contact person, it is essential to read chapter 6 to ensure the correct information for targeted troubleshooting.

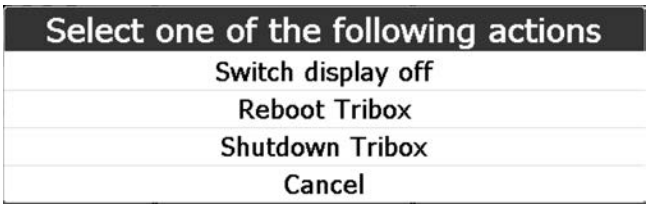




The “System Info” menu appears automatically when the “Info” menu item is opened. Information such as serial number, memory location etc. can be read out here.
The “Messages” menu contains program messages that are only relevant for support contacts.
The manufacturer's contact information can be found under “Contact”.

3.4.7 Power and Home

If you click on the “Power” button, a window opens where you can restart the TriBox3 or switch off the display (e.g. to save energy in an autonomous measuring station). If the display is switched off, you can switch it back on by touching the screen again.



The “Home” button is only visible while configuration menus are open. Pressing it closes the configuration menus and only the displays are visible.

NOTICE

To ensure that all previously made settings are saved and updated, a restart should be carried out after each reconfiguration. A recovery point should always be saved after the restart.

4 Application

The TriBox3 is housed in a solid aluminum housing and designed for outdoor use. The design of the TriBox3 fulfills the degree of protection IP65. This means that the internal components are protected against dust and water jets. For optimum operation, the device is best housed indoors or protected from rain by a roof.

NOTICE

Avoid direct sunlight and only operate the system within a temperature range between 0° C and 40 °C.

For maintenance and inspection tasks, choose a location that is easily accessible.

⚠ CAUTION

The controller/power supply unit is supplied with a mains connection cable that is only intended for use in a dry environment. For outdoor operation, this must be replaced with a suitable connection cable.

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

⚠ DANGER

Danger to life due to electric shock!
A residual current circuit breaker with a maximum ignition current of 30 mA must be used.
Overvoltage protection should be used for outdoor installations.

⚠ DANGER

Danger to life due to electric shock!
If the device is permanently connected, a disconnecting device must be integrated into the supply line.

This disconnecting device must comply with the relevant standards and regulations. It must be installed close to the device, be easily accessible to the operator and be labeled as a disconnecting device for the device. If the connection is made via a mains connection cable permanently connected to the power supply unit, the plug of the mains connection cable can be used as a local disconnect.

⚠ DANGER

Danger to life due to electric shock!
Only use earthed sockets to connect this device to the power supply.

If necessary, check that the socket outlet is earthed.

NOTICE

If you are not sure whether the sockets are earthed, have this checked by a qualified electrician. In addition to the power supply, the mains plug is also used to quickly disconnect the device from the mains if necessary. This is recommended for longer periods of non-use and can prevent potential hazards in the event of a malfunction. Therefore, make sure that the sockets to which the device is connected are easily accessible to all users at all times.

4.1 Installation

⚠ DANGER

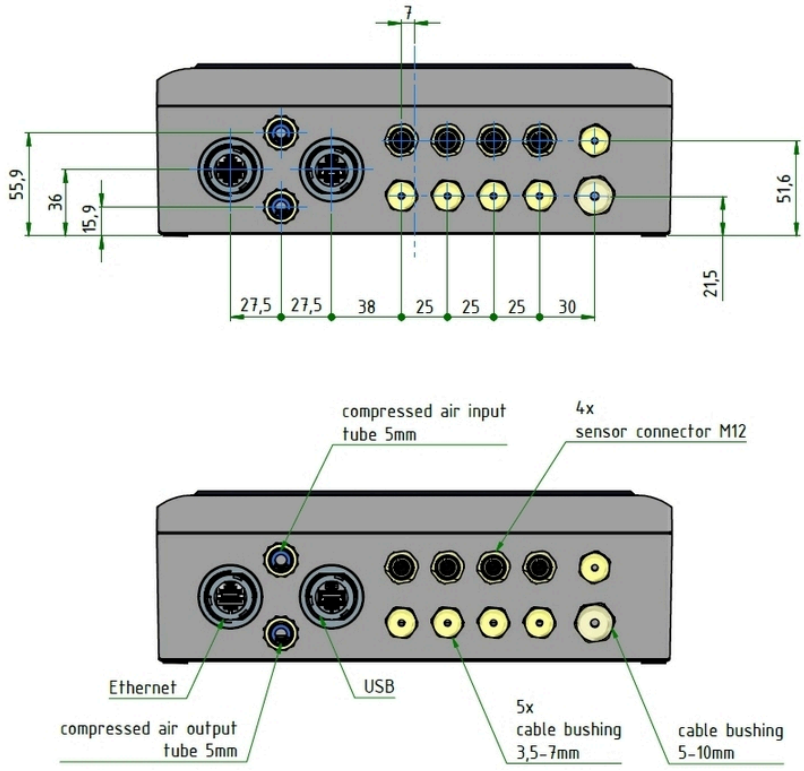
Danger to life due to electric shock!
Disconnect the mains voltage before making any changes to the supply cable or plug.

It is essential to check that there is no voltage and to secure it against being switched on again.

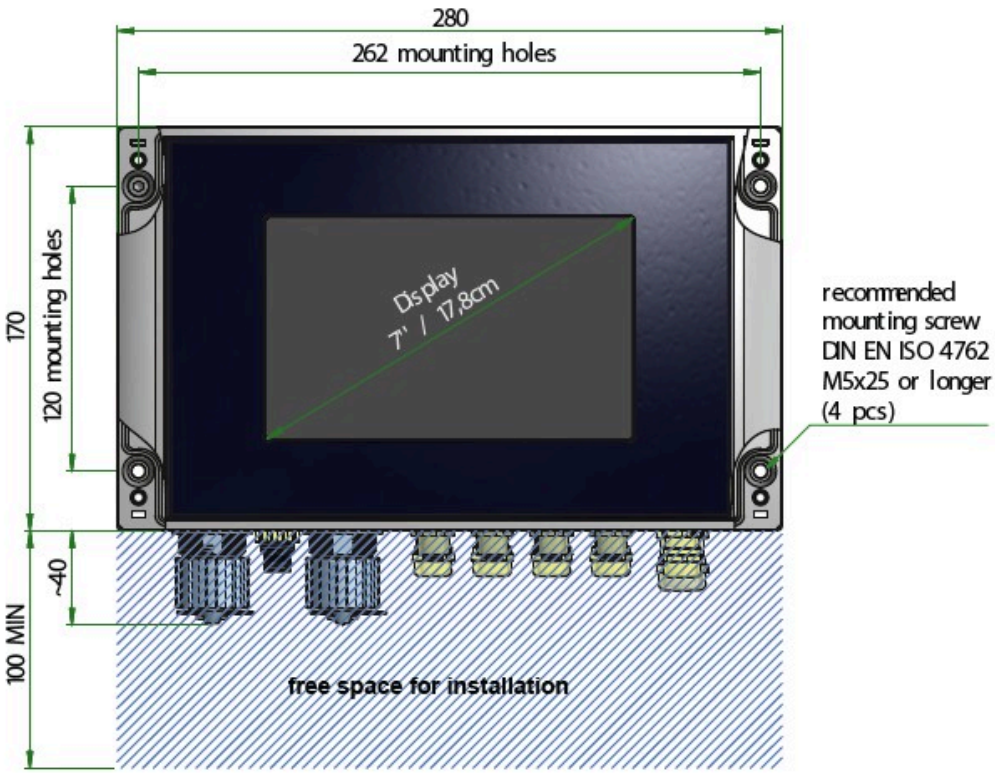
The TriBox3 is screwed to a solid wall or similar. Make sure that the selected mounting surface is flat and able to hold the device securely.

1. For mounting, carefully remove the aluminum covers on both sides of the TriBox3, see illustration.
2. The device is mounted with the connection sockets facing downwards. To ensure the IP degree of protection, all unused connections must be sealed with the plugs inserted by the manufacturer.
3. There are two 5.3 mm holes on each side of the TriBox3 for mounting. After installation, check that the TriBox3 is firmly seated.

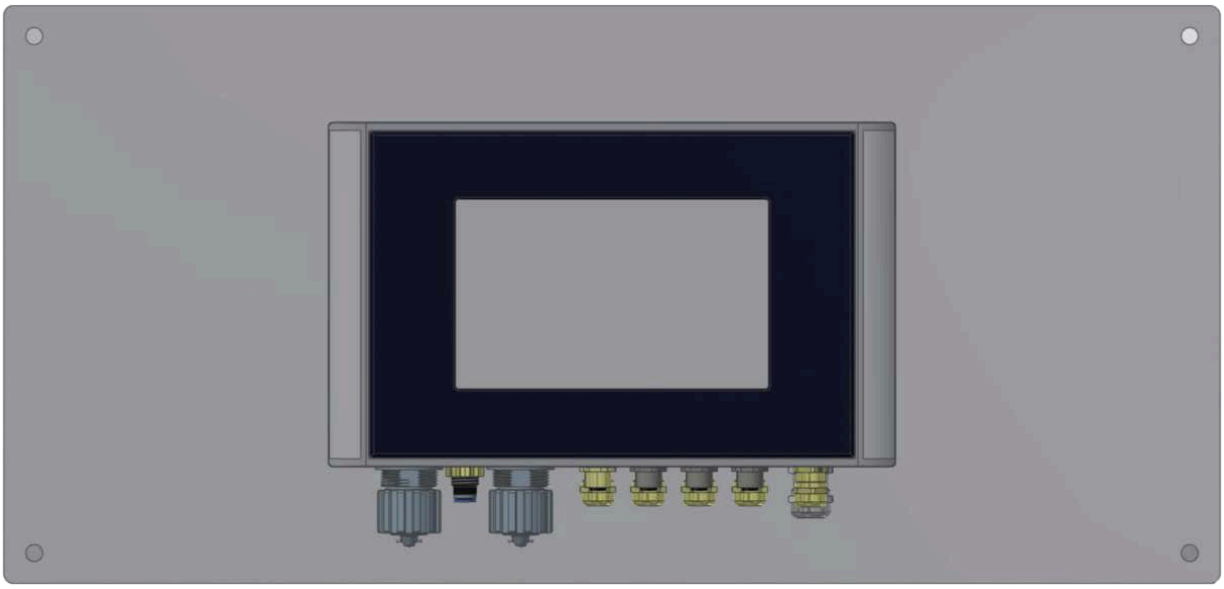




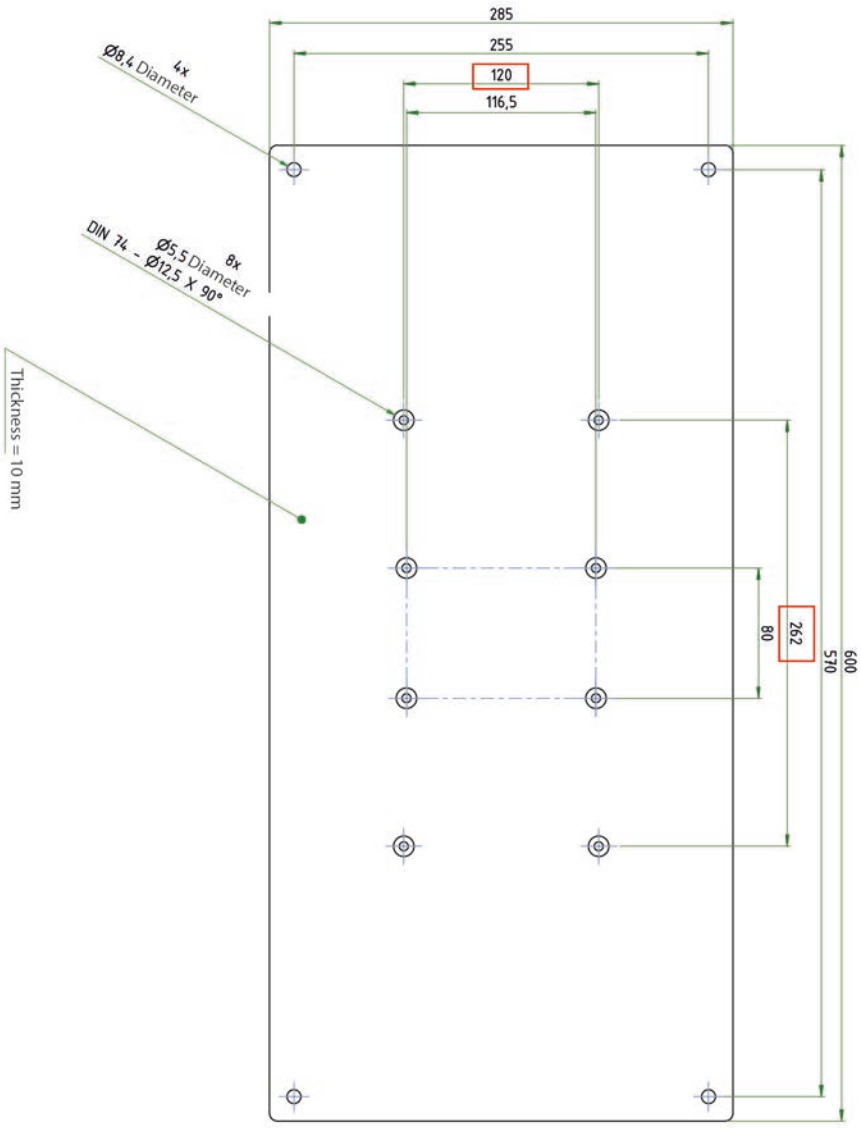
For better orientation, the following figure describes the external dimensions in mm, as well as the dimensions of the mounting holes.



TriOS offers suitable panels for mounting the TriBox3 (item no. 11A100000).



Dimensions of the panel and mounting dimensions of the TriBox3



4.2 Electrical installation

The connections for the DC voltage supply are located in the TriBox3 and are only accessible when the device is open. The following sections describe how to connect the individual components.

4.2.1 Operation with alternating voltage

Connect the power supply cable to a professionally installed earthed socket. The device has internal glass tube fuses to protect against overload (see Chap. 6.3.1).

⚠ DANGER

Danger to life due to electric shock!
When replacing a defective fuse, first pull out the mains plug and only use fuses of the same type.
Before putting the device back into operation, ensure that the fault has been completely rectified.

Alternatively, a fixed installation can be used for the power supply. In this case, the pre-installed mains cable with the Schuko plug is removed. To do this, please proceed as follows:

NOTICE

Please note that the TriBox is operated at an operating temperature between 5 °C and 40 °C when using the integrated mains supply cable. For an installation without the pre-installed mains supply cable, an operating temperature between -10 °C and 50 °C is recommended.

1. Carefully remove the aluminum covers on both sides of the device.



2. Loosen the four screws on the edge of the TriBox3 using a Phillips screwdriver.

⚠ DANGER

Danger to life due to electric shock!
Disconnect the mains voltage before making any changes to the supply cable or plug.

It is essential to check that there is no voltage and to secure it against being switched on again.

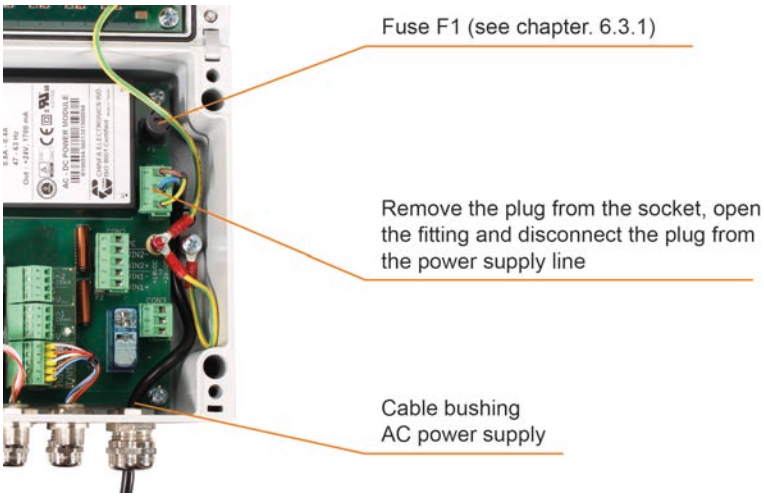
3. After loosening the four screws, carefully lift the housing cover upwards. It must be possible to open it without resistance and without using force. Otherwise there is a danger of damaging the cables in the device.

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

4. The position of the connection plug for the AC voltage on the circuit board is marked in the illustration below. Disconnect this plug from the supply line.



5. Loosen the cable gland screw connection and pull the supply cable out of the device.

NOTICE

Always use ferrules for flexible conductors. Keep the flexible conductors short and lay out the protective earth conductor longer than the other conductors.

The large cable gland is designed for sheath diameters of 5 to 10 mm.

The small cable glands are designed for sheath diameters of 3.5 to 7 mm.

⚠ WARNING

Only use a mains cable with sufficient insulation for the mains voltage and a protective earth conductor (PE). The cross-section of the cable must be at least 0.75 mm².

⚠ WARNING

Before inserting the new mains cable into the power supply unit/controller or touching it, it is essential to ensure that the device is de-energized and cannot be switched on again.

6. Push the new supply cable through the cable gland into the device.
7. Connect the supply cable to the CON1 plug. The following table describes the contact assignment.

Connection CON1

AC power supply	
Pin	**Assignment**
1	Protective earth conductor (PE)
2	Neutral conductor (N)
3	Phase (L)

8. Reconnect the plug to the circuit board and tighten the nut on the cable gland.
9. Check the earthing.
10. Close the housing of the TriBox3 and screw the cover shut. Attach the aluminum covers. Put the device back into operation.

4.2.2 Operation with DC voltage

The TriBox3 can also be integrated into battery-powered measuring stations. For such applications, the TriBox3 can be operated with 12 - 24 V (± 5%) DC voltage.

As an alternative to the connection cable with Schuko plug, the 12 - 24 VDC can be connected directly in the TriBox3. In 12 - 24 VDC direct voltage operation, the earthed plug can be removed, but this is not absolutely necessary. It is important to ensure that the direct current source can provide the required maximum power and has a low impedance output. To operate the TriBox3 with DC voltage, follow the next steps:

To open the box and insert a suitable cable into the TriBox3, please follow these steps:

1. Carefully remove the aluminum panels on both sides of the device.



2. Loosen the four screws on the edge of the TriBox3 using a Phillips screwdriver.

⚠ DANGER

Danger to life due to electric shock!
Disconnect the mains voltage before making any changes to the supply cable or plug.

It is essential to check that there is no voltage and to secure it against being switched on again.

3. After loosening the four screws, carefully open the housing cover upwards. It must be possible to open it without resistance and without using force. Otherwise there is a danger of damaging the cables in the device.
4. Connect the DC cable to the CON2 plug marked in the illustration. The following table describes the contact assignment.

