bNovate TECHNOLOGIES

BactoSwitch User Manual

English

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https://manual.bnovate.net/bactoswitch/

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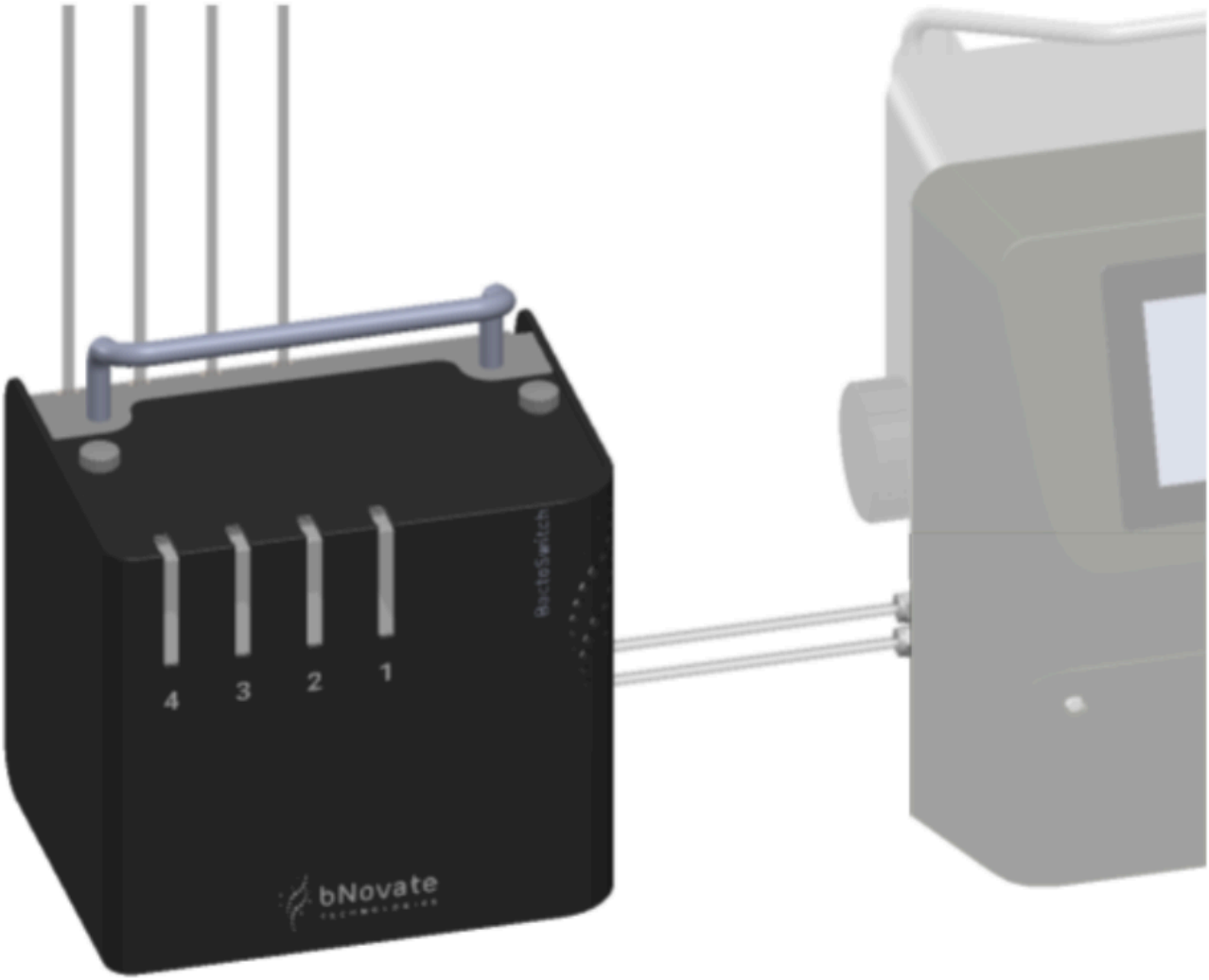
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BactoSwitch

Multi-Line Selector for BactoSense

Document number **UM-0001**



The BactoSwitch routes water from up to four sampling points to one BactoSense, one line at a time.

The BactoSwitch is an accessory of the BactoSense. Read the BactoSense user manual as well before installing and operating the BactoSwitch.

Getting started

- General user information
- Instrument overview and technical data
- Safety
- Installation

Operating the BactoSwitch

- Operation
- Warning and error messages
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- Storage, transport and disposal
- Contact

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1. General User Information

1.1 About this instruction manual

This instruction manual provides the user with helpful information about the entire life cycle of the BactoSwitch. Before commissioning and using the BactoSwitch, the user should be completely familiar with this instruction manual. As the BactoSwitch is an accessory of the BactoSense, the user should also be familiar with the BactoSense user manual. All bNovate manuals can be found online at www.bnovate.com/user-manuals.

This instruction manual is intended for all persons who are responsible for the operation and maintenance of the instrument. This document is part of the product. It should be stored in a safe place and always be available to the user.

A list with all bNovate representatives can be found on our website: www.bnovate.com/distribution-partners.

Additional associated product documentation can be found in the table below.

Table 1-1 Additional documentation

DOCUMENT	TITLE	CONTENT
UM-0006	BactoSense User Manual	Sophisticated menu functions, connectivity solutions and work steps for advanced users.
CER-50117	CE declaration of conformity	Compliance with the underlying directives and standards.
CER-50118	UKCA declaration of conformity	Compliance with the underlying directives and standards.
CER-50119	CB test certificates	UL/CSA/FCC test certificates, also under DE-6-T2502195 and DE-6-T2600373 on certificates.iecee.org.

1.2 Declaration of conformity, norms and classifications

Current technological principles were followed in designing and manufacturing the instrument. They comply with the applicable guidelines concerning safety and the duty to take due care.

The instrument meets all applicable requirements within the European Union (EU) for carrying the CE mark.

The instrument meets all applicable requirements for carrying the UKCA mark.

The instrument is UL/CSA/FCC compliant.

For more details, please refer to the separate declaration of conformity.

This device is protected from total dust ingress and from low pressure water jets from any direction (IP65).

Table 1-2 Compliance and certifications

COMPLIANCE AND CERTIFICATIONS	
Regulatory compliance	CE UKCA RoHS FCC compliant
Applied EMC standards	IEC 61326-1:2021 EN 55011:2016 IEC 61000-3-2:2019/A2:2024 IEC 61000-3-3:2013/A2:2021 CFR 47 Subpart B, §15.107, §15.109 ICES-001 Issue 5, §3.2.1, §3.2.2
Applied safety standards	IEC 61010-1:2010/Amd1:2019 CISPR 11:2024 CAN/CSA C22.2 No. 61010-1-12/UPD4:2024 UL 61010-1:2012/Amd1:2024 JIS C 1010-1:2019 EN 60529:1989

CERTIFICATES

For more details on the CE mark, please refer to the separate declaration of conformity. For UL/CSA/FCC compliance, please refer to the CB test certificates.

1.3 Safety symbols

The symbols below identify hazards and required protective equipment. Warning and Caution use the same exclamation symbol; read the title and instructions in every box.

DANGER: ELECTRIC SHOCK

Electric shock that may result in serious injury or death

Ignoring this notice may lead to electrical shocks and death.

DANGER: EXPLOSION HAZARD

Explosion that may result in serious injury or death

Ignoring this notice may cause explosions resulting in serious property damage and death.

WARNING: RISK OF INJURY

Injury or hazards to health with long-term effects

Ignoring this warning may lead to injuries with possible long-term effects.

CAUTION: MATERIAL DAMAGE

Ignoring this notice may cause material damage to the instrument and its peripherals.



WEAR PROTECTIVE GLOVES

Mandatory protective equipment

Wear the specified protective gloves when handling tubings, sampling devices or components that come into contact with them.

1.4 Pictograms

All pictograms used in this document are explained below:



ADDITIONAL INFORMATION

Additional information about the current topic.

1.5 Intended use of the BactoSwitch



INTENDED USE

The BactoSwitch is an accessory for the BactoSense CORE or BactoSense SMART, serial number 910500 onwards, software version 3.1.0 onwards.

The intended use of the BactoSwitch is to sequentially route water from each of its four inlets to the attached BactoSense instrument, to the integrated flowmeter and finally to the drain.

The BactoSwitch (and BactoSense) must be operated by trained technical personnel who have read and understood the content of both user manuals.

1.6 Usage restrictions



EXPLOSIVE ENVIRONMENTS

Operation in explosive areas can cause explosions, which can lead to the injury or death of persons in the vicinity.

- It is not permitted to operate the instrument in explosion hazardous areas or rooms.
- It is not permitted to use the instrument with explosive sample substances.

1.7 Improper use

IMPROPER USE

Improper use of the instrument can cause injuries to persons, process-related consequential damage and damage to the instrument and its peripherals. In the following cases the manufacturer cannot guarantee the protection of persons, the instrument and surrounding equipment, and therefore assumes no legal responsibility:

- The instrument is not used in the described area of application and intended use.
- The instrument is not installed, mounted, set up or transported in accordance with the user manual.
- The instrument is not operated in accordance with the user manual.
- The instrument is operated with accessory parts or consumables which bNovate Technologies SA has not specifically provided, approved or recommended.
- The instrument underwent improper changes or modifications.
- The instrument is operated outside of the specifications, in particular pressure, temperature and power.
- The instrument is operated with a different power supply unit.
- The instrument is exposed to vibrations, shocks, or other mechanical forces.

2. Instrument Overview

2.1 BactoSwitch product overview

An overview of the BactoSwitch elements is shown below:

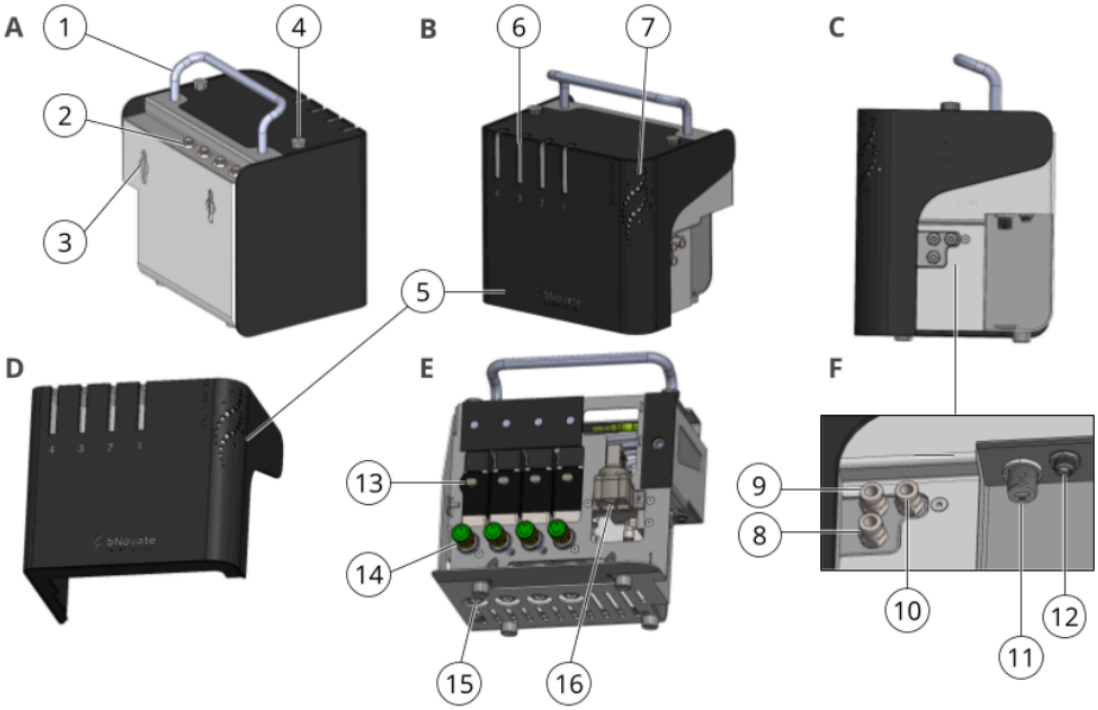


Figure 2-1 BactoSwitch elements

1	Handle	2	Input lines connectors
3	Wall mount	4	Front cover fixation knob
5	Removable front cover	6	Selected line light indicator
7	Status light indicator	8	Water line to BactoSense
9	Water line from BactoSense	10	Water line output to drain
11	USB-C socket	12	Power socket
13	Manual line open/close override	14	Flow rate adjustment knob
15	Pressure regulator set clearance	16	Flow meter

2.2 Light indicators

The behaviour of the light indicators is summarized in Table 2-1. Numbers refer to Figure 2-1, view B.

Table 2-1 Light indicator behaviour

LIGHT INDICATOR	BEHAVIOUR
Line selection lights (6)	**Blue:** line open **Off:** line closed
Status light (7)	**Green light:** idle **Slow blinking green light:** measurement in progress, no sampling **Fast blinking green light:** measurement in progress, sampling water from the line **Red light:** measurement error

2.3 Working principle

The scheme below shows the basic operation of the BactoSwitch (front cover removed for clarity). Water from each input line (1) flows through a check valve (2, not visible), through a pressure regulator (3), then through a needle flow valve (4) and finally through a solenoid valve (5). Each input line can be open or closed. Water from the open lines combines and flows out of the BactoSwitch to the online sampling device of the BactoSense (6). After flowing through the sampling device, water flows back to the BactoSwitch, through the flowmeter (7), and finally to the drain (8).

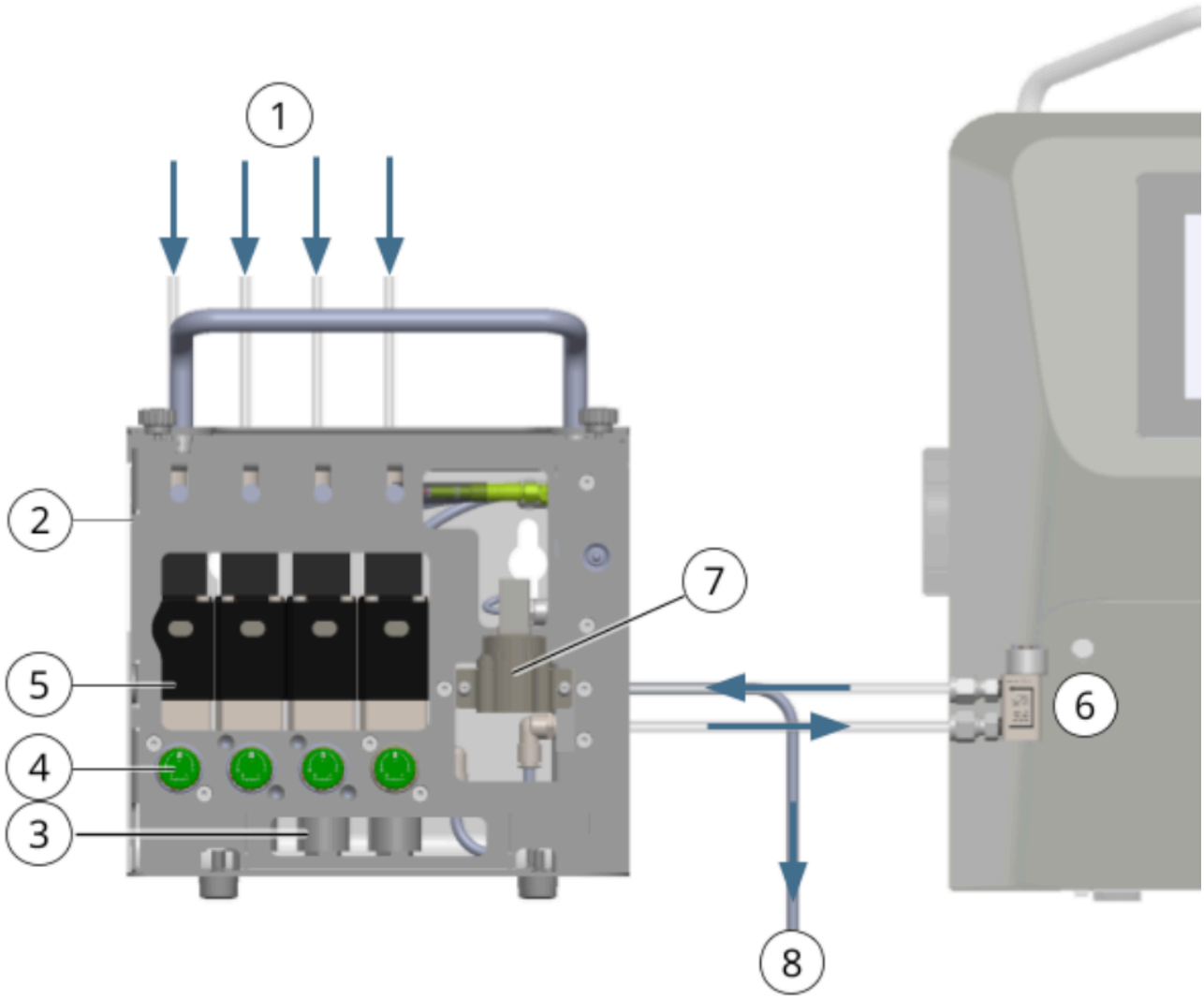


Figure 2-2 BactoSwitch working principle. See text above for explanations.

CLOSE UNUSED LINES

Solenoid valves of unused input lines must be closed manually and the corresponding lines disabled in the software. See Installation of the input lines and Line configuration for more information.

2.4 Type plate of the BactoSwitch

The type plate of the BactoSwitch can be found on the right-hand side of the instrument.

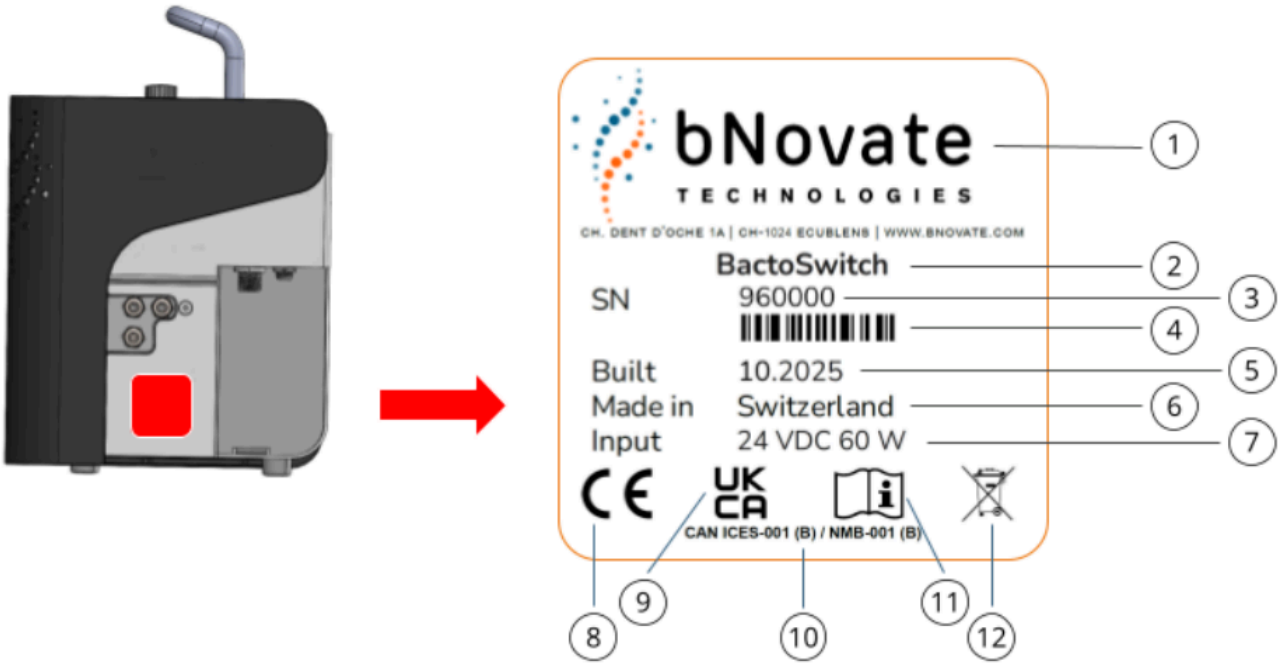


Figure 2-3 Type plate of the BactoSwitch

1	Manufacturer	2	Product name
3	Serial number	4	Barcode
5	Manufacturing date	6	Country of origin
7	Voltage and power requirements	8	CE mark
9	UKCA mark	10	Compliance with Canadian EMC and interference standards
11	Read the instructions and operate with caution	12	Disposal information

2.5 Type plate of the BactoSwitch power supply

The type plate of the BactoSwitch power supply can be found on the power supply and has the following elements:

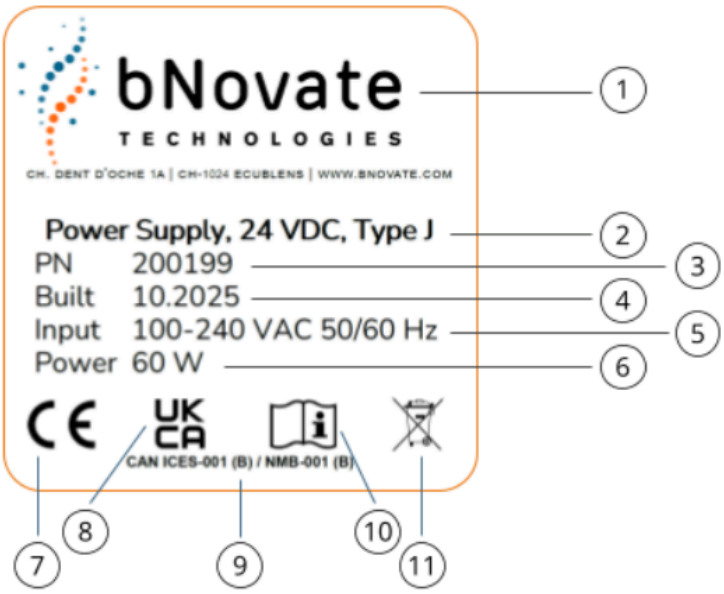


Figure 2-4 Type plate of the BactoSwitch power supply unit

1	Manufacturer	2	Product name
3	Part number (varies with plug type)	4	Manufacturing date
5	Service input voltage and frequency	6	Power consumption
7	CE mark	8	UKCA mark
9	Compliance with Canadian EMC and interference standards	10	Read the instructions and operate with caution
11	Disposal information		

2.6 Technical data

Table 2-2 Technical data of the BactoSwitch

PROPERTY	SPECIFICATION
GENERAL	
Required hardware version	BactoSense CORE/SMART, serial number 910500 onwards
Required software version	3.1.0-BS and above
Operating environment	Indoor use
Operating altitude	Max. 2000 m (6600 feet) above sea level
Operating temperature	5 °C – 30 °C (41 °F – 86 °F)
Operating humidity	10 % – 90 % RH
Storage temperature	5 °C – 30 °C (41 °F – 86 °F)

PROPERTY	SPECIFICATION
Storage humidity	10 % – 70 % RH
Ventilation requirements	None
Sound pressure level	< 64 dBA
Protection class	Instrument: IP65 Power supply: IP67
SAMPLING	
Sampling type	Online
Sample conditions	Water only Temperature: 5 °C – 40 °C (41 °F – 104 °F) Turbidity: 0 – 10 FTU, 0 – 10 FNU Conductivity: 0 – 100’000 µS/cm at 20 °C pH value: 5 – 12 Chlorine: max. 3 mg/L Iron: max. 200 µg/L Manganese: max. 50 µg/L Solid particles: < 0.5 mm
Number of inputs	4
Input pressure range	0.1 – 5 bar
Individual line flow rate range	150 – 400 mL/min
Pressure regulator	Built-in and pre-adjusted (non-relieving)
Flow control	Adjustable needle valve
Line selection	Normally open, media-separated solenoid valves Manual override close command
Fluidic interfaces	Push-in fitting ø6×1 mm
Inlet tubings	Material: PFA (transparent) Outer diameter: 6 mm Inner diameter: 4 mm Maximum length: 4 m Quantity: 4x
Online sampling device tubings	Material: PFA (transparent) Outer diameter: 6.35 mm (1/4’’) Inner diameter: 4.35 mm Recommended length: 200 mm Quantity: 2x
Outlet tubing to drain	Material: PFA (transparent) Outer diameter: 6 mm Inner diameter: 4 mm Maximum length: 2 m Quantity: 1x
Wetted materials	PFA, SS 316L, SS 316Ti, FKM, EPDM, ENP-brass, PPS 40 % GF, PVDF, zirconia ceramic

PROPERTY	SPECIFICATION
CLEANING	
Agents and conditions	Water (temperature: 1 °C – 85 °C, pressure: max. 2 bar, time: max. 15 min) Chlorine: max. 10’000 mg/L of active chlorine (temperature: max. 25 °C)
PHYSICAL	
Dimensions (W x D x H)	264 × 206 × 300 mm (10.4 × 8.1 × 11.8″)
Weight	12 kg (26.5 lbs)
Power supply dimensions (W x D x H)	230 × 80 × 65 mm (9.0 x 3.1 × 2.6″)
Power supply weight	0.9 kg (2.0 lbs)
ELECTRICAL	
Installation category	II
Pollution degree	2
Power supply	Power supply unit: 100 – 240 VAC ± 10 %, 50/60 Hz, 1.4 A BactoSwitch: 24 VDC, 60 W
Power consumption	Max. 60 W
INTERFACES	
USB	1 x USB 2.0 type C (female)

3. Safety

3.1 Dangers

DAMAGED CABLES

Damaged instrument or cabling

Touching damaged cables may lead to electrical shocks or death.

- The instrument may be operated only when the cables are intact.
- The instrument may be operated only if it has been properly installed or repaired.

MAINS VOLTAGE

Dangerous voltage inside the supplied mains device connection and cable

- Touching a wet or damaged mains device may lead to electrical shocks or death.
- Do not position the mains device in moist locations.
- Do not operate the mains device if its housing is damaged.

CORRECT SUPPLY VOLTAGE

Damage due to incorrect service voltage

If the instrument is connected to an incorrect service voltage, the instrument can be damaged.

- The instrument must only be connected to voltage sources as specified on the type plate.
- The instrument must only be operated with the supplied power supply unit, as described in Electrical connections.

KEEP THE MANUAL AVAILABLE

Missing user manual

Operating the instrument without following the procedures indicated in the user manual may lead to injuries to persons and damage to the instrument.

- If the instrument changes hands, always include the user manual.
- If the user manual is lost, you can contact bNovate to request a replacement at www.bnovate.com/contact.

PREVENT CONDENSATION

Moisture or condensation on the electrical components

If moisture enters the instrument's electronic enclosure, the instrument can be damaged.

- The electronic enclosure covers and lids must always be attached during operation.
- Service inside the electronic enclosure must only be performed by trained personnel in a dry room and at room temperature. The instrument should be at operating or room temperature (avoid condensation on electrical surfaces).

⚠ AVOID AGGRESSIVE CHEMICALS

Use of aggressive chemicals

Use of aggressive chemicals can cause damage to instrument components.

- Do not use aggressive chemicals or cleaning agents.
- Should the instrument come in contact with aggressive chemicals, clean it thoroughly with a neutral cleaning agent.
- Use a damp cloth (water only) to clean the exterior of the device.

3.2 Residual risk

⚠ MEASUREMENT ACCURACY

Risk of the displayed measurement values being incorrect

According to the risk assessment of the applied safety directive DIN EN 61010-1, there remains the risk of the displayed measurement values being incorrect. This risk can be reduced with the following measures:

- Perform the specified servicing duties.
- Use an access code on the BactoSense to prevent unauthorized persons from changing parameters.

⚠ CROSS-CONTAMINATION

Risk of cross-contamination

According to the risk assessment of the applied safety directive DIN EN 61010-1, there remains a risk of cross-contamination of the water pipes if the check valves inside the BactoSwitch fail. Customers should consider installing mitigation measures (e.g. double check valves) if that risk is not acceptable.

3.3 Warning and danger symbols on the device

⚠ FOLLOW THE SAFETY INSTRUCTIONS

No warning or danger symbols on the instrument

Users must ensure that they observe the safety measures as specified in the user manual at all times when working with the instrument and its peripheral equipment, even if no warning or danger symbols are attached to the instrument.

- Observe safety points when performing the described procedures.
- Observe local safety regulations.

4. Installation

⚠ **BEFORE INSTALLATION**

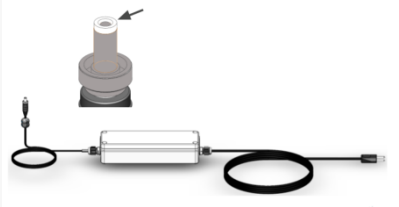
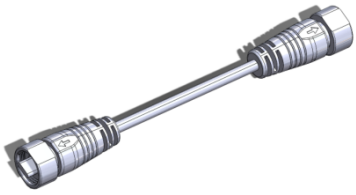
Attention

Before working on the instrument, carefully read the safety points.

- Perform the work steps in the exact order instructed.
- When replacing parts, use only genuine original parts supplied or recommended by bNovate.
- Modification or repair of the BactoSwitch by non-agreed service technicians is at the customer's risk and responsibility and voids the warranty.
- Use the original packaging of the BactoSwitch when returning components.

4.1 Packing list

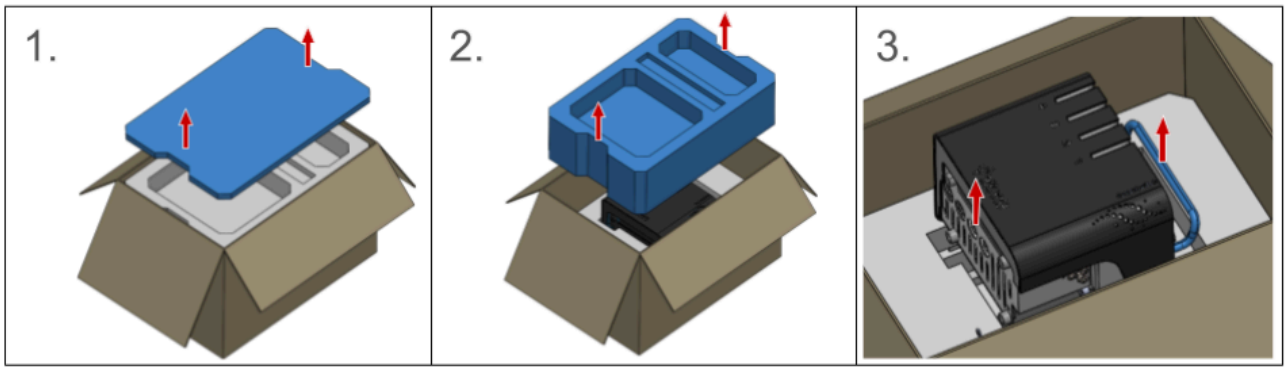
Table 4-1 BactoSwitch packing list

ART. NO	NAME	IMAGE
200195	BactoSwitch	
200199 – Type J plug (CH) or 200200 – Type E plug (EU) or 200201 – Type G plug (UK) or 200202 – Type B plug (USA)	Power supply unit Note: To avoid confusion with the BactoSense power supply, the BactoSwitch power connector tip has a white ring.	
101265	Waterproofed dual head USB-C cable, L = 50 cm	

ART. NO	NAME	IMAGE
101368	PFA tubing roll ø6 mm x 4 mm, 15 m	
101382	Tube cutting tool	
101367	Online sampling device with pre-installed 200 mm long OD ¼" tubings and protective cap	
101022 (Cardboard) 101362 (Foam set)	BactoSwitch packaging	

4.2 Unpacking

	WORK STEP
1.	Open the box and remove the lid.
2.	Remove the compartments with accessories.
3.	Carefully remove the BactoSwitch from the box.
4.	Store the packaging and foams for future use.



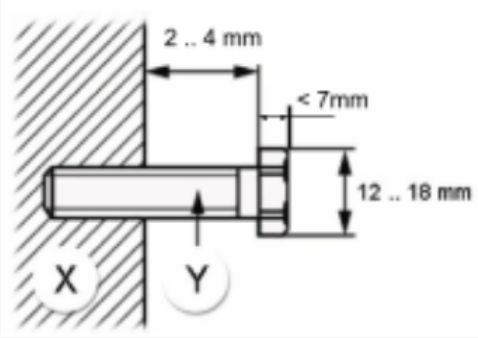
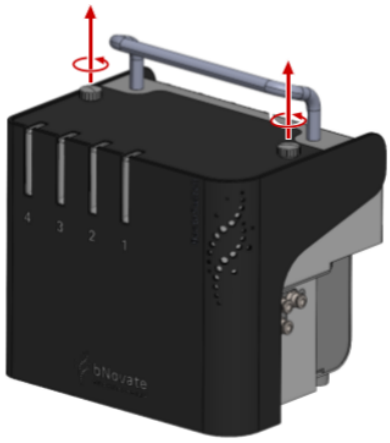
4.3 Placement of the BactoSwitch

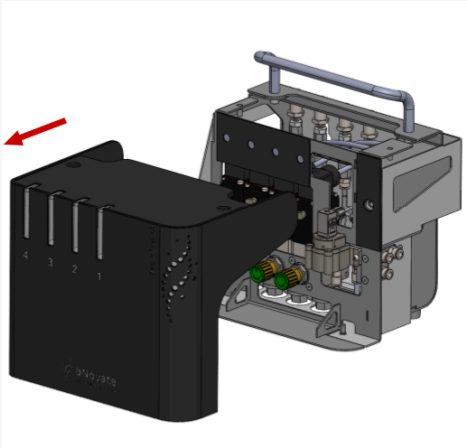
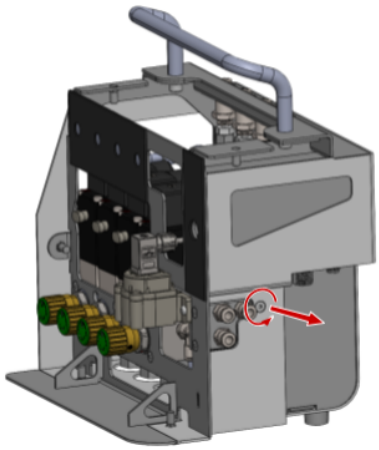
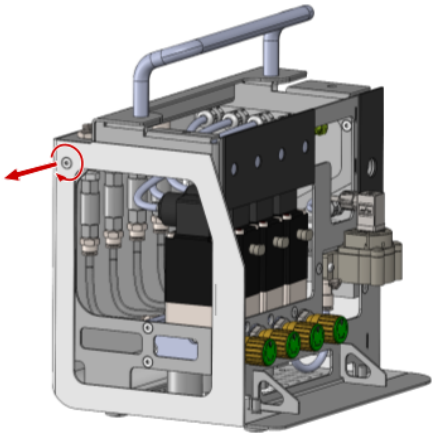
The BactoSwitch can be operated as a benchtop instrument on a flat surface, or mounted to a wall or panel.

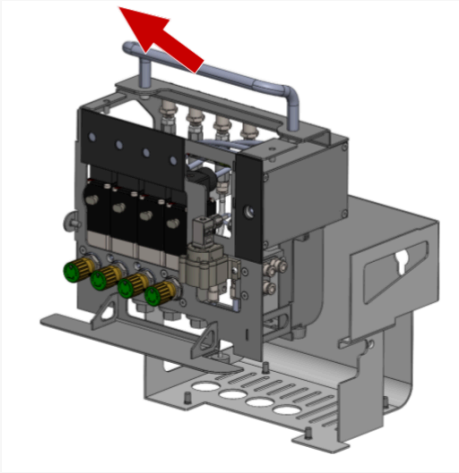
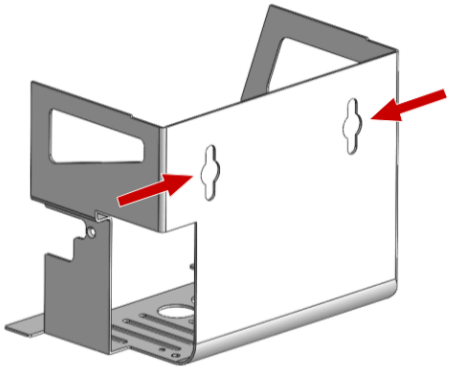
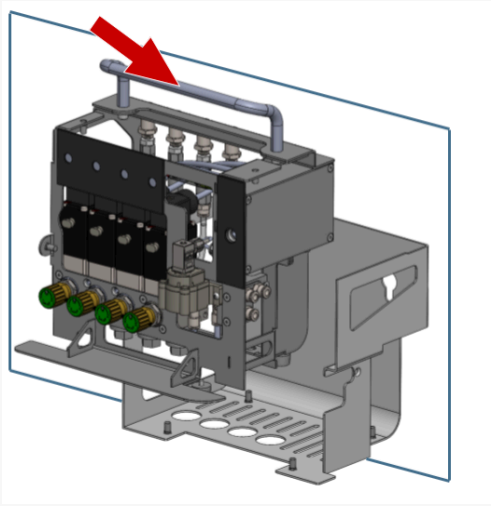
> **CHOOSE A SUITABLE LOCATION**
>
> Note the following points for selecting an appropriate operating location:
>
> - The BactoSwitch shall be installed in a vibration-free environment.
> - The power supply must be stable, without spikes or interruptions.
> - The BactoSwitch should not be exposed to direct sunlight during operation.

4.3.1 Mounting the BactoSwitch with BactoSense on a wall or panel

The following procedure describes the mounting of the BactoSwitch to a vertical wall or panel, next to a BactoSense. Please also consult Mounting the BactoSense on a wall in the BactoSense user manual.

	WORK STEP	ADDITIONAL INFO / IMAGES
1.	The 4 fixation points for a BactoSwitch with BactoSense are shown in Figure 4-1 below this table. The screw head diameter needs to be between 12 mm and 18 mm (0.47" – 0.71"), and the screw head needs to be less than 7 mm (0.28") thick.	**SECURE WALL MOUNTING** Each fixation screw must be able to carry at least 30 kg (66 lbs).
2.	Adjust the distance between the screw heads and the wall according to the picture on the right. X: Wall Y: Screw	
3.	Unscrew and remove the two knob screws on top of the front cover.	

	WORK STEP	ADDITIONAL INFO / IMAGES
4.	Detach the front cover from the BactoSwitch.	
5.	Remove the two screws from both sides of the structure, using a 2.5 mm hex key.	 

	WORK STEP	ADDITIONAL INFO / IMAGES
6.	Detach the rear structure from the rest of the assembly by lifting it with the handle.	
7.	Mount the rear structure on the wall using its wall mounting system (red arrows). Tighten the two screws such that the structure is firmly attached to the wall.	
8.	Place the main assembly back into the rear structure now fixed to the wall.	
9.	Re-install the two screws removed in step 5.	

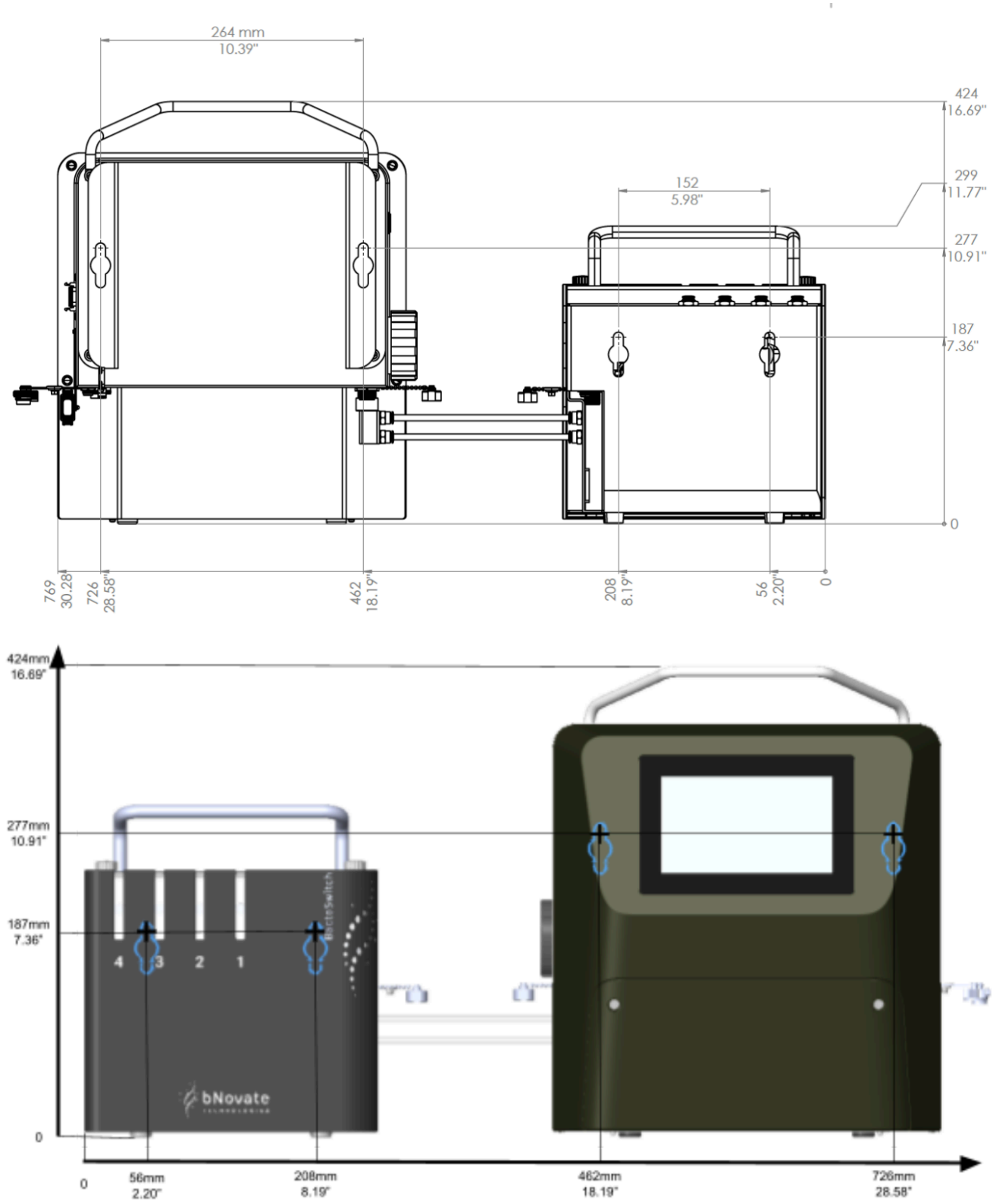


Figure 4-1a Location of BactoSwitch and BactoSense mounting points for serial numbers up to 960015. Top: back view (horizontal axis reversed). Bottom: front view.

