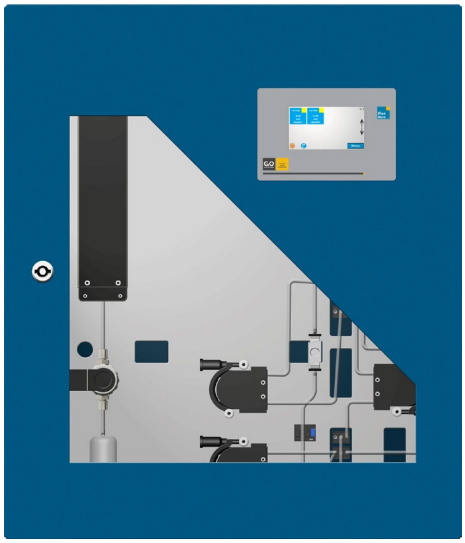
GO SYSTEMELEKTRONIK

WE MAKE LIQUIDS TRANSPARENT.

# Manual
# BlueMon TNTP
## Commissioning and Maintenance
### Total Nitrogen
### Orthophosphate  Total Phosphorus
### 488 2TPN



BlueMon

**Version of this manual: 3.1 en**

www.go-sys.de

**Copyright**



**Changes**

GO Systemelektronik GmbH retains the right to modify the contents of the manual without prior notice.

**Liability exclusion**

GO Systemelektronik GmbH takes no responsibility for correct system operation under all possible operating conditions. It is not possible to guarantee that the software will function completely without error under all possible circumstances. GO Systemelektronik GmbH therefore disclaims all liability for any direct or indirect damage resulting from system operation or the contents of this manual.

**Product observance**

Within the scope of our obligation for product observance GO Systemelektronik GmbH will endeavour to warn third parties about all identified dangers which could arise from the interaction between hardware and software and from the use of other components. Effective product observance is only possible with adequate information from the end user about the planned field of application and the hardware and software used. If the conditions of use change or if the hardware or software is changed, due to the complex relationships between hardware and software, it is no longer possible to describe all possible dangers and their effects on the total system, in particular on our system. This manual does not describe every possible property and combination of the system. For further information, please contact GO Systemelektronik GmbH.

**Manufacturer's declaration**

When installing the system, it is necessary to ensure correct electrical connection, protection against moisture and foreign bodies and excessive condensation, and system heating which can arise from both correct and incorrect use. It is the responsibility of the installer to ensure that the correct installation conditions are provided.

**© GO Systemelektronik GmbH**
**Faluner Weg 1**
**24109 Kiel**
**Germany**
**Tel.: +49 431 58080-0**
**Fax: +49 431 58080-11**
**www.go-sys.de**
**info@go-sys.de**

Creation date: 23.1.2024
Version of this manual: 3.1 en
File name: 488 2TPN-BDA Manual BlueMon TNTP CaM 3p1 en.pdf

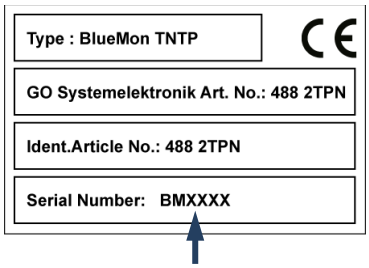
## Table of Contents

# 1 Introduction

This manual describes the **commissioning** and the **maintenance** of the BlueMon Analyser for Total Nitrogen (TN), Orthophosphate and Total Phosphorus (TP) with the article number 488 2TPN.

This manual describes only the commissioning and the maintenance of the BlueMon analyzer and not the operation at work.
Operation at work is described in the enclosed *Manual BlueMon Menu Operation*.

To determine the type of the BlueMon, look at the shipping note.
The serial number of BlueMon stands on the type label right down ahead of the housing.




Serial Number

The products of GO Systemelektronik are constantly being developed, therefore deviations between this manual and the delivered product can result. Please understand that no legal claims can be derived from the contents of this manual.

**Safety instructions:**

| | |
|---|---|
|  | **Danger:** Used if non-observance threatens serious injury or death. |
|  | **Warning:** Used if non-observance threatens slight injuries or serious property damage. |
|  | **Caution:** Used if non-observance threatens minor property damage. |


Symbol of safety instruction relating to the use of electricity.


Symbol of safety instruction relating to the use of optical radiation.

# 2 Device Information

## 2.1 Hazard Notes

**Danger:** Improper handling of electrical devices endangers man and property.
The operation of the BlueMon should only be performed by informed and trained staff using appropriate tools. Incorrect installation could cause serious faults and errors that may damage the device.

**Danger:** Improper handling of chemicals endangers humans and property.
The operation of the BlueMon should only be performed by informed and trained staff using appropriate tools. Read the allocated safety data sheets of the chemicals carefully and follow the appropriate instructions.

## 2.2 Notes for Operation

Never deliver the BlueMon to other persons without this manual. The manufacturer is not liable for improper or unintended usage.

This device is designed in accordance with the Low Voltage Directive and the safety regulations for electronic measurement devices.

The correct functioning and operational safety of the device can only be ensured, if in using the operator follows the generally applicable safety precautions and the specific safety instructions in this manual.

- Before connecting the BlueMon with the national grid, make sure that the mains voltage is according to the operation voltage label on the BlueMon (indicated power supply range).
- The correct functioning and operational safety of the device can be ensured only within the climatic conditions specified in Chapter 2.3 Operation Conditions in this manual.
- Transporting the device from a cold to a warm environment may cause condensation and therewith function failures. In this case wait until the device temperature is similar to the ambient temperature, and then try a new start.
- Maintenance and repair work may only be performed by a trained person authorized from GO Systemelektronik.

If it can be assumed that the instrument can no longer be operated safely, it must be taken out of service and marked against an inadvertent use.

The security of the user can be affected by the device, if it for example:

- shows visible damages,
- does not work as prescribed any more
- was stored under inexpedient conditions for a longer time,
- was exposed to heavy transport conditions.

When in doubt, give notice to GO Systemelektronik GmbH and send, if necessary, the device for repair or maintenance to GO Systemelektronik GmbH.

## 2.3 Operation Conditions

A trouble-free operation of the BlueMon requires the fulfilment of the following conditions:

- No one-sided thermal radiation; no direct sunlight
- No vibrations
- The environmental conditions correspond to the IP protection code of the device. Environments with corrosive gases or vapours or with explosion hazard require additional protective precautions.
- Ambient temperature 15 - 35 °C; Humidity max. 95 % (non-condensing)
- Operation only in a protected position
- The sample feeds must be free of solids and homogeneous, otherwise a filter must be installed. Samples with particle size > 30 microns require filtration.
- Maximum pressure of the inflowing sample is 0.05 bar, if necessary, use a pressure reducer.
- The permissible range of the sample temperature is 10 to 40 °C, if necessary, use sample cooling or heating.
- The BlueMon must be accessible for maintenance (illumination, free space, etc.).
- At an ambient temperature > 20 °C reagent cooling is recommended. A Reagent refrigerator can be ordered from GO Systemelektronik (Article-No. 416 5000-X).

## 2.4 Measurement Method

To determine the **total nitrogen**, the sample is mixed with an alkaline buffer and persulfate as oxidizing agent and digested within 15 minutes by UV irradiation at 90°C in the digester. For optimal mixing, air is pumped into the digester during the reaction time.

After completion of the reaction, most **nitrogen compounds** are available **as nitrate**. The hot sample cools down in the measuring volume and the absorbance* is measured with a spectralphotometer at a wavelength of 228 nm.

In natural waters as well as in waste water various **phosphorus compounds** can be found. These include **orthophosphates**, **inorganic polyphosphates** as well as **organic phosphate compounds** and some **organophosphorus compounds**.

Phosphorus compounds can be determined by various colorimetric methods with different advantages and disadvantages. It is differentiated whether the parameters are determined in the dissolved phase (orthophosphate $PO_4^{3-}$) or under consideration of the solids (total phosphorus $P_{total}$).

With the standard methods (molybdenum blue or molybdate vanadate) only the orthophosphates are recorded. All other phosphorus compounds must be converted into orthophosphates by digestion. In this procedure, the sample, acidified and mixed with an oxidizing agent, is prepared by a combined UV and thermal digestion for 15 minutes. The methods are selected according to their purpose, importance and accuracy. The molybdenum blue method tends to be much more accurate in the lower measuring range.

After digestion, molybdate ions and a reducing agent are added. $PO_4^{3-}$ reacts to a slightly yellow molybdenum phosphoric acid. By the addition of the reducing agent the molybdenum blue is formed, which has a blue colour:

$$PO_4^{3-} + 12\ (NH_4)_6Mo_7O_{24} + 3H^+ \rightarrow\ H_3P(Mo_3O_{10})_4$$

$$H_3P(Mo_3O_{10})_4 + 2\ SnCl_2 + 8\ HCL \rightarrow\ H_7P(Mo_3O_{10})_4 + 2\ H_2\ (SnCl_6)$$

The absorbance* of this compound is measured with a spectralphotometer at a wavelength of 643 nm using the intensity of the dye molybdenum blue. Disturbances such as caused by silicate are minimized using citric acid.

**Minimal process sequence duration:** • TN 26 minutes • TP 30 minutes • TN plus TP 50 minutes

* In absorption, radiation is absorbed by a substance. Further attenuating effects due to scattering or reflection are summarized in the optics together with the absorption under the term **absorbance**, also called **extinction**.

## 2.5 Technical Data

| Measurement | |
|---|---|
| Parameter | Total Nitrogen, Orthophosphate and Total Phosphorus in water |
| Measurement principle | Colorimetry at 228 nm (Nitrogen) and at 643 nm (Phosphate) |
| Measurement accuracy | Total Nitrogen < 5 % \| Orthophosphate, Total Phosphorus < 3 % |
| Minimal process sequence duration | TN 26 min \| TP 30 min \| TN plus TP 50 min |
| Calibration | Auto 3 point calibration |
| Sample lines | 2 sample lines default<br>Up to 6 sample lines optional |

At ambient temperatures > 20 °C cooling of the reagents is recommended.
Reagent refrigerator: Article number 416 5000-X
Samples with particle size > 30 µm need filtration.

| Parameter | Meas. range | Detection limit | Meas. resolution | Dilution |
|---|---|---|---|---|
| Nitrogen | 0.0 – 20/50/100 mg/l | 1 % FS | 0.01 mg/l | 1 : 10 |
| Phosphate | 0.0 – 10/20 mg/l | 1 % FS | 0.01 mg/l | no dilution |

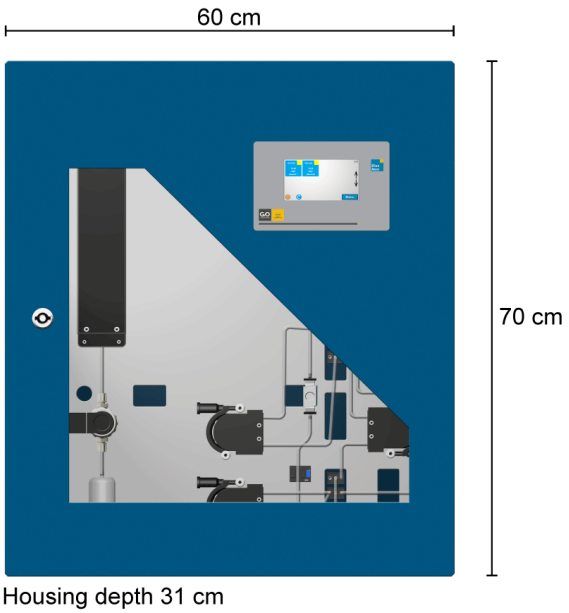
| Sensors |
|---|
| 1x Spectralphotometer (190 – 720 nm) |
| 1x Connector for pH glass electrode |
| 1x Connector for temperature (PT1000) 0 – 80 °C |
| 1x Connector ORP (Redox) electrode (optional pH) |
| 1x Current input 0 – 20 mA \| 4 – 20 mA |
| 2x Digital In |
| 1x Connector for leakage sensor |
| 1x Bubble detector (liquid detector) for sample reagent lack<br>1x Bubble detector (liquid detector) for DI water lack<br>2x Connector for additional bubble detectors |
| Expandable with CAN-bus and Modbus |

| Actuators | |
|---|---|
| 1x Digestor with heating and UV lamp, temperature and UV monitoring | |
| 1x Stirrer control | |
| 2x Motor control right/left | |
| 6x Motor control (direction of rotation manually switchable) | |
| 12x Relay 24 VDC/GND (called valve relays) | also usable as relay outputs |
| 4x Potential-free relays, max. switching voltage 48 V | also usable as valve relays |
| Expandable with CAN-bus and Modbus | |

| Interfaces | |
|---|---|
| 1x Ethernet (Modbus TCP) | |
| 1x RS-232 or RS-485 (Modbus) | |
| 1x CAN-bus (for connecting further modules, sensors and actuators) | |
| 6x Current output[1] | 0 – 20 mA \| 4 – 20 mA |

| General Information | | |
|---|---|---|
| Voltage supply | | Input voltage 85 – 264 VAC; 47 – 63 Hz \| 120 – 370 VDC |
| Power consumption typical | | 80 W |
| IP protection code | | IP54 (optional IP65) [2] |
| Colour display | | Touchpanel 480 x 272 pixel |
| Housing | Material<br>Dimensions (WxLxH)<br>Colour | Steel, powder-coated<br>60 x 70 x 31 cm<br>RAL 5010 (blue) |
| Empty weight | | approx. 45 kg |
| Sample pressure | | 0 bar (max. 0.05 bar overpressure) |
| Sample flow rate | | 2 - 10 l/h, no suspended solids |
| Sample temperature | | 10 – 40 °C |
| Ambient temperature | | 15 – 35 °C |
| Computer | | PC 104; 800 MHz; access memory 256 MB |
| Storage memory | | Industrial NANDrive™ 512 MB; optional 2 GB |
| Operating system | | embedded Linux™ |

