



Nitrate sensor

- UV photometer for nitrate monitoring
- Reagent-free optical measurement
- EDIP sensor: compatible with Type 8905/8906 measurement systems
- Xenon flash lamp, 3 channels for optical measurement with reduced interference
- Nano-coated glasses to reduce maintenance

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

	Type 8905 Online water analysis system	▶
	Type 8906 Online water analysis system	▶
	Type MZ20 Cleaning System	▶
	Type ME61 EDIP process display	▶
	Type ME43 Fieldbus gateway	▶
	Type ME63 Industrial Ethernet gateway, IP65/ IP67/ IP69k	▶
	Type ME44 I/O module, IP 20	▶
	Type ME66 büS distribution box, IP65/ IP67/ IP69k	▶

Type description

The Type MS09 sensor is an optical sensor for UV absorption measurement to determine the nitrate content in drinking water.

The sensor has a xenon flash lamp as a light source and can measure nitrate content with reduced interference through three different detection channels. The nitrate content is determined at 212 nm, the organic matter at 254 nm and the turbidity at 360 nm. The sensor is therefore insensitive to cross-influences in the water.

The sensor is mainly used in drinking water to ensure compliance with regulatory limits. The measurement is carried out in raw water as well as in pure water.

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1. General technical data

Type MS09 is a nitrate measurement system consisting of a photometer with a 2 m cable with 8-pin M12 connector, a measurement chamber (flow cell) which allows a bypass installation, a büS (Bürkert system bus) interface, 3 cables of 1 m equipped with M12 connectors and a Y-splitter .

Product properties

Material

Make sure the device materials are compatible with the fluid you are using.

Further information can be found in chapter [“3.1. Bürkert resistApp” on page 5.](#)

Photometer	Housing in stainless steel (1.4571/1.4404)
Flow cell	<ul style="list-style-type: none"> • Housing in POM • Seal in NBR • Screw in stainless steel 316 (A4)
büS interface	<ul style="list-style-type: none"> • Front side housing: PC (polycarbonate) • Rear side housing: polyurethane potting resin, natural
Fixed connector and cable	<ul style="list-style-type: none"> • Cable in PUR • Screw connection in zinc die casting, matt nickel-plated
Compatibility	With online water analysis system Type 8905 Further information can be found in the data sheet of the online water analysis system, see data sheet Type 8905 ▶.

Dimensions

Further information can be found in chapter [“4. Dimensions” on page 5.](#)

Photometer	469 × 48.3 mm (L x Ø) with a 5 mm path
Flow cell	108 × 65 × 65 mm
büS interface	210 × 65 × 18 mm

Weight

Photometer	Approx. 3.20 kg
Flow cell	Approx. 0.65 kg
büS interface	Approx. 0.40 kg
Measurement technology	Photometry <ul style="list-style-type: none"> • Light source: Xenon flash lamp • Detector: 3 photodiodes + filter
Measurement principle	Attenuation
Optical path	5 mm (others on request)
Measured quantity	NO ₃
Measuring range	0.44...44 mg/l with a 5 mm path
Compensation	Turbidity

Data logger

büS interface	Micro SD card (not included in delivery), for storage of device parameters, configuration and for easy replacement of photometer
Maintenance	Calibration/maintenance interval: 24 months

Performance data

Nitrate measurement

Measurement deviation	±(5% + 0.88) of the measured value
Measurement interval	≥ 10 s
Response time (t100)	10 s

Electrical data

Operating voltage

Photometer	24 V DC ± 10 % (via connector X8 of büS interface)
büS interface	24 V DC ± 10 % - residual ripple 10 % ¹⁾ (via connector X4 connected to online water analysis system Type 8905. Further information can be found in the chapter “5.1. büS interface” on page 6 or in the data sheet of the online water analysis system, see data sheet Type 8905 ▶.)