Connection CON2

AC power supply	
Pin	**Pin assignment**
1	DC voltage 1, VIN1 (plus)
2	DC voltage 1, VIN1 (minus, GND)
3	DC voltage 2, VIN2 (plus)
4	DC voltage 2, VIN2 (minus, GND)
5	Protective earth conductor (PE)

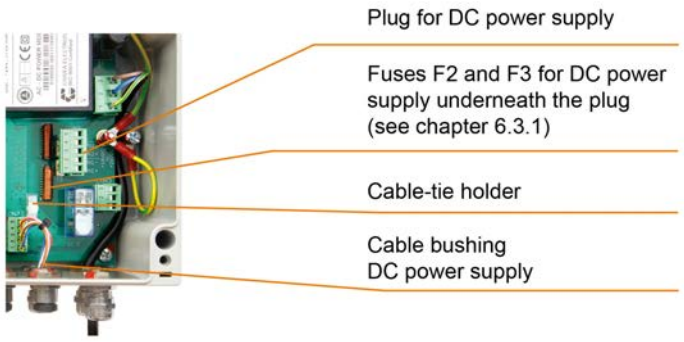
5. Insert the plug back into the socket and tighten the nut on the cable gland until the supply cable is seated firmly, but not too tightly, in the cable gland.
6. Secure the cable to the white cable tie holder with a cable tie.
7. Close the housing of the TriBox3 and screw on the cover. After fixing the aluminum covers, put the device into operation.

NOTICE

Always use ferrules for flexible conductors. Keep the flexible conductors short and lay out the protective earth conductor longer than the other conductors.

The large cable gland is designed for sheath diameters of 5 to 10 mm.

The small cable glands are designed for sheath diameters of 3.5 to 7 mm.



4.2.3 Prioritized supply voltage

The TriBox3 can be operated with both AC and DC voltage. The TriBox3 automatically selects the input voltage with the highest priority from the available input voltages. The priorities are fixed:

Priority	Assignment	Connection/pins
1	AC voltage	CON1, Pin 1-3
2	DC voltage VIN1	CON1, pin 1-2
3	DC voltage VIN2	CON1, pin 3-4

If several input voltages are used at the same time, the supply voltage can also be switched or selected when the device is switched on to ensure uninterrupted operation. If two DC input voltages are used, they should have approximately the same potential (within 12 - 24 VDC (± 5%)).

4.3 Connecting the sensors

The TriBox3 offers four serial sensor interfaces as standard, COM1 to COM4. Customized extensions are available for connecting additional sensors. Only original cables from TriOS Mess- und Datentechnik GmbH may be used for the sensor connection.

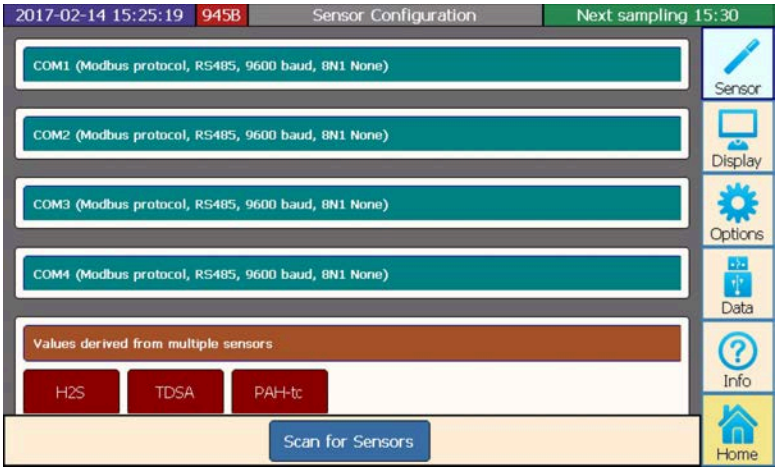
Connect the connection cable of your TriOS sensors to a COM port of the TriBox3. Insert the M12 plug into the desired COM port and secure the connection by tightening the screw connection (see figure below).



NOTICE

A sensor should always be connected in maintenance mode.

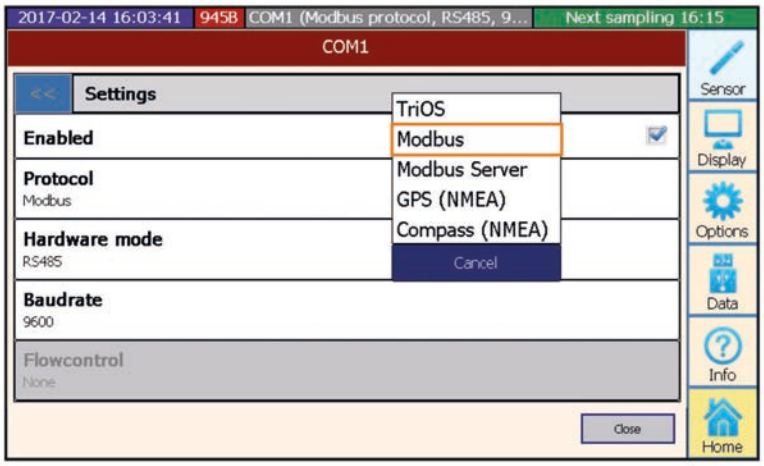
The respective settings of the individual COM ports are visible in the green fields of the COM ports.



For analog sensors, a "TAMMO" can also be installed, which converts analog signals into the RS-485 Modbus RTU protocol (see section 5.7).

For TriBoxes mounted in an EGCWA (TriBox3 serial number begins with 751*), an "AdamE" can be installed for this purpose.

Tapping the COM port button opens the settings menu.



Default setting of the COM ports for all Modbus-capable sensors:

Protocol: Modbus

Hardware mode: RS-485

Baud rate: 9600

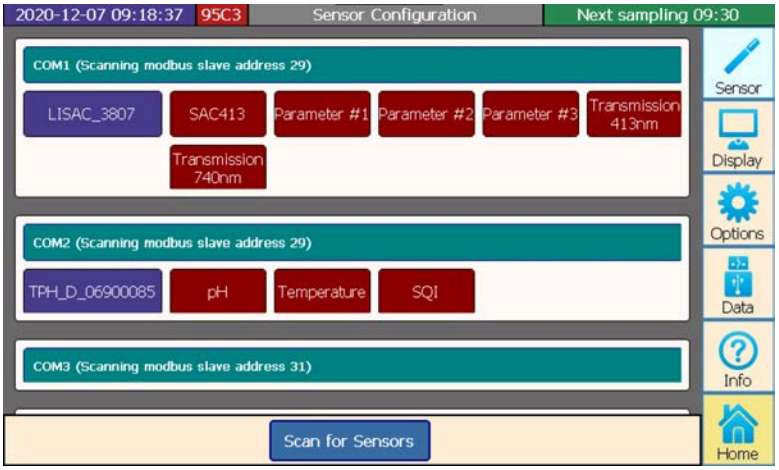
Flow control: None (setting locked for Modbus protocol)

Parity: None

Data bits: 8

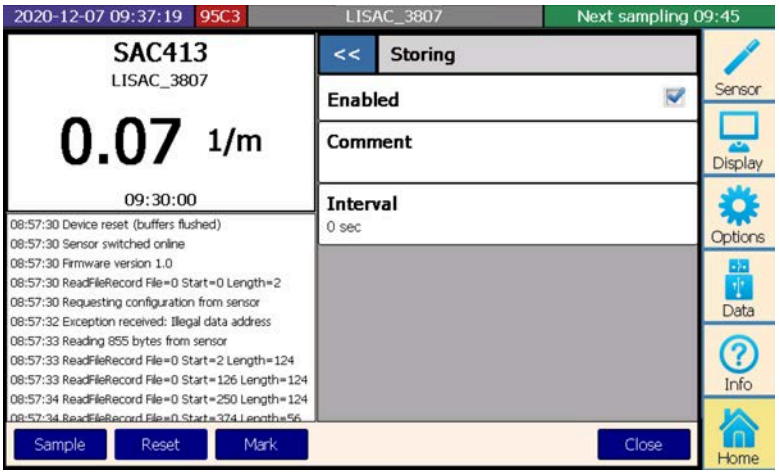
Stop bits: 1

If the sensor is recognized correctly after connection, it appears in the overview of COM ports, as in this example illustration:



When the sensor button has been pressed, a screen like in the following examples opens:

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TPH_D_06900085



In this screen, the current measured value is visible at the top left and the log protocol for the sensor below it. On the right-hand side, a description of the measurement location can be entered and automatic measurement can be activated or deactivated. Some sensors have the option “As soon as possible”, whereby the sensor triggers a measurement as often as possible.

The automatic measurements must be activated for the sensor to measure.

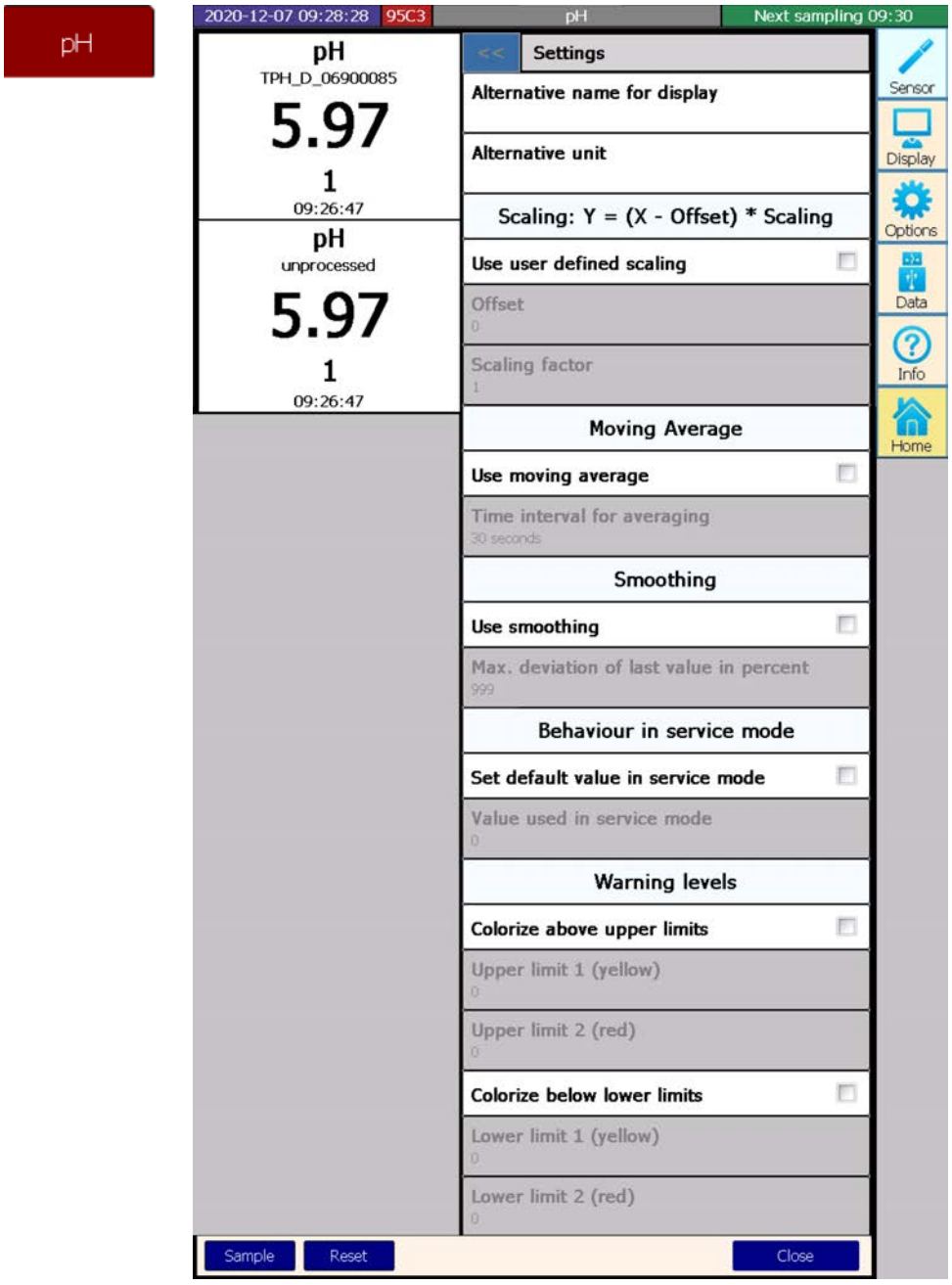
The menu item “Data storage” is covered in chapter 5.1 and “Modbus server settings” can be found in chapter 5.4. Further information can be found in the corresponding sensor manual.

If you have any further questions, please contact TriOS Support.



“Measurement” can be used to immediately trigger a measurement of the corresponding sensor.	“Reset” resets the sensor.	With “Mark” you can mark the next measured value in the data log.	“Calibrate” starts the calibration wizard. For further information, see chapter 4.4.

When a parameter button is pressed, the following screen opens (example illustration):



This screen shows the current scaled measured value at the top left and the unscaled measured value below.

Alternative display name

A different display name for the parameter can be entered here.

Scaling

Scaling can be activated here and an offset and scaling factor can be entered. See also the manual for the respective sensor.

Moving averaging

The sub-item “Moving averaging” is dealt with in chapter 4.3.1.

Smoothing

The sub-item “Smoothing” is dealt with in chapter 4.3.2.

Behavior in maintenance mode

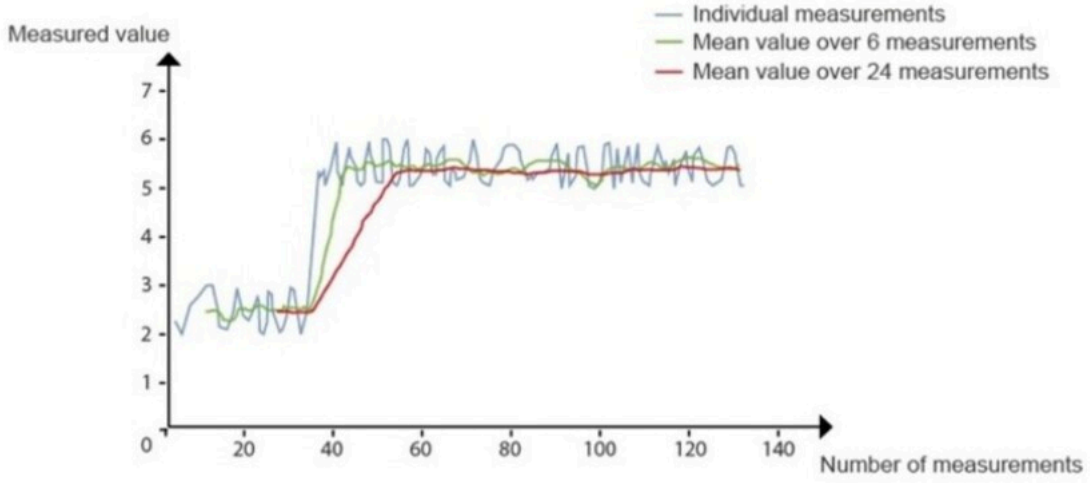
This can be used to define a default value that is always output in maintenance mode (see sections 3.4.4 and 6.2.1)

Warning thresholds

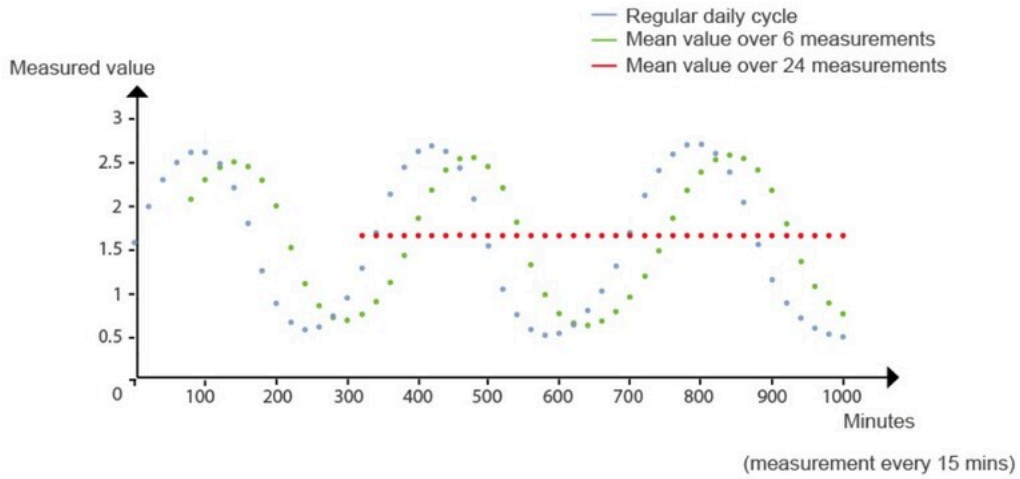
The sub-item “Warning thresholds” is dealt with in chapter 4.3.3.

4.3.1 Moving average

It is possible to output a moving average of past measurements. A period of between 30 seconds and one hour can be selected. However, it should be noted that sudden changes in the measurement results are only displayed with a time delay when moving averaging is activated. This function is only recommended to a limited extent for regularly occurring cycles.



Daily cycle



4.3.2 Smoothing

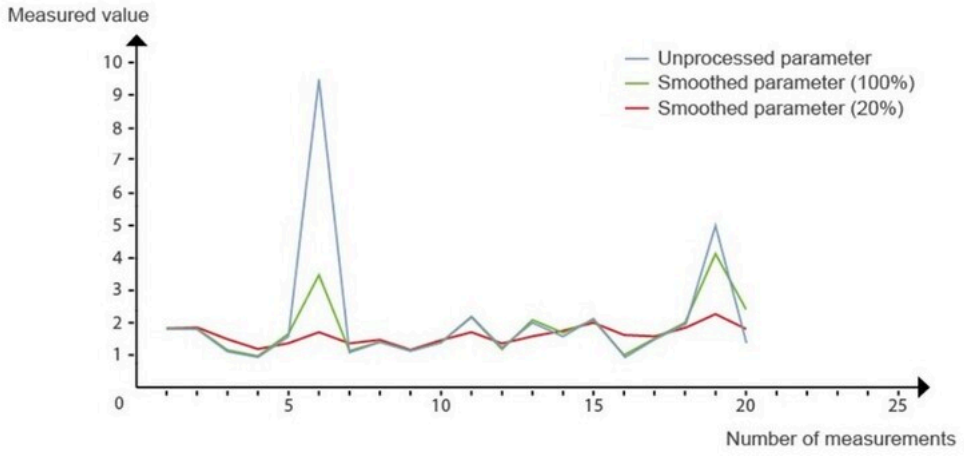
Smoothing a parameter may be necessary if the measurement signal is very unstable and the output concentrations fluctuate greatly. This can happen if the measured medium is inhomogeneous or in motion. The aim is to eliminate spikes in the process and only allow the measured values to rise slowly. The smoothing setting (in %) defines the maximum deviation of the current measured value from the previous measured value.