## 2.6 Housing



Housing depth 31 cm

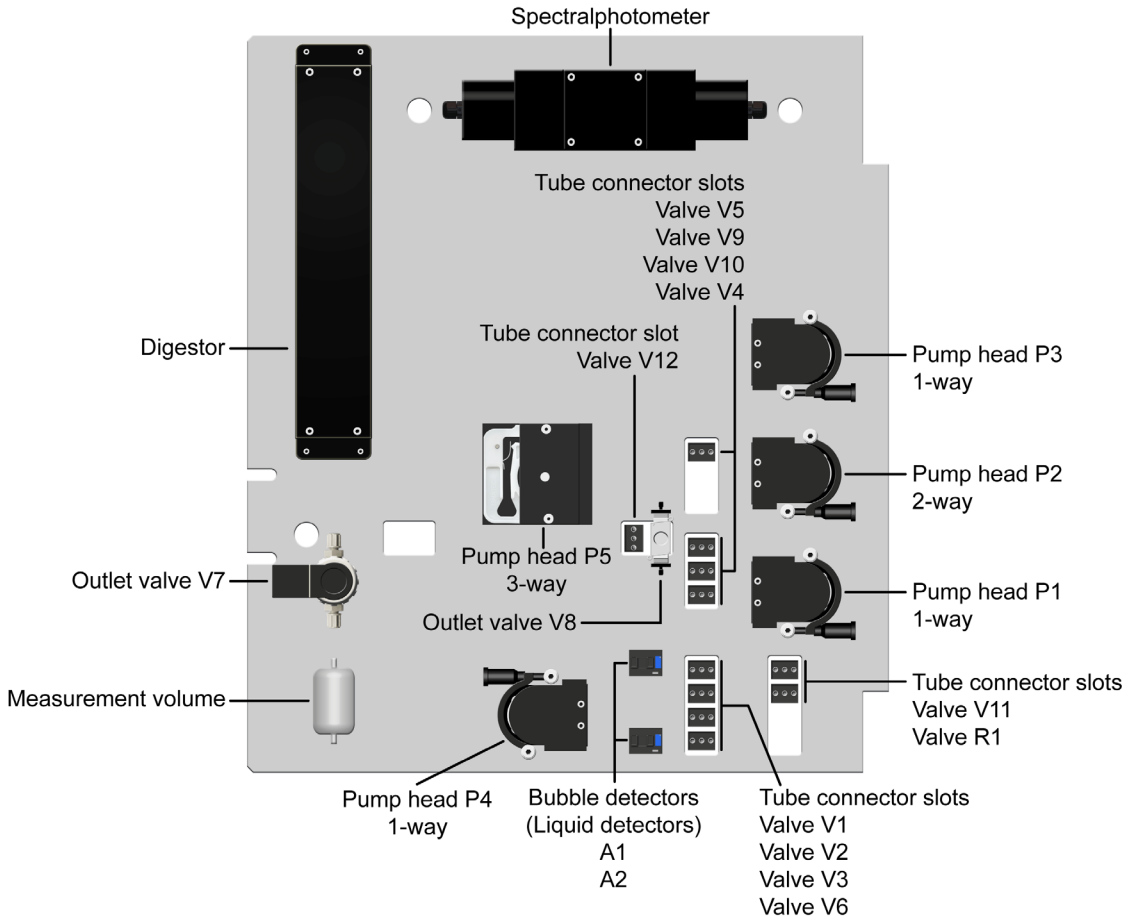
[1] Strictly speaking, a current output is not an interface, but an analogue actuator.

[2] Precondition for compliance with the IP protection code is the use of appropriate protective caps and plugs.

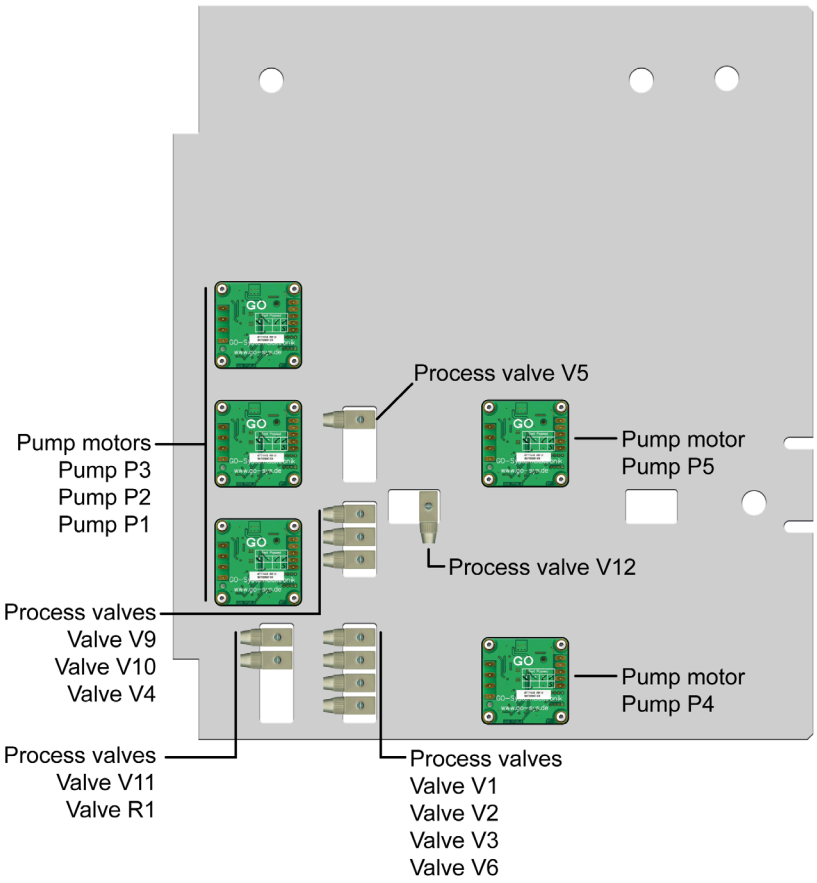
## 2.7 Device Configuration of the Analyser Plate

**Spectralphotometer – Total Nitrogen – Orthophosphate – Total Phosphorus – 488 2TPN – Large housing**

**Front**



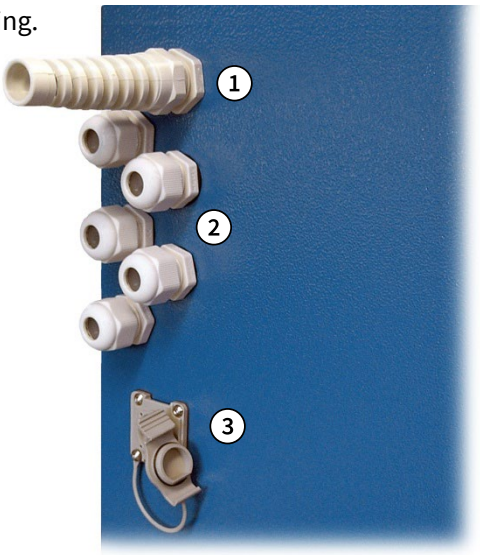

**Rear**



## 2.8 Connections

**The BlueMon has the following electrical connection options:**

The connectors are located at the top left on the left side of the housing.



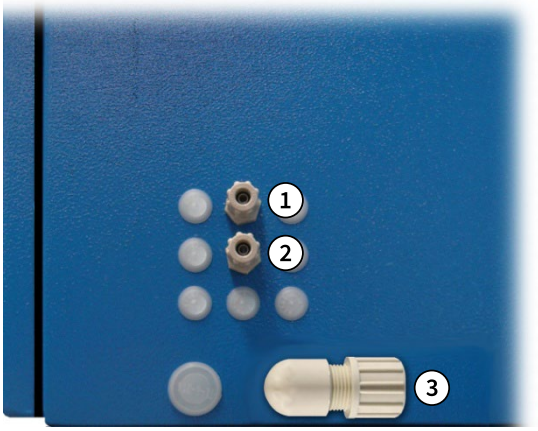

① Feed through power supply (85 – 264 VAC)

② Additional PG glands, e.g. for an antenna cable

③ Connection for a LAN cable in standard or cross-link design with protection cap

**The BlueMon has the following liquid connectors:**

The connectors are located at the lower left on the right side of the housing.




① Supply connector Sample 1

② Supply connector Sample 2

③ Drain connector

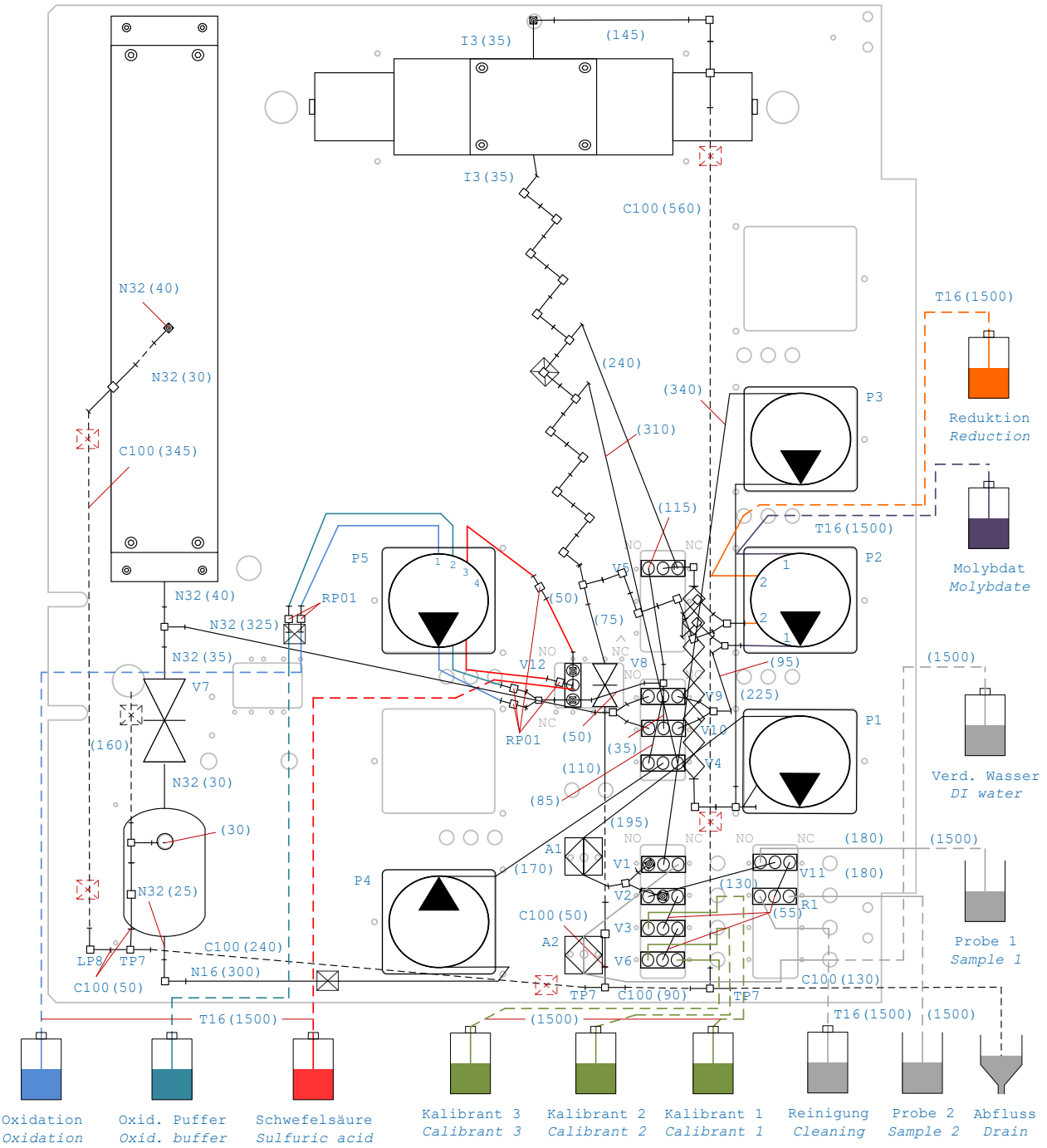
Additional: Holes with protection caps

**Mainboard and plug-on board** of the BlueMon are located behind the analyser plate on the back of the housing. The boards are protected by a metal cover; the metal cover is fixed with four M4 screws. Here you will find further connection options, i.e. CAN-bus, Modbus, current output etc. (see *Appendix D - Connection Diagram of the Mainboard* and *Appendix E – Connection Diagram of the Plug-on Board*).

**Modems (optional):** • UMTS/HSPA modem with antenna • Analogue modem • ISDN-modem

## 2.9 Tubing Diagram

### Spectralphotometer – Total Nitrogen – Orthophosphate – Total Phosphorus – 488 2TPN – Large housing




### Legende / *Description of figures*

**Spektralfotometer**
***Spectralfotometer***

**Pumpenschlauch / *Pump tubing*:**
**P1:** T16
**P3, P4:** M48
**P2-1/-2:** T16
**P5-1/-3:** ye-ye
**P5-2:** or-or

PX-1 vorne/*front*
PX-2 hinten/*back*

**Ablaufschlauch:** C100(1500)
***Drain Tubing:*** *C100(1500)*

**Schlauchbezeichnung:** Typ(Länge)
***Tubing Description:*** *Type(Length)*
Sofern nicht anders bezeichnet: T24(20)
*If not otherwise indicated: T24(20)*

LP2 TP2 VP2 RP92

Schlauch auf der Rückseite
*Tubing on the reverse side*
Schlauch auf der Vorderseite
*Tubing on the frontside*
optionales Bauteil
*Element optional*

NO NC
Ventil AN
*Ventile ON*

NO NC
Ventil AUS
*Ventile OFF*

NO – Normally open
NC – Normally closed

Fixierung / *Fixation*
Art no. 330 9760
Art no. 330 9761

## 2.10 Consumption Material (Tubing-set) TNTP

The tubing-set consist of the following components. We recommend ordering the tubing-set as a whole (Article No. 418 6025).

| Designation | Article No. | Pieces/Length | on Dilution |
|---|---|---|---|
| Cable ties | 335 7000 | 32 pcs. | |
| Tube I3 | 330 7538 | 70 mm | |
| Pump tubes M48 | 330 7553 | 2 pcs. | |
| Pump tubes T16 | 330 7552 | 2 pcs. | +1 pcs. |
| Pump tube P/OR-OR | 330 7566 | 1 pcs. | |
| Pump tubes P/YE-YE | 330 7567 | 2 pcs. | |
| Tube C100 | 330 7544 | 1530 mm | |
| Tube N16 | 330 7551 | 300 mm | |
| Tube N32 | 330 7546 | 530 mm | |
| Tube T16 | 330 7549 | 9000 mm | |
| Tube T24 | 330 7545 | 12100 mm | +1600 mm |
| Tube connectors RP01 | 330 9620 | 6 pcs. | |
| Tube connectors LP2 | 330 9751 | 25 pcs. | |
| Tube connector LP8 | 330 9754 | 1 pcs. | |
| Tube connectors RP92 | 330 9753 | 4 pcs. | |
| Tube connectors TP2 | 330 9750 | 8 pcs. | +1 pcs. |
| Tube connectors TP7 | 330 9752 | 3 pcs. | |
| Tube connectors VP2 | 330 9755 | 6 pcs. | |
| Mixer | 330 9618 | 1 pcs. | |

## 2.11 Spare Parts TNTP

| Designation | Article No. | Pieces | on Dilution |
|---|---|---|---|
| Bubble detector (Liquid detector) | 461 6501 | 2 pcs. | |
| Digestor | 442 0040 | 1 pcs. | |
| Spectralphotometer | 461 6810 | 1 pcs. | |
| Peristaltic pump multichannel with motor | 363 6029 | 1 pcs. | |
| Peristaltic pump 2-way with motor | 363 6027 | 1 pcs. | |
| Peristaltic pump 1-way with motor | 363 6028 | 2 pcs. | +1 pcs. |
| Measurement volume with guard plate | 343 0004 | 1 pcs. | |
| Outlet valve set V8 | 442 0009 | 1 pcs. | |
| Outlet valve set V7 | 442 0012 | 1 pcs. | |
| Process valve set | 442 0008 | 11 pcs. | |
| Cuvette spectralphotometer 10 mm | 330 9073 | 1 pcs. | |

## 2.12 Chemicals TNTP

The annual consumption varies with the measurement range to which the BlueMon analyzer is calibrated. The higher the measuring range, the lower the annual consumption. However, high measuring ranges above 6 mg/l N and 20 mg/l P require dilution, resulting in additional DI water consumption.