Power consumption

Photometer	≤ 7 W
büS interface	≤ 2 W (only consumption of the interface)

Current

büS interface	<ul style="list-style-type: none"> • Max. input current: 4 A for supply via X4 (M12, A-coded, plug) • Max. output current: 4 A in total with supply via X4
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Output

Photometer	Ethernet (TCP/IP)
büS interface	Bürkert system bus (büS)

Medium data

Fluid	Water without particles: drinking water, industrial water
Temperature of the fluid sample	+ 2...+ 40 °C (+ 36...+ 104 °F)
Pressure of the fluid sample	<ul style="list-style-type: none"> • Photometer alone: 3 bar • With flow cell: ≤ 1 bar
Flow rate of the fluid sample	With flow cell: 2...4 l/min
Inflow velocity of the fluid sample	0.1...10 m/s (0.33...33 fps)

Product connections

Process connection	Hose connections of flow cell (6 or 8-mm inlet, 6-mm outlet)
Electrical connection	M12 male plug, A-coded (X4 (IN)) of büS interface

Data transfer

External communication	<ul style="list-style-type: none"> • Via büS (Bürkert system bus, CANopen-based) or CANopen • Via status LED: with RGB-LED based on NAMUR NE 107 on the büS interface
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Approvals and conformities

Directives

CE directive	Further information on the CE directive can be found in chapter “2.2. Standards” on page 5
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Environment and installation

Ambient temperature

Photometer	<ul style="list-style-type: none"> • Operating: + 2...+ 40 °C (+ 36...+ 104 °F) • Storage: - 20...+ 80 °C (- 4...+ 176 °F)
büS interface	<ul style="list-style-type: none"> • Operating: - 20...60 °C (- 4...+ 140 °F) • Storage: - 20...70 °C (- 4...+ 158 °F)
Relative air humidity	≤ 90 %, without condensation
Height above sea level	Max. 2000 m
Operating condition	Continuous
Equipment mobility	Fixed
Application range	Indoor and outdoor Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions.

Degree of protection

Photometer	IP68 according to IEC/EN 60529, NEMA 6P
büS interface	IP65, IP67 and IP69k according to EN/IEC 60529 (with cables connected and with protective caps on unused connections)
Cable	IP65, IP67 according to EN/IEC 60529
Installation category	Category I according to UL/EN 61010-1
Pollution degree	Degree 2 according to UL/EN 61010-1

1.) The requirements of the attached components need to be considered in the selection of the power supply as well.

2. Approvals and conformities

2.1. Conformity

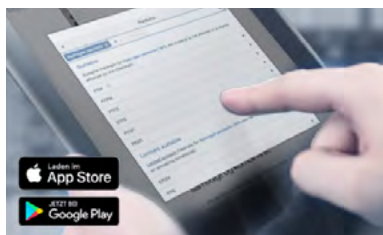
In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.2. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

3. Materials

3.1. Bürkert resistApp



Bürkert resistApp – Chemical resistance chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