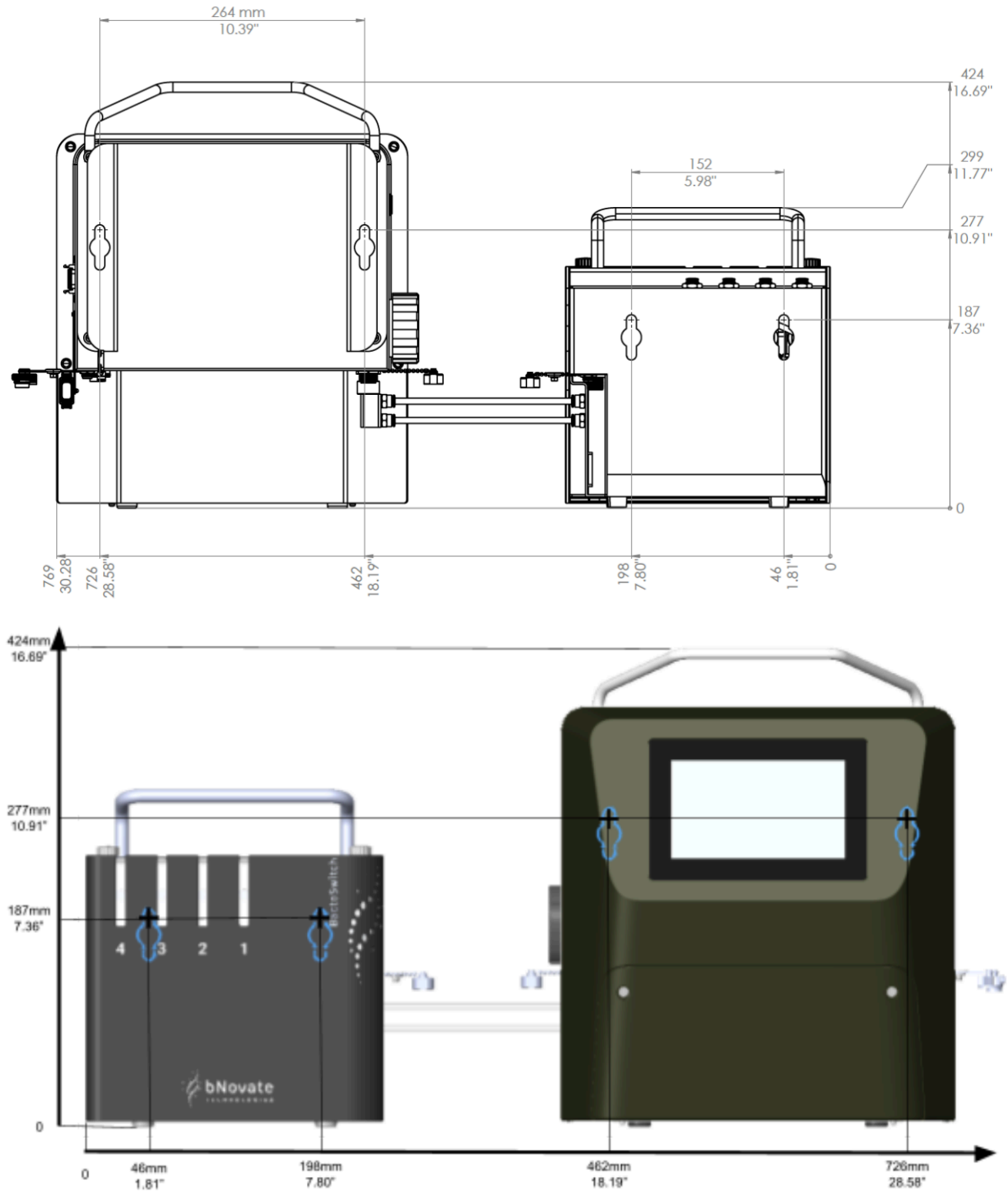


Figure 4-1b Location of BactoSwitch and BactoSense mounting points for serial numbers from 960016 and above. Top: back view (horizontal axis reversed). Bottom: front view.

4.4 Installation of the fluidic lines

Figure 4-2 provides a schematic illustration of the fluidic lines installation. Detailed explanations and instructions are given below.

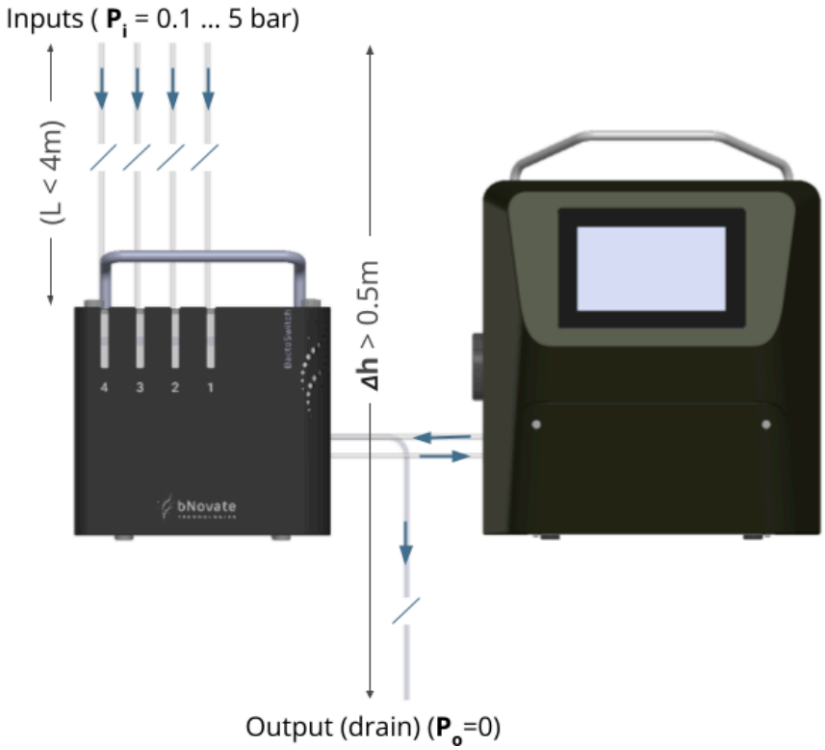


Figure 4-2 Overview of the fluidic lines installation

Please consider the following points:

- Tubings should be kept as short as possible. The maximum recommended length is 4 m (157.5″) for each tubing, but it depends on available pressure, bacterial load, etc.
- The input pressure range P_i of 0.1 ... 5 bar assumes a minimum height difference Δh of 0.5 m between the inputs and the output. Every additional meter of height difference Δh reduces the needed input pressure P_i by approximately 0.1 bar.
- It is not necessary to have all 4 water inputs connected; the BactoSwitch can work with 2 or 3 inputs as well. However, the system needs to be configured appropriately. See Installation of the input lines.

WEAR NITRILE GLOVES

Avoid contamination of the equipment. Wear nitrile gloves when handling tubings, the online sampling device, and any component which comes in contact with them.

DO NOT RETURN DRAIN WATER

Do not return drain to the water pipe system

Water diverted from the water system must not be returned to it after flowing through the BactoSwitch and BactoSense. Water from the output must go to a drain (used / waste water).

CROSS-CONTAMINATION RISK

The BactoSwitch is equipped with check valves to prevent water from flowing from one line to another. However, a cross-contamination risk exists in case those valves fail. Customers should consider installing mitigation measures (e.g. double check valves) if that risk is not acceptable. Double check valves may require extra pressure.

⚠ **SECURE TUBINGS AND SAMPLING DEVICE**

Firmly attach tubings and sampling device

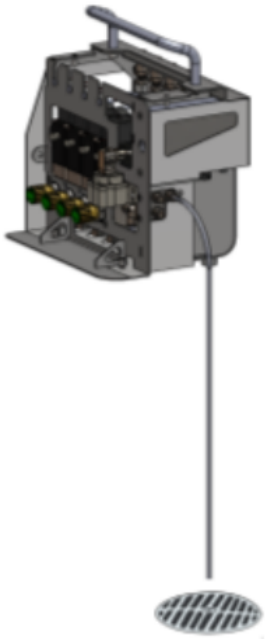
If the plumbing, tubings or sampling device are not tightly assembled or mounted, liquid can squirt and injure the user, or flood surrounding areas and cause material damage to nearby objects or infrastructure. All tube junctions must be carefully secured and tightened. The connections should be checked periodically after installation.

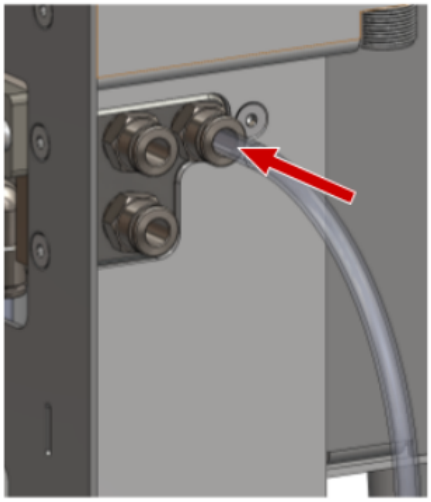
⚠ **INSPECT TUBINGS AFTER ASSEMBLY**

Inspect tubings following assembly

Pinched tubings can increase the flow resistance and reduce flow rates or prevent liquid from flowing at all. The tubings should be checked periodically for pinching after installation.

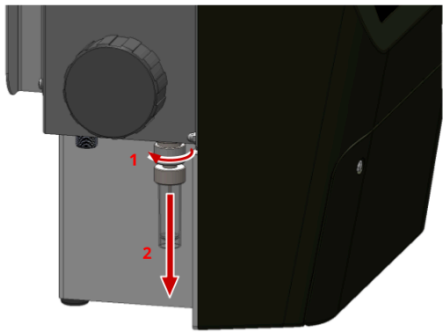
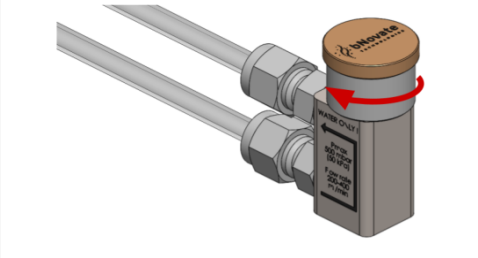
4.4.1 Installation of the output tubing (drain)

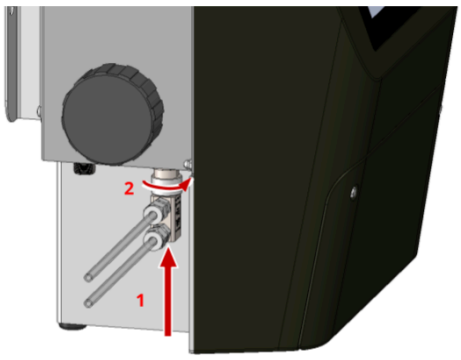
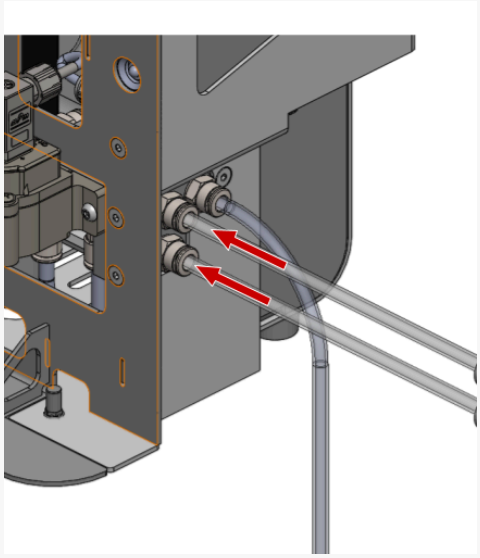
	WORK STEP	ADDITIONAL INFO / IMAGES
1.	Measure the tubing length needed from the BactoSwitch water output connector to the drain, considering that: • **IMPORTANT:** Water diverted from a drinking water pipe system **must not be returned** to the drinking water pipe system after flowing through the BactoSwitch; it must go to a drain (used water).	
2.	Cut the tube to the desired length with the provided tube cutting tool, making sure that tubings are cut square to prevent leaks. ⚠ **CUT TUBINGS SQUARE** **Make sure that tubings are cut square** to prevent leaks or tubing detachment.	

	WORK STEP	ADDITIONAL INFO / IMAGES
3.	Insert the tube up to the fitting end-stop. ⚠ **CHECK THE CONNECTION** **Pull back on the tubings** to verify they are correctly connected.	
4.	Fix the other side of the tubing (output) in the drain.	The tubing output must not face any back pressure and the water must be free to flow out.

4.4.2 Installation of the online sampling device

The BactoSwitch comes with a dedicated online sampling device with pre-cut (200 mm) and pre-installed tubings. This facilitates the installation, as the tubing length is adjusted to fit the installation hole pattern (Mounting the BactoSwitch with BactoSense on a wall or panel).

	WORK STEP	ADDITIONAL INFO / IMAGES
1.	Remove the manual sampling device from the BactoSense by: • unscrewing the knurled fixation ring and • pulling gently down.	
2.	• Use the sampling device with 200 mm pre-cut tubings supplied with the BactoSwitch. • Remove the protective cap from the online sampling device by loosening the knurled fixation ring (the protective cap cannot turn), and attach it to the manual sampling device of the BactoSense.	

	WORK STEP	ADDITIONAL INFO / IMAGES
3.	Attach the BactoSwitch online sampling device to the BactoSense: • Insert the online sampling device in the sampling port of the BactoSense, carefully aligning the positioning pins of the online sampling device with the openings in the BactoSense sampling device port. • Tighten the knurled fixation ring until the sampling device is installed tightly. ⚠ **FINGER-TIGHT ONLY** Tighten by hand only. Do not use any tools.	
4.	• Insert both tubes up to the fitting end-stop. ⚠ **CHECK THE CONNECTION** **Pull back on the tubings** to verify they are correctly connected.	

4.4.3 Installation of the input lines

Reduction fittings must be installed on the input (water pipe) side to accommodate the supplied PFA 6 mm OD tubing.

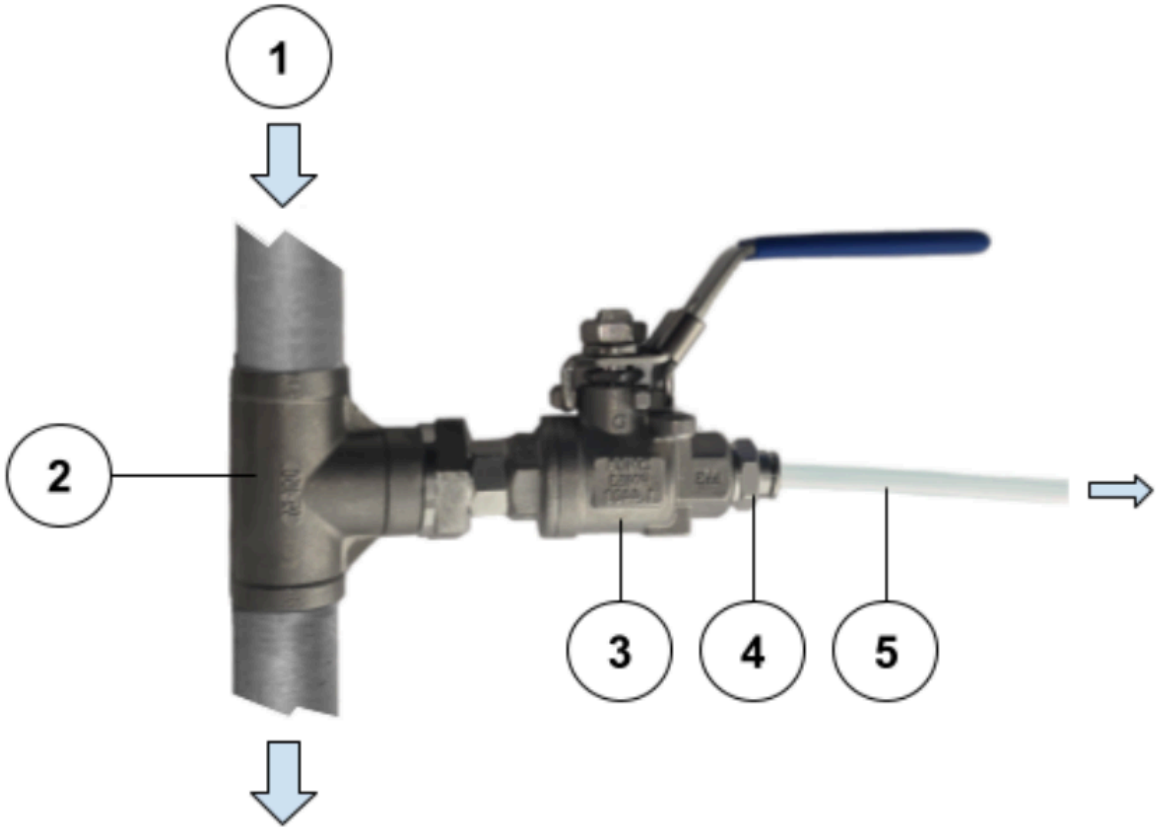
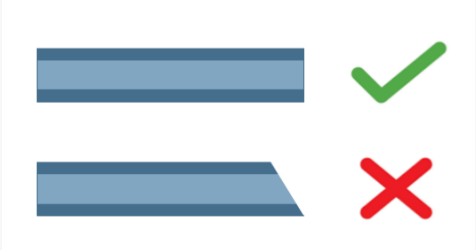
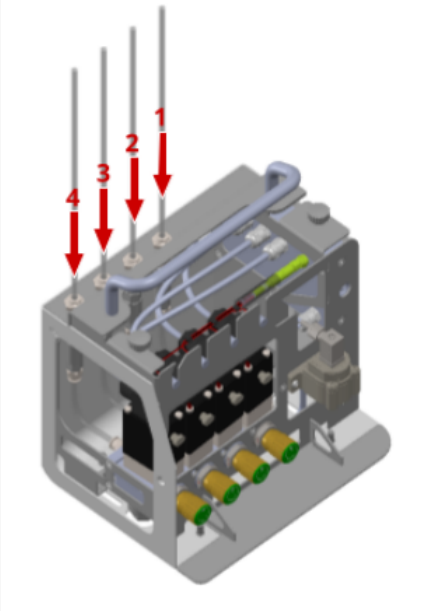
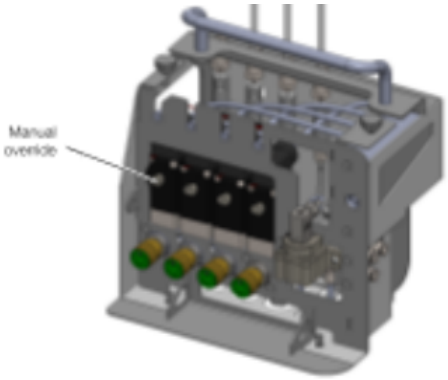


Figure 4-3 Typical input tubings installation, on source side

#	DESCRIPTION
1	Existing line to monitor
2	T-junction
3	On/Off valve
4	Reduction fittings to ø6 mm tubing
5	PFA tubing to BactoSwitch ø6 mm x 1 mm

	WORK STEP	ADDITIONAL INFO / IMAGES
1.	Define the tubing length needed from the BactoSwitch water input connectors to the water pipe reduction fittings. Consider the recommended maximum tubing length of 4 m when deciding where to place the instrument.	
2.	Cut the tubes to the desired length with the provided tube cutting tool. ⚠ **CUT TUBINGS SQUARE** **Make sure that tubings are cut square** to prevent leaks or tubing detachment.	

	WORK STEP	ADDITIONAL INFO / IMAGES
3.	Connect each tubing to the source side fittings (water pipes).	
4.	On the BactoSwitch, insert each tubing up to the fitting end-stop. ⚠ **CHECK THE CONNECTION** **Pull back on the tubings** to verify they are correctly connected.	
5.	Should any of the input lines be unused, the corresponding solenoid valve must be closed manually: • Press and hold the manual override. • Turn the manual override clockwise by 90° to switch the line off. The manual override is open when it is horizontal, closed when it is vertical. Note: Unused input lines must also be disabled in the BactoSense user interface, as explained in Line configuration.	 

4.5 Electrical connections

Figure 4-4 provides a schematic illustration of the electrical connections. Detailed instructions for the connections are given below. Please refer to Connecting the BactoSense to power in the BactoSense user manual for more details.