The following annual consumption values refer to a measurement range < 10 mg/l in continuous operation with one calibration per week.

| Article-No. | Reagents for parameter detection | |
|---|---|---|
| 418 3020 | Molybdate solution | up to 15 L/year |
| 418 3021 | Oxidation solution | up to 60 L/year |
| 418 3022 | Reduction solution | up to 15 L/year |
| 418 3023 | Sulphuric acid | up to 60 L/year |
| 418 3024 | Oxidation buffer | up to 60 L/year |

| Article-No. | Calibration liquids | |
|---|---|---|
| 318 4169 | Mix standard solution* | up to 40 L/year |
| 418 3515 | Zero standard solution | up to 30 L/year |
| | DI water | ** |

* The concentration depends on the measurement range.

** The quantity depends on the measurement range and the resulting dilution.

# 3 Installation

## 3.1 Wall Mounting

The BlueMon is designed for wall mounting. Four screwed wall mountings are located in the corners at the back of the device. see *Appendix H– Device Mounting (large housing)*

The BlueMon must be accessible for maintenance (illumination, free space, etc.).

**Warning:** The condition of the wall and the mounting material must carry the total weight of the BlueMon (case, reagents, liquids etc.). Depending on the equipment the BlueMon can weigh up to 125 kg. We recommend a mounting with M8 threaded bolts in anchors in a concrete wall.

**Warning:** The BlueMon must not fall or tip over. Use suitable handling devices (crane, shoulder straps etc.).

Check the attached tipping or shock indicators of the transport box and the housing for evidence of improper transport.

Take the device with suitable load suspension equipment out of the transport box.

After wall mounting open the housing door and remove the foam blocks from the analyser plate, loosen the knurled nut of the analyser plate, swing out the analyser plate and remove the transport locks here also. It is recommended to keep the protective materials for reuse. In case of using a reagent refrigerator from GO Systemelektronik, screw this firmly on the bottom side of the housing (if not supplied already screwed). You can also mount the reagent refrigerator separately.

## 3.2 Connection of Chemicals and Waste

1. Place the required chemicals in the transport canister underneath the device or into the reagent refrigerator (Article-No. 416 5000-X). Make sure that the height difference between the canisters and the connected pumps does not exceed 1000 mm.
2. If you want to use dilution water in your application, place DI water.
3. Insert the tube ends into the corresponding containers (see *2.9 Tubing Diagram*) and screw the tube firmly.

**Caution:** Make sure that the reagents and calibration liquids are connected to the appropriate tubing. see *2.9 Tubing Diagram*

**Warning:** The liquid feeding must take place almost without pressure (max. 0.05 bar).

**Caution:** Make sure that the sink is not corroded by the chemicals. Observe local discharge requirements.

**Note necessary protective measures! see safety data sheet**

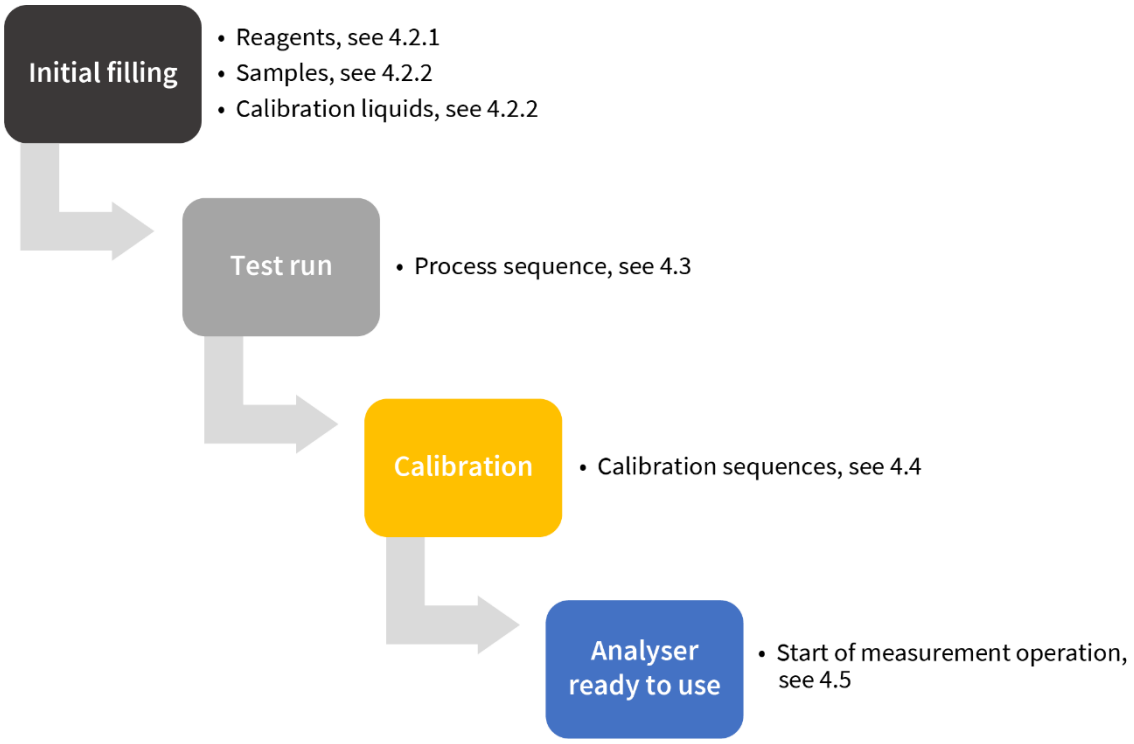
**Observe personal protective measures!**

# 4 Commissioning

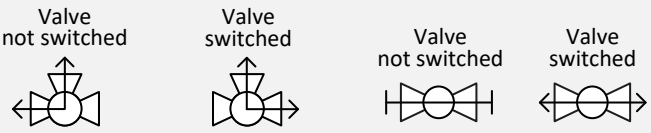
**Precondition**: approved and complete installation in accordance with *3 Installation*

**Commissioning procedure:**

1. Switch on the BlueMon, see 4.1
2. Initial filling, see 4.2
   a. Reagents supply, see 4.2.1
   b. Samples supply, see 4.2.2
   c. Calibration solution supply 4.2.2
3. Test run, see 4.3
4. DI water calibration and Parameter calibration, see 4.4
5. Operation start, see 4.5



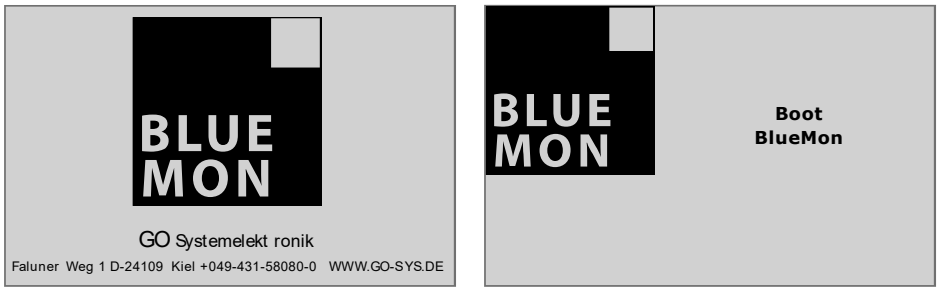

**Note:** Switching states of the valves



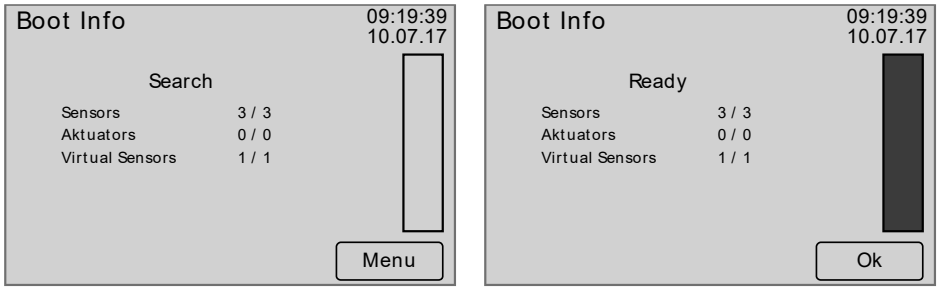
## 4.1 Switching On the BlueMon

**Danger**
- Close the housing door.
- Blockages in the tube system can loosen tube connections. As a result, hazardous liquids may leak out.

After the Blue Box has been started by switching on the power supply, the display shows following information in succession.

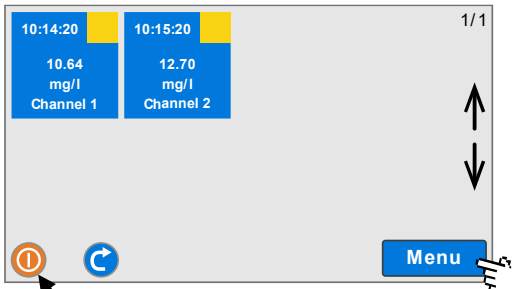



Then the BlueMon initiates the connected sensors and actuators.




Once the initialization is complete, the display shows the number of connected sensors and actuators.

After 20 seconds or after pressing <OK> the Parameter display appears.

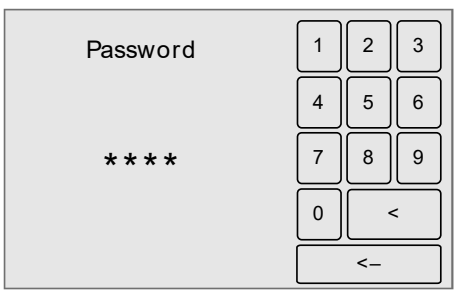


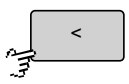

Switches to the Main menu.

Icon device status "Standby“

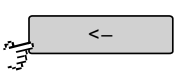
**Password input**

To access certain menus, a password consisting of 5 digits must be entered.
The password can be found in the configuration data sheet.
see *Appendix B – The Configuration Data Sheet* there *1. BlueMon* there *BlueMon Password (PIN)*




Deletes the last entered digit.

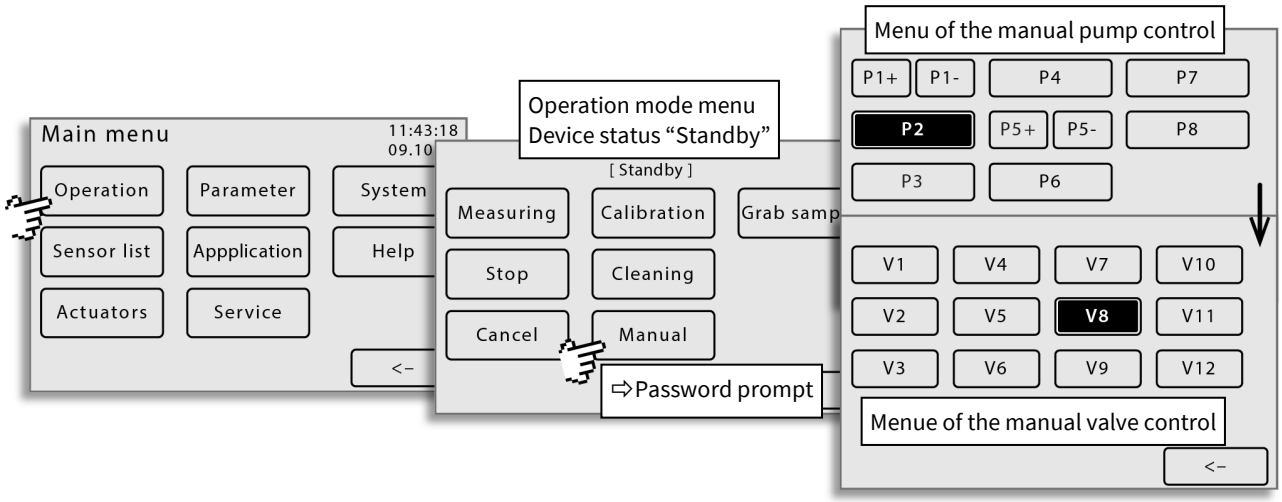



Verifies the password and switches forward. If the password is incorrect, you receive an error message.

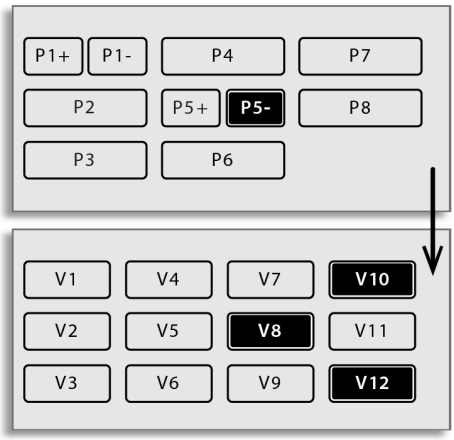
## 4.2 Initial Filling

### 4.2.1 Reagents Supply

- **Reduction Solution and Molybdate Solution** – To perform the manual initial filling, start Pump 2 in the menu operation while Valve 8 is switched until all reagents had been transported to the valve connection.




- **Oxidation Solution, Oxidation Buffer and Sulfuric Acid** – To perform the manual initial filling, start Pump 5 in counter-clockwise rotation <P5-> (thus Pump 5-1, 5-2 and 5-3) while Valve 8, Valve 10 and Valve 12 are switched until all reagents had been transported to the valve connections.