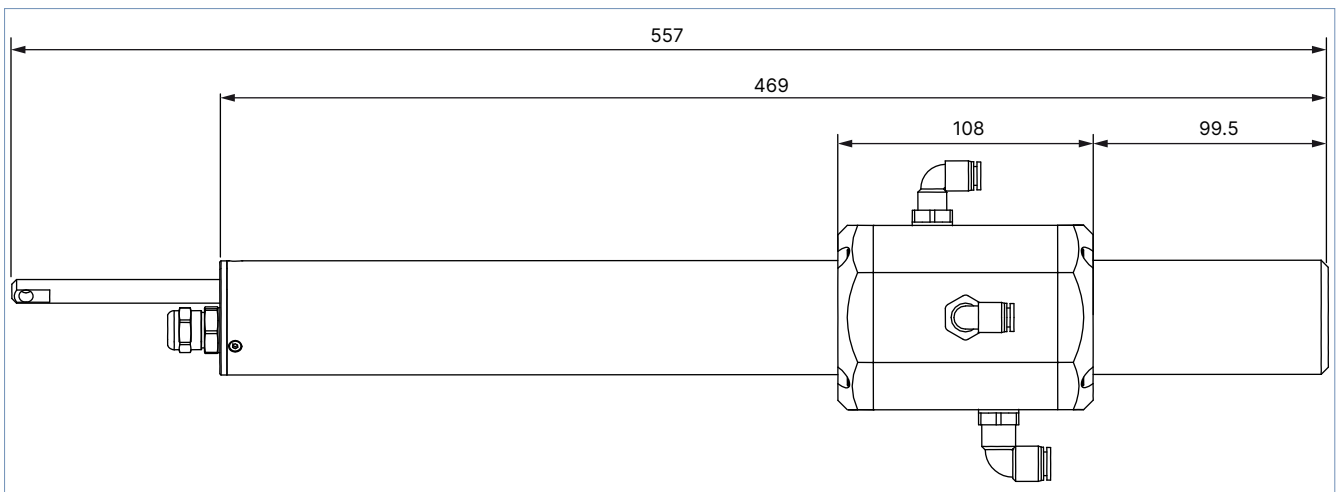
[Start chemical resistance check](#)

4. Dimensions

4.1. Photometer installed into the measurement chamber (flow cell)

Note:

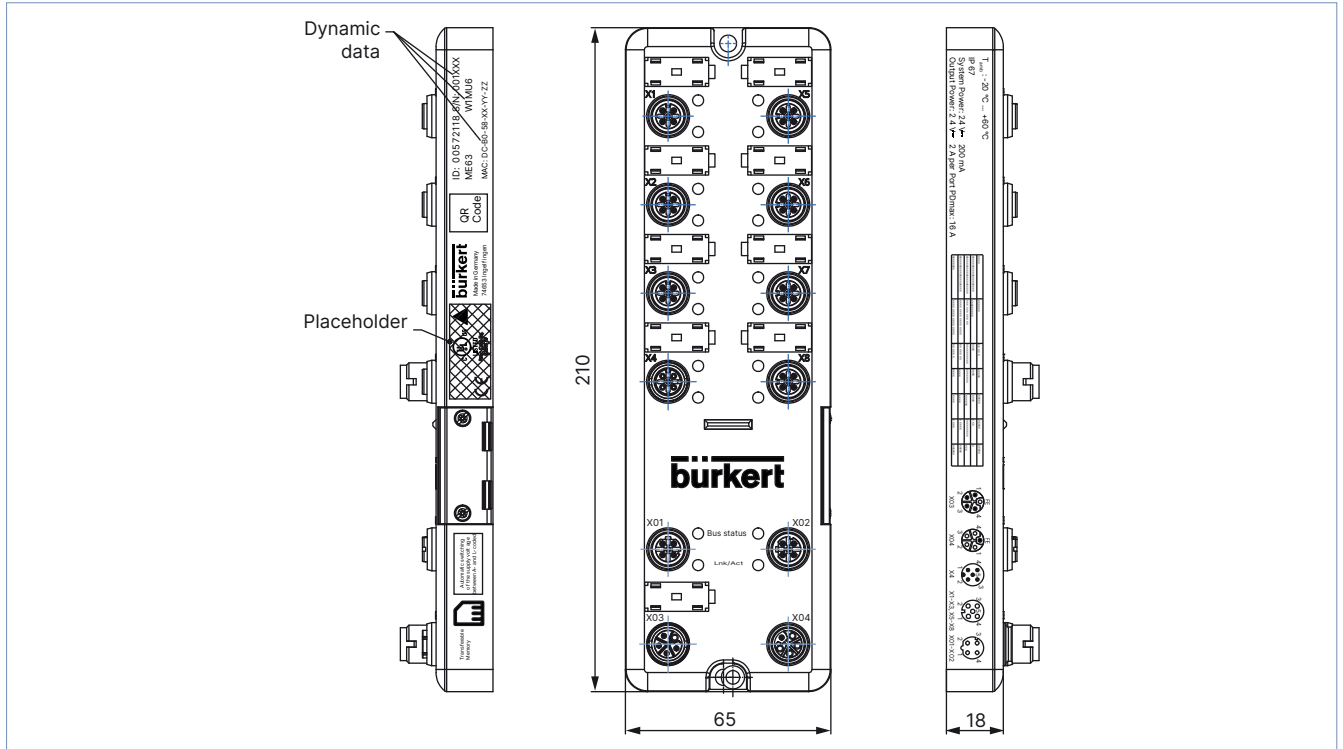
Dimensions in mm, unless otherwise stated



