s::can
A Badger Meter® Brand

Manual

con::line D-500-012

May 2023 Release

Table of Contents

1 General

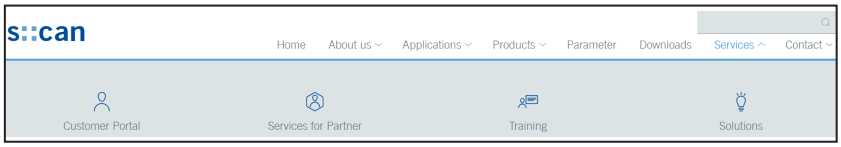
This manual contains, firstly, general information (chapter 1) and safety guidelines (chapter 2). The next chapter (chapter 3) provides a technical description of the s::can product itself as well as information regarding transport and storage of the product. In further chapters the installation (chapter 4) and the initial startup (chapter 5) are explained. Furthermore information regarding how to operate the software Io::Tool (chapter 6), how to perform a functional check (chapter 7) and maintenance (chapter 8) can be found in this manual. Information regarding troubleshooting (chapter 9), the available accessories (chapter 10) and the technical specifications (chapter 11) complete the document.

Each term in this document that is marked *italic and underlined*, can be found on the display of your controller for operation or as lettering on your s::can product.

In spite of careful elaboration this manual may contain errors or incompletion. s::can does not assume liability for errors or loss of data due to such faults in the manual. The original manual is published in English and German by s::can. This original manual serves as the reference in case discrepancies occur in versions of the manual after translation into third languages.

This manual, at the time of its publication (see release date printed on the top of this document), concerns the s::can products listed in chapter 3. Information and technical specifications regarding these items in s::can manuals from earlier release dates are herewith replaced by this manual.

The electronic version (pdf-document) of this manual is available on the s::can Customer Portal (Services for Customer) of the s::can website (www.s-can.at).



2 Safety Guidelines

Installation, electrical connection, initial startup, operation and maintenance of any s::can product as well as complete s::can measuring systems must only be performed by qualified personnel. This qualified personnel has to be trained and authorised by the plant operator or by s::can for these activities. The qualified personnel must have read and understood this manual and have to follow the instructions contained in this manual.

For proper initial startup of complete s::can measuring systems, the manuals for the controller and software used for operation (e.g. con::lyte, con::cube, con::nect, moni::tool), the connected probes and sensors as well as the used additional devices (e.g. compressor) have to be consulted.

The operator has to obtain the local operating permits and has to comply with the joint constraints associated with these. Additionally, the local legal requirements have to be observed (e.g. regarding safety of personnel and means of labour, disposal of products and materials, cleaning, environmental constraints). Before putting the measuring device into operation, the operator has to ensure that during mounting and initial startup – in case they are executed by the operator himself – the local legislation and requirements (e.g. regarding electrical connection) are observed.

All s::can products are leaving our factory in immaculate technical and safety conditions. Inappropriate or not intended use of the product, however, can cause danger! The manufacturer is not responsible for damage caused by incorrect or unauthorised use. Any kind of manipulation of the instrument is strictly prohibited - except for the activities described in this document. Conversions and changes to the device must not be made, otherwise all certifications and guarantee / warranty become invalid. For details regarding guarantee and warranty please refer to our general terms and conditions.

2.1 Declaration of Conformity

This s::can product has been developed, tested and manufactured for electromagnetic compatibility (EMC) and according to applicable European standards, as defined in the declaration of conformity.

Hereby, s::can GmbH declares that the radio equipment type con::line is in compliance with Directive 2014/53/EU. The full text of the EU declaration of confirmity is available at the following internet address:

https://extranet.s-can.at/websites/external/Marketing%20%20Sales%20Information/Certificates%20(ISO,%20CE,%20ATEX)/Declarations%20of%20Conformity/CE_UKCA_DoC_conline_20221006.pdf

CE-marks are applied on the device. The declaration of conformity related to this marking can be requested from s::can or your local s::can sales partner or can be downloaded from the s::can Customer Portal.

For further details about certifications related to this product please refer to the technical specifications located at the end of this manual.

2.2 Special Hazard Warning

Because the s::can measuring systems are frequently installed in industrial and municipal waste water applications, one has to take care during mounting and demounting of the system, as parts of the device can be contaminated with dangerous chemicals or pathogenic germs. All necessary precautions should be taken to prevent endangering of one’s health during work with the measuring device.

3 Technical Description

3.1 Intended Use

The con::line is a low power terminal for on-line operation of s::can spectrometer probes, i::scan, ISE probes and sensors as well as a complete pipe::scan monitoring station. The installed web based operating software Io::Tool ensures configuration and maintenance of the device via mobile devices. Data transfer of the parameter readings and status information is possible via the installed 4G modem.

In all types of applications, the respective acceptable limits, which are provided in the technical specifications in the respective s::can manuals, have to be observed. All applications falling outside of these limits, and which are not authorised by s::can GmbH in written form, do not fall under the manufacturer's liability.

