bürkert
FLUID CONTROL SYSTEMS

Type MS09

Nitrate Sensor

Operating Instructions

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Operating Instructions 2110/00_EU-ML 00572429 / Original EN

TABLE OF CONTENTS

1 About this document 8
1.1 Manufacturer 8
1.2 Used symbols 8
1.3 Terms and abbreviations 9
2 Safety instructions 10
2.1 Warranty 10
2.2 Intended use 10
2.3 General safety information 10
3 Product description 13
3.1 Design 13
3.1.1 ME63 Sensor Interface 13
3.1.2 MS09 Nitrate Sensor 14
3.1.3 Flow cell 14
3.2 Display elements 15
3.2.1 Product status indicator 16
3.3 Markings 17
3.3.1 Type label 17
3.3.2 Conformity marking 18
3.4 Memory Card 18
3.5 Operating principle 18
4 Technical data 22
4.1 Operating conditions 22
4.2 Product materials 22
4.3 Conformity 22
4.4 Dimensions, weight 23
4.5 Performance data 23
4.6 Fluid data 24
4.7 Electrical data 24
5 Installation 25
5.1 Safety instructions 25
5.2 Installing procedure 25
6 Electrical connection 28
6.1 Connection plan MS09 28
6.2 Connection plan ME63 29
6.3 Assignment of the connections 29
6.4 Supply voltage 31
6.5 M12 8 pins Nitrate Sensor connection 31
7 Commissioning 33
7.1 Safety instructions 33

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

7.2 Manufacturer calibration ... 33
7.3 Path length check ... 33
7.3.1 Turbidity and organics compensation ... 33
7.3.2 Nitrite ... 33
7.3.3 Salinity ... 34
7.3.4 Path lengths and limit values ... 34
7.3.5 Unknown substances ... 35
7.4 Install the micro SD card ... 35
7.5 Transfer data to or from another product ... 36
8 Setting and operation ... 38
8.1 Safety instructions ... 38
8.2 Setting tools and setting software ... 38
8.3 Description of the user interface ... 38
8.4 Available login user levels ... 39
8.5 Product functions and menus ... 40
9 Sensor - Parameter ... 41
9.1 Select the type of sensor connected to the ME63 interface ... 41
9.2 Define the organic compensation level ... 42
9.3 Set the interval for the automatic measurements ... 42
9.4 Adjust the measure values (customer calibration) ... 42
9.5 Monitor the values of the water sample ... 43
9.6 Freeze the values transmitted on the fieldbus ... 44
9.6.1 Manual freeze ... 45
9.6.2 Automatic freeze ... 45
9.6.3 Change the binary event for the automatic freeze ... 46
9.6.4 Stop the manual freeze or the automatic freeze ... 47
10 Sensor - Diagnostics ... 48
10.1 Check sensor information ... 49
10.2 Check calibration values ... 49
10.3 Check measured values ... 49
10.4 Check values for advanced diagnostics ... 50
11 Sensor - Maintenance ... 51
11.1 Stop the simulation mode ... 51
11.2 Start the simulation mode ... 51
11.3 Manually start a measurement ... 52
11.4 Calibrate the zero value (base intensity) ... 52
11.5 Plan the calibrations ... 53
11.6 Activate or deactivate the service mode ... 53
12 General Settings - Parameter ... 55
12.1 Set the colours and behaviour of the device status LED ... 56
12.2 Enter a name for the product ... 56

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

12.3 Enter the location of the product ... 57
12.4 Enter a description for the product ... 57
12.5 Enter a unique name for the product ... 57
12.6 Change the transmission speed of the product ... 57
12.7 Address of a product connected to büS ... 58
12.8 Change the address of the product connected to a CANopen fieldbus ... 58
12.9 Read the actually used CANopen address (Node ID) ... 58
12.10 Set the digital communication for büS or for a CANopen fieldbus ... 58
12.11 Set the CANopen status ... 59
12.12 Show errors from büS partners ... 59
12.13 Stop sending the measured process data (PDOs) to büS or to the CANopen fieldbus ... 59
12.14 Change the time to check the presence of a participant on the fieldbus ... 60
12.15 Monitor the supply voltage ... 60
12.16 Monitor the device temperature ... 61
12.17 Disable or enable the diagnostics ... 61
12.18 Set the transmission time between 2 values of a PDO ... 63
12.19 Restore all PDOs to their default values ... 64

13 General Settings - Diagnostics ... 65
13.1 Read the current device temperature ... 66
13.2 Read the current supply voltage ... 66
13.3 Read the number of voltage drops since the last restart ... 66
13.4 Read the maximum and minimum values of the device temperature and the supply voltage ... 66
13.5 Read the number of product starts ... 66
13.6 Check the presence of the memory card ... 67
13.7 Read the current time ... 67
13.8 Read the number of current receive errors ... 67
13.9 Read the maximum number of receive errors since the last power-up of the device ... 67
13.10 Read the number of current transmit errors ... 67
13.11 Read the maximum number of transmit errors since the last power-up of the device ... 68
13.12 Reset the 2 maximum error counters ... 68
13.13 Read whether the measured process data is sent on büS or on the CANopen fieldbus ... 68
13.14 Read the generated events ... 68

14 General Settings - Maintenance ... 70
14.1 Read device information ... 70
14.2 Restart the product ... 71
14.3 Reset the product to its factory settings ... 71
14.4 Restart the sensor ... 72

15 Maintenance ... 73
15.1 Safety instructions ... 73

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

15.2 Maintenance data ... 73
15.3 Replace the memory card ... 74
15.4 Maintenance and inspection ... 74
15.5 Cleaning and upkeep ... 74
15.5.1 Cleaning the enclosure ... 74
15.5.2 Cleaning the measuring window ... 75
15.5.3 Preparing the sensor for the function test and zero value determination ... 76
15.6 Checking the zero value ... 77

16 Troubleshooting ... 78
16.1 Troubleshooting with messages ... 78
16.2 Messages [ERROR]: failure, error or malfunction ... 78
16.2.1 Message Select sensor and restart the device ... 78
16.2.2 Message Communication with the sensor is interrupted ... 78
16.2.3 Message Sensor error (internal error). Contact the service for your device ... 79
16.2.4 Message büS event: producer not found ... 79
16.2.5 Message büS is not operational ... 79
16.3 Messages [OUT OF SPECIFICATION]: out of specification ... 79
16.3.1 Message Warning: Quality of measurement limited (SQI). Check sensor and process ... 79
16.3.2 Message Warning: Quality of measurement limited (NO3). Check sensor and process ... 80
16.3.3 Message Error: Quality of measurement significantly reduced (SQI). Check sensor and process ... 80
16.3.4 Message Error: Quality of measurement significantly reduced (NO3). Check sensor and process ... 80
16.4 Messages [FUNCTION CHECK]: function check ... 80
16.4.1 Message Simulation mode active ... 81
16.4.2 Message Hold mode active ... 81
16.5 Messages [MAINTENANCE]: maintenance required ... 81
16.5.1 Message Device is in service mode, no communication with sensor ... 81
16.5.2 Message Path length could not be set ... 81
16.5.3 Message Calibration setting could not be set ... 82
16.5.4 Message Deviation from default settings detected, resets to default settings ... 82
16.5.5 Message Last calibration is older than 1 days. Recalibrate your device ... 82
16.5.6 Message Sensor error (invalid baseline). Contact the service for your device ... 82
16.5.7 Message Sensor error (optical path length too short). Contact the service for your device ... 83
16.5.8 Message Sensor error (optical path length too long). Contact the service for your device ... 83
16.6 Messages [INFO]: information ... 83
16.6.1 Message Sensor error (data transfer failed). Contact the service for your device ... 83
16.6.2 Message Sensor error (UPS error). Contact the service for your device ... 83
16.6.3 Message Sensor error (power fail detected). Contact the service for your device ... 84
16.6.4 Message Transferable memory is not accessible ... 84

17 Spare parts and accessories ... 85
17.1 MS09 Nitrate Sensor accessories ... 85

18 Uninstallation ... 86

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

18.1 Safety instructions 86
18.2 Uninstalling procedure 86
19 Logistic 87
19.1 Transport 87
19.2 Storage 87
19.3 Return 87
19.4 Disposal 87

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

1 ABOUT THIS DOCUMENT

The document is an important part of the product and guides the user to safe installation and operation. The information and instructions in this document are binding for the use of the product.

- Before using the product for the first time, read and observe the whole safety chapter.
- Before starting any work on the product, read and observe the respective sections of the document.
- Keep the document available for reference and give it to the next user.
- Contact the Bürkert sales office for any questions.

Further information concerning the product at country.burkert.com.

1.1 Manufacturer

Bürkert SAS

Rue du Giessen

F-67220 TRIEMBACH-AU VAL

The contact addresses are available at country.burkert.com in the Contact menu.

1.2 Used symbols

DANGER!

Warns of a danger that leads to death or serious injuries.

WARNING!

Warns of a danger that can lead to death or serious injuries.

CAUTION!

Warns of a danger that can lead to minor injuries.

ATTENTION!

Warns of property damage that can damage the product or the installation.

Indicates important additional information, tips and recommendations.

Refers to information in this document or in other documents.

▸ Indicates an instruction to avoid a danger.

→ Indicates a step to be carried out.

Indicates a result.

Menu Indicates a software user-interface text.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

1.3 Terms and abbreviations

The terms and abbreviations are used in this document to refer to following definitions.

Product	MS09 ▪ Photometer, digital
büS	Bürkert system bus, a communication bus developed by Bürkert and based on the CANopen protocol
NAMUR	Standards committee for measurement and control technology (NAMUR) is an international association of users of automation systems for the process industry.
NAMUR recommendation NE 107	Self-monitoring and diagnosis of field devices.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

2 SAFETY INSTRUCTIONS

2.1 Warranty

The warranty is conditional on compliant use of the product in observance of the operating conditions.

2.2 Intended use

Improper use of the product may be a hazard to people, nearby equipment and the environment.

MS09 is used exclusively for the implementation of NO3 or photometric measurements as described in this manual. The product has been developed for use in industrial an municipal water treatment plants. The ME63 Sensor Interface is used to connect the Sensor Types MS08 and MS09 into Bürkert büS networks.
The flow cell is used to install the Nitrate Sensor as a bypass.

- The sensor may only be used to measure the NO3 and transmission of aqueous fluids with water qualities equal or better than drinking water. The use of other media can damage the sensor. For the use of the product in other media then those specified this manual, please contact the Bürkert Customer Service
- The photometer is an immersion sensor, which is used underwater or with flow cells. Please note the technical data of the accessory parts. Other uses do not comply with the intended use.
- Observe the data (additional data, operating conditions, service conditions) in the contract documents, in the Operating Instructions, on the type label and on the calibration label.
- Only use the product with external instruments that the product manufacturer recommends.
- Only use the product up to an altitude of 2000 m.
- Only use the product with components that the product manufacturer recommends.
- Operate the product carefully and ensure regular and professional maintenance.
- Operate the product only in perfect working order.
- Ensure appropriate storage, transport, installation and use.
- Only use the product for its intended purpose.

Qualification of the personnel

The target group for the operation of the product is technically skilled staff in plants, water plants and institutes. Operating this product often requires the handling of hazardous substances. Operating personnel must be familiar with dealing with dangerous substances based on their professional training and experience. Operating personnel must be able to correctly understand and implement the safety labels and information on the packaging and in the package inserts of the test kits.

2.3 General safety information

These safety instructions do not take into account any unforeseen circumstances and events which occur during installation, operation and maintenance.

The operator is responsible for observing the location-specific safety regulations, also with reference to the personnel.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

To prevent injuries and product damage, observe the following:

- Install the product according to the regulations applicable in the respective country.
- Make sure only trained technicians carry out installation and maintenance work.
- Secure the product or system to prevent unintentional activation.
- Do not subject the product to mechanical stress.
- The Nitrate Sensor is made from stainless steel. Sensors made from stainless steel must be cleaned immediately after coming into contact with salt water or other corrosive substances (e.g acids, alkalis, chlorine-based connections).
- The material resistance must be checked after every use.
- The sensor has seals made from NBR (nitrile butadiene rubber). Sealing rings made from other materials may be used upon individual request. Before operation, ensure that the measured medium does not damage the seals.
- Do not cut, damage or change the cord. Make sure there are no heavy objects on the cable and that the cable is not folded. Make sure that the cable is not anywhere near hot surfaces.
- If the sensor cable is damaged, then it must be replaced with an original part by the Bürkert Customer Service.
- Do not place unsuitable items in the optical path as long as the measurement process is running, as this can cause damage to the sensor or incorrect measurement results.
- Stop operation of the sensor in the event of excessive heat development (i.e. if it is hot to the touch). Switch off the sensor immediately and unplug the power cord from the power supply. Please contact your dealer or the Bürkert Customer Service.
- After an interruption in the power supply, make sure that the process is restarted in a controlled manner.
- Never try to disassemble or modify the product or a part of the product if such a procedure is not explicitly described in this manual.
- Products from Bürkert meet the highest safety standards. Inspections, modifications and repairs to the product, which involve the replacement of the connecting cable, must be carried out by Bürkert or by a workshop /qualified experts authorized by Bürkert. Defective, improper repairs can lead to accidents and injuries
- Observe the general rules of technology.

DANGER!

Injuries due to UV light

- Never look directly at the light source. The radiation emitted (UV light) can cause serious damage to the eyes.

DANGER!

Handling with reagents and liquid waste

- Follow the safety and operating instructions of the manufacturer when using reagents. Observe the valid Hazardous Materials Ordinance for reagents.
- Liquid waste may be a biohazard. Always wear gloves when working with such materials. Observe the currently valid biological agents regulation.
- When handling liquid waste, observe the regulations on water pollution, drainage and waste disposal.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

DANGER!

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

CAUTION!

Electrostatically sensitive components and assemblies.

The product contains electronic components that are susceptible to the effects of electrostatic discharging (ESD). Components that come into contact with electrostatically charged persons or objects are at risk. In the worst case scenario, these components are destroyed immediately or fail after start-up.

- Meet the requirements specified by EN 61340-5-1 to minimize or avoid the possibility of damage caused by sudden electrostatic discharge.
- Do not touch electronic components when the supply voltage is connected.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

3 PRODUCT DESCRIPTION

3.1 Design

The MS09 consists of the following components:

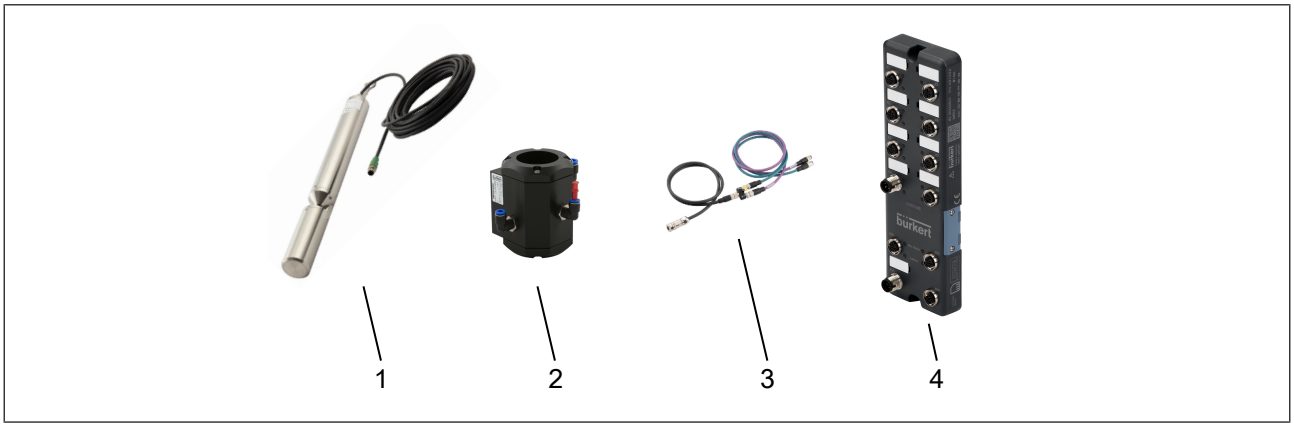


Fig. 1: MS09 components

1	Nitrate Sensor	2	Flow cell
3	Connecting cable	4	ME63 Sensor interface

3.1.1 ME63 Sensor Interface

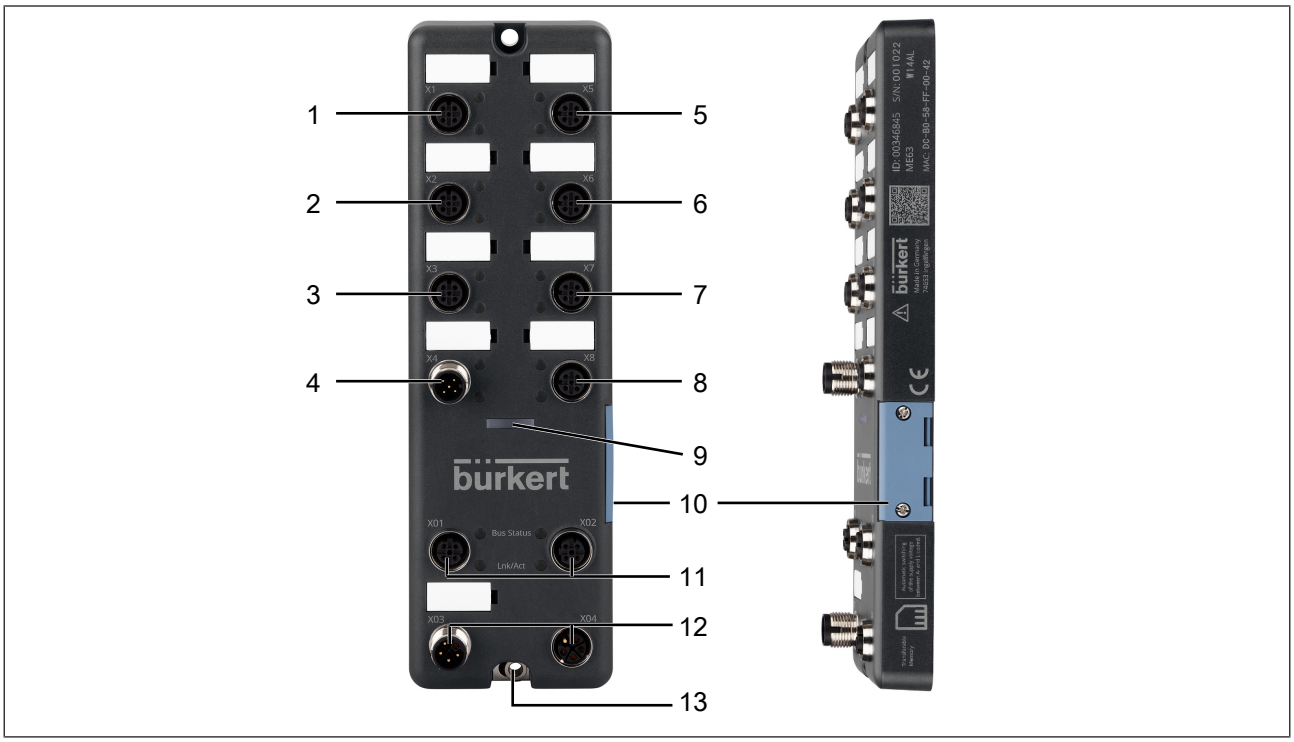


Fig. 2: View of ME63 type

1	X1	2	X2
3	X3	4	X4
5	X5	6	X6
7	X7	8	X8

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

9	Product status indicator	10	Cover with 2 screws, slot for micro SD card
11	X01, X02: D-coded connection	12	X03 (IN), X04 (OUT): L-coded connection, 24 V DC
13	Earth connection		