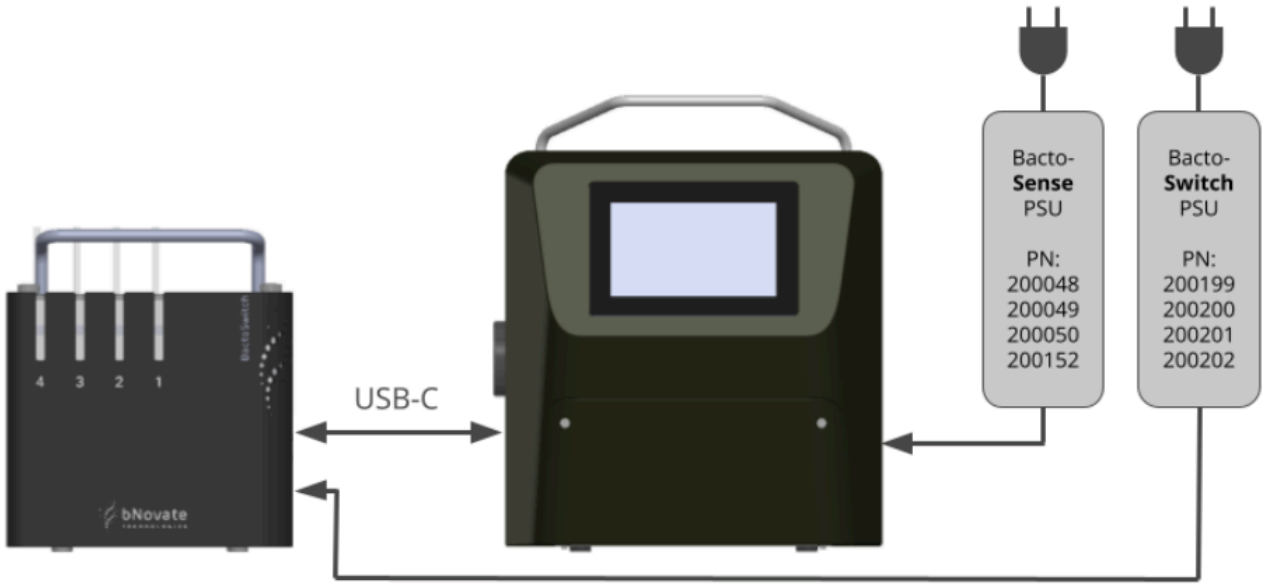


Figure 4-4 Schematic illustration of a BactoSwitch electrical installation

⚠ USE THE ORIGINAL POWER SUPPLY

The BactoSwitch must be operated using the supplied original power supply unit (PSU) to ensure:

- Compliance with the applicable standards for safety, EMC, ingress protection and RoHS, as listed in Declaration of conformity, norms and classifications.
- Instrument performance according to bNovate instrument validation protocols.
- Warranty coverage.

Operation with alternative power supply units requires specific evaluation and permission by bNovate.

⚠ STABLE POWER SUPPLY

An uninterrupted and stable power supply as specified in Technical data must be guaranteed.

⚠ DO NOT INTERCHANGE POWER SUPPLIES

The BactoSwitch and the BactoSense each have their own power supply type, with different output voltages and different power connectors. They are not interchangeable!

Each power supply comes in an IP67 enclosure with a cable fitted with a type J, type E, type G or type B plug.

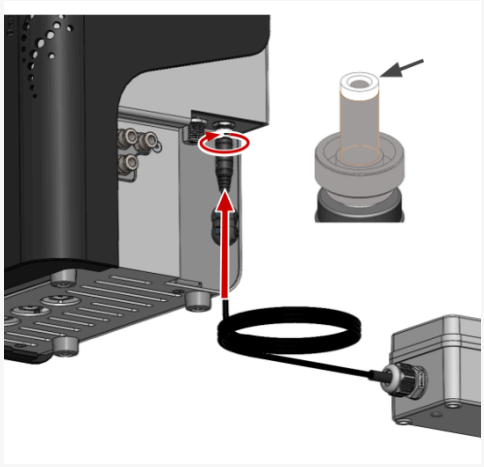
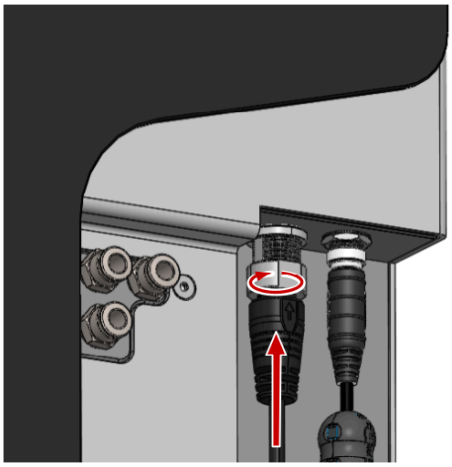
Table 4-2 Part numbers of BactoSwitch and BactoSense power supplies

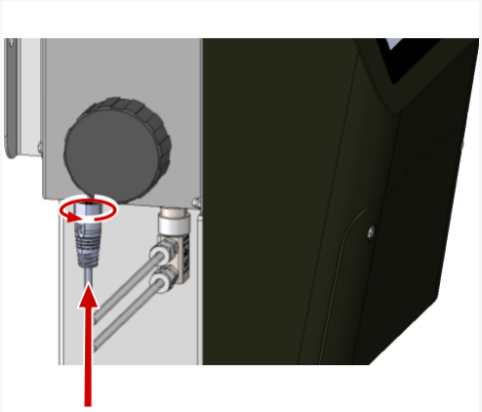
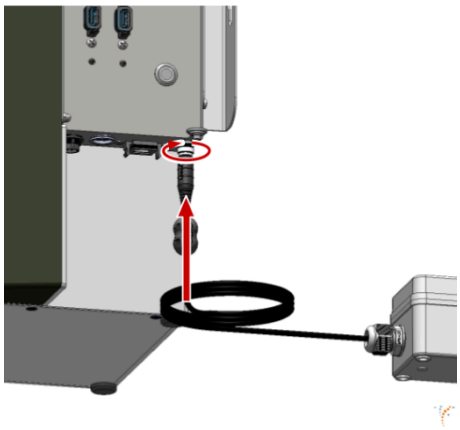
	TYPE J (CH)	TYPE E (EU)	TYPE G (UK)	TYPE B (USA)
BactoSwitch PSU	200199	200200	200201	200202
BactoSense PSU	200048	200049	200050	200152

KEEP THE POWER DISCONNECT ACCESSIBLE

- The electrical plug or an additional circuit breaker should always be accessible to disconnect the main supply.
- The circuit breaker should respect the standards IEC60947-1 and IEC60947-3 and should protect a current of 10 A to 16 A.
- It is recommended that the transformer be connected to an electrical installation compliant with IEC 60364 and protected by a residual current device (RCD) with a rated residual operating current not exceeding 30 mA.

Note: The BactoSwitch does not have a power button; it is powered on as soon as its power supply unit is connected. It is detected by the BactoSense as soon as it is connected via the provided USB-C cable.

	WORK STEP	ADDITIONAL INFO / IMAGES
1.	Identify the power supplies of the BactoSwitch and the BactoSense, based on Table 4-2.	
2.	Make sure both power supply units are dry and do not show any signs of damage.	
3.	Plug the J, E, G or B-type plugs of the power supply units into a power source supplying the indicated voltage.	
4.	Refer to Table 4-2 to identify the correct BactoSwitch power supply part number. Remove the cover of the BactoSwitch power connector, insert the power connector plug into the power connector socket, and fasten the locking ring.	
5.	Remove the cover of the BactoSwitch USB connector. Connect the supplied USB-C cable to the BactoSwitch and tighten the locking ring to secure it.	

	WORK STEP	ADDITIONAL INFO / IMAGES
6.	Remove the cover of the USB-C connector on the left side of the BactoSense, insert the USB-C connector and tighten the locking ring to secure it.	
7.	Refer to Table 4-2 to identify the correct BactoSense power supply part number. Remove the cover of the power connector on the right side of the BactoSense, insert the power connector plug into the power connector socket, and fasten the locking ring. If the power connector is connected correctly and the instrument is powered, the instrument power button starts blinking. Please refer to the BactoSense user manual for more details.	
8.	To switch the BactoSense on, briefly press the power button. The BactoSense power button LED lights up constantly and after a few seconds, the welcome screen is displayed on the user interface. Please refer to the BactoSense user manual for more details.	
9.	If all connections are made correctly, the BactoSwitch status light turns green and the four line selection lights light up blue to indicate that the line valves are all open.	See Light indicators for more information on the status light operation.

4.5.1 Modifying the standard power supply unit with a different connector

USING A DIFFERENT POWER CONNECTOR

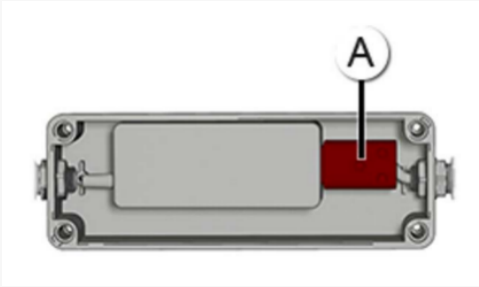
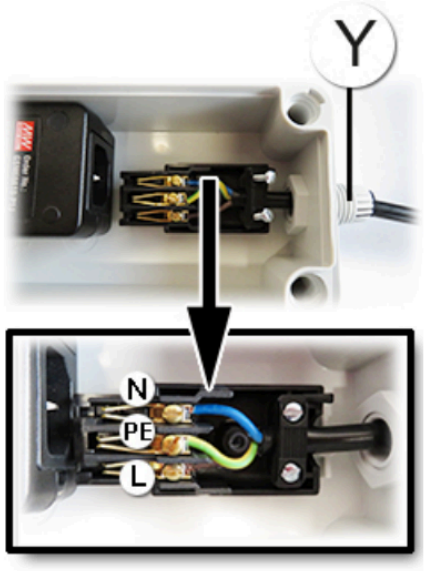
The following procedure only applies if the BactoSwitch shall be connected to a power source with a different plug than what has been delivered together with the standard power supply unit (J, E, G or B). In that case, the power supply unit is opened and the new connector installed manually.

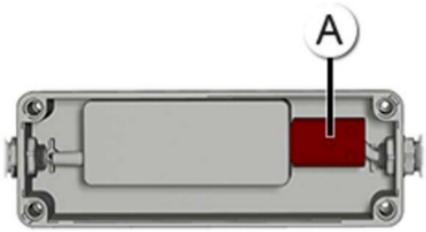
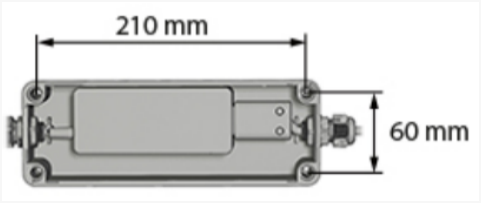
QUALIFIED ELECTRICIANS ONLY

- Only professional electricians are authorized to modify the power supply unit.
- It is forbidden to modify or repair the BactoSense instrument.
- Perform the work steps in the exact order instructed.
- Always use a plug with Protective Earth (PE).

POWER CABLE REQUIREMENTS

- If the power supply cable is longer than 2 m, label it near the plug with the name of the device.
- If the power supply cable is longer than 20 m, the impedance of PE needs to be smaller than 0.2 Ω.

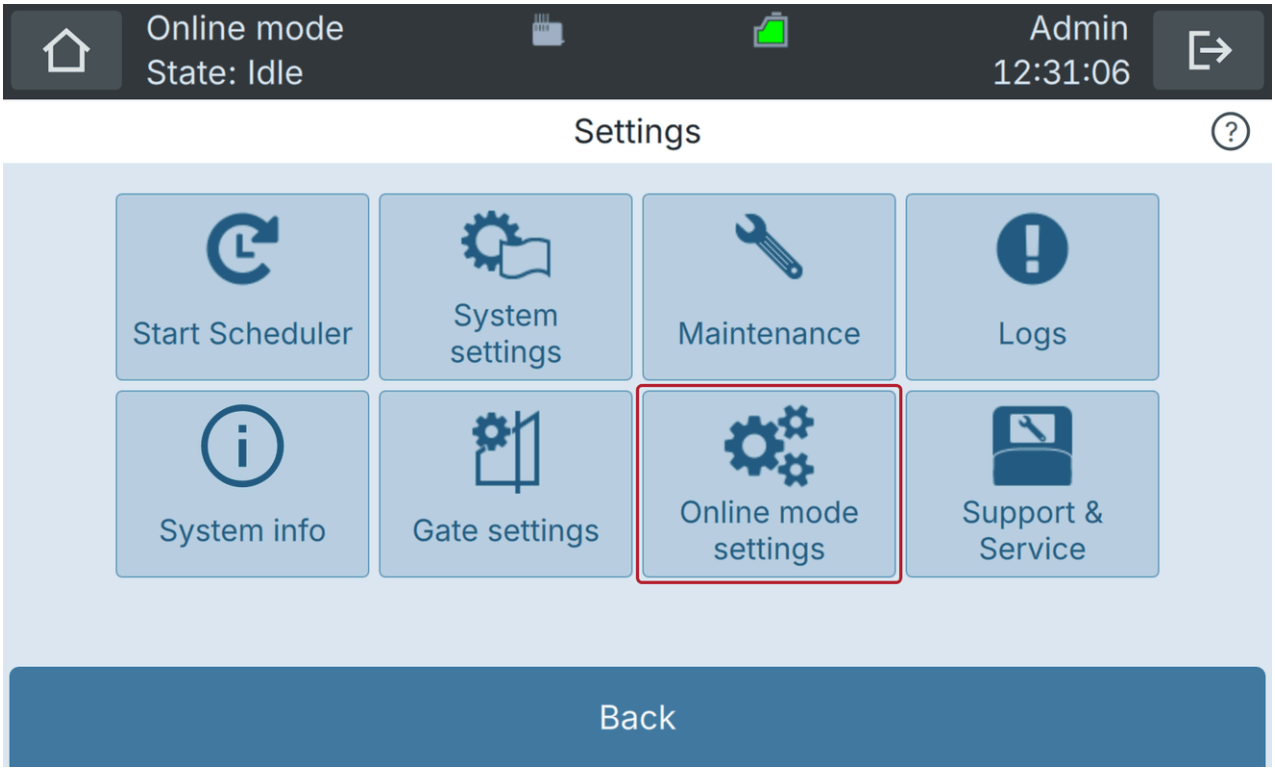
	WORK STEP	ADDITIONAL INFO / IMAGES
1.	**DISCONNECT THE POWER SUPPLY** Ensure that the power supply is not connected to power. Remove the cover of the enclosure by unscrewing the four screws (circles).	
2.	Remove the C13 connector (A) and unscrew it to open. 	
3.	Open the cable connector (Y) and insert the new cable. Cable lengths and wire cross sections: • 0 – 9 m (0 – 30 ft), 1 mm^2 • 9 – 21 m (30 – 69 ft), 1.5 mm^2 (maximal) The cable connector is dimensioned for a cable diameter of 3 – 10 mm (0.12″ – 0.39″).	

	WORK STEP	ADDITIONAL INFO / IMAGES
4.	**CONNECT PROTECTIVE EARTH** Tighten the 3 wires (N, PE, L) in the electrical terminal and secure the cable insulation. Ensure that a plug with Protective Earth (PE) is used and the device is correctly connected to it.	See the inset in the image above.
5.	Close the C13 connector (A) using the screw and plug it into the power supply. Tighten the cable connector. Try to pull the cable to assess whether the cable connector is tight enough.	
6.	Optional: the power supply can be mounted on a wall. M4 screws should be used with a minimum length of 20 mm. With the cover still removed, place the 4 screws and fix the enclosure to the wall.	
7.	Put the cover of the enclosure back and tighten the four screws to seal it.	
8.	Connect the power supply unit to power and the instrument as described in Electrical connections.	

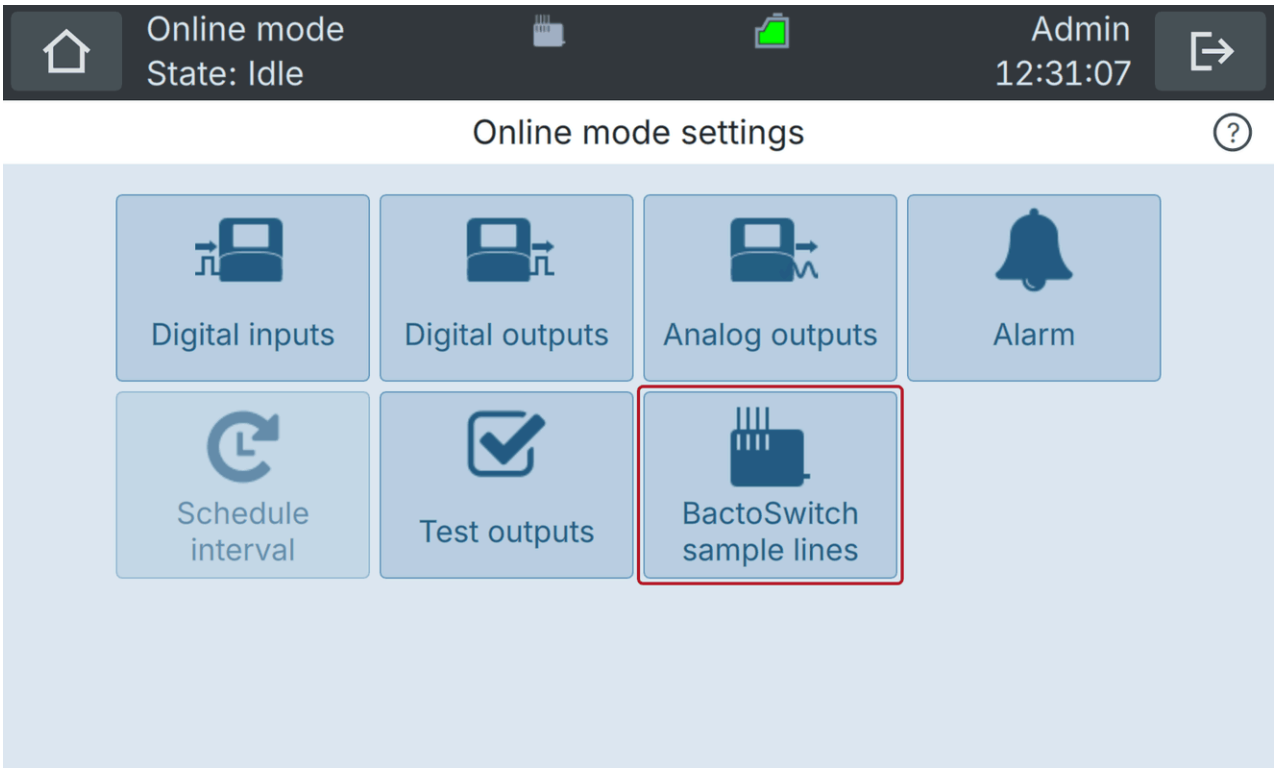
4.6 Line configuration

The following sections show examples of the BactoSense user interface. They assume that you are familiar with the BactoSense and only focus on BactoSwitch operation. Please refer to the BactoSense user manual for more information.

Log in to the BactoSense in Admin mode. In **Settings**, select **Online mode settings**.



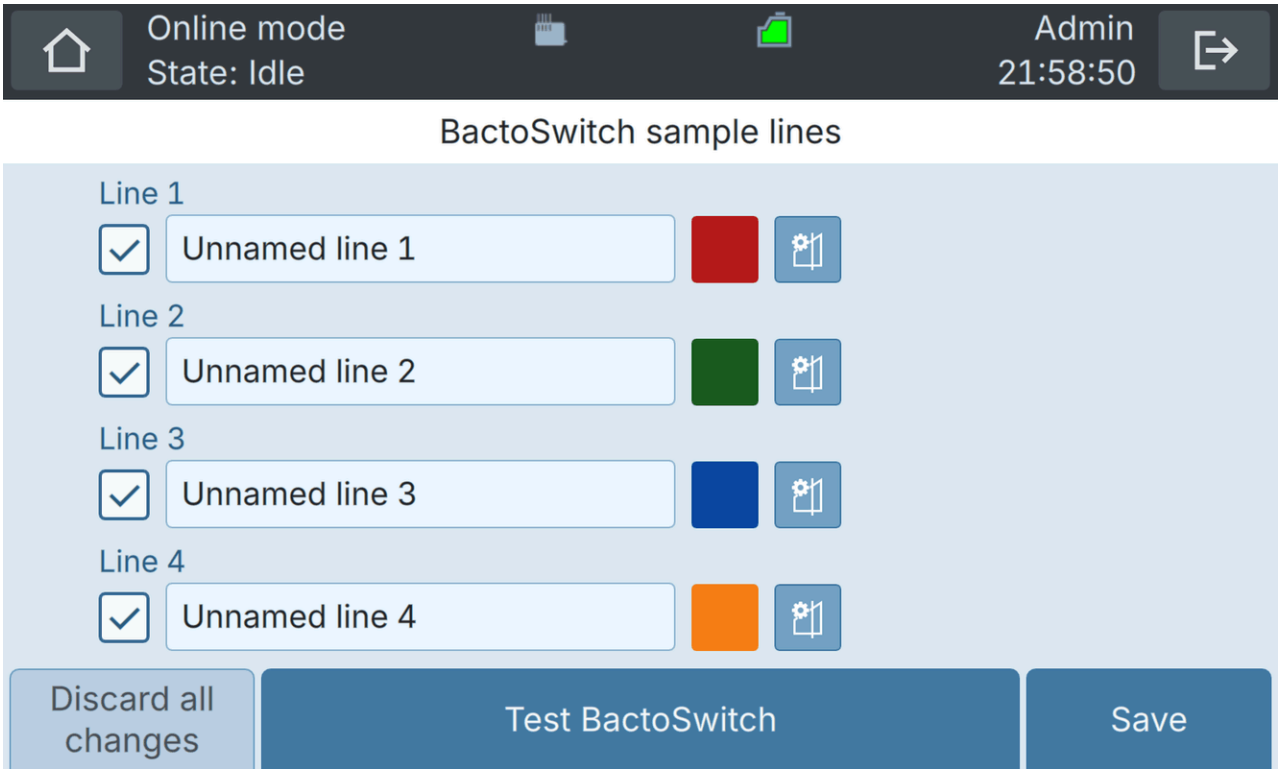
Next, select **BactoSwitch sample lines**:



The BactoSense detects the BactoSwitch automatically as soon as it is connected and powered (see Electrical connections); the BactoSwitch icon then appears in the top toolbar.