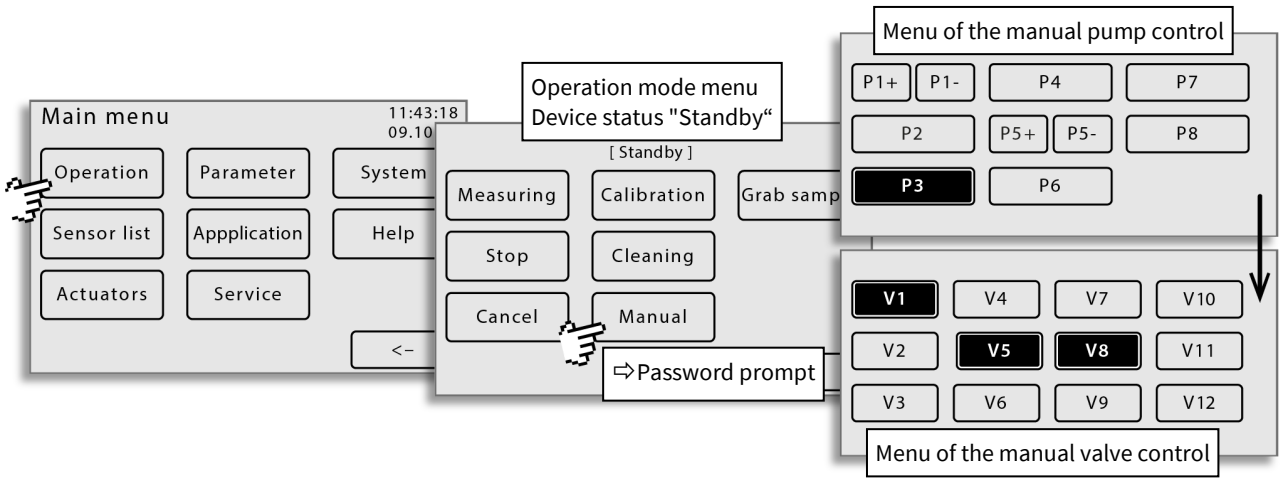

**Note:** When the menu of the manual pump control is called up, a running process sequence is immediately interrupted*. All pumps and valves go into idle state. As soon as you switch back to the operating mode menu, the interrupted process sequence starts with the next ↻ sequence element.

see also *Manual BlueMon Menu Operation* there *8.2.1.1 Manual Pump and Valve Relay Control*

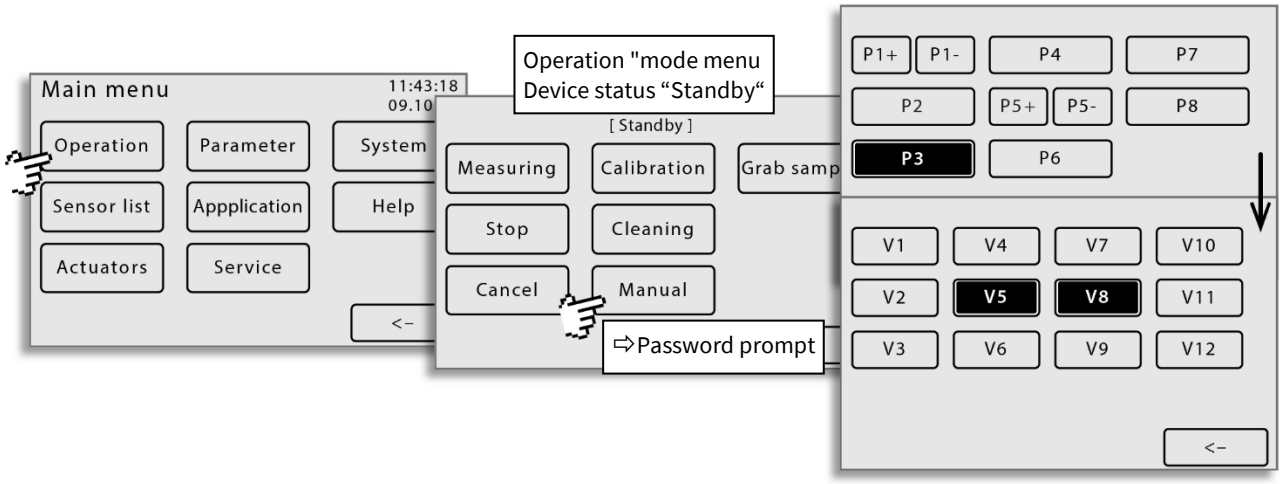
* An individually started sequence program is terminated immediately.

### 4.2.2 All other Liquid Supply

- **DI water** – To perform the manual initial filling with DI water, start Pump 3 while Valve 1, Valve 5 and Valve 8 are switched until the DI water had been transported to the vale connections.




- **Sample TN** ⇨ Inlet Sample 1
  To perform the manual initial filling with sample liquid 1, start Pump 3 in the menu operation while Valve 5 and Valve 8 are switched until sample liquid 1 has been transported to the valve connections.

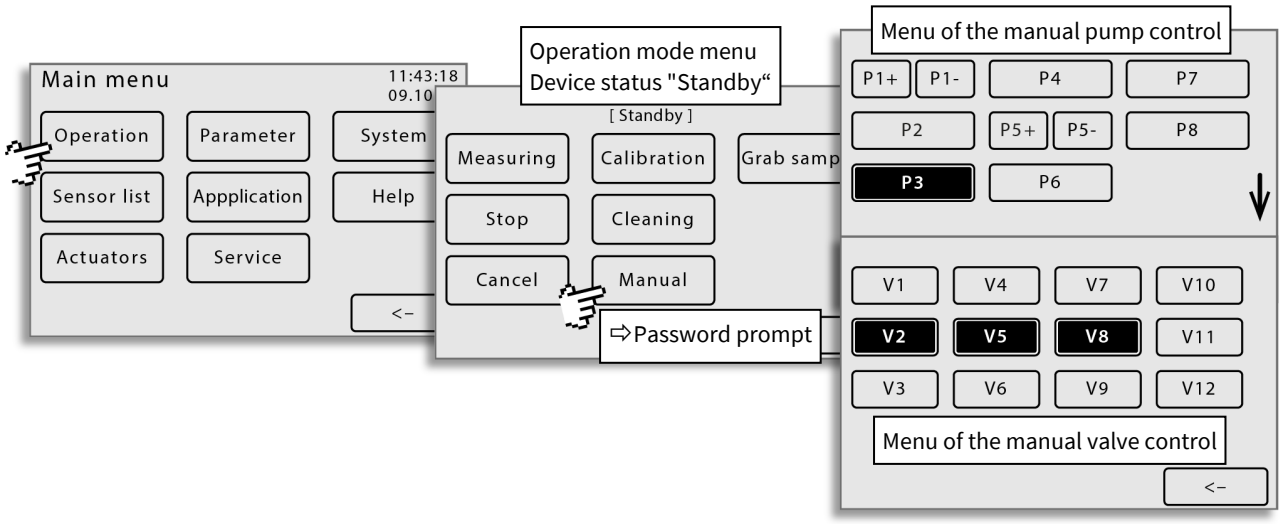



**Note:** When the menu of the manual pump control is called up, a running process sequence is immediately interrupted*. All pumps and valves go into idle state. As soon as you switch back to the operating mode menu, the interrupted process sequence starts with the next ↻ sequence element.

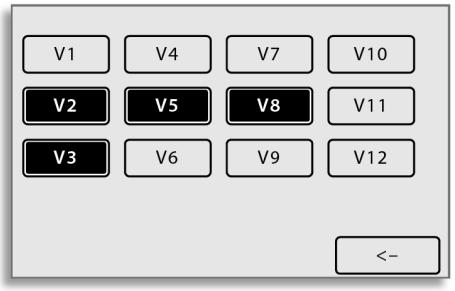
see also *Manual BlueMon Menu Operation* there *8.2.1.1 Manual Pump and Valve Relay Control*

* An individually started sequence program is terminated immediately.

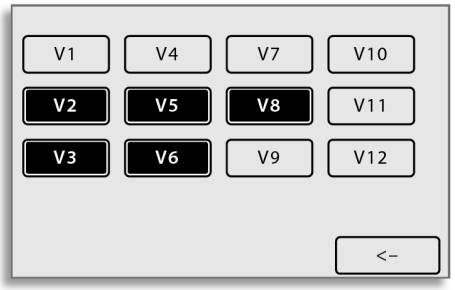
- **Calibration liquid 1** ⇨ Inlet Calibrant 1
  To perform the manual initial filling with calibration liquid 1, start Pump 3 while Valve 2, Valve 5 and Valve 8 are switched until the calibration liquid had been transported to the valve connections.



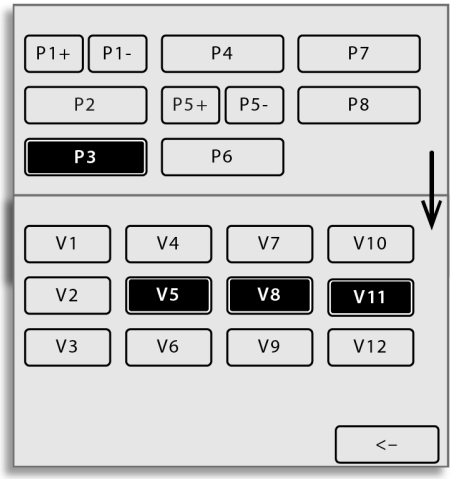

- **Calibration liquid 2** ⇨ Inlet Calibrant 2
  Switch additional Valve 3 and start Pump 3 until the calibration liquid had been transported to the valve connection.




- **Calibration liquid 3** ⇨ Inlet Calibrant 3
  Switch additional Valve 6 and start Pump 3 until the calibration liquid had been transported to the valve connection.




- **Cleaning liquid** ⇨ Inlet Cleaning
  To perform the manual initial filling with cleaning liquid, start Pump 3 while Valve 5, Valve 8 and Valve 11 are switched until the cleaning liquid had been transported to the valve connections.

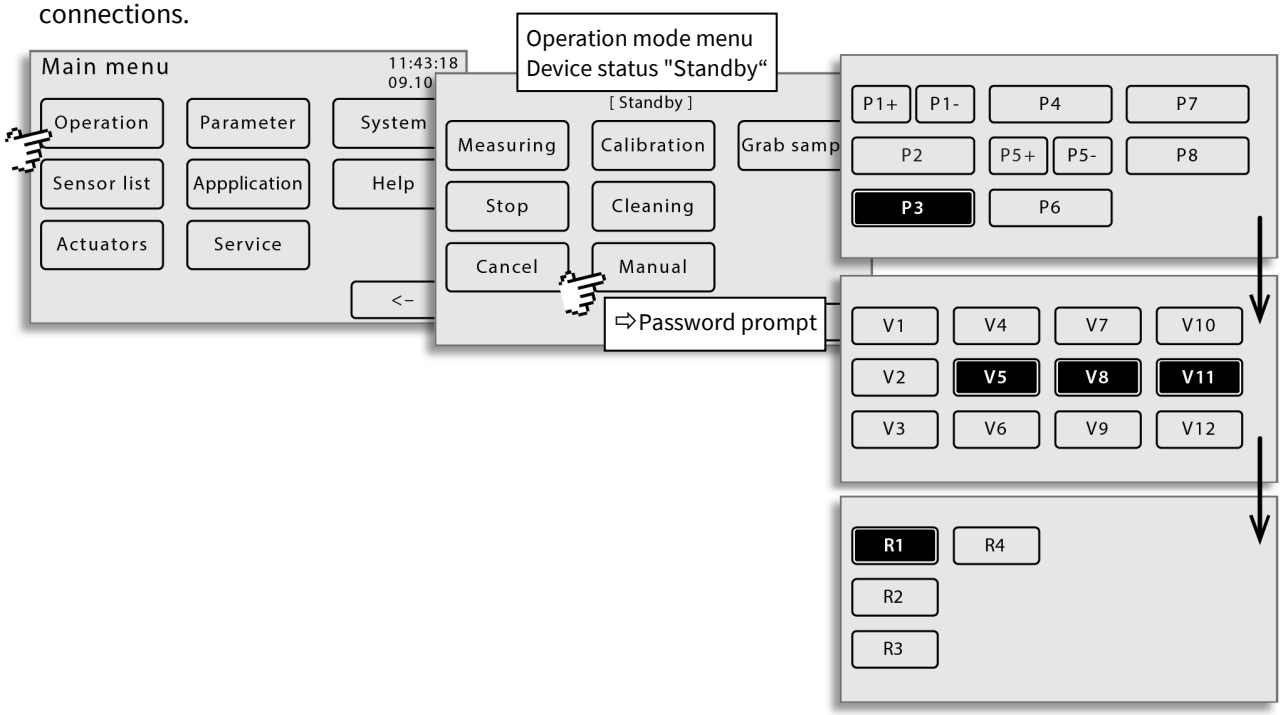



**Note:** When the menu of the manual pump control is called up, a running process sequence is immediately interrupted*. All pumps and valves go into idle state. As soon as you switch back to the operating mode menu, the interrupted process sequence starts with the next ↻ sequence element.

see also *Manual BlueMon Menu Operation*
there *8.2.1.1 Manual Pump and Valve Relay Control*

* An individually started sequence program is terminated immediately.

- **Sample TP/OP** ⇨ Inlet Sample 2
  To perform the manual initial filling with sample liquid 2, start Pump 3 in the menu operation while Valve 5, Valve 8, Valve 11 and Valverelay R1 are switched until sample liquid 2 has been transported to the valve connections.




**Note:** When the menu of the manual pump control is called up, a running process sequence is immediately interrupted[1]. All pumps and valves go into idle state. As soon as you switch back to the operating mode menu, the interrupted process sequence starts with the next ↻ sequence element.

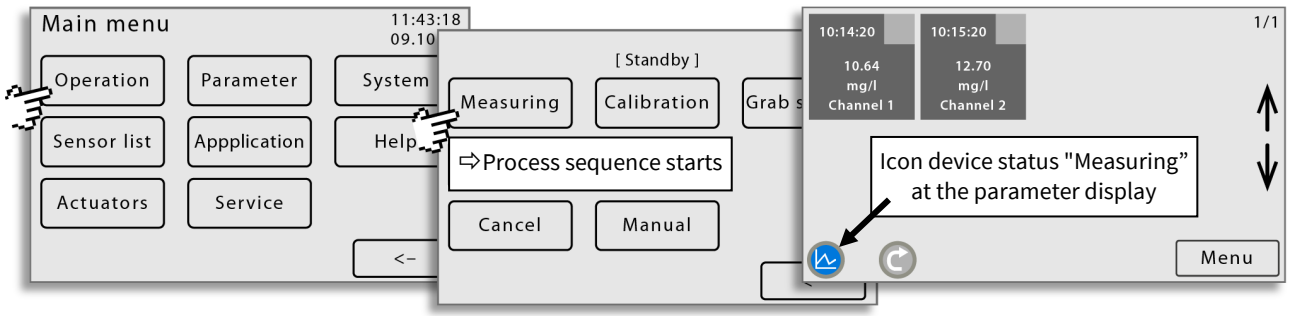
see also *Manual BlueMon Menu Operation* there *8.2.1.1 Manual Pump and Valve Relay Control*

## 4.3 Test Run

For an optimal functioning of the pumps and the solution flow in the tubing, a test run of the process sequence is recommended.
The process sequence is preset at the factory.

After the initial filling of all liquids, the process sequence can be started.

