



**evoqua**  
WATER TECHNOLOGIES



# **BLU-SENTINEL™ PRO FLOW CELL**

**INSTRUCTION MANUAL**



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*Please note*

Original instruction manual!

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## 1. Introduction

### 1.1 Documentation

#### 1.1.1 Target groups

This instruction manual provides the information for installation, operating and maintenance personnel. It is required for operation and maintenance of the Blu-Sentinel™ Pro flow cell (module type D01).

All persons working with the Blu-Sentinel™ Pro flow cell must have read and understood the instruction manual, in particular, the safety instructions it contains.

#### 1.1.2 Documentation Structure

This instruction manual is intended for operators of the Blu-Sentinel™ Pro flow cell. It contains important information for safe, trouble-free, and efficient operation of the Blu-Sentinel™ Pro flow cell. Observing these instructions will help prevent risks, reduce repair costs and downtimes, and increases the reliability and service life of the Blu-Sentinel™ Pro flow cell.










Chapters Installation, Commissioning, and Maintenance are intended only for trained and authorized service personnel. These chapters contain important information on the assembly, configuration, commissioning and start-up, maintenance and repair of the Blu-Sentinel™ Pro flow cell that should only be performed by this target group.










Please consult the table of contents and the index to quickly find the information you require.

## 1.2 Conventions

### NOTICE

This instruction manual contains a number of safety notes with different priorities, which are marked with safety panels and pictograms.

Pictogram	Safety Panel	Safety note
		Immediate danger to life and limb! If the situation is not handled properly, death or serious injury is the result.
		Danger to life and limb! If the situation is not handled properly, death or serious injury may be the result.
		If this warning is not observed, there is a medium or slight risk that injury or damage to the equipment may be the result.
		Electrical hazard.
		<b>Never override sample flow switch!</b> Uncontrolled feeding of chemicals can result in injury or death. Sample flow switch is a critical safety device which prevents uncontrolled chemical feed. Follow instructions carefully!
		<b>Test flow switch function!</b> Uncontrolled feeding of chemicals can result in injury or death. Assure flow switch prevents chemical feed in any circulation NO-FLOW or backwash condition. Follow instructions carefully!

Pictogram	Safety Panel	Safety note
		<p>Always use anti-siphon devices!                      Uncontrolled feeding of chemicals can result in injury or death.                      Anti-siphon devices must be installed to prevent uncontrolled chemical feed.                      Follow instructions carefully.</p>
		<p>Never connect feeder directly to power source!                      Uncontrolled feeding of chemicals can result in injury or death.                      Chemical metering pumps must be connected to the controller to enable safety controls.                      Follow instructions carefully.</p>
		<p>Always install interlock!                      Chemical feed without water circulation can result in injury or death.                      Circulation pump interlock with chemical feeders is a critical safety device which prevents unsafe chemical feed.                      Recirculation pump must be interlocked to prevent chemical feed whenever pump power is removed.                      Follow instructions carefully.</p>
		<p>Electrical surges can damage your controller!                      A damaged controller could feed chemicals in an uncontrolled manor.                      Uncontrolled feeding of chemicals can result in injury or death.                      If you suspect your controller is not operating properly, disconnect it from control of chemical feed</p>
		<p>These notes assist in the operation of the system.</p>

### 1.3 Disclaimer

We are not liable for any damages incurred during installation or use of these hardware and software components. This applies specifically to trouble-free interaction with the software and hardware components you choose.

We are not liable for buyer damages (in particular, lost profits, lost information and service interruptions), which arise when using the Blu-Sentinel™ Pro flow cell, nor for other damages. You are solely responsible for the installation!

The contents of the instruction manual has been checked to make sure that it matches the detailed hardware and software. Deviations can nevertheless not be ruled out and we therefore assume no liability for full conformity. The details in this instruction manual are checked regularly and any necessary corrections are included in subsequent issues.



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## 2. Safety

### 2.1 Intended use

The Blu-Sentinel™ Pro flow cell (module type D01) in combination with the installed sensors and Blu-Sentinel™ Pro electronics module (module type E01) is intended exclusively for the measurement and control of the treatment of water in swimming pools and spas.

The operational safety of the Blu-Sentinel™ Pro flow cell is only guaranteed if it is used in accordance with its intended application. It may only be used for the purpose defined under the installation, operating and ambient conditions specified in this instruction manual.

All inspection and maintenance work must be carried out in accordance at the specified intervals.

Compliance with the intended use also includes reading this instruction manual and observing all the instructions it contains.

The owner/operator of the installation has sole responsibility for consequences of any use that does not conform with the installation's intended use.

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 **DANGER**

#### **Risk of injury or death!**

The device must not be used with flammable liquids.

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## 2.2 General safety instructions

The manufacturer places great value upon safety when working with the unit. This was already taken into account in the design of the system, by the integration of safety features.

<i>Safety regulations</i>	The safety instructions in this documentation must be observed. Additional industry-wide or in-house safety regulations also continue to apply.
<i>Safety warnings on the unit</i>	All safety instructions attached to the unit itself must be observed. These instructions must always be clearly legible and complete.
<i>State-of-the-art technology</i>	The unit has been manufactured in accordance with state-of-the-art technology and the accepted safety regulations. However, if the unit is used by persons who have not been adequately trained, risks to life and limb of such persons or third parties and damage to the unit itself or to other property cannot be ruled out. Work described in this instruction manual must be performed only by authorized personnel.
<i>Personnel</i>	The operator of the overall system must ensure that only authorized and qualified specialized personnel are permitted to work with and on the unit within their defined scope of authority. "Authorized, specialized personnel" refers to trained technicians employed by the operator, the manufacturer, or, if applicable, the service partner. Only qualified electricians must perform work on electrical components.
<i>Spare parts / components</i>	Trouble-free operation of the unit is only guaranteed if original spare parts and components are used in precisely the combination described in this instruction manual. Failure to observe this instruction may incur the risk of malfunction or damage to the unit.
<i>Extensions and conversions</i>	Never attempt to perform any modifications, extensions or conversions on the unit that could have an adverse affect on safety without the written approval of the manufacturer.
<i>Electrical power</i>	During normal operation, the electronics enclosure must remain closed. Connect the power cables in accordance with the wiring diagram.



### **Risk of injury or death!**

External voltages can be connected even with the operating voltage switched off. Disconnect all power sources before opening the device.

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*IT security* The manufacturer offers IT security mechanisms for its products to support secure system operation. We recommend checking on a regular basis to see what information is available regarding IT security developments for your products. Information on this can be found on the Internet.

For the safe operation of an installation, it is furthermore necessary to integrate the automation components into a holistic IT security concept which comprises the entire system and is in accordance with latest state of the art technology. In the process, implemented products deriving from other manufacturers should be taken into account.

*Disposal* Ensure safe and environment-friendly disposal of agents and replaced parts.




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*Attention!*

**Environmental hazard!**

Dispose of the electronics waste in accordance with valid local and national regulations.

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*Normal operation* Never employ any working methods which could affect safety!

The device must not be used with flammable liquids.

Inspect the Blu-Sentinel™ Pro flow cell at least daily for externally visible damage and faults! Inform the responsible person/authority immediately of any detected changes (including any changes in the operating performance)!

Have malfunctions remedied immediately!

*Installation and maintenance work* Do not use aggressive cleaning agents (e.g., alcohol, abrasive cleaners)! We recommend a damp cloth moistened with a commercially available neutral detergent.

## 2.4 Warranty conditions

The following must be observed for compliance with warranty conditions:

- Installation and commissioning by the manufacturer or trained and authorized specialists, e.g. of contractors
- Intended use
- Observation of the operational parameters and settings.
- The unit may only be operated by trained personnel.
- An operating log book must be kept (only in the public sector).
- Only approved calibration chemicals may be used
- The unit must not be exposed to frost.
- Maintenance work must be executed
- Use of genuine spare parts

If any of the above conditions are not met, the warranty is void.

## 2.5 Warranty

Evoqua Water Technology warrants equipment of its manufacture and bearing its trademark to be free of defects in materials and workmanship and to materially conform to any applicable specifications and drawings approved in writing by Evoqua Water Technologies.

If the customer gives Evoqua Water Technologies prompt written notice of breach of this warranty within twelve months from the date of start-up for the controller in accordance with the below conditions (the "Warranty Period"), Evoqua Water Technologies will, at its sole option and as the customer's exclusive remedy, either repair or replace free of charge, or refund the purchase price paid with respect to, any material found to be defective during the warranty period.

No repair or replacement of defective products shall extend the warranty period, but any such repaired or replaced product shall be covered for the balance of the original warranty period. If Evoqua Water Technologies determines that any claimed breach is not, in fact, covered by this warranty, the customer shall pay Evoqua Water Technologies 's then customary charges for any repair or replacement.

The "Warranty Period" for Blu-Sentinel controller components shall be as follows: a) the controller electronics shall be five (5) years from the date of manufacture b) the Strantrol sensors shall be two (2) years from the date of shipment c) the Wallace & Tiernan sensors (if used) and flow cell shall be one (1) year from the date of shipment.

The foregoing warranty is subject to the following conditions: (i) initial start-up of the equipment shall be completed by a factory authorized representative within the first twelve months after shipment of the equipment, with such installation and start-up to be documented in a duly completed start-up and field test report to be returned to Evoqua Water Technologies by the customer within thirty (30) days of start-up.; (ii) the customer shall have operated and maintained the equipment in accordance with all instructions provided by Evoqua Water Technologies; (iii) the customer shall not have made any unauthorized repairs or alterations; (iv) the customer shall not be in default of any payment obligation to Evoqua Water Technologies; (v) if requested, the customer will deliver the equipment to Evoqua Water Technologies authorized service center the customer shall pay all inbound and outbound freight costs; (vi) the customer must provide a complete and detailed description of the problem including, without limitation the Evoqua Water Technologies job number, date of delivery, date of installation, date of start-up and the operating conditions of the unit (s); and (vii) for equipment which is destined for extended storage, such equipment must have been stored in the accordance with the storage requirements detailed in the operation and maintenance manual (storage of equipment does not extend the warranty period).

The foregoing warranty does not extend to, and Evoqua Water Technologies assumes no responsibility for, (i) the installation quality or any services defects resulting there from unless a Evoqua Water Technologies representative or designee supervised the installation; (ii) in the event that the unit size and location are predetermined by someone other than by Evoqua Water Technologies or our local representative, the serviceability and/or performance of the unit for the specified design and/or actual operating conditions (this exclusion shall not apply if all necessary design information is submitted to and approved in writing by Evoqua Water Technologies); (iii) any auxiliary equipment or accessories supplied by Evoqua Water Technologies but manufactured by others (the original manufacturer's warranty, if any, shall apply to such products); (iv) damage to the equipment or products resulting from normal wear, abuse, neglect or operation in a manner inconsistent with Evoqua Water Technologies' recommendations; and (v) damage to the equipment or products that have been modified, tampered with or altered without written consent from Evoqua Water Technologies.

In addition to the foregoing conditions and limitations, the following product-specific limitations and conditions must be satisfied for the foregoing warranty to apply:

- This warranty does not cover damage caused by chemical action or abrasive material, damage caused by handling or during transportation, or damage arising from misuse, installation or any other cause beyond Evoqua Water Technologies' control.
- Standard units not in outdoor configurations are not warranted in outdoor applications.

The warranties set forth above are Evoqua Water Technologies' sole and exclusive warranties. Evoqua Water Technologies makes no other warranties of any kind, express or implied, including without limitation, any warranty of merchantability or of fitness for a particular purpose, all warranties arising from course and dealing and usage of trade and all such express or implied warranties are hereby disclaimed. The remedies provided above are the customer's sole remedies for Evoqua Water Technologies' failure to comply with obligations. Correction of any nonconformity in the manner and for the period of the time provided above shall constitute complete fulfillment of all the warranty liabilities of Evoqua Water Technologies, whether the claims of the purchaser are based in contract, in tort (including negligence) or otherwise with respect to or arising out of the work performed hereunder.

Limitation of liability: notwithstanding anything else to the contrary, Evoqua Water Technologies and its suppliers and any affiliated companies shall not be liable for any consequential, incidental, special, punitive or other indirect damages, and Evoqua Water Technologies total liability arising at any time from the sales of use of the equipment shall not exceed the purchase price paid for the equipment. These limitations apply whether the liability is based on contract, tort, strict liability or any other theory.

## 3. Description

### 3.1 General

The Blu-Sentinel™ Pro flow cell (module type D01) is part of the Blu-Sentinel™ Pro Pool Management System.

The Blu-Sentinel™ Pro flow cell (module type D01) is a special flow cell adapter for sample water from various pool applications. In combination with the Blu-Sentinel™ Pro electronics module (module type E01) and the integrated sensors, the Blu-Sentinel™ Pro flow cell measures and controls the hygiene assistance parameters free chlorine, pH value and ORP voltage, as well as total chlorine (optional), conductivity and temperature.