The function can be activated for each measured value on the Tribox, whereby a maximum signal change of 1 to 999 percent from the previous measured value can be configured

Caution:

- If the current (averaged, scaled) measured value is NaN*/range, no smoothing is performed and the result is also NaN.
- If the current measured value is 0, the 0 is replaced by the previous (averaged, scaled and smoothed) measured value.
- If the parameter settings are changed, a recalculation is then carried out using the first measured value after the change.

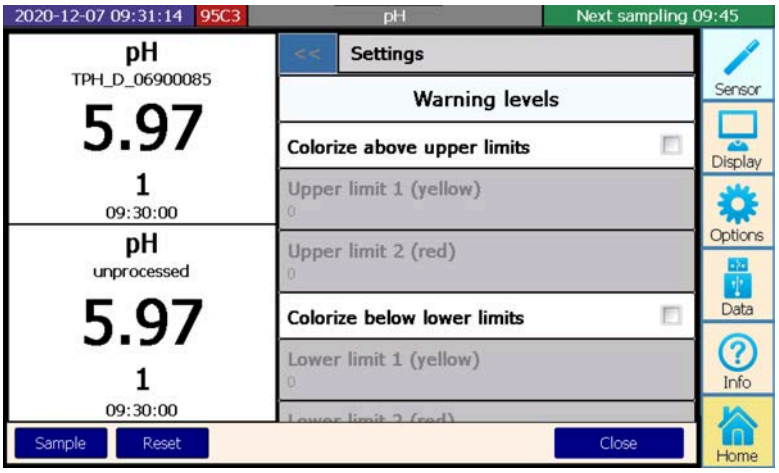
  *NaN = Not a Number



If the measured values are predominantly 0, percentage smoothing is not recommended.

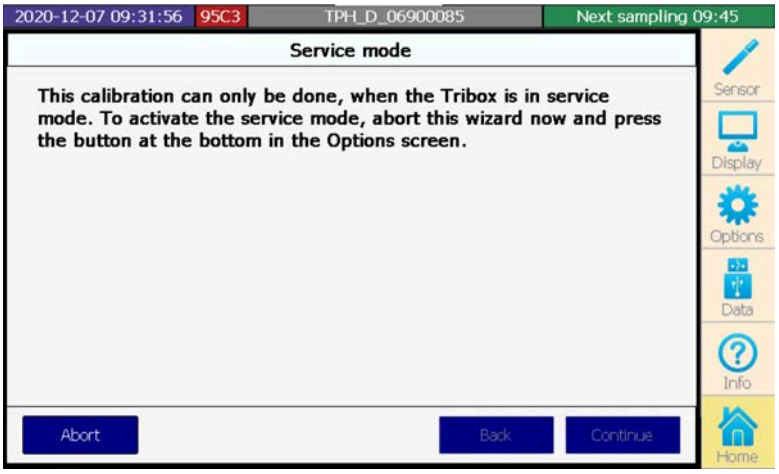
4.3.3 Warning thresholds

The setting options for warning thresholds can be found further down on the screen. Under “Warning thresholds”, the display field of the corresponding parameter is highlighted in color in all displays according to the selected threshold values by activating the threshold value violations.

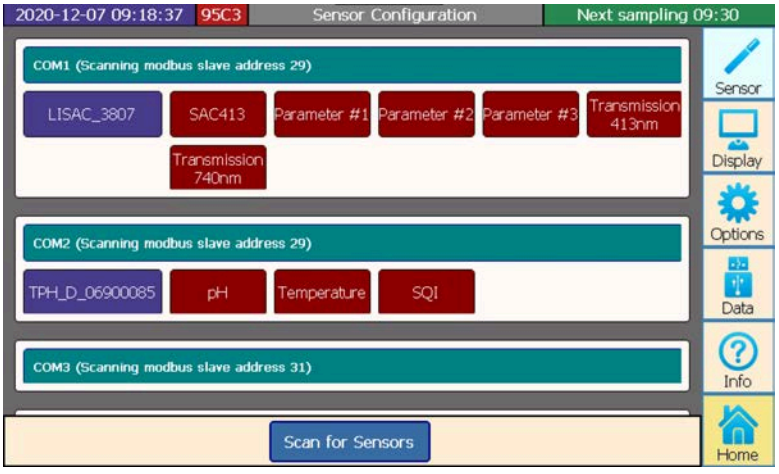


4.4 Calibration wizard

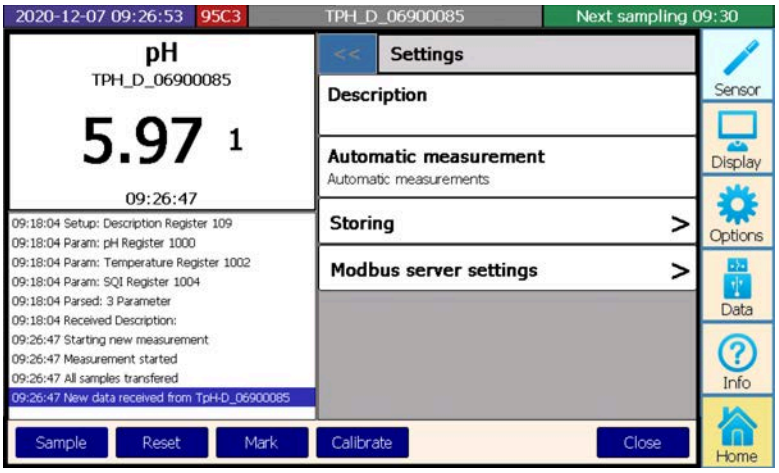
The TriBox3 has a wizard for the calibration of various sensors, which enables a fully guided calibration. To carry out a calibration with the wizard, please proceed as follows:



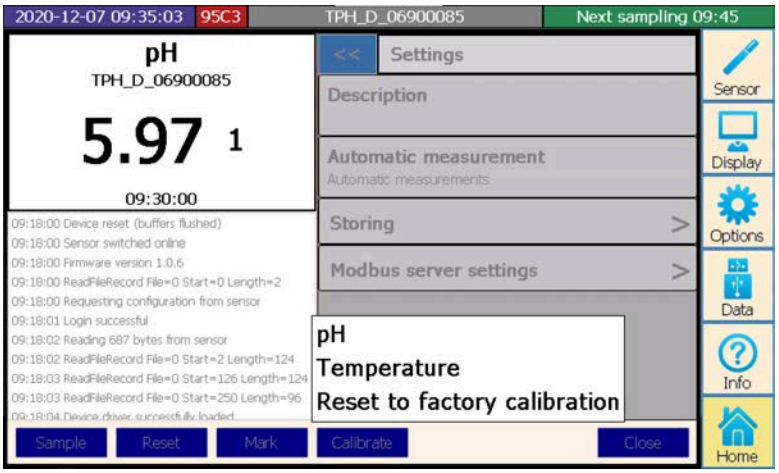
1. Switch to maintenance mode (“Options” menu ->“Maintenance mode” button at the bottom of the screen). As soon as maintenance mode is activated, the five LEDs flash.



2. Select the sensor to be calibrated in the sensor menu by tapping the blue sensor area.



3. Select “Calibrate” in the menu of the selected sensor.
4. The calibration depends on the type of sensor. After selecting the value to be calibrated, the calibration wizard begins. Reference standards should already be available or prepared for calibration (e.g. TpH-D reference solutions etc.).



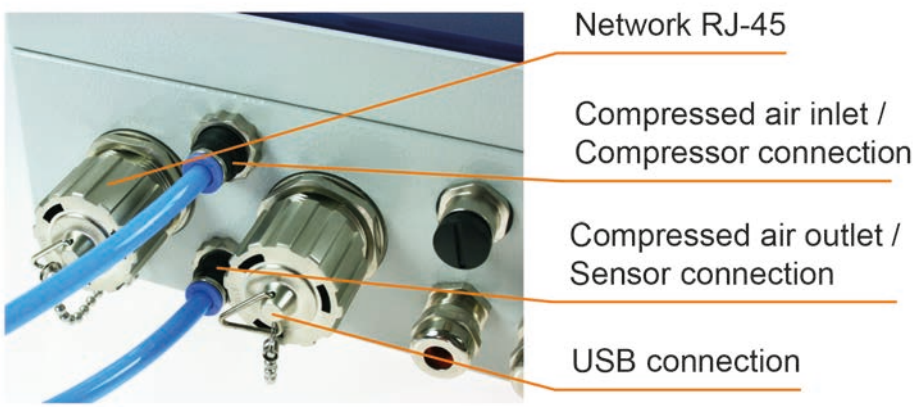
5. The instructions of the wizard must be followed exactly, otherwise the accuracy of the measurements cannot be guaranteed once the wizard has been completed.

A room temperature of around 20 °C is required for precise calibration.

6. Maintenance mode can be exited after calibration.

4.5 Installation of compressed air purge

All sensors are available with components for a compressed air purge. Operation with a controllable compressed air valve is supported by the TriBox3, which prevents cleaning during the measurement and thus prevents error results. The sensors have a nozzle that concentrates the compressed air directly onto the optical windows, removing any biofilm or deposits. The required compressor must be provided by the customer and installed near the TriBox3.



1. Connect the compressor to the compressed air inlet of the TriBox3. To do this, push the end of the hose into the compressed air inlet of the device and check that it is firmly seated by pulling. To remove the hose, press the small blue safety ring on the compressed air inlet towards the device and pull on the hose at the same time.
2. As described above, the compressed air outlet is connected to the compressed air nozzle of the sensor. The air pressure of the compressor is maintained throughout operation. By switching the compressed air valve, the compressed air is directed to the sensor's flushing nozzle.

NOTICE

TriOS recommends setting an air pressure of 3-6 bar. The pressure line from the compressor to the sensor should not be longer than 25 meters.

Suitable compressed air hoses with different lengths (10 m, 15 m and 25 m) are available from TriOS Mess- und Datentechnik GmbH and from specialist dealers. The hose used is of type PU 6/4 (polyurethane material, 6 mm outer diameter and 4 mm inner diameter).

NOTICE

The internal valve may only be used in unpressurized media. In the event of water ingress through the valve, no warranty claims can be made against TriOS.

NOTICE

When switching the valve, the air must flow out of the outlet and stop completely when the switching process is complete. If no air escapes or the valve does not close properly at the end of the switching process, the two hoses must be swapped.

NOTICE

The compressed air valve must never be exposed to a pressure of more than 7 bar (0.7 Mpa). Otherwise the valve could be damaged.

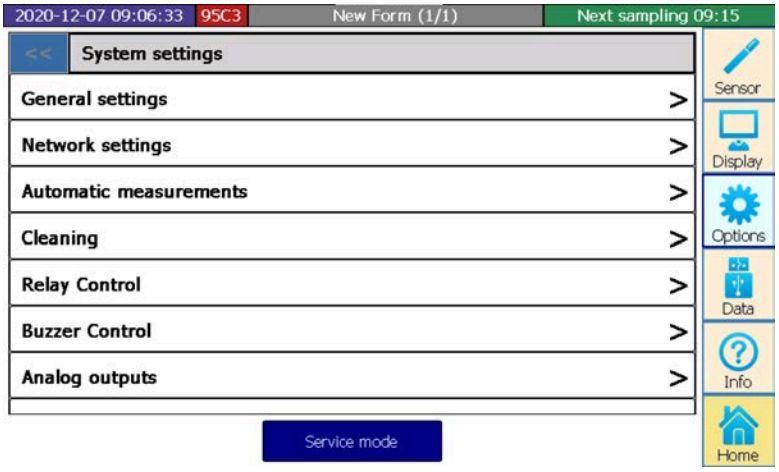
To ensure that settings are not lost during reconfiguration, it is essential to save a restore point beforehand.

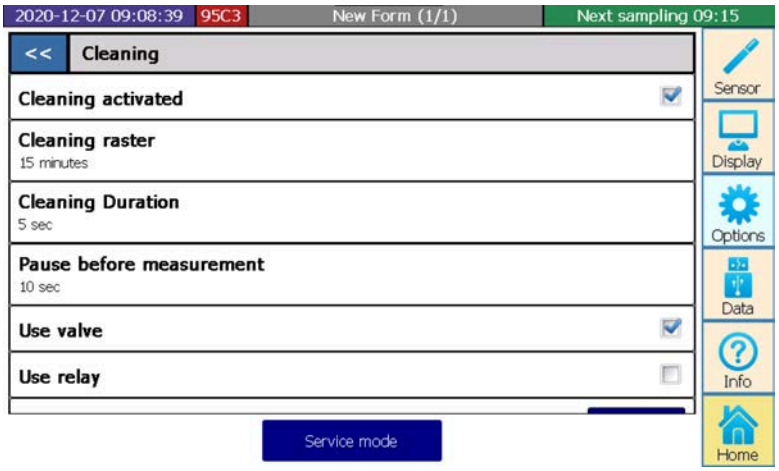
In the “Cleaning” sub-item (“Options” menu item), it is possible to set the cleaning intervals.

To use an automatic cleaning interval, this must first be activated (tick the box) and a cleaning grid set. The cleaning duration and the pause before the measurement are also defined here.

Please note that measurement and cleaning intervals should be coordinated to prevent measurements from being interrupted. Use the recommended settings for this, which are described in the table below.

It is also possible to trigger cleaning and define whether the valve and relay should be activated during cleaning.





Recommendations for timers and flushing intervals*

	Measuring grid***	Cleaning grid	Cleaning duration	Pause before measurement
minimum**	30 s	30 s	5 s	5 s
typical**	2 min	15 min	10 s	5 s
maximum	1 day	6 hours	20 s	5 min

* with TriOS compressed air hose 4/6 mm in 10 m length
** depending on the type of sensor
*** See chapter 3.4.4 Options

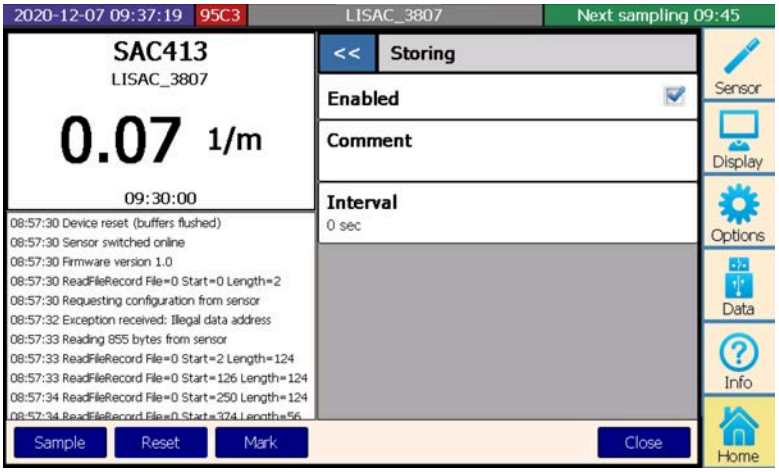
4.6 Data storage

Activate the “Sensor” view.



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When the sensor button is pressed, a screen opens as shown in the following example:



The “Data storage ” sub-item offers the following options:



Storage activated This can be used to control whether the measured values for the individual sensor should be saved.

Comment This can be used to define an individual comment for the sensor that is written to the measured values.

Interval An individual storage interval can be specified for the sensor, which can be used to reduce the number of stored measured values without affecting the measurement interval and any alarm functions linked to it. If the interval is 0 seconds, this function is deactivated.

4.7 Recovery

Activate the “Recovery point” view.



In the “Recovery point” sub-item, settings are also saved as recovery points.

For your safety, a recovery point should always be saved when settings such as scaling factors, analog outputs or measuring intervals are changed so that the previous settings can be accessed at a later time.



In this illustration, a recovery point is already saved next to the factory settings.
If the factory settings are restored, all user-specific settings will be lost.

To ensure that settings are not lost during reconfiguration, it is essential to save a recovery point beforehand.

The recovery points can be saved both locally and on a USB medium. If there is a USB stick in the TriBox3 when “Create” is pressed, the following window opens and the “Create” button turns black.

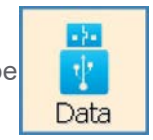


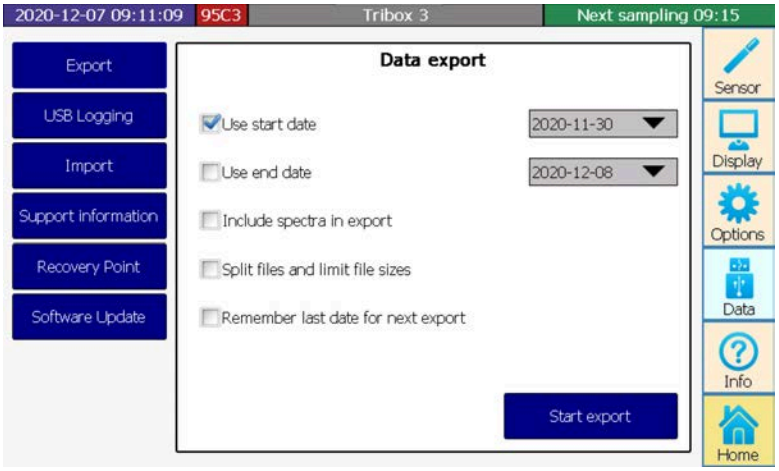
Press Yes to confirm saving to the USB stick and No to enter a comment for a recovery point directly on the TriBox3.

5 Extended application

5.1 Data export

The “Data” button opens a submenu in which all settings for data exchange via USB stick (e.g. data, software, calibration files, etc.) can be configured and executed.





Export

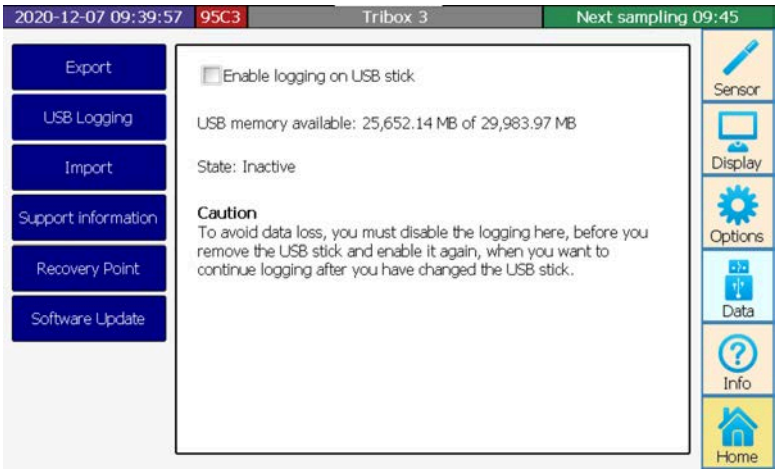
In the “Export” submenu, data and spectra can be copied from the TriBox3 to USB sticks, which can then be evaluated using standard programs.