4.2. bÜS interface

Note:

Dimensions in mm, unless otherwise stated

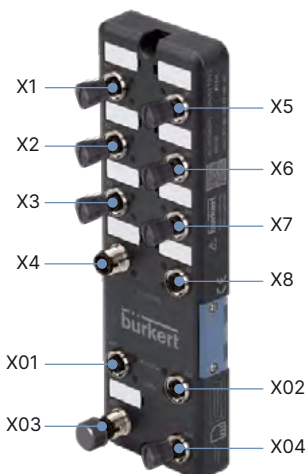


5. Product connections

5.1. bÜS interface

Note:

The device automatically recognises if the power supply is connected to X4 or X03.



No.	Description
X1	M12-A, socket, not used
X2	M12-A, socket, not used
X3	M12-A, socket, not used
X4	M12-A, plug, Power IN 24 V DC, max. 4 A and bÜS/CANopen
X5	M12-A, socket, not used
X6	M12-A, socket, not used
X7	M12-A, terminating resistor 120 Ω, if necessary
X8	M12-A, socket, Power OUT 24 V DC, max. 4 A, to power the photometer
X01	M12-D, socket, not used
X02	M12-D, socket, Ethernet, e.g. for Ethernet integration of the photometer
X03	M12-L, plug, not used
X04	M12-L, socket, not used

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6. Product installation

6.1. Installation notes

The nitrate measurement system is designed for use with the online water analysis system, Type 8905. It is simply connected via a cable to Type 8905. But with help of the USB-büS interface set Type 8923, it is also possible to connect the nitrate measurement system to a PC with the Bürkert Communicator Software Type 8920.

See **data sheet Type 8905** ▶ Online water analysis system, **software manual Type 8920** ▶ or chapter “**9.2. USB-büS interface set Type 8923**” on page 9 for more information.

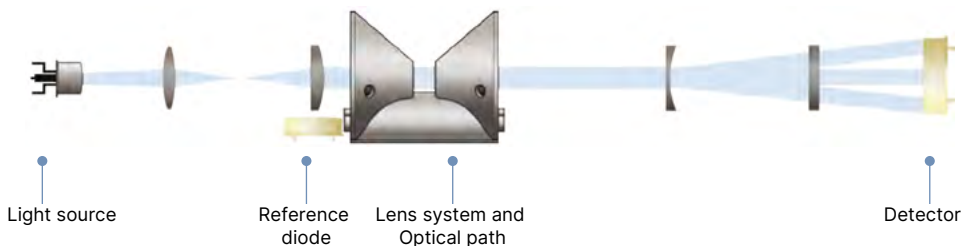
7. Product operation

7.1. Measurement principle

Note:

It is necessary to understand the physical principles of the sensor in order to use the sensor optimally. An overview of the measurement principle, the visual arrangement and the subsequent calculation will be provided as follows.

The photometer essentially consists of four parts: a defined light source, a lens system, the optical path through the medium and a second lens system with three photodiodes as detectors. The arrangement of these parts is represented schematically in the following illustration.