The device must only be used for the purpose described in this manual. Use in applications not described in this manual, or modification of the device without written agreement from s::can, is not allowed. s::can is not liable for claims following from such unauthorised use. In such a case, the risks are the sole responsibility of the operator.

3.2 Functional Principle

The con::line is equipped with an operation software (Io::Tool) that can be operated via any mobile device connected via WLAN or Ethernet. The device has no local display but 4 LEDs to display the actual device status. The software starts automatically when the con::line is powered up. The con::line collects readings for probes and sensors using a digital bus connection and transfers the data via 4G modem.

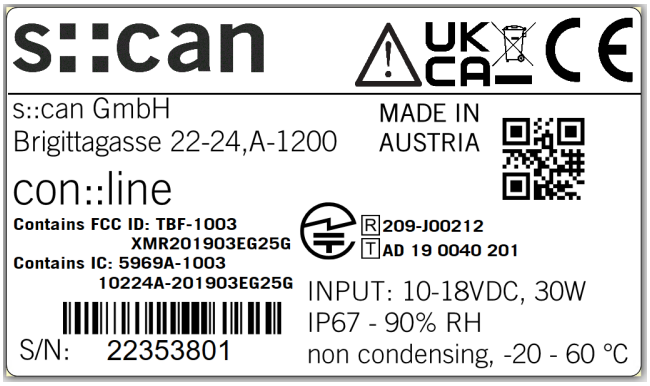
3.3 Product

The following device variants and accessories parts of the con::line are available. Regarding detailed information of the device variants please refer to the technical specifications located at the end of this manual. Regarding detailed information of the accessories parts please refer to section 10.

Type	Specification
D-500-012	Low-power terminal with 10 - 18 VDC main power supply incl. monitoring station software for 4 parameters (S-500-04-IO), external antenna (D-330-ANTENNA) and power supply cable (C-500-POWER-030)
C-500-POWER-030	3 m power supply cable for con::line
D-330-ANTENNA	External high range antenna incl. 3 m cable
D-500-ADAPTER	DIN rail mounting set for con::line
C-500-ETHERNET	Network adapter cable (see section 10.2 for technical specifications)
C-500-PIPESCAN-CABLE	Connection cable for pipe::scan operation (see section 10.4 for technical specifications)
C-500-CLEANING	Connection cable for automatic cleaning (see section 10.5 for technical specifications)
C-500-IO-BOX	Cable connection box for 12-pin sys-plug (see section 10.6 for technical specifications)
C-500-UPLINK-XXX	Connection cable for SCADA data upload (see section 10.7 for technical specifications)
S-500-04-IO	Io::Tool monitoring station software for 4 parameters
S-500-08-IO	Io::Tool monitoring station software for 8 parameters
S-500-24-IO	Io::Tool monitoring station software for 24 parameters

The device is typified by a type label, as shown on the right, that contains the following information:

- Manufacturer's name and country of origin
- Several certification marks
- Device name (con::line)
- Type of power supply
- Bar code
- Device serial number (S/N)
- Information on power supply (INPUT)
- Environment rating (IP)
- Acceptable humidity and temperature limits
- QR code



Use a certified limited power source (LPS) according EN 62368-1 with max. 40 W.

1 Housing cover

2 Plug for external antenna

3 6 screws to open housing cover (on backside)

4 Holding loops to mount the device

5 Connector for power supply (2 pins sys-plug)

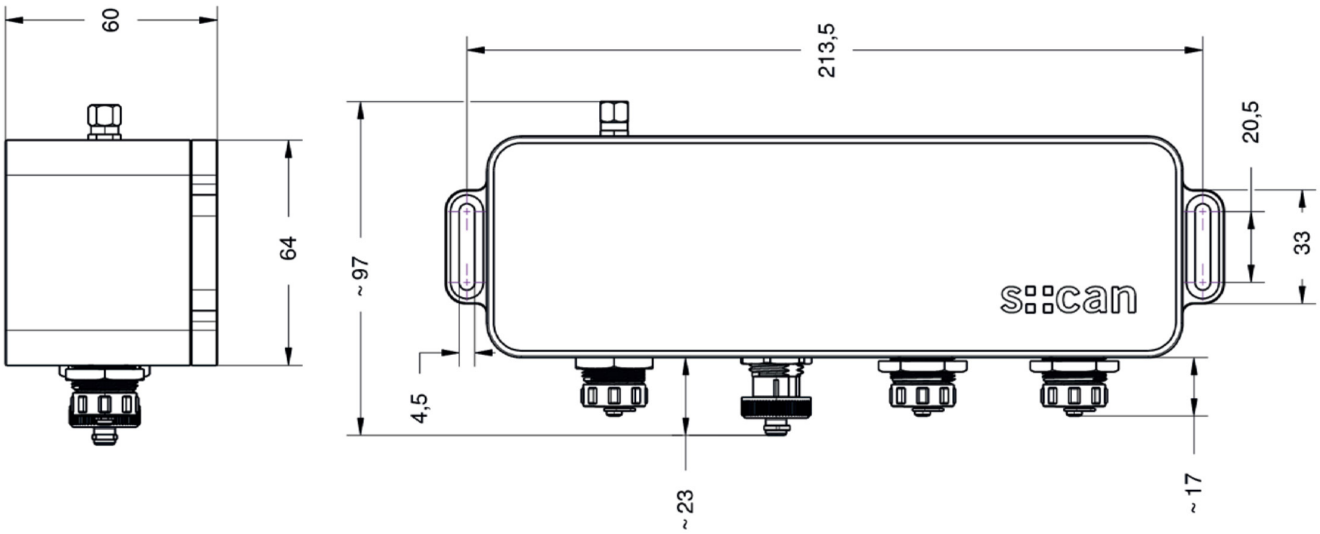
6 Connector (M12) for ethernet connection or s::can spectrometer probes