On the **BactoSwitch sample lines** page you can:

- Enable or disable a line. Lines that are not physically connected must be closed with the manual override (as explained in Installation of the input lines) and must be unchecked here.
- Rename the lines.
- Change the color that is used to plot the lines in the graphs.



Press **Save** to store the changes. While the advanced scheduler is enabled, the lines cannot be edited on this page.

4.7 Priming water in the system

Carefully open the On/Off valves at your sampling points to let water flow through the system, and carefully check the appliance for leaks at the:

- Input lines connectors (#2 in Figure 2-1)
- Tubings between the BactoSwitch and the BactoSense (#8 and #9 in Figure 2-1)
- Output to drain tubing connector (#10 in Figure 2-1)
- Online sampling device connection to the BactoSense (see work step 3 in Installation of the online sampling device)

Also, watch for any water puddle forming below the BactoSwitch and the connection to the BactoSense.

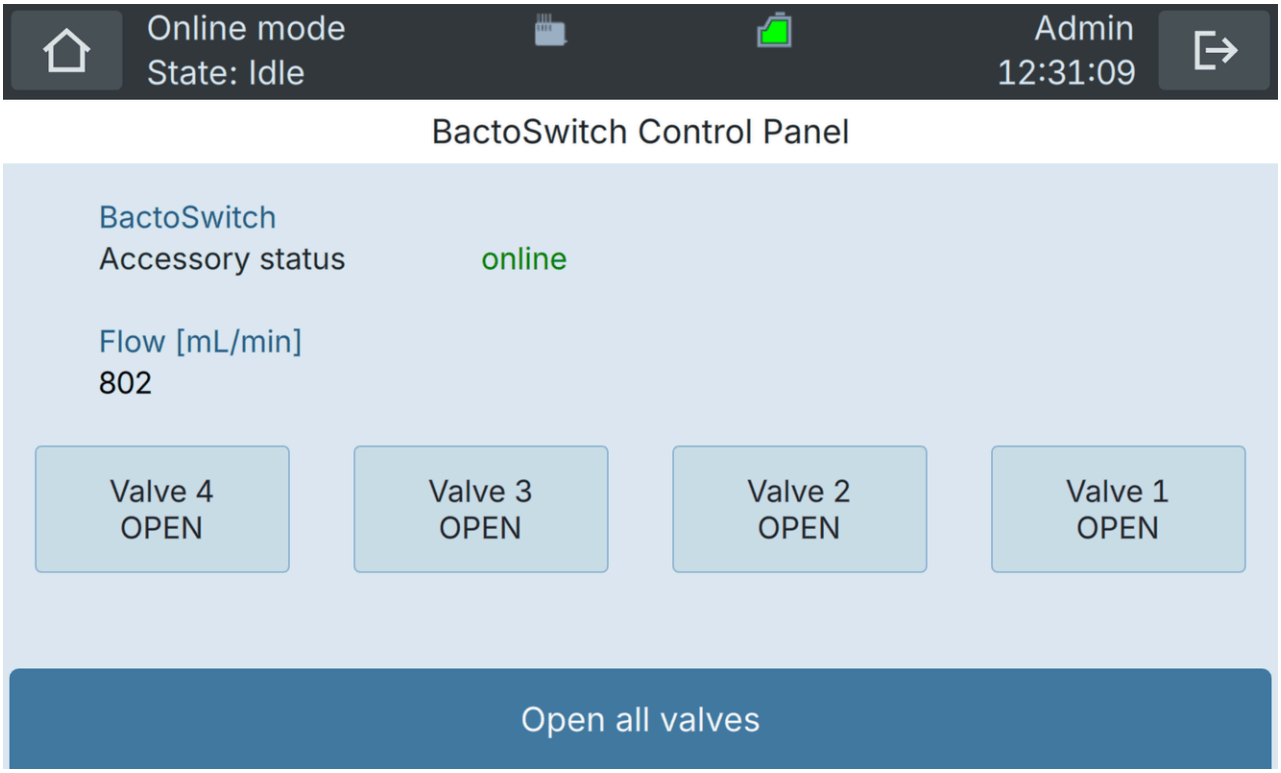
If any leak appears, close the On/Off valves at your sampling points before troubleshooting.

Note that the solenoid valves inside the BactoSwitch are all open by default (NO = “Normally Open”), so water should flow freely from the inputs to the drain.

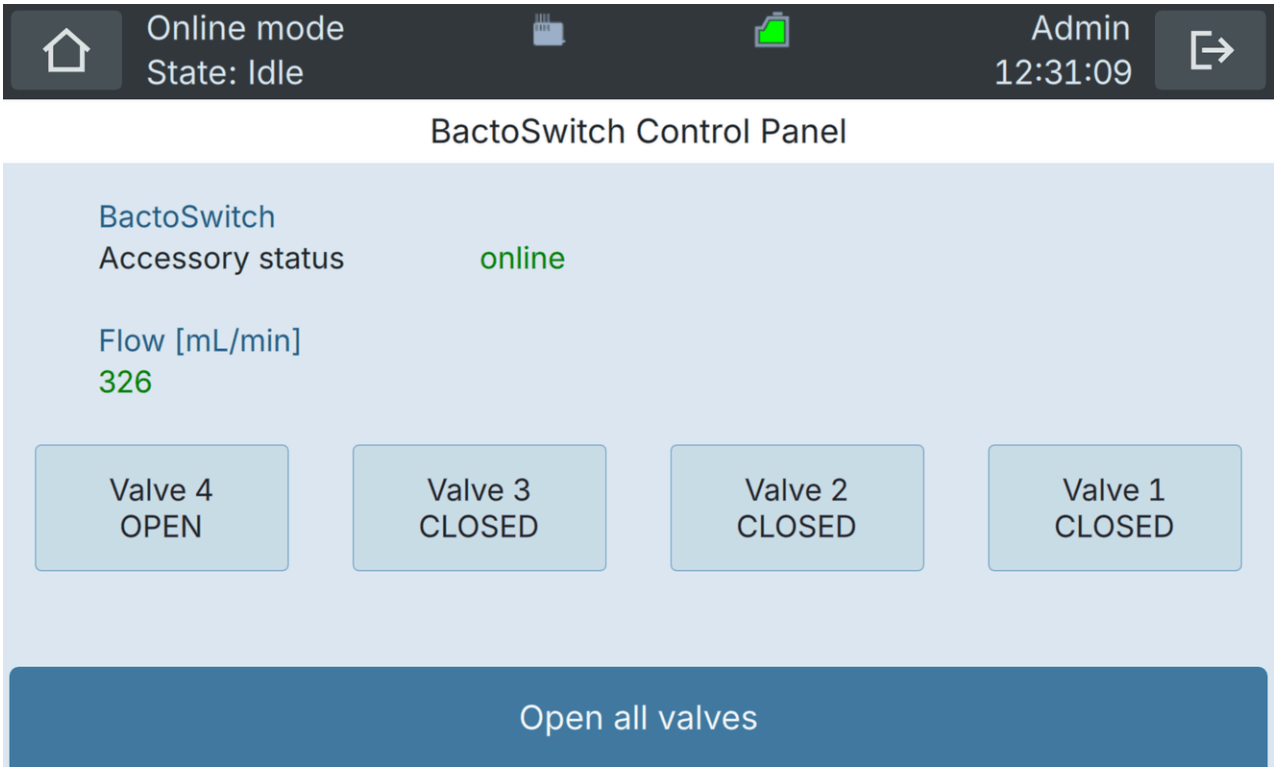
4.8 Line testing and flow setting

To test or set the flow rate using the built-in needle valves of the BactoSwitch, remove the front cover (if not already removed).

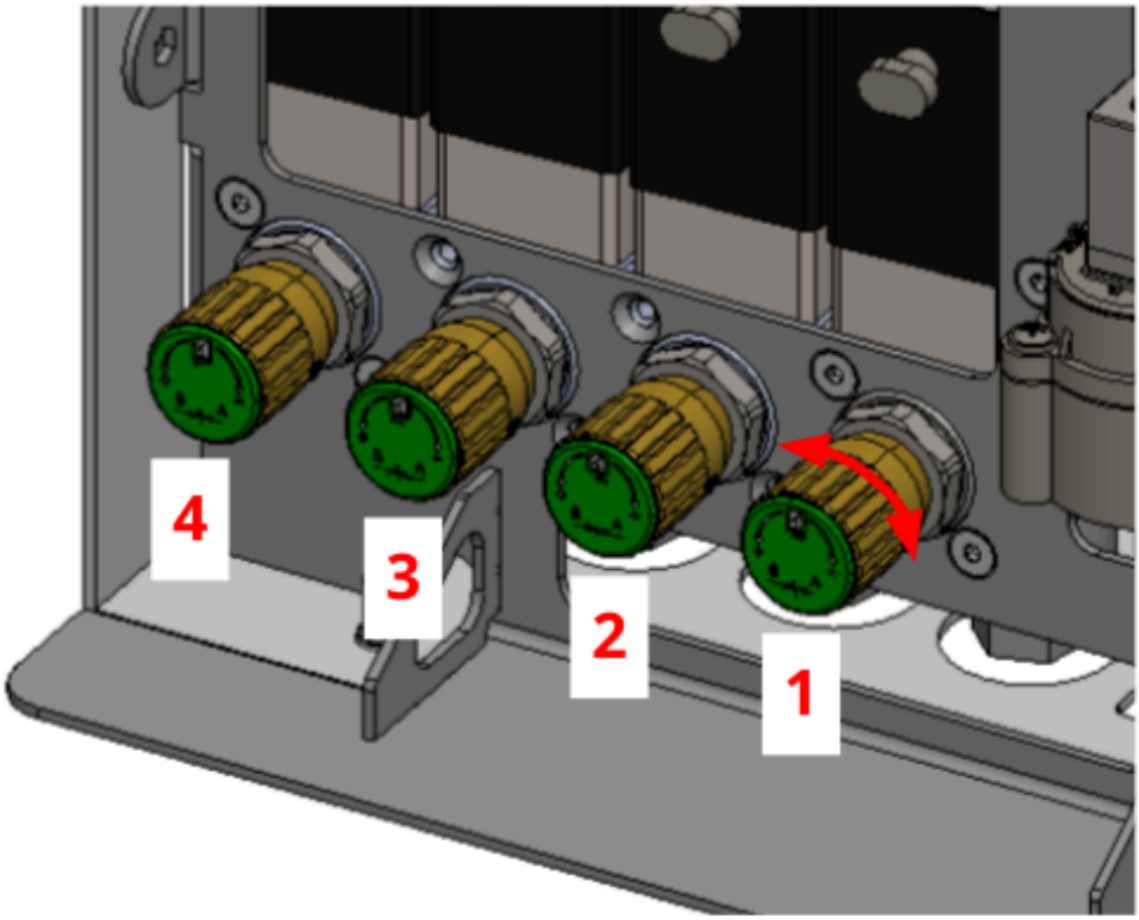
Then, on the BactoSense user interface, enter the **BactoSwitch sample lines** menu (see Line configuration), and press the **Test BactoSwitch** button. This opens the **BactoSwitch Control Panel**. The four valve buttons allow you to open only the selected valve, while the others are closed automatically. To re-open all valves, press the **Open all valves** button at the bottom of the screen.



When only one of the valves is open, the indicated flow rate value turns green or red, depending on whether the flow rate is within the specified values of 150 – 400 mL/min or not:



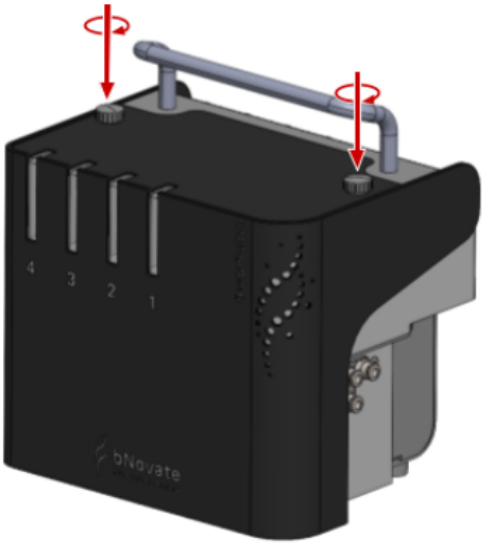
To adjust the flow rate of each input line, use the adjustment knobs of the BactoSwitch (see figure below) until the flow rates are within the 150 – 400 mL/min range, ideally about 300 mL/min.



Notes:

- If the pressure drop is above 0.3 bar, the flow rate should adjust automatically within the limits after factory calibration.
- If you cannot reach 150 mL/min, this is likely because the pressure drop across the device is too low. Increase the input pressure or Δh (see Figure 4-2).

Finally, place the front cover back and secure it with the two knob screws:



5. Operation

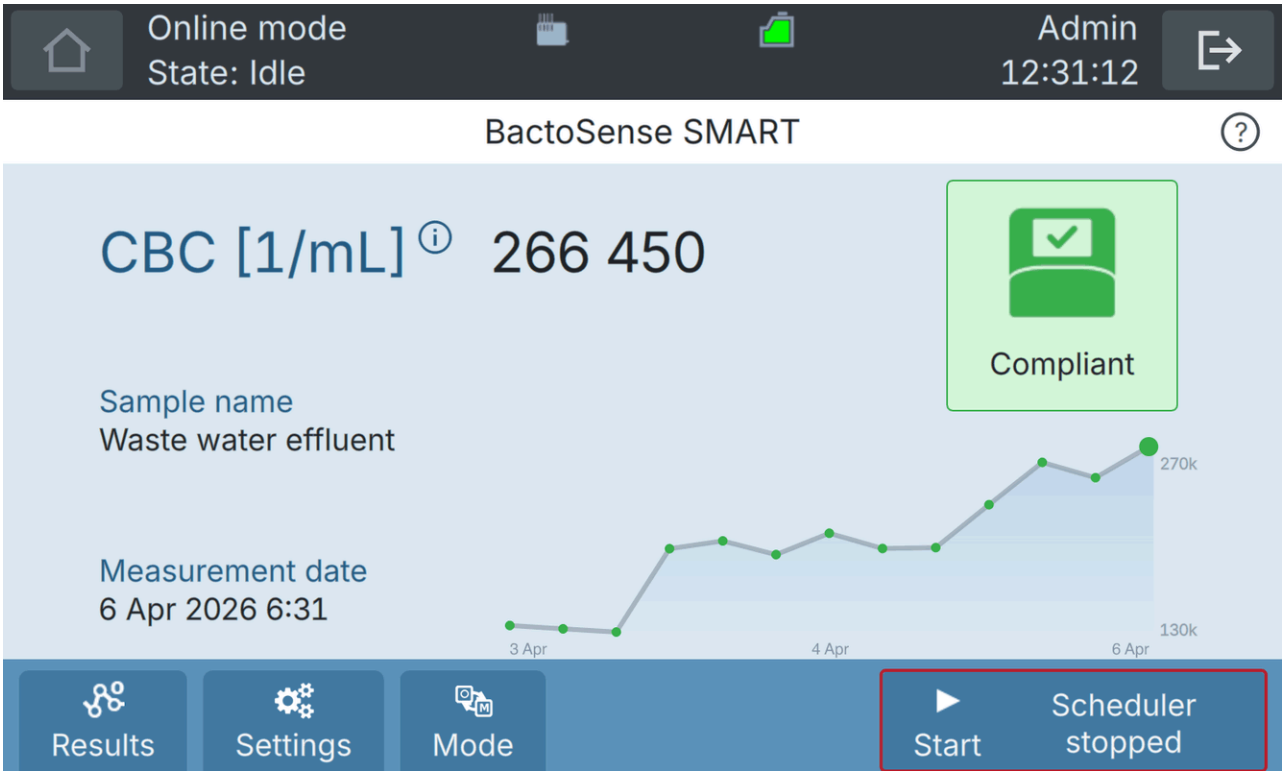
5.1 Operation via BactoSense GUI

This section provides a basic introduction to the BactoSwitch operation and to viewing the results, which are very similar to BactoSense Online mode operation and data viewing. For more details, please refer to Measuring automatically in Online mode in the latest version of the BactoSense user manual.

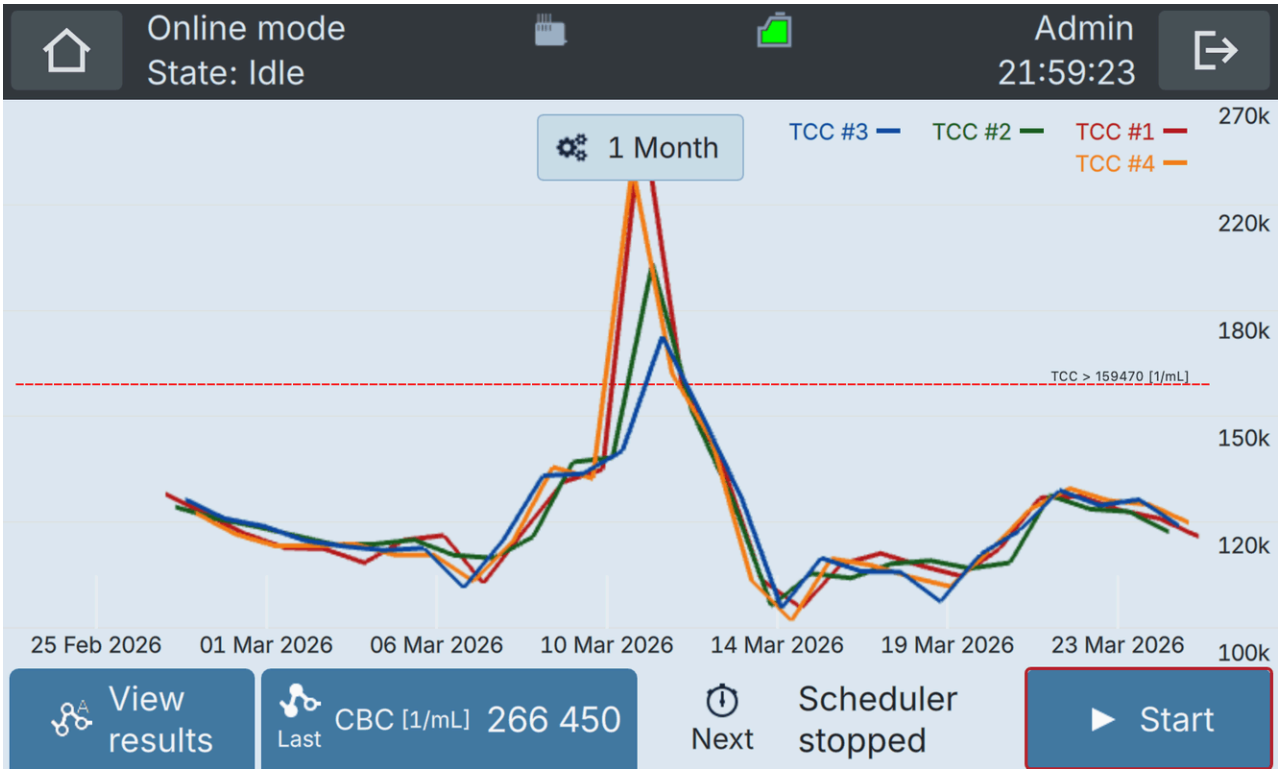
5.1.1 Starting Online mode measurements

Make sure the BactoSwitch is correctly installed as described in Installation.