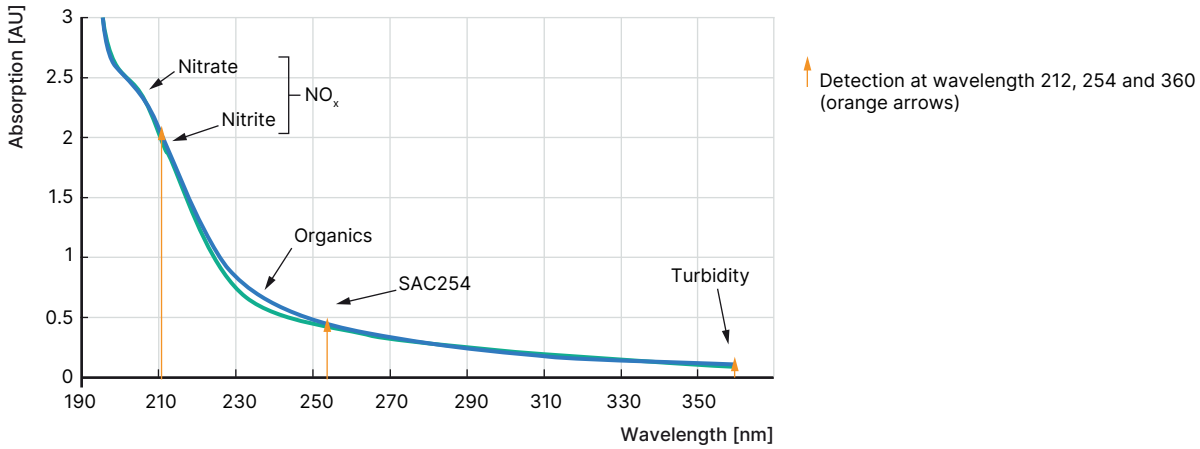


A xenon flash lamp is used as a broadband light source. The light passes through the medium in the optical path and is partially absorbed by it. The photodiodes pick up the remaining light and determine its intensity “I” at defined wavelength points.

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 ”. According to the equation, the photometer determines the transmission $T (=I/I_0)$ and the absorbance $A (= -\log_{10}T)$ for three defined wavelengths.

The integrated analysis software can calculate the corresponding concentrations from the absorption. The unit of the absorption value is the absorption unit [AU]. The manufacturer calibration is based on an allocation of the absorption units to a defined nitrate concentration based on standard nitrate solutions at a wavelength of 212 nm. An integrated compensation of turbidity and organics allows the measurement principle of the photometer to be described as attenuation.