7 Connector (6 pins sys-plug) for s::can sensors or hub or 12 VDC output

8 Connector (12 pins sys-plug) for operation of pipe::scan or 2 multi-purpose inpus, 4x 12 VDC output, 1x 5 VDC output

9 Cover plate

10 Slot for SIM card



Dimensions of the con::line in mm

3.4 Storage and Transport

The limiting values for device storage and transport, which are described in the section technical specifications, have to be observed at all times. The device shall not be exposed to strong impacts, mechanical loads or vibrations. The device should be kept free of corrosive or organic solvent vapours, nuclear radiation as well as electromagnetic radiation.

Transport should be done in a packaging that protects the device (original packaging or protective covering if possible).

This product is marked with the WEEE symbol to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EC. The symbol indicates that this product should not be treated as household waste. It must be disposed and recycled as electronic waste. Please assist to keep our environment clean.

3.5 Scope of Delivery

Immediately upon receipt, please check the received consignment for completeness on the basis of the delivery note and check for any possible damage incurred during shipping. Please inform the delivering dispatcher and s::can immediately in case of any damages in transit.

The following parts should be included in the delivery:

- s::can con::line (part-no. D-500-012)
- Power supply cable (part-no. C-500-POWER-030)
- External antenna (part-no. D-330-ANTENNA)
- s::can manual con::line (part-no. S-47-M)

The following parts could be included in the delivery if ordered as an option:

- Mounting clips (part-no. D-500-DIN-ADAPTER)
- Network Adapter (part-no. C-500-ETHERNET)
- Connection cable pipe::scan (part-no. C-500-PIPESCAN-CABLE)
- Automatic cleaning adapter (part-no. C-500-CLEANING)
- Cable connection box (part-no. C-500-IO-BOX)
- Modbus RTU Adapter (part-no. C-500-UPLINK-XXX)

In case of incompleteness please contact your s::can sales partner immediately!

3.6 Product Updates, Other

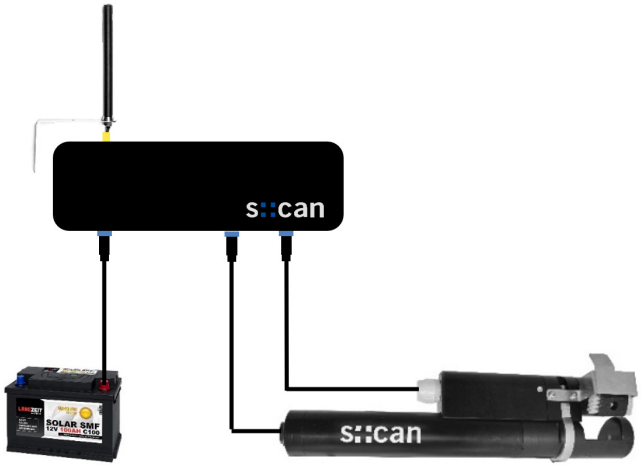
The manufacturer reserves the rights to implement, without prior notice, technical developments and modifications in the light of continuous product care.

3.7 Examples of typical Applications

Within this section the general layout of a monitoring system operated with the s::can con::line are explained. Besides a schematic overview, the needed parts and possible limitations are displayed. Important notes for the configuration are added.

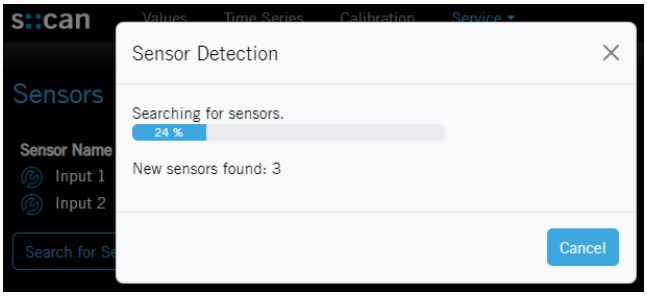
Needed parts for this setup:

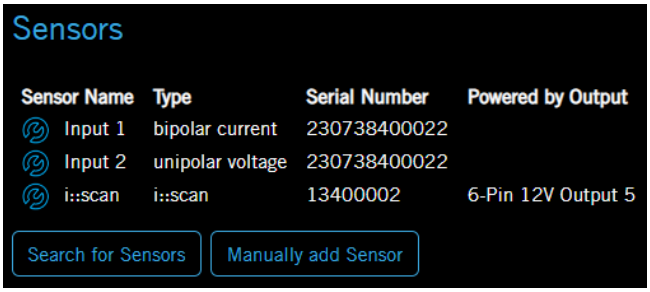
- con::line D-500-012
- C-500-POWER-030 (incl. in delivery)
- D-330-ANTENNA (incl. in delivery)
- C-500-CLEANING to connect ruck::sack



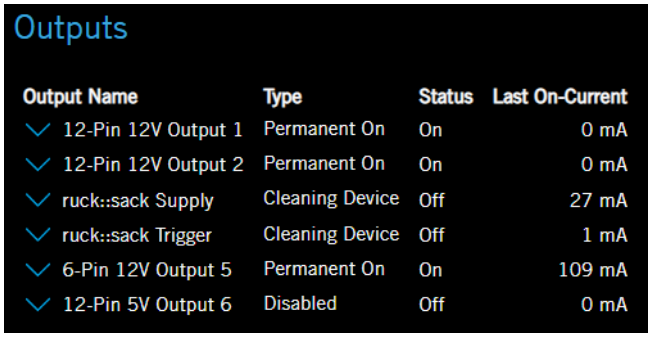
Start-up procedure for this setup:

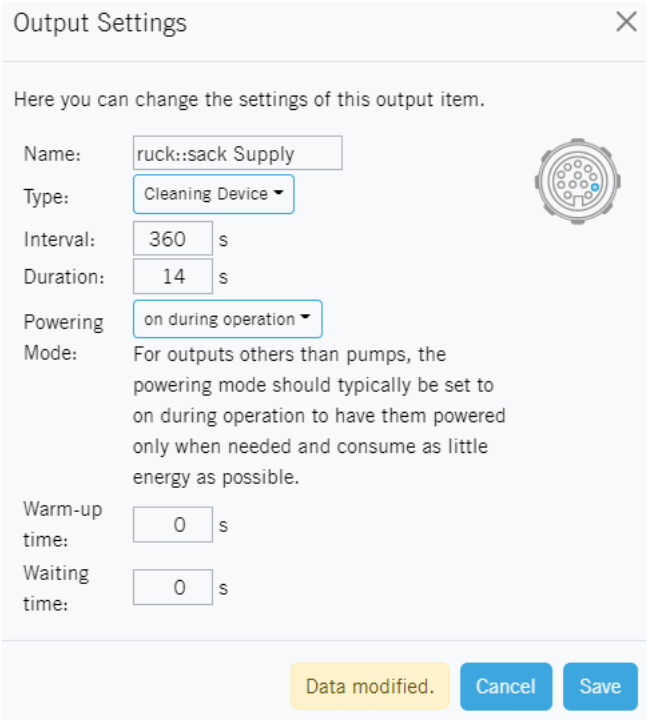
- Power up the con::line
- connect the i::scan to the 6-pins sys-plug of the con::line
- Wire the ruck::sack connect the cleaning adapter C-500-CLEANING
- Automatic sensor search of i::scan (*Service \ Sensor and Outputs \ Search for Sensors*)

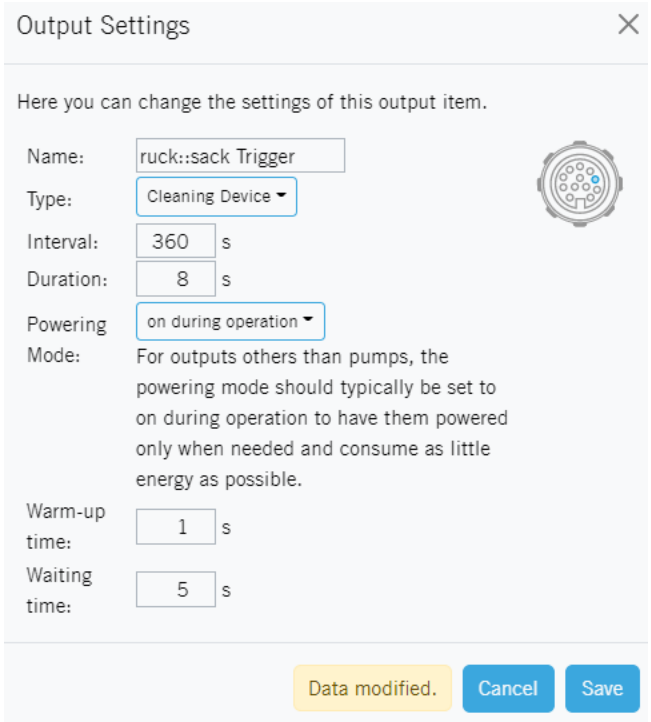




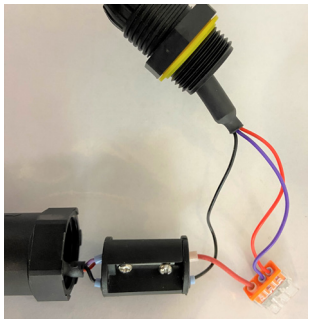
- Change Type of *6-Pin 12V Output 5* from *Permanent On* to *Sensor Supply*, if you want to use *Sleep Mode*.
- Configure the power supply of the ruck::sack via *12-Pin 12V Output 3* as explained in the left figure below.
- Configure the trigger of the ruck::sack via *12-Pin 12V Output 4* as explained in the right figure below.