- Start the process sequence with button <Measuring>.
  Duration of the process sequence: approx. 60 min



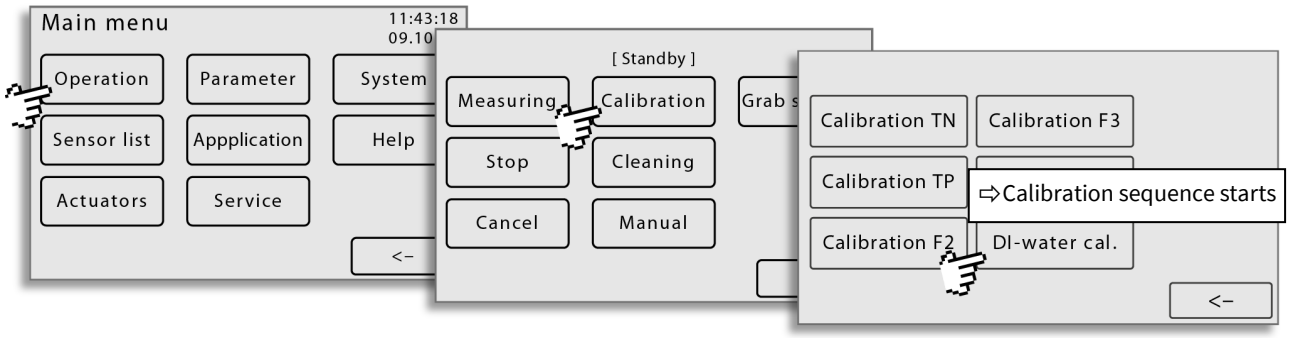

**Automatic analysis sequence:** The process sequence and the operating parameters of the BlueMon are factory set. In normal operation no changes at the BlueMon is necessary until the next maintenance[2]. The measured values of the sample lines and of the virtual (calculated) sensors[3] are displayed in the parameter display after their first recording.

[1] An individually started sequence program is terminated immediately.
[2] see maintenance description in *chapter 6*
[3] and the possibly connected external CAN-bus sensors

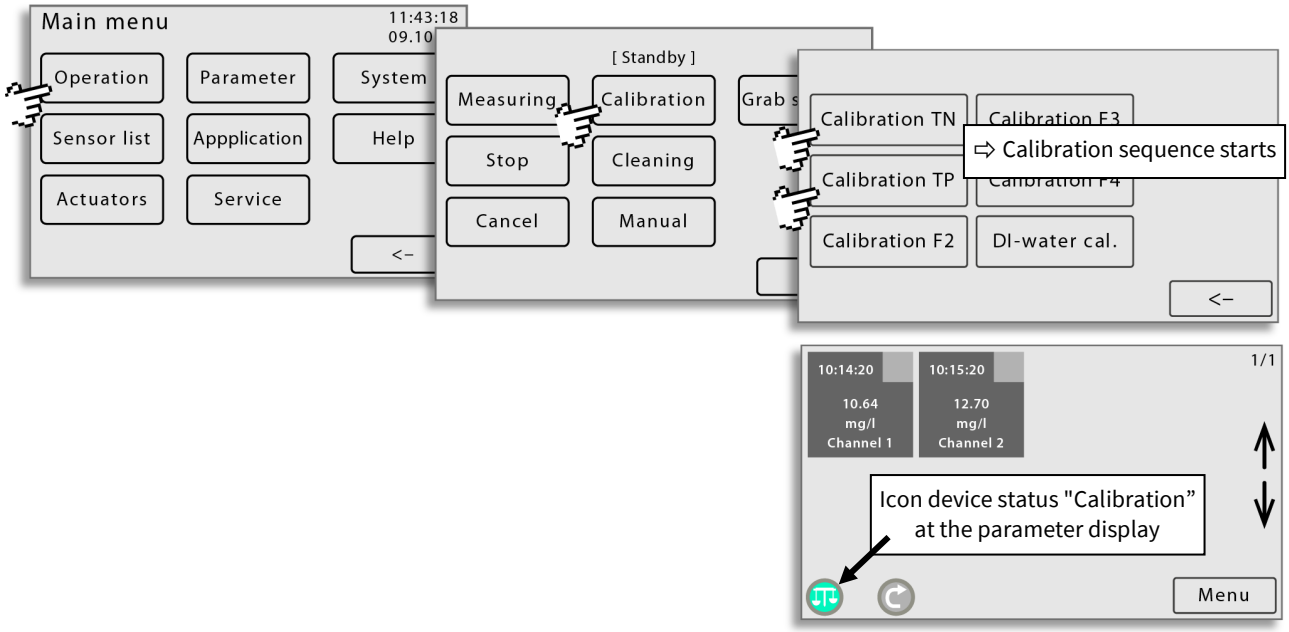
## 4.4 Calibration

- Start the DI water calibration with button <DI-water cal.>.
- Start the calibration for total nitrogen with button <Calibration TN> or
  the calibration for orthophosphate and total phosphorus with button <Calibration TP>.
- Duration: DI water calibration approx. 3 min – Calibration total nitrogen approx. 60 min
  Calibration orthophosphate and total phosphorus approx. 30 min

### DI water calibration



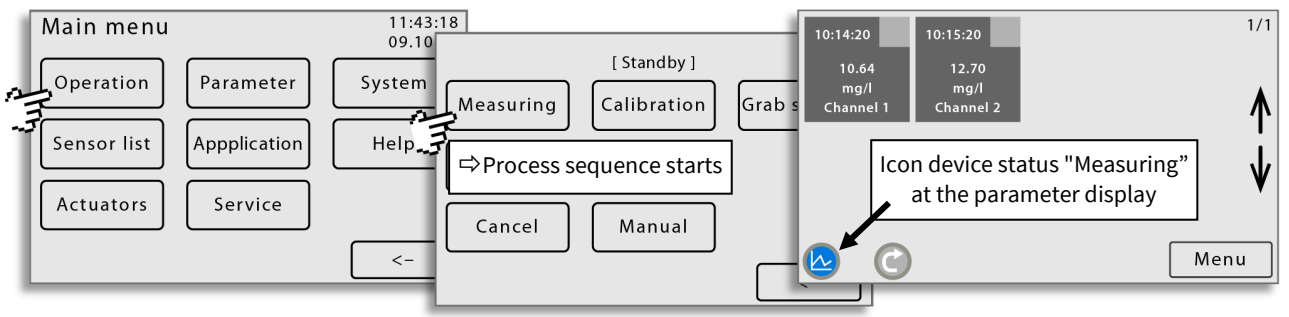

### Parameter calibration total nitrogen / orthophosphate and total phosphorus




## 4.5 Operation Start

After the calibration, the process sequence can be started via the operation menu.
The process sequence is preset at the factory.

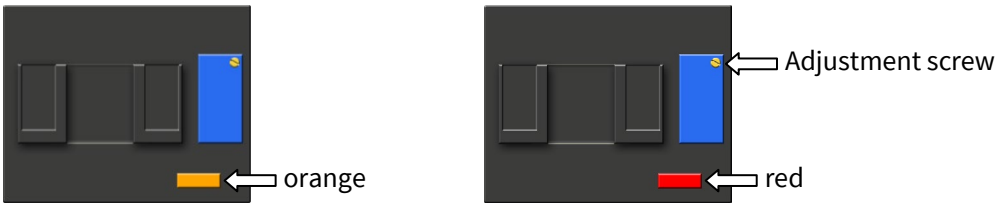
- Start the process sequence with the button <Measuring>
  Duration of the process sequence: approx. 30 min.



## 4.6 Notes on the Bubble Detector (Liquid Detector)

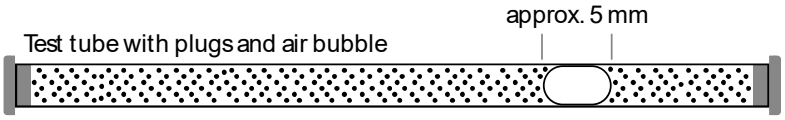
The bubble detector detects air bubbles in tubes, i.e. a general lack of liquid. The bubble detector is tested and adjusted on delivery. In certain conditions (e.g. deposits in the tube, exposure to heat, etc.) a reset may be necessary.

- The function lamp lights **orange** if **no bubble** is detected.
- The function lamp lights **red** when **a bubble** is detected.
- The function lamp does **not** light up if **no light** is detected.




The sensitivity of the bubble detector is adjusted with the adjustment screw (see above) in standby mode. The adjustment screw operates a potentiometer. Turning to the left increases the sensitivity, turning to the right decreases the sensitivity.

**The expected maximum rotation angle range is ± 45°, even ± 90° would be very unusual.***




The sensitivity is tested with a test tube: Move the air bubble through the measuring section, if the air bubble is in the measuring path, the function lamp must light red, otherwise orange.

For further information see *Manual BlueMon Menu Operation* there *8.2.5.6 Liquid Detector*

* Depending on the version of the potentiometer actuated with the adjusting screw, the setting range is 15 to 20 rotations. A slight clicking noise is noticeable when the end stop jumps over. It is not possible to overturn the potentiometer.

## 5 Decommissioning

I f you want to shut down the BlueMon for a long time, proceed as follow:

1. Stop the program sequence with <Menu> Main menu ⇨ <Operation> ⇨ <Stop>
   Each running program is executed to the end and the system is then stopped. The system will then go to "Standby" status.

2. Interrupt the supply of chemicals.

3. Immerse the sample tubes in DI water.

4. Let the cleaning program run at least 3 times.

5. Remove the tubes of the chemical canisters.

6. Immerse all tubes from the chemical canisters in DI water.
   Start with <Menu> Main menu ⇨ <Operation> ⇨ <Manual> all pumps by pushing the appropriate pump button. Flush the BlueMon for about half an hour.
   see *4.2.1 and 4.2.2*

7. Remove the dip tubes from the DI water so that the pumps pump air. Let the pumps pump for as long as necessary until the whole device is completely emptied.
   To empty all Reagents **and** empty Digestor:
   P2 P5- V8 V10 V12
   P4 V7 V4

   To empty all other liquids:

| **Liquid** | **Pumps and Valves** |
|---|---|
| DI Water | P1 P3 V5 V8 V1 |
| Sample liquid 1 | P1 P3 V5 V8 |
| Calibration liquid 1 | P1 P3 V5 V8 V2 |
| Calibration liquid 2 | P1 P3 V5 V8 V2 V3 |
| Calibration liquid 3 | P1 P3 V5 V8 V2 V3 V6 |
| Cleaning liquid | P1 P3 V5 V8 V11 |
| Sample liquid 2 | P1 P3 V5 V8 V11 R1 |

8. Leave the pump menu.

9. Turn off the BlueMon by pulling the power plug.

10. If the BlueMon shall be transported, mount the transportation locks.

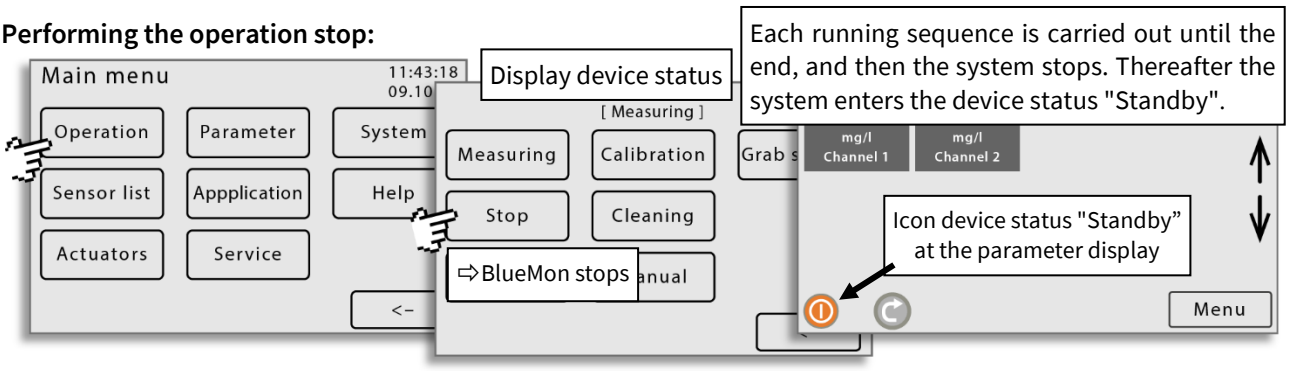
**Note necessary protective measures! see safety data sheet**

**Observe personal protective measures!**

# 6 Maintenance

**Danger:** Stop any operation before opening the housing door.

**Performing the operation stop:**




**Note necessary protective measures! see safety data sheet**

**Observe personal protective measures!**

## 6.1 Changing Chemicals

You will receive the necessary reagents and calibration liquids (see *2.12 Chemicals TNTP*) from GO Systemelektronik. To change the chemicals, you have to stop the process sequence and replace the chemicals canisters after the BlueMon had stopped.

After a successful change, feed the chemicals manually (as in *4.2 Initial Filling*).

**After a reagent change, a calibration is required.**

## 6.2 Changing Tubes and Tube Connectors

You need the consumables set (see 2.10) from GO Systemelektronik.

Before changing tubes and tube connectors, put all suction tubing in DI water. Start the cleaning sequence via <Menu> Main menu ⇨ <Operation> ⇨ <Cleaning>.

At the end of the cleaning program, remove the tubes from the DI water.

Start via <Menu> Main menu ⇨ <Operation> ⇨ <Manual> all pumps so that air is pumped. Let the pumps pump until the entire unit is completely drained. see Point 7. at *5 Decommissioning* and see *7 Tube Changing at the Pump Head*

## 6.3 Cleaning (manual)

**GO Systemelektronik recommends regular cleaning of the BlueMon. Cleaning must be carried out at the latest after underrunning/overrunning of the minimum/maximum values of the calibration factors.**

To remove reaction residues, you can use cleaning liquid (min. 100 ml) and feed it via the sample feeder.

After a residence time of 30 minutes of the cleaning liquid, the system must be emptied via the drain valves.

Then repeat this procedure with DI water to rinse the system.

## 6.4 Maintenance Intervals

- **Change reagents every 3 months**
- **Replace tubing every 6 months**

## 6.5 Notes on the Digestor

For methods that require digestion of the sample, Digestors are used. While in flow the heated sample is irradiated with UV light of varying intensity depending on the method.

**Danger:** Before working at the Digestor of the BlueMon, the electrical supply of the Digestor must be interrupted. If not, harmful UV rays can leak out, which can cause permanent eye damage. In addition, aggressive and hot liquids can be found in the Digestor. Before maintenance it is essential to ensure that the Digestor is empty and cooled down.