3.1.2 MS09 Nitrate Sensor

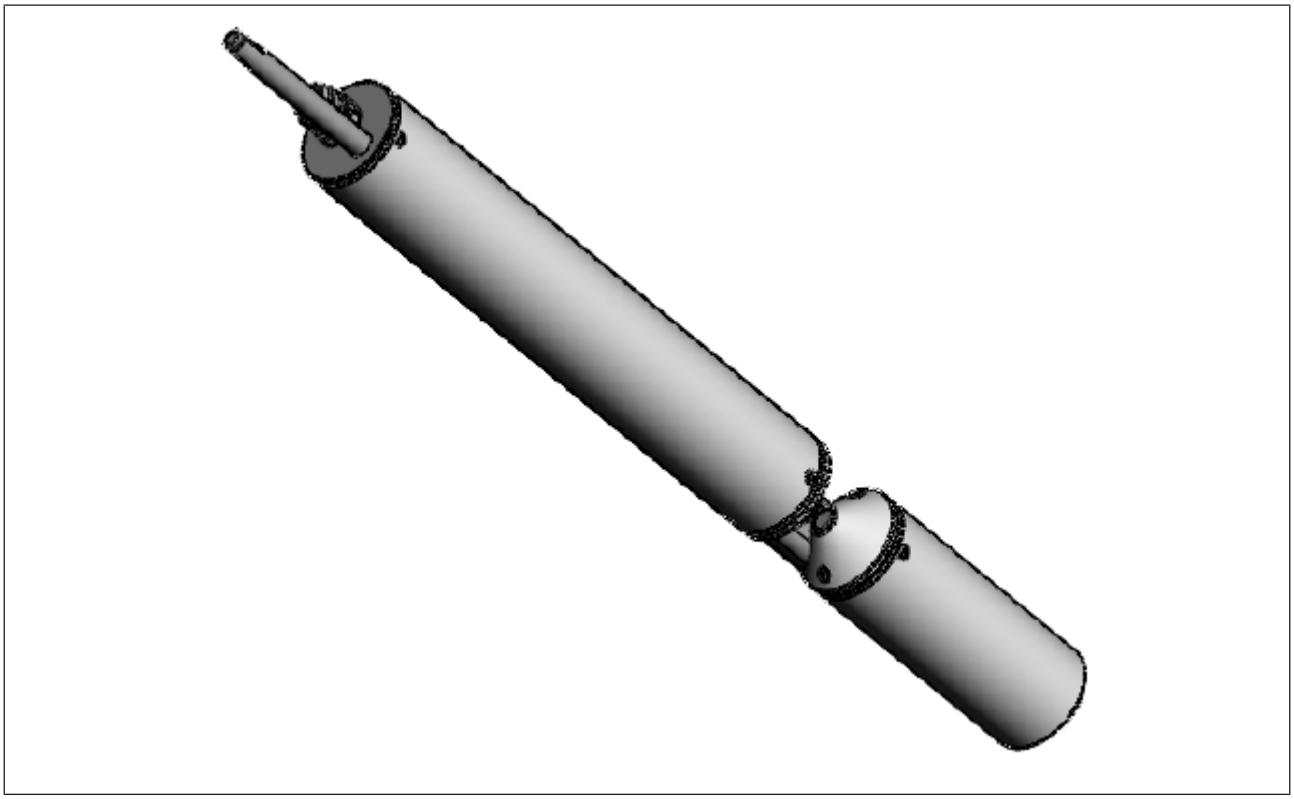


Fig. 3: View of Nitrate Sensor

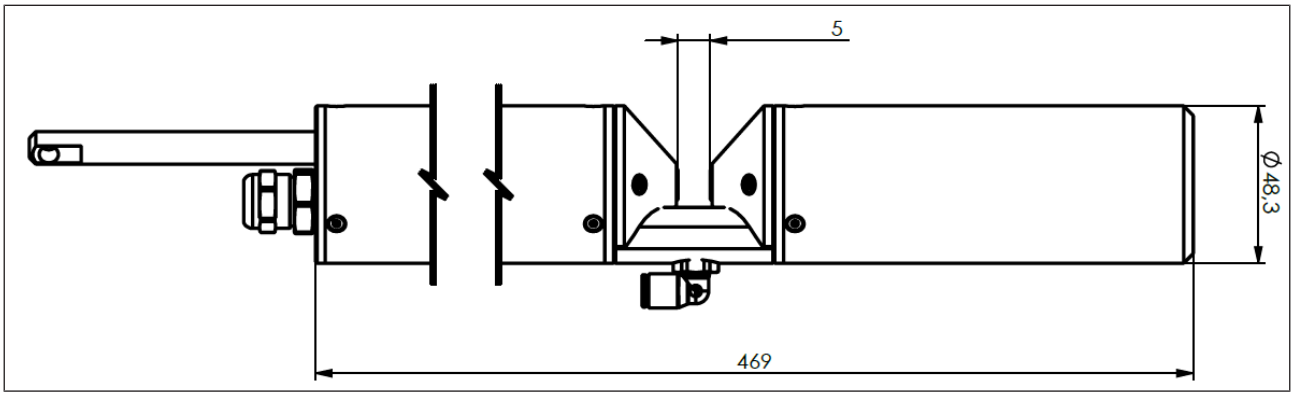


Fig. 4: Nitrate Sensor dimensions

3.1.3 Flow cell

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Fig. 5: View of flow cell

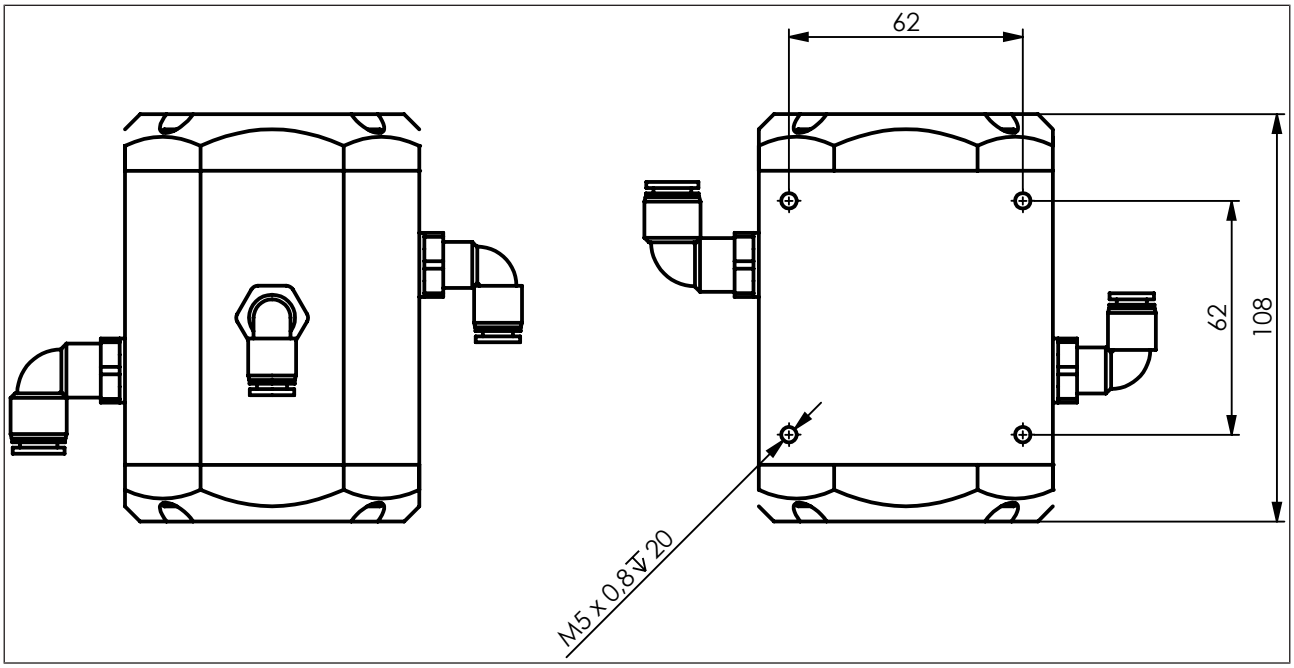


Fig. 6: Flow cell dimensions

3.2 Display elements

Type ME63 has LEDs for diagnostics on the product status:

Fig. 7: Display elements for ME63 type

1	Product status indicator. The indicator operates according to NAMUR NE 107.	2	Communication status indicator 1. The indicator changes between green and red.
3	Link/Act Blinking - There is activity on this port. Off - No link is established	4	Communication status indicator 2. The indicator changes between green and red.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

5	Link/Act Blinking - There is activity on this port. Off - No link is established

3.2.1 Product status indicator

The product status indicator changes its colour based on the NAMUR recommendation NE 107.

The colour of the product status indicator gives the following pieces of information:

- Whether product diagnostics are active or not. Diagnostics are active on the product and cannot be de-activated.
- If product diagnostics are active, then the product status indicator shows whether diagnostics events have been generated or not. If several diagnostics events have been generated, then the product status indicator shows the diagnostics event with the highest priority. Refer to table [▶ 16]

If the product status indicator flashes, then the product is selected in a man-machine interface such as the Bürkert Communicator software.

Colour [1]	Colour code (for a PLC)	Diagnostics event [1]
Red	5	Failure, error or fault
	Due to a malfunction of the product or its periphery. The functionality of the product is not guaranteed.	
Orange	4	Check function
	The product is being worked on: ▪ The product is searching for a büS participant. ▪ This status is exited after a few seconds. ▪ Product simulation active.	
Yellow	3	Out of specification
	The ambient conditions or process conditions for the product are outside the specified ranges. Product internal diagnostics point to problems in the product or with the process properties. Data sheet values cannot be complied with.	
Blue	2	Maintenance required
	The product has detected a deviation during ongoing diagnostics and has implemented a correction. → Do the required maintenance operation.	
	3	Product configuration cannot be managed
	The updated product configuration cannot be saved. It is not possible to transfer the configuration when swapping products.	
Green	1	Diagnostics active
	Product is in error-free operation. Status changes are highlighted in colour. Messages are sent via any fieldbus that may be connected.	

[1] *according to NE 107*

Colour [1]	Colour code (for a PLC)	Diagnostics event [1]
White	0	Diagnostics inactive
	Product is switched on. Status conditions are not displayed. Messages are not listed in the message list or transmitted via any connected field-bus. Product is running within its specifications.	

Tab. 1: Product status indicator in accordance with NAMUR NE 107, edition 2006-06-12, for active diagnostics

→ To solve a problem indicated by the product status indicator, refer to chapter: Troubleshooting [▶ 78].

3.3 Markings

3.3.1 Type label

3.3.1.1 ME63 Sensor Interface

Fig. 8: ME63 Label

3.3.1.2 Nitrate Sensor

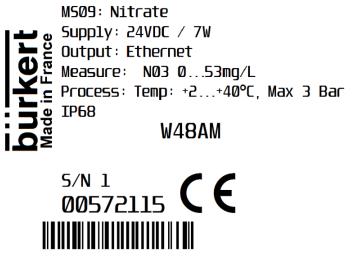


Fig. 9: Nitrate Sensor Label

3.3.1.3 Flow cell

Fig. 10: MS09 Flow cell Label

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

3.3.2 Conformity marking

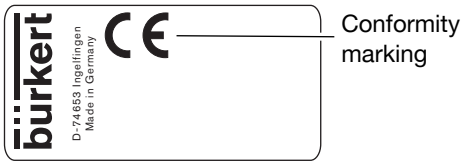


Fig. 11: CE marking

3.4 Memory Card

A micro SD card (available as an optional accessory) can be used as a memory card to store product-specific values and user settings and transfer them to another product. Refer to chapter Install the micro SD card [▶ 35] and Transfer data to or from another product [▶ 36].

CAUTION!

The micro SD card used is a special industrial version that offers additional durability and temperature resistance.

- Do not use a standard micro SD card for the product. Only purchase the micro SD card for the product from your Bürkert sales department.

Function of the micro SD card limited to data exchange

The micro SD card is not suitable for back-ups. If the micro SD card of the product is re-inserted at a later stage, then the data last saved are not restored. The function of the micro SD card is limited to data exchange.

3.5 Operating principle

The ME63 Sensor Interface represents the central control unit for MS08 and MS09.

Function: The ME63 Sensor Interface is an additional interface for büS devices. The ME63 Sensor Interface exchanges data with the Nitrate Sensor on Ethernet communication.

Measurement principle

For optimal use of the sensor, it is essential to understand the measuring principle and measurement setup which the sensor is based on. The following is an overview of the measurement principle, the optical arrangement and the subsequent calculation.

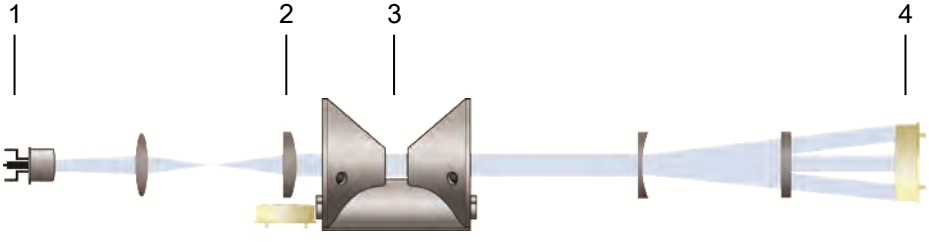


Fig. 12: Operating principle MS09 Nitrate Sensor

1	Light source	2	Reference diode
3	Lens system and optical path	4	Detector

The Nitrate Sensor essentially consists of four parts (see figure above):

- a defined light source
- a lens system
- the optical path through the medium
- a second lens system with three photodiodes as detectors

A xenon flash lamp is used as a broadband light source. The light passes through the medium in the optical path and is partially absorbed by it. The photodiodes pick up the remaining light and determine its intensity at defined wavelength points. The weakening of the light when passing through the measurement medium is compared to the weakening caused by ultra-pure water. The measurement in ultra-pure water provides the so-called basic intensity I_0. Using equation 1 and equation 2, the Nitrate Sensor determines the transmission T and the absorbance A for three defined wavelengths.

$$T = \frac{I}{I_0}$$

Fig. 13: Equation 1 - Calculation of transmission

$$A = -log_{10}T = -log_{10}\frac{I}{I_0}$$

Fig. 14: Equation 2 - Calculation of absorbance

where:

T	transmission in %
I	current light intensity
I_0	basic light intensity in ultra-pure water
A	absorption in AUs (AU = absorbance unit)

Analysis

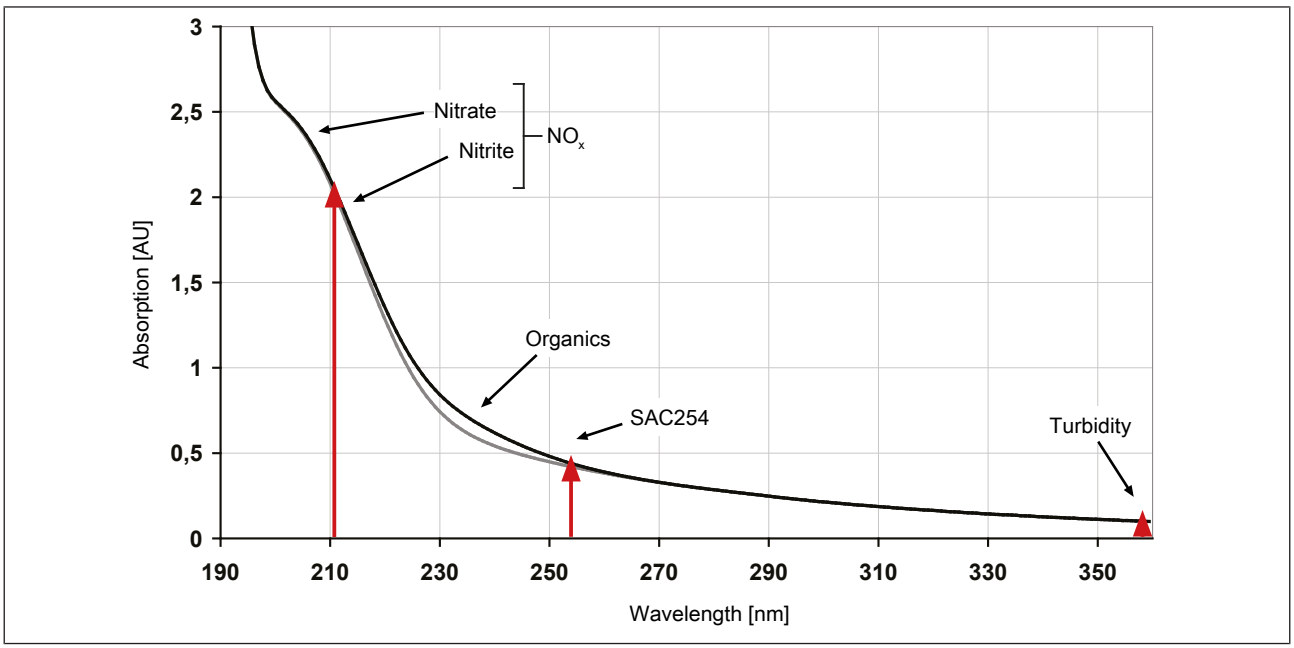


Fig. 15: Detection at wavelengths 212, 254 and 360 nm (red arrows)

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Parameters

The Nitrate sensor measures absorption at 212 nm. The derived parameter NO_3 is output.

Taking the path length into account, the absorption values [AU] are calculated with the unit [1/m] at 212, 254 and 360 nm. The Nitrate sensor uses the absorption at 212 nm for the detection of NO_3-N. Absorption at 254 (SAC254) and 360 nm is used to correct organic compounds and turbidity. Optical path lengths of 0.3, 1, 2, 5 or 10 mm are available for the Nitrate sensor.