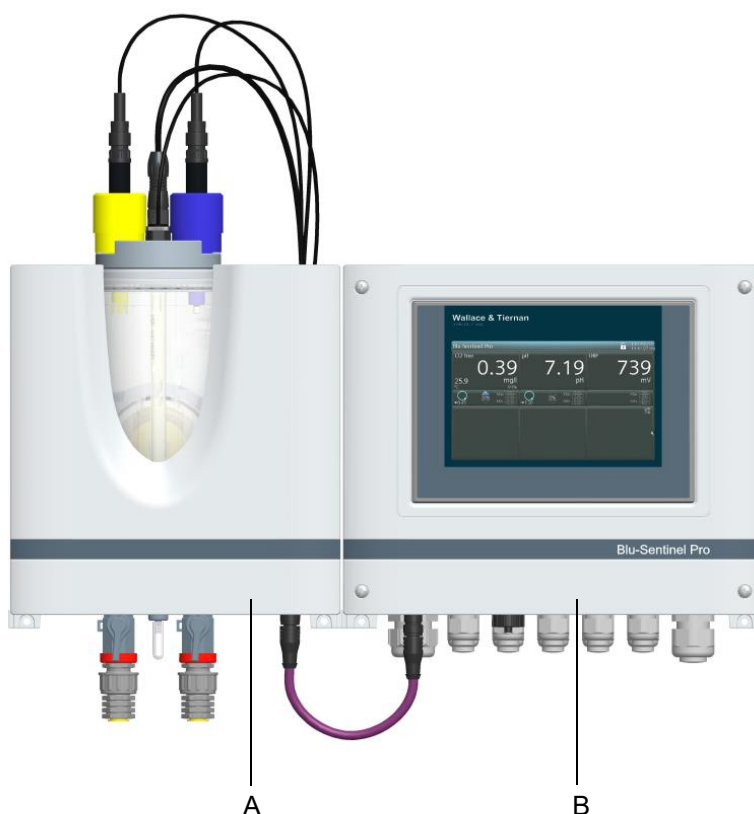


Image 1 Blu-Sentinel™ Pro Pool Management System with sensors

- A Blu-Sentinel™ Pro flow cell, pressurized version with sensors
- B Blu-Sentinel™ Pro electronics module

Blu-Sentinel™ Pro flow cell is available in a pressurized version. With the pressurized version, the sample water is returned into the system's circuit.

The for sensors required for the measurement tasks in swimming pools and the LED glow stick are inserted or screwed into the mounting hole in the cell body cover.

The Blu-Sentinel™ Pro flow cell can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581.

The maintenance-free flow control valve is the main hydraulic part of Blu-Sentinel™ Pro flow cell. It has the task of keeping the sample water flow constant, irrespective of fluctuations in operating pressures.

The multi-sensor monitors the acceptable minimum flow and records the temperature of the sample water. The metallic sensor housing guarantees a good sample water ground. The continuous hydromechanical cleaning of the electrode of the free chlorine sensor minimizes fouling of the electrode surfaces and guarantees long-term accuracy of chlorine measurements.

DFMe electronics converts the analog sensor signals for digital transmission to the Blu-Sentinel™ Pro electronics module. The conductivity sensor (optional) is connected to DFMe electronics via a conductivity module SiDiSens (optional). If a total chlorine membrane sensor TC3 CAN (optional) is used, this is connected directly to DFMe electronics module.

## 3.2 Version

The Blu-Sentinel™ Pro Pool Management System (part no. W3T385932) consists of:

- Blu-Sentinel™ Pro electronics module (module type E01)
- Blu-Sentinel™ Pro flow cell (module type D01) , pressurized version contains the DFMe electronics
- Free chlorine sensor
- pH electrode (yellow)
- ORP electrode (blue)

### Optional:

- Total chlorine membrane sensor TC3 CAN

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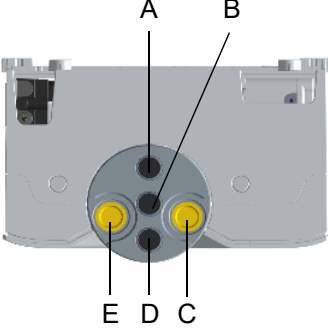
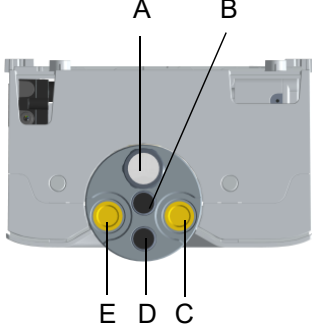
### NOTICE

The Blu-Sentinel™ Pro flow cell can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581.

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### 3.3 Configuration options

Description Blu-Sentinel™ Pro pressurized version	Blu-Sentinel™ Pro pressurized version W3T385933	Blu-Sentinel™ Pro pressurized version W3T385933 with cell body cover W3T409581 (optional)
	 <p data-bbox="651 943 1011 1122"> <i>A Conductivity sensor (optional)</i>  <i>B Free chlorine sensor (free chlorine)</i>  <i>C ORP electrode (blue)</i>  <i>D LED glow stick</i>  <i>E pH electrode (yellow)</i> </p>	 <p data-bbox="1034 943 1394 1178"> <i>A Total chlorine membrane sensor TC3 (optional)</i>  <i>B Free chlorine sensor (free chlorine)</i>  <i>C ORP electrode (blue)</i>  <i>D LED glow stick</i>  <i>E pH electrode (yellow)</i> </p>
Free chlorine sensor (free chlorine)	X	X
pH electrode (yellow)	X	X
ORP electrode (blue)	X	X
Conductivity sensor (optional)	X	-
Total chlorine membrane sensor (optional)	-	X
Sample water temperature (multi-sensor)	X	X
Flow rate monitor (multi-sensor)	X	X
Sample water ground (multi-sensor)	X	X
LED glow stick	X	X
Ball valve (sample water inlet)	X	X
Ball valve (sample water outlet)	X	X

### 3.4 Design and Functions

#### 3.4.1 Overall design

The Blu-Sentinel™ Pro flow cell (module type D01) has the following design:

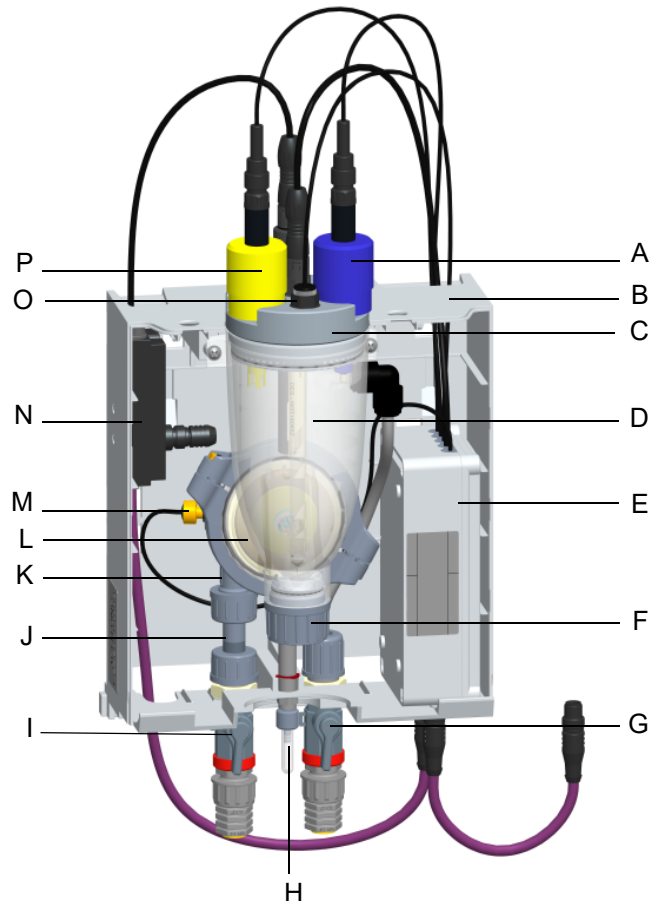


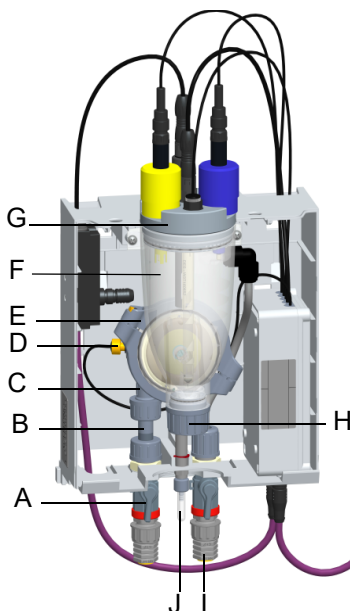
Image 2 Blu-Sentinel™ Pro flow cell, pressurized version (cover removed)

- A ORP electrode (blue)
- B Plastic housing with removable housing cover
- C Cover for holding the sensors
- D Cell body
- E DFMe electronics
- F Flow distributor cap
- G Sample water outlet with shut-off ball valve
- H Sample valve assembly (drain)
- I Sample water inlet with shut-off ball valve
- J Filter unit
- K Check valve housing
- L Flow control valve
- M Multi-sensor
- N Module SiDiSens conductivity (optional)
- O LED glow stick
- P pH electrode (yellow)

**3.4.2 Blu-Sentinel™ Pro flow cell**

The functional description of Blu-Sentinel™ Pro flow cell is described below from the sample water inlet to the sample water outlet.

The sample water is connected on the input side to the shut-off ball valve (A). The input pressure must be around 0.25 to 3.0 bar. To guarantee a constant flow, the minimum input pressure must not be less than 0.25 bar. Otherwise, an optional booster pump must be used. If the admission pressure exceeds 3.0 bar, an optional pressure reducing valve must be used. The differential pressure between the sample water inlet and sample water outlet must always be more than 0.25 bar. For example:



Back pressure	0.5 bar
Inlet pressure	min. 0.75 bar

The sample water flows in the flow direction to the check valve housing (C) through the filter unit (B). The check valve housing (C) provides a non-return function and guides the ball for monitoring the flow rate.

The multi-sensor (D) monitors the correct flow by the float principle with reed switch and measures the temperature with the Pt1000. The large-surface transducer grounding is through the stainless steel sensor housing.

The flow control valve (E) ensures a flow of the sample water that is not dependent on the operating pressure. The correct sample water flow of 33 l/h is factory-preset, checked and logged. If the inlet pressure rises, the valve ball moves towards the closed position; if the inlet pressure drops, the ball moves towards the open position.

The transparent cell body (F), which can be lit, holds the sensors and is designed to allow convenient cleaning and servicing. The sensors are installed in the mounting hole of the cell body cover (G) with standard thread connections or in special sensor mounts.

The LED glow stick is fitted in the flow cell cover for visual inspection of the sensors, sand cleaning and for color indication of messages or faults.

The flow distributor cap (H) screwed into the cell body from the bottom enables the continuous hydromechanical cleaning of the electrode of the free chlorine sensor using special cleaning sand and thereby effectively minimizes the fouling of the electrode surfaces. Clean electrode surfaces and a constant flow of sample water are critical for a qualitative good chlorine measurement and fast responsiveness.

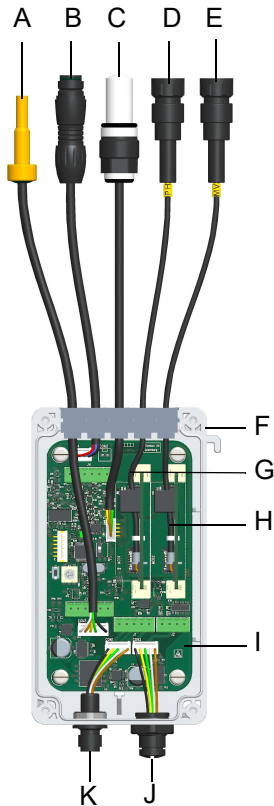
The sample water runs off through a shut-off ball valve. With the pressurized version, a maximum back pressure of 1.5 bar is permitted here.

For calibration, a flow cell sample valve assembly (J) is fitted. It is used to draw sample from the cell body through the low-pressure side of the flow control valve and to drain the cell body for servicing.

**CAUTION**

Do not overtighten the sample valve assembly as damage to this component may be the result.

### 3.4.3 DFMe electronics

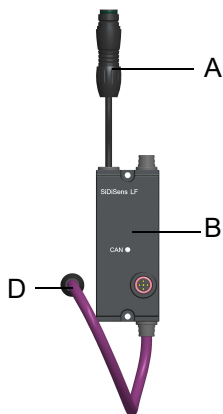


DFMe electronics consists of a splash proof housing with built-in sensor electronics and is integrated in the main housing of the flow cell. The sensor cables are prefabricated and are splash-proof to IP66. The motherboard holds the sensor input for the free chlorine sensor, the LED glow stick and the electronics for the multi-sensor. The motherboard contains two slots for the pH electrode (yellow) and the ORP electrode (blue). To the integrated CAN socket the CAN connection cable to Blu-Sentinel™ Pro electronics module is connected. The conductivity module SiDiSens or the total chlorine membrane sensor TC3 CAN (optional) can be connected through a second CAN connection socket (optional).