# 7 Tube Changing at the Pump Head

**Note necessary protective measures!** **see safety data sheet**
**Warning:** Only perform this when the pump is not running.
Preparation according to *6.2 Changing Tubes and Tube Connectors*

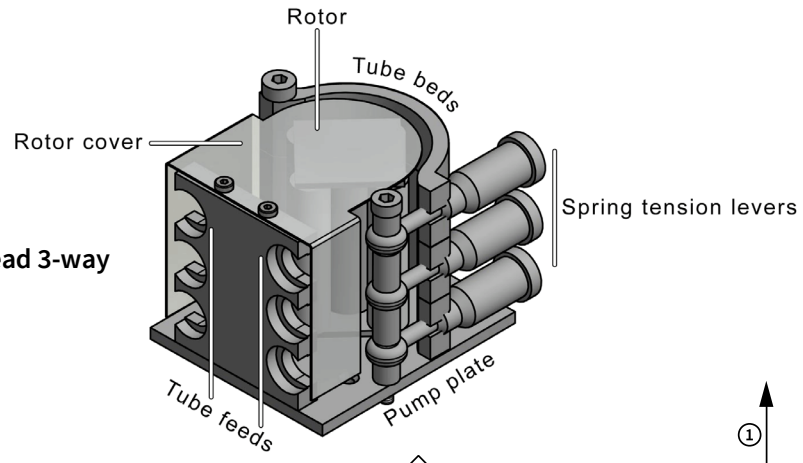
**Observe personal protective measures!**

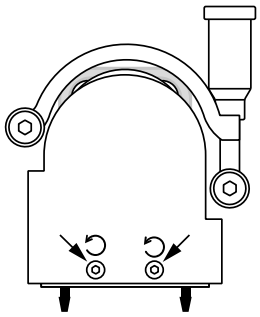
It is recommended to oil the axles of the pump rollers at each tube changing.
see *7.3 Oiling the Pump Roller Axles*

## 7.1 Tube Bed Pump

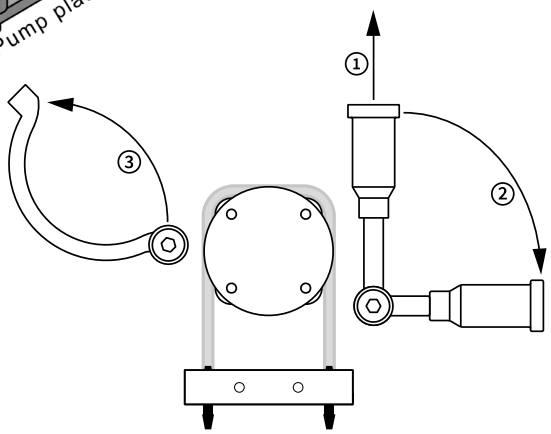
A pump head can be designed for 1 to 3 tubes. The tubes are placed at the rotor with the tube beds.

**Example: pump head 3-way**



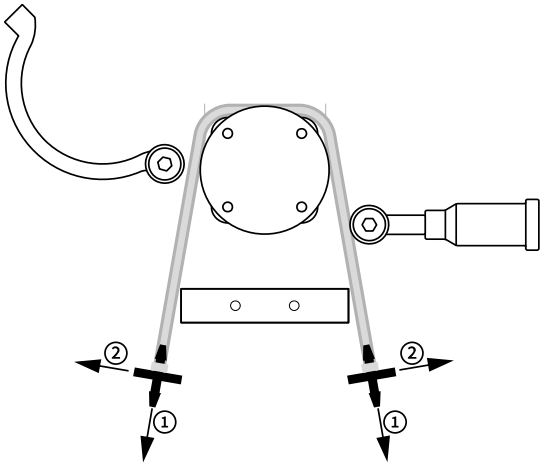
Unfasten the mounting screws
(Hex socket ⬡ 2.5 mm) of the rotor cover.
Remove the rotor cover.




Pull each lever out of the groove of the tube beds (1) and turn the levers to the side (2).
Swivel the tube beds to the side (3).

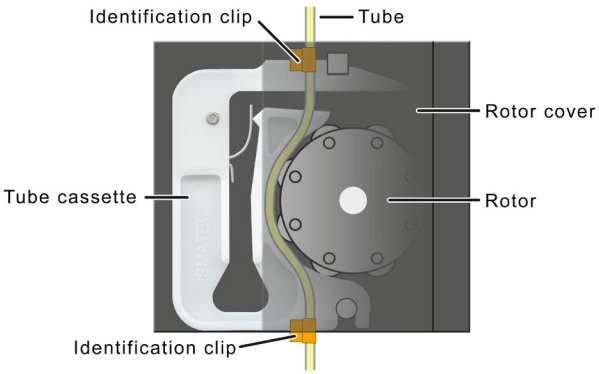
Pull the tube connectors downwards out of the fitting in the tube feed (1) and then turn the tube ends to the side (2).
Remove the tubes.

Insert the new tubes in the reverse order.



## 7.2 Cassette Pump

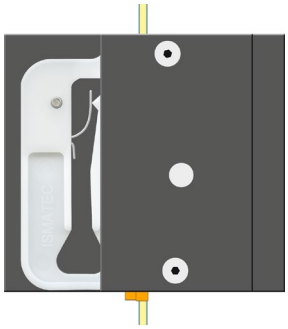
The pump head of a cassette pump can be designed for 1 to 4 tube cassettes.
The tubes are placed at the rotor with the tube cassettes.

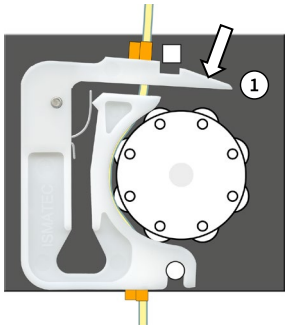


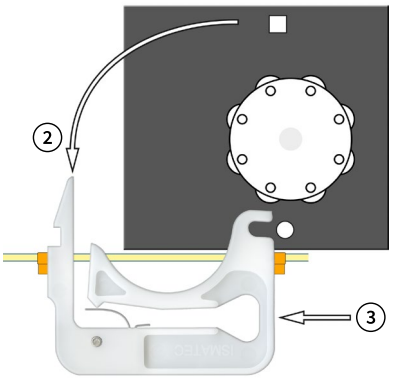

① Press the nose of the tube cassette from above.

② Swivel the tube cassette to the left.

③ Slide the tube cassette out of the holder to the left.





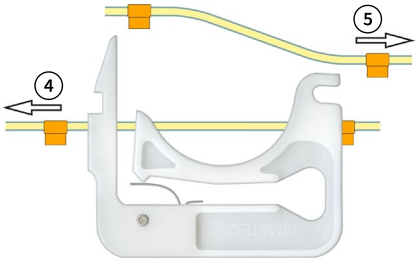

The tube cassette with the pump tube is detached.

④ Stretch the elastic tube to the left until the left identification clip is out of the tube fitting.

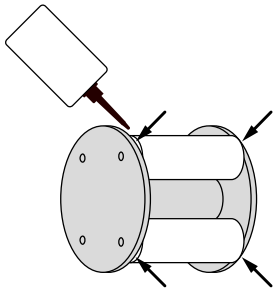
⑤ Lift and pull the tube out of the tube fittings.

The tube is detached.

Insert the new tube in the reverse order.




## 7.3 Oiling the Pump Roller Axles



It is recommended to oil the axles of the pump rollers at each tube changing.

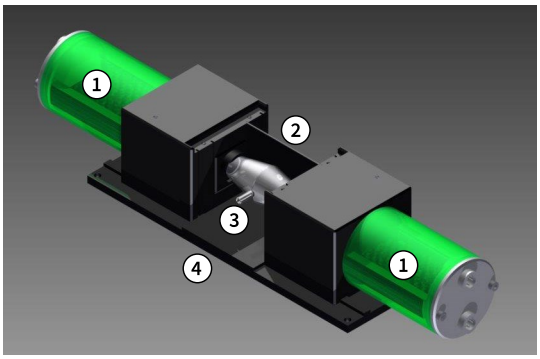
Carefully and sparingly apply some sewing machine oil to the area between the circular surfaces of the pump rollers and the pump rotor.
Turn the pump rollers to spread the oil.

## 8 Replacement of the Cuvette on the Photometer and Spectralphotometer

It is usually not necessary to remove and install the glass cuvette, but it may happen that the cuvette is damaged when the cuvette tubes are removed in the course of a tube exchange. It is also possible that the cuvette may have to be removed for cleaning due to unusual sample contamination.

**Note necessary protective measures! see safety data sheet**

### 1 Photometer setup




① Cuvette holders

② Side cover

③ Cuvette

④ Base plate

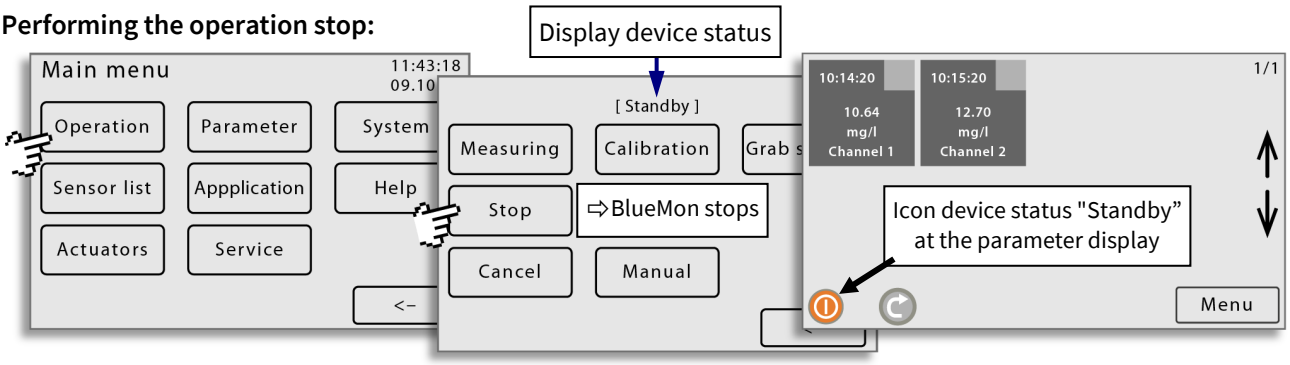
### 2 Preparation

**Note:** Cleaning should be carried out as required.

**Danger:** All operation must be stopped before opening the housing door.

**Danger:** Empty the photometer and the connected components completely.

**Performing the operation stop:**





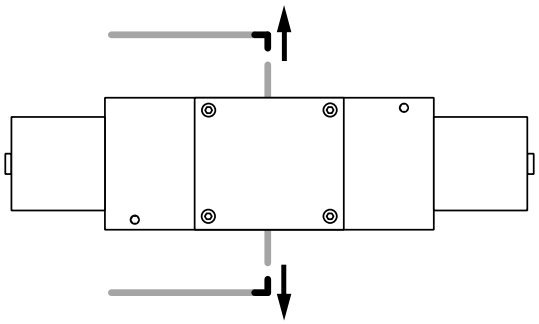
Each running sequence is carried out until the end, and then the system stops. Thereafter the system enters the device status "Standby".

**Required tools:**

- Hex socket wrench 2.5 mm for the four socket screws of the photometer housing cover
- Hex socket wrench 1.5 mm for the two headless socket screws of the cuvette holders

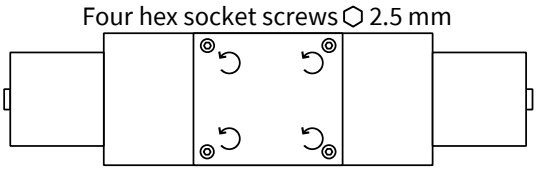
**Remove tube connection:**

The photometer is located at the top in the middle on the device plate of the BlueMon analyzer.
Remove the connecting tubes from the cuvette tubes.

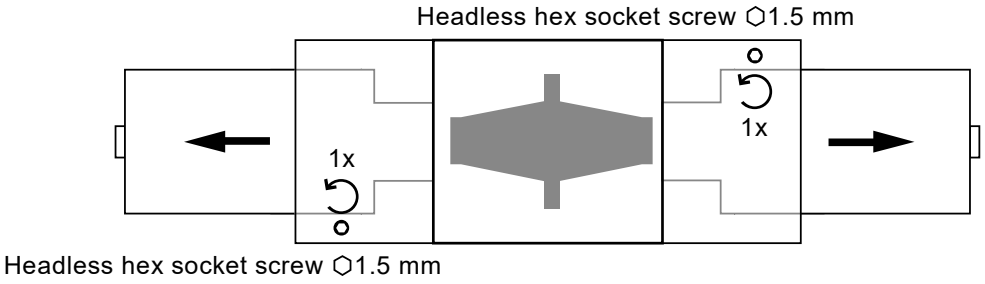


## 3 Cuvette dismounting

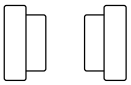
**Opening the photometer housing**
Use the 2.5 mm hex socket wrench to remove the four hex socket screws of the photometer housing cover.
Remove the photometer housing cover.



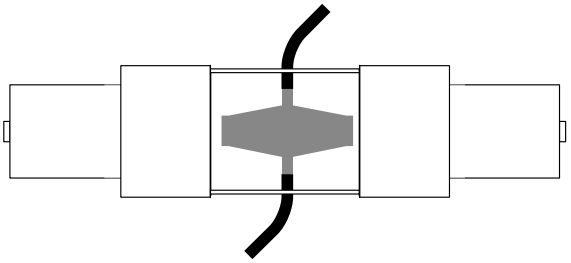

**Pull out the cuvette holders:** Use the 1.5 mm hex socket wrench to turn each headless hex socket screw one turn to the left. Carefully pull out the cuvette holders until the cuvette is unlocked.
Here as an example is the 50 mm barrel cuvette without small cuvette adapters.



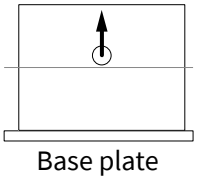

**Note:** For cuvettes in the size from 1 mm to 5 mm, small cuvette adapter are installed.
If necessary, reinstall these after exchanging the cuvettes.



**Pull out the cuvette with the two side covers:**
Pull out the cuvette with the cuvette tubes and side covers.
Carefully ⚠ separate the cuvette, the tubes and the side covers.



**Note that both side covers are not symmetrical!**




**Caution:** The properties of the optical surfaces of the cuvette must not be changed, e. g. avoid touching them by hand

**Observe personal protective measures!**

## 4 Cuvette mounting

The mounting of the new or cleaned cuvette is done in reverse order to the removal of the cuvette.

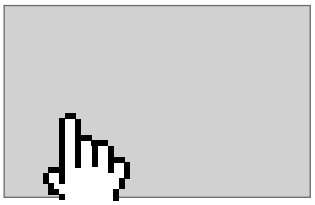
## Appendix A – Adjustment of the Touch Display

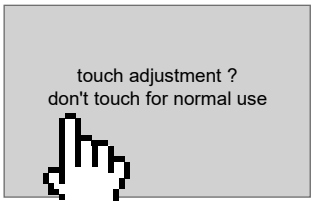
If the display does not respond correctly or only under high pressure, a display adjustment is necessary.