Certain properties of the export can be defined using the five checkboxes:

- **“Use start date”**
  All data from the start date is copied to the USB stick.
- **“Use end date”**
  All data up to the end date is copied to the USB stick.
- **“Also export spectra”**
  In the case of spectral probes, spectra can also be copied to the USB stick. This selection is due to the significantly larger data volume of a spectrum in contrast to the calculated numerical values.
  The export may take some time for spectra of a longer period. When using spectra for evaluation, it is always advisable to activate the following sub-item “USB logging”.
- **“Limit file sizes and split files”**
  The exported data is written to several smaller files instead of one large file. These individual files are then easier to handle for later evaluation.
- **“Remember the last date for the next export”**
  The date of the last exported measured value is saved internally and can therefore be used as the start date for the next export.

USB logging

In the “USB logging” sub-item, you can activate the option to save the data both on the internal SD card and on a USB stick.



The “USB logging” function is only active when the data carrier is inserted. You should always deactivate this window before removing it to avoid data loss. Suitable USB sticks, which do not affect the IP degree of protection, are available from TriOS as accessories.

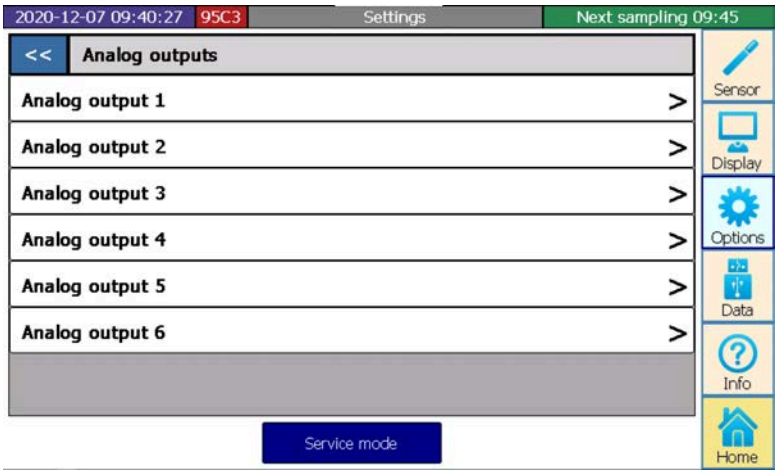


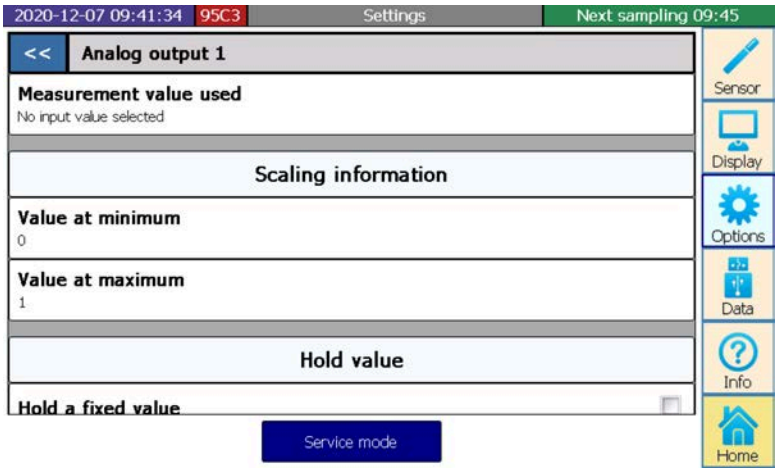
Information on the sub-item “Import” can be found in chapter 13 FAQ.

Further information on the sub-items “Support information”, “Recovery” and “Software updates” is covered in chapter 6.3.

5.2 Analog output

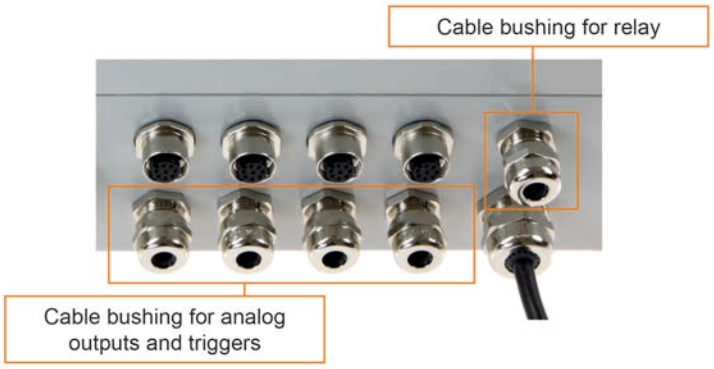
The analog outputs can be configured in the “Analog outputs” submenu (“Options” menu). To configure, select one of the six buttons.





In the lower area, holding a fixed value for the respective interface can be activated for test purposes.

Six analog outputs are available in the TriBox3 which provide 4 ... 20 mA for the operating range. The measured values can be transmitted in freely selectable scaling via the analog interface to other systems, for example process control systems.



NOTICE

Please note that only passive components are connected to the analog outputs so that no external voltages can reach the input. Otherwise the TriBox3 may be damaged.

1. Carefully remove the aluminum covers on both sides of the device.



2. Loosen the four screws on the edge of the TriBox3 using a Phillips screwdriver.

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

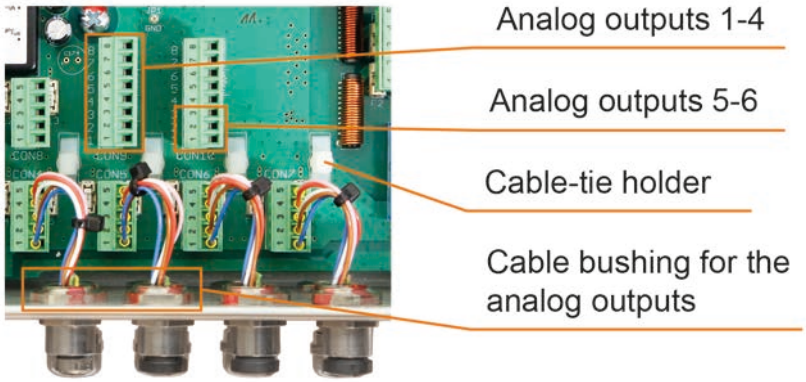
3. After loosening the four screws, carefully open the housing cover upwards. It must be possible to open the housing cover without resistance and without using force, otherwise there is a danger of damaging the cables in the device.

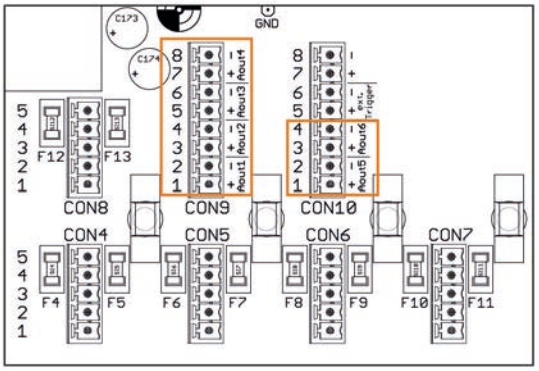
NOTICE

Always use ferrules for flexible conductors. Keep the flexible conductors short and lay out the protective earth conductor longer than the other conductors.

The large cable gland is designed for sheath diameters of 5 to 10 mm.

The small cable glands are designed for sheath diameters of 3.5 to 7 mm.





4. Connect the control cable to the connectors marked in the illustration.

   The following tables describe the contact assignment.

Connection CON9

Analog outputs 1 - 4	
Pin	**Assignment**
1	Analog output 1 (plus)
2	Analog output 1 (minus, GND)
3	Analog output 2 (plus)
4	Analog output 2 (minus, GND)
5	Analog output 3 (plus)
6	Analog output 3 (minus, GND)
7	Analog output 4 (plus)
8	Analog output 4 (minus, GND)

Connection CON10

Analog outputs 5 - 6	
pin	**Assignment**
1	Analog output 5 (plus)
2	Analog output 5 (minus, GND)
3	Analog output 6 (plus)
4	Analog output 6 (minus, GND)

5. Insert the plugs back into the socket and screw the cable gland tightly, but not too tightly.
6. Fix the cable to the white cable tie holder with a cable tie.
7. Close the housing of the TriBox3 and screw on the cover. After attaching the aluminum covers, put the device into operation.

5.3 Relay and buzzer

The connections for connecting the relay and an external trigger signal are located in the TriBox3 and are only accessible when the device is open. The following sections describe the connection of the individual components.

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

The TriBox3 contains a potential-free relay changeover contact. The relay can switch small loads, but should only be used as a signal transmitter for power relays / contactors if possible. The relay can be used to implement a programmable alarm output. In this case, the relay switches if, for example, a selected measured value is exceeded or undershot.

NOTICE

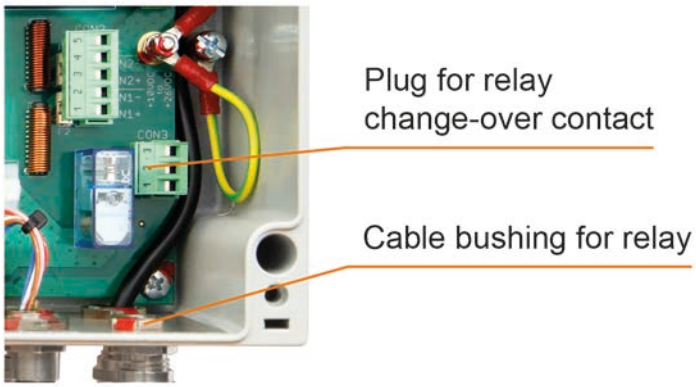
Always use ferrules for flexible conductors. Keep the flexible conductors short and lay out the protective earth conductor longer than the other conductors.

The large cable gland is designed for sheath diameters of 5 to 10 mm.

The small cable glands are designed for sheath diameters of 3.5 to 7 mm.

To connect the relay, first carry out steps 1.-3. in **chapter 4.2.1** to open the TriBox3 and insert a suitable cable into the TriBox3. Then follow the next instructions:

1. Remove the CON3 connector marked in the illustration and connect it to the control cable. The pin assignment is described in the following table.



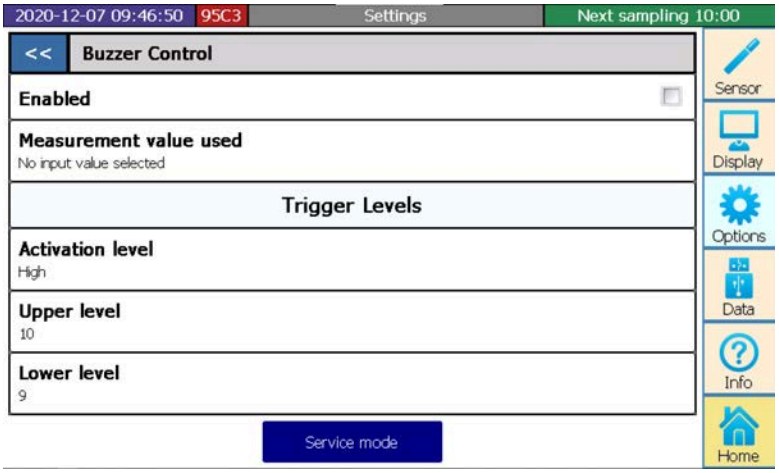
CON3 connection

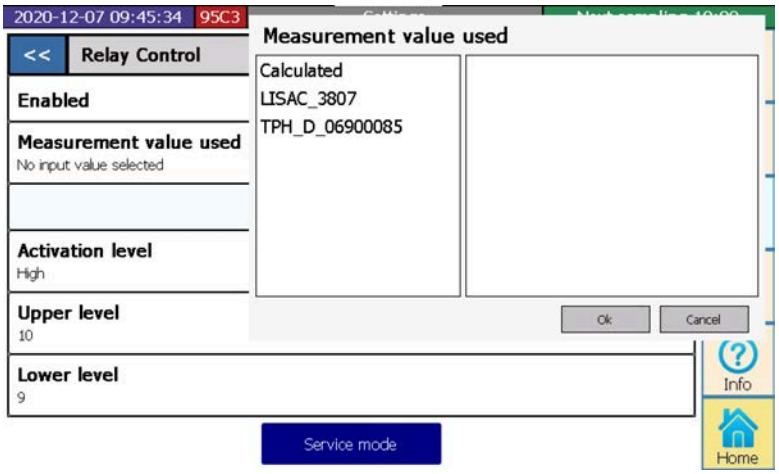
Relay changeover contact	
Pin	**Pin assignment**
1	Normally closed contact (NC)
2	Changeover contact (CO)
3	Normally open contact (NO)

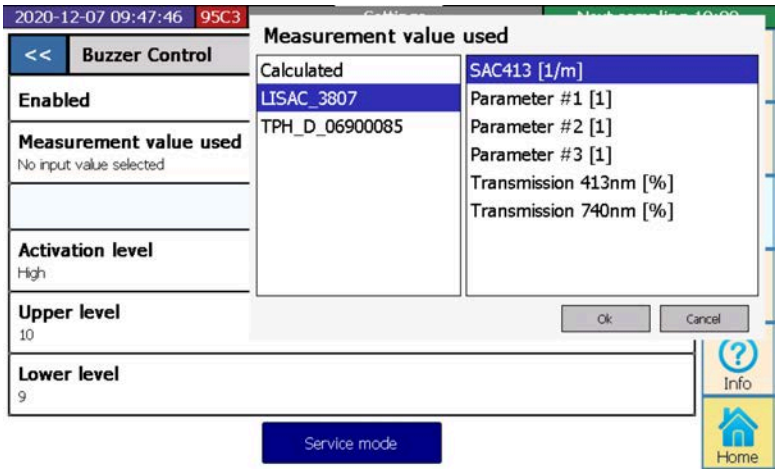
2. Insert the plug back into the socket and screw the cable gland tightly, but not too tightly.
3. Fix the cable to the white cable tie holder with a cable tie.
4. Close the housing of the TriBox3 and screw on the cover. After fixing the aluminum covers, put the device into operation.

Controlling the relay

By ticking the box under “Relay control”, a routine is activated which is configured in the following points. The parameter that influences the triggering of the relay and its activation and deactivation limits are defined.

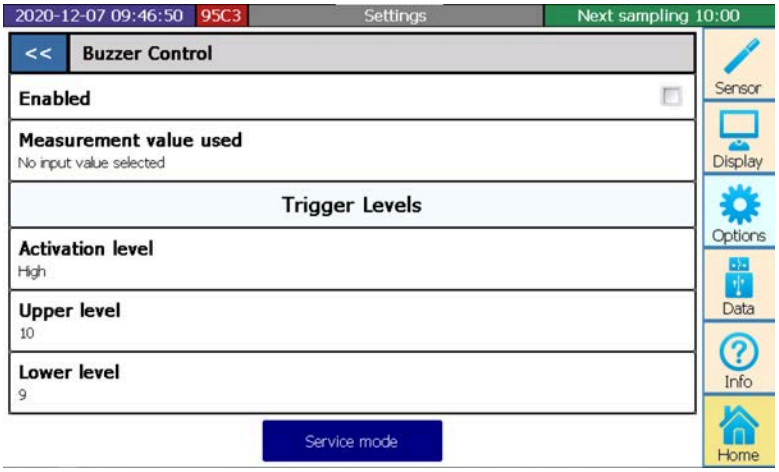


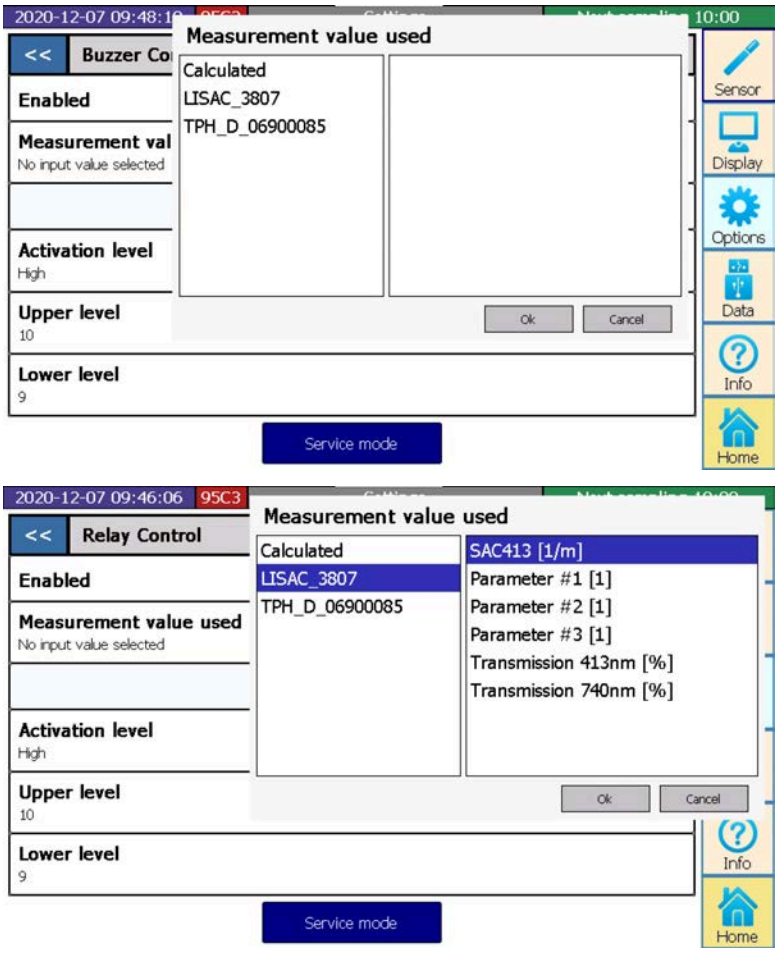




Controlling the buzzer

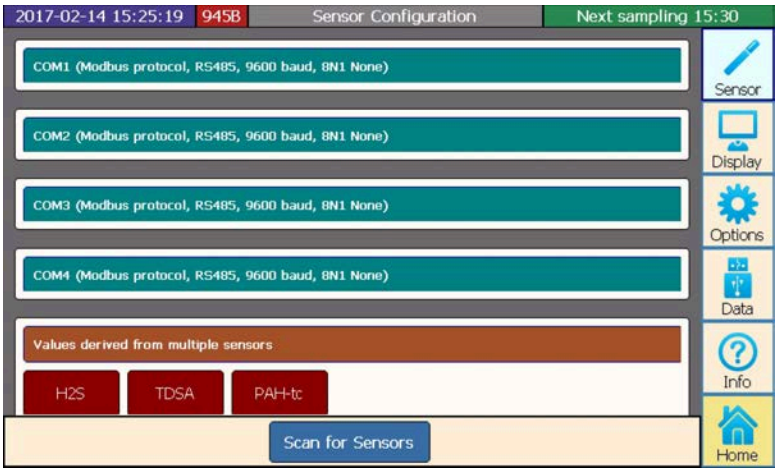
Checking the box in the “Buzzer control” sub-item activates a routine that is configured in the subsequent items. This defines the parameter that influences the triggering of the buzzer, as well as its activation and de-activation limits.