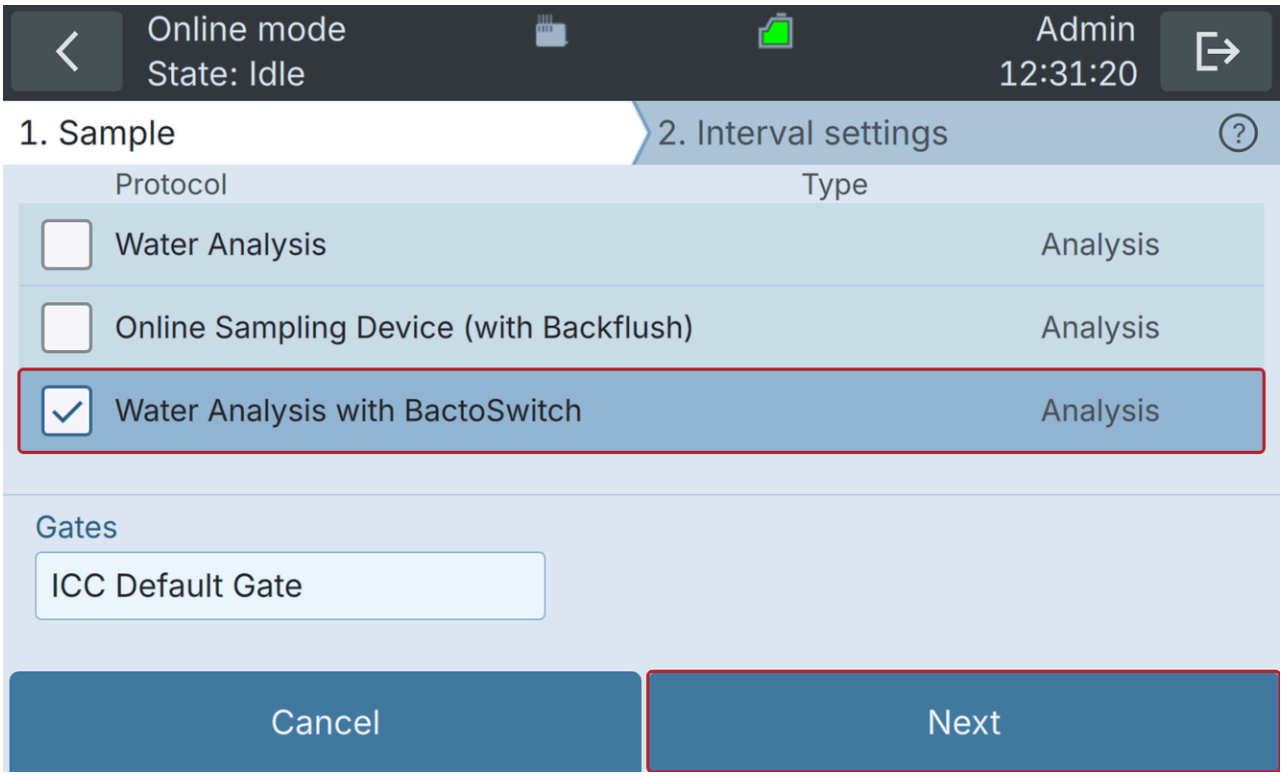
Navigate to the home screen of the BactoSense user interface. If the instrument is in Manual mode, switch it to Online mode with **Mode**. Then press **Start**:



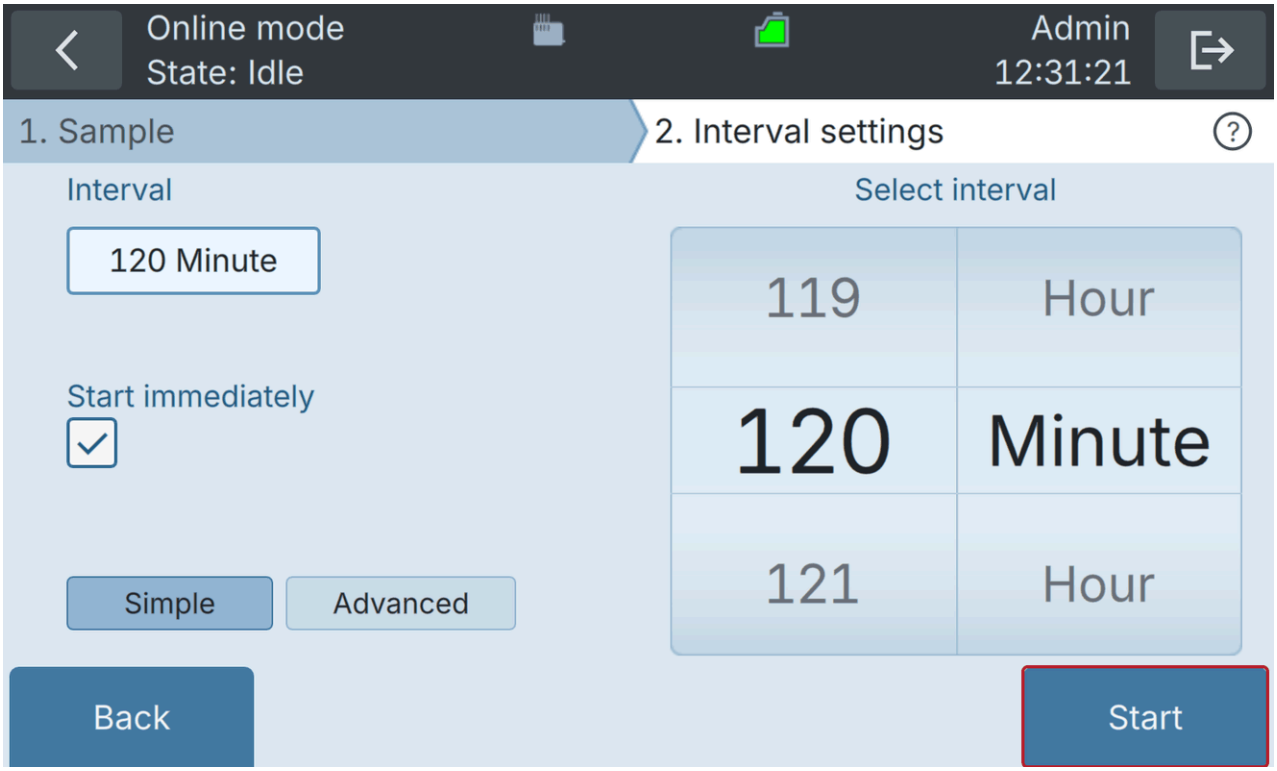
In the Online mode plot window, press **Start**:



Select the protocol **Water Analysis with BactoSwitch** and press **Next**.

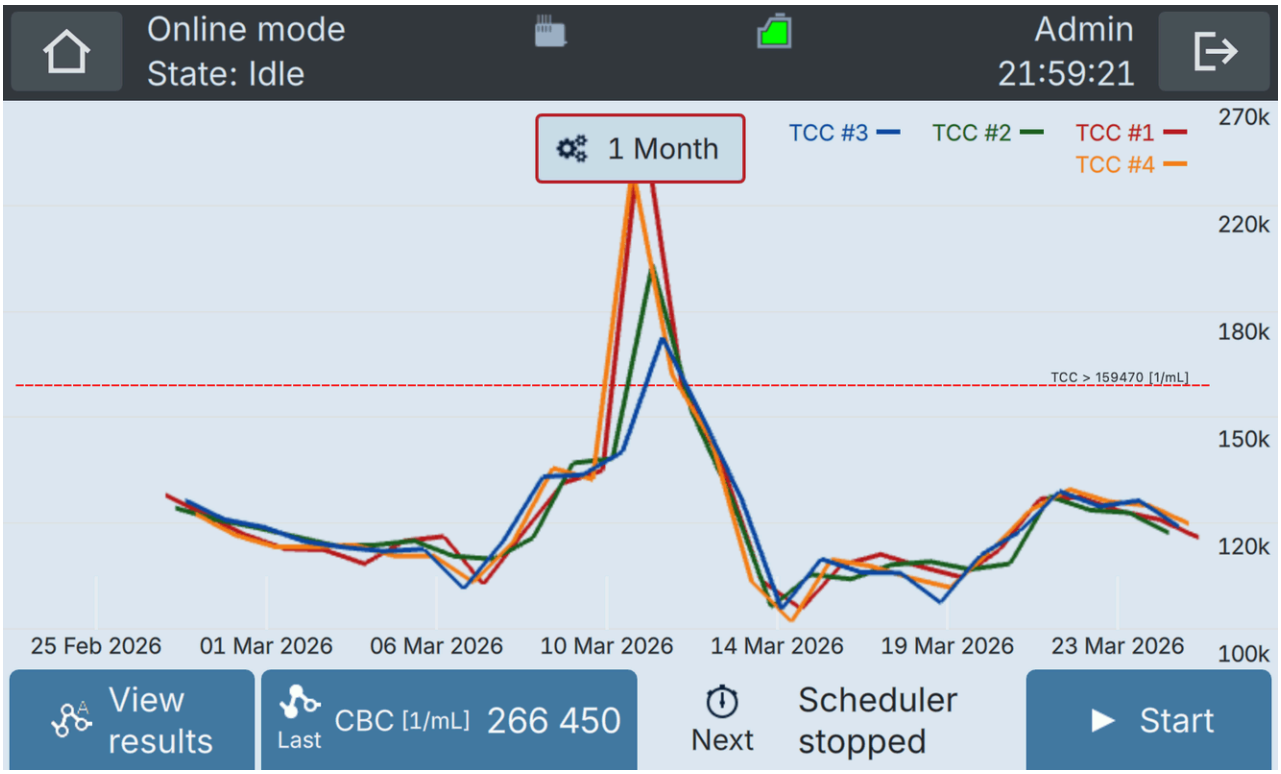


Finally, select the measurement interval and press **Start**. Note that this is the interval between each measurement. The measurement interval for each source is N times larger, where N is the number of enabled sources. For example, if you enable 4 sources and select an interval of 30 min, each single source is measured with an interval of 2 h.

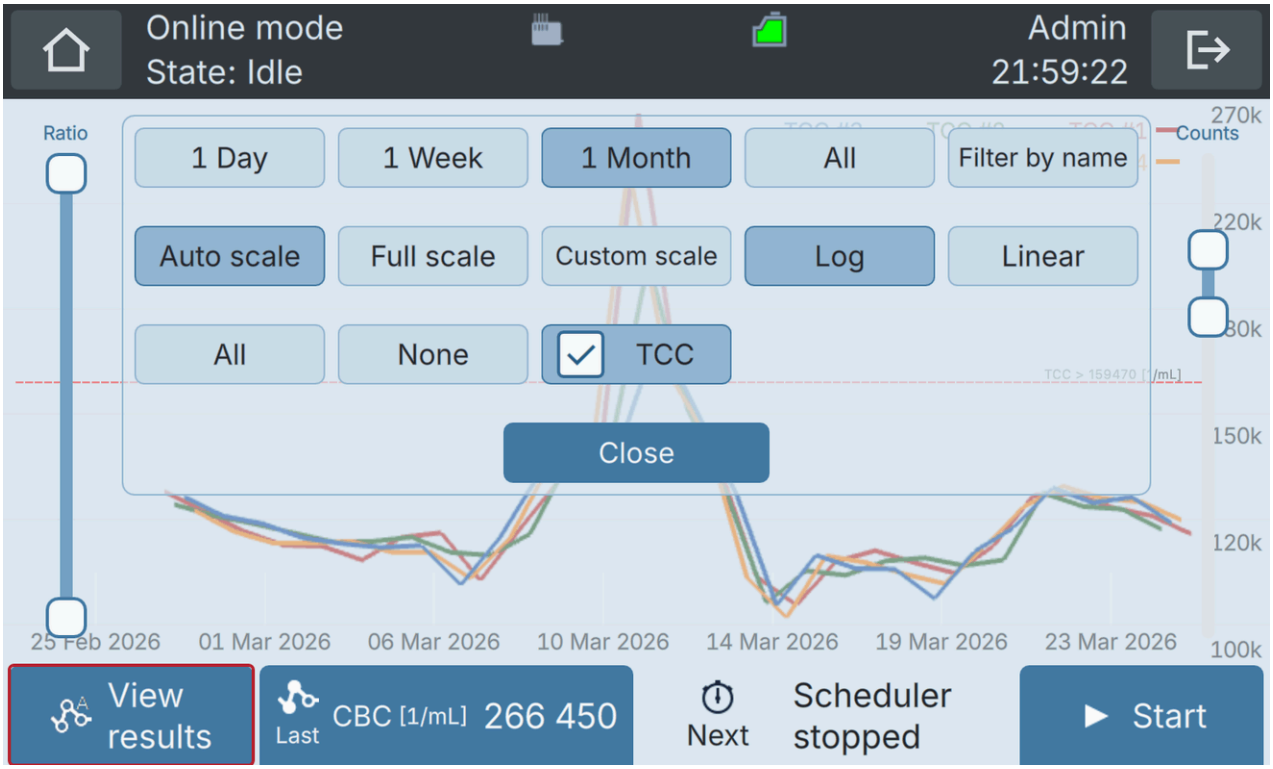


5.1.2 Viewing measurement results

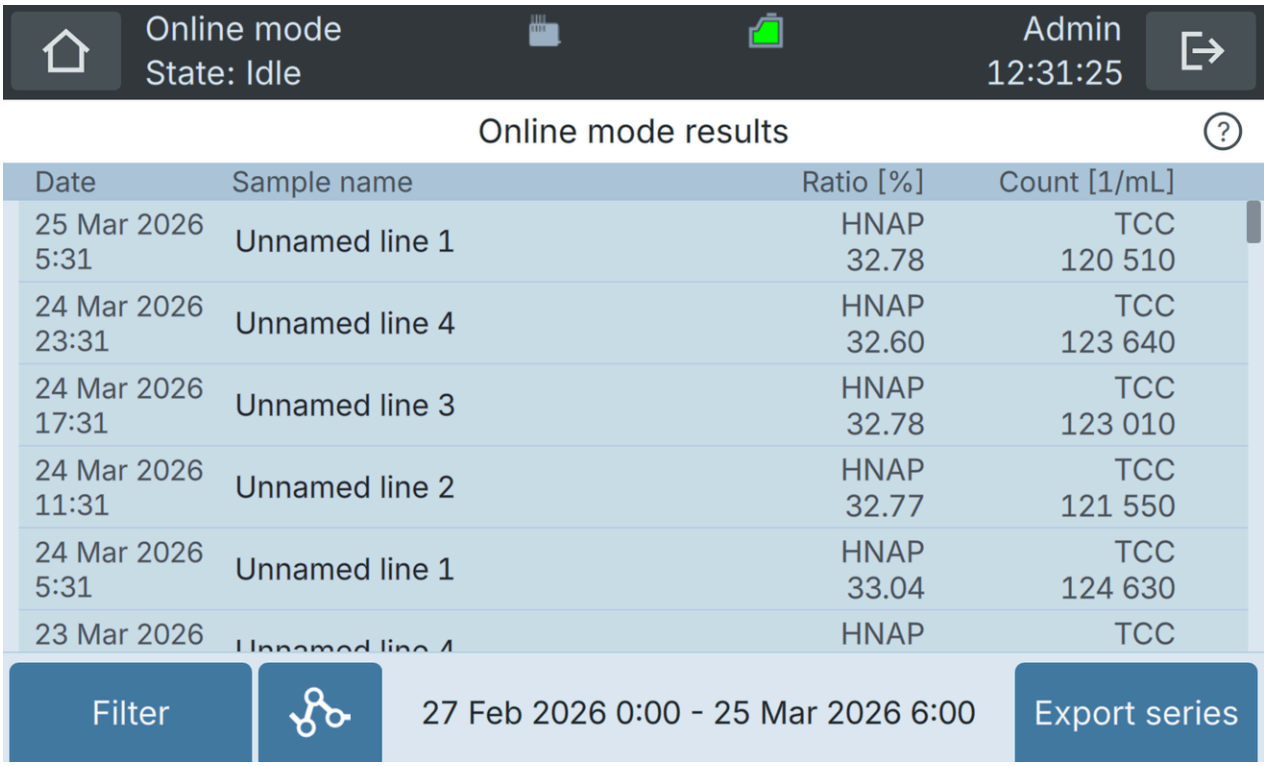
As soon as measurements are started, the Online mode plot window is shown again. When a BactoSwitch is connected, the Online mode window displays the individual line counts [1/mL], but no LNA/HNA [%] or other parameters.



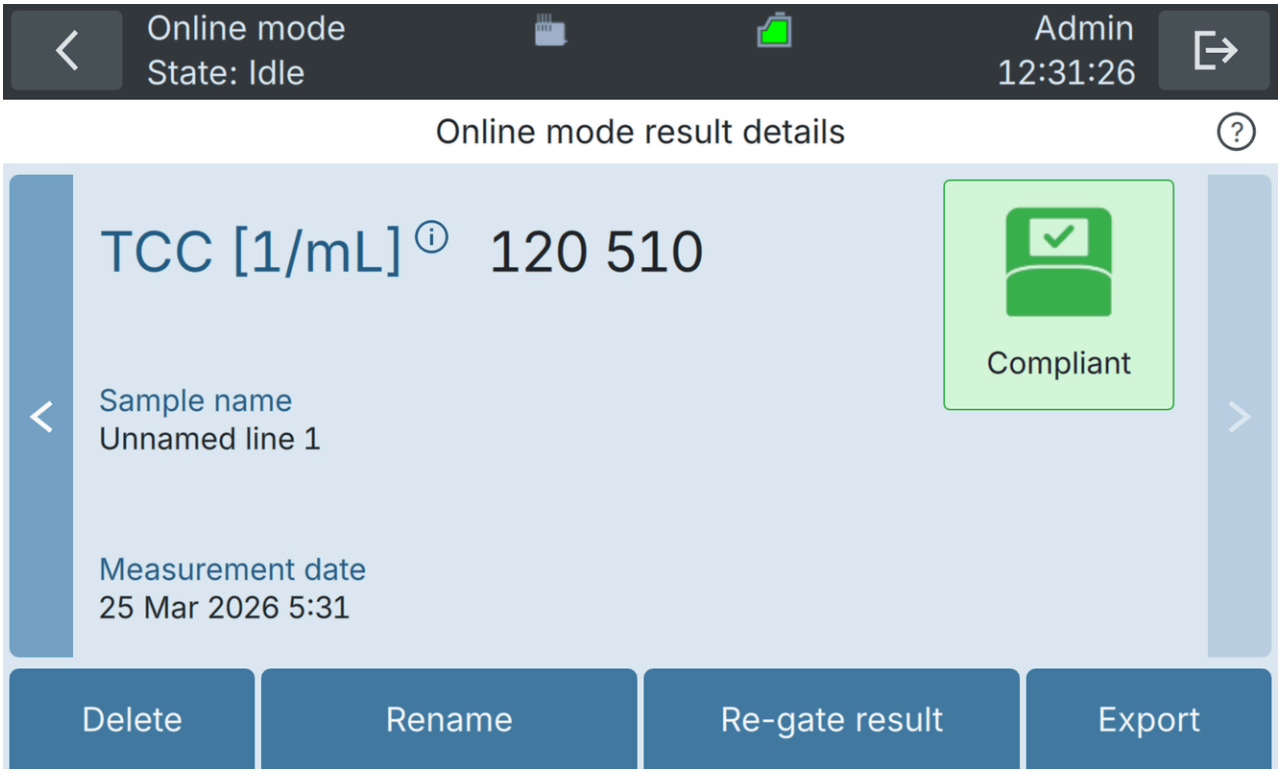
The display settings can be modified via the button at the top center of the plot.



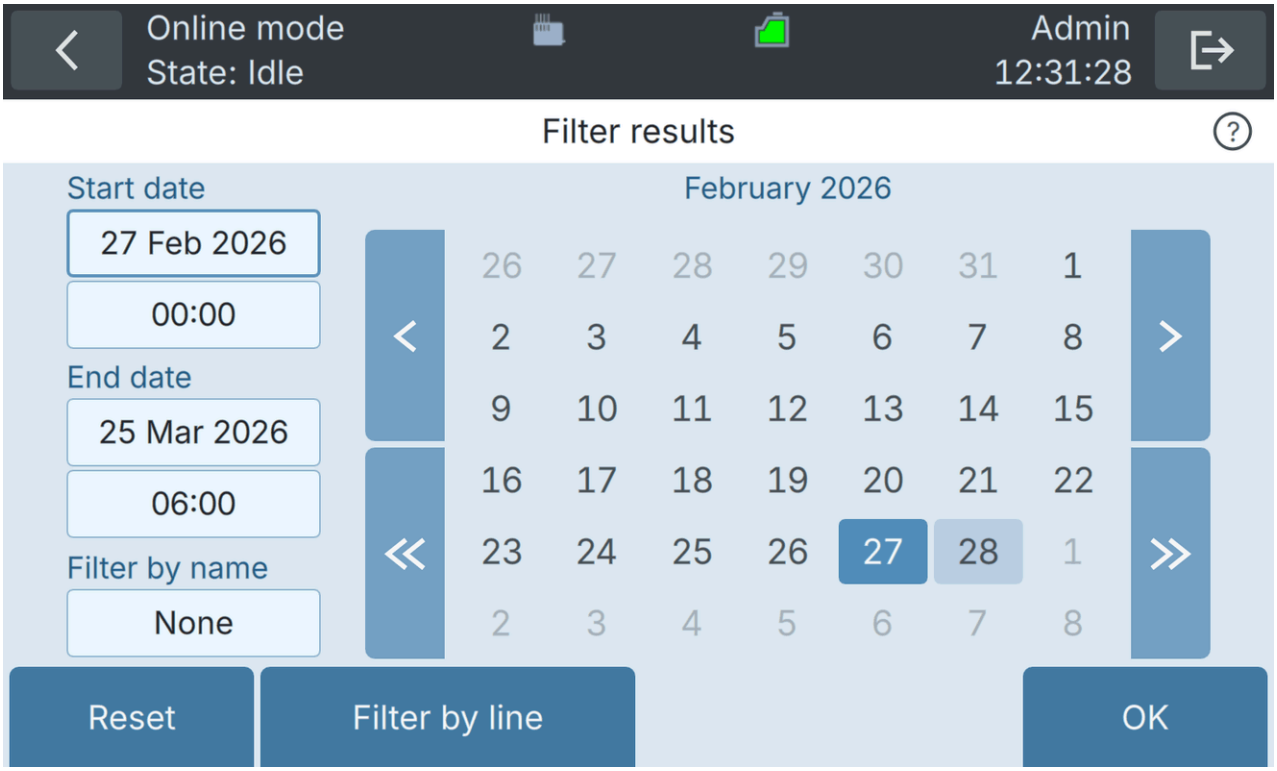
Pressing the **View results** button opens the **Online mode results** list. Sample names match the line names set in Line configuration.