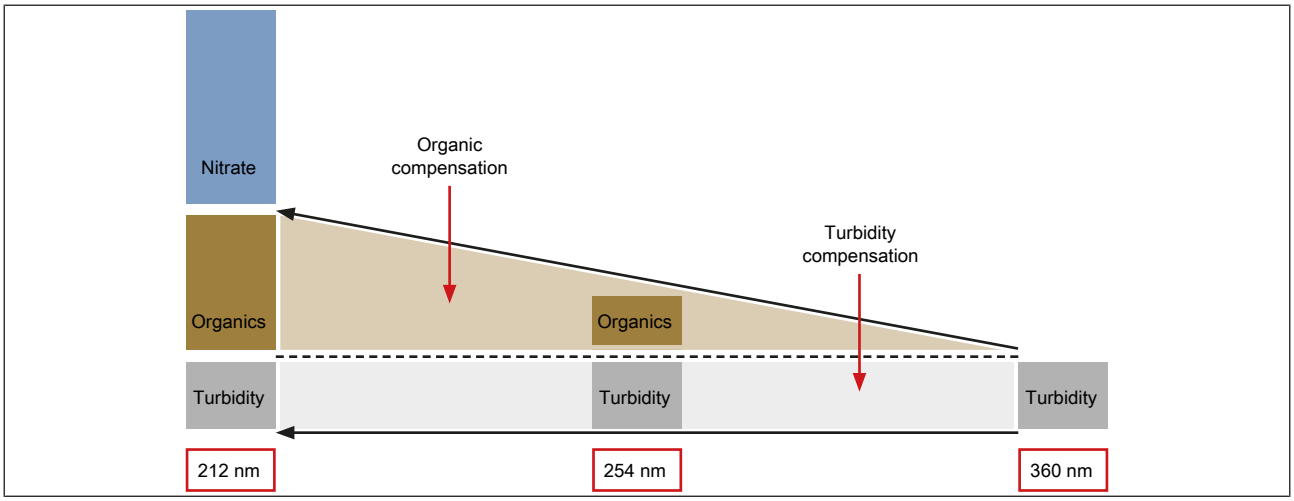
It is possible to adapt the sensor with scaling factors to laboratory analyses and local conditions. Please note that the manufacturer's calibration is not affected by the customer-specific calibration (refer to chapter Adjust the measure values (customer calibration) [▶ 42]).

	Optimal range	Allowed range	Out of specification range Refer to chapter Maintenance [▶ 73]
SQI value	1...0.8	0.8...0.5	< 0.5

Tab. 2: SQI value range and quality of measurement

Compensation of Turbidity and Organics

Optical nitrate measurement can be influenced by the presence of particles (turbidity) and organic substances (organics). For this reason, the manufacturer's calibration contains a compensation for turbidity and organics, as shown schematically in the figure below.



In the case of organic compensation, it is possible to choose from three fixed compensations for different applications:

Default:	standard manufacturer calibration.
High:	manufacturer calibration with enhanced compensation for high concentrations of organic substances.
Low:	manufacturer calibration with reduced compensation for low concentrations of organic substances.

Reference values

In addition to NO_3, the following reference values are output (refer to chapter Check values for advanced diagnostics [▶ 50]):

- The SQI value is the sensor quality index that indicates the quality of the measurement.
- RefA indicates the light intensity on the 212 nm channel.

- RefB indicates the light intensity on the 254 nm channel.
- RefC indicates the light intensity on the 360 nm channel.
- RefD indicates the light intensity of the reference diode.

Details and limit values of the reference parameters can be found in chapter Path lengths and limit values [▶ 34] and chapter Maintenance [▶ 73].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

4 TECHNICAL DATA

4.1 Operating conditions

Ambient temperature	-20 °C…+60 °C
IP-Code according to EN 60529	IP65 and IP67 [2] If the following condition is met: connections are fitted with protective caps

Tab. 3: ME63 Sensor Interface: Operating conditions

Ambient temperature	+2 °C…+40 °C
Fluid temperature	+2 °C…+40 °C
Pressure with fixed cable	3 bar
Pressure in flow cell	1 bar, 2…4 L/min
IP-Code according to EN 60529	IP68 [2]

Tab. 4: Nitrate Sensor: Operating conditions

4.2 Product materials

Product part	Material
Housing	Polycarbonate
Casting resin	Casting resin: WEVOPUR 552 FL, natural

Tab. 5: ME63 Sensor Interface: Product materials

Product part	Material
Housing	Stainless steel (1.4571/1.4404)

Tab. 6: Nitrate Sensor: Product materials

Product part	Material
Housing	Polyoxymethylene (POM)
Sealings	NBR
Screws	A4

Tab. 7: Flow Cell: Product materials

4.3 Conformity

The product complies with the EU directives according to the EU declaration of conformity (if applicable).

The applied standards, which verify conformity with the EU directives, can be found on the EU type examination certificate and/or the EU declaration of conformity (if applicable).

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

[2] *The IP-Code is determined by Bürkert. The IP-Code is not evaluated by UL.*

4.4 Dimensions, weight

Refer to the data sheet of the related product.

4.5 Performance data

Parameters	NO_3 (calibrated with NO_3 standard solution)
Measurement range	see parameter list below
Measurement accuracy	see parameter list below
Turbidity compensation	Yes
Data Logger	~ 2 GB
Reaction time T100	20 s
Measurement interval	≥ 10 s

Tab. 8: Nitrate Sensor: Measurement data

Measuring ranges and detection limits

The following table provides an overview of the measurement ranges of various parameters as a function of the path length.

The values apply to laboratory conditions.

Path length [mm]	Parameters	Measurement range[3]	Detection limit[3)]	Determination limit[3]	Precision[3]	Accuracy [4]
0.3	Nitrate NO_3-N	0…200	1.65	4.95	0.495	± (5 % + 3.3)
	Nitrate NO_3	0…886	7.26	21.78	2.178	± (5 % + 14.5)
1	Nitrate NO_3-N	0…60	0.5	1.5	0.15	± (5 % + 1)
	Nitrate NO_3	0…266	2.2	6.6	0.66	± (5 % + 4.4)
2	Nitrate NO_3-N	0…30	0.25	0.75	0.075	± (5 % + 0.5)
	Nitrate NO_3	0…133	1.1	3.3	0.33	± (5 % + 2.2)
5	Nitrate NO_3-N	0…12	0.1	0.3	0.03	± (5 % + 0.2)
	Nitrate NO_3	0…53	0.44	1.32	0.132	± (5 % + 0.88)

[3] *The unit used for all measured values is [mg/L]*
[4] *Based on a standard calibration solution; Note: 1 mg/L NO3-N corresponds to 4.43 mg/L NO3.*

Path length [mm]	Parameters	Measurement range[3]	Detection limit[3)]	Determination limit[3]	Precision[3]	Accuracy [4]
10	Nitrate NO_3-N	0…6	0.05	0.15	0.015	± (5 % + 0.1)
	Nitrate NO_3	0…26.6	0.22	0.66	0.066	± (5 % + 0.44)
20	Nitrate NO_3-N	0…3	0.025	0.075	0.0075	± (5 % + 0.05)
	Nitrate NO_3	0…13	0.11	0.33	0.033	± (5 % + 0.22)
50	Nitrate NO_3-N	0…1.2	0.01	0.03	0.003	± (5 % + 0.02)
	Nitrate NO_3	0…5	0.0.44	0.132	0.0132	± (5 % + 0.09)

Tab. 9: Measuring and detection limits

4.6 Fluid data

Operating fluid	Aquaeous solutions
Type of liquids	Aqueous fluids with water qualities equal or better than drinking water
Sample temperature	+2…+40 °C
Inflow velocity	0.1…10 m/s

Tab. 10: Operating fluid

4.7 Electrical data

Operating voltage	24 V DC ±10 % – residual ripple
Power consumption	≤ 2 W
Communication interface	büS (Ethernet TCP/IP)
Degree of protection	IP65 and IP67 (only if connections are fitted with protective caps)
Protection class	3 according to DIN EN 61140 (VDE 0140)

Tab. 11: ME63 Sensor Interface: General electrical data

Supply voltage	24 V DC ±10 %
Power consumption	≤ 7 W
Communication interface (digital)	Ethernet (TCP/IP)

Tab. 12: Nitrate Sensor: General electrical data

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

5 INSTALLATION

5.1 Safety instructions

WARNING!

Risk of injury due to improper installation.

- Only trained technicians may perform installation work.
- Perform installation work using suitable tools only.

CAUTION!

Malfunction due to electrostatic discharge.

Electrostatic discharge on the product may cause malfunctions.

- Connect the product to the functional earth.

CAUTION!

Danger due to electro-magnetic fields.

If the functional earth (FE) is not connected, then this represents an infringement of the legal regulations of EMC.

- Connect the product to the functional earth.
- If the installation surface is not grounded, then use an earthing strap or FE line. Connect the earthing strap or FE line to the earthing point using an M4 screw.

To discharge interference currents and EMC resistance, the products have an earth connection.

5.2 Installing procedure

Step 1: Installing the ME63 Sensor Interface

The product will be delivered fully installed. Modifications to the device are only permitted to be carried out by Bürkert.

→ Connect the product to the functional earth.

→ Install the product on a level surface using 2 screws (M4) and 2 flat washers (according to DIN 125). Observe the maximum tightening torque of 1 Nm.

Step 2: Installing the Nitrate Sensor

With the flow cell, the Nitrate Sensor can be installed as a bypass.

ATTENTION!

The maximum pressure in the flow cell must not exceed 1 bar. Make sure that the sensor is installed in the correct position to guarantee the free flow of water.

The flow cell of the Nitrate Sensor has three hose connections:

- The inlet has an 8-mm hose connection and is located on the right side of the flow cell. The inflow can be adapted with a 6-mm hose when backpressure is available.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

- There is a 6-mm outlet hose connection on the left side of the cell.
- There is a third hose connection on the top of the cell which can be used for cleaning with fluids. If this inlet is not being used, it should be sealed with a plug.

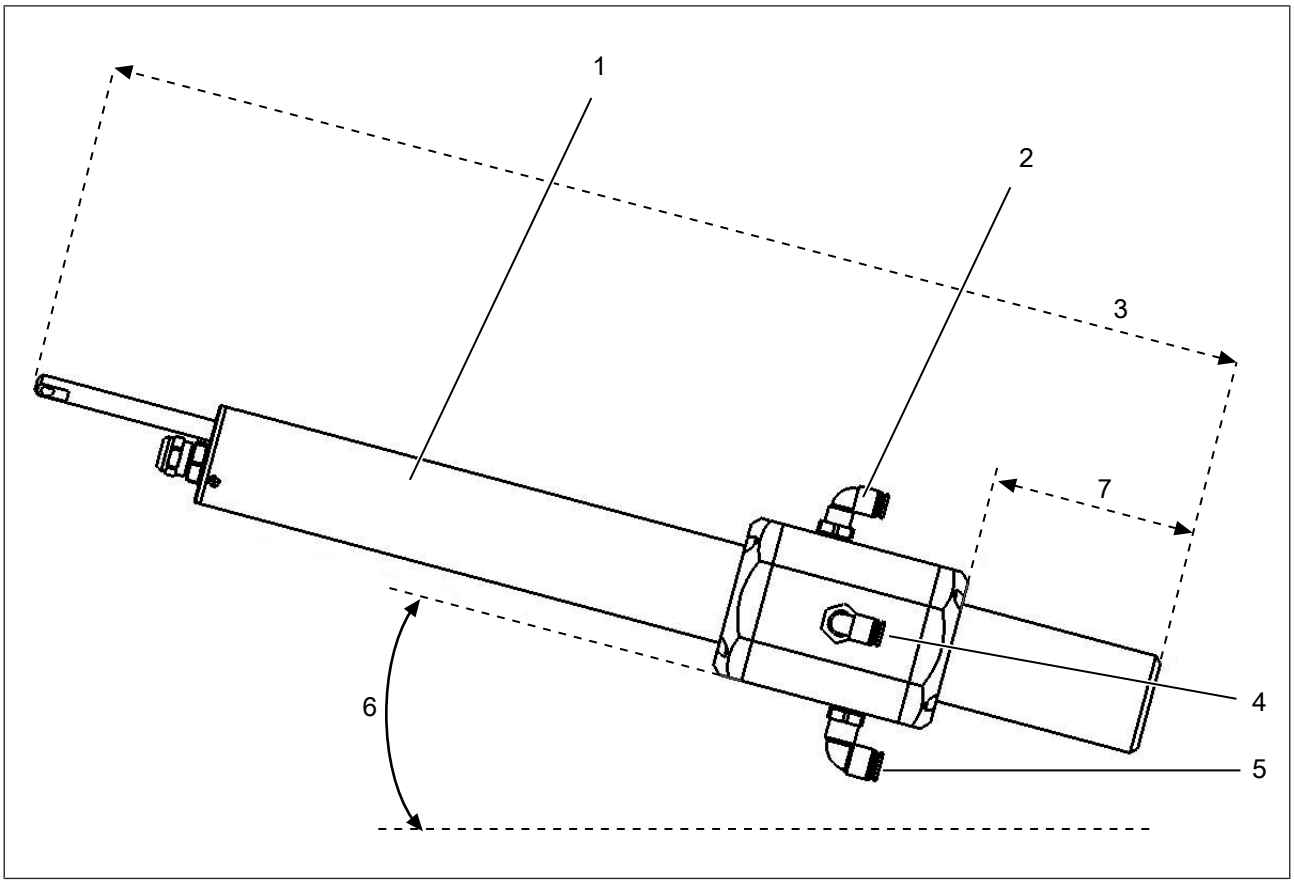


Fig. 16: Nitrate Sensor with flow cell housing

1	Housing diameter 48.3 mm	2	Outlet 6 mm
3	557 mm	4	Connection with plug
5	Inlet 8 mm	6	15° to 75°
7	99.5 mm		

→ To install the hoses, put light pressure on the hose connectors.

→ To remove the hoses, press on the locking ring on the hose connector and carefully pull the hose away.

ATTENTION!

The flow cell cannot be combined with the compressed-air cleaning.

Step 3: Connect the Nitrate Sensor to the ME63 Sensor Interface

Follow the steps below to install the Nitrate Sensor in the flow cell.

→ Remove both end caps and both seals by loosening the eight screws.

→ Slide the Nitrate Sensor into the flow cell and secure it in the correct position. All openings must be clear so that the flowing fluid can flow directly through the optical path. The back of the Nitrate Sensor should point towards the flow cell bottom (the bottom of the flow cell is the side on which the cell is mounted). The screw heads at the tube ends should disappear completely into the flow cell cuvette, so that the Nitrate Sensor sits centrally in the flow cell cuvette.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Slide a seal over the Nitrate Sensor in the slots provided in the flow cell cuvette. Before final assembly, please check seals for damage and use new ones where necessary. Seals (48 x 5 mm NBR) are available as spare parts and can be purchased from Bürkert.

→ If the sensor position is correct, install both end caps and secure them with the eight screws. The flow cell and the Nitrate Sensor should be installed at an angle between 15° and 75° to the horizontal, so that neither bubbles nor sinking dirt particles affect the measurement. After installation, check for leaks and free flow of water.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

6 ELECTRICAL CONNECTION

6.1 Connection plan MS09

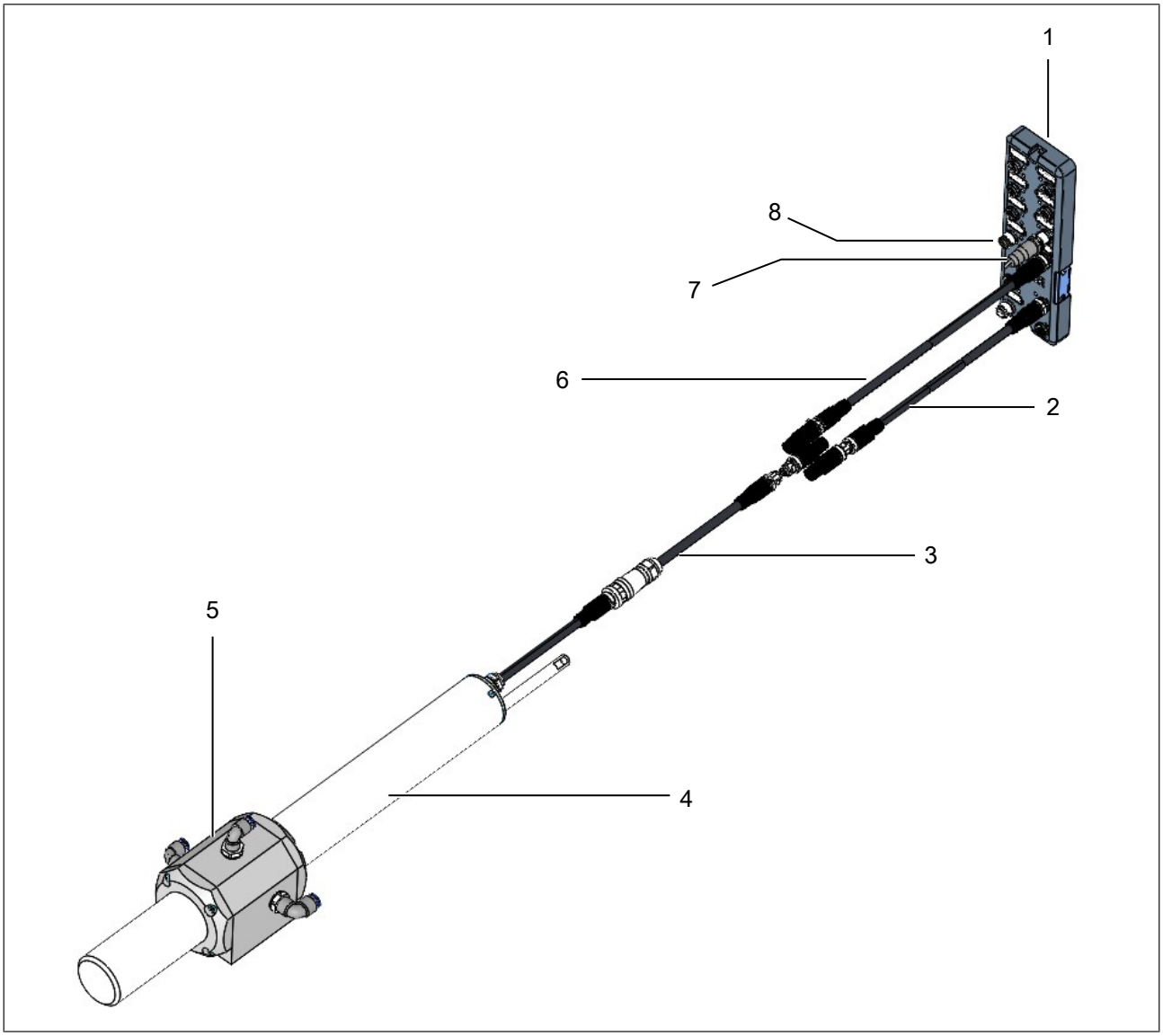


Fig. 17: Connection plan MS09

1	ME63 Sensor interface	2	MS09 Ethernet cable (blue colour): X01 or X02
3	Cable	4	Nitrate Sensor
5	Flow cell	6	MS09 power supply cable: X1–X3, X5–X8
7	M12 terminating resistor: X1–X3, X5–X8	8	Burkert büS input (CAN + power supply): X4 (IN)