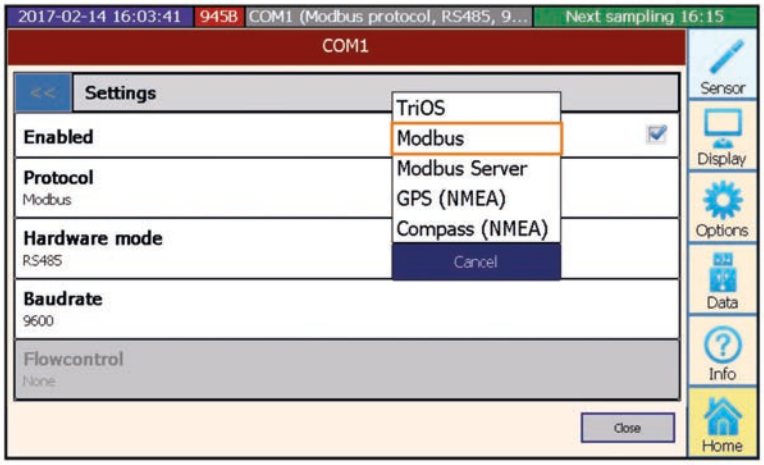




5.4 Modbus RTU

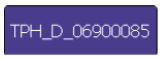
It is also possible to operate each COM port of the TriBox3 in Modbus server mode. In this mode, Modbus RTU requests can be sent to the TriBox3, e.g. to read out current measured values. To activate this mode, select the “Modbus server” setting in the protocol setting.





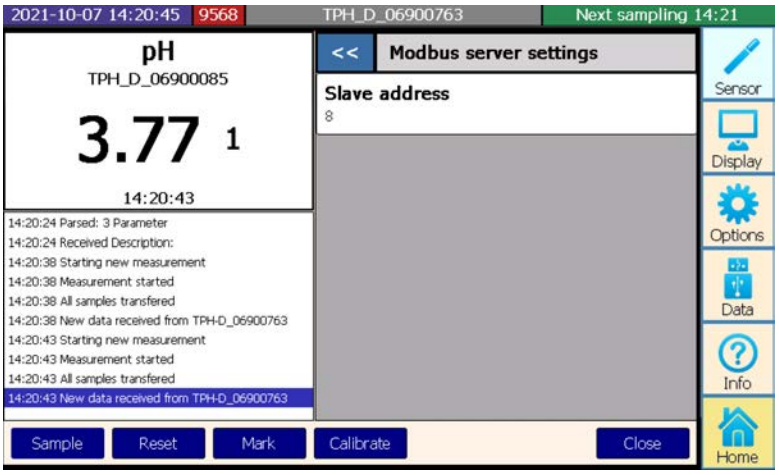


In contrast to a simple Modbus device, the TriBox3 responds to several slave addresses, as the connected sensors are distributed to different addresses. You can view and change the address used for a sensor in its settings.

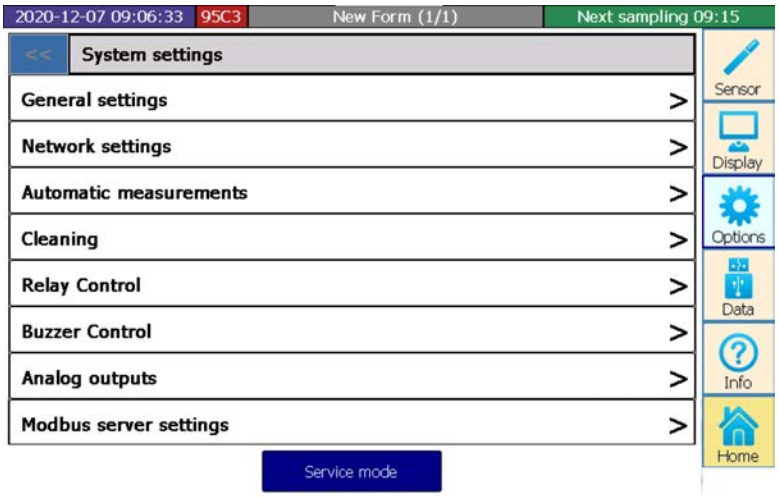


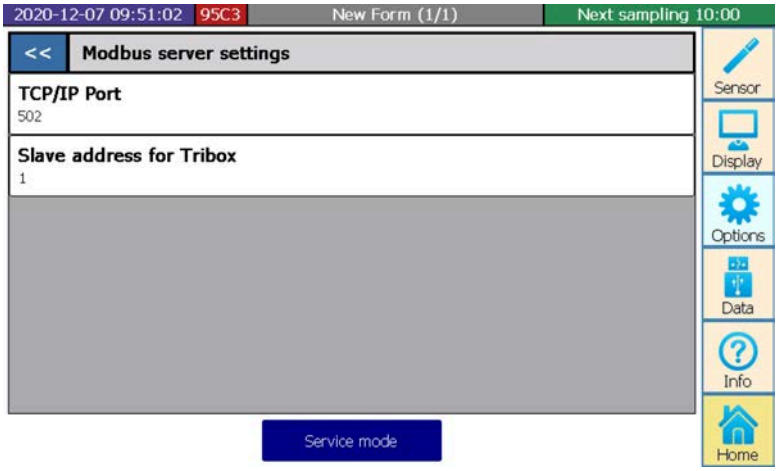


The slave address can then be entered under Modbus server settings.



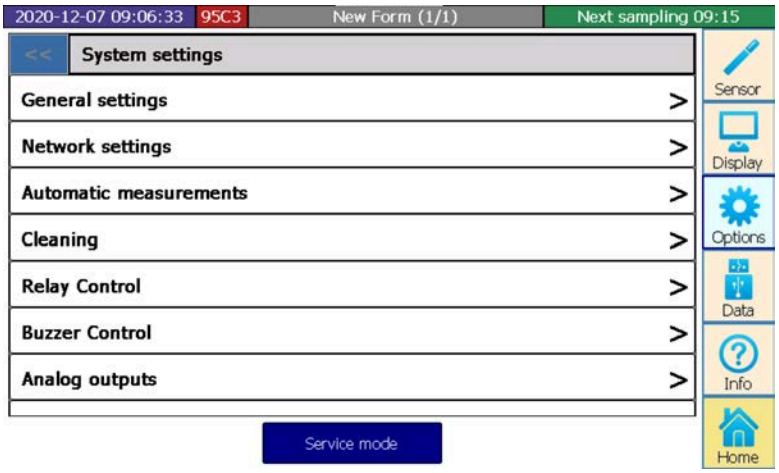
The TriBox3 also responds to Modbus TCP commands that it receives via the network on the set port. The default setting for this is port 502, but you can also change this port in the TriBox3 options.





5.5 Network

In the “Network” sub-item, you can view the IP address.



The integrated RJ-45 network connection makes it possible to connect the TriBox3 directly to a PC or a network.

There are various settings for the TCP/IP connection:

TCP/IP connection

Static IP The data is defined by the user (static).

DHCP server A DHCP server in the Tribox assigns the settings for both the Tribox and the connected PCs (DHCP server).

DHCP client The Tribox receives the settings from a DHCP server in an existing network (DHCP client).

Configuration notices

- All devices involved in data transmission using the IP protocol require a unique IP address. This IP address is made up of a combination of four numbers between 0 and 255, each separated by a dot.

  The DHCP configuration protocol automatically assigns the IP addresses in a network. In a class C network, all devices use an IP address that matches the first three numbers. The last number must be different for each device so that it can be uniquely identified in the network.
- The address ranges reserved for private purposes are

Address ranges

IP range	Netmask	Usage
192.168.0.0 - 192.168.255.255	255.255.255.0	Private networks of class C (256 networks with approx. 250 subscribers)
172.16.0.0 - 172.31.255.255	255.255.0.0	Class B private networks (16 networks)
10.0.0.0 - 10.255.255.255	255.0.0	1 Class A private network

- The IP address on the TriBox3 must be different from the IP address of the computer. If the TriBox3 is integrated into a network, it must be unique in the entire network.
- If you have problems with the integration of the TriBox3, please contact your system administrator.

To retrieve the current TCP/IP settings on your computer, open a command window, enter “ip-confi g /all” and confirm with Enter.

To make changes to your TCP/IP settings, open the properties of your network connection. Make sure that the entry for “Internet Protocol Version 4 (TCP/IPv4)” (from Windows 7) is present and activated.

Contact your system administrator before connecting the TriBox3 to a network.

5.6 External trigger

The TriBox3 offers the option of starting a measurement via an external trigger input. The trigger input can be operated with a DC voltage of 12 - 24 VDC (± 5%). If a trigger is activated, a measurement is started for all sensors that have automatic measurement activated.

When using the external trigger, it is recommended to deactivate the automatic (time-controlled) measurement in the options menu of the TriBox3.

To connect the trigger input, follow instructions 1. to 3. from **chapter 4.2.1** and then carry out the following steps:

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

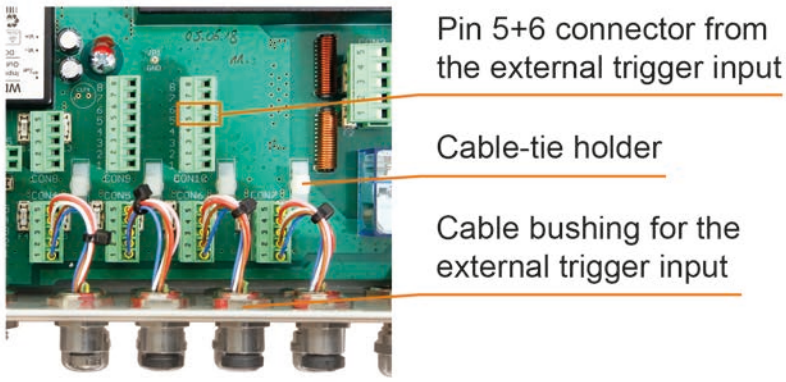
NOTICE

Always use ferrules for flexible conductors. Keep the flexible conductors short and lay out the protective earth conductor longer than the other conductors.

The large cable gland is designed for sheath diameters of 5 to 10 mm.

The small cable glands are designed for sheath diameters of 3.5 to 7 mm.

1. Remove the CON10 plug marked in the illustration and connect it to the control line. The pin assignment is described in the following table.



Connection CON10

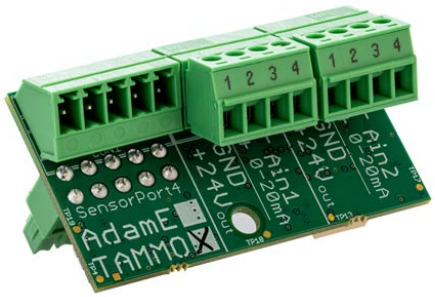
External trigger input	
Pin	**Pin assignment**
5	Trigger input (plus)
6	Trigger input (minus, GND)

2. Insert the plug back into the socket and screw the cable gland tightly, but not too tightly.
3. Fix the cable to the white cable tie holder with a cable tie.
4. Close the housing of the TriBox3 and screw on the cover. After attaching the aluminum covers, put the device into operation.

The automatic measuring function should be switched off when using an external trigger (see chapter 3.4.4).

5.7 Installation TAMMO

TAMMO is an extension module for the TriBox3 that converts analog signals into the RS-485 Modbus RTU protocol (**T**riOS **A**nalog **M**odbus **Mo**dul).
The analog-to-Modbus module offers a total of two current inputs, where both the parameter and the unit can be set for two parameters.



The TriBox3 must have at least software version V1.5.4 installed. Older versions require a software upgrade first.

Installing TAMMO

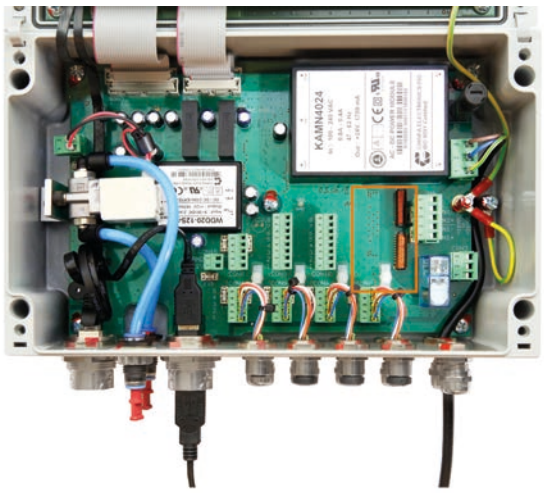
1. Open the cover of the TriBox3 by removing the dark gray panels and unscrewing the screws underneath.

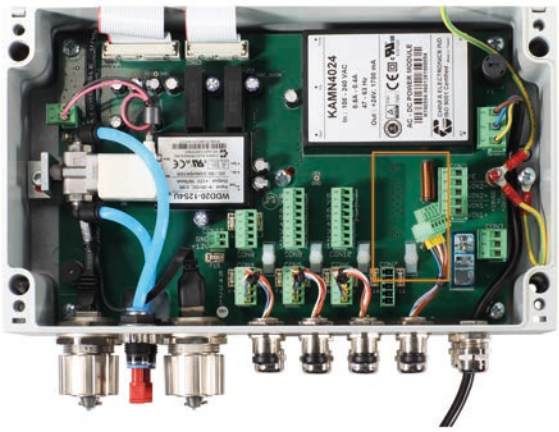
⚠ DANGER

The device may only be opened when the power supply is disconnected. Further safety instructions to be observed can be found in chapter 4 of the TriBox3 manual.



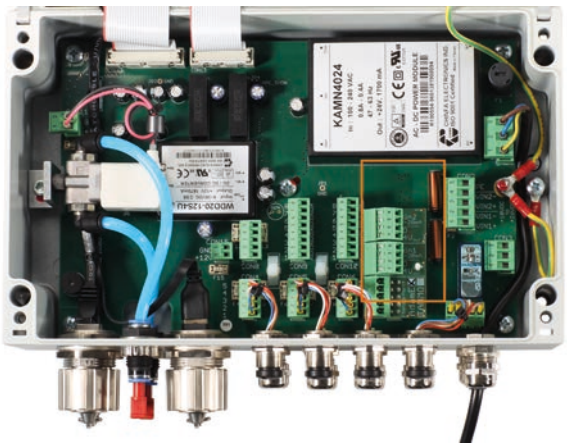
2. Now remove the plug in COM port 4 from the CON7 slot and cut out the white cable holder using a side cutter.





3. Position the white stabilizing pin with the narrow tip from the underside on the TAMMO and place this together with the pin on CON7.



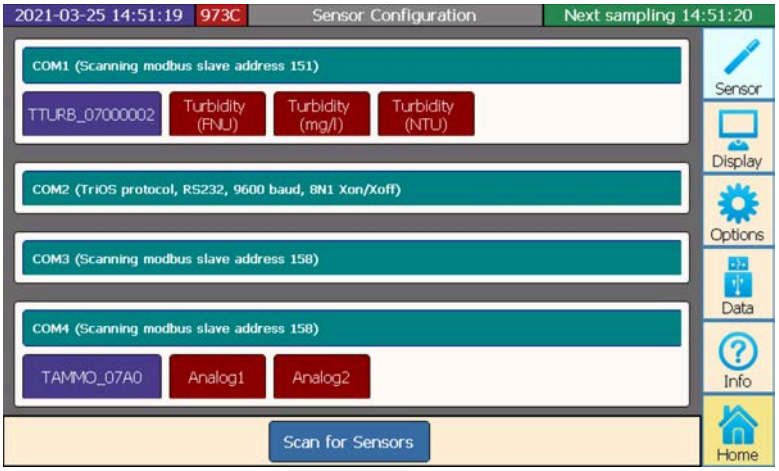


4. Re-insert the previously removed plug.
5. The cable for the analog signals can now be fed through the cable gland into the TriBox3 and connected to the module according to the following pin assignment.

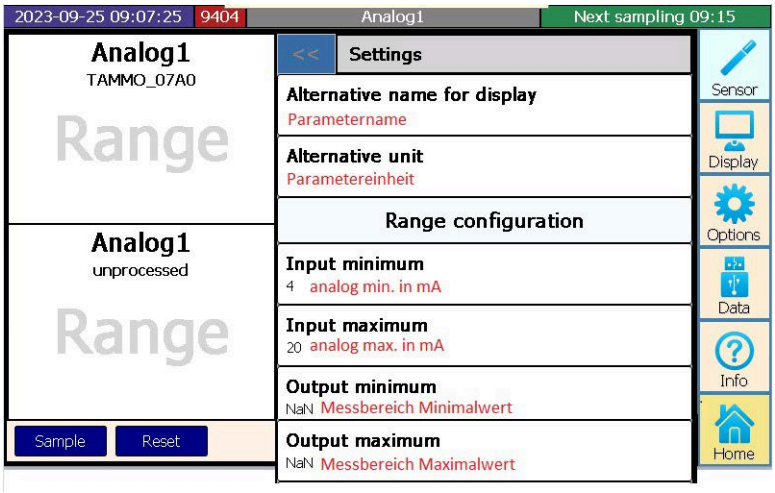
		pin assignement	pin	TAMMO	designation
passive sensor, loop-powered		current input 2: Ground	4		analog input 2 0 .. 20 mA
	→	current input 2: 0 .. 20 mA	3		
		voltage output: Ground	2		voltage output 24 V / max. 4 W
	→	voltage output: 24V / 4W	1		
aktive sensor	analog.interface →	current input 1: Ground	4		analog input 1 0 .. 20 mA
	→	current input 1: 0 .. 20 mA	3		
	→	voltage output: Ground	2		voltage output 24 V / max. 4 W
	→	voltage output: 24V / 4W	1		
					COM-Port 4 (sensor interface)

The 24 VDC / max. 4 W voltage output can be used to operate external sensors.

6. Now close the TriBox3 again and put the device into operation.
7. Carry out a sensor scan. The TAMMO then appears in the display under COM port 4 and can be further configured using the “Analog1” and “Analog2” buttons.



Configuration



6 Malfunction and maintenance

6.1 Cleaning and care

6.1.1 Housing cleaning

- Check the Tribox3 regularly for mechanical damage.
- Regularly check all connections for leaks and corrosion.
- Regularly check all cables for mechanical damage.
- Clean the TriBox3 from time to time with a soft, damp cloth. Use a mild cleaning agent if necessary.

6.1.2 Manual sensor cleaning

The TriBox3 should be set to maintenance mode beforehand to prevent unwanted measurements being triggered automatically when sensors are cleaned manually and false alarms being generated.