While switching on power, press display until the notice

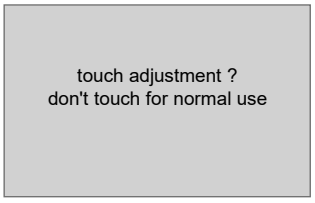
"touch adjustment ?
don't touch for normal use"

appears.

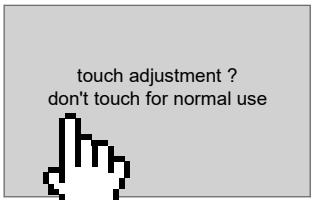




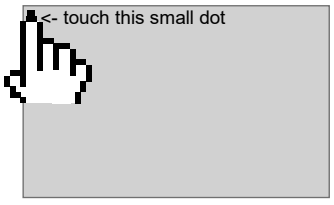

Left off the display immediately!



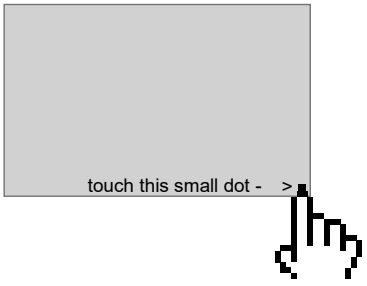

Press the display immediately again for more than one second.




A blinking dot appears at top left.
Press the blinking dot top left.




A blinking dot appears at bottom right.
Press the blinking dot bottom right.

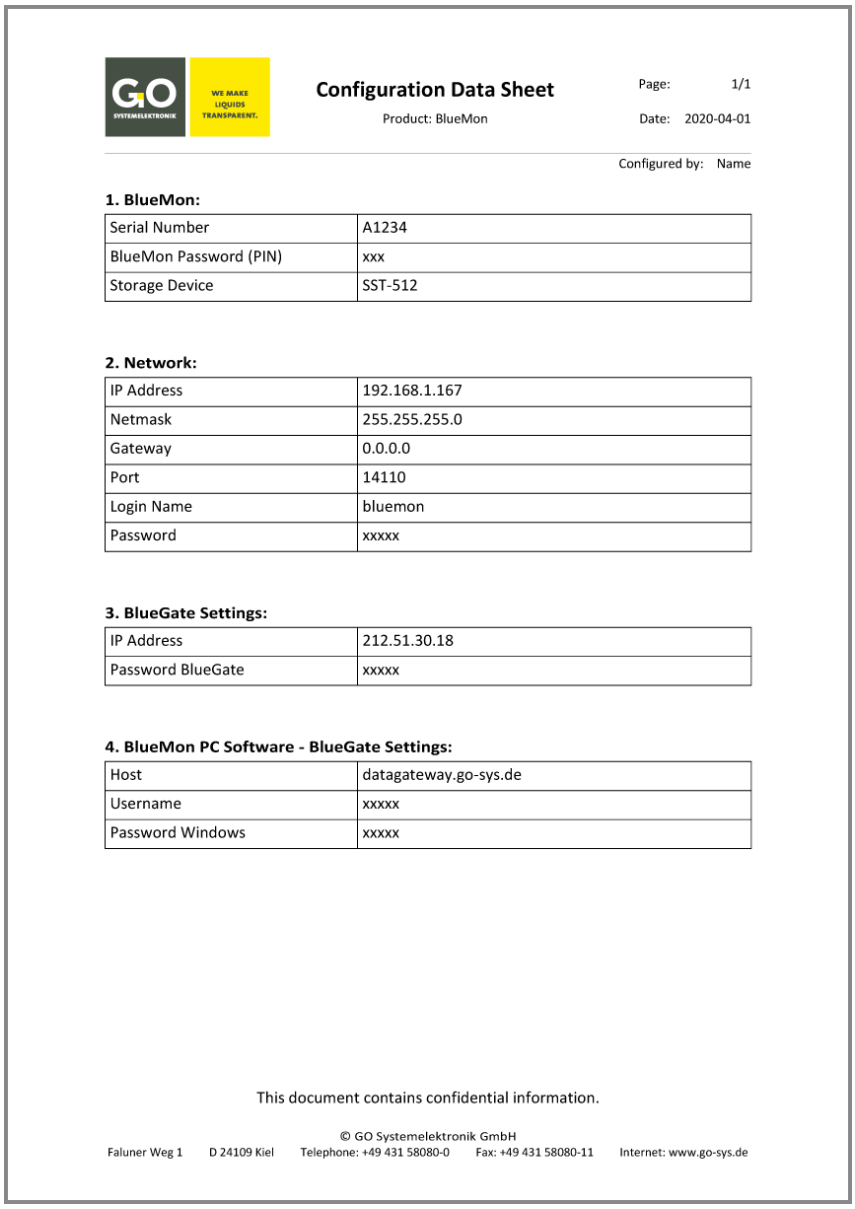



The adjustment is finished.

## Appendix B – The Configuration Data Sheet

The configuration data sheet contains the passwords, network addresses etc. necessary for operating the BlueMon.

**Example:**



**Configuration Data Sheet**

Page: 1/1

Product: BlueMon

Date: 2020-04-01

Configured by: Name

**1. BlueMon:**

| | |
|---|---|
| Serial Number | A1234 |
| BlueMon Password (PIN) | xxx |
| Storage Device | SST-512 |

**2. Network:**

| | |
|---|---|
| IP Address | 192.168.1.167 |
| Netmask | 255.255.255.0 |
| Gateway | 0.0.0.0 |
| Port | 14110 |
| Login Name | bluemon |
| Password | xxxxx |

**3. BlueGate Settings:**

| | |
|---|---|
| IP Address | 212.51.30.18 |
| Password BlueGate | xxxxx |

**4. BlueMon PC Software - BlueGate Settings:**

| | |
|---|---|
| Host | datagateway.go-sys.de |
| Username | xxxxx |
| Password Windows | xxxxx |

This document contains confidential information.



Faluner Weg 1 D 24109 Kiel Telephone: +49 431 58080-0 Fax: +49 431 58080-11 Internet: www.go-sys.de

**1. BlueMon:**

| | |
|---|---|
| Serial Number | A1234 |
| BlueMon Password (PIN) | xxxxx |
| Storage Device | SST-512 |

**Serial Number**

Serial number of the BlueMon
With this serial number the BlueMon is identified by the BlueMon PC Software.
⇨ set at the factory, not changeable

**BlueMon Password (PIN)**

Password of the BlueMon
Is required to change the BlueMon system settings.
⇨ set at the factory, not changeable

**Storage Device**

Model and size of the internal BlueMon memory, here SST-512 (SST= SST NANDrive™; 512=512MB)
⇨ set at the factory, changeable by replacing

**2. Network:**

| | |
|---|---|
| IP Address | 192.168.1.167 |
| Netmask | 255.255.255.0 |
| Gateway | 0.0.0.0 |
| Port | 14110 |
| Login Name | bluemon |
| Password | xxxxx |

**IP Address** IP address of the BlueMon
At this address, the BlueMon is addressed on the network.
⇨ set at the factory, changeable

**Netmask** Netmask of the BlueMon
⇨ set at the factory, changeable

**Gateway** Standard gateway of the BlueMon
⇨ set at the factory, changeable

**Port** Default gateway of the BlueMon
⇨ set at the factory, not changeable

**Login Name** User name for a modem connection
⇨ set at the factory, not changeable

**Password** Network password of the BlueMon
Is needed to access the BlueMon via the BlueMon PC Software.
⇨ set at the factory, not changeable

**3. BlueGate Settings:**

| | |
|---|---|
| IP Address | 212.51.30.18[1] |
| Password BlueGate | xxxxx |

**IP Address** IP address of an Internet Gateway
⇨ can be configured at the factory, changeable[2]

**Password BlueGate** Password of an Internet Gateway
⇨ can be configured at the factory, changeable

**4. BlueMon PC Software – BlueGate Settings:**

| | |
|---|---|
| Host | datagateway.go-sys.de |
| Username | xxxxx |
| Password Windows | xxxxx |

If the BlueMon is accessed via a gateway (e.g. with an UMTS connection), you have to enter these access data in the BlueMon PC Software.

[1] IP address of the GO webserver (default address)
[2] changeable only at the default address

## Appendix C – Maintenance Protocol

☐ Ammonium ☐ Chlorine ☐ Fluoride ☐ Nitrate ☐ Phosphate

Month/Year _____

Measurement component: _____ Measurement range: _____

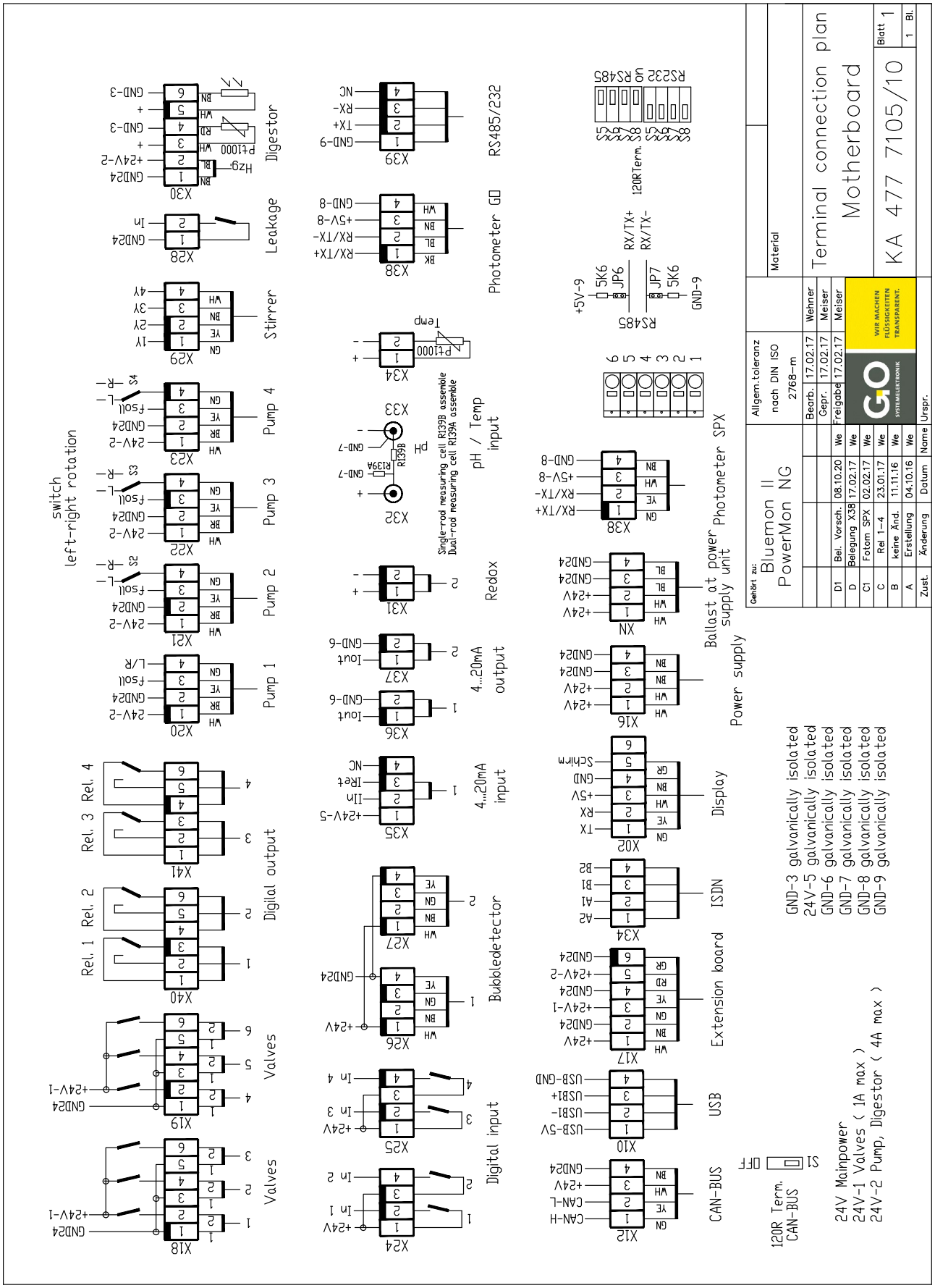
Device in operation since: _____

Performed maintenance works:

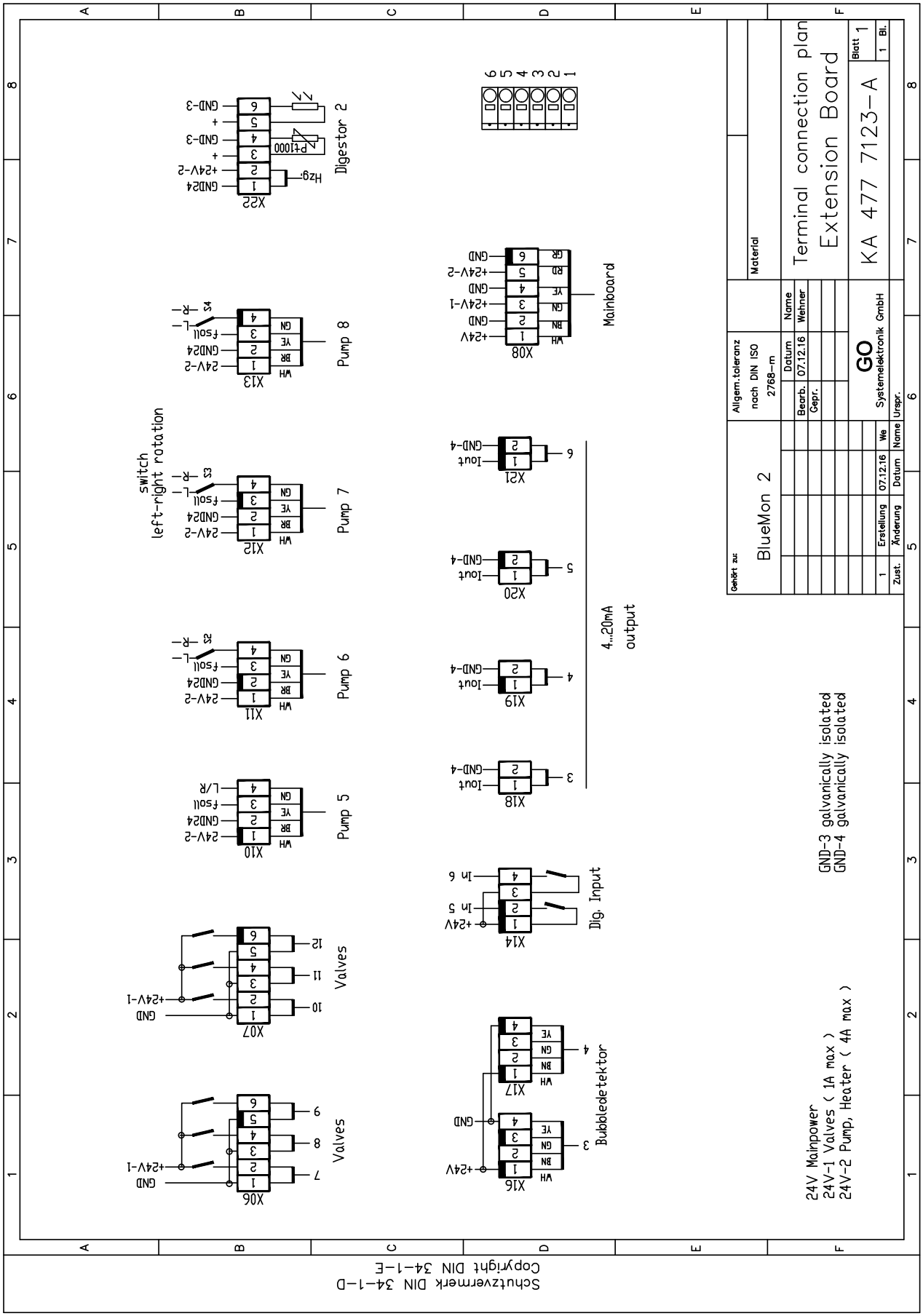
| Daily | | | | | Weekly |
|---|---|---|---|---|---|
| Date | Time | Visual inspection | Remark | Signature | |
| | | ☐ OK | | | ☐ Reagent stock OK<br>☐ Leakage detectetor checked<br>Date:<br>Signature: |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | Reagent stock OK<br>Leakage detectetor checked<br>Date:<br>Signature: |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | Reagent stock OK<br>Leakage detectetor checked<br>Date:<br>Signature: |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | Reagent stock OK<br>Leakage detectetor checked<br>Date:<br>Signature: |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |
| | | ☐ OK | | | |