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

6.2 Connection plan ME63

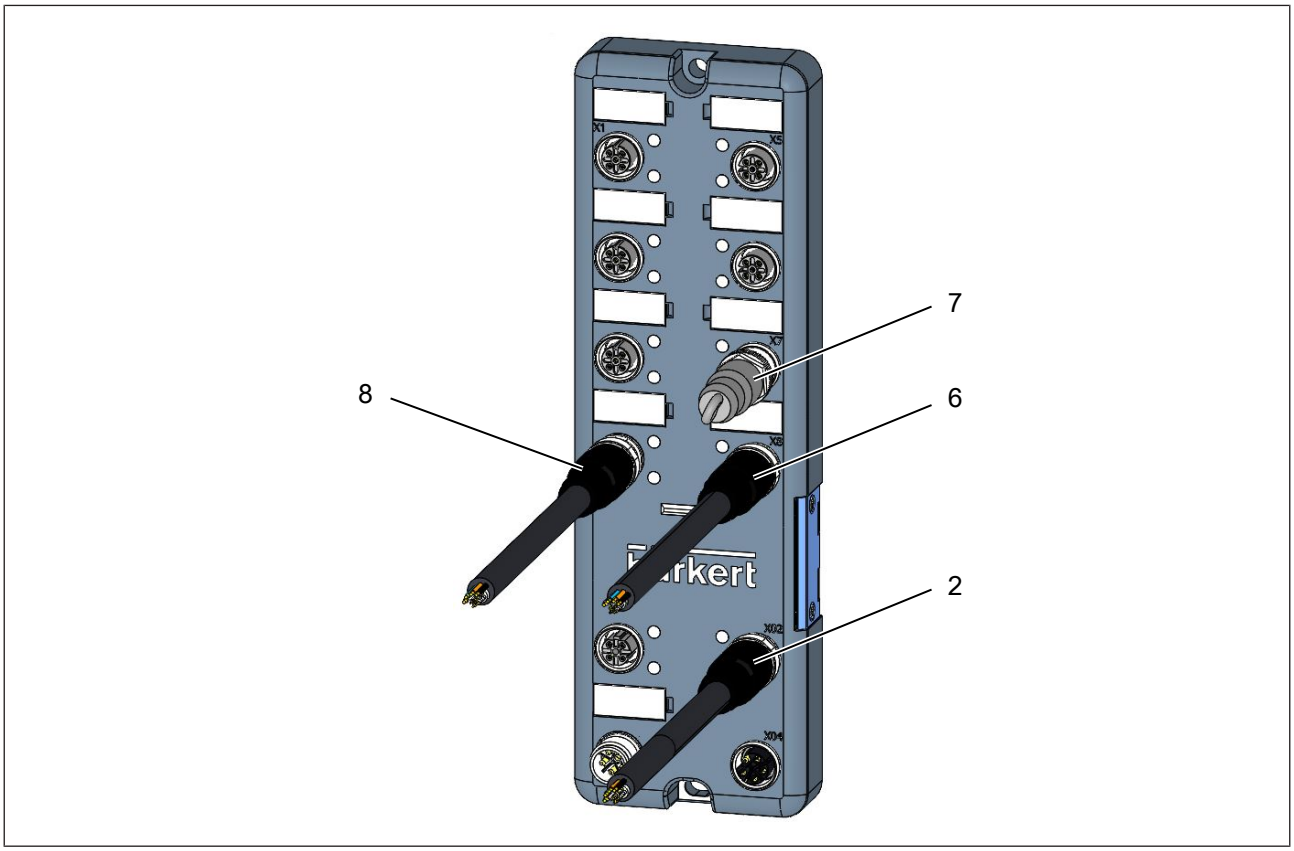


Fig. 18: Connections ME63 Sensor interface (detail)

2	MS09 Ethernet cable (blue colour): X01 or X02	6	MS09 power supply cable: X1–X3, X5–X8
7	M12 terminating resistor: X1–X3, X5–X8	8	Burkert büS input (CAN + power supply): X4 (IN)

6.3 Assignment of the connections

Prerequisite for the fault-free functioning of the product

- Avoid interference issues: Use only shielded cables with a braided or foil shield.
- Ensure the degree of protection: Fit unused connections with protective caps.

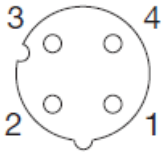
→ Connect pins according to the variant.

Port	Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
X01 (IN), X02(OUT)	EtherNet	TD+	RD+	TD-	RD-	-
X03 (IN), X04(OUT)	Power supply	(+24 V)	GND	GND	(+24 V)	FE
X1–X3, X5-X8 (OUT)	CAN + power supply	CAN_GND	24 V	GND	CAN_H	CAN_L

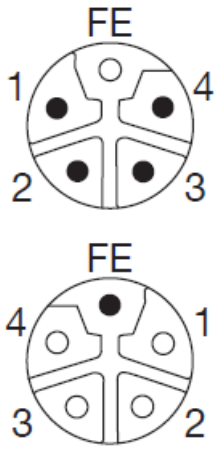
MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Port	Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
X4 (IN)	CAN + power supply	CAN_GND	24 V	GND	CAN_H	CAN_L

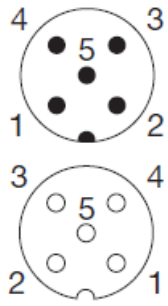
Tab. 13: Assignment of the connections

	Pin	Assignment	Function
	1	TD+	Send data +
	2	RD+	Receive data +
	3	TD-	Send data -
	4	RD-	Receive data -

Tab. 14: Connections M12, X01, X02 (socket), D-coded

	Pin	Assignment	Function
	1	24 V	Supply 1
	2	GND	Supply 2
	3	GND	Supply 1
	4	(24 V)	Supply 2
	5	FE	Shielding

Tab. 15: Connections M12, X03 (plug), X04 (socket), L-coded

	Pin	Assignment	Function
	1	FE/CAN_GND	Shielding
	2	24 V	Supply
	3	GND	Supply
	4	CAN_H	büS communication
	5	CAN_L	büS communication

Tab. 16: Connections M12, X4 (plug) and X1-X3, X5-X8 (socket), A-coded

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

6.4 Supply voltage

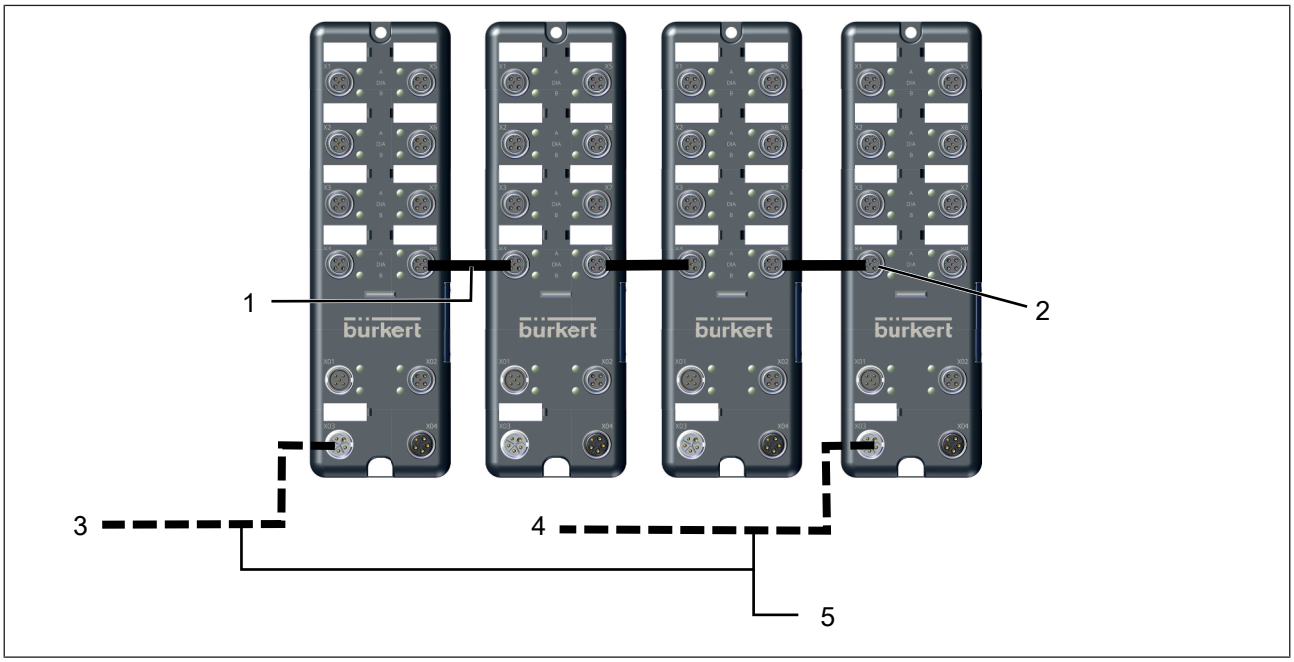


Fig. 19: Supply options

1	Supply via A-coded connection, max. 4 A, automatic detection	2	Return flow is prevented via reverse protection
3	24 V/32 A source 1	4	24 V/32 A source 2
5	Supply via L-coded connection, max. 32 A		

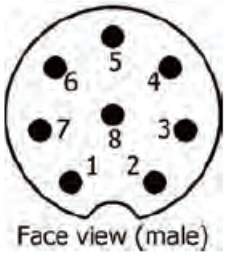
If both supplies (A-coded and L-coded) are connected, then it is not permitted for any return flow to occur via the A-coded supply. With the ME63 type, this is prevented via reverse protection. If the modules are supplied via the M12 A-coded (X4) supply only, the reverse protection function switches over automatically.

6.5 M12 8 pins Nitrate Sensor connection

ATTENTION!

▸ Ensure correct polarity of the operating voltage or otherwise the sensor may be damaged.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

	Pin	Assignment	Function
 Face view (male)	1	RS-232 RX / RS-485 A (commands)	
	2	RS-232 TX / RS-485 B (data)	
	3	ETH_RX-	
	4	ETH_RX+	
	5	ETH_TX-	
	6	ETH_TX+	
	7	Ground (Power + Ser. Interface)	
	8	Power (24 VD C)	

Tab. 17: Nitrate Sensor: M12 8 pins connections

Ensure correct polarity of the operating voltage or otherwise the sensor may be damaged.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

7 COMMISSIONING

7.1 Safety instructions

WARNING!

Risk of injury from improper operation.

Improper operation can lead to injuries and damage to the product and its environment.

- Before commissioning, make sure that the operating personnel are familiar with, and fully understand the content of the Operating Instructions.
- Observe the safety information and the intended use.
- Only properly trained personnel may commission the installation and the product.
- Only properly trained personnel may change parameters with the help of the Bürkert ME21 display module or Communicator software.

7.2 Manufacturer calibration

All Bürkert sensors are delivered calibrated. The calibration factors of the Nitrate Sensor are stored in the sensor, meaning that all values that are output coming out from the ME63 Sensor Interface are calibrated values.

7.3 Path length check

The path length must be chosen according to the absorption level of the medium.

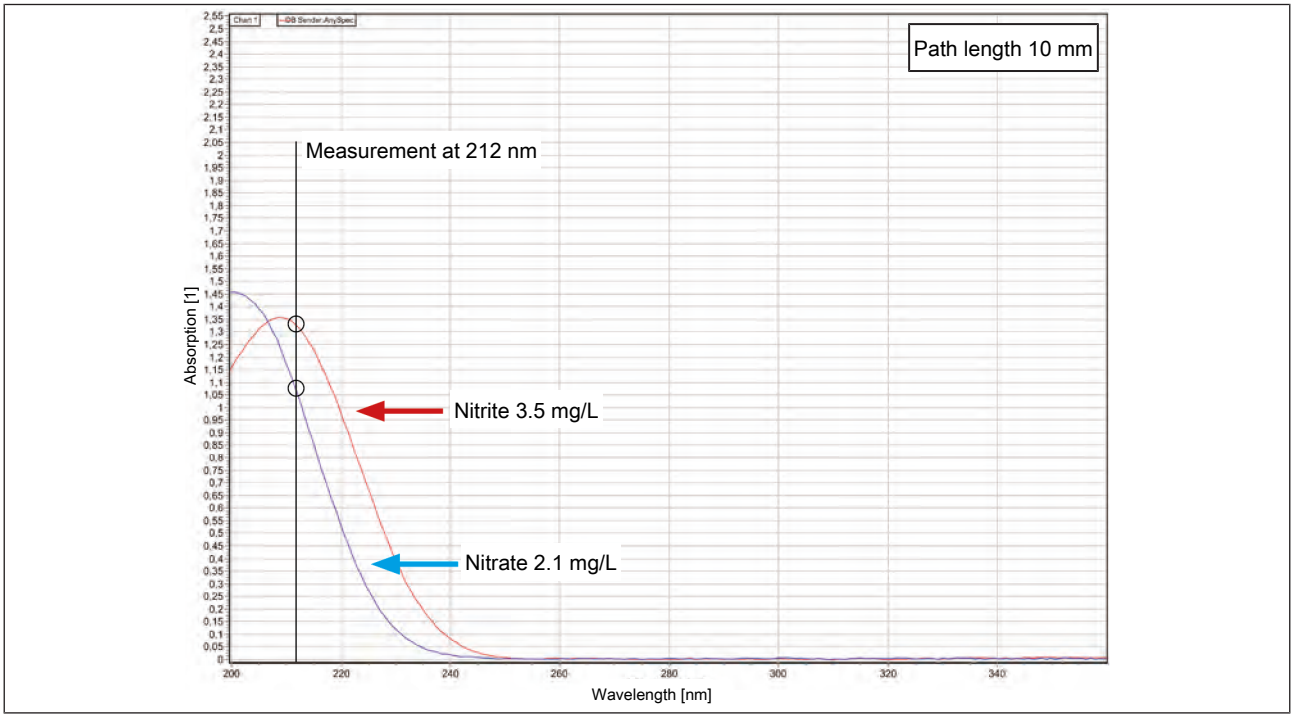
7.3.1 Turbidity and organics compensation

There is a correlation between turbidity/organics and absorption, however these depend greatly on the size and type of particles and the concentration of organic substances. Normally the organic matter is sufficiently compensated for the existing calibration settings (Default, High, Low). If in doubt about the accuracy of the data provided, please contact Bürkert customer service.

7.3.2 Nitrite

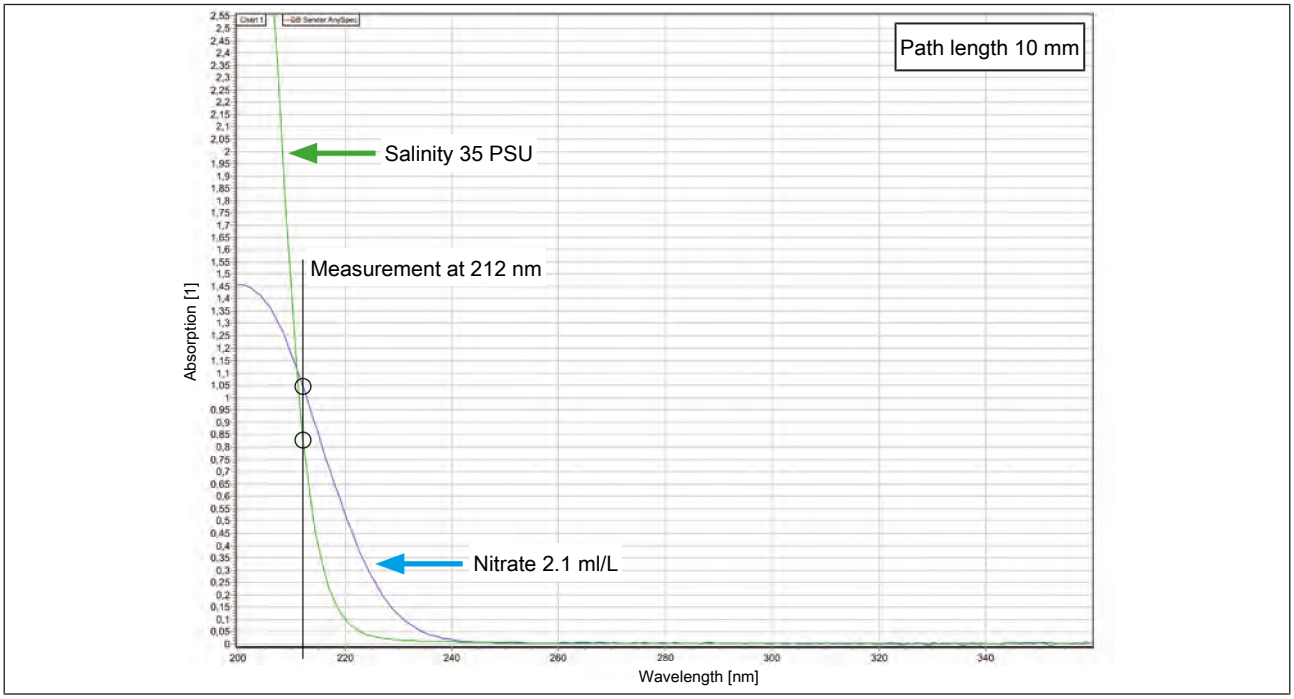
Increased concentrations of nitrite can severely interfere with the optical determination of nitrate, as nitrite and nitrate absorb in the same wavelength range. The figure below shows the absorption curves of nitrate (2.1 mg/L) and nitrite (3.5 mg/L). Please note that specific spectral analysis at 212 nm may result in an overlap of nitrate and nitrite. Since the sensor has been calibrated for nitrate, the measured value applies only to nitrate. If nitrite is present, it is no longer possible to determine how high the respective concentration actually is and an incorrect determination is made.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025



7.3.3 Salinity

Please note that the optical determination of nitrate in connection with high salt concentrations (≥ 1 PSU) can lead to interference. The salinity absorbs light of the same wavelength range. The figure below shows the absorption curves of nitrate (2.1 mg/L) and salinity of seawater (35 PSU). Specific spectral analysis at 212 nm may result in an overlap of the absorption of nitrate and salinity.



7.3.4 Path lengths and limit values

The reference values RefA, RefB, RefC and SQI should first be checked in the application (refer to chapter Check values for advanced diagnostics [▶ 50]).

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

The following table lists the limit values of the reference values RefA, RefB, RefC and SQI for checking the sensor in the application.

Reference value	Explanation	Lower limit value	Recommendation
RefA	Light intensity on the 212 nm channel	150	Check the sensor and, if necessary, shorten the path length
RefB	Light intensity on the 254 nm channel	150	Check the sensor and, if necessary, shorten the path length
RefC	Light intensity on the 360 nm channel	150	Check the sensor and, if necessary, shorten the path length
SQI	Spectral quality index	0.5	Check the sensor and, if necessary, shorten the path length

If the limit values RefA, RefB, RefC and SQI fall below the limit values listed in the table above, it should be ensured that the Nitrate Sensor functions properly before the path length is changed! Further details can be found in chapter Maintenance and inspection [▶ 74]

7.3.5 Unknown substances

Substances that absorb UV light but are not taken into account in the calibration can severely interfere with the measurement result. Under certain circumstances, measured values can no longer be calculated (NAN or permanently zero).