6.2 Maintenance and testing

6.2.1 Service mode

Select the options menu item in the navigation bar and then the “Service mode” sub-item.



When service mode is activated, the relay, valve and buzzer are deactivated. The automatic measurement function is also suspended.

The behavior in service mode can be set for each parameter under each sensor parameter.

Service mode also deactivates cleaning and prevents measurement commands from being sent to the sensor. The supply voltages of the sensors are no longer changed by the global trigger and measured values that are output at the analog outputs and that are requested via Modbus are given the default value.

To ensure that the service mode does not remain active unintentionally, it is automatically deactivated again after two hours, whereby the TriBox3 starts to switch the buzzer on and off every second beforehand to give the user notice of this.

To prevent unwanted measurements and thus possibly false alarms during manual cleaning of sensors, the TriBox3 should be set to service mode beforehand.

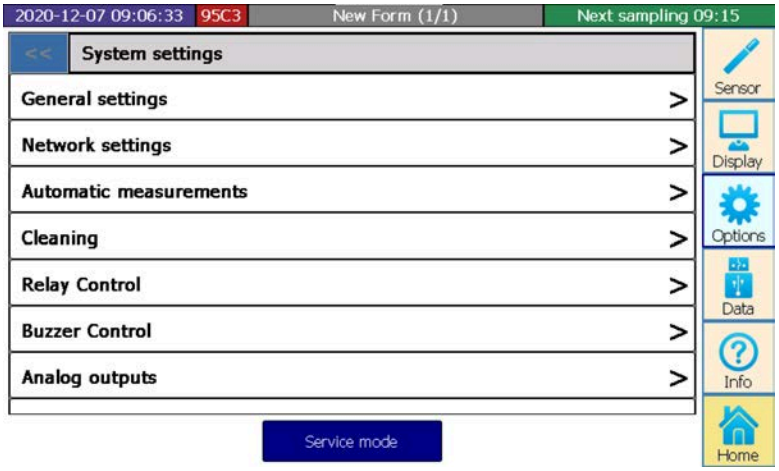
6.2.2 Testing the analog outputs

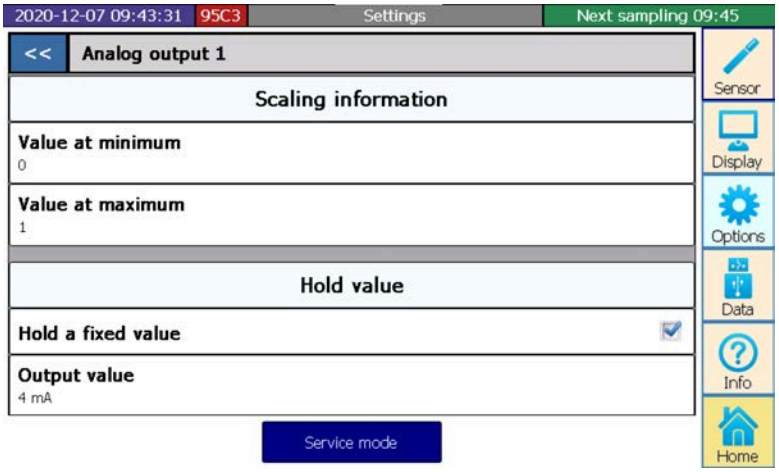
⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

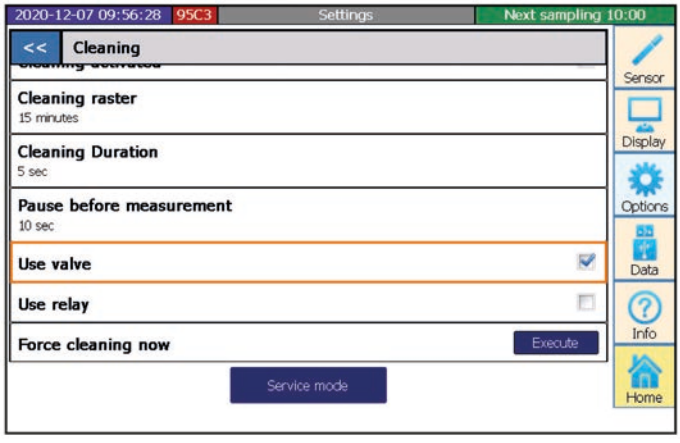
To check the function of the analog outputs, a constant and fixed output current can be set via the menu. This value can then be measured directly at the corresponding analog output (see chap. 5.2). Holding the analog values is automatically deactivated when you return to the main view.





6.2.3 Checking the valve

To check the function of the valve, the valve can be activated immediately via the menu. The compressed air from the input should then be present at the output (at the bottom or closer to the wall). You can clearly hear the valve click each time it is switched (see chapter 4.5).

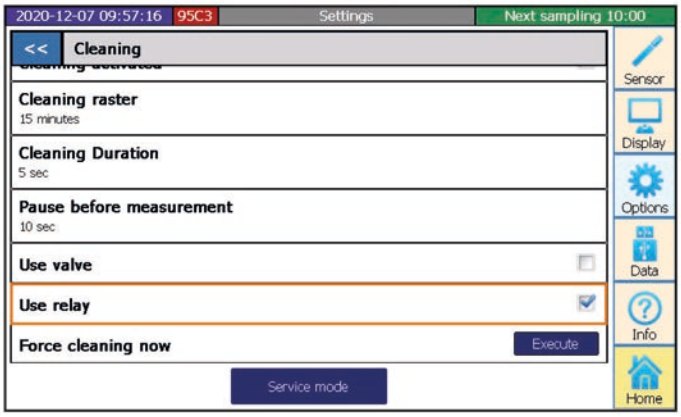


NOTICE

The internal valve may only be used in unpressurized media. In the event of water ingress through the valve, no warranty claims can be made against TriOS.

6.2.4 Checking the relay

To check the function of the relay, it can be activated immediately via the menu. You can clearly hear the relay click each time it switches. The continuity can be measured at the corresponding outputs and inputs (see Chap. 5.3).

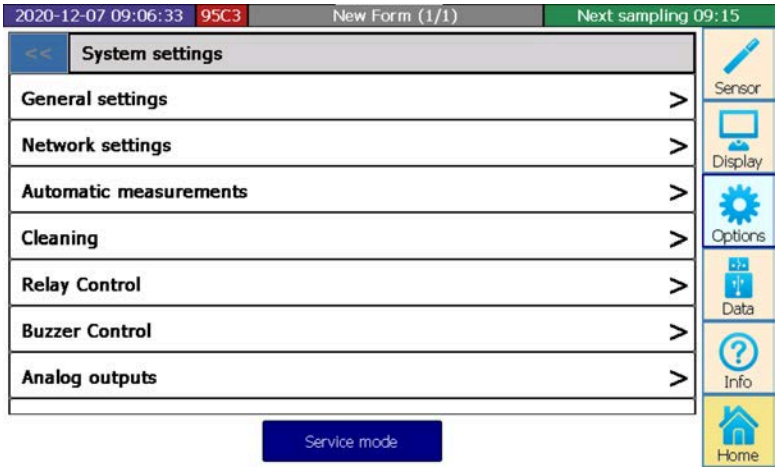


⚠ DANGER

Risk of electric shock and fire. Only qualified personnel should carry out the test described in this chapter of the operating instructions.

6.2.5 Working on the compressed air system

As with the cleaning of sensors, the TriBox3 should be set to maintenance mode before any work is carried out on the compressed air system.



To use an automatic cleaning interval, this must first be activated (check the box) and a cleaning grid set.

The cleaning duration and the pause before the measurement are also defined here.

Cleaning can also be triggered directly and you can define whether the valve and relay should be activated during cleaning.

6.2.6 Replacing a sensor

If a sensor needs to be replaced, the following must be observed:

1. Switch on maintenance mode; this keeps all measured values at the output.
2. Remove the current sensor from the COM port.
3. Connect a new sensor to the COM port.
4. Start sensor scan.
5. Configure display settings (see **chapter 3.4.3**)
6. If necessary, change the Modbus slave ID (important if the sensor is linked to a PLC).
7. If necessary, reconfigure the analog output (if measured values are transmitted to a central system via this).
8. If necessary, reset the measuring interval.
9. Exit maintenance mode.

When using the TriBox3 with 8-digit serial numbers, the Modbus addresses are fixed. Point 6 is not applicable in this case.

6.3 Troubleshooting

If the TriBox3 cannot be operated as described in the manual or shows other abnormalities, please first make sure that there is no damage.

If this can be ruled out, it is possible that the operating system is not running properly. In this case, please restart the system. This is especially true if a new sensor is not found immediately.



The “Info” button opens a window with the contact details of the nearest contact person for problems or general inquiries.
Before contacting the contact person, it is essential to read Chapter 6 in full to ensure that you have the correct information for targeted troubleshooting.

6.3.1 Changing the fuse

⚠ DANGER

Danger to life due to electric shock!
Due to the free mains voltage in the appliance, installation work may only be carried out by electronically trained specialists who are authorized to do so on the basis of their training.

The relevant safety and VDE regulations must be observed. Before opening the appliance, it is essential to ensure that the power supply is disconnected and cannot be restored or switched on again.

⚠ DANGER

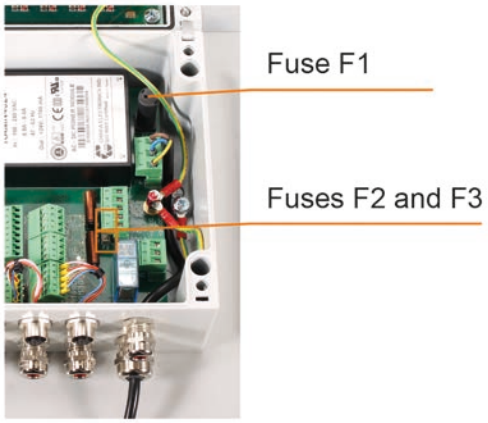
Danger to life due to electric shock!
When replacing a defective fuse, first pull out the mains plug and only use fuses of the same type.
Before putting the device back into operation, ensure that the fault has been completely rectified.

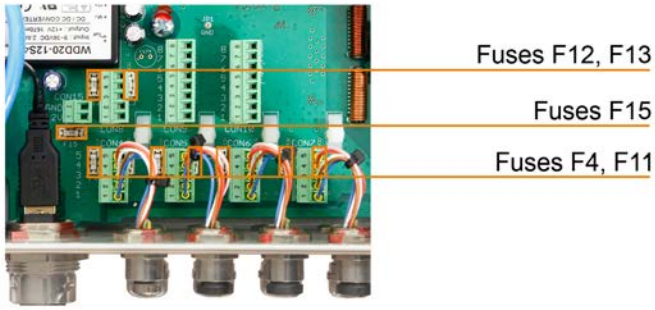
The following fuses are used in the Tribox3:

Fuse F1	1A, 250 V, slow-blow, 5x20 mm; item no. 00P100009
Fuse F2 and F3	4A, 125 V, fast-acting, SMD without holder; art. no. 00P100008
Fuse F4 to F15*	1A, 125 V, fast, SMD without holder; item no. 00P100007

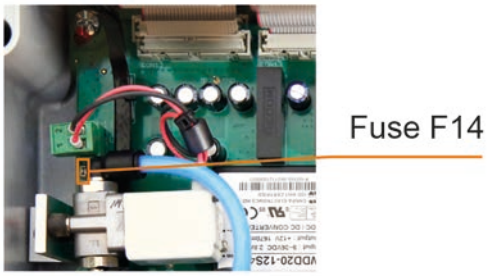
*F15 Included since TriBox3 HW version 1.1.0 (June 2018)

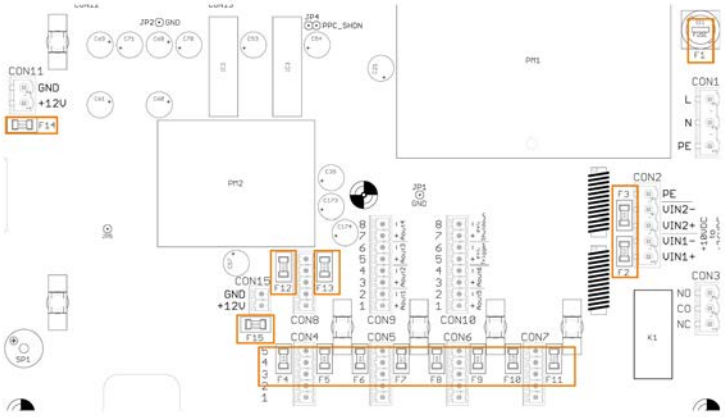
Fuses F1, F2, F3 and F4 to F11, F12, F13, F15





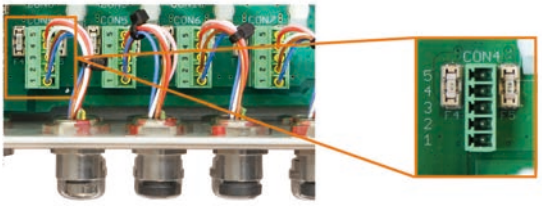
Fuse F 14 and overview



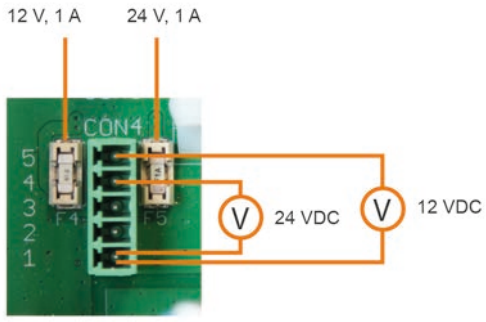


6.3.2 Measuring the output voltage

To measure the output voltage, the cover of the TriBox must first be opened. Here you can see that each COM port has a connection.



To measure the output voltage, use a voltmeter to measure a voltage of 24 VDC between 1 and 4 and a voltage of 12 VDC between 1 and 5.



If zero volts are displayed between pins 1 and 4, the fuse to the right of the connection must be replaced. If zero volts are displayed between pins 1 and 5, the fuse to the left of the connection must be replaced.

6.3.3 Sensor is not displayed

As soon as a sensor is connected to the TriBox3, it is displayed under the corresponding COM port.

If the sensor does not appear in the display even after pressing the “Search sensors” button, there may be various reasons for this.

Settings for data communication do not match

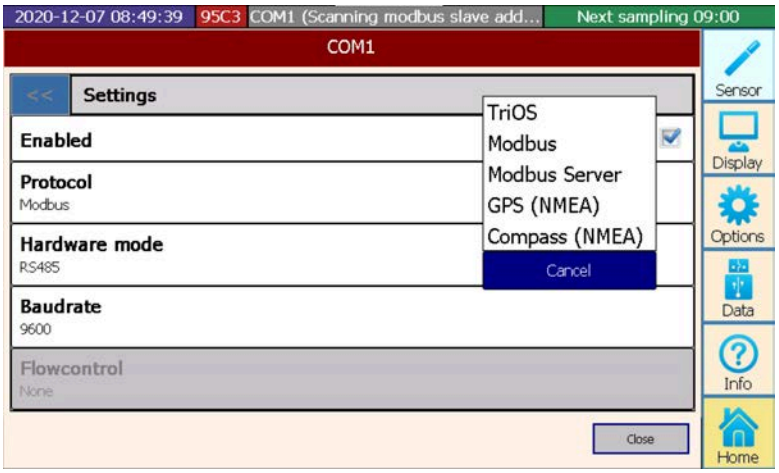
If the standard settings as described in **chapter 4.3** do not result in the device being displayed, a G2 interface connection should be established with the sensor and the sensor settings should be set as follows:

Protocol: Modbus
Hardware mode: RS-485
Baud rate: 9600
Flow control: None (setting disabled for Modbus protocol)
Parity: None
Data bits: 8
Stop bits: 1

In the case of non-Modbus-capable sensors (see FAQ), the protocol may have to be changed to TriOS data protocol.

Then reconnect the sensor to the TriBox3 and run the “Search sensors” function again.

The respective settings are visible in the green fields of the COM ports on the display. Press the COM port button to open the settings menu.



COM port defective

One possible cause of a sensor not being recognized may be a defective COM port. To check whether the COM port is possibly defective, please connect another sensor to the same COM port and check whether it is recognized. Please only replace the sensor in maintenance mode as described in chapter 6.2.6.

If the sensor is recognized and appears in the overview, the COM port is OK.

If this sensor is also not recognized, the fuses of the COM port should be checked. The exact procedure for this can be found in **chapter 6.3.1.**

Checking the power supply

For some sensors, you can easily check whether the sensor is receiving a power supply from the TriBox.

The TpH, TpH-D and TTurb sensors have a status LED which is active as soon as the sensor is supplied with voltage.

In the case of enviroFlu, you can hear a soft ticking sound when the sensor is supplied with voltage.

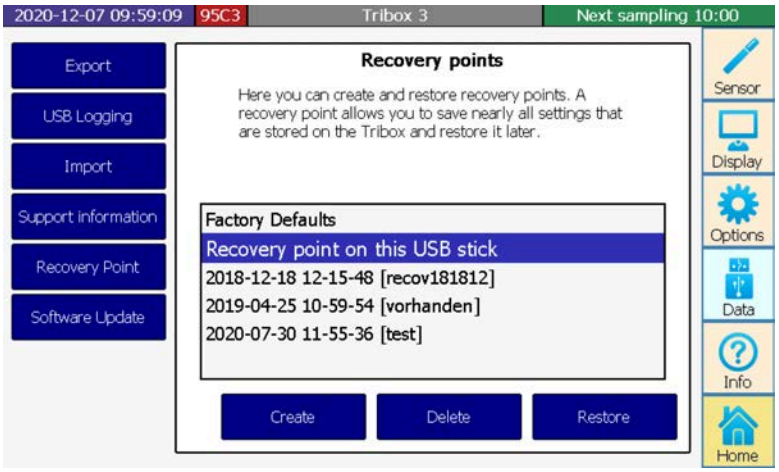
If you notice that the respective sensor does not show any of the described reactions, you can assume that no power supply has taken place. You can also check the COM port as described in **chapter 6.3.1**.

If the device is not displayed after checking the above points, there is probably a serious error. In this case, contact TriOS technical support.

6.3.4 Calling up the recovery point



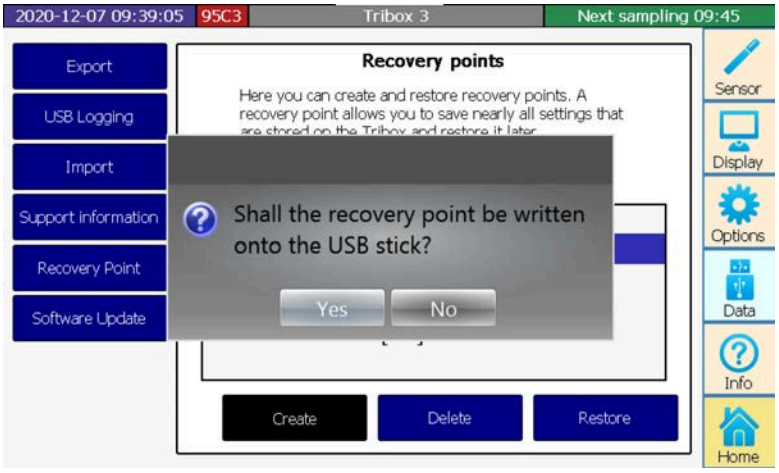
Settings are also saved in the “Recovery” sub-item. For your safety, you should always save a recovery point if you change settings such as scaling factors, analog outputs or measuring intervals.