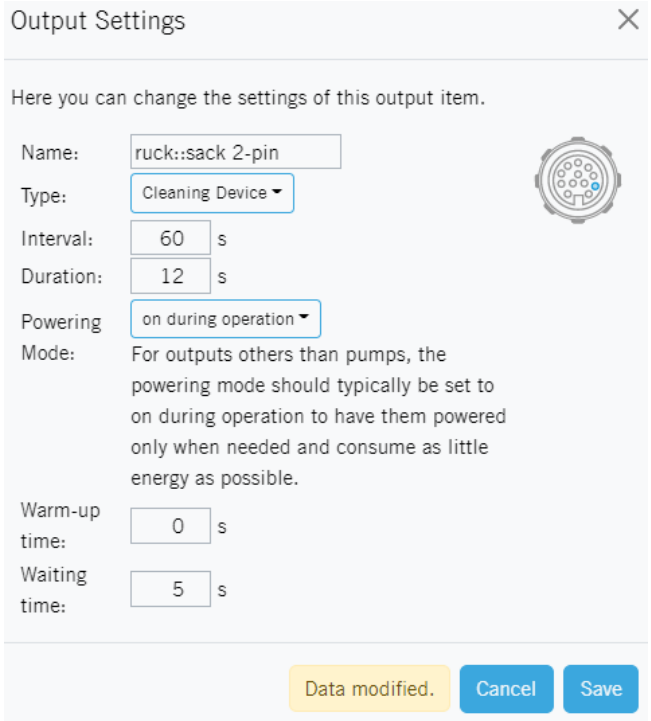






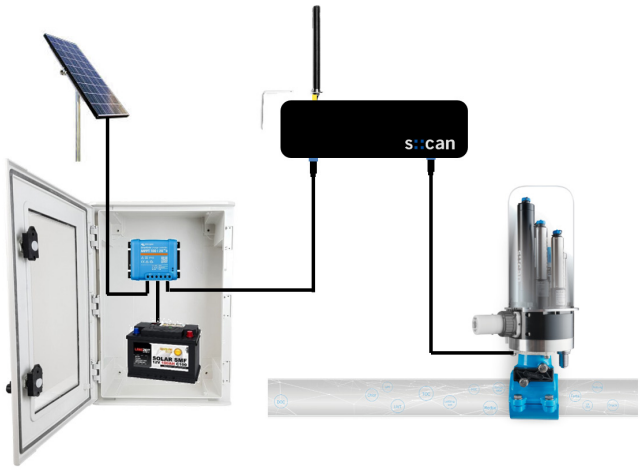
⚠ For 2-pin operation the red and violett cable of the ruck::sack must be wired to the trigger (see figure below). The Output 4 (*12-Pin 12V Output 4*) must be set to a cleaning duration of 12 seconds (see figure on the right) to ensure 2 complete cleaning moves of the ruck::sack.





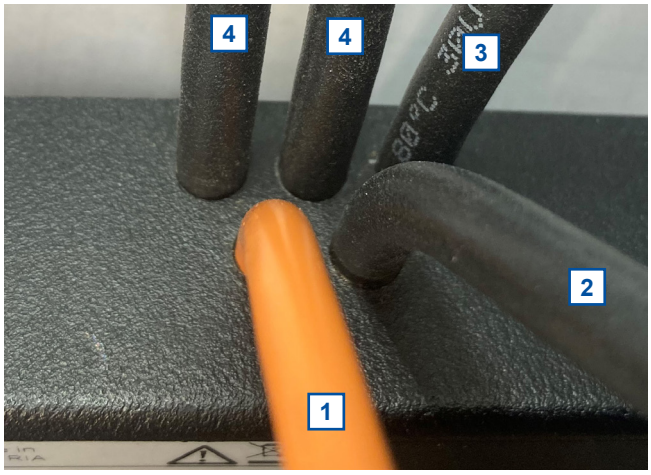
Needed parts for this setup:

- con::line D-500-012
- C-500-POWER-030 (incl. in delivery)
- D-330-ANTENNA (incl. in delivery)
- C-500-PIPESCAN-CABLE to connect pipe::scan hub to 12-pins sys-plug of con::line