Image 3 DFMe electronics (cover removed)

- A Multi-sensor
- B Sensor cable  $Cl_2$  free
- C LED glow stick
- D pH electrode cable
- E ORP electrode cable (mV)
- F Housing of DFMe electronics
- G Plug-in card pH electrode
- H Plug-in card ORP electrode (mV)
- I DFMe motherboard with measurement input  $Cl_2$
- J CAN extension socket (optional)
- K CAN connection socket for Blu-Sentinel™ Pro electronics module

### 3.4.4 Modul SiDiSens conductivity (optional)



To measure the conductivity, conductivity module SiDiSens LF (optional) is installed in Blu-Sentinel™ Pro flow cell. The SiDiSens conductivity module contains the sensor electronics for conductivity sensor LF325 (4-conductor measurement). Through the CAN interface the SiDiSens conductivity module is connected with Blu-Sentinel™ Pro electronics module.

Image 4 Module SiDiSens LF

- A Sensor cable to conductivity sensor
- B SiDiSens LF module
- C CAN connection cable with plug

**3.5 Technical data**

**3.5.1 Blu-Sentinel™ Pro flow cell (module type D01)**

<i>Housing</i>	Dimensions (WxHxD)	253 x 375 x 163 mm (10 x 15 x 6.5 inch)
	Weight	approx. 2.5 kg (5.5 lbs)

<i>Connections</i>	Pressurized version	Inlet and outlet: G 1/2" (adapter) to 1/4" NPT
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<i>Flow control valve</i>	Sample water flow	33 l/h (8.7 gal/hr), controlled, preset at the factory
	Flow control range	0.25 to 3.0 bar (3 to 45 psig)
	Back pressure	Pressurized version max. 1.5 bar (22.5 psig)

<i>Multi-sensor</i>	Switching point	21 l/h ±3 l/h (5.5 gal/hr ± 0.8 gal/hr)
	Switching hysteresis	2 l/h (0.5 gal/hr)
	Temperature sensor	Pt1000

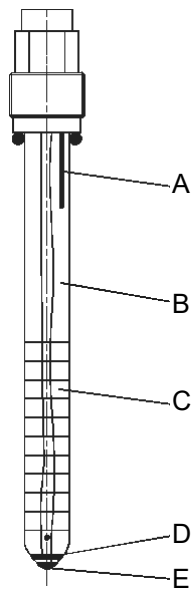
<i>Operating conditions</i>	Water quality	Bath water acc. to standard
	Storage temperature	-20 to +70°C (-4 °F to 158 °F)

**3.5.2 DFMe electronics**

Version	Sensor electronics integrated in the flow cell for connection of: <ul style="list-style-type: none"> <li>• Free chlorine sensor</li> <li>• pH electrode (yellow)</li> <li>• ORP electrode (blue)</li> <li>• Multi-sensor</li> </ul>
Power supply	24 V DC
Connection	5-pole M12 socket for CAN interface and 24 V DC supply. Extension option for second 5 pole M12 socket
Storage temperature	-20 to +70 °C (-4 °F to 158 °F)
Ambient temperature	0 to 50 °C (32 °F to 122 °F)
Environment	No direct sunlight
Atmospheric pressure	75 to 106 kPA (10.8 to 15.3 psi)
Max. working height	2000 m (6000 feet)
Relative humidity	< 80 %, non-condensing
Noise emission	< 45 dB

**3.5.3 Free chlorine sensor**

Version	Amperometric 3-electrode sensor with platinum electrodes, salt reserve, zirconium dioxide diaphragm, polymerized solid electrolyte, Ag/AgCl reference electrode
Measurement range	0 to 50 mg/l Cl <sub>2</sub>
Working temperature range	-5 to +80°C (23 to 176°F)
Operating pressure	0 to 6 bar
Minimum conductivity of the sample water	50 µS/cm
Installation length	165 mm (6.5 inch)
Screw-in thread	PG 13.5
Storage temperature	-5 to +30°C (23 to 86°F)



- A Reference electrode (REF)
- B KCl electrolyte
- C Salt
- D Counter electrode (CNT)
- E Working electrode (WRK)

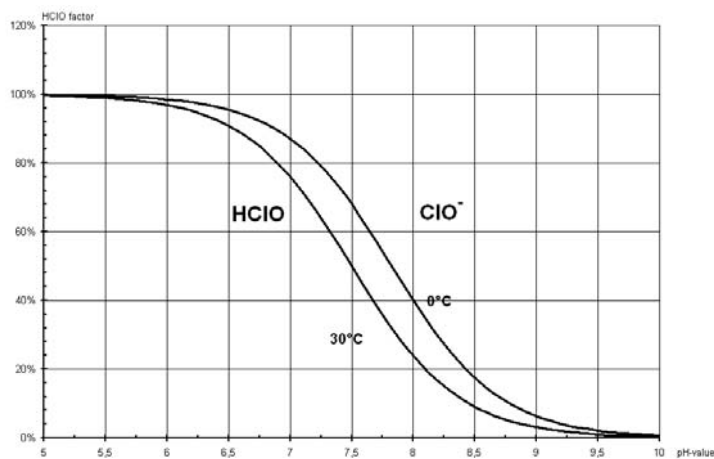
The chlorine measuring cell consists of a 3-electrode system as a combination electrode. The working and counter electrodes are made of a platinum alloy; the reference electrode is a silver/silver chloride electrode. The electrolyte is a saturated KCl gel and it cannot be replenished.

The measuring cell is delivered with a protective cap over the electrodes and the diaphragm. The protection cap contains KCl solution to ensure that the measuring cell is ready for operation. The protection cap must be removed before the unit is used. If the electrode is not used for some time, fill the protection cap with water (not distilled) and replace it over the electrodes of the sensor.

The surface of the electrode is continuously hydromechanically cleaned with special sand to prevent fouling. Ensure that the electrode is screwed in as far as possible for effective cleaning.

The measuring cell is connected to the DFMe electronics. A potentiostatic control circuit maintains the adjustable voltage between the working and reference electrodes constant. The resulting measuring cell current is proportional to the concentration of the oxidising agent. This complex measuring device ensures an accurate and reproducible measured value and a zero point that is stable for a long time.

The chlorine measurement is dependent on the pH value. The following graph shows the relationship between pH value and chlorine measurement. The disinfection effect of chlorine products in water is driven by the free hypochlorous acid HClO. Increasing the pH will decrease the part of hypochlorous acid. A constant pH value is therefore recommended to ensure a stable chlorine measurement.



Graph shows relationship between pH value and chlorine measurement

### 3.5.4 pH electrode (yellow)

Working temperature range	-0 to +50°C (23 to 122°F)
Temperature drift	0.2 %/10 K max.
Calibration	Pre-calibrated
Measuring range	0 to 14 pH (can be freely scaled in 1 pH value steps)
Input resistance	$5 \times 10^{11}$ Ohm
Storage temperature	-5 to +30°C (23 to 86°F)

The pH electrode has a porous Teflon® reference junction and a silver/silver chloride reference electrode. The saturated KCl electrolyte does not need to be replenished.

The electrode is supplied with a protection cap filled with KCl solution that keeps the electrode ready for operation at all times. If the electrode is not used for some time, fill the protection cap with water (not distilled) and place it over the electrode.

### 3.5.5 ORP electrode (blue)

Working temperature range	-0 to +50°C (23 to 122°F)
Temperature drift	0.2 %/10 K max.
Calibration	Pre-calibrated
Measuring range	0 to 1000 mV (can be freely scaled in 100 mV steps)
Input resistance	$5 \times 10^{11}$ Ohm
Storage temperature	-5 to +30°C (23 to 86°F)

The ORP voltage is used to indicate the state of the water that contains active oxidising and reducing substances.

The following approximate values can be used for a quick and complete disinfection of the swimming pool water:

For fresh water:	pH 6.5 – 7.3	UG > 750 mV
	pH 7.3 – 7.6	UG > 770 mV
For sea water (brine):	pH 6.5 – 7.3	UG > 700 mV
	pH 7.3 – 7.8	UG > 720 mV

The ORP electrode has a porous Teflon® reference junction and a silver/silver chloride reference electrode. The saturated KCl electrolyte does not need to be replenished.

The electrode is supplied with a protection cap filled with KCl solution that keeps the electrode ready for operation at all times.

If the electrode is not used for some time, fill the protection cap with water (not distilled) and place it over the electrode.



**3.5.6 Conductivity (optional)**

Design (sensor)	LF325
Working temperature range	-0 to +50°C (23 to 122°F)
Calibration	Pre-calibrated
Measuring range	2500 µS/cm 10, 20, 50, 100 mS/cm
Storage temperature	-5 to +90°C (23 to 194°F)

The Blu-Sentinel™ Pro flow cell can optionally be equipped with the conductivity sensor.

**NOTICE**

The conductivity measurement is available as a retrofit kit and must be ordered separately if necessary. See chapter 6.1.2 “Retrofit kit sensor measuring modules, total chlorine membrane sensor TC3 CAN, SiDiSens LF module conductivity measuring”.

**3.5.7 Modul SiDiSens conductivity (optional)**

Version	Sensor electronics integrated in the flow cell for connection of the conductivity sensor:
Connection	5-pole M12 socket for CAN interface extension CAN connection cable with 5-pole M12 plug for connection to the DFMe Sensor cable for connection of the conductivity sensor LF325 (4-electrode system)
Power supply	24V DC via CAN connection cable
Storage temperature	-20 to +70 °C
Ambient temperature	0 to 50 °C
Environment	No direct sunlight
Atmospheric pressure	75 to 106 kPA (10.8 to 15.3 psi)
Max. working height	2000 m
Relative humidity	< 80 %, non-condensing
Noise emission	< 45 dB



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## 4. Installation

### 4.1 Scope of delivery

The Blu-Sentinel™ Pro flow cell is supplied with the following:

- Blu-Sentinel™ Pro flow cell (module type D01), pressurized version
- LED glow stick
- Free chlorine sensor
- pH electrode (yellow)
- ORP electrode (blue)
- Strainer with ball valve
- Instruction manual Blu-Sentinel™ Pro flow cell

Additional includes the scope of supply:

- Blu-Sentinel™ Pro electronics module (module type E01)
- Din rail
- Assembly accessories
- 4-way mA analog output
- Instruction manual Blu-Sentinel™ Pro electronics module

Optional accessories:

- Conductivity sensor
- Module SiDiSens conductivity
- Total chlorine membrane sensor TC3 CAN

## 4.2 Transport and storage

<i>Transport</i>	<p>The flow cell is shipped in standard packaging. During transport, the packaged system must be handled carefully and should not be exposed to wet weather or moisture.</p> <p>Check that the transport packaging is undamaged. In the event of damage, please inform the transport company immediately, as your rights to compensation will otherwise be lost.</p> <p>If a component is damaged, please contact your affiliate immediately. Keep the packaging until the flow cell has been commissioned and put into operation.</p>
<i>Storage</i>	<p>The electronics module, flow cell and sensors must be stored in a dry condition without any residual water in a dry place that is not exposed to the weather. Storage temperature, see chapter 3.5 “Technical data”.</p>

## 4.3 Ambient conditions

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**NOTICE**

Correct and safe operation can only be guaranteed if the requirements for the ambient conditions are met. All applicable national and local regulations must be observed!

---

### 4.3.1 Installation site

The following points must be taken into account when installing Blu-Sentinel™ Pro flow cell:

- The flow cell must be protected from moisture, rain, frost, heat and direct sunlight and must not be installed outdoors.
- Do not use the flow cell in environments where there are flammable gases, fumes or dust or conductive dust.
- Do not subject the flow cell to strong shocks or vibrations.
- The air in the room should be non-condensing.
- Select the sample water withdrawal point that guarantees a proper mixture of disinfectant and a bubble-free sample water flow.
- To prevent long loop dead times, keep the sample water takeoff line as short as possible.
- Do not install sample water lines made of copper as these would distort the measurements.
- If electronics module and flow cell are installed in different locations, you must use CAN bus extension cable (optional). This must not be longer than 1000 m or 3000 feet.

## 4.4 Mechanical installation

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### NOTICE

The Blu-Sentinel™ Pro Pool Management System consists of the Blu-Sentinel™ Pro flow cell and the Blu-Sentinel™ Pro electronics module. We recommend joint assembly of the modules.

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### ⚠ WARNING

#### Risk of injury or damage to the installation!

All electrical work on the equipment must be performed only by authorized and qualified electricians. Modifications to the device other than those described in this instruction manual are not permitted.

---

The following installation options are available to mount the Blu-Sentinel™ Pro flow cell and the Blu-Sentinel™ Pro electronics module:

- with din rail
  - without din rail
- 

### NOTICE

The electronics module is not suitable for electrical connection with permanently installed cable conduits. If the cable glands do not meet local installation rules and regulations, these glands must be replaced with suitable ones.

---

---

### NOTICE

Leave a clearance of at least 250 mm or 10 inches above the Blu-Sentinel™ Pro flow cell for handling the sensors.