If this is the case, please contact Bürkert customer service (see also Maintenance and inspection [▶ 74]).

7.4 Install the micro SD card

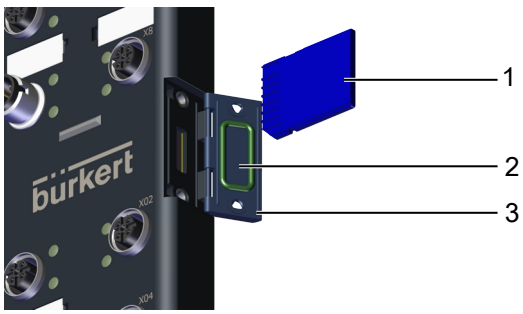


Fig. 20: Micro SD card slot

1	Micro SD Card	2	Seal
3	Cover		

ATTENTION!

The micro SD card can be inserted while the product is connected to the supply voltage. A restart is required to ensure that the product detects the micro SD card.

To install the micro SD card on the product, do the following procedure:

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Open the micro SD card slot: Unfasten the 2 screws using a cross-tip screwdriver and open the cover.

→ Insert the micro SD card: Slide the micro SD card into the card slot. Ensure that the micro SD card locks into position.

Observe the direction of insertion when inserting the card.

CAUTION!

→ Screw on the cover with 2 screws using a cross-tip screwdriver.

ATTENTION!

Guarantee the degree of protection when screwing on the cover.

- Ensure that the seal is correctly fitted.
- When screwing on the cover, observe a maximum tightening torque of 0.4 Nm.

A newly installed micro SD card is checked for the presence of existing data when the product is re-started. Depending on the existing data, the following actions are carried out:

- The micro SD card does not contain any data.
  The existing product-specific values are saved to the micro SD card.
- The micro SD card contains data compatible with the product.
  The data on the micro SD card are transferred to the product. The existing product-specific values are saved to the micro SD card.
- The micro SD card contains data that are not compatible with the product.
  The product overwrites the data on the micro SD card with its own product-specific values and user settings.

7.5 Transfer data to or from another product

Product specific values and user settings can be transferred to or from another product with a micro SD card.

CAUTION!

If the micro SD card is removed while the supply voltage is applied, then data may be lost and the micro SD card may be damaged.

- Do not remove the micro SD card while the product is connected to the supply voltage.

To replace the micro SD card and transfer data from another micro SD card to the product, do the following procedure:

Step 1: Open the micro SD card slot

→ If you need to remove a micro SD card that is already installed, then de-energise the product.

→ Unfasten the 2 screws using a cross-tip screwdriver and open the cover.

Step 2: Remove a micro SD card that is already installed

→ To unlock, press on the edge of the engaged micro SD card.

→ Remove the micro SD card.

Step 3: Install the new micro SD card

Refer to chapter Install the micro SD card [▶ 35]

Step 4: Restart the product

Please note that a newly installed micro SD card is checked for the presence of existing data. Refer to chapter Install the micro SD card [▶ 35]

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

8 SETTING AND OPERATION

8.1 Safety instructions

WARNING!

Risk of injury from improper operation.

Improper operation can lead to injuries and damage to the product and its environment.

- Before commissioning, make sure that the operating personnel are familiar with, and fully understand the content of the Operating Instructions.
- Observe the safety information and the intended use.
- Only properly trained personnel may commission the installation and the product.
- Only properly trained personnel may change parameters with the help of the Bürkert ME21 display module or Communicator software.

DANGER!

Risk of injury from electric shocks.

- Before working on the installation or product, switch off the power supply. Make sure that nobody can switch the power supply on.
- Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

8.2 Setting tools and setting software

The settings can be made with the following tools:

- a PC with the software Type 8920 Bürkert Communicator and the büS stick. To get general information about the Type 8920 software, refer to the Operating Instructions of the Type 8920.
- the Type ME21 touchscreen of the Type 8905 system. To get general information about the Type ME21 touchscreen, refer to the Type ME25 Operating Instructions that are available on the CD delivered with the system and that are also available at country.burkert.com.

These Operating Instructions describe the product-specific settings that are made with the Type ME21 touchscreen.

8.3 Description of the user interface

The user interface contains:

- desktop views
- a trend view
- a help view
- a device view.

The desktop views, the trend view and the help view are described in detail in the Type ME25 Operating Instructions. The Type ME25 Operating Instructions give also general information on the software. The Type ME25 Operating Instructions are available on the CD that is delivered with the product and at country.burkert.com.

The Operating Instructions of the product describe the following elements of the user interface:

- the user levels. Refer to chapter Available login user levels [▶ 39].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

- the product functions. Each function has 3 menus. Refer to chapter Product functions and menus [▶ 40].
- the Messages overview, overview of the messages that are related to both the system and the product. Refer to chapter Read the generated events [▶ 68].
- the Logbook, overview of the messages that are related to the product. Refer to chapter Read the generated events [▶ 68].

8.4 Available login user levels

The following 4 login user levels are available:

- the basic user level, which is the level with the least functions,
- the Advanced User user level,
- the Installer user level,
- the Bürkert user level.

By default, the settings of the product are protected by passwords.

Table Login user levels [▶ 39] shows the symbol displayed in the information bar, depending on the user level that is active on the product, and what can be done with each type of user level. The symbol is displayed only if the settings are protected through passwords.

Symbol	User level	Description
	Basic user	▪ No password is required. ▪ This level is active by default (and by default, password protection is switched off). ▪ The menu items with the symbol  enable read-only access. ▪ Not all the menu items that are available with a higher user level are displayed.
	Advanced User	▪ Password required, if the password protection is active. Default password is 5678. ▪ The menu items with the symbol  enable read-only access. ▪ Not all the menu items that are available with a higher user level are displayed.
	Installer	▪ Password required, if the password protection is active. Default password is 1946. ▪ All the available menu items can be adjusted.
	Bürkert	▪ Password required, if the password protection is active. ▪ Only for Bürkert service.

Tab. 18: Login user levels

- If you have forgotten your passwords, you can restore the default passwords with the Type 8920 Bürkert Communicator software. Refer to the related Operating Instructions.
- If you want to change the passwords, refer to the Type 8920 Operating Instructions.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

8.5 Product functions and menus

The product has 2 functions and each function has 3 menus.

To access the product functions and the menus, do the following procedure:

→ Press  that is located under the touchscreen.

→ Select < or > to display the Device view. Refer to Fig. Schematic representation of the menu navigation [▶ 40].

→ Scroll and select the product in the list of devices.

✓ The product functions are displayed.

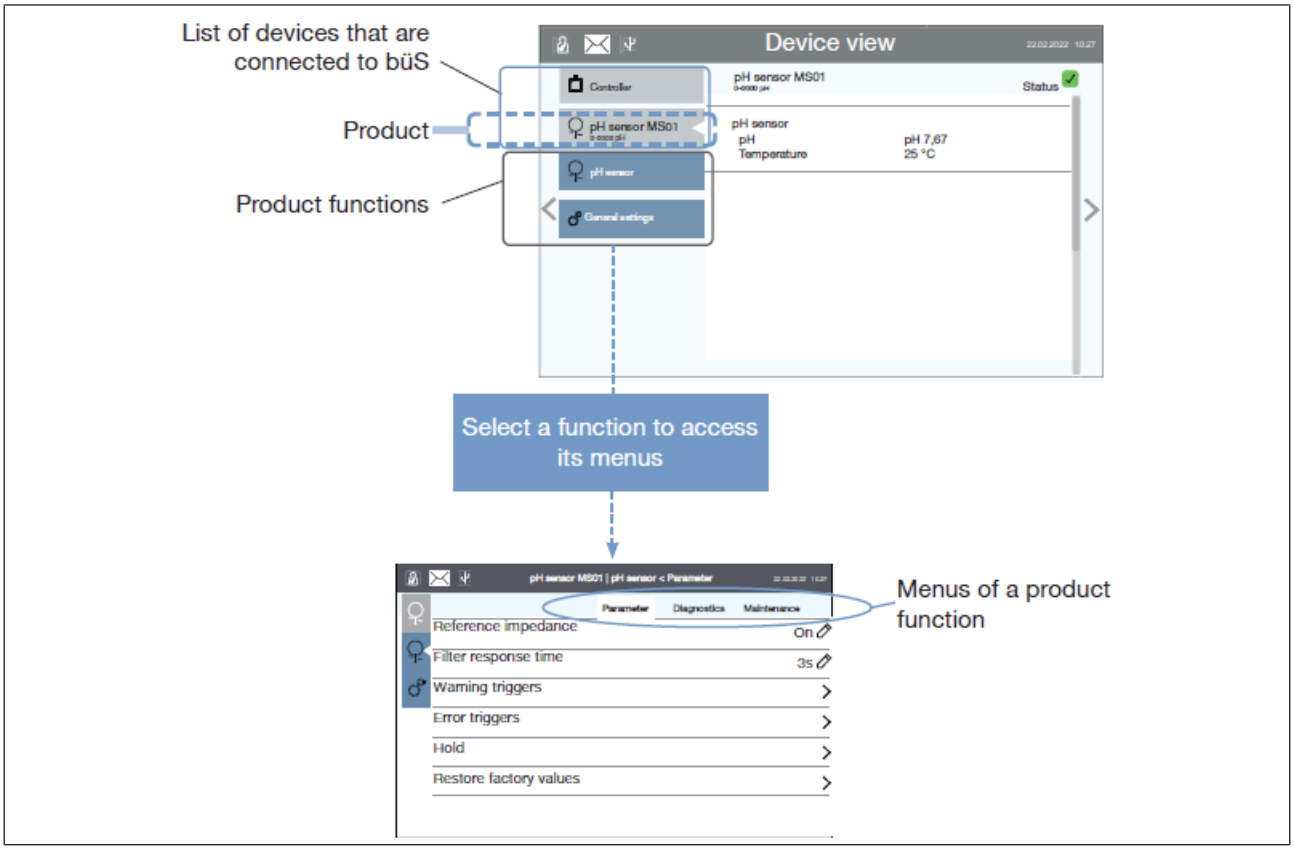


Fig. 21: Schematic representation of the menu navigation

The functions and menus are described in the following chapters:

- Function Sensor, menu Parameter in chapter Sensor - Parameter [▶ 41].
- Function Sensor, menu Diagnostics in chapter Sensor - Diagnostics [▶ 48].
- Function Sensor, menu Maintenance in chapter Sensor - Maintenance [▶ 51].
- Function General settings, menu Parameter in chapter General Settings - Parameter [▶ 55].
- Function General settings, menu Diagnostics in chapter General Settings - Diagnostics [▶ 65].
- Function General settings, menu Maintenance in chapter General Settings - Maintenance [▶ 70].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

9 SENSOR - PARAMETER

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

Detailed view Parameter

Setting	
Sensor	Select the type of sensor connected to the ME63 interface.
Organic compensation	Set the level for organic compensation.
Measure interval	Set the interval for the automatic measurements.
Measure values	Adjust the measure values (customer calibration).
	NO3
Warning triggers	Monitor values and configure when to display a warning.
	Activation flag
	NO3
	SQI
Error triggers	Monitor values and configure when to display a warning.
	Activation flag
	NO3
	SQI
Hold value	Temporarily freeze the values that are sent by the product on the fieldbus.
	Set the Mode
	Set the Action

Tab. 19: Settings in the "Sensor" configuration area, parameter detailed view

The menu items are detailed in the following chapters:

- Sensor, refer to chapter Select the type of sensor connected to the ME63 interface [▶ 41].
- Organic compensation, refer to chapter Define the organic compensation level [▶ 42].
- Measure interval, refer to chapter Set the interval for the automatic measurements [▶ 42].
- Measure values, refer to chapter Adjust the measure values (customer calibration) [▶ 42].
- Warning triggers, refer to chapter Monitor the values of the water sample [▶ 43].
- Error triggers, refer to chapter Monitor the values of the water sample [▶ 43].
- Hold value, refer to chapter Freeze the values transmitted on the fieldbus [▶ 44].

9.1 Select the type of sensor connected to the ME63 interface

With this menu you select which sensor is connected to the ME63 interface. The interface can work only with one sensor type. Each sensor needs one ME63 interface.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select Sensor.

→ Select the sensor type from the drop-down list: For the MS09, select NO3.

✓ After changing the sensor type, the device has to be restarted.

✓ The device restarts with the selected sensor type.

9.2 Define the organic compensation level

Optical nitrate measurement can be influenced by the presence of organic substances (organics). If this is the case, it is possible to adjust the organic compensation level and choose from 3 calibrations for different applications (refer to chapter Operating principle [▶ 18]):

- Default: standard calibration.
- Low: calibration with reduced compensation for low concentrations of organic substances.
- High: calibration with enhanced compensation for high concentrations of organic substances.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Organic compensation.

→ Select the desired compensation level from the drop-down list.

✓ The organic compensation level is set.

If the measured nitrate value deviates from the laboratory value, the higher or lower fixed compensation should be tried out first.

Before performing application-specific organic compensation, it must be ensured that the prerequisites are met.

You can check this as follows:

- Time series of the reference values RefB and RefC can be plotted (at least 20 values).
- If the values of RefC exceed the values of RefB, an individual compensation of the organics can make sense.

If organic compensation does not improve your measurements, please contact Bürkert.

9.3 Set the interval for the automatic measurements

The parameter Measure interval stores the interval for the automatic measurements.

The valid range is 10 s to 86400 s (i.e. 1 day).

The default unit for the measure interval is seconds (s). However, the measure interval can also be entered in days (d), hours (h), minutes (m), milliseconds (ms), microseconds (µs), or nanoseconds (ns).

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Measure interval and enter a value.

→ Validate with Apply.

✓ The value is set.

9.4 Adjust the measure values (customer calibration)

The parameters at Measure values make it possible to adjust the manufacturer calibration and configure a customer calibration.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

The customer calibration supplements the manufacturer calibration. The manufacturer calibration values are not changed by the customer calibration. Customer calibration can be used as a fine adjustment of the sensor for special media and is not intended to replace the manufacturer calibration.

To configure the customer calibration, 2 constants will be needed:

- the scaling factor or slope (default: 1)
- the offset (default: 0)

The calculation of the scaling factor (slope) is explained below. We do not recommend offset calibration. Please contact Bürkert if necessary.

To set a customer calibration, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Measure values > NO3.

→ To set the offset, select Offset and enter a value. Validate with Apply.

→ To set the slope, select Slope and enter a value. Validate with Apply.

→ To name the adjusted value, select Name and enter a name. Validate with Apply.

Calculation of the scaling factor (slope)

Customer calibration is adjusted by means of a linear equation. Normally, only the scaling factor is needed to do this. Offset calibration is not always recommended.

A customer calibration with laboratory values should only be performed if the offset=0 and the scaling is between 0.8-1.2. Larger deviations should be checked.

For customer calibration, at least 2 data points are required:

- a laboratory value
- a sensor value

Offset = 0 is given.

The scaling factor can be calculated using the following equation:

Scaling factor = Laboratory value / Measured value

Measurement ranges and detection limits of the scaled parameters are dependent on the scaling factor!

9.5 Monitor the values of the water sample

The following values can be monitored:

- NO3
- SQI

Configure and activate the warning limits of the values

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Warning Triggers.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select the desired parameter and enter a value under which a diagnostic event (Out of specification) and a warning message are generated. The product status indicator is yellow (refer to chapter Product status indicator [▶ 16]).

→ Validate with Apply.

→ Select Activation flags.

→ Select the parameter for which a value is set.

→ Validate with Apply.

✔ When a parameter value is less than the set limit, a diagnostic event is generated. Details about the associated diagnostic message are given in Troubleshooting with messages.

✔ If a parameter value is more than the set limit, then a diagnostic event is generated. Details about the associated diagnostic message are given in Troubleshooting with messages.

→ To enable the monitoring, i.e. to be informed when the parameter values are outside the normal range, enable the diagnostics. See Disable or enable the diagnostics [▶ 61].

Configure and activate the error limits of the values.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Error Triggers.

→ Select the desired parameter and enter a value under which a diagnostic event (Out of specification) and an error message are generated. The product status indicator is yellow (refer to chapter Product status indicator [▶ 16]).

→ Validate with Apply.

→ Select Activation flags.

→ Select the parameter for which a value is set.

→ Validate with Apply.

✔ When a parameter value is less than the set limit, an error event is generated. Details about the associated error message are given in Troubleshooting with messages.

✔ If a parameter value is more than the set limit, then an error event is generated. Details about the associated error message are given in Troubleshooting with messages.

→ To enable the monitoring, i.e. to be informed when the parameter values are outside the normal range, enable the diagnostics. See Disable or enable the diagnostics [▶ 61].

9.6 Freeze the values transmitted on the fieldbus

The product makes it possible to temporarily freeze the values that are sent by the product on the fieldbus. You can choose one of the following options:

- If you want to manually freeze the values, then refer to Manual freeze [▶ 45].
- If you want to automatically freeze the values, for example with a special event that is considered as a trigger, then refer to Automatic freeze [▶ 45]. Example for a special event that is considered as a trigger: Cleaning operation of the product with the Type MZ20 cleaning system.

Parameter	Description
SQI	Quality index
NO3	Nitrate

Tab. 20: Values that can be freezed

9.6.1 Manual freeze

Access to parameter Hold value

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Hold value.

Activate the parameter Hold value

→ Select Mode > On.

✔ The product status indicator is orange.

✔ For the meaning of the signal of the product status LED, refer to chapter Product status indicator [▶ 16].

✔ The chosen values are sent on the fieldbus.

Choose the values to be sent on the fieldbus

If you want to send the last-measured values, then proceed as follows:

→ Select Action > Last values.

If you want to send user-specific values, then proceed as follows:

→ Select Action > User values

→ Select a parameter and enter a value.

→ Validate with Apply.

→ Proceed the same way for all the user-specific values you want to be sent to the fieldbus.

9.6.2 Automatic freeze

The product makes it possible to stop the measurements temporarily during a special event. You can only select one special event. A special event is triggered by a binary event.

Access to parameter Hold value

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Hold value.

Choose the values to be sent on the fieldbus

If you want to send the last-measured values, then proceed as follows:

→ Select Action > Last values.

If you want to send user-specific values, then proceed as follows:

→ Select Action > User values

→ Select a parameter and enter a value.

→ Validate with Apply.

→ Proceed the same way for all the user-specific values you want to be sent to the fieldbus.

Select the binary event

→ Select Select data source. The view Device connections is displayed.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select a device in the list. The available binary events are displayed.

→ Select the binary event.

→ Validate with Apply.

The next step restarts the product.

→ Select Finish to set the connection.

✓ The product restarts.

→ Go to the Device connections view to make sure that the connection is set.

If the device that can generate the binary event is not connected to büS, then the connection is broken and the following message büS event is displayed, whether the parameter Hold is activated or not: producer not found. To restore the connection, refer to chapter Change the binary event for the automatic freeze [▶ 46]

Activate the parameter Hold value

→ Select Mode > External.