| Every three months | Every six months |
|---|---|
| ☐ Valves checked<br>☐ Hose holder checked<br>☐ Hose system, cuvette/measurement cell checked<br>☐ Calibration factors checked<br>☐ Electrodes (if existing) checked<br>☐ Chemicals changed<br>☐ Multi pump hoses shifted<br><br>Date:<br>Signature: | ☐ Hoses renewed Date:<br>Signature:<br>**Annual**<br>GO Systemelektronik service personnel:<br>☐ Cuvette cleaned<br>☐ Electrodes (if existing) maintained<br>☐ Seals and O-rings renewed<br>Date:<br>Signature: |

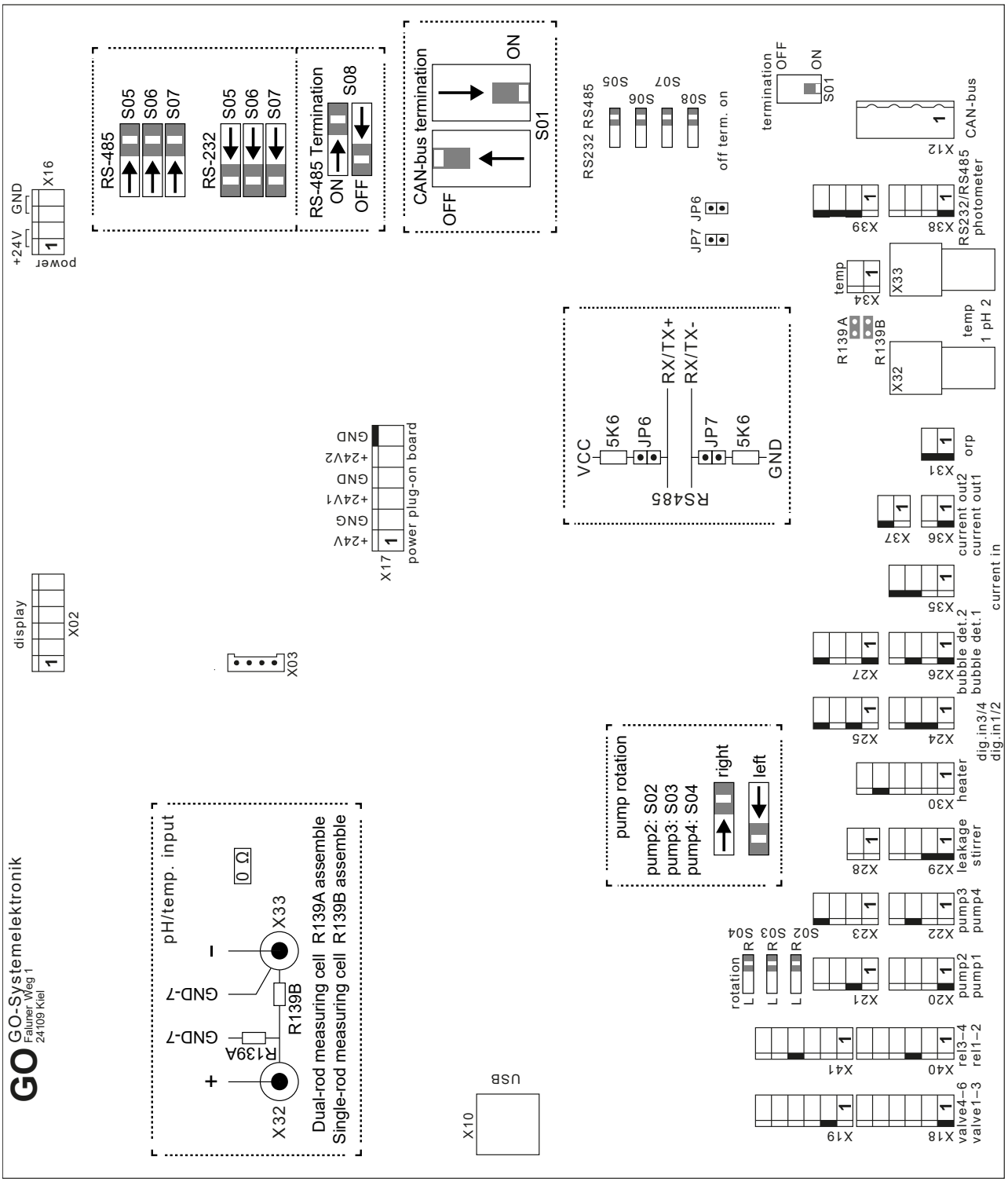
## Appendix D – Connection Diagram of the Mainboard



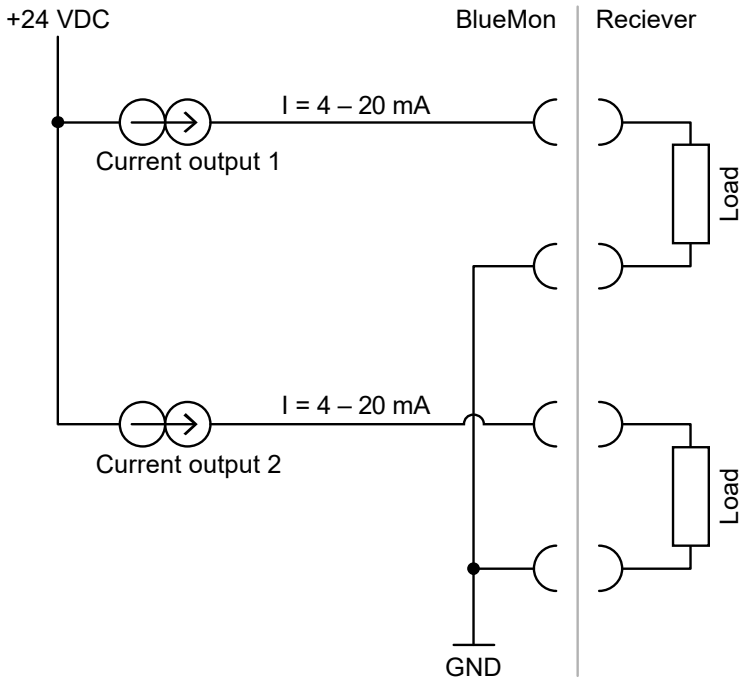
## Appendix E – Connection Diagram of the Plug-on Board



## Appendix F – Configuration of the Mainboard



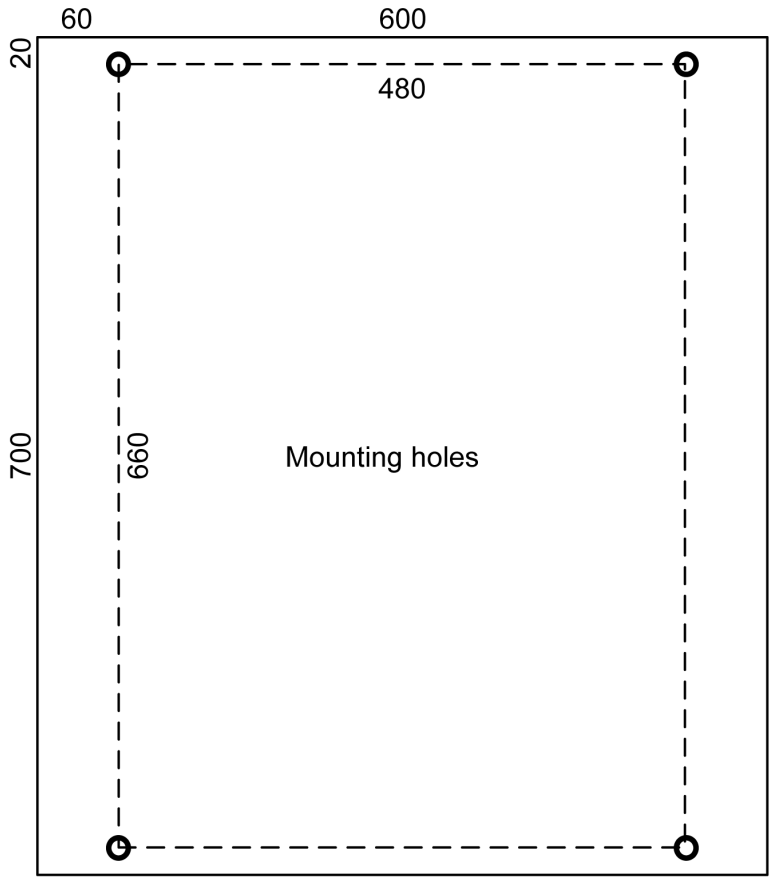
## Appendix G – Connection Diagram of the Current Outputs



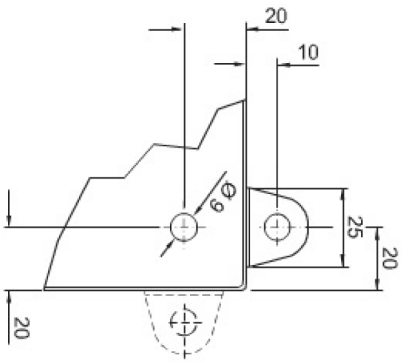

**Note:** In difference to the BlueBox* the two current outputs of the BlueMon are galvanically isolated from the other connections, but not from each other.

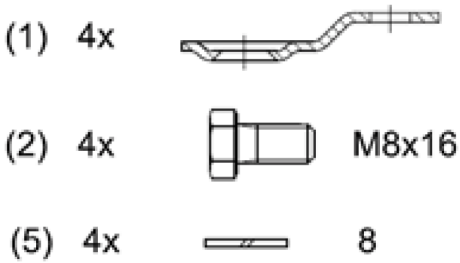
* The BlueBox from GO Systemelektronik is the central element of the BlueBox system. The BlueBox system is a modular measurement and control system.

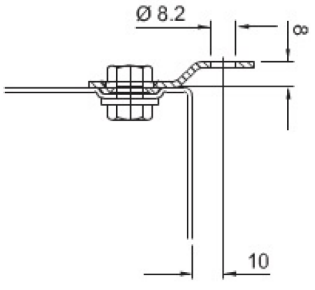
## Appendix H – Device Mounting (large housing)

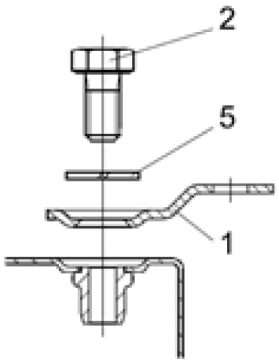



In each mounting hole a rotatable wall bracket is screwed.




All dimensions in mm

# Appendix I – EU Declaration of Conformity

## EU-Konformitätserklärung
## *EU Declaration of Conformity*

| | |
|---|---|
| **Hersteller:**<br>***Manufacturer:*** | GO Systemelektronik GmbH<br>Faluner Weg 1<br>24109 Kiel Germany |

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
*The sole responsibility for issuing this EU declaration of conformity is carried by the manufacturer.*

| | |
|---|---|
| **Gegenstand dieser Erklärung:**<br>***Subject to this declaration:*** | BlueMon Analysator<br>*BlueMon Analyser* |
| **Artikelnummer:**<br>***Article No.:*** | 488 XXXX |

**Typenschild des Produktes:**
***Type plate of the product:***

| |
|---|
| Type : BlueMon xxxxxxx CE |
| GO Systemelektronik Art. No.: 488 XXXX |
| Ident.Article No.: 488 XXXX |
| Serial Number: BMXXXX |

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsvorschriften der Union.
*The subject matter described above fulfills the relevant harmonization rules of the Union.*

**Zugrunde liegende harmonisierte Normen:**
***Underlying harmonized standards:***

| | | | |
|---|---|---|---|
| 1. | DIN EN 61000-6-3:2011 | Störaussendung | *Interference emission* |
| 2. | DIN EN 61000-6-1:2007 | Störfestigkeit | *Interference resistance* |

(Falls zutreffend) **Gemäß den Bestimmungen der Richtlinie/den Dokumenten:**
*(If applicable)* ***Following the provision of directive/the documents:***

| | | | |
|---|---|---|---|
| 1. | DIN EN 62368-1 | Niederspannungsrichtlinie | *Low voltage directive* |
| 2. | Fertigungsanleitung BlueMon Analysator<br>*Manufacturing instruction BlueMon Analyser* | 488 XXXX<br>*488 XXXX* | |
| 3. | Fertigungsanleitung Aufbau, Verdrahtung und Verschlauchung incl. Grundbestückung<br>*Manufacturing instruction, assembly, wiring and tubing incl. basic equipping* | 442 0060<br>*442 0060* | |
| 4. | Prüfanleitung BlueMon Analysator<br>*Test instruction BlueMon Analyser* | QM 50 5110<br>*QM 50 5110* | |
| 5. | Bedienungsanleitung BlueMon Inbetriebnahme und Wartung<br>*Manual BlueMon Commissioning and Maintenance* | | |

Kiel, 4.3.2022
Ort, Datum der Ausstellung
*Place, date of issue*

Dr. Thorsten Knutz
Geschäftsführer *Managing director*

GO Systemelektronik GmbH Faluner Weg 1 24109 Kiel Germany Tel.: +49 431 58080-0 Fax: -58080-11
www.go-sys.de info@go-sys.de
Seite *Page* 1 / 1