---

### 4.4.1 Sequence

Perform the mechanical installation according to the following check list.

Ser. No.	Task	Reference to chapter	Completed
1	Installation of the modules <ul style="list-style-type: none"> <li>• With din rail</li> </ul> or <ul style="list-style-type: none"> <li>• Without din rail</li> </ul>	4.4.2	
2	Taking off the housing cover	4.4.5	
3	Connecting the sample water inlet <ul style="list-style-type: none"> <li>• With hose connection</li> </ul> or <ul style="list-style-type: none"> <li>• With rigid pipes</li> </ul>	4.4.6	
4	Connecting the sample water outlet	4.4.8	
5	Filling the electrode cleaning sand	4.4.9	
6	Connecting sensors with DFMe electronics	4.4.10	
7	Fitting the sensors	4.4.11	
8	Installing calibration aids	4.5	
9	Fitting the enclosure cover	4.4.5	

### 4.4.2 Installation variant with din rail

Proceed as follows, see chapter 4.4.4 “Dimension drawing”:

- 1 Secure the din rail to a solid wall using the supplied dowels and screws. (screws and dowels for fixing to a solid wall are included in the scope of delivery.)

#### **NOTICE**

If the device is to be installed on a suitable lightweight wall, use the relevant mounting fixtures (not included in the scope of delivery).

- 2 Hook the Blu-Sentinel™ Pro electronics module onto the din rail so that it is flush at the right.
- 3 Fasten the Blu-Sentinel™ Pro electronics module to the solid wall at the bottom by the holders using dowels and screws.
- 4 Hook the Blu-Sentinel™ Pro flow cell onto the mounting rail on the left next to the Blu-Sentinel™ Pro electronics module.
- 5 Fasten the Blu-Sentinel™ Pro flow cell to the solid wall at the bottom by the holders using dowels and screws.

### 4.4.3 Installation variant without din rail

Instead of hooking the Blu-Sentinel™ Pro flow cell and Blu-Sentinel™ Pro electronics module onto the din rail, they can also be hooked onto suitable tallow-drop screws by the top holding clips.

---

**NOTICE**

The dimensions for the drilling pattern can be found on the back of the plastic housing.

Proceed as follows:

- 1 Affix the supplied screws and dowels to the solid wall (screws and dowels for fixing to a solid wall are included in the scope of delivery.)

---

**NOTICE**

If the device is to be installed on a suitable lightweight wall, use the relevant mounting fixtures (not included in the scope of delivery).

- 2 Hook the Blu-Sentinel™ Pro electronics module into the screws.
- 3 Fasten the Blu-Sentinel™ Pro electronics module to the solid wall at the bottom by the holders using dowels and screws.
- 4 Hook the Blu-Sentinel™ Pro flow cell onto the screws.
- 5 Fasten the Blu-Sentinel™ Pro flow cell to the solid wall at the bottom by the holders using dowels and screws.

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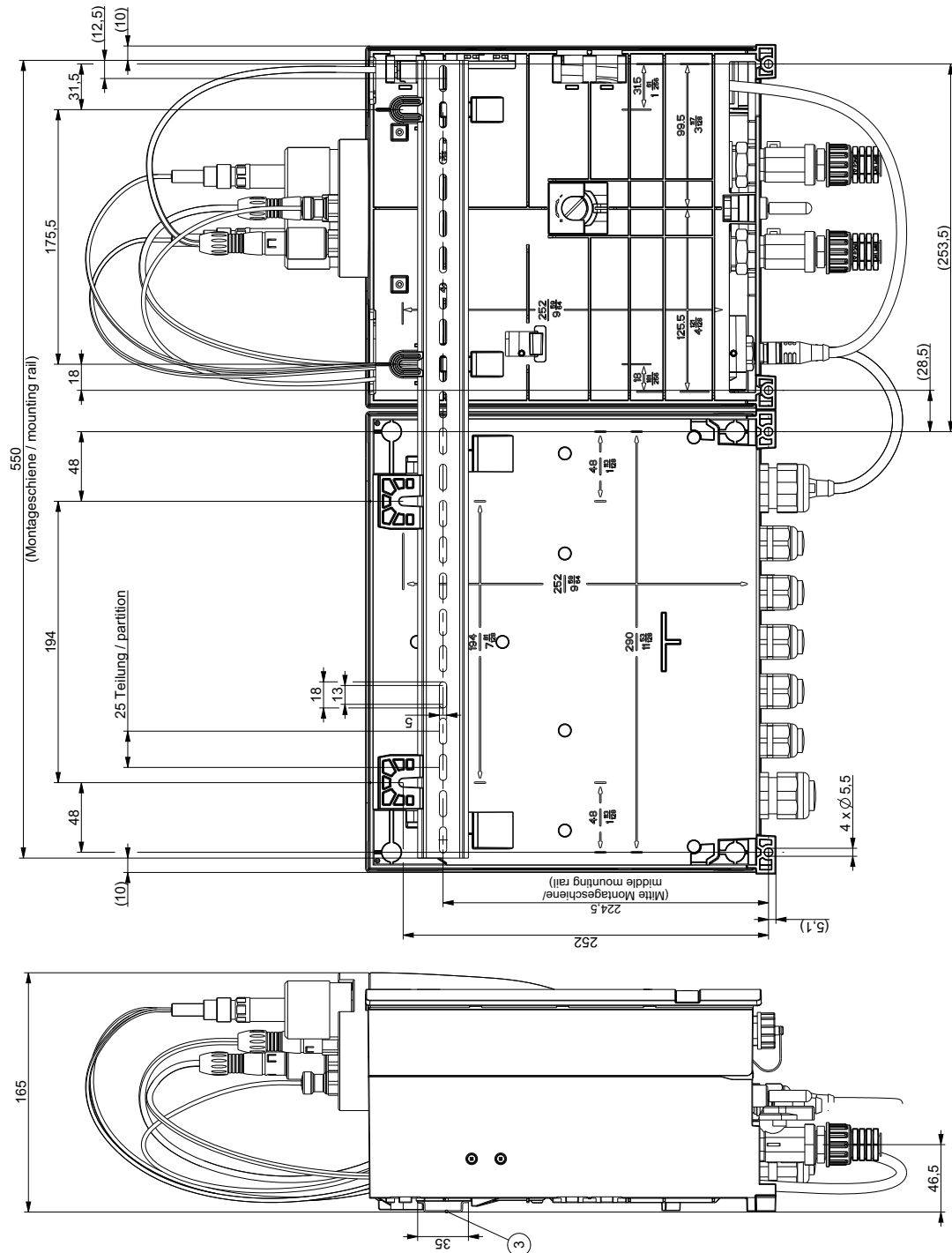
**NOTICE**

If Blu-Sentinel™ Pro electronics module and Blu-Sentinel™ Pro flow cell are installed in different locations, you must use CAN bus extension cable (optional); see chapter 6.2.6 “CAN bus extension cable for connection to DFMe electronics module”. This must not be longer than 1000 m or 3000 feet.

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## 4.4.4 Dimension drawing

Blu-Sentinel™ Pro flow cell (pressurized version) and Blu-Sentinel™ Pro electronics module (example)

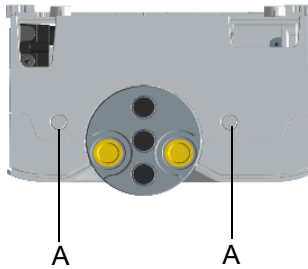
**NOTICE**

Measurement are shown in millimeters. To convert to inch measurement, divide by 25.4.

1 inch = 25.4 mm.



#### 4.4.5 Removing or fitting the housing cover



- 1** Remove the housing cover of the flow cell. To do this, press both unlocking buttons on the top of the housing and carefully remove the housing cover forwards.
- 2** Refit and engage the housing cover of the flow cell. To do this, place the housing cover against at the bottom of the housing and carefully push it upwards until the housing cover engages with the unlock buttons.

Image 1 Top view of housing cover

*A* Unlocking buttons

#### 4.4.6 Connecting the sample water inlet

##### NOTICE

Do not install water carrying lines made of copper. These would distort the measurements.

When connecting the sample water inlet, observe the following:

- Sample water inlets are classified according to whether they have a hose connection or are fitted with rigid piping.
- The pressure in the sample water inlet must always be within a range of 0.25 to 3.0 bar (3 psig to 45 psig). The pressure in the sample water inlet must generally be 0.25 bar (3 psig) higher than in the sample water outlet.
- At an inlet pressure below 0.25 bar (3 psig), an optional pressure booster pump must be used. See chapter 4.4.7 – “Example for sample water withdrawal using a booster pump”.
- If the inlet pressure exceeds 3.0 bar (45 psig), an optional pressure reducing valve must be used.
- To prevent long loop lag times, ensure that the lines in the sample water inlet are as short as possible.
- The strainer (see figure 3) with a mesh width of 0.5 mm is suggested for the sample water inlet.

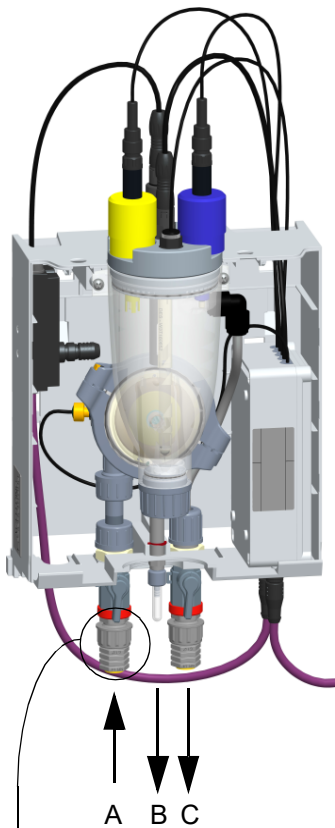


Image 2 Blu-Sentinel™ Pro flow cell (cover removed)

- A Sample water inlet with shut-off ball valve
- B Flow cell sample valve (drain on the drain screw)
- C Sample water outlet with shut-off ball valve

##### NOTICE

Install the strainer with the fine filter at sample water inlet.

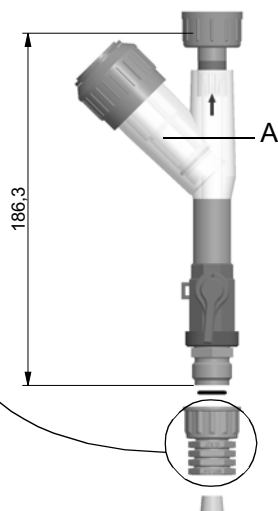


Image 3 Strainer

- A Fine filter (inside)

**Sample water inlet with hose connection**

**NOTICE**

The water-tightness of the hose screw connection is only guaranteed if the following installation instructions are followed!

Proceed as follows:

- 1 Release the union nut (A) on the hose screw connection.
- 2 Insert the hose (B) until it hits the hose bushing (D).
- 3 Push the locking ring (C) out until the union nut (A) engages the connecting threads.

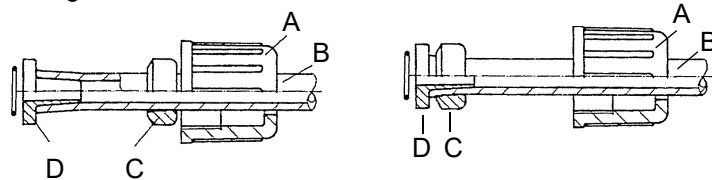


Image 4 Detail: hose union cutout

- A Union nut
- B Hose
- C Locking ring
- D Hose bushing

Overview of hose connections

PVC hose, reinforced, ID x wall thickness	Ø 4 x 3	Ø 6 x 3	Ø 10 x 3
Hose	W2T505524	W2T505525	W2T505334
Hose connecting parts cpl.	W3T167626	W3T167518	W3T167590
consisting of:			
O-ring	W3T172861	W3T172861	W3T169068
Locking ring	W3T161417	W3T161436	W3T159622
Union nut	W3T161502	W3T161502	W3T167297
Hose bushing	W3T172945	W3T161501	W3T167293

PE hose, ID x wall thickness	Ø 4 x 1	Ø 6 x 1	Ø 6 x 2	Ø 10 x 2
Hose	W2T507155	W2T505784	W2T505676	W2T505734
Hose connecting parts cpl.	W3T163752	W3T171453	W3T163796	W3T163825
consisting of:				
O-ring	W3T172861	W3T172861	W3T172861	W3T169068
Locking ring	W3T172891	W3T169815	W3T161436	W3T163437
Union nut	W3T161502	W3T161502	W3T161502	W3T167297
Hose bushing	W3T172945	W3T161501	W3T161501	W3T167293