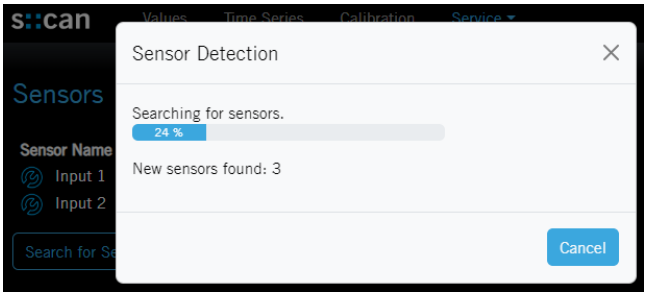


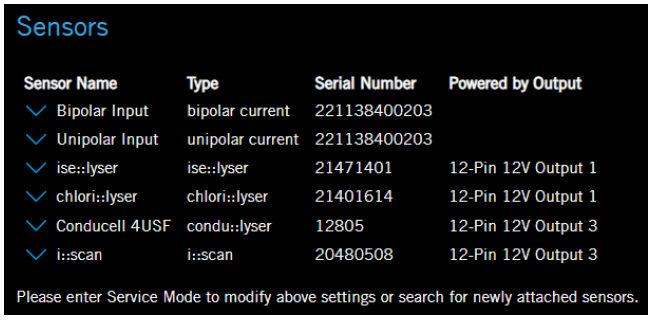
Start-up procedure for this setup:

⚠ The power supply to the sensors on connection cables no. 2 and no. 3 (see figure on the right) is provided via the output 3 of the 12-pin connector. The power supply to the sensors on connection cables no. 4 (see figure on the right) is provided via the output 1 of the 12-pin connector. This is important for power-saving operation.



- Connect the pressure sensor with the orange cable (labelled with no.1 in figure on the right) to the pipescan-hub.
- Connect the i::scan sensor with the connection cable (labelled with no.2 in figure on the right) to the pipescan-hub.
- Connect one sensor (ise::lyser) with the connection cable (labelled with no.3 in figure on the right) to the pipescan-hub.
- Connect the other two sensors (condu::lyser and disinfection sensor) with the connection cable (labelled with no.4 in figure on the right) to the pipescan-hub.
- Connect the pump and the auto::brush to the pipescan-hub.
- Connect the pipescan-hub to the con::line with the C-500-PIPESCAN-CABLE
- Automatic sensor search of i::scan (*Service \ Sensor and Outputs \ Search for Sensors*)
- Configure the pump and the autobrush cleaning





4 Installation

4.1 Environment

The con::line is designed according to environmental protection rating IP 67 and is resistant against environment effects. Indoor use is preferred. In case of outdoor use the installation in a cabinet will protect the con::line. When using the GNSS (GPS) interface of the con::line the housing material of the cabinet must be plastic.

Enclosure class IP 67 protection is only guaranteed if the housing cover is fixed tightly with the six screws and the sealing of the housing cover is undamaged and placed correctly. In addition all connectors must be covered with corresponding caps when not in use. Any damage caused by intrusion of water will not be covered by the warranty.

The correct installation of measuring instruments is an important prerequisite for satisfactory operation. Therefore the following checklist for the installation can be used to ensure that all sources for potential operational problems can be ruled out to the greatest possible extent during the installation, allowing the s::can monitoring system to operate properly.

Installation site:

- Easy accessibility (mounting, sampling, functional check, demounting)
- Availability of sufficient space (probe, sensor, installation fitting, terminal, etc.)
- Adherence to limit values (see technical specifications located at the end of this manual)
- Protection against splash water and extreme weather conditions
- Power supply for terminal (operational reliability, voltage, power)
- Oil- and particle free compressed-air supply (optional for automatic probe / sensor cleaning)
- Shortest possible distances between system components (probe – terminal – compressed-air supply – energy supply)
- Best possible layout of cables (non-buckling, working dependability, no damage etc.)

4.2 Mounting

For mounting and electrical installation the following tools and materials are necessary:

- Torx screw driver (size T10) to open housing cover on backside
- 2 screws (M4) for fastening the device on the wall (if required)

The con::line can be mounted quickly and easily onto a flat wall using two M4 countersunk head screws (not included in delivery). The screws can be screwed through the provided brackets of the housing from the front.

Specific mounting clips (D-500-DIN-ADAPTER) are availabe to attach the con::line onto a DIN-rail (35 mm top-hat rail).

For the correct dimensioning and space required for mounting please refer to the figure in section 3.3 and the technical specifications.

5 Initial Startup

Once mounting and installation of the con::line have been completed and checked (see section 4) the initial startup of the s::can monitoring system will require the following actions, in the order presented below:

- Insert a SIM card into your con::line if modem connection is necessary (see section 5.1)
- Connect the s::can probes and sensors (see section 5.2).
- Wire the cleaning devices (ruck::sack, autobrush or cleaning valve) to the cleaning adapter C-500-CLEANING.
- Connect the cleaning adapter C-500-CLEANING to the 12-pin sys-plug of the con::line.
- If a pipe::scan is operated, connect the specific connection cable (C-500-PIPESCAN-CABLE) to the con::line and to the hub of the pipe::scan. Please refer to section 3.7 and the pipe::scan manual for the initial startup of the pipe::scan itself.
- Establish 12 VDC main power supply to the con::line (see section 5.3).
- Connect you mobile device to the con::line using WLAN and start the operating software Io::Tool (see section 5.4).
- Start the automatic sensor search in the operating software Io::Tool (*Service \ Sensor and Outputs \ Search for Sensors*).
- Configure the measurement settings and cleaning settings via the used outputs.
- Check whether the cleaning system works properly.
- Connection and parameterisation of data transfer when desired (please refer to manual of operating software).