In this illustration, a recovery point is already saved next to the factory settings. If the factory settings are restored, all user-specific settings will be lost.

To ensure that all previously made settings are saved and updated, a restart should be carried out after each reconfiguration. After the restart, a recovery point should always be saved.

The second item in the list above (illustration) is a recovery point that has been saved on a USB stick and is only displayed as long as the USB stick is inserted in the TriBox3. When “Load” is pressed, the following window opens:



“OK” confirms that the recovery point has been loaded and “Cancel” cancels the process.

6.3.5 Modbus server problems

Previous software versions may cause problems. Therefore, the Modbus server can only be used without errors from version 1.4.20.

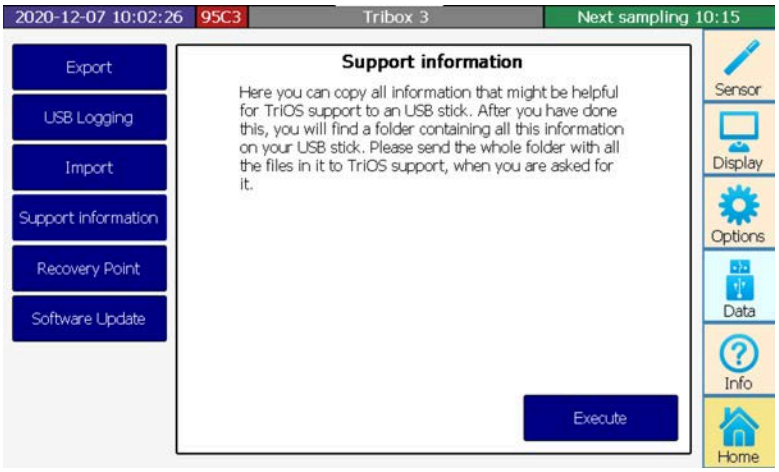
6.3.6 Support Info

To ensure error-free and reliable measurement, the device should be checked and maintained at regular intervals.

For many malfunctions that ultimately require our technical support, it is helpful to document the condition of the TriBox3 shortly after the possible error occurred. To do this, please export the support information to a USB stick and send it to the support team together with your initial request.

Support information

In the sub-item “Support information”, process logs and settings are copied to a USB stick. These files should always be sent directly to TriOS with support requests.



6.3.7 Software updates

Softwareupdate

New software versions can be installed in the TriBox3 under “Software updates”.

The new software version must first be copied to a USB stick. The files must be saved in a subdirectory at the top level.

If you have received the software updates as a ZIP archive, please unzip the contents first and copy them to a USB stick. Then insert the USB stick into the TriBox3. All software updates found will be displayed.

Select the desired update. By pressing the “Install” button, the TriBox3 will automatically install the update and then restart.

6.4 Return shipment

Please note the procedure for your return.

If you are returning a sensor or device, please use the URL **trios.de/rma** to go to our **online form**, which you can use to register your return shipment to TriOS **technical support**.

To ensure a smooth return shipment process, please complete the online form in full. Please note the mandatory fields, otherwise the form cannot be sent. The system **automatically assigns an RMA number**.

After submitting your entries, you will immediately receive an e-mail with the data you have entered, a link to **free DHL shipping** and a label with the **RMA number of your case**.

Please make sure you stick this label **clearly visible on the** outside of **your return package** so that the package can be assigned more quickly.

Please note! Returns without an RMA number cannot be accepted and processed!

Please note that the sensor or the device must be cleaned and disinfected before shipping.

Use the original packaging to ensure that the goods are sent undamaged. If this is not available, ensure that safe transportation is guaranteed and that the sensors are secured with sufficient packing material.

We will contact you as soon as possible after receiving the return shipment.

7 Technical data

7.1 Technical specifications

Power supply

Power supply	100 - 240 VAC, 50 - 60 Hz, 12 - 24 VDC (± 5%)
Power consumption	Type: 6 W, max: 50 W
Protection class	1
Overvoltage category	II

Sensor interfaces

Connection	4 x M12 industrial connectors for TriOS sensors
Standard interface	RS-232, RS-485
Protocol	Modbus RTU, TriOS

Modbus RTU

Server RTU	yes (on each sensor connection)
Client RTU	yes (at each sensor connection)
Parameters	adjustable (default: 9600-8-N-1)

Modbus TCP

Server TCP	Yes
TCP port	adjustable (default: 502)

Network / USB

standard	Ethernet
Ethernet connection	1 x RJ-45
Protocol	TCP/IP, Modbus TCP, VNC
Web interface	no
USB PORT	USB 2.0 (host), USB-A socket

Analog interfaces

Analog output	6 x analog outputs, configurable: 4 ... 20 mA
Load	max. 500 Ω
Connection terminals	1.5 mm² (AWG 16)

Error indicator	0 mA

Switching input/output

Measuring trigger	Trigger for global measurement (galvanically isolated), control voltage: 12 - 24 VDC (± 5%) Connection terminal: 1.5 mm² (AWG 16)
Control voltage	no

Relay outputs

Electrical specification	1 x relay changeover contact (SPDT) / 250 VAC, 2 A / 30 VDC, 2 A
Connection terminals	max. 2.5 mm² (AWG14)

Compressed air cleaning

Valve	integrated, max. air pressure: 5 bar

Display

Display	7 inch capacitive touch display (800x480 pixels)
LED	5 x status LED

Data storage

Storage medium	Internal 8 GB microSD card, direct logging to USB stick possible
Data export	via USB 2.0 host

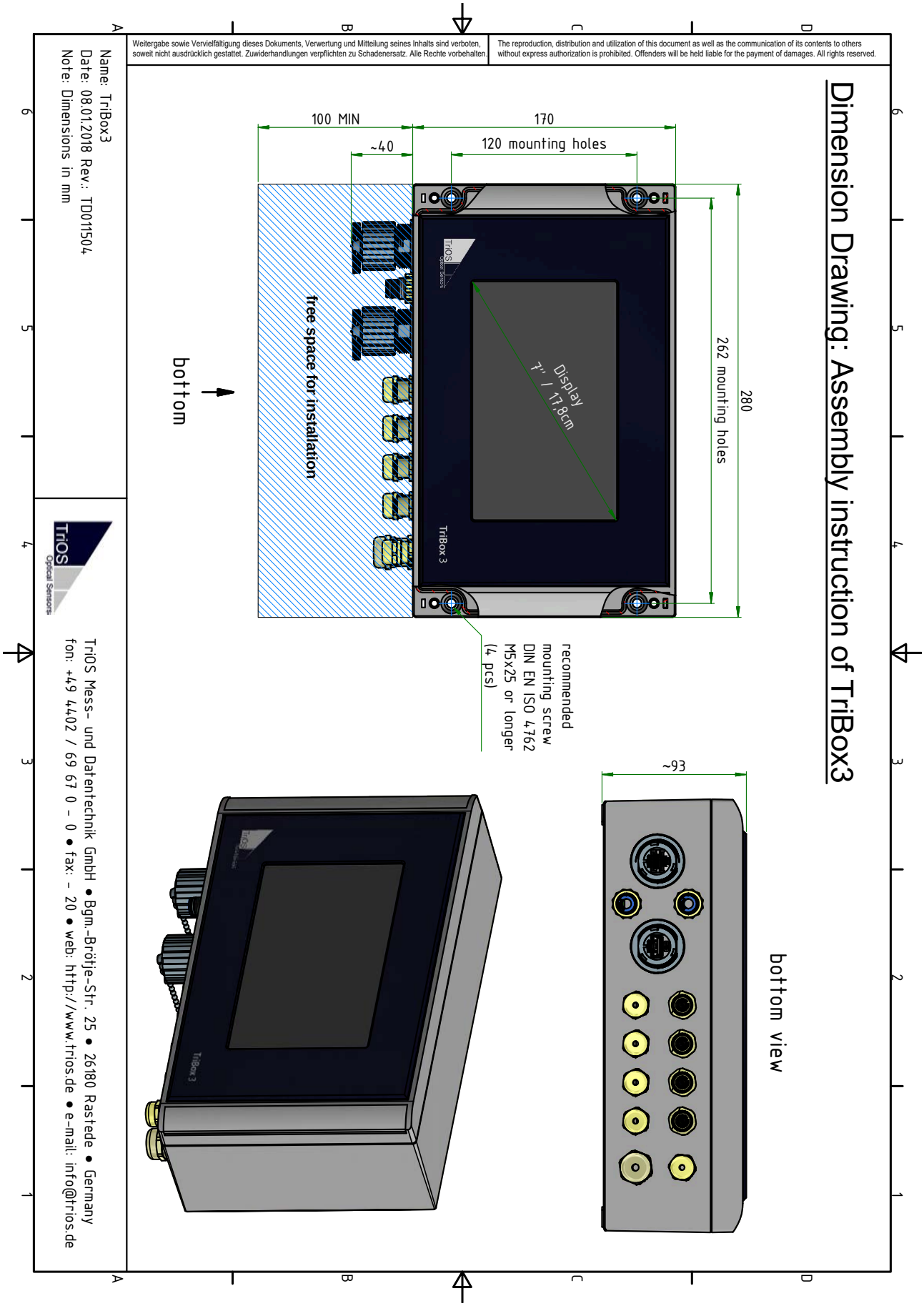
Environment

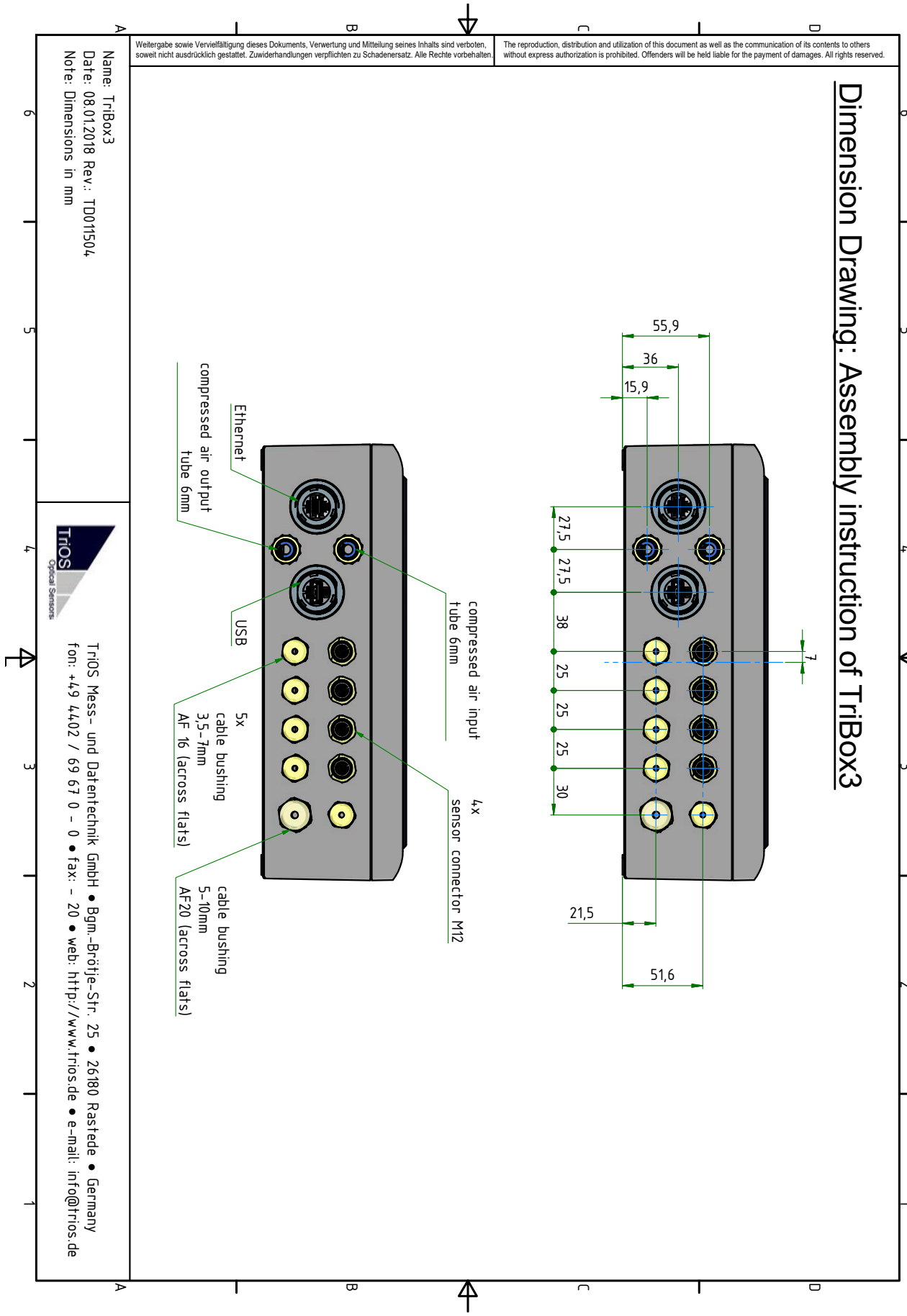
Operating temperature	-10...+50 °C (with pre-installed mains connection cable +5...+40 °C)	~ +14 ˚F to +122 ˚F (with pre-installed mains connection cable +41...+104 ˚F)
Storage temperature	-20...+70 °C	~ -4 ˚F to +158 ˚F
Relative humidity	0...95 % (non-condensing)	
Degree of protection	IP65	
Degree of soiling	2	

Mechanics

Dimensions (W/H/D)	280 x 170 x 94 mm	~ 11" x 6.7" x 3.7"
Weight	3.7 kg	~ 8.2 lbs
Materials	Housing: Die-cast aluminum alloy, Front panel: Acrylic glass (PMMA)	

7.2 Outer dimensions




Dimension Drawing: Assembly instruction of TriBox3
Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und Mitteilung seines Inhalts sind verboten, soweit nicht ausdrücklich gestattet. Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte vorbehalten.
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55,9
36
15,9
27,5
27,5
38
25
25
25
30
7
21,5
51,6
Ethernet
compressed air output tube 6mm
USB
5x cable bushing 3,5-7mm AF 16 (across flats)
cable bushing 5-10mm AF20 (across flats)
compressed air input tube 6mm
4x sensor connector M12
Name: TriBox3
Date: 08.01.2018 Rev.: TD011504
Note: Dimensions in mm
TriOS Mess- und Datentechnik GmbH • Bgm.-Fröje-Str. 25 • 26180 Rastede • Germany
fon: +49 4402 / 69 67 0 - 0 • fax: - 20 • web: http://www.trios.de • e-mail: info@trios.de

8 Accessories

8.1 AirShot2

AirShot2 compressed air cleaning system

The handy AirShot2 compressed air cleaning system works with compressed air pulses instead of a continuous air flow. This significantly reduces the volume of air required and allows the system to be kept very compact.
In addition, pressure pulses clean more effectively compared to a continuous airflow, making AirShot2 a valuable addition.
AirShot2 can be used as an alternative to a standard compressor and can be controlled directly via the TriBox.



8.2 Modbus distributor box

5-fold M12 connection

This distributor box makes it possible to expand one controller input to five and thus control considerably more sensors with one controller than before.



8.3 Compass

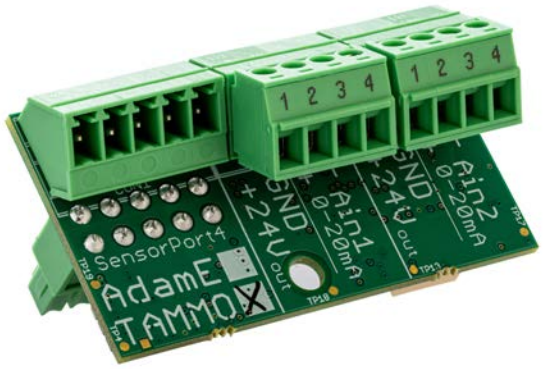
3-axis compass

The 3-axis compass determines the direction of the compass, the angle of inclination and the angle of rotation.
It can be mounted together with sensors in order to correlate the measured values with the position.

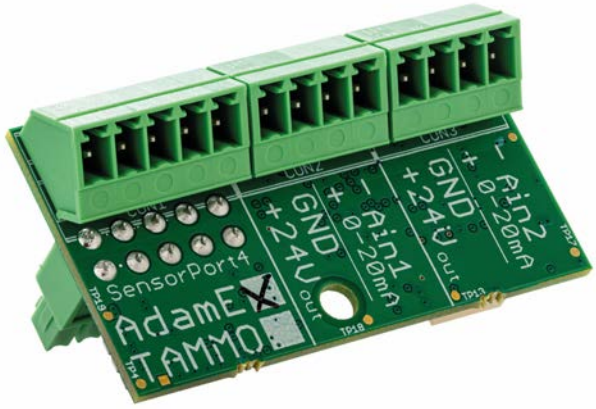


8.4 TAMMO and AdamE

TAMMO is an extension module for the TriBox3 that converts analog signals into the RS-485 Modbus RTU protocol. The analog-to-Modbus module offers a total of two current inputs, where both the parameter and the unit can be set for two parameters. For use with TAMMO, see chapter 5.7 of this manual.



The AdamE variant is installed as standard in the TriBox3 EGCWA (8-digit serial number beginning with 751xxxxx) used in the EGC Water Analyzer. AdamE is also available as a spare part for the Tri-Box3 EGCWA. Please note that TAMMO and AdamE are not interchangeable. For further information, see manual D01-081 EGCWA.



9 Warranty

The warranty period for our devices within the EU and the USA is 2 years from the date of invoice. Outside the EU it is 1 year. Excluded from the warranty are all normal consumables
(depending on the product, e.g. light sources or windows).

The warranty is subject to the following conditions:

- The device and all accessories must be installed as described in the relevant manual and operated in accordance with the specifications.
- Damage caused by contact with aggressive and material-damaging substances, liquids or gases, as well as transport damage, are not covered by the warranty.
- Damage caused by improper handling and use of the device is not covered by the warranty.
- Damage caused by modification or unprofessional attachment of accessories by the customer is not covered by the warranty.

NOTICE

Opening the device will void the warranty!

10 Technical support

If you have a problem with a TriOS sensor / a TriOS device, please contact TriOS technical support.

We recommend sending in sensors every 2 years for maintenance and calibration. When returning devices, please be sure to follow the procedure described in Chapter 6.