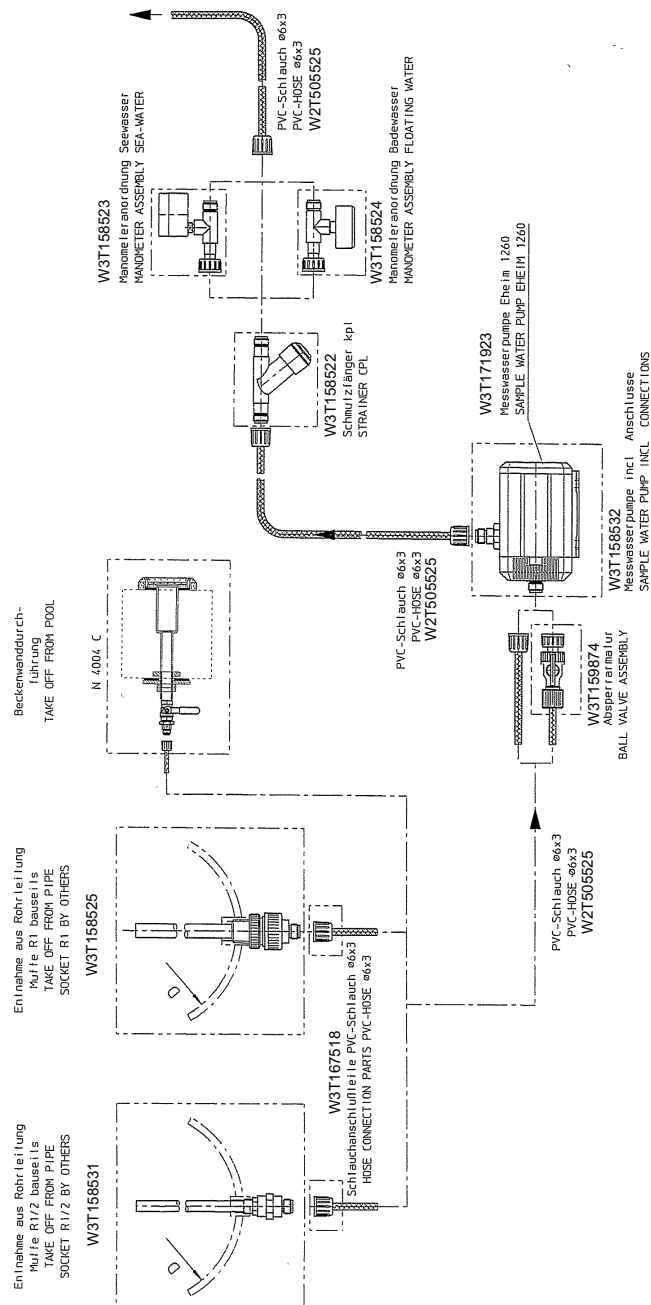
## Sample water inlet with rigid pipes

For a sample water inlet with rigid pipework, proceed as follows:

- 1 Connect the sample water pipework to the connection thread of the ball valve.
- 2 Ensure that the sample water pipes are installed so that it is free of mechanical stress.

### 4.4.7 Sample water withdrawal options

Example for sample water withdrawal using a booster pump



Only operate with sample water inlet

4.4.8 Connecting the sample water outlet

**NOTICE**

Do not install water lines made of copper. These would falsify the measurements.

For the sample water outlet of the pressurized version, proceed as follows:

- 1 On the pressurized version, a maximum back-pressure of 1.5 bar is permitted on the sample water outlet.
- 2 Ensure that the drain screw (flow cell sample valve) is always closed.

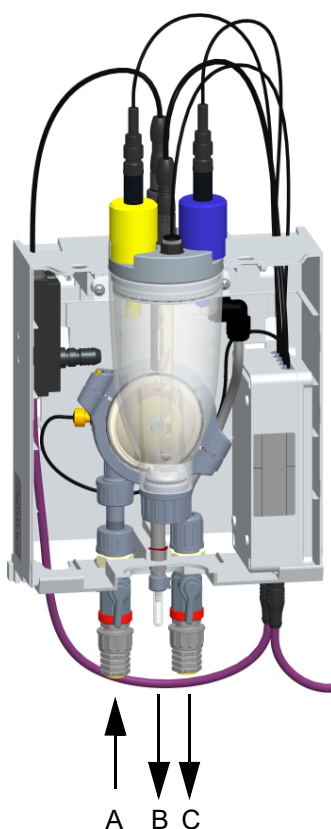


Image 5 Blu-Sentinel™ Pro flow cell, pressurized (cover removed)

- A Sample water inlet with shut-off ball valve
- B Flow cell sample valve
- C Sample water outlet with shut-off ball valve

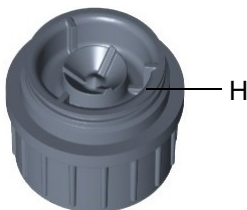
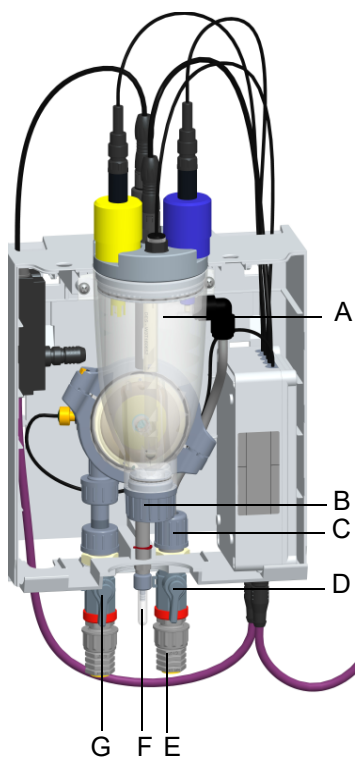
#### 4.4.9 Filling the electrode cleaning sand

##### NOTICE

Before opening the cover always release the pressure in the cell body first with the drain screw.

The continuous hydromechanical cleaning of the electrode of the chlorine sensor using special electrode cleaning sand effectively prevents the natural contamination of the electrode surface. The electrode cleaning sand (part no. W3T171317) is supplied in a plastic bottle, the cap serves as a measure.

Proceed as follows:



- 1 Close the ball valve (G) at the sample water inlet and sample water outlet (D).
- 2 Open the flow cell sample valve (F) and empty the cell body. To do so, temporarily loosen a plug or sensor to allow air to flow in.
- 3 When the cell body (A) is empty, close the drain screw (sample taking unit) once more.
- 4 Remove the housing cover of the flow cell.
- 5 Unscrew the flow distributor cap (B). Hold the container underneath as the remaining water will drip out.
- 6 Fill the cap of the cleaning sand bottle until it is one third full and then pour into the middle of the flow distributor cap (H). The inner indentation of the flow distributor cap is filled to the half-point with electrode cleaning sand.
- 7 Screw the flow distributor cap (B) back on.
- 8 Open the ball valve (G) at the sample water inlet and sample water outlet (D).
- 9 The cell body (A) fills with sample water.
- 10 Refit the housing cover of the flow cell and engage.
- 11 After 2 to 3 hours running-in time, perform a chlorine calibration. If necessary, repeat the chlorine calibration after 24 hours. See section on Calibration in the instruction manual "Blu-Sentinel™ Pro electronics module".

##### NOTICE

An entrained air bubble at the bottom of the cell body does not affect the measurement.

Image 6 Blu-Sentinel™ Pro flow cell, pressurized (cover removed)

Image 7 Flow distributor cap

**4.4.10 Plugging sensors into the DFMe electronics**

The sensors are connected to the DFMe electronics as follows.

Proceed as follows:

- 1 Insert the multi-sensor (A) in the flow control valve.
- 2 Connect sensor cable Cl<sub>2</sub> free to the free chlorine sensor.
- 3 Insert or screw the LED glow stick (C) into the mounting hole in the cell body cover.
- 4 Connect the pH- and ORP sensor cable plug (D, E) with the pH electrode (yellow) and the ORP electrode (blue).
- 5 Plug the CAN connection cable into the CAN connection socket (H) and with connect with Blu-Sentinel™ Pro electronics module (CAN socket).

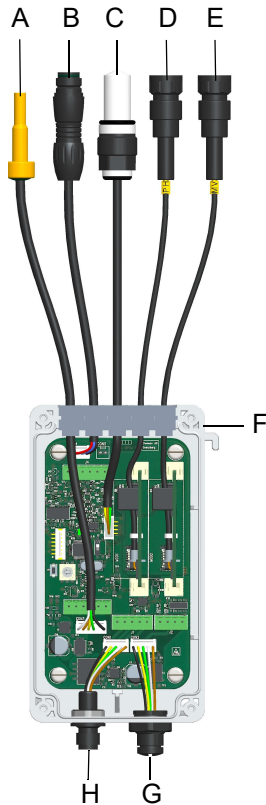


Image 8 Cross-section, DFMe electronics

- A Multi-sensor
- B Sensor cable Cl<sub>2</sub> free
- C LED glow stick
- D pH sensor cable
- E ORP sensor cable (mV)
- F Housing DFMe
- G CAN extension socket
- H CAN connection socket for Blu-Sentinel™ Pro electronics module

**4.4.11 Fitting the sensors**

**NOTICE**

The free chlorine sensor, the pH electrode (yellow) and the ORP electrode (blue) must be prepared accordingly. Please follow the appropriate instructions for the sensors!

The Blu-Sentinel™ Pro flow cell can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581.

**NOTICE**

With the pressurized version, the sensors must be screwed in or secured to prevent them from being pushed out.

Proceed as follows:

- 1 Remove the plug from the mount hole on the cover of the cell body.
- 2 Remove the protection caps from the free chlorine sensor
- 3 Remove the KCl tank and stand for the pH electrode (yellow) and the ORP electrode (blue).

### NOTICE

Keep the protection cap or KCl tank with stand for later use.

- 4 With the conductivity sensor (optional), remove the blind plug and O-ring.
- 5 Install the sensors in the positions shown below.

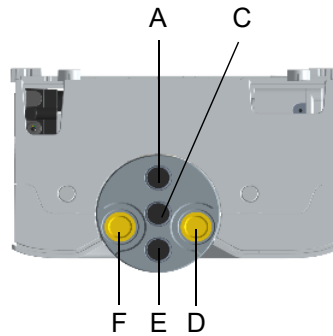


Image 9 Body cell cover

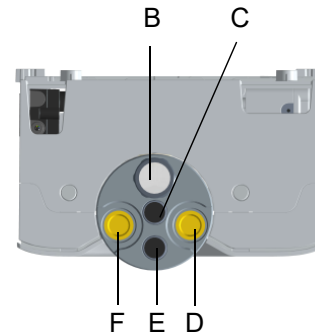


Image 10 Body cell cover  
W3T409581 (optional)

- A Conductivity sensor (optional)
- B Total chlorine membrane sensor TC3 CAN (optional)
- C Free chlorine sensor
- D ORP electrode (blue)
- E LED glow stick
- F pH electrode (yellow)



## 4.5 First commissioning

After the electronics module and flow cell and sensors are installed, you can perform the initial startup. See instruction manual “Blu-Sentinel™ Pro electronics module”, and instructions for the sensors.



---

### **! WARNING**

#### **Test flow switch function!**

Uncontrolled feeding of chemicals can result in injury or death. Assure flow switch prevents chemical feed in any circulation NO-FLOW or backwash condition. Follow instructions carefully.

---

If flow switch does not stop and remain stopped during backwash, no-flow, or very low flow conditions, the controller cannot prevent the uncontrolled feed of chemicals, which could cause personal injury or death.

Testing of the flow switch installation is essential to assure the flow switch stops, remains stopped, and controller shows "NO-FLOW ALARM" within 20 seconds, whenever filter is in backwash or circulation flow stops. If the flow switch does not stop completely, plumbing corrections or the installation of additional safeguards will be necessary to avoid uncontrolled chemical feed.

## 4.6 Shut-down

---

### **! CAUTION**

If the installation site of the Blu-Sentinel™ Pro flow cell is not frost-free, the system must be taken out of operation in good time! See also instruction manual „Blu-Sentinel™ Pro electronics module” and the corresponding instructions for the sensors.

---

### 4.6.1 Emptying the Blu-Sentinel™ Pro flow cell

Proceed as follows:

- 1 Switch off the power supply.
- 2 Drain the sample water inlet and outlet line.
- 3 Remove the housing cover of the Blu-Sentinel™ Pro flow cell.
- 4 Empty the cell body through the sample taking unit opening.

- 5 Remove the cleaning sand.
- 6 Remove and empty filter unit and check valve housing. See chapter 5.7 “Cleaning the flow rate monitor and non-return ball valve”.
- 7 When the remaining water has drained from the flow control valve, refit the filter housing and the check valve housing.
- 8 Remove the sensors from the mounting hole in the cell body cover and separate from DFMe electronics.
- 9 Shutting down the sensors. See appropriate sensor operating instructions.
- 10 Refit and engage the housing cover of the Blu-Sentinel™ Pro flow cell.

#### 4.6.2 Shutting down the sensors

---

**NOTICE**

Please follow the relevant instruction manual for the sensors!

---

For the free chlorine sensor and the pH electrode (yellow) or the ORP electrode (blue), proceed as follows:

- 1 Pull out or unscrew the sensors.
- 2 Store the sensors in a frost-free place.