5.1 Installation of SIM Card

Once the cover has been opened (six torx head screws removed) you have access to the slot for the SIM card. Push the SIM card (1FF full-size) into the slot carefully and close the housing cover.

Take care the sealing of the housing cover is undamaged and placed correctly

5.2 Connection of s::can spectrometer probe, ISE Probe, i::scan and Sensors

The s::can spectrometer probe can be connected via the M-12 plug connector located on the con::line. This connector is marked with no.6 in the figure of section 3.3. An s::can ISE probe, an i::scan and / or s::can sensors can be connected via the sys plug connector located on the con::line. This connector is marked with no.7 in the figure of section 3.3. If necessary, the distribution box (B-41-HUB) has to be used to increase the number of plugs.

If an extension cable is used the total length of the probe / sensor cable should not be more than 40 m.

Before connecting the probes or sensors, ensure that the sensor plug and connector plug on the device are dry and clean. Otherwise communication errors and / or device damage might occur. Connectors not in use should always be covered with the protective cap.

5.3 Connection of Main Power Supply

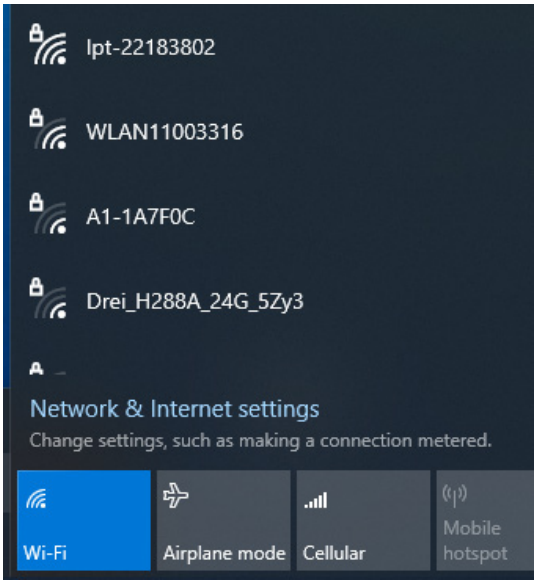
This type of work must be performed by authorised persons only! (see section 2). Use a certified limited power source (LPS) according EN 62368-1 with max. 40 W.

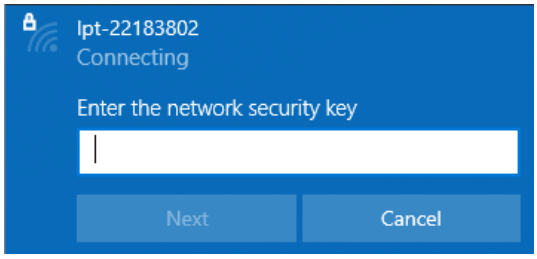
Connect the sys-plug of the power supply cable, which is included in the delivery, to the sys-plug connector located on the con::line. The connector is marked with no. 5 in the figure of section 3.3.

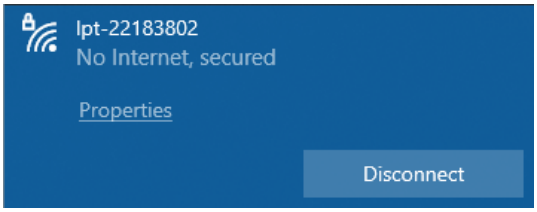
The power supply earth (PE) is to be made properly. Proper grounding implies suitable wiring for grounding which includes proper wire size (see technical specification) and a suitable equipment ground. Process medium (e.g. waste water) must be connected to the same earth ground with less than 0.5 Ohm.

5.4 Connection to con::line via WLAN / Ethernet

- Connect the con::line to the main power supply as explained in section 5.3.
- Several seconds after the con::line was connected to power supply, the LED on the front of the housing will flash blue.
- Within one minute the LED will change from flashing to continuous color. The con::line is online now and measurements will start automatically according to user settings.
- Connect your mobile device to the WLAN / Ethernet of the con::line. The network name belonging to Lthe con::line starts with *lpt-xxxxxxxx* (xxxxxxxx corresponds to the serial number of the device). WLAN password = *spectrolyser*.
- Alternatively connect your notebook with a LAN cable to the connectioncable of the con::line. Please consider administrator rights might be needed to establish connection.
- Enter the IP address of the con::line into your webbrowser to start Io::Tool. The table below displays the different possibilities to get the correct IP address.
- If you do not know the correct IP address, enter https://iotool.lan or http://iotool.lan.







If a security warning pops up, simply scip the message by confirming the page.

Please note that WLAN is active for 10 minutes only after startup. Within this time you should start Io::Tool.