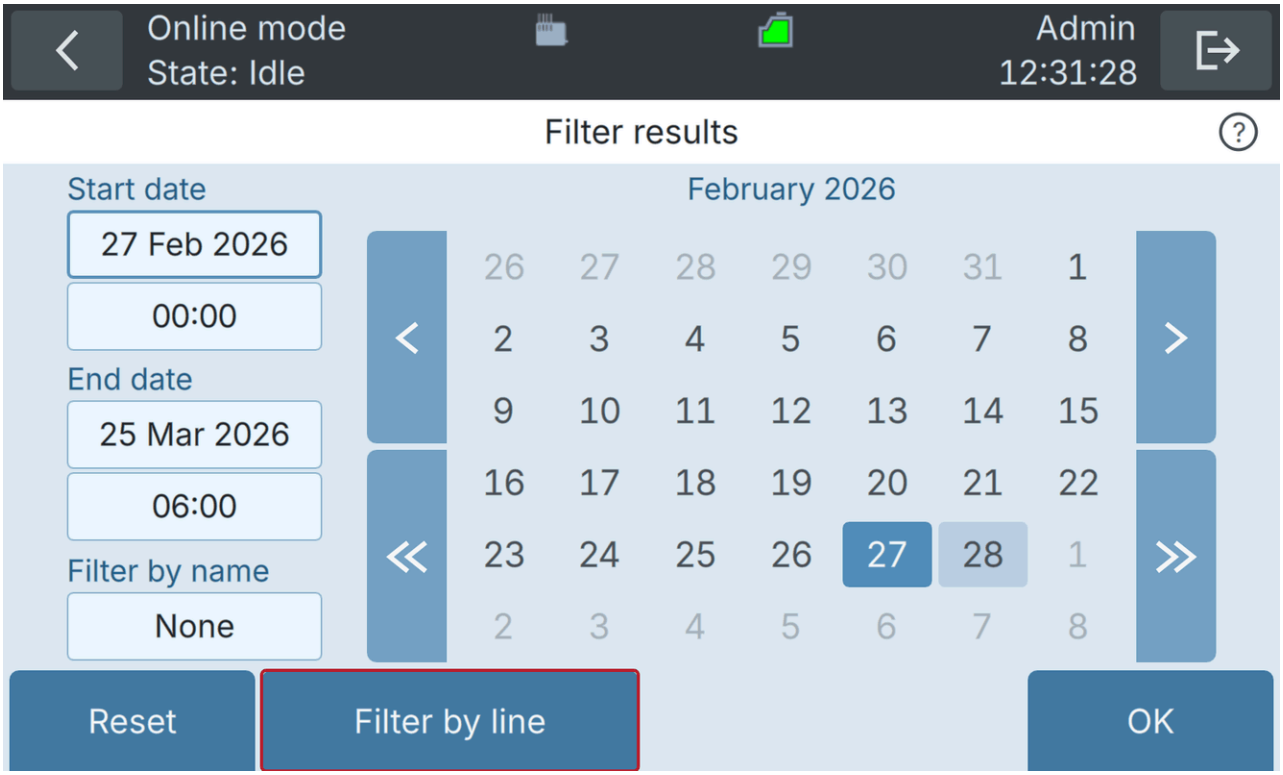
Pressing one of the measurements displays the details of that measurement (again, please refer to the BactoSense user manual for more details).

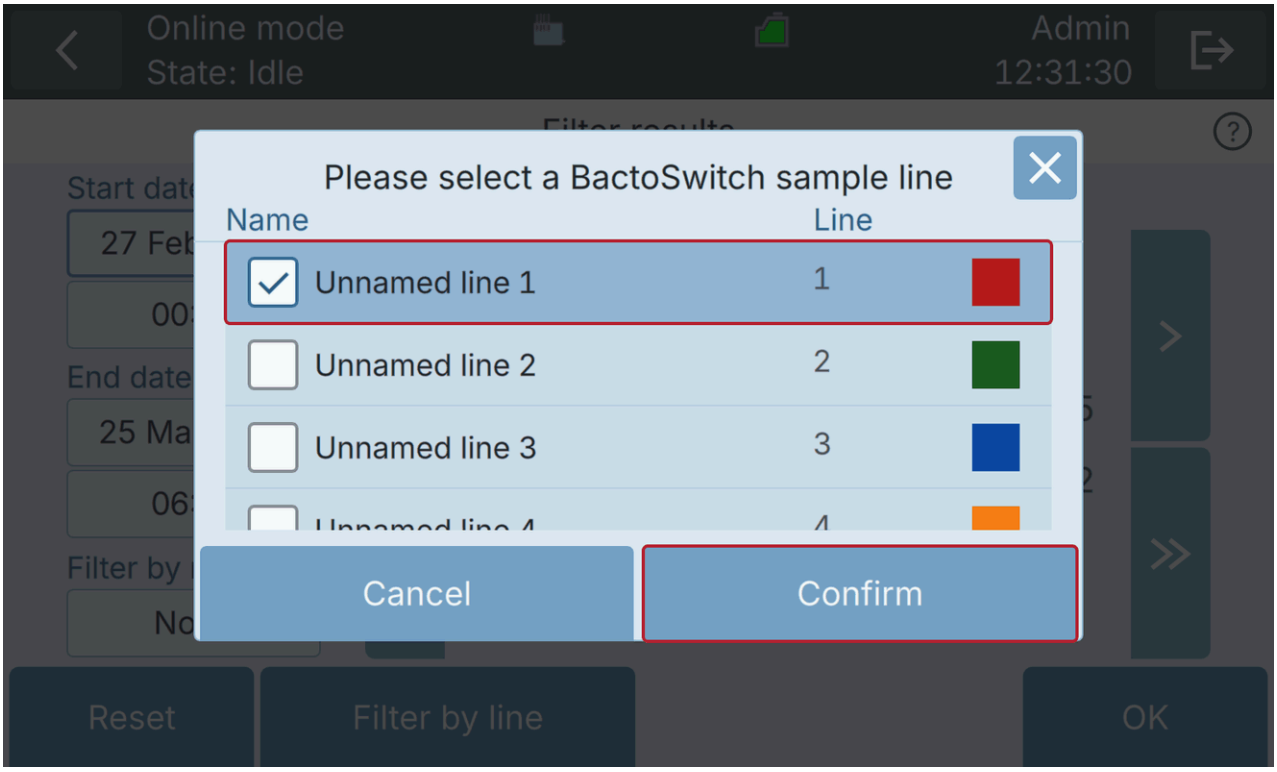


Pressing the **Filter** button in the **Online mode results** list opens the **Filter results** window. Here you can filter results based on a string via the **Filter by name** field.

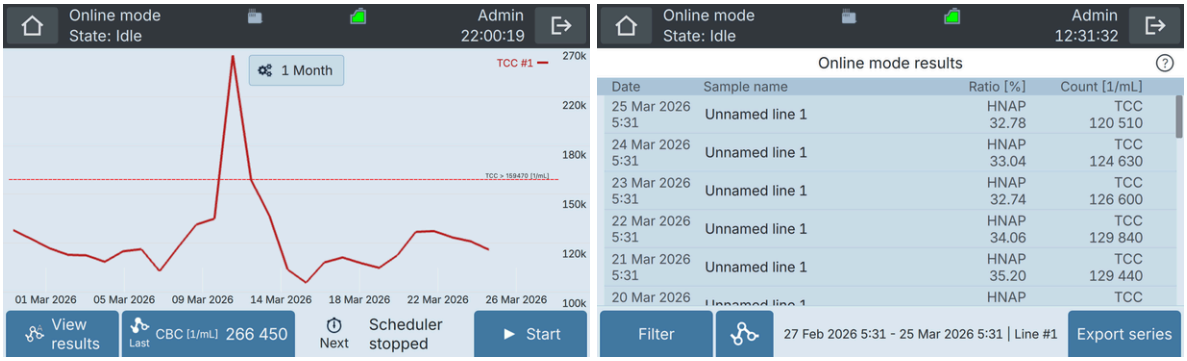


In addition to filtering by start and end dates and measurement name, pressing the **Filter by line** button allows filtering results by BactoSwitch line.



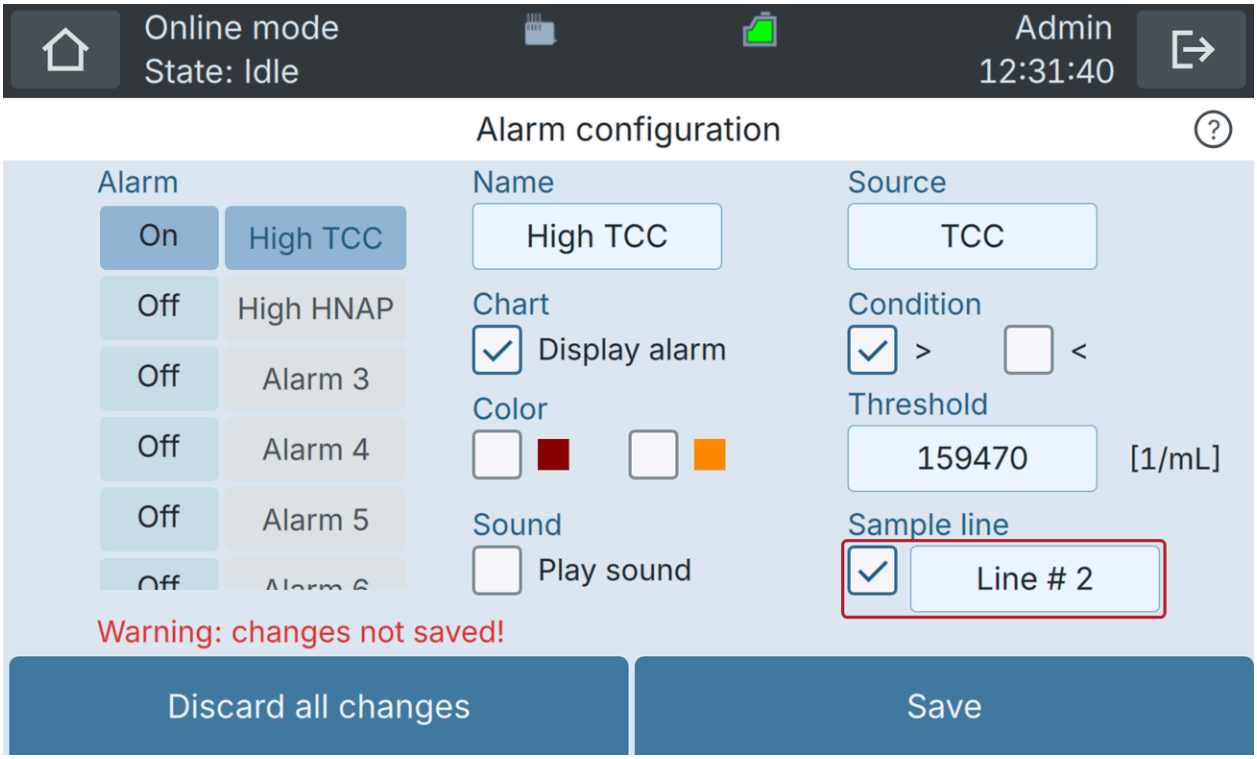


Filters not only apply to the Online mode results list, but also to the Online mode plot, which allows you to selectively plot results based on line numbers or line names (as defined in Line configuration). See also Filtering measurements in the BactoSense user manual.



5.1.3 Setting alarms

The **Alarm configuration** window (accessible via **Settings** / **Online mode settings** / **Alarm**) allows you to define alarms selectively on certain lines:

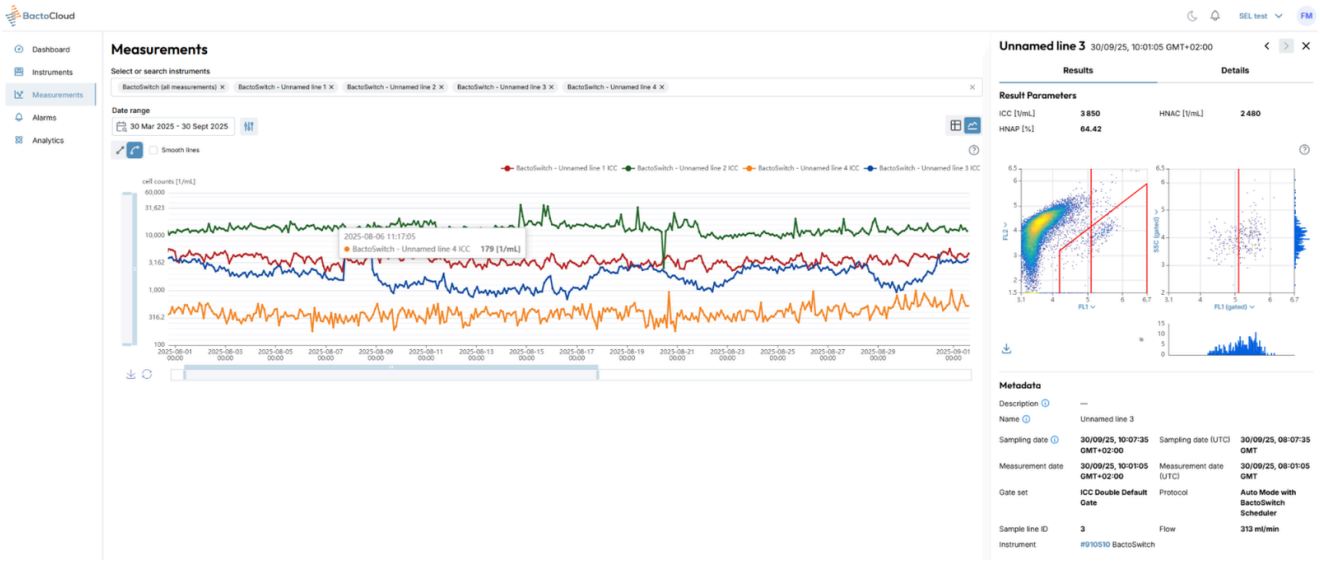


5.2 Remote control and data visualization

5.2.1 BactoCloud

BactoCloud is bNovate's cloud-based remote instrument control, data visualization and advanced analytics solution. The basic version of BactoCloud is available with all instruments.

BactoCloud includes features that make it particularly easy to visualize multi-line data generated by a BactoSense equipped with a BactoSwitch. Moreover, advanced analytics make differential calculations easy, e.g. for qualifying the microbiological efficiency of water treatment steps. See BactoCloud in the BactoSense user manual to connect the instrument.



5.2.2 Web User Interface

The web user interface of the BactoSense contains functionalities that allow filtering data from the different BactoSwitch lines.

In the **Results** tab, in the **Online mode results** section, it is possible to filter the data by **Name** or **Line ID**. **Name** corresponds to the line name, and **Line ID** corresponds to the line number set in Line configuration. Filtering also applies to the Online mode graph.

ONLINE MODE RESULTS

05 November 2014 - 05 November 2026 | Download ZIP

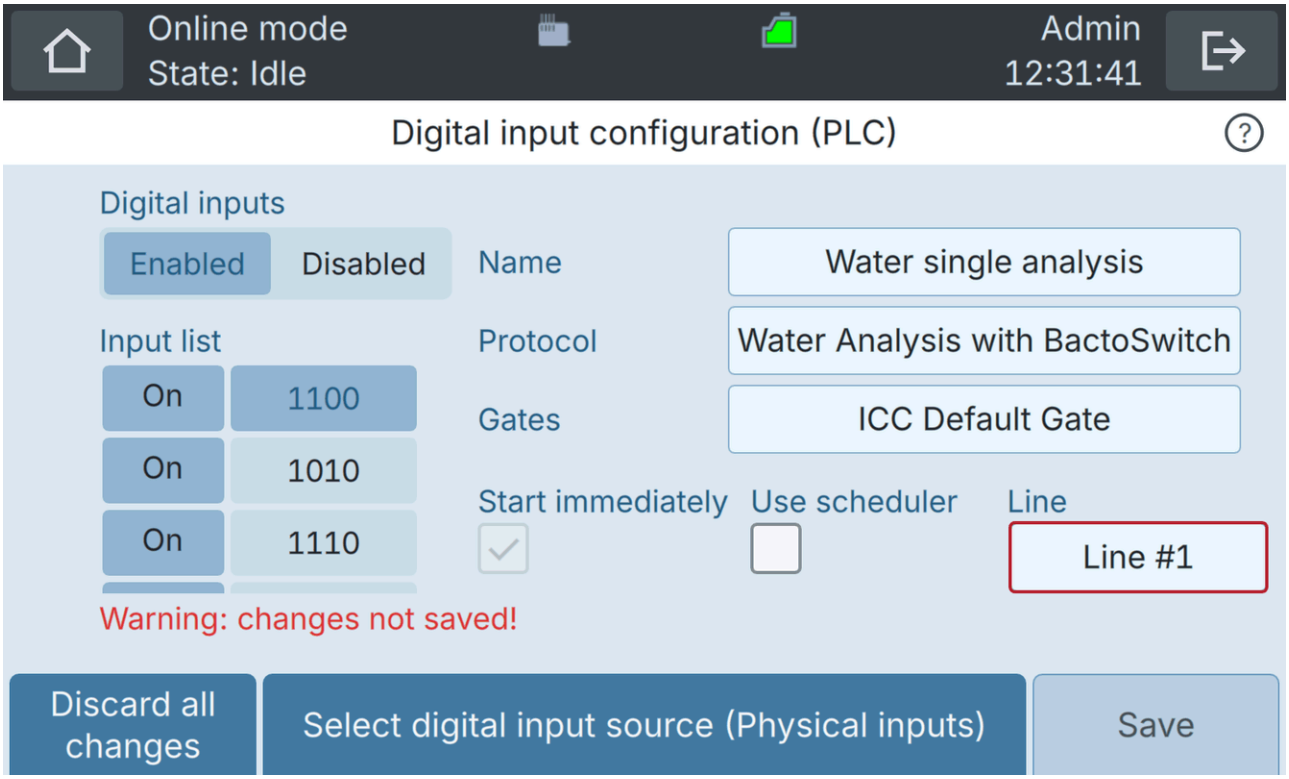
Date	Sampling date	Name	Line ID	TCC [1/mL] ...	ICC [1/mL] ...	CBC [1/mL] ...	Gate+
		Unnamed					
2026-03-25 05:31:27	2026-03-25 05:32:27	Unnamed line 1	1	120510			
2026-03-24 23:31:27	2026-03-24 23:32:27	Unnamed line 4	4	123640			
2026-03-24 17:31:27	2026-03-24 17:32:27	Unnamed line 3	3	123010			
2026-03-24 11:31:27	2026-03-24 11:32:27	Unnamed line 2	2	121550			
2026-03-24 05:31:27	2026-03-24 05:32:27	Unnamed line 1	1	124630			
2026-03-23 23:31:27	2026-03-23 23:32:27	Unnamed line 4	4	127880			
2026-03-23 17:31:27	2026-03-23 17:32:27	Unnamed line 3	3	129040			
2026-03-23 11:31:27	2026-03-23 11:32:27	Unnamed line 2	2	126180			
2026-03-23 05:31:27	2026-03-23 05:32:27	Unnamed line 1	1	126600			
2026-03-22 23:31:27	2026-03-22 23:32:27	Unnamed line 4	4	128770			

5.2.3 BactoSwitch control via BactoSense I/O-Box

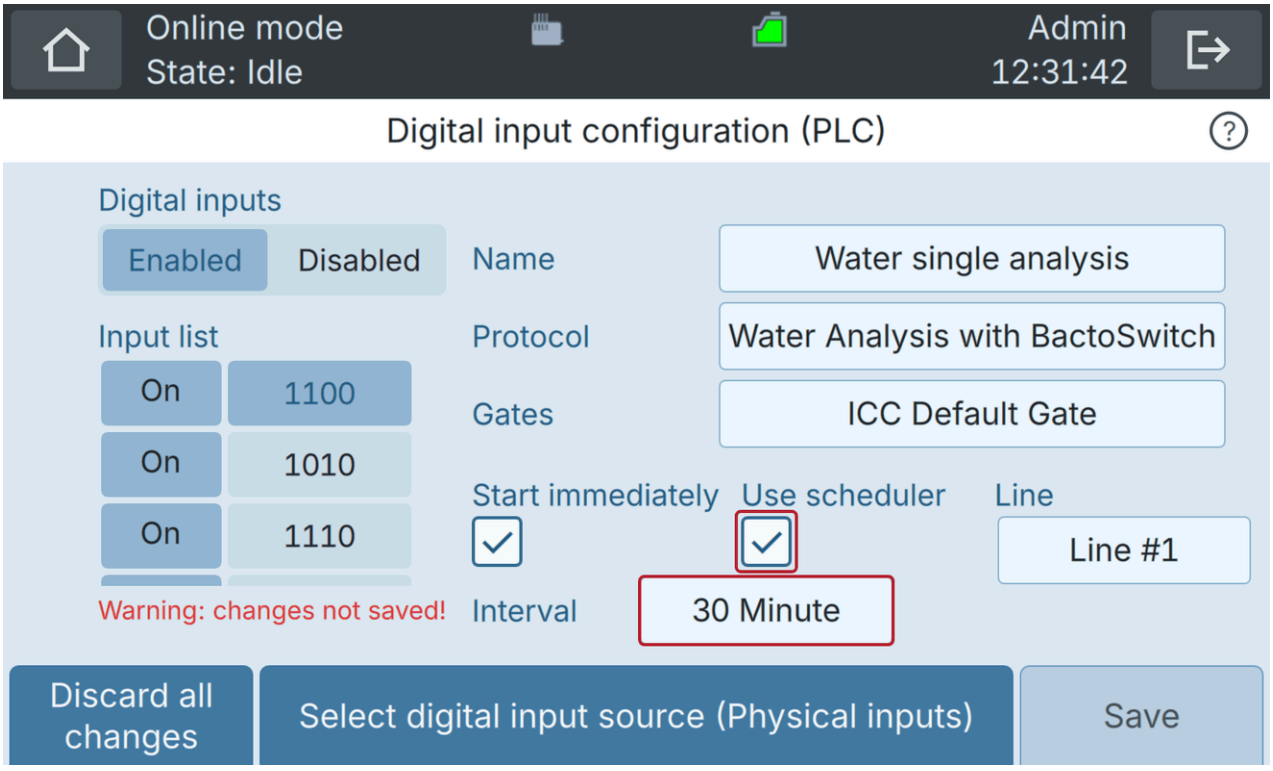
The BactoSwitch operation can be controlled with a Programmable Logic Controller (PLC) via the BactoSense and the optional I/O-Box. Please refer to Digital inputs configuration and PLC mode in the BactoSense user manual for more detailed information. Here we only explain the specificities of BactoSwitch operation.