#### 4.7 Recommissioning

- 1 Prepare the sensors. See relevant instructions for the sensors.
- 2 Refit the sensors and connect the sensors with DFMe electronics. See Chapter 4.4.11 Fitting the sensors and chapter 4.5 “First commissioning”.
- 3 Filling electrode-cleaning sand, see chapter 4.4.9 “Filling the electrode cleaning sand”.
- 4 For recommissioning, see instruction manual “Blu-Sentinel™ Pro electronics module”.

## 5. Maintenance

**⚠ DANGER**

**Risk of injury or death!**

External voltages can be connected even with the operating voltage switched off.



**⚠ WARNING**

**Risk of electrical shock!**

Disconnect all power sources before servicing.

Line voltage (120/240VAC) can be present inside the Blu-Sentinel™ Pro electronics module and caution should be used to prevent electrical shock, burns or electrocution. Be sure electric power is disconnected before opening the cover of any Blu-Sentinel™ Pro. Follow all local safety policies, procedures and electrical codes, to prevent injury from electrical hazards, before opening the cover of this controller. If you are not trained and comfortable performing work on electrical equipment, contact a licensed electrician to perform the work.

### 5.1 Maintenance intervals

**NOTICE**

Liability for defects can only be accepted if maintenance work is performed as specified. Adhere to the applicable standards and national and regional regulations.



**⚠ WARNING**

**Daily comparative measurements are highly recommended!**

Check the water quality with daily grab sample measurements. Perform calibrations as necessary.


**WARNING**
**Maintenance for the device!**

Maintain the device as suggested on the following page! Inspect the device at least once daily for externally visible damage and faults! Remedy all fault and error messages.

Activity	Period/Interval	
Check for leakages	daily	Chapter 5.3
Grab sample analysis for chlorine and pH, perform a calibration if necessary	Acc. to standard	See instruction manual Blu-Sentinel™ Pro electronics module
Checking the electrode cleaning sand	Weekly	Chapter 5.4
Replacing the electrode cleaning sand	Every six months	Chapter 5.5
Checking the ORP in the calibration solution	Every 4 to 6 weeks	See instructions on Sensors
Checking the conductivity (when using the conductivity sensor)	Every 4 to 6 weeks	See instructions on Sensors
Replacing the electrolyte for the total chlorine membrane sensor (when using the total chlorine membrane sensor TC3 CAN)	Every six months	See instructions on Sensors
Replacing the membrane cap for the total chlorine membrane sensor (when using the total chlorine membrane sensor TC3 CAN)	Annually	See instructions on Sensors

## 5.2 Maintenance parts kit

**NOTICE**

The parts required for the service are included in the maintenance parts kits. Maintenance parts kits for wear parts for 1 year and for 4 years are available.

Part No.	Description
W3T158874	Maintenance parts kit, annual maintenance
W3T158878	Maintenance parts kit, 4 years
W3T158882	Spare parts set for flow control valve
W3T166180	Seal set
W3T320611	Sealing kit LED pressurized for LED glow stick

## 5.3 Checking for leakages

Check the Blu-Sentinel™ Pro flow cell, including all screw connections, for leakage every day. Repair any leakage points immediately!

**NOTICE**

Air bubbles in the flow cell can influence the measuring accuracy. The cause must be determined and remedied.

## 5.4 Checking the electrode cleaning sand

Every week, check if there is sufficient electrode cleaning sand in the cell body. The cleaning sand must be around in the swirling bottom part of the cell body. The electrode cleaning sand is necessary for cleaning the electrode of the free chlorine sensor and must be replenished if necessary or replaced.

## 5.5 Replacing the electrode cleaning sand

The electrode cleaning sand used for constant cleaning of the free chlorine sensor grinds itself down with time. The cleaning sand must be replaced regularly. See chapter 5.1 Maintenance intervals.

For procedure, see chapter 4.5 First commissioning.

---

**NOTICE**

After adding fresh electrode cleaning sand or replacing it, the electrode current can increase slightly for approximately 2 to 3 hours. A calibration is needed after this. See instruction manual "Blu-Sentinel™ Pro electronics module".

---

## 5.6 Cleaning

Do not use aggressive cleaning agents (e.g., alcohol, abrasive cleaners)! We recommend a damp cloth moistened with a commercially available neutral detergent.

### 5.7 Cleaning the flow rate monitor and non-return ball valve

Proceed as follows:

- 1 Switch off the power supply.
- 2 Drain the sample water inlet and outlet line.
- 3 Remove the housing cover of the Blu-Sentinel™ Pro flow cell.
- 4 Dismantle the filter unit.
- 5 Carefully pull the complete non-return ball valve housing (A) down and out.
- 6 Turn the non-return ball valve housing upside down and catch the flow ball (B) or if the ball is jammed, release it with a slight knock.
- 7 Use a suitable blunt tool to now push out the ball seat (D) and glass ball (C) against the direction of flow.
- 8 Clean the empty non-return ball valve housing, flow ball, ball seat and glass ball with clear water.
- 9 During reassembly, make sure that the ball seat and ball are correctly positioned.
- 10 To help push the assembled non-return ball valve housing back into the control valve, we recommend slightly lubricating the gaskets with the supplied Unisilikon grease.
- 11 Check that the non-return ball valve housing is correctly positioned through the guide lugs on the housing.
- 12 Fit the filter unit again.
- 13 Refit and engage the housing cover of the Blu-Sentinel™ Pro flow cell.
- 14 Reconnect the sample water inlet and outlet lines.
- 15 Re-establish the power supply.

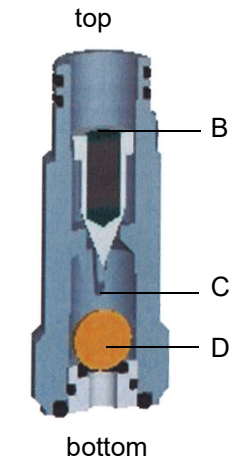
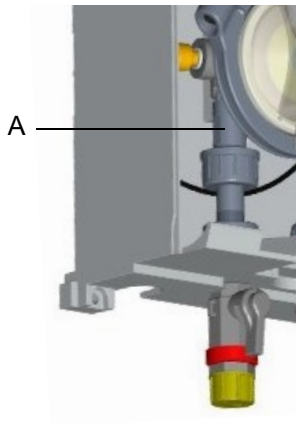


Image 1 Detail: installation location of check valve housing

Image 2 Cross-section of check valve-housing

- A Check valve housing (overall)
- B Flow cone
- C Spherical seat
- D Glass ball





## 6. Retrofit kits and spare parts

### 6.1 Retrofit kits

#### 6.1.1 Sensor measuring modules

The Blu-Sentinel™ Pro flow cell gives the option to retrofit sensor measuring modules.

Part No.	Description
W3T320091	Sensor measuring module DFMe Conductivity LF325 with cable and calibration solution
W3T320090*	Sensor measuring module DFMe Total chlorine TC3 CAN with CAN bus extension cable 1 m
W3T409581*	Cell body cover, fully pressurized version comprising: cell body cover and gasket kit W3T158755

**NOTICE**

\* The Blu-Sentinel™ Pro flow cell can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581.

### 6.1.2 Retrofit kit sensor measuring modules, total chlorine membrane sensor TC3 CAN, SiDiSens LF module conductivity measuring

Proceed as follows:

- 1 Disconnect the Blu-Sentinel™ Pro electronics module from the power supply. See instruction manual “Blu-Sentinel™ Pro electronics module”.
- 2 Remove the housing cover of the Blu-Sentinel™ Pro flow cell.
- 3 Take out all sensors from the mounting hole in the cell body cover and unplug the cable gland from DFMe electronics. Hold the cable while doing this as it must not be allowed to twist.
- 4 Keep the sensors in a safe place (see instruction manual for sensors).
- 5 The Blu-Sentinel™ Pro flow cell can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581. Please see chapter 6.1.3 “Replace standard cell body cover (optional)”.
- 6 Disconnect CAN connection cable between DFMe electronics and Blu-Sentinel™ Pro electronics module.
- 7 Remove DFMe electronics from the Blu-Sentinel™ Pro flow cell housing. To do this, release the fixing screw on the underside of DFMe electronics.
- 8 Unhook DFMe electronics from the mounting hook (G) of Blu-Sentinel™ Pro flow cell. To do this, raise DFMe electronics and carefully unhook it from the mounting hook.
- 9 Open the housing of DFMe electronics. To do this, release the four cover screws of DFMe electronics.
- 10 Insert the sensor measuring module conductivity card in the provided slot. See chapter 6.2.3 “DFMe electronics”.

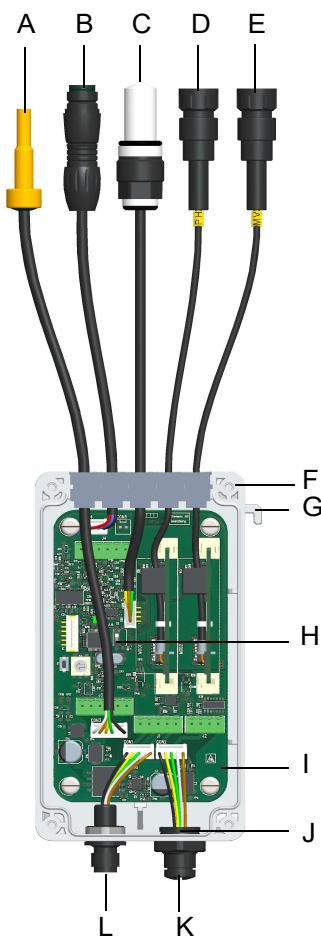
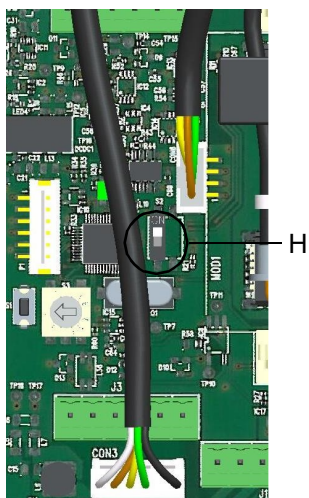


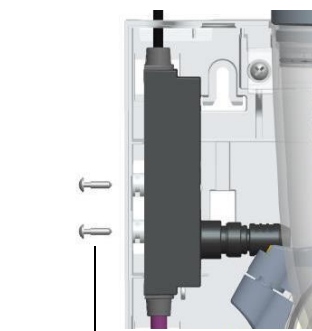
Image 1 Cross-section, DFMe electronics module

- A Multi-sensor
- B Sensor cable  $Cl_2$  free
- C LED glow stick
- D pH electrode cable
- E ORP electrode cable (mV)
- F Housing DFMe
- G Mounting hook
- H DIP switch
- I Base plate DFMe with measurement input  $Cl_2$
- J Protrusion for CAN extension socket
- K CAN extension socket
- L CAN connection socket for Blu-Sentinel™ Pro electronics module



**11** When installing the SiDiSens conductivity module and/or the total chlorine membrane sensors TC3 CAN, switch off the CAN-balancing resistors on the DFMe electronics module. Set DIP switch (H) to the „OFF” position. Furthermore, the CAN extension socket (M) must also be retrofitted. To do this, break out the indent on the housing underside of DFMe electronics module and fit the CAN extension socket (K). Check that all gasket inserts are correctly mounted.

**12** Fit the housing cover of DFMe electronics and secure with the four cover screws. Tighten the housing screws to a maximum torque of 0.7 Nm (± 0.15 Nm).



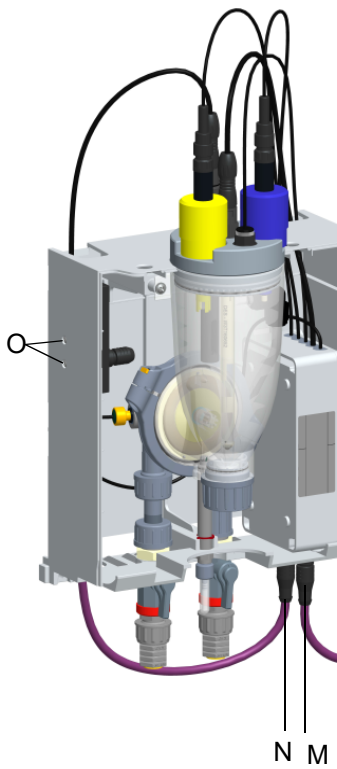
Plastic self-tapping screw (10 mm)

**13** Hook DFMe electronics by the mounting hook (G) onto Blu-Sentinel™ Pro flow cell and secure on the underside with the securing screws.

**14** Install the SiDiSens LF module on the left side in the flow cell and secure with the enclosed plastic self-tapping screws (W2T807965 - 10 mm) in position O.

**NOTICE**

Prior to the installation of the SiDiSens module, please ensure that you use the correct plastic self-tapping screws. Use only the plastic self-tapping screws A2 (W2T807965 - 10 mm) when installing the SiDiSens module. Please distinguish between the plastic self-tapping screws for installing the flow cell and those used for the SiDiSens module. The screws should not be confused.