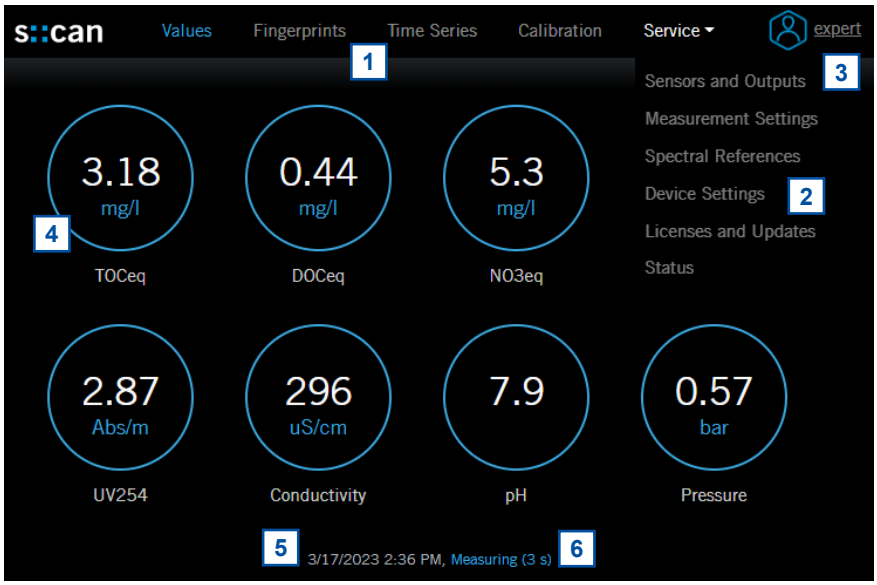
Connection methode	IP address of spectrometer	Remark
via WLAN	192.168.43.1	default address; password = *spectrolyser*
via LAN	to be checked on DHCP Server	DHCP active on spectrometer probe per default
via LAN	192.168.42.10	fall back (static) if network without DHCP Server (e.g. when connecting directly with notebook). Please see manual of con::nect for further details how to set static IP on your notebook.

6 Io::Tool

The operating software Io::Tool is installed on the con::line. Enter the IP address of the con::line (e.g. 192.168.43.1 for WLAN, see section 5.4) or http://iotool.lan in the webbrowser of a connected device (e.g. notebook, mobile phone, tablet, etc.) to start Io::Tool.

As soon as the connection is established, Io::Tool will pop up in the webbrowser showing the actual readings of the connected probes and sensors (see figure below).

Io::Tool will use the same language like the webbrowser. That means the language of Io::Tool can be changed by changing the default language of the webbrowser.



1 Main tabs to change the displayed information

2 Service menu with available submenus.

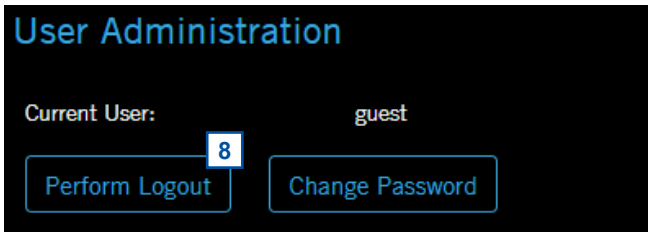
3 Name of user logged in currently. For more details please see below.

4 Actual parameter readings and unit. The color of the circle indicates the parameter status.

5 Actual system date and time.

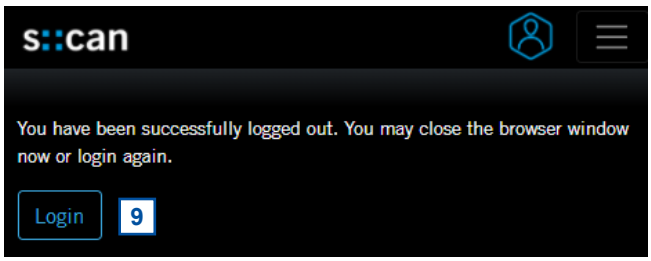
6 Activity (e.g. *Idle*, *Cleaning*, *Measuring*, *Offline*).

For operation of Io::Tool there are three users available. Per default the user is logged in as *guest* automatically (no password required). For the normal operator the level *user* (with password *scan*) and for service personal the user *expert* (with password *scan*) is available. A change of the user is performed by the following steps:



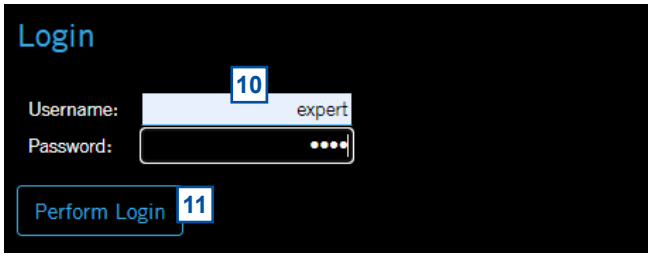
7 Click on the user icon in the upper right corner of Io::Tool (no. 3 in figure above).

8 Click on the button *Perform Logout* to logout the current user.



9 Click on the button *Login*.

10 Enter the new *Username* (e.g. guest, user or expert).