7.2. Analysis



7.3. Parameters

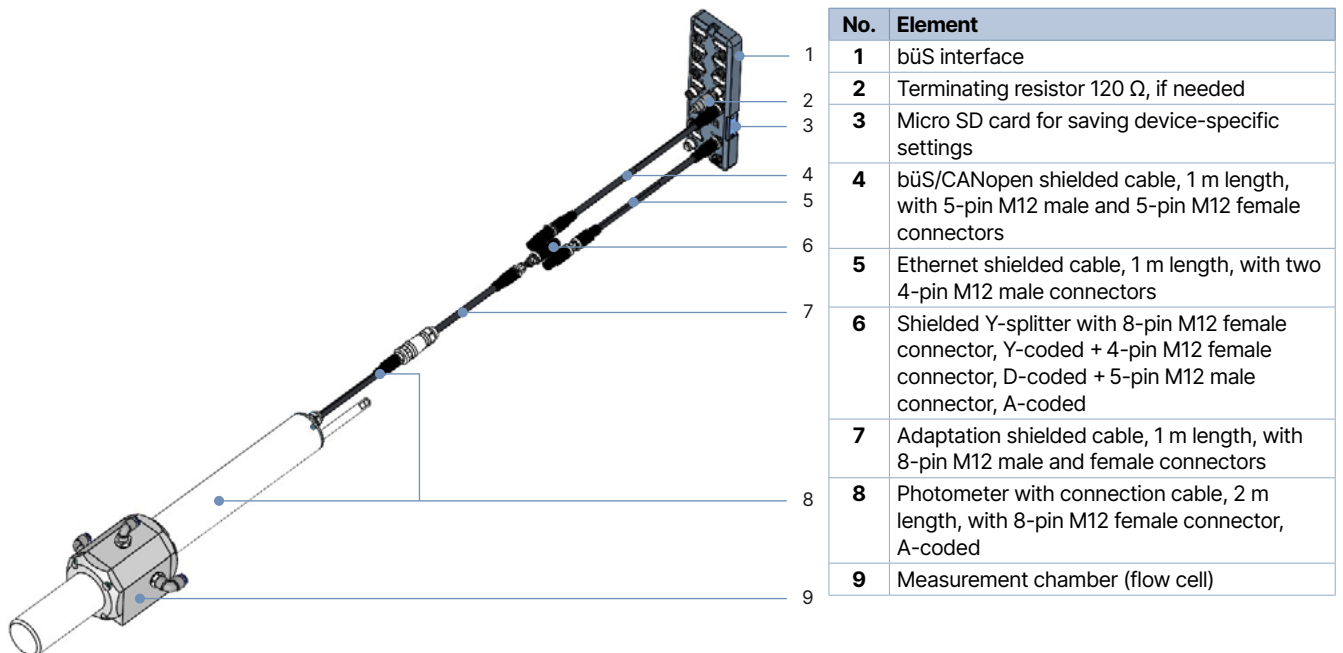
The photometer measures absorption at 212 nm. The parameter NO₃ is output.

Taking the path length into account, the absorption values [AU] are calculated with the unit [1/m] at 212, 254 and 360 nm. The photometer sensor uses the absorption at 212 nm for the detection of NO₃. 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 photometer. A longer variant of the photometer allows longer path lengths of 20 and 50 mm.

It is possible to adapt the sensor with scaling factors to laboratory analyses and local conditions. Note that the manufacturer's calibration is not affected by the customer-specific calibration. The parameter NO₃ parameter can be scaled.

8. Product design and assembly

8.1. Product assembly



No.	Element
1	büS interface
2	Terminating resistor 120 Ω, if needed
3	Micro SD card for saving device-specific settings
4	büS/CANopen shielded cable, 1 m length, with 5-pin M12 male and 5-pin M12 female connectors
5	Ethernet shielded cable, 1 m length, with two 4-pin M12 male connectors
6	Shielded Y-splitter with 8-pin M12 female connector, Y-coded + 4-pin M12 female connector, D-coded + 5-pin M12 male connector, A-coded
7	Adaptation shielded cable, 1 m length, with 8-pin M12 male and female connectors
8	Photometer with connection cable, 2 m length, with 8-pin M12 female connector, A-coded
9	Measurement chamber (flow cell)

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9. Product accessories

9.1. Bürkert Communicator Software Type 8920

Note:

The associated communication software can be downloaded under **Type 8920** ▶.

The Bürkert Communicator is the most important software tool of the device platform EDIP (Efficient Device Integration Platform). The extensive features of this universal tool facilitate the configuration and parameterisation of all devices equipped with the digital CAN-open-based interface.

The Bürkert Communicator provides the user with a complete overview of all cyclic process values and acyclic diagnostic data. The integrated graphical programming environment enables the creation of control functions for decentralised sub-systems. The connection to the PC can be established via a USB-büS interface set. This is available as an accessory (see **"10.4. Ordering chart accessories" on page 11**).

The Bürkert Communicator enables:

- Configuration, parameterisation and diagnosis of EDIP devices / networks
- Easy and convenient assignment (mapping) of cyclic values
- Graphical display of process values
- Firmware update for the connected EDIP devices
- Backup and restoring of device configurations
- Zero-point adjustment
- Guided re-calibration routine

9.2. USB-büS interface set Type 8923


See **"10.4. Ordering chart accessories" on page 11** for ordering information.