**15** Plug in the CAN sensor cable of the SiDiSens LF module or the total chlorine membrane sensor TC3 CAN at position N.

**16** Refit and engage the housing cover of the Blu-Sentinel™ Pro flow cell.

Image 2 Blu-Sentinel™ Pro flow cell, pressurized (cover removed)

*M* CAN sensor cable connection

*N* SiDiSens LF connection

*O* Mounting recess

Overview of CAN connection

The image below shows the CAN connection

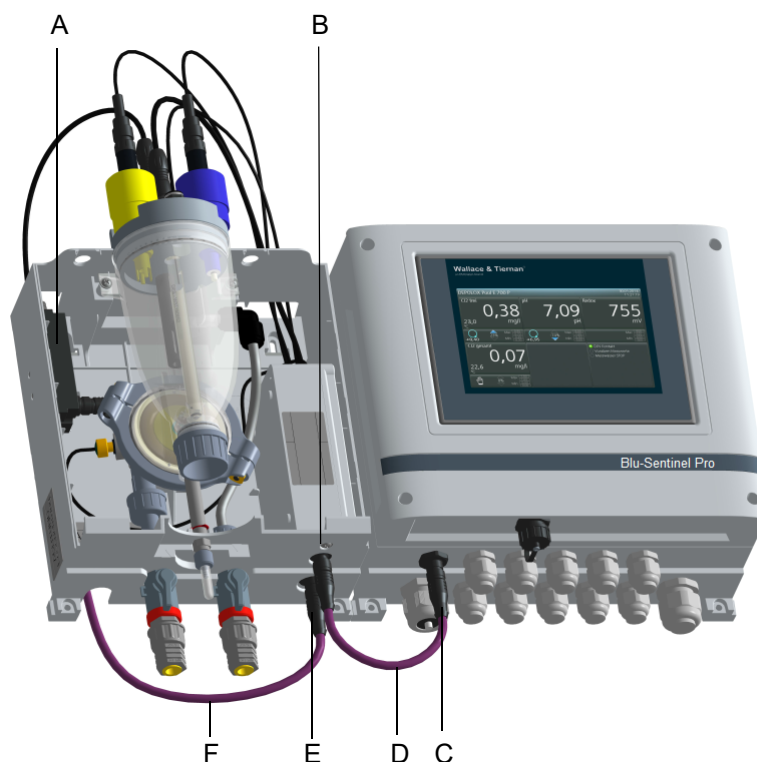


Image 3 Cross-section Blu-Sentinel™ Pro flow cell with Blu-Sentinel™ Pro electronics module

- A SiDiSens LF module
- B Securing screw, DFMe electronics
- C CAN socket for connection of CAN connection cable of the Blu-Sentinel™ Pro flow cell or DFMe electronics
- D CAN connection cable
- E CAN extension socket for connection of the CAN sensor cable of the SiDiSens or for the total chlorine membrane sensor TC3 CAN
- F CAN connection cable for SiDiSens conductivity module

### 6.1.3 Replace standard cell body cover (optional)

The pressurized version can be retrofitted with the total chlorine membrane sensor TC3 CAN. Please note that the standard cell body cover must be replaced by an optional cell body cover, part no. W3T409581. Proceed as follows:

- 1 Unscrew the standard body cell cover.
- 2 Remove from the optional body cell cover (E) the union bush (A) with dummy disc (B) and O-ring (C). Keep the parts for subsequent use (equipped without membrane sensor for total chlorine).
- 3 Screw the optional body cell cover (E) into the lid of the cell body (pressurized version).
- 4 First install the gasket W3T164773 and than the clamping ring W3T171789 in the corresponding opening on the cell body cover (D)
- 5 Install the sensor measuring module DFMe for total chlorine TC3 CAN, see chapter 6.1.2 "Retrofit kit sensor measuring modules, total chlorine membrane sensor TC3 CAN, SiDiSens LF module conductivity measuring".

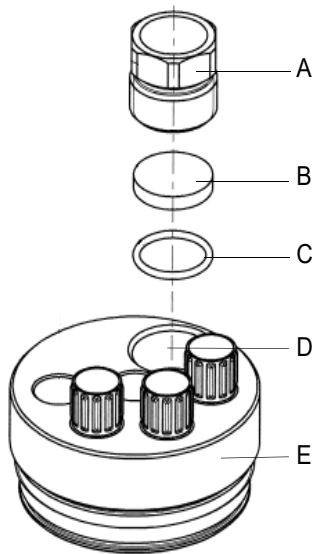


Image 4 Cell body cover W3T409581

- A Union bush  
 B Dummy disc  
 C O-ring  
 D Opening for cell body cover  
 E Cell body cover W3T409581

## 6.2 Spare parts

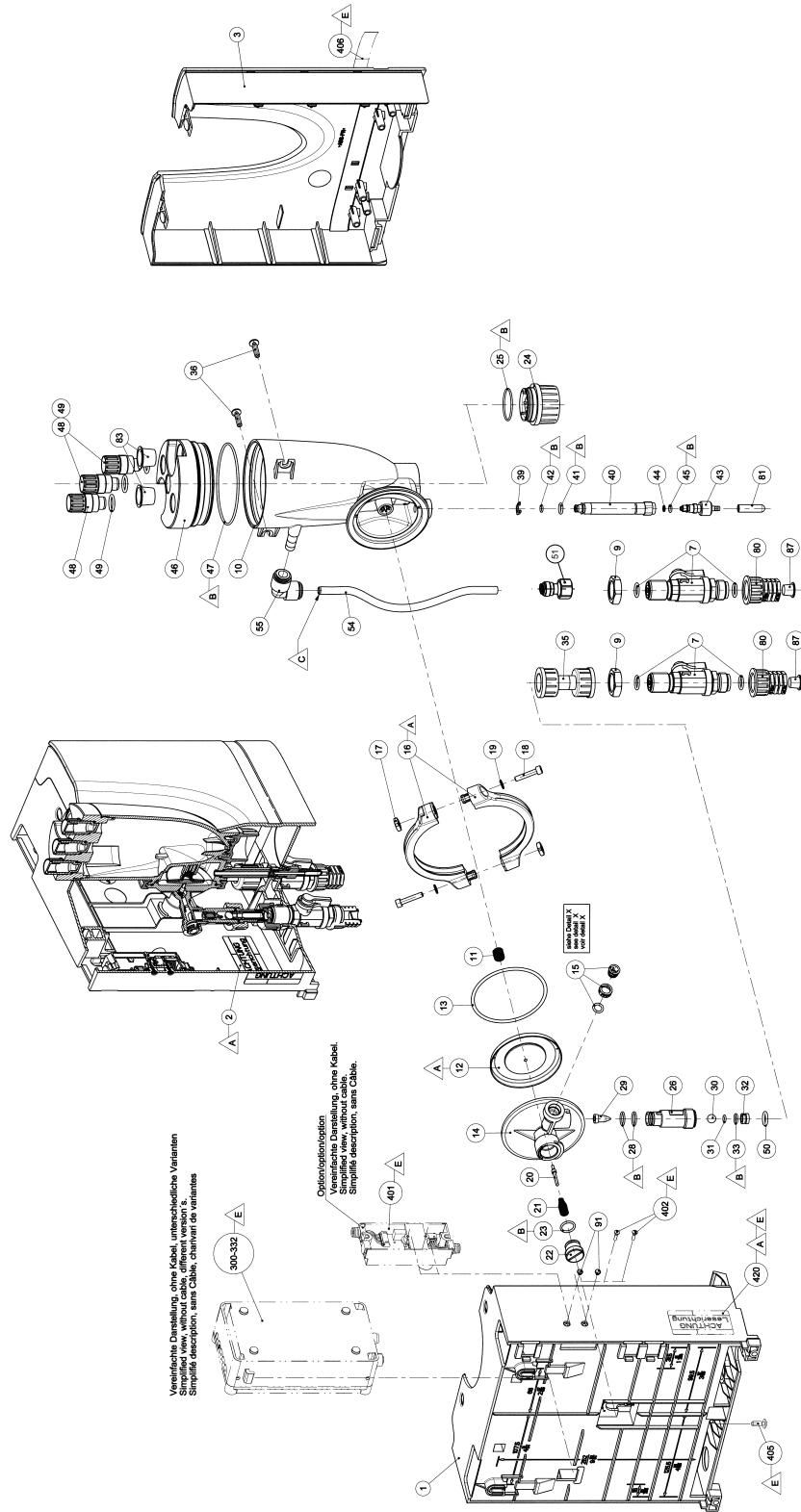
### NOTICE

For reasons of safety, only use original spare parts. Please contact our customer service if you need any spare parts.

### 6.2.1 Blu-Sentinel™ Pro flow cell (module type D01)

Artikel-Nr.	Bezeichnung
W3T385933	Blu-Sentinel™ Pro flow cell (module type D01) pressurized version

**Drawing Blu-Sentinel™ Pro flow cell (module type D01),  
pressurized version**



△ O-ring slightly greased with special grease UNISILIKON L250L (WZT504248WZT504249)

**Parts list Blu-Sentinel™ Pro flow cell (module type D01),  
pressurized version**

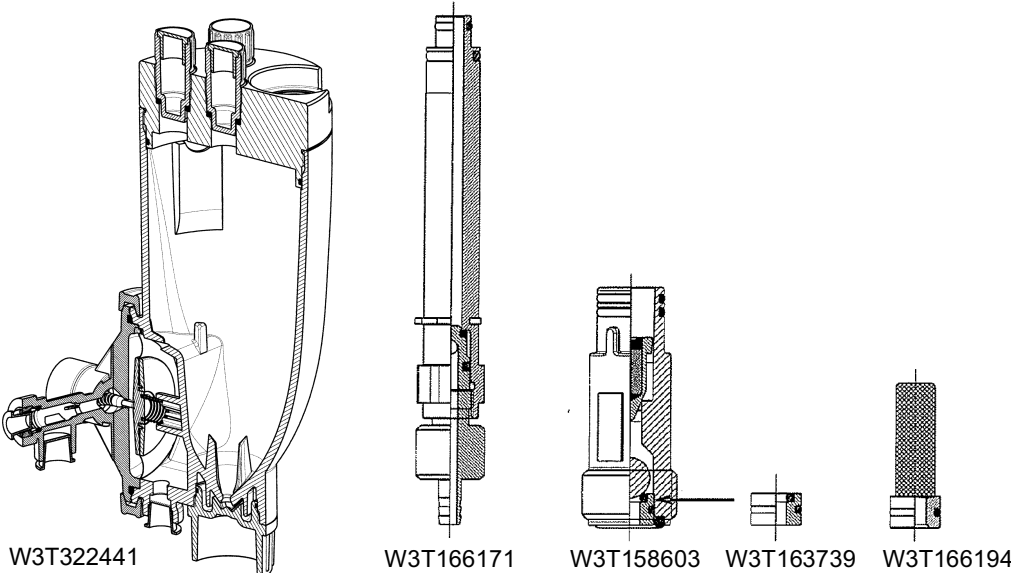
Item	Part No.	Description
1	W3T247776	Basic housing
2	W2T507548	Type plate
3	W3T247777	Housing cover
7	W3T166170	Shut-off valve
9	W2T507615	Flat nut
10	W3T192471	Cell body
11	W3T164226	Compression spring
12	W3T158569	Membrane unit
13	W3T160654	O-ring
14	W3T158595	Control valve body
15	W2T504209	Plastic cartridge
16	W3T160649	V profile clamp
17	W3T158567	Square nut
18	W2T504659	Cheese-head screw
19	W2T506019	Washer
20	W3T158572	Valve pin
21	W3T172795	Compression spring
22	W3T158573	Adjusting screw
23	W3T160357	O-ring
24	W3T160650	Flow distributor cap
25	W3T160655	O-ring
26	W3T160648	Check valve housing
28	W3T161396	O-ring
29	W3T169827	Cone
30	W3T172946	Ball
31	W3T172949	O-ring
32	W3T159707	Insert
33	W3T172975	O-ring
35	W3T158602	Filter unit
36	W2T505463	Pan head screw
39	W3T172041	Securing ring
40	W3T158576	Outlet drain pipe

Item	Part No.	Description
41	W3T172997	O-ring
42	W3T164597	O-ring
43	W3T158575	Drain screw
44	W3T166160	EPDM flat gasket
45	W3T172556	O-ring
46	W3T320105	Cell body cover
47	W3T160657	O-ring
48	W3T161450	Plug
49	W3T168859	O-ring
50	W3T172861	O-ring
51	W2T863568	Adapter
54	W3T438413	Hose
55	W2T505093	Angle-reducing connector
80	W3T171786	Adapter
81	W3T168162	Protective cap
83	W3T161453	Protection plug
87	W3T161275	Protection plug
401	W3T183616	Conductivity measurement module SiDiSens
402	W2T807965	Plastic self-tapping screw A2 (10 mm)
405	W2T807968	Plastic self-tapping screw A2
406	W3T341065	Product strip without imprint
420	W2T507548	Type plate