From **Settings**, navigate to **Online mode settings** / **Digital inputs**. The BactoSwitch line can be selected via the **Line** box.

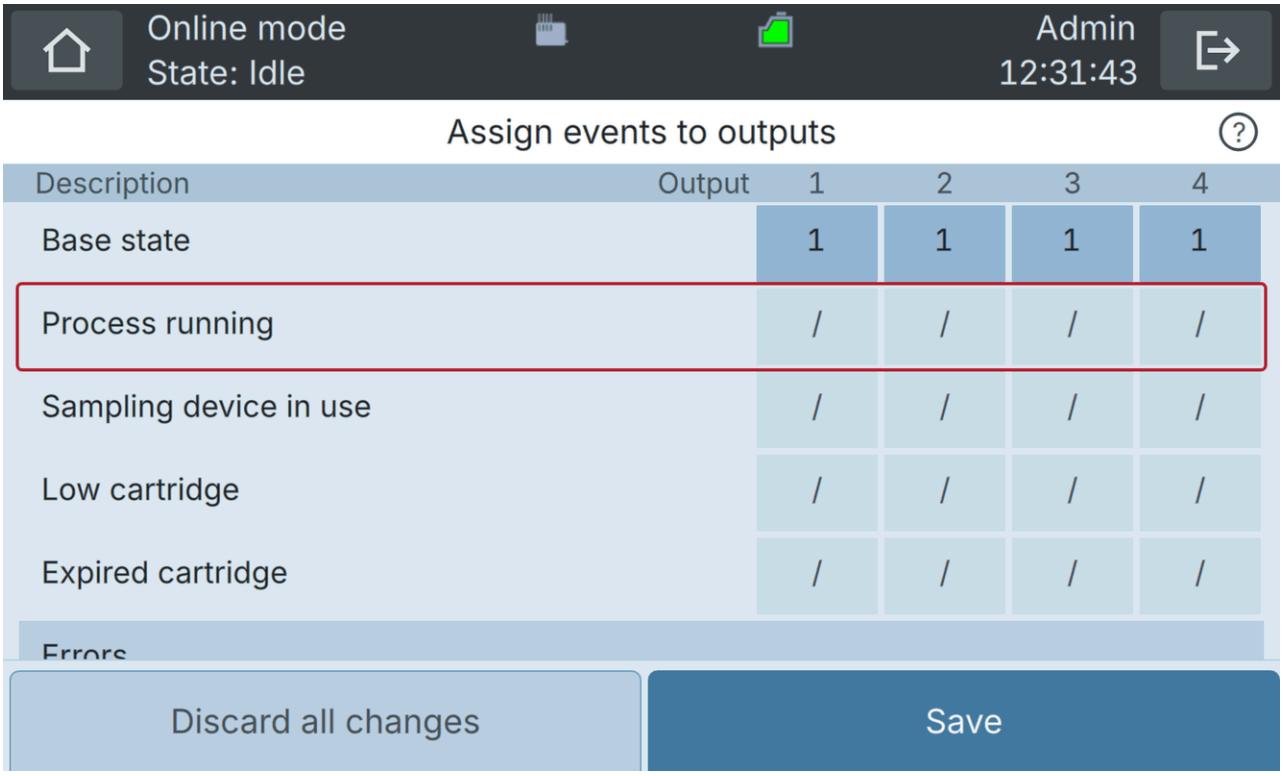
In the example below, with the **Use scheduler** option unchecked, when the PLC sets the digital inputs to 1100, a measurement is started immediately on line #1:



To start regular measurements, check the **Use scheduler** option and set the desired interval. All active lines are read sequentially, starting from the selected line (line #1 in this example):



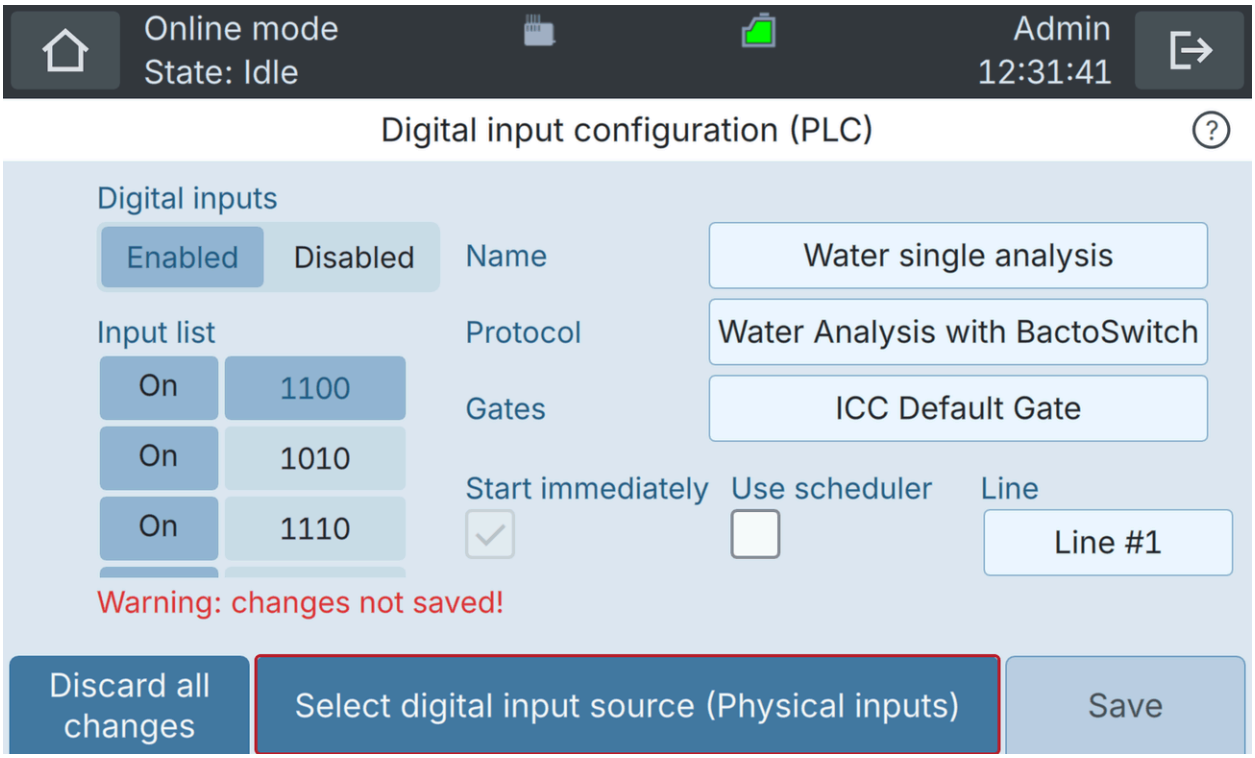
Reading data from a specific line via the analogue outputs has to be done right after the measurement has finished on that line, e.g. by assigning the **Process running** signal to a specific digital output and triggering the analogue output read-out when the status of that output changes. Note that this is not the default setting. Please refer to Digital output configuration in the BactoSense user manual for more details.



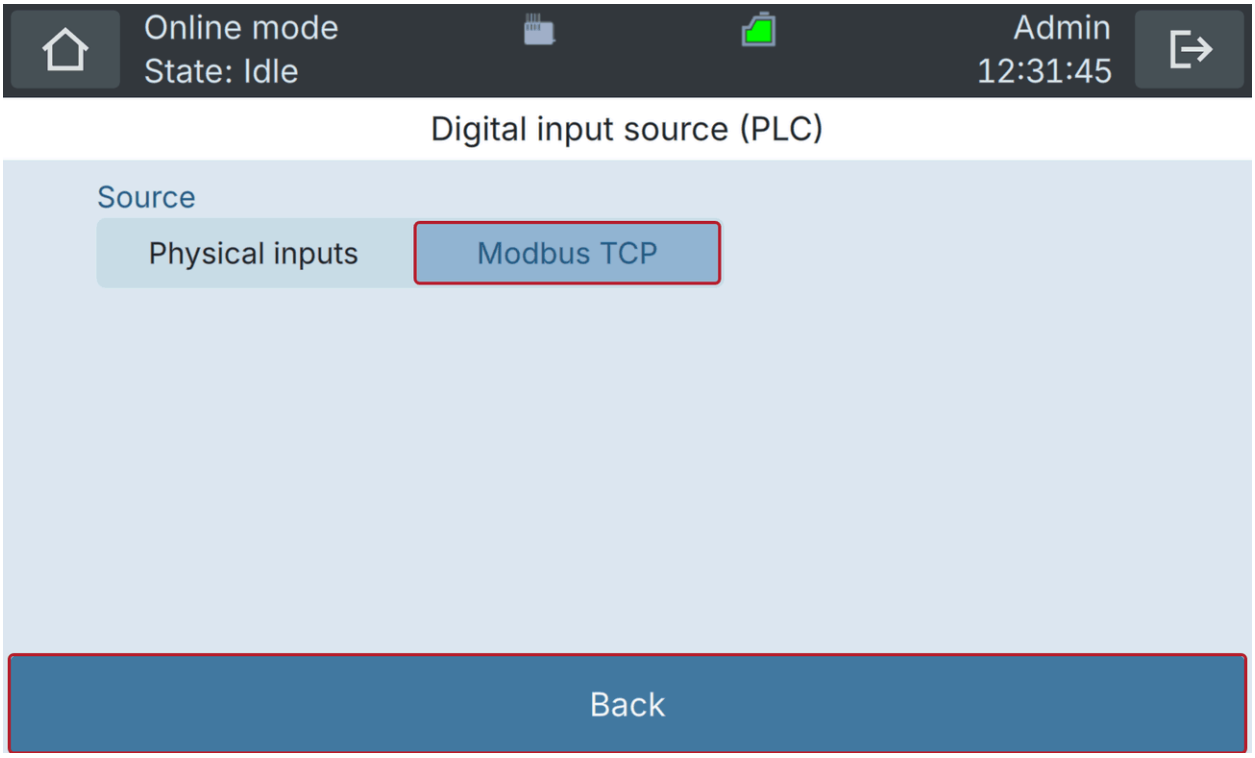
5.2.4 Modbus TCP

The BactoSwitch and BactoSense can be controlled remotely via the Modbus Transmission Control Protocol (TCP), which does not require any I/O-Box. Please refer to Modbus TCP in the BactoSense user manual for more details.

Setting up the instrument for Modbus TCP control is identical to what is explained in the previous section about the I/O-Box. To select Modbus TCP as digital input source, in the **Digital input configuration (PLC)** window, press **Select digital input source** at the bottom.



Then switch the source to **Modbus TCP** and press **Back**.



In addition to the usual BactoSense Modbus registers, specific Modbus registers are available to read information from the BactoSwitch:

- Current measurement stream
- Next measurement stream
- Flow rate
- Status
- Connection
- Solenoid valve state

Please refer to Address list on Modbus TCP in the latest BactoSense user manual for details about register addresses and formats.

Extracting results from a particular stream requires that the desired data is read out at the end of a measurement, which can be detected by the PLC when the **Measurement stage** register is set back to 0.

6. Warning and Error Messages

6.1 Warnings

Warnings indicate a condition that requires user attention but does not necessarily stop operation.

Table 6-1 BactoSwitch warnings

ERROR CODE	NAME	DESCRIPTION	CAUSES / WHAT TO DO
W15	BactoSwitchLowFlow	The input flow is lower than the advised value. Measurement precision could be degraded.	**Typical causes:** inlet pressure below specification, partially closed upstream valve, or installation creating back-pressure at the drain. **Recommended action:** • In **Test BactoSwitch**, open the affected line alone and adjust it to 150 – 400 mL/min using the flow rate adjustment knob (see Line testing and flow setting). • Confirm that the inlet pressure is > 0.1 bar and Δh > 0.5 m (see Figure 4-2). • Correct any upstream restrictions.

6.2 Errors

Table 6-2 BactoSwitch errors

ERROR CODE	NAME	DESCRIPTION	CAUSES / WHAT TO DO
E60	BactoSwitchFlowTooLowError	The measured flow on the selected input is below the acceptable range for single-line operation.	**Typical causes:** low inlet pressure; upstream restriction; drain installation causing back-pressure; valve manually closed. **Recommended action:** • In **Test BactoSwitch**, open the affected line alone and adjust it to 150 – 400 mL/min using the flow rate adjustment knob (see Line testing and flow setting). • Confirm that the inlet pressure is > 0.1 bar and Δh > 0.5 m (see Figure 4-2). • Correct any upstream restrictions. • Check that the On/Off valve is open.

ERROR CODE	NAME	DESCRIPTION	CAUSES / WHAT TO DO
E61	BactoSwitchDeviceNotFoundError	The BactoSense does not detect the BactoSwitch.	**Typical causes:** power not applied to the BactoSwitch; USB-C cable not connected or not screwed on both devices. **Recommended action:** Connect the power supply to the BactoSwitch and secure the USB-C cable with the screw collars on both the BactoSwitch and the BactoSense. The device is detected automatically when connected.
E62	BactoSwitchTimeoutError	A communication attempt with the BactoSwitch exceeded the expected time.	**Typical causes:** temporary communication issue on the USB-C link; loose or unscrewed connectors. **Recommended action:** Check that the USB-C cable is seated and screwed on both ends and that the BactoSwitch is powered, then retry the operation.
E63	BactoSwitchCommunicationError	A communication error occurred between the BactoSense and the BactoSwitch.	**Typical causes:** unstable or incorrect USB-C connection; cable not secured. **Recommended action:** Inspect and re-secure the USB-C cable on both devices (use the screw collars), verify power to the BactoSwitch, and reboot both devices.

If issues persist after applying the steps above, contact your local service partner (see Contact).

For the warnings and errors of the BactoSense itself, see Warnings, errors and troubleshooting in the BactoSense user manual.

7. Maintenance

7.1 Maintenance by the user

To ensure proper functioning of the device, the following maintenance can be performed by the user.

WEAR NITRILE GLOVES

Avoid contamination of the equipment. Wear nitrile gloves when handling tubings and online sampling devices and any component which comes in contact with them.

BEFORE MAINTENANCE

Before performing any maintenance operation

- Close the On/Off valves at the water pipe connections.
- Disconnect the mains power supply to avoid any risk of short circuits.

7.1.1 Cleaning

In the event of biological contamination, the BactoSwitch can be cleaned in the following ways:

AGENT	CONDITIONS
Chlorine	Flowing water with up to 10'000 mg/L of active chlorine is allowed. **CHLORINE CLEANING** • Wear appropriate personal protective equipment. • Ensure that all tube junctions are carefully secured and tightened.
Hot water	Flowing water at temperatures up to 85 °C, with a reduced maximum pressure of 2 bar, and for up to 15 min. **HOT WATER CLEANING** • The installation must include a pressure-limiting device at the inlet tubings input, to ensure that the pressure cannot exceed 2 bar. • Ensure that all tube junctions are carefully secured and tightened (see Installation of the fluidic lines). • The front cover must be installed when flowing hot water in the system. • Durations longer than 15 min may heat the accessible device surfaces and cause skin burns. • Wear appropriate personal protective equipment.

Contact support@bnovate.com for questions.

7.1.2 Replacement of input tubings

In the event of persistent biological or non-biological (e.g. iron, manganese) contamination of the tubing, the user can replace it.

> ⚠ **BEFORE REPLACING TUBINGS**
>
> **Before disconnecting the tubings**
>
> - Close the On/Off valves at the water pipe connections.
> - Disconnect the mains power supply to avoid any risk of short circuits.

7.2 Preventive maintenance by a service professional

A yearly preventive maintenance intervention must be scheduled to replace wear parts, update software and firmware, and verify proper functioning of the device. This is important to prevent failures, optimize the performance and reliability, and ensure a long product lifetime.

The preventive maintenance must only be conducted by specifically trained service professionals.

Your local service partner can provide you with information about the preventive maintenance schedule and the available options.

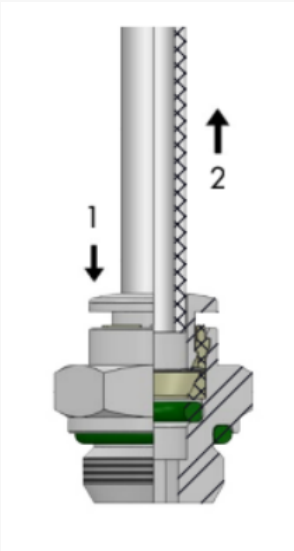
8. Storage, Transport and Disposal

8.1 Storage

WEAR NITRILE GLOVES

Avoid contamination of the equipment. Wear nitrile gloves when handling tubings and online sampling devices and any component which comes in contact with them.

Preparations

	WORK STEP	ADDITIONAL INFO / IMAGES
1.	Terminate any ongoing measurement series.	
2.	Close the On/Off valves at the water pipe connections to stop the water flow through the BactoSwitch tubings and online sampling device.	
3.	Disconnect the BactoSwitch mains power supply to avoid any risk of short circuits.	
4.	Remove the power connector plug from the power connector socket, and reinstall the power connector protection cap.	
5.	Remove the USB-C cable from both the BactoSwitch and the BactoSense, and reinstall both connector protection caps.	
6.	Remove the input line tubings from the BactoSwitch by (1) pressing on the quick connector ring and (2) pulling on the tubing.	
7.	Disconnect the input line tubings from the water pipes, and drain the tubings.	
8.	Detach the online sampling device from the BactoSense by loosening its knurled ring and pulling it downwards.	

	WORK STEP	ADDITIONAL INFO / IMAGES
9.	Detach the protective cap from the BactoSense manual sampling device (turn the knurled ring, not the cap) and install it on the online sampling device. Install the manual sampling device on the BactoSense.	
10.	Detach the online sampling device from the BactoSwitch by pressing on the quick connector rings and pulling on the tubings. Drain the sampling device tubings.	
11.	Detach the outlet (drain) tubing by pressing on the quick connector ring and pulling on the tubing, and drain the tubing.	

⚠ DO NOT USE COMPRESSED AIR

Flow meter damage by pressurized air

Do not connect pressurized air to the BactoSwitch input connectors in an attempt to drain it: this may irreversibly damage the flow meter.

Storage

Store the BactoSwitch and the accessories listed in Table 4-1 in their original packaging and in the following storage conditions:

- Temperature between 10 °C and 30 °C (50 °F – 86 °F)
- Relative humidity between 10 % and 70 %
- Non-vibrating, non-corrosive, dark and clean environment
- Store the tubings and online sampling device in a clean, dry plastic bag

Re-installation

After storage, follow the general installation instructions described in Installation.

8.2 Transport

⚠ FOLLOW THE SHIPPING INSTRUCTIONS

Adhere to shipping instructions

bNovate does not take responsibility for deliveries which do not comply with our shipping regulations and will charge for repairs. Please contact support@bnovate.com if the original packaging is no longer available or you need help with packaging.

- Pack the BactoSwitch in its original packaging with foam inserts.
- Ship on a pallet or skid.

8.3 Returns

In case you return the BactoSwitch to bNovate or a distribution partner, please follow the instructions in this section.

> ⚠ **DECONTAMINATE BEFORE RETURNING**
>
> **Do not return contaminated materials**
>
> Instruments that have come into contact with hazardous media must be decontaminated before shipment and must be accompanied by a certificate of decontamination. Contact support@bnovate.com for more information.

Preparations

	WORK STEP
1.	If the instrument has been exposed to hazardous substances, fully decontaminate it and provide a certificate of decontamination.
2.	Follow the preparation procedure given in Storage.
3.	Pack the BactoSwitch and its accessories listed in Table 4-1 in its original packaging with foam inserts. Tubings and the online sampling device must have been drained and packed in a clean plastic bag.

Return

Ship the BactoSwitch to bNovate or the distribution partner, adhering to the transportation recommendations given in Transport and the general storage temperature and humidity requirements listed in Storage.

8.4 Recycling and disposal

The disposal of the BactoSwitch has to be carried out in compliance with regional statutory regulations. The BactoSwitch contains no environmentally damaging sources of radiation.

Table 8-1 Materials and their recycling or disposal

CATEGORY	MATERIALS	DISPOSAL POSSIBILITIES
Packaging	Cardboard, wood, paper	Reuse as packaging material or dispose for recycling
	Protective foils, polystyrene shells	Reuse as packaging material or dispose for recycling
Metal structure	Stainless steel	Recycling via metal waste
Electronics and solenoid valves	Printed circuit boards, electro-mechanical components	To be disposed of as electronic waste. Follow the local legislation.

CATEGORY	MATERIALS	DISPOSAL POSSIBILITIES
Front cover	Plastic (ABS V0)	Local disposal center

9. Contact

9.1 Contacting customer service

If you have any questions, please contact the bNovate support team under support@bnovate.com, or the service centre responsible in your country or region.

A list of all bNovate representatives is available online at www.bnovate.com/distribution-partners.