Accessories	No.	Description
<p>USB-büS interface set 1</p>	1	Quick-Start
	2	Power supply: 100...240 V AC/24 V DC 1 A and power supply adapters for worldwide use
	3	büS terminating resistor on büS Y-splitter
	4	5-pin M12 male connector wired on free end cable, cable length: 0.2 m
	5	büS connection cable with 5-pin M12 male connector, micro USB B plug, cable length: 0.3 m
	6	büS adapter with 5-pin M12 male connector, A-coded to 5-pin M12 male connector, A-coded
	7	büS stick (USB to büS/CANopen adapter)
	8	büS service cable with 5-pin M12 female connector, mini USB plug and circular female connector for power supply, cable length: 0.7 m
	9	Magnetic key
<p>USB-büS interface set 2</p>		
		The Bürkert Communicator software can be downloaded from our website under the "Software" heading of Type 8920 ▶.

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10. Ordering information

10.1. Bürkert eShop




Bürkert eShop – Easy ordering and quick delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

10.2. Bürkert product filter



Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements? Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

10.3. Ordering chart

Description	Article no.
Nitrate measurement system (photometer with 5 mm path + measurement chamber (flow cell) + büS interface + cables), without micro SD card	572113

Further variants on request






































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Additional

Nitrate measurement: other possible measuring ranges

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10.4. Ordering chart accessories

Description		Article no.
Nitrate photometer with 5 mm path		572115 
Measurement chamber (flow cell)		572117 
bÜS interface		572118 
Micro SD card		774087 
Fluidic accessories		
Sample water hose 4/6 mm	5 m	567793 
	10 m	567701 
	25 m	567794 
Swivel elbow connector made of POM, ¼" threaded connection and 4/6 mm push-in hose connection		782348 
Set with a pressure regulator (article no. 774322), a bourdon tube pressure gauge (0...4 bar), a holder and a nut		775799 
Pressure regulator (pressure inlet: 0...10 bar, pressure outlet: 0...4 bar, inlet and outlet: G ¼, internal part in stainless steel)		774322 
Filter housing made of plastic with NBR seal for filter element 50 µm, inlet and outlet ¼"		774292 
Filter housing made of plastic with NBR seal for filter element 90 µm or 140 µm, inlet and outlet ¼"		774287 
Filter element	50 µm	774293 
	90 µm	774290 
	140 µm	774291 
Bubble trap		568492 
Type MZ20 cleaning system, 2 solutions See data sheet Type MZ20  for more information.		567124 
Cleaning set for optical		574346 
	Calibration set	574344 
		574345 
Interface accessories		
USB-bÜS interface set		
	USB-bÜS interface set 1 (Type 8923) Further information can be found in chapter "9.2. USB-bÜS interface set Type 8923" on page 9.	772426 
	USB-bÜS interface set 2 (Type 8923) Further information can be found in chapter "9.2. USB-bÜS interface set Type 8923" on page 9 .	772551 
Connectors and sockets		
bÜS Y-distributor (M12 female connector, 5-pin to M12 male and female connectors, 5-pin)		772420 
bÜS Y-distributor with power interrupt (M12 female connector, 5-pin to M12 male and female connectors, 5-pin)		772421 
bÜS adapter (M12 male connector, 5-pin, A-coded to M12 male connector, 5-pin, A-coded)		772867 
bÜS terminating resistor 120 Ω, M12 male connector, 5-pin		772424 
bÜS terminating resistor 120 Ω, M12 female connector, 5-pin		772425 
Extensions		
	M12 female and male connectors, 5-pin, straight, moulded on bÜS cable, shielded	0.5 m 772403 
		1 m 772404 
		3 m 772405 
		5 m 772406 
		10 m 772407 
		20 m 772408 
Software		
Software Bürkert Communicator		Download Type 8920 