✓ As soon as the selected binary event is activated, the product status indicator is orange.

✓ For the meaning of the signal of the product status LED, refer to chapter Product status indicator [▶ 16].

✓ The chosen values are sent on the fieldbus.

As soon as the selected binary event is deactivated, the following actions are carried out:

- The product sends the measured values on the fieldbus.
- The product status indicator is green.
- For the meaning of the signal of the device status LED, refer to chapter Product status indicator [▶ 16].

9.6.3 Change the binary event for the automatic freeze

The product makes it possible to stop the measurements temporarily during a special event. You can only select one special event. A special event is triggered by a binary event.

Access to parameter Hold value

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Hold value.

Select the binary event

→ Select Select data source. The view Device connections is displayed.

→ Select  to delete the connection.

→ If needed, select another binary event. Confirm with Finish.

→ Select ✓ to take the changes into account.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

The next step restarts the product.

→ Select Finish to restart the product.

✔ The product restarts.

9.6.4 Stop the manual freeze or the automatic freeze

Access to parameter Hold value

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Parameter.

→ Select Hold value.

Deactivate the parameter Hold value

→ Select Mode > Off.

✔ The product status indicator is green.

✔ For the meaning of the signal of the product status LED, refer to chapter Product status indicator [▶ 16].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

10 SENSOR - DIAGNOSTICS

→ Go to device Nitrate Sensor > function Sensor > tab Diagnostics.

Detailed view Diagnostics

In these menus, the current values are displayed, not set.

Setting		
General Information	Read information about the sensor.	
	Type	
	Optical path length	
	Serial number	
	Firmware version	
	Lamp	Type
		Serial number
		Shot counter
Calibration	Read calibration values.	
	Base intensity 212nm	
	Base intensity 254nm	
	Base intensity 360nm	
	Detector temperature	
	Reference temperature	
Measure values	Read measured values.	
	SQI	
	NO3	
Advanced	Read values for advanced diagnostics.	
	Last occurred error code	
	Detector temperature	
	Reference temperature	
	Absorption AU 212nm	
	Absorption AU 254nm	
	Absorption AU 360nm	
	Light intensity 212nm (RefA)	
	Light intensity 254nm (RefB)	
	Light intensity 360nm (RefC)	
	Light intensity reference xenon lamp (RefD)	

Tab. 21: Settings in the “Sensor” configuration area, diagnostics detailed view

The menu items are detailed in the following chapters:

- General Information, refer to chapter Check sensor information [▶ 49].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

- Calibration, refer to chapter Check calibration values [▶ 49].
- Measure values, refer to chapter Check measured values [▶ 49].
- Advanced, refer to chapter Check values for advanced diagnostics [▶ 50].

10.1 Check sensor information

The values displayed under General information show information about the connected sensor. The displayed values are read-only.

→ Go to device Nitrate Sensor > function Sensor > tab Diagnostics.

→ Select General information.

✓ The values are shown. See Table Description of the general sensor information parameters [▶ 49] for a description.

Parameter		Description
Type		Device type of the sensor
Optical path length		Optical path length of the sensor
Serial number		Serial number of the sensor
Firmware version		Version number of the installed firmware
Lamp	Type	Type of lamp module
Lamp	Serial number	Serial number of the lamp
Lamp	Shot counter	Number of measurements performed with the lamp

Tab. 22: Description of the general sensor information parameters

10.2 Check calibration values

The values displayed under Calibration are used for calibration. The displayed values are read-only.

→ Go to device Nitrate Sensor > function Sensor > tab Diagnostics.

→ Select Calibration.

✓ The values are shown. See Table Description of the calibration parameters [▶ 49] for a description.

Parameter	Description
Base intensity 212nm	Calibrated base intensity at wavelength 212 nm
Base intensity 254nm	Calibrated base intensity at wavelength 254 nm
Base intensity 360nm	Calibrated base intensity at wavelength 360 nm
Detector temperature	Measured value of the detector temperature, in °C
Reference temperature	Measured value of the reference temperature, in °C

Tab. 23: Description of the calibration parameters

10.3 Check measured values

The values displayed under Measure values show information about the values measured by the sensor. The displayed values are read-only.

→ Go to device Nitrate Sensor > function Sensor > tab Diagnostics.

→ Select Measure values.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

✔ The values are shown. See Table Description of the measured values parameters [▶ 50] for a description.

Parameter	Description
SQI	Quality index
NO3	Nitrate

Tab. 24: Description of the measured values parameters

10.4 Check values for advanced diagnostics

The values displayed under Advanced are used for advanced diagnostics. The displayed values are read-only.

→ Go to device Nitrate Sensor > function Sensor > tab Diagnostics.

→ Select Advanced.

✔ The values are shown. See Table Description of the advanced diagnostics parameters [▶ 50] for a description.

Parameter	Description
Last occurred error code	Value of the last error code
Detector temperature	Measured value of the detector temperature, in °C
Reference temperature	Measured value of the reference temperature, in °C
Absorption AU 212nm	Measured absorption value (212 nm)
Absorption AU 254nm	Measured absorption value (254 nm)
Absorption AU 360nm	Measured absorption value (360 nm)
Light intensity 212nm	Measured light intensity (212 nm) RefA
Light intensity 254nm	Measured light intensity (254 nm) RefB
Light intensity 360nm	Measured light intensity (360 nm) RefC
Light intensity reference xenon lamp	Measured light intensity from the xenon lamp RefD

Tab. 25: Description of the advanced diagnostics parameters

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

11 SENSOR - MAINTENANCE

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

Detailed view Maintenance

Setting		
Simulation	Status	Start or stop the simulation mode and enter simulated data.
Start measurement	Wizard to manually start a measurement.	
Calibration	Wizard to calibrate the zero value (base intensity).	
Calibration schedule	Plan the calibrations.	
	Interval in days	Set the regular interval.
	Last calibration	Read the date of the last calibration.
	Next calibration	Read the date of the next planned calibration.
Advanced	Service mode	Activate or deactivate the service mode.

Tab. 26: Settings in the "Sensor" configuration area, maintenance detailed view

The menu items are detailed in the following chapters:

- Simulation, refer to chapter Stop the simulation mode [▶ 51] and Start the simulation mode [▶ 51].
- Start measurement, refer to chapter Manually start a measurement [▶ 52].
- Calibration, refer to chapter Calibrate the zero value (base intensity) [▶ 52].
- Calibration schedule, refer to chapter Plan the calibrations [▶ 53].
- Advanced, refer to chapter Activate or deactivate the service mode [▶ 53].

11.1 Stop the simulation mode

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Simulation > Status > Off.

✓ As soon as the parameter Simulation > Status is set to Off, the following actions are carried out:

- The product measures again.
- The product status indicator is green.
- For the meaning of the signal of the device status LED, refer to chapter Product status indicator [▶ 16].

11.2 Start the simulation mode

In simulation mode, you can enter simulated data for the following measure values and simulate the behaviour of the sensor:

- NO3: Nitrate
- SQI: Quality index

To start the simulation mode, do the following procedure:

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Simulation > Status > On.

✓ The simulation mode is active.

✓ A list of measure values appears.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select the measure value you want to simulate and enter the desired value. Validate with Apply.

→ Repeat for any value you want to simulate.

✓ The product status indicator is orange.

✓ For the meaning of the signal of the product status LED, refer to chapter Product status indicator [▶ 16].

11.3 Manually start a measurement

The feature Start measurement makes it possible to initiate a measurement manually, deviating from the regular automatic measure interval.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Start measurement.

✓ The Start measurement wizard page appears, the measurement starts and the message Measurement running is displayed.

✓ When the measurement is finished, the wizard page displays the message Measurement successfully completed.

→ Close the wizard page: Select Finish.

11.4 Calibrate the zero value (base intensity)

The feature Calibration makes it possible to calibrate the zero value (base intensity) for the sensor.

Recommended setting for the zero-value determination

- Ambient temperature: 20 °C (if at all possible)
- Temperature of the ultra-pure water: 20 °C

Preparation of the sensor

Before you start the calibration, the following requirements have to be considered:

→ Prepare the sensor as described in chapter Preparing the sensor for the function test and zero value determination [▶ 76].

→ Make sure the optical path suits the needs of your application.

→ Make sure the optical path length is set correctly. Refer to chapter Path length check [▶ 33].

→ Make sure the window is totally clean. Refer to chapter Cleaning the measuring window [▶ 75].

→ Make sure the cleaned sensor is immersed in ultra-pure water (18.2 MΩcm).

→ Make sure that there are no bubbles on the glass surfaces.

→ Carry out 3–5 individual measurements to bring the sensor up to operating temperature.

Perform calibration

To perform the calibration, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Calibration.

✓ The Calibration wizard page appears and displays the current calibration values.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ To continue, select Next.

✓ The wizard page displays requirements to check before the calibration.

→ Check the requirements displayed on the wizard page.

→ To start the calibration, select Next.

✓ The calibration process starts, the wizard page displays status messages.

✓ When the calibration process is finished, the new calibration values are displayed.

→ Close the wizard page: Select Finish.

11.5 Plan the calibrations

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Calibration schedule.

- The field Last calibration indicates the date of the last calibration procedure that has succeeded.
- The field Next calibration indicates the date of the next calibration procedure that must be done. The field Next calibration only appears when the calibration interval is set to a value > 0.

If you want to change the time interval between two calibrations, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Select Interval in days.

→ Enter the number of days between two calibration procedures. Bürkert recommends to calibrate the product every 24 months.

→ Validate with Apply.

✓ The calibration schedule is updated.

✓ The date that is displayed in the field Next calibration is automatically calculated.

✓ When the calibration date is reached, the following actions are carried out:

- The device status LED turns blue.
- For the meaning of the signal of the device status LED, refer to chapter Product status indicator [▶ 16].

Disable the calibration schedule

If you want to disable the calculation schedule, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Calibration schedule.

→ Select Interval in days and set the value to 0.

→ Validate with Apply.

✓ The field Next calibration is not displayed any more.

✓ The calibration schedule is disabled.

Note that Bürkert recommends to calibrate the product every 24 months.

11.6 Activate or deactivate the service mode

When Service mode is activated (On), the values are not updated anymore.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Go to device Nitrate Sensor > function Sensor > tab Maintenance.

→ Select Service mode.

→ To activate the service mode, select On.

- ✔ The IP address of the sensor is displayed.
- ✔ Values are not updated anymore.

→ To deactivate the service mode, select Off.

- ✔ Values are updated.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

12 GENERAL SETTINGS - PARAMETER

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

Detailed view Parameter

Setting		
Status LED	Mode	
büS	Configuration of the büS interface	
	Displayed name For display and Bürkert Communicator	
	Location Specify location displayed for the device.	
	Description Enter description text for tooltips.	
	Advanced	Unique device name for partner assignment
		Specify Baud rate
		Specify Fixed CANopen address (Node ID)
		Specify CANopen address (Node ID)
		Bus mode Set operation mode of the büS interface
		Show errors from büS partners Set whether and from which partners errors are displayed
		Deallocation delay Time from the loss of a partner until deletion of its configuration
Alarm limits	Set limits after which the device issues a warning or error.	
	Supply voltage Set alarm limit for supply voltage.	Error low threshold value is displayed
		Error high threshold value is displayed
		Specify Warning low threshold value
		Specify Warning high threshold value
		Hysteresis threshold value is displayed
	Device temperature Set alarm limit for device temperature.	Error low threshold value is displayed
		Error high threshold value is displayed
		Specify Warning low threshold value
		Specify Warning high threshold value
		Hysteresis threshold value displayed
Diagnostics	Enabling or disabling diagnostics.	
PDO Configuration	Configuring process data objects Set the Inhibit time value and Event timer value for following PDO: ▪ PDO 1 ▪ PDO 2 ▪ PDO 3 ▪ PDO 4	

Tab. 27: Settings in the “General settings” configuration area, parameter detailed view

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

The menu items are detailed in the following chapters:

- Status LED, refer to chapter Set the colours and behaviour of the device status LED [▶ 56].
- büS, refer to chapter Enter a name for the product [▶ 56], Enter the location of the product [▶ 57], Enter a description for the product [▶ 57], Enter a unique name for the product [▶ 57], Change the transmission speed of the product [▶ 57], Address of a product connected to büS [▶ 58], Change the address of the product connected to a CANopen fieldbus [▶ 58], Read the actually used CANopen address (Node ID) [▶ 58], Set the digital communication for büS or for a CANopen fieldbus [▶ 58], Set the CANopen status [▶ 59], Show errors from büS partners [▶ 59], Stop sending the measured process data (PDOs) to büS or to the CANopen fieldbus [▶ 59] and Change the time to check the presence of a participant on the fieldbus [▶ 60].
- Alarm limits, refer to chapter Monitor the supply voltage [▶ 60] and Monitor the device temperature [▶ 61].
- Diagnostics, refer to chapter Disable or enable the diagnostics [▶ 61].
- PDO Configuration, refer to chapter Set the transmission time between 2 values of a PDO [▶ 63] and Restore all PDOs to their default values [▶ 64].

12.1 Set the colours and behaviour of the device status LED

You can adjust the colours and behaviour of the device status LED by setting a status LED mode. The following status LED modes are available:

Mode	Description
NAMUR mode	The LED uses colours to indicate the device status in accordance with NAMUR NE 107. See chapter Product status indicator [▶ 16].
Fixed color	The LED always uses one colour.
LED off	The LED is off.

Tab. 28: Status LED modes

To set a status LED mode, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select Status LED > Mode.

→ Select the desired mode from the drop-down list.

→ If your selection is Fixed color, select a colour from the drop-down list.

✓ The selected mode takes effect immediately.

12.2 Enter a name for the product

The entered name will be shown on any display connected to büS.

To enter the name of the product, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Displayed name and enter a name.

→ Validate with Apply.

✓ The name is set.

12.3 Enter the location of the product

The entered location will be shown on any display connected to büS.

To enter the information where the product is located, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Location and enter a location.

→ Validate with Apply.

✔ The location is set.

12.4 Enter a description for the product

The description allows you to precisely identify the product. It will be displayed e.g. in tooltips.

To enter a description for the product, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Description and enter the description.

→ Validate with Apply.

✔ The description is set.

12.5 Enter a unique name for the product

The unique name of the product is used by the other fieldbus participants. The fieldbus participants can use the data provided by the product on the fieldbus. For example, a Type ME25 controller-module can display the water Nitrate value, given by the product.

If the unique name is changed, then the participant loses the link to the product and the participant generates the error büS event: producer not found. The link between the participant and the product must then be restored.

Bürkert recommends not to change the unique name of the product. By default, the unique name is composed with product article-number and serial number.

To change the unique name, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Advanced > Unique device name and enter the name (max. 19 characters).

→ Save the name with Apply.

✔ The unique name is set.

→ Restart the product to take the unique name into account.

→ If a participant was linked to the product, restore the link in the settings of the participant.

12.6 Change the transmission speed of the product

The transmission speed for the communication on the fieldbus (büS or CANopen) must be the same for all the participants of the fieldbus.

By default, the transmission speed of the product is set to 500 kbit/s.

To change the transmission speed, do the following procedure:

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.
→ Select büS > Advanced > Baud rate.
→ Select the transmission speed from the drop-down list.
✓ The transmission speed of the product is set.
→ Restart the product to take the transmission speed into account.

12.7 Address of a product connected to büS

If the product is connected to büS, büS automatically addresses the product.

12.8 Change the address of the product connected to a CANopen fieldbus

To attribute an available address to the product, do the following procedure:
→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.
→ Select büS > Advanced > Fixed CANopen address (Node ID).
→ Enter an available address in the parameter Fixed CANopen address (Node ID).
→ To activate automatic addressing of the CANopen address, enter 0 in the parameter Fixed CANopen address (Node ID).
→ Validate with Apply.
✓ The address of the product is set.
→ Restart the product to take the set address into account.

12.9 Read the actually used CANopen address (Node ID)

This value is read-only.
→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.
→ Select büS > Advanced.
→ Read the value of the parameter CANopen address (Node ID).

12.10 Set the digital communication for büS or for a CANopen fieldbus

By default, the operating mode of the digital communication is set to büS and the measured process data (PDOs, process data objects) is sent on a connected fieldbus.

The other operating modes of the digital communication are CANopen or Standalone.

If the product is connected to büS or to a CANopen fieldbus, do the following to change the operating mode of the digital communication:
→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select büS > Advanced > Bus mode.

→ Select the operating mode büS or CANopen from the drop-down list.

→ Validate with Apply.

✔ The operating mode of the digital communication is changed.

✔ If the operating mode of the digital communication is set to büS or to CANopen, the PDOs are sent to the connected fieldbus.

→ Restart the product to take the operating mode of digital communication into account.

12.11 Set the CANopen status

If the bus mode is set to CANopen, you can set the CANopen status.

Possible CANopen status are:

- Pre-Op (pre-operational): The PDOs are not sent on büS or on the CANopen fieldbus and the message büS is not operational is generated in the message list.
- Operational: The PDOs are sent to büS or to the CANopen fieldbus.

To set the CANopen status, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Advanced > CANopen status.

→ Select the desired option from the drop-down list.

→ Restart the product to take the setting into account.

12.12 Show errors from büS partners

If the bus mode is set to büS, you can adjust which errors of partners the device will show.

The options are:

- None (default): No errors are shown.
- All partners: Errors of all partners are shown.
- Only producers: Only errors of producers are shown.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Advanced > Show errors from büS partners.

→ Select the desired option from the drop-down list.

→ Restart the product to take the setting into account.

12.13 Stop sending the measured process data (PDOs) to büS or to the CANopen fieldbus

If the product is connected to büS or to a CANopen fieldbus and you want to temporarily stop sending the PDOs to büS or to the CANopen fieldbus, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Advanced > Bus mode.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Select Standalone.

→ Validate with Apply.

→ Restart the product to take the operating mode of digital communication into account.

✓ The PDOs are no more sent to the connected fieldbus.

12.14 Change the time to check the presence of a participant on the fieldbus

Bürkert recommends not to change the parameter Deallocation delay of the product. By default, the parameter value is set to 500 ms.

To change the parameter value, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select büS > Advanced > Deallocation delay and enter a value in ms.

→ Validate with Apply.

→ Restart the product to take the new value into account.

✓ The new value is set.

12.15 Monitor the supply voltage

The parameters at Alarm limits make it possible to monitor the supply voltage and issue a warning or error in case of too low or too high supply voltage.

The alarm limits for warnings can be set by the user. The alarm limits for errors and hysteresis are read-only. Table Alarm limits regarding the supply voltage [▶ 60] shows an overview of the parameters.

Parameter	Description
Error low	Limit for error alarm due to low supply voltage
Error high	Limit for error alarm due to high supply voltage
Warning low	Limit for warning alarm due to low supply voltage
Warning high	Limit for warning alarm due to high supply voltage
Hysteresis	Limit for alarm due to low hysteresis value.

Tab. 29: Alarm limits regarding the supply voltage

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select Alarm limits > Supply voltage.