Contact technical support:

E-mail: support@trios.de
Phone: +49 (0) 4402 69670 - 0
Fax: +49 (0) 4402 69670 - 20

To enable us to help you quickly, please send us the sensor ID number (serial number with 8 digits, consisting of letters and numbers, e.g. 6700003F) by e-mail.

11 Contact us

We are constantly working on improving our devices. Please visit our website for the latest news.

If you have found a fault in one of our devices or programs or would like additional functions, please contact us:

Technical Support:	support@trios.de
General questions/sales:	sales@trios.de
Website:	www.trios.de

TriOS Mess- und Datentechnik GmbH
Bürgermeister-Brötje-Str. 25
26180 Rastede
Rastede, Germany

Telephone	+49 (0) 4402 69670 - 0
Fax	+49 (0) 4402 69670 - 20

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13 FAQ - Frequently asked questions

Overview

"1. Which TriOS sensors are not Modbus-capable?"
"2. What do I have to consider when using RAMSES* sensors with the TriBox3?"
"3. How do I connect an enviroFlu?"
"4. How can I switch to the sensitive / high-resolution channel on the enviroFlu?"
"5. How to get Modbus addresses and registers from the TriBox3?"

*Please **note**: We are talking about RAMSES and not RAMSES G2 sensors.

1. **Which TriOS sensors are not Modbus-capable?**
   enviroFlu, microFlu and RAMSES

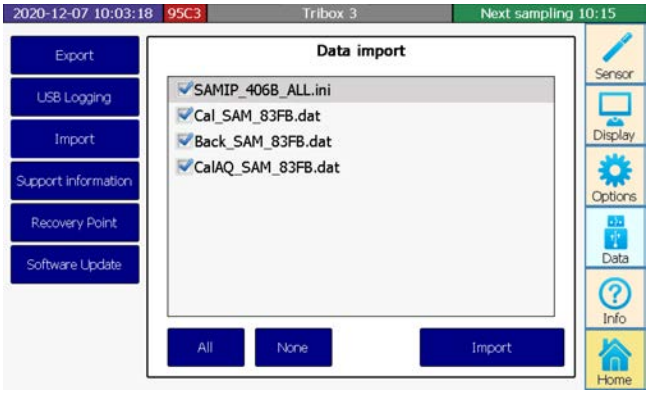
2. **What do I need to consider when using RAMSES sensors in conjunction with the TriBox3?**

Before you connect the RAMSES to the TriBox3, the files contained on the calibration CD must first be imported into the TriBox3:

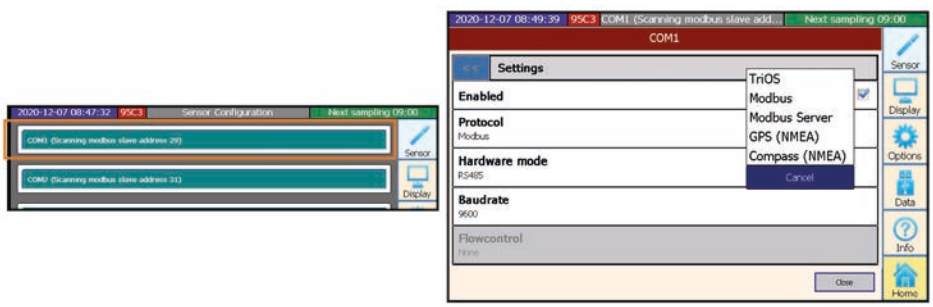
- Cal_SAM_8XXX.dat
- CalAQ_SAM_8XXX.dat
- SAM_8XXX.ini
- Back_SAM_8XXX.dat

Copy the four files to a USB stick and then connect it to the TriBox. Select the “Data” menu in the navigation bar and then the “Import” sub-item (blue button on the left).

You will now see the four files, which you first select and then download to the TriBox by clicking on the “Import” button (bottom right).



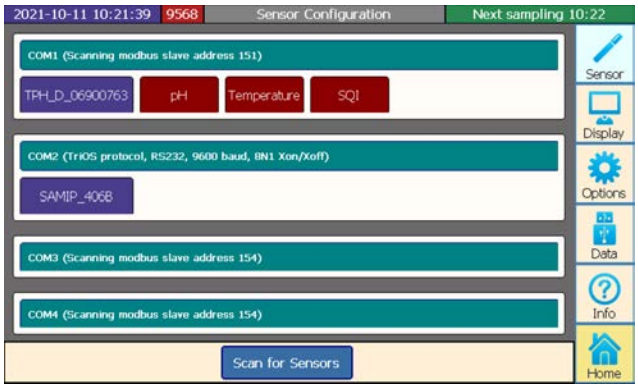
Now go to the “Sensor” menu in the navigation bar and click on the COM port you want to use.

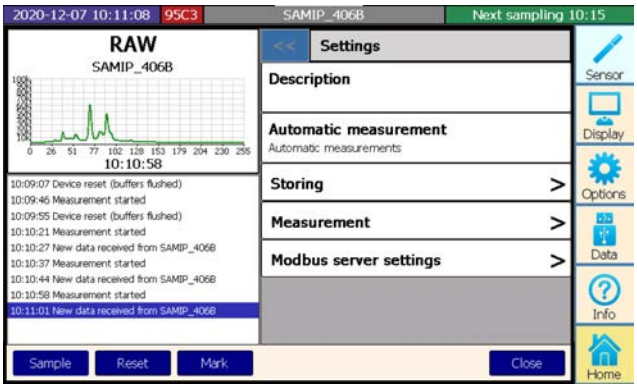


Click on “Protocol” and select the TriOS data protocol.

Now return to the sensor menu by clicking on the “Close” button (bottom right).

Now connect your sensor to the TriBox3 and press the “Search sensors” button (bottom center). All connected sensors are now displayed.



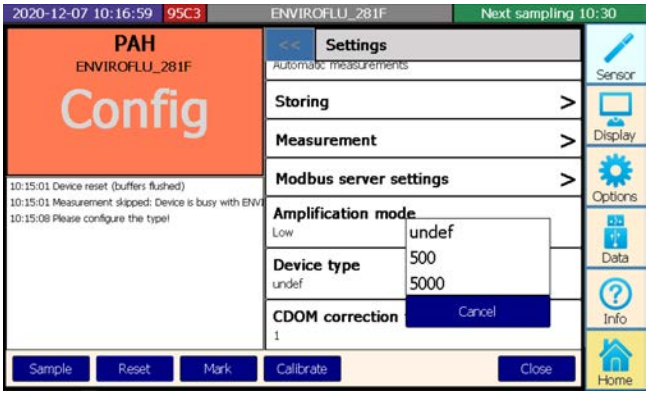


You can now change the sensor settings by clicking on the corresponding sensor button.

3. How do I connect an enviroFlu?

Connect the sensor cable to the TriBox3. Now click on the corresponding COM port in the sensor menu item and select the TriOS data protocol as described in the previous question.

Tip on the sensor field to set the corresponding measuring channel of your sensor under “Device type”.



4. How can I switch to the sensitive / high-resolution channel on the enviroFlu?

Tip the sensor button and then select the sensitivity “high” or “low” under “Gain mode”. The adjustment can also be made via Modbus by making an entry in register 102.

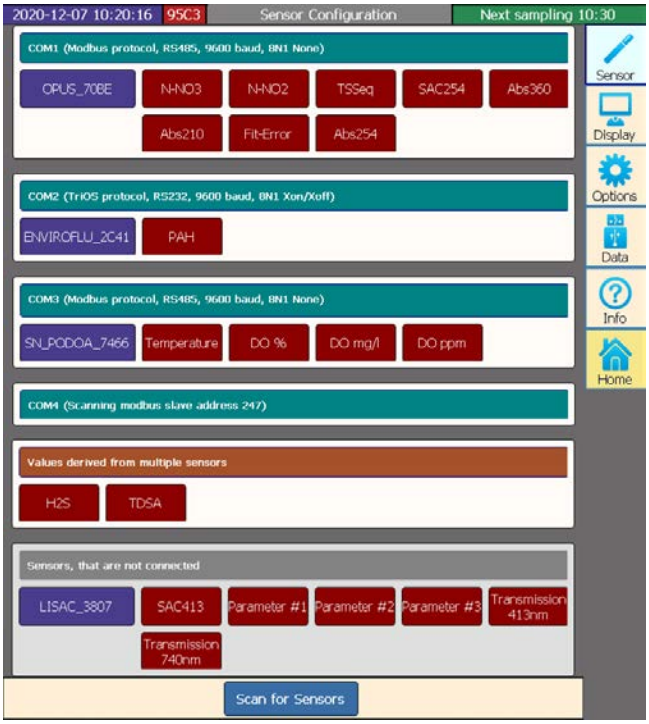
5. **How do I obtain Modbus addresses and registers from the TriBox3?**

The TriBox3 can output Modbus TCP/IP via the Ethernet connection port or Modbus RTU via the COM ports. The following steps explain how to obtain the “ModbusStatus.txt” file from the TriBox3.

Step 1

To obtain the complete Modbus mapping, all required sensors must be connected to the TriBox3 and displayed with the corresponding parameters in the “Sensor” menu.

Overview of connected sensors



If the slave ID of a sensor is to be changed, this can be done by pressing the corresponding sensor button. E.g. "enviroFlu_2C41.

The sensor menu opens. Now select “Modbus server settings” (right). The slave ID can be adjusted here.

These parameters are calculated internally. They also appear in the ModbusStatus.txt file.

Remove unconnected sensors

Unconnected sensors should be removed.

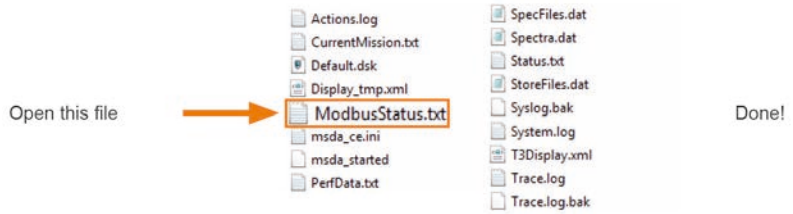
1. Press the corresponding sensor button, e.g. “SAMIP_406B”.
2. Select “Remove device” and confirm the selection.

When all unconnected sensors have been removed or the slave IDs have been adjusted, the TriBox3 must be restarted (otherwise the ModbusStatus.txt file will be longer than necessary).

Step 2

Connect a USB stick to the TriBox3 and open the “Data” menu. The blue “Support Information” button is located on the left-hand side.

Pressing the button opens a submenu. If you press “Execute”, a folder of the TriBox3 with the current date will be copied to your USB stick. The folder contains the following files:



14 Appendix

CE declaration of conformity

Hersteller/Manufacturer/Fabricant:	TriOS Mess- und Datentechnik GmbH Bürgermeister-Brötje-Str. 25 D- 26180 Rastede

Konformitätserklärung
Declaration of Conformity
Déclaration de Conformité

Die TriOS GmbH bescheinigt die Konformität für das Produkt
The TriOS GmbH herewith declares conformity of the product
TriOS GmbH déclare la conformité du produit

Bezeichnung Product name Désignation	**TriBox3**
Typ / Type / Type	TriBox3 w/o WiFi (Art.Nr. 10C10000x) TriBox3 EGCWA (Art.Nr. 10C100001)
Mit den folgenden Bestimmungen With applicable regulations Avec les directives suivantes	2014/30/EU EMV-Richtlinie 2014/35/EU Niederspannungsrichtlinie 2011/65/EU RoHS-Richtlinie
Angewendete harmonisierte Normen Harmonized standards applied Normes harmonisées utilisées	EN IEC 61326-1:2021 EN 61010-1:2010 +A1:2019 +A1:2019/AC:2019 EN IEC 63000:2018
Datum / Date / Date	Unterschrift / Signature / Signature
24.11.2025	R. Heuermann

D05-051yy202511

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Modbus Server

1. Introduction

The TriBox3 Modbus server can be addressed either via Modbus/TCP using an IP connection or via Modbus/RTU using a serial RS-485 or RS-232 connection. The same addresses and register assignments are used in both cases.

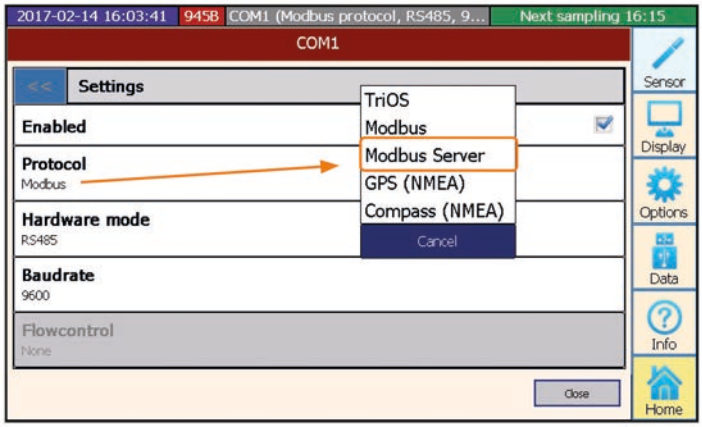
This document describes the specifications of the Modbus implementation in the TriBox3. It is not a complete Modbus documentation. It is assumed that the user is generally familiar with the use of Modbus protocols.

2 Modbus/TCP

Modbus/TCP can be used by any device that can establish a TCP connection to the TriBox3. By default, the TriBox receives incoming Modbus connections on the standard port 502, but the port number can be changed in the TriBox settings.

3. Modbus/RTU

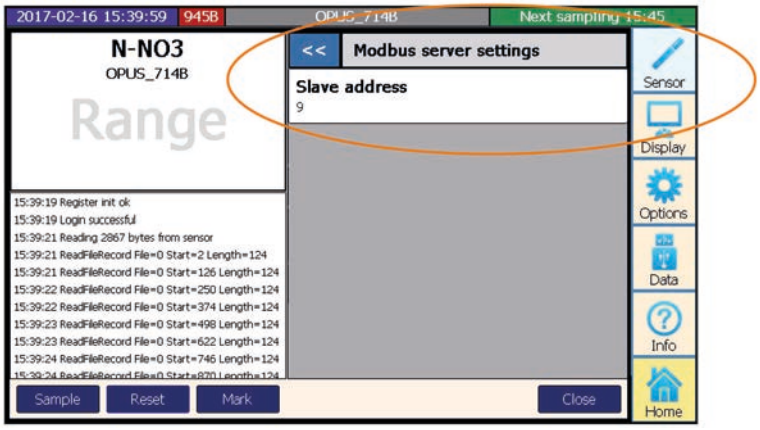
Each of the four sensor connections can alternatively be used to operate connected Modbus clients. In this case, the protocol of the port must be changed to “Modbus Server” (reboot the Tribox after the protocol settings have been changed to “Modbus Server”).



Unlike other Modbus slaves, the TriBox can respond to multiple slave addresses, as each connected sensor and the TriBox itself are treated as individual Modbus slaves with their own slave addresses.

4. Slave addresses

To handle any number of sensors with their own register tables, the TriBox assigns each sensor its own slave address when it is first detected. By default, the TriBox itself uses slave address 1. The slave address of each sensor can be set in the sensor menu.



If no address has been assigned here, the TriBox3 must be restarted.

The “ModbusStatus.txt” file can be viewed to obtain an overview of all sensors that have been assigned a slave address. It is part of the “Support Information”.

5. Data types

Data type Name	Count	Format or Range
Boolean	1	false = 0, true ≠ 0
Int16	1	16-bit positive integer. Values: -32.768 ... 32,767
Int32	2	32-bit positive integer. Values: -2,147,483,648 ... 2,147,483,647
Float	2	IEEE 754 32-bit floating point number
Char[n]	$\geq \left[\frac{n}{2}\right]$	Zero terminated ASCII character string
DateTime	6	Year, month, day, hour, minute, second

Attention: All data types longer than 16 bits, such as floats, are processed in “big-endian” format.

6. Register tables

The registers in this document are numbered from 0 to 65535, which corresponds to the same numbering used in the Modbus frames. If using software that starts with numbering from 1, a 1 must be added to each register number found in this document to obtain the correct register number for that software.

Input and Holding use the same table, so there is no difference between the results of the “Read Holding Register” and the “Read Input Register” commands.

Attention: Due to internal adjustments to coordinate the use of registers with our sensors, some inconsistencies have arisen, especially with regard to the register arrangement of longer data types. It is possible that further adjustments will follow.

6.1 Coils

Among the various devices, there are numerous coils that are used to trigger certain actions, such as measurements.

Register	Supported devices	Description
1	Sensors, TriBox	Trigger a measurement. For sensors, a measurement is triggered on this sensor; for the TriBox, a measurement is triggered for the entire measuring system.
2	Sensors	Resets the software status of the sensor.
3	TriBox	Triggers cleaning.

6.2 Modbus device registers

Register range	Data type	Read / Write	Descrption
20 ... 39	Char[40]	R	Name of the sensor, e.g. OPUS_7123
80	Int16	R	Number of measured values
81	DateTime	R	Time of the last measurement
1000ff		R	Measurement results (see below)
2000ff		R	Spectrum (if the sensor has one)
2000	DateTime	R	Sample time of the spectrum
2006	Int16	R	Integration time
2007	Int16	R	Number of channels
2008	Int16	R	Path length
2009	Float	R	CAL factor
2100ff	Floats	R	Spectral data

Measurement results

Depending on the sensor type, there are two different register mappings that are used here. If it is a TriOS sensors that uses registers 1000 ff for its measurement results, these are mapped to the same registers that are used in the sensor.

Further information regarding the register numbers can be found in the respective sensor manuals.

Currently, the TriBox converts the Hi- and LOW values of the floats into low-endian format. This differs from the behavior of the sensors. It is possible that this will be changed in future software versions.

Spectral data

These are pairs of wavelengths and Y values: A wavelength value is always accompanied by the corresponding Y value.

6.3 Registers of the TriBox

Register range	Data type	Read / Write	Descrption
20 ... 39	Char[40]	R	Name of the Tribox: Tribox_9401
100 ... 101	Int32	R	Serial number
102 ... 107	DateTime	RW	System time
108ff	Char[64]	RW	User-defined name of the Tribox

6.4 Registers of other multiparameter probes

As far as possible, all devices have the same register mapping. The registers used by all sensors with up to 32 measurement parameters are listed in the following table.

Register range	Data type	Read / Write	Descrption
20 ... 39	Char[40]	R	Name of the device
80	Int16	R	Number of parameters
81	DateTime	R	Time of the last measurement
1000ff		R	Data from up to 32 measurement parameters
1000 ... 1063	32 floats	R	Up to 32 measurement results
1064 ... 1383	32 * Char[20]	R	Names of the parameters in the order of the measurement results
1384 ... 1639	32 * Char[16]	R	Naming the units of the parameters in the order of the measurement results

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