6.2.2 Blu-Sentinel™ Pro cell body

Drawing

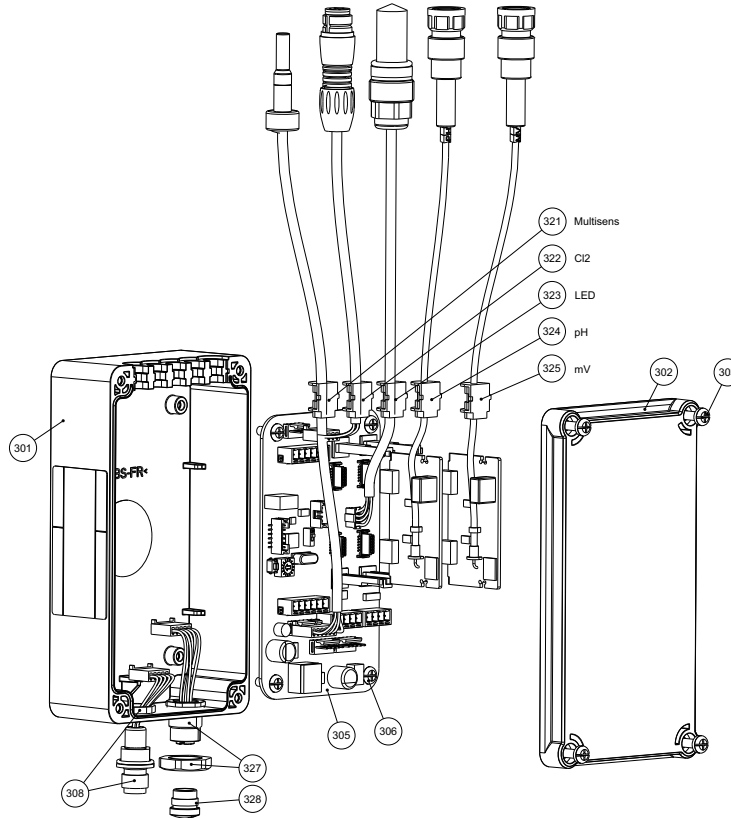


Parts list

Part No.	Description
W3T322441	Cell body, fully pressurized version
W3T166171	Flow cell sample valve assembly
W3T158603	Back pressure unit with float
W3T163739	Spherical set cpl.
W3T166180	Seal set

### 6.2.3 DFMe electronics

*Drawing*



*Spare parts list*

Item	Part No.	Description
	W3T320004	DFMe electronics module comprising: basic housing DFMe, DFMe Board DES and DFMe connection
301	W3T262803	Basic housing DFMe
302	W3T256343	Housing cover DFMe
303	W2T807967	Plastic self-tapping screw A2
305	W3T320085	Spare PCB, DFMe board DES
306	W2T504397	Plastic self-tapping screw d4x10
308	W3T263401	DFMe connection - M12 plug
321	W3T271603	Multi-sensor DFMe
322	W3T271602	Sensor cable DFMe - DES
323	W3T277062	LED glow stick complete; DFMe - LED
324	W3T320081	Spare part sensor card; DFMe-pH
325	W3T320082	Spare part sensor card; DFMe-mV
327	W3T308952	DFMe connection - M12 socket
328	W3T206059	Protective cap for jack M12x1, IP67

**6.2.4 Sensors**

*Free chlorine sensor*

Part No.	Description
W3T160652	Free chlorine sensor (free chlorine in platinum version)
W3T271602	Sensor cable for free chlorine sensor
W3T320085	Spare PCB, DFMe board DES
W3T164482	KCl tank with stand and 5 ml KCl solution
W3T160410	Electrolyte solution 3 mole/l KCl, 250 ml (only for storage of the sensor, sensor is not serviceable)
W3T171317	Electrode cleaning sand, white
W3T158600	Measuring beaker (5 pcs)

*pH electrode (yellow)*

Part No.	Description
W2T817978	pH electrode (yellow)
W3T320081	Plug-in card with sensor cable for pH electrode
W3T165076	Buffer solution pH 7.00, bottle 250 ml
W3T165084	Buffer solution pH 4.65 ,bottle 250 ml
W3T161181	Buffer solution pH 7.00, bag 12.5 ml
W3T161189	Buffer solution pH 4.65, bag 12.5 ml
W3T164482	KCl tank with stand and 5 ml KCl solution
W3T160410	Electrolyte solution 3 mole/l KCl, 250 ml
W3T158600	Measuring beaker (5 pcs)

*ORP electrode (blue)*

Part No.	Description
W2T817979	ORP electrode (blue)
W3T320082	Plug-in card with sensor cable for Redox single-rod measuring chain
W3T165048	Calibration solution 478 mV, bottle 250 ml
W3T161182	Calibration solution 478 mV, bag 12.5 ml
W3T164482	KCl tank with stand and 5 ml KCl solution
W3T160410	Electrolyte solution 3 mole/l KCl, 250 ml
W3T158600	Measuring beaker (5 pcs)

*Conductivity sensor  
LF325*

Part No.	Description
W3T172052	Conductivity sensor LF325
W3T183616	Conductivity measurement module SiDiSens
W3T166180	Sealing kit LF325, pressurized
W3T161187	Calibration solution 60 mS/cm, bottle 1000 ml
W3T158600	Measuring beaker (5 pcs)

*Total chlorine membrane  
sensor*

Part No.	Description
W3T391563	Total chlorine membrane sensor TC3 CAN
W3T437804	CAN bus extension cable 1 m for total chlorine membrane sensor
W3T164339	Spare parts kit (incl. lapping paper, elastomer seal, O-ring)
W3T365500	Membrane cap
W3T171793	Electrolyte solution E-TC for total chlorine TC3 CAN

**6.2.5 LED glow stick**

Part No.	Description
W3T277062	LED glow stick complete; DFMe - LED

**6.2.6 CAN bus extension cable for connection to DFMe electronics module**

Part No.	Description
W2T504979	CAN bus extension cable 0.3 m
W2T504980	CAN bus extension cable 1.0 m
W2T504981	CAN bus extension cable 2.0 m
W2T504982	CAN bus extension cable 5.0 m
W2T504850	CAN bus extension cable 10.0 m

**6.2.7 Strainer**

Part No.	Designation
W3T158721	Strainer with ball valve

**6.2.8 Instruction Manual**

Part No.	Designation
W3T386191	Blu-Sentinel™ Pro electronics module
W3T386192	Blu-Sentinel™ Pro flow cell

## 7. Declarations and certificates

### 7.1 Declaration of Conformity



## EG-Konformitätserklärung EC Declaration of Conformity Déclaration CE de conformité

No. MAE1563

Ausgabe/issue/édition 05

Hersteller/Manufacturer/Constructeur:	Evoqua Water Technologies GmbH
Anschrift/Address/Adresse:	Auf der Weide 10, D-89312 Günzburg
Produktbezeichnung:	Durchfluss-Modul DEPOLOX Pool E (D01), Durchfluss-Modul DEPOLOX 5 E (D01), Durchfluss-Modul Strantröl Pool E (D01), Durchfluss-Modul Blu-Sentinel Pro (D01)
Product description:	Flow block assembly DEPOLOX Pool E (D01), Flow block assembly DEPOLOX 5 E (D01), Flow block assembly Strantröl Pool E (D01), Flow block assembly Blu-Sentinel Pro (D01)
Description du produit:	Module de la cellule de mesure DEPOLOX Pool E (D01), Module de la cellule de mesure DEPOLOX 5 E (D01), Module de la cellule de mesure Strantröl Pool E (D01), Module de la cellule de mesure Blu-Sentinel Pro (D01)

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender europäischer Richtlinien überein:

*The product described above in the form as delivered is in conformity with the provisions of the following European Directives:*

**Le produit désigné est conforme, dans la version que nous avons mise en circulation, avec les prescriptions des directives européennes suivantes :**

2014/30/EU	Richtlinie des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit. <i>Directive of the European Parliament and of the Council of 26 February 2014 on the approximation of the laws of the Member States relating to electromagnetic compatibility.</i> <b>Directive du Parlement européen et du Conseil du 26 février 2014 relative au rapprochement des législations des Etats membres concernant la compatibilité électromagnétique.</b>
2014/35/EU	Richtlinie des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen. <i>Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.</i> <b>Directive du Parlement européen et du Conseil du 26 février 2014 concernant le rapprochement des législations des Etats membres relatives au matériel électrique destiné à être employé dans certaines limites de tension.</b> CE-Kennzeichnung / CE marking / Marquage CE: 2017



Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung der in der Nachweisdokumentation aufgelisteten Normen.

*Evidence of conformity to the Directives is assured through the application of the standards listed in the relevant documentation.*

**La conformité avec les directives est assurée par le respect des normes listés dans la documentation technique correspondante.**

Benannte Person für technische Unterlagen:

*Authorized person for the technical file:*

**Personne désignée pour la documentation technique:**

Name / name / nom: Evoqua Water Technologies GmbH

Adresse / address / adresse: Auf der Weide 10, D-89312 Günzburg

Günzburg, den / the 2017-07-25

Evoqua Water Technologies GmbH

Klaus Andre  
Technischer Leiter / Director Engineering

Unterschrift  
signature / signature

Helmut Fischer  
Leiter QM / Quality Manager

Unterschrift  
signature / signature

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

*This declaration certifies the conformity to the specified directives but does not imply any warranty for properties. The safety documentation accompanying the product shall be considered in detail.*

**La présente déclaration atteste de la concordance avec les directives citées, elle n'offre cependant pas de garantie quant à la nature ou la durabilité selon l'article 443 du code civil allemand. Les consignes de sécurité de la documentation du produit fournie sont à respecter.**

## 7.2 Certificate of Compliance



# Certificate of Compliance

<b>Certificate:</b> 70027582	<b>Master Contract:</b> 226676
<b>Project:</b> 70138021	<b>Date Issued:</b> 2017-07-14
<b>Issued to:</b> Evoqua Water Technologies GmbH Auf der Weide 10 Gunzburg, 89312 GERMANY	

***The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.***



**Issued by:** *Jean-Philippe Laplante*  
Jean-Philippe Laplante

**PRODUCTS**

CLASS - C363106 - ELECTRICAL MEASUREMENT AND TEST EQUIPMENT  
 CLASS - C363186 - ELECTRICAL EQUIPMENT FOR MEASUREMENT USE-Certified to US Standards

Water management system, Models:

Main units: W3Ta E01 b; rated: 100-240Vac, 50/60Hz, 48W or 24Vdc, 30W /  
 W3Ta E02; rated: 100-240Vac, 50/60Hz, 24W **or** 24Vdc, 15W;  
 all models: 6A max rating including external loads supplied from the mains input circuit of the main units via cord outlets or permanently wired

Flow-through units: W3Tc D01 / W3Tc D02, supplied by the main units.  
 (Where a, b & c are alphanumeric placeholders (different length; including blanks) for non-safety-critical properties and configurations like user interface design and water analysis functions)

DOD 507 Rev. 2016-02-18
Page 1



**Certificate:** 70027582

**Master Contract:** 226676

**Project:** 70138021

**Date Issued:** 2017-07-14

Notes:

1. The above models are permanently connected or non-detachable cord (model dependent) Equipment Class I, Pollution Degree 2, Overvoltage category II
2. Mode of operation: Continuous
3. Environmental Conditions: Extended: 0 to 50°C, 2000m max, maximum 80% RH non-condensing.

**APPLICABLE REQUIREMENTS**

- |   |   |  |
|---|---|--|
| CAN/CSA-C22.2 No. 61010-1-12                  | - | Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements  |
| UL Std. No. 61010-1 (3 <sup>rd</sup> Edition) | - | Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements |

**CONDITIONS OF ACCEPTABILITY**

1. The input pressure for the water management system shall be externally limited to 3 bars (300kPa).
2. The equipment shall be installed to the mains supply system using a disconnecting device with the off-position clearly marked and a 6A back-up fuse must be used in the main supply line (for permanently connected only)
3. Relay connections to external devices shall be connected using 5A fuses as overcurrent protection (model E01 only)
4. This product has not been evaluated for rigid conduit installation. The product shall not be installed using conduits.
5. Equipment is only to be installed by authorized qualified electricians.
6. Maintenance of equipment (including fuse and battery replacements) is only to be performed by authorized qualified electricians.
7. Equipment is not to be used with flammable liquids.





*Supplement to Certificate of Compliance*

**Certificate:** 70027582

**Master Contract:** 226676

*The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.*

**Product Certification History**

<b>Project</b>	<b>Date</b>	<b>Description</b>
70138021	2017-07-14	CSA c/us report update for alternate construction (new models E02 & D02) on a Water management system, Models: W3Ta E01 b, W3Ta E02 with flow-through modules: W3Tc D01 / W3Tc D02
70095602	2016-10-19	CSA c/us report update for alternate construction (relay) and model naming changed on a Water management system, Models: W3Txxxxxx-E01 / W3Txxxxxx-D01
70027582	2015-07-09	CSA (c/us) certification of a pool management system for water treatment based on the acceptance of CB test report.



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