→ Read the value of the parameter you want to learn (see Table Alarm limits regarding the supply voltage [▶ 60]).

→ To set the limit for warning alarm due to low supply voltage, select Warning low and enter a value. Validate with Apply.

→ To set the limit for warning alarm due to high supply voltage, select Warning high and enter a value. Validate with Apply.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

12.16 Monitor the device temperature

The parameters at Alarm limits make it possible to monitor the device temperature and issue a warning or error in case of too low or too high temperature.

The alarm limits for warnings can be set by the user. The alarm limits for errors and hysteresis are read-only. Table Alarm limits regarding the device temperature [▶ 61] shows an overview of the parameters.

Parameter	Description
Error low	Limit for error alarm due to low device temperature
Error high	Limit for error alarm due to high device temperature
Warning low	Limit for warning alarm due to low device temperature
Warning high	Limit for warning alarm due to high device temperature
Hysteresis	Limit for alarm due to low hysteresis value.

Tab. 30: Alarm limits regarding the device temperature

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select Alarm limits > Device temperature.

→ Read the value of the parameter you want to learn (see Table Alarm limits regarding the device temperature [▶ 61]).

→ To set the limit for warning alarm due to low device temperature, select Warning low and enter a value. Validate with Apply.

→ To set the limit for warning alarm due to high device temperature, select Warning high and enter a value. Validate with Apply.

12.17 Disable or enable the diagnostics

To disable or enable the diagnostics, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Parameter.

→ Select Diagnostics.

✔ The Diagnostics wizard page appears.

→ To disable the diagnostics, select Off. To enable the diagnostics, select On.

✔ The confirmation of your choice restarts the product.

→ To cancel the procedure, select Cancel.

→ To change your choice, select Back.

→ To confirm your choice and restart the product, select Next.

✔ The product restarts.

Product behaviour with Diagnostics enabled

If the diagnostics are enabled, the product gives information about the following items:

- Monitoring of the measurement values.
- Monitoring of product-internal parameters.
- Status of the communication with the connected fieldbus.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

By default, the diagnostics are enabled. The product status are shown according to Table Product status when the diagnostics are enabled [▶ 62].

Product status indicator		Colour code (for a PLC)	Displayed symbol	Description	Meaning
Colour	Red	5		Failure, error, malfunction	Due to a malfunction of the product or its periphery, the measured values can be incorrect.
	Orange	4		Function check	Ongoing work on the product. For example, simulating measurement values.
	Yellow	3		Out of specification	At least one of the monitored parameters is outside its monitored limits.
	Blue	2		Maintenance required	The product is in controlled operation; however, the function is briefly restricted. → Do the required maintenance operation.
	Green	1		Diagnostics active and no event has been generated	Messages are listed and possibly transmitted through any connected fieldbus.
Flashing rapidly		-	-	Identification	The product is selected using a man-machine interface, for example the Bürkert Communicator software.

Tab. 31: Product status when the diagnostics are enabled

Product behaviour with Diagnostics disabled

If the diagnostics are disabled, the product status changes are not shown. Refer to Table Product status when the diagnostics are disabled [▶ 62].

Product status indicator	Colour code (for a PLC)	Displayed symbol	Description	Meaning
White	0		Diagnostics inactive	Messages are neither listed nor transmitted through any connected fieldbus.

Product status indicator	Colour code (for a PLC)	Displayed symbol	Description	Meaning
Flashing rapidly	-	-	Identification	The product is selected using a man-machine interface, for example the Bürkert Communicator software.

Tab. 32: Product status when the diagnostics are disabled

12.18 Set the transmission time between 2 values of a PDO

The process data objects (PDO) are cyclic data sent from the product to the other participants of the fieldbus or received by the product from other participants to the fieldbus.

The transmission time between 2 values of a PDO is described by the 2 following parameters:

- the value of the parameter Event timer is the time after which the product sends the value of the same PDO, even if the value did not change. It enables a periodical transmission of the PDO.
- the value of the parameter Inhibit time is the minimum time between the sending of 2 different PDOs.

The product transmits the following PDOs:

- PDO 1, see Table PDO 1 - Transmitted data and their default values [▶ 63].
- PDO 2, see Table PDO 2 - Transmitted data and their default values [▶ 63].
- PDO 3, see Table PDO 3 - Transmitted data and their default values [▶ 63].
- PDO 4, see Table PDO 4 - Transmitted data and their default values [▶ 64].

PDO 1

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Nitrate (NO3)	REAL32	g/l	0…886 mg/L	5000	500
NAMUR status	UNSIGNED8	-	-	5000	500

Tab. 33: PDO 1 - Transmitted data and their default values

PDO 2

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Quality index (SQI)	REAL32	-	-	5000	500
Sensor status	INTEGER32	-	-	5000	500

Tab. 34: PDO 2 - Transmitted data and their default values

PDO 3

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Light intensity 212nm	REAL32	-	0...65535	5000	500

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Light intensity 254nm	REAL32	-	0...65535	5000	500

Tab. 35: PDO 3 - Transmitted data and their default values

PDO 4

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Light intensity 360nm	REAL32	-	0...65535	5000	500
Light intensity reference diode	REAL32	-	0...65535	5000	500

Tab. 36: PDO 4 - Transmitted data and their default values

Received PDO

The product receives from other participants to the fieldbus the PDO 1 described in the following table:

Name	Data type	Unit SI	Range	Event timer (ms)	Inhibit time (ms)
Hold	REAL32	-	-	-	-

Tab. 37: Received PDO 1 and its default values

To set the transmission time between 2 values of the PDO, do the following procedure:

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.
→ Select PDO configuration > PDO 1, PDO 2, PDO 3 or PDO 4.
→ Select Inhibit time and enter a value in ms.
→ Repeat for any value you want to adjust.
→ To reset all values to default, select Reset to default values.
→ To apply and save the changes, select Apply and Save.
✓ The PDO inhibit times are changed.

12.19 Restore all PDOs to their default values

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Parameter.
→ Select PDO configuration.
→ Select Reset to default values.
✓ The PDOs are set to their default values.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

13 GENERAL SETTINGS - DIAGNOSTICS

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

Detailed view Diagnostics

In these menus, the current values are displayed, not set.

Setting		
Device status	Operating duration	
	Operating period since last boot	
	Device temperature	
	Supply voltage	
	Voltage drops Number since restart	
	Min./Max. values	Max. temperature
		Min. temperature
		Max. supply voltage
		Min. supply voltage
	Device boot counter	
	Transferable memory status	
	Current system time	
büS status	Receive errors Number since restart	
	Receive errors max. Most serious receive error that was issued in the same way as the device status is displayed. The display can be reset to 0.	
	Transmit errors Number since restart	
	Transmit errors max. Most serious send error that was issued in the same way as the device status is displayed. The display can be reset to 0.	
	Reset error counter	
	CANopen status Operational or pre-operational	
Logbook	The logbook lists all warning messages and error messages with details of the type, time and signature. The messages displayed in the logbook can be updated, saved and deleted.	

Tab. 38: Settings in the "General settings" configuration area, diagnostics detailed view

The menu items are detailed in the following chapters:

- Device status, refer to chapter Read the current device temperature [▶ 66], Read the current supply voltage [▶ 66], Read the number of voltage drops since the last restart [▶ 66], Read the maximum and minimum values of the device temperature and the supply voltage [▶ 66], Read the number of product starts [▶ 66], Check the presence of the memory card [▶ 67] and Read the current time [▶ 67].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

- büS status, refer to chapter Read the number of current receive errors [▶ 67], Read the maximum number of receive errors since the last power-up of the device [▶ 67], Read the number of current transmit errors [▶ 67], Read the maximum number of transmit errors since the last power-up of the device [▶ 68], Reset the 2 maximum error counters [▶ 68] and Read whether the measured process data is sent on büS or on the CANopen fieldbus [▶ 68].
- Logbook, refer to chapter Read the generated events [▶ 68].

13.1 Read the current device temperature

The parameter Device temperature indicates the current device temperature.

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

✓ Read the value of the parameter Device temperature.

To set the limits for warnings issued due to low or high supply voltage, refer to chapter Monitor the device temperature [▶ 61].

13.2 Read the current supply voltage

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

✓ Read the value of the parameter Supply voltage.

To set the limits for warnings issued due to low or high supply voltage, refer to chapter Monitor the supply voltage [▶ 60].

13.3 Read the number of voltage drops since the last restart

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

✓ Read the value of the parameter Voltage drops.

To set the limits for warnings issued due to low or high supply voltage, refer to chapter Monitor the supply voltage [▶ 60].

13.4 Read the maximum and minimum values of the device temperature and the supply voltage

The values at Min./Max. values make it possible for you to inform yourself about the maximum and minimum device temperature as well as the maximum and minimum supply voltage since the last start.

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status > Min./Max. values.

✓ Read the value of the parameter you want to learn about.

To set the limits for warnings issued due to low or high supply voltage or low or high device temperature, refer to chapter Monitor the supply voltage [▶ 60] and Monitor the device temperature [▶ 61].

13.5 Read the number of product starts

The parameter Device boot counter indicates the number of restarts of the product.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

✓ Read the value of the parameter Device boot counter.

13.6 Check the presence of the memory card

You can check if the memory card is inserted in its product slot without removing the product from the backplane. For more information on the memory card, refer to chapter Install the micro SD card [▶ 35].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

→ Read the value of the parameter Transferable memory status.

- If you read Memory available, the memory card is inserted in the product.
- If you read Memory not available, no memory card is inserted in the product.

13.7 Read the current time

The parameter Current system time indicates the current time of the system.

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Device status.

✓ Read the value of the parameter Current system time.

13.8 Read the number of current receive errors

→ Make sure that the login user level is at least Advanced user. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status.

→ Read the value of the parameter Receive errors.

13.9 Read the maximum number of receive errors since the last power-up of the device

→ Make sure that the login user level is at least Advanced user. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status.

→ Read the value of the parameter Receive errors max..

13.10 Read the number of current transmit errors

→ Make sure that the login user level is at least Advanced user. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status.

→ Read the value of the parameter Transmit errors.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

13.11 Read the maximum number of transmit errors since the last power-up of the device

→ Make sure that the login user level is at least Advanced user. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status.

→ Read the value of the parameter Transmit errors max..

13.12 Reset the 2 maximum error counters

To reset the 2 maximum error counters, do the following procedure:

→ Make sure that the login user level is at least Advanced user. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status.

→ Select Reset error counter.

✔ The Reset error counter wizard page appears.

→ To cancel the procedure, select Cancel.

→ To reset the error counters, select Finish.

✔ The 2 maximum error counters are reset.

13.13 Read whether the measured process data is sent on büS or on the CANopen fieldbus

To read out whether the measured process data (PDO, process data object) is sent on büS or on the CANopen fieldbus, do the following procedure:

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select büS status and read the value of the parameter CANopen status.

- If the CANopen status is Operational, the PDOs are sent to büS or to the CANopen fieldbus.
- If the CANopen status is Pre-Op (pre-operational), the PDOs are not sent on büS or on the CANopen fieldbus and the message büS is not operational is generated in the message list.

13.14 Read the generated events

→ Go to device Nitrate Sensor > function General settings > tab Diagnostics.

→ Select Logbook.

✔ The events that are related to the product are displayed. Refer to fig. Overview of events in the logbook [▶ 69].

The default list view shows message type, message text and the time of the message.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

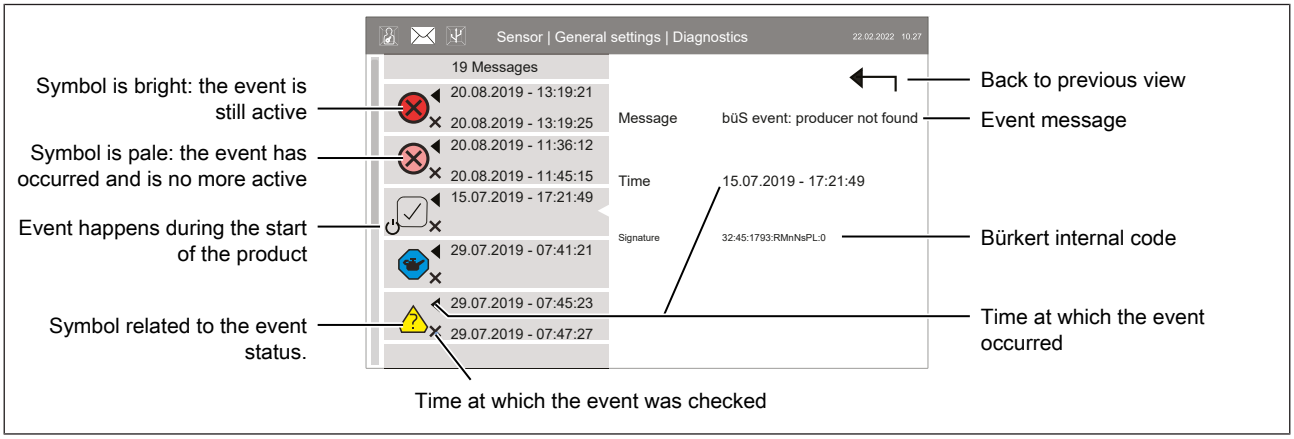


Fig. 22: Overview of events in the logbook

Symbol	Status	Description
	Failure, error or fault	Malfunction
	Function check	Ongoing work on the product. For example, simulating measurement values.
	Out of specification	At least one of the monitored parameters is outside its monitored limits.
	Maintenance required	The product is in controlled operation; however, the function is briefly restricted. → Do the required maintenance operation.
	Diagnostics active and no event has been generated	Status changes are shown in colour. Messages are listed and possibly transmitted through any connected fieldbus.
	Diagnostics inactive	Status changes are not shown. Messages are neither listed nor transmitted through any connected fieldbus.

Tab. 39: Description of the symbols

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

14 GENERAL SETTINGS - MAINTENANCE

→ Go to device Nitrate Sensor > function General settings > tab Maintenance.

Maintenance detailed view

Setting			
Device information	Displayed name Only displayed if a name was entered in the menu of the same name for the Parameter detailed view.		In these menus, the current values are displayed, not set.
	Ident. number		
	Serial number		
	Firmware ident. number		
	Firmware version		
	büS version		
	Hardware version		
	Product type number		
	Manufacture date		
	EDS version		
	Device driver	Driver version	
		Firmware group	
		DLL version	
		Origin	
Reset device	Restart		
	Reset to factory settings		
Restart sensor			

Tab. 40: Settings in the "General settings" configuration area, maintenance detailed view

The menu items are detailed in the following chapters:

- Device information, refer to chapter Read device information [▶ 70].
- Reset device, refer to chapter Restart the product [▶ 71] and Reset the product to its factory settings [▶ 71].
- Restart sensor, refer to chapter Restart the sensor [▶ 72].

14.1 Read device information

→ Go to device Nitrate Sensor > function General settings > tab Maintenance.

→ Select Device information. The menu shows only read-only values. Table Description of the device information parameters [▶ 71] shows the values.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Parameter		Description
Displayed name		Entered name of the product. The name of the product is shown on any display connected to the fieldbus. See chapter Enter a name for the product [▶ 56].
Ident. number		Product article number
Serial number		Product serial number
Firmware ident. Number		Article number of the product firmware
Firmware version		Version number of the product firmware
büS version		büS version number
Hardware version		Version number of the product hardware
Product type number		Type of the product
Manufacture date		Product manufacturing date
EDS version		EDS version number
Device driver	Driver version	Version number of the product driver
	Firmware group	Product name and EDS version number
	DLL version	DLL Version number

Tab. 41: Description of the device information parameters

14.2 Restart the product

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Maintenance.
→ Select Reset device > Restart.
  ✔ The Restart wizard page appears.
→ To cancel the procedure, select Cancel.
→ To restart the product, select Next.
✔ The product restarts.

14.3 Reset the product to its factory settings

By resetting the product to the factory settings, the data saved on the micro SD card are also reset.

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].
→ Go to device Nitrate Sensor > function General settings > tab Maintenance.
→ Select Reset device > Reset to factory settings.
  ✔ The Reset to factory settings wizard page appears.
→ To cancel the procedure, select Cancel.
→ To reset to factory settings, select Next.
✔ The product restarts.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

✔ The product is reset to all its factory settings.

14.4 Restart the sensor

→ Make sure that the login user level is Installer. Refer to chapter Available login user levels [▶ 39].

→ Go to device Nitrate Sensor > function General settings > tab Maintenance.

→ Select Restart sensor.

✔ The Restart sensor wizard page appears.

→ To cancel the procedure, select Cancel.

→ To restart the sensor, select Next.

✔ The sensor restarts.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

15 MAINTENANCE

15.1 Safety instructions

DANGER!

Risk of injury from electric shocks.

- Before working on the installation or product, switch off the power supply. Make sure that nobody can switch the power supply on.
- Observe all applicable accident protection and all applicable safety regulations for electrical equipment.

WARNING!

Risk of injury that is due to escape of the fluid.

Contact with the operating fluid, its reaction products and vapours can cause injuries.

Inhaled vapours can be harmful.

- Observe all applicable accident protection and all applicable safety regulations relating to the operating fluid used.

WARNING!

If you open the housing, risk of injury from malfunction and risk of product failure.

Sensitive product parts are used to measure the values.

- Do not open the product housing.
- Only carry out the cleaning work and maintenance work on the product that are described in the Operating Instructions.
- Only the manufacturer can carry out further work and calibration.

WARNING!

Risk of injury that is due to improper maintenance.

- Only trained personnel can do the maintenance work. Personnel must use suitable tools.
- Secure the installation against unintentional actuation.
- Ensure a controlled restart after maintenance.

ATTENTION!

- Avoid touching the glass parts of the optical window, since these can become scratched or dirty. If this happens, then the functionality of the product can no longer be guaranteed.

15.2 Maintenance data

Required service	≤ 0.5 h/month (typical)
Calibration/maintenance interval	24 months

Tab. 42: Nitrate Sensor: Maintenance data

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

15.3 Replace the memory card

For a description of how to replace the memory card, refer to chapter Transfer data to or from another product [▶ 36].

15.4 Maintenance and inspection

To evaluate the reference values and to avoid unnecessary maintenance and a failure of the measurement operation, please carry out the following steps:

1. The reference value RefD indicates the light intensity of the xenon flash lamp (refer to chapter Check values for advanced diagnostics [▶ 50]). If this value is below 13,000, the sensor must be sent in for inspection. The lamp is probably used up.

   Please note that consumable parts of the sensor, such as the lamp and the reference diodes, are subject to normal ageing processes and must be replaced depending on the frequency of use. Please contact the Bürkert customer service.
2. If the reference value RefD exceeds 13,000 but the values of RefA, RefB and RefC are below 150, remove the sensor from the medium and perform a measurement in air.

   If the values of RefA, RefB and RefC do not increase, please thoroughly clean the sensor and especially the measuring windows (refer to chapter Cleaning the measuring window [▶ 75]) and repeat the air measurement.
3. If cleaning does not cause the reference values RefA, RefB and RefC to increase when measuring in air, we recommend checking the zero value in ultra-pure water (refer to chapter Checking the zero value [▶ 77]).
4. The reference values RefA, RefB and RefC should reach the order of magnitude of the reference value RefD: RefA, RefB and RefC ≈ RefD ± 5000 is acceptable.
5. If the reference values RefA, RefB and RefC do not reach the order of magnitude of the RefD even after careful cleaning and measurement in ultra-pure water, the sensor must be sent in. Please contact the Bürkert customer service.
6. If reference values RefA, RefB and RefC reach the order of magnitude of RefD but are still below 150 in the medium, the optical path should be shortened.

15.5 Cleaning and upkeep

To ensure an error-free and reliable measurement, the product should be periodically checked and maintained. The sensor must first be cleaned.

The degree of pollution depends on how the sensor is used: Vegetation deposits and dirt depend on the medium and the duration of exposure in the medium. For this reason, it is not possible to give a general answer regarding how often the sensor should be cleaned.

Normally, the system is kept clean by the nano-coated window and, additionally, the Bürkert MZ20 chemical cleaning system cleaning system. If the degree of contamination is too high, then follow the instructions below.

15.5.1 Cleaning the enclosure

CAUTION!

▸ Please use protective goggles and gloves when cleaning the sensor, especially when using acids, etc.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

Prepare cleaning

During cleaning, do not let exposed connectors come in contact with water. Please learn about the risks and the safe handling of the cleaning solution used.

In the case of calcification, a 10% citric acid solution or acetic acid can be used for cleaning.

Brownish dirt or spots can be contamination from iron manganese oxides. For this type of contamination, a 5% oxalic acid solution or a 10% ascorbic acid solution can be used to clean the sensor. Please note that the sensor should only briefly come in contact with the acid, and then it should be thoroughly rinsed.

ATTENTION!

Under no circumstances should the sensor be cleaned with hydrochloric acid. Even very low concentrations of hydrochloric acid can damage components made of stainless steel. In addition, Bürkert cautions against using strong acids, even if the sensor should have a titanium housing.

Perform cleaning

To loosen dirt, soak the sensor for several hours in a rinsing solution.

If the sensor is very dirty, then additional cleaning with a sponge may be necessary.

Proceed with extreme caution avoid scratching the glass of the optical path.

Fig. 23: Enclosure cleaning

15.5.2 Cleaning the measuring window

Make sure that you do not touch the window surface with your fingers!

Clean the window with a few drops of acetone and a lint-free cloth, a clean paper towel or a special optical paper.

ATTENTION!

- Do not use any aggressive cleaning solutions, putty, sandpaper or cleaning solutions that contain abrasive substances to remove dirt.

Damaged windows can be replaced by the Bürkert Customer Service. Please contact our Bürkert Customer Service.

ATTENTION!

- After replacing the measuring windows, carry out a new zero-value measurement.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

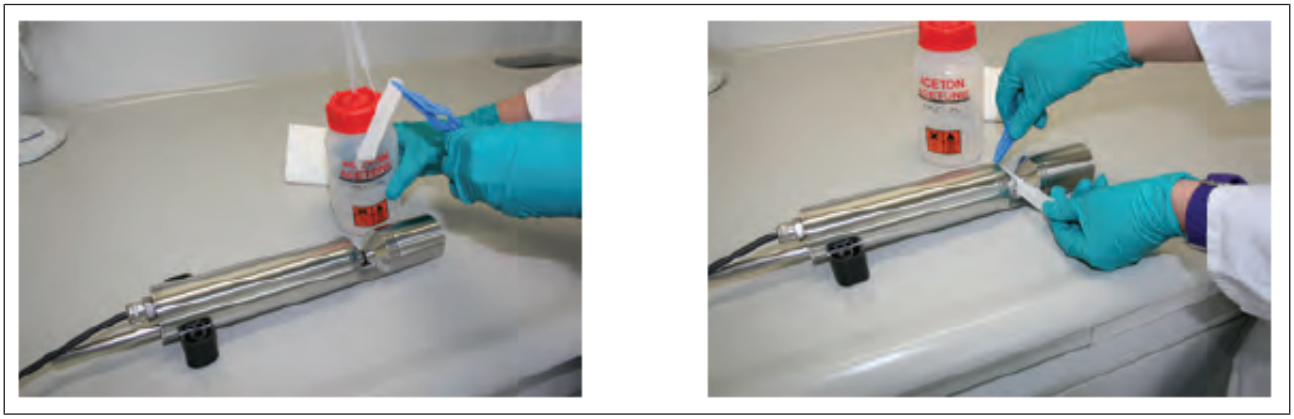


Fig. 24: Measuring window cleaning

15.5.3 Preparing the sensor for the function test and zero value determination

Preparation

Preparation: Have a suitable measurement container ready nearby, cleaned carefully with a detergent solution and rinsed with ultra-pure water. The container must be filled with ultra-pure water so that the measuring windows are completely covered by water.

→ Clean the probe as described in chapter Cleaning the enclosure [▶ 74].

→ At the end of the cleaning process, rinse the probe carefully with deionized water.

→ Dry the sensor with a paper towel.

→ Remove any greasy residues: Wipe the sensor off with a little acetone on a kitchen towel.

CAUTION!

▸ For your own safety, you must wear the appropriate gloves and protective goggles!

Clean the sensor window according to the previous instructions in Cleaning the measuring window [▶ 75]

Important: Polish the window next with a soft dry cloth or special optical paper to remove the thin film that may have appeared while cleaning the window.

ATTENTION!

Damage caused by improper cleaning is not covered by the warranty!

→ Immerse the sensor in the prepared measurement container with ultra-pure water so that the measuring windows are completely covered by water.
The sensors should be positioned diagonally in the measurement container, if at all possible, to prevent very small, almost invisible air bubbles collecting at the top of the measuring window. When using an upright measuring cylinder which requires the sensor to be positioned vertically, make sure to watch out for air bubbles in the optical path.
Make sure the container is sufficiently stable!

→ Wait 10 – 15 minutes. During this time, hidden dirt can come loose from the sensor.

→ Remove the probe from the water and rinse it with ultra-pure water.

→ Fill the container once more with fresh ultra-pure water and immerse the sensor again.

→ Lift the probe and move it around in the water to remove any air bubbles that may have formed.

→ Carry out the function test or the calibration of the sensor.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

15.6 Checking the zero value

A container suitable for immersion can be used. When taking a measurement, the optical path must always be completely immersed in the water.

→ Before the zero-value check, prepare the sensor as described in chapter Preparing the sensor for the function test and zero value determination [▶ 76].

→ Before filling the measurement container with ultra-pure water, clean the measurement container carefully with a detergent solution and rinse it with ultra-pure water.

→ Rinse the properly cleaned sensor carefully with deionized water and immerse it in the container of ultra-pure water. The optical path must be completely in the water.

Recommended setting for the zero value determination:

- ambient temperature: 20 °C (if at all possible).
- temperature of the ultra-pure water: 20°C.

General Information

- Do not touch the part of the sensor which has been submerged in the ultra-pure water with your hands during the sensor check unless you are wearing gloves.
- Be sure to use highly pure water (ultra pure, resistance of 18.2 MΩcm) or distilled water.
- If impurities in the water show up during the check, then start over the process!
- Make sure there are no air bubbles in front of the measuring windows.
- We recommend carrying out at least five individual measurements in “Measurement” prior to the check, to bring the sensor up to operating temperature.

Limit values for the determination of zero values

Limit values to decide whether a new zero line must be drawn (in ultra-pure water with clean measuring windows):

- 4 mg/L N-NO3 with 1 mm path
- 0.4 mg/L N-NO3 with 10 mm path

No new zero line needs to be drawn below these values.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

16 TROUBLESHOOTING

16.1 Troubleshooting with messages

Messages can only be generated if the diagnostics are enabled. Refer to chapter Disable or enable the diagnostics [▶ 61].

When a message is generated, the following actions are carried out:

- The symbol  is displayed in the information bar.
- The product status indicator changes its colour and state based on the NAMUR NE 107 recommendation. Refer to chapter Product status indicator [▶ 16].

To read the message, select  . The message is displayed in the list Messages overview. See chapter Read the generated events [▶ 68].

16.2 Messages [ERROR]: failure, error or malfunction

→ If the message displayed on your product is not explained in the Operating Instructions, contact Bürkert.

16.2.1 Message Select sensor and restart the device

Product status symbol	
Possible cause	No sensor type is selected. The wrong sensor has been selected.
What to do?	→ Select the sensor type. Refer to chapter Select the type of sensor connected to the ME63 interface [▶ 41] → Restart the ME63 interface. → In case of a ME63 interface exchange, use the SD card to restore the parameters.

16.2.2 Message Communication with the sensor is interrupted

Product status symbol	
Possible cause	The ME63 interface could not access the sensor. The ethernet communication is broken.
What to do?	→ Check if the cable wiring is correct, restart the device. → Check the ethernet communication activities. The led link/act is blinking when there is activities. Refer to chapter Display elements [▶ 15]. → Check if the sensor is powered.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

16.2.3 Message Sensor error (internal error). Contact the service for your device

Product status symbol	
Possible cause	A sensor internal error occurred.
What to do?	→ Check the wiring. → Restart the sensor and the ME63 interface. → If the message is still there, send the sensor back to Bürkert.

16.2.4 Message büS event: producer not found

Product status symbol	
Possible cause	When you want to automatically freeze the values, the device that can generate the binary event is not connected to büS.
What to do?	→ Make sure that the device that generate the binary event is connected to büS. → Make sure that the connection between the binary event and the product is set. Refer to chapter Automatic freeze [▶ 45].

16.2.5 Message büS is not operational

Product status symbol	
Possible cause	Unknown cause
What to do?	→ Restart the product. → If the message is still displayed, send the product back to Bürkert.

16.3 Messages [OUT OF SPECIFICATION]: out of specification

→ If the message displayed on your product is not explained in the Operating Instructions, contact Bürkert.

16.3.1 Message Warning: Quality of measurement limited (SQI). Check sensor and process

Product status symbol	
Possible cause	The SQI (Sensor Quality Index) value is under the programmed warning threshold level.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

What to do?	→ Check the sensor. → Clean the sensor. → Check the process.

16.3.2 Message Warning: Quality of measurement limited (NO3). Check sensor and process

Product status symbol	
Possible cause	The NO3 (Nitrate) value is under the programmed warning threshold level.
What to do?	→ Check the sensor. → Clean the sensor. → Check the process.

16.3.3 Message Error: Quality of measurement significantly reduced (SQI). Check sensor and process

Product status symbol	
Possible cause	The SQI (Sensor Quality Index) is under the programmed error threshold level.
What to do?	→ Check the sensor. → Clean the sensor. → Check the process.

16.3.4 Message Error: Quality of measurement significantly reduced (NO3). Check sensor and process

Product status symbol	
Possible cause	The NO3 value (Nitrate) is under the programmed error threshold level.
What to do?	→ Check the sensor. → Clean the sensor. → Check the process.

16.4 Messages [FUNCTION CHECK]: function check

→ If the message displayed on your product is not explained in the Operating Instructions, contact Bürkert.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

16.4.1 Message Simulation mode active

Product status symbol	
Possible cause	You are checking the correct behaviour of the system or of the product. Refer to chapter Start the simulation mode [▶ 51].
What to do?	→ If you have finished to check the behaviour of the system or of the product, set the parameter Simulation > Status to Off. Refer to chapter Stop the simulation mode [▶ 51].

16.4.2 Message Hold mode active

Product status symbol	
Possible cause	The values that are sent by the product on the fieldbus are temporarily frozen. Refer to chapter Freeze the values transmitted on the fieldbus [▶ 44].
What to do?	→ Wait until the binary event is deactivated. Refer to chapter Automatic freeze [▶ 45]. → If you want that the measured values are sent on the fieldbus, set the parameter Hold > Mode to Off. Refer to chapter Stop the manual freeze or the automatic freeze [▶ 47].

16.5 Messages [MAINTENANCE]: maintenance required

→ If the message displayed on your product is not explained in the Operating Instructions, contact Bürkert.

16.5.1 Message Device is in service mode, no communication with sensor

Product status symbol	
Possible cause	The service mode has been activated. (See chapter Activate or deactivate the service mode [▶ 53].)
What to do?	→ Deactivate the service mode. Refer to chapter Activate or deactivate the service mode [▶ 53].

16.5.2 Message Path length could not be set

Product status symbol	
Possible cause	The path length is not the correct one.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

What to do?	→ Check if the right sensor with the correct path length is connected to the ME63 interface. Refer to chapter Check sensor information [▶ 49]. → Restart the sensor and the ME63 interface. → Check if the wiring is correct.

16.5.3 Message Calibration setting could not be set

Product status symbol	
Possible cause	The new parameters could not be written into the sensor.
What to do?	→ Check if the wiring is correct. → Restart the sensor. → Modify the parameter again.

16.5.4 Message Deviation from default settings detected, resets to default settings

Product status symbol	
Possible cause	The default settings have been modified. They will be overwritten by the ME63 interface.
What to do?	No action.

16.5.5 Message Last calibration is older than 1 days. Recalibrate your device

Product status symbol	
Possible cause	The calibration date is due.
What to do?	→ Recalibrate the sensor. Refer to chapter Calibrate the zero value (base intensity) [▶ 52].

16.5.6 Message Sensor error (invalid baseline). Contact the service for your device

Product status symbol	
Possible cause	After performing a calibration. The base line is wrong.
What to do?	→ Clean the sensor. → Check the calibration solution (DI water). → Recalibrate the sensor. Refer to chapter Calibrate the zero value (base intensity) [▶ 52].

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

16.5.7 Message Sensor error (optical path length too short). Contact the service for your device

Product status symbol	
Possible cause	The path length is not the good one.
What to do?	→ Clean the sensor. → Check the sensor range according to the process.

16.5.8 Message Sensor error (optical path length too long). Contact the service for your device

Product status symbol	
Possible cause	The path length is not the good one.
What to do?	→ Clean the sensor. → Check the sensor range according to the process.

16.6 Messages [INFO]: information

→ If the message displayed on your product is not explained in the Operating Instructions, contact Bürkert.

16.6.1 Message Sensor error (data transfer failed). Contact the service for your device

Product status symbol	
Possible cause	A file transfer error occurred.
What to do?	→ Check the wiring. → Restart the sensor and the ME63 interface.

16.6.2 Message Sensor error (UPS error). Contact the service for your device

Product status symbol	
Possible cause	A wrong communication between the ME63 interface and sensor occurred.
What to do?	→ Check if the wiring is correct. → Restart the sensor and the ME63 interface.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

16.6.3 Message Sensor error (power fail detected). Contact the service for your device

Product status symbol	
Possible cause	The power supply was below the acceptable range.
What to do?	→ Check the power supply voltage. → Restart the sensor and the ME63 interface.

16.6.4 Message Transferable memory is not accessible

Product status symbol	
Possible cause	No memory card is plugged in the product.
What to do?	→ If a memory card is needed, insert a memory card. Contact your Bürkert sales office to buy a new memory card. → If no memory card is needed, valid the message by clicking on Acknowledge.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

17 SPARE PARTS AND ACCESSORIES

CAUTION!

Risk of injury, property damage due to incorrect parts.

Incorrect options and unsuitable spare parts can cause injuries to people and damage to the appliance and its surroundings.

▸ Only use original options and original spare parts from Bürkert.

For any questions, contact **Bürkert**.

17.1 MS09 Nitrate Sensor accessories

ATTENTION!

Property damage due to incorrect parts.

Incorrect accessories and unsuitable spare parts may cause damage to the product.

▸ Use only original accessories and original spare parts from Bürkert.

Accessories	Order number
USB büS interface set 1 (including power supply unit, büS stick, terminating resistor, Y-distributor, 0.7 m cable with M12 plug)	00772426
USB büS interface set 2 (including büS stick, terminating resistor, Y-distributor, 0.7 m cable with M12 plug)	00772551
Nitrate sensor	00572115
Flow Cell Nitrate 5 mm pathlength	00572117
MS09 büS interface	00572118
Bubble trap	00568492
Hose connector, angled, 1/4", 6 mm	00782348
5 m hose tubing 6/4 mm	00567793
Micro SD card	00774087

Tab. 43: Nitrate Sensor: Accessories

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

18 UNINSTALLATION

18.1 Safety instructions

WARNING!

Risk of injury due to improper installation.

- Only trained technicians may perform installation work.
- Perform installation work using suitable tools only.

CAUTION!

Malfunction due to electrostatic discharge.

Electrostatic discharge on the product may cause malfunctions.

- Connect the product to the functional earth.

CAUTION!

Danger due to electro-magnetic fields.

If the functional earth (FE) is not connected, then this represents an infringement of the legal regulations of EMC.

- Connect the product to the functional earth.
- If the installation surface is not grounded, then use an earthing strap or FE line. Connect the earthing strap or FE line to the earthing point using an M4 screw.

To discharge interference currents and EMC resistance, the products have an earth connection.

18.2 Uninstalling procedure

Step 1: Uninstalling the Nitrate Sensor

→ Disconnect the Nitrate Sensor from the ME63 Sensor Interface. Refer to chapter Connection plan MS09 [▶ 28].

→ To deinstall the flow cell, remove the two hose connections. To remove the hoses, press on the locking ring on the hose connector and carefully pull the hose away. Refer to chapter Installing procedure [▶ 25].

Step 2: Uninstalling the ME63 Sensor Interface

→ Uninstall the product loosening 2 screws (M4) and 2 flat washers (according to DIN 125).

→ Disconnect the product from the functional earth.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025

19 LOGISTIC

19.1 Transport

ATTENTION!

Transport damage.

If the product is not protected in transport, then the product can be damaged.

- ▸ Remove cables, connectors, product-external filters and installation equipment.
- ▸ Protect the electrical interfaces with protective plugs.
- ▸ Clean and vent contaminated products.
- ▸ Pack the product in two suitable zip lock bags, to avoid any contamination during the transport.
- ▸ Transport the product in an impact-resistant package, protected from moisture and dirt.
- ▸ Avoid storage above or below the recommended storage temperature.

19.2 Storage

ATTENTION!

Incorrect storage can cause damage to the product.

- ▸ Store the product dry and dust-free in sealed zip lock bags.
- ▸ Observe the storage temperature.

Storage temperature	-20...+80 °C

Tab. 44: Nitrate Sensor: Storage

Storage temperature	-20...+70 °C

Tab. 45: ME63 Sensor Interface: Storage

19.3 Return

No work or tests will be carried out on the product until a valid Contamination Declaration has been received.

→ To return a used product to Bürkert, contact your Bürkert sales office. A return number is required.

19.4 Disposal

ATTENTION!

Environmental damage that is due to parts contaminated by fluids.

- ▸ Dispose of the product and its packaging in an environmentally friendly manner.
- ▸ Comply with applicable environmental and disposal regulations.

- ▸ Adhere to the national waste disposal regulations.

MAN 1000530086 EN Version: C Status: RL (released | freigegeben) printed: 16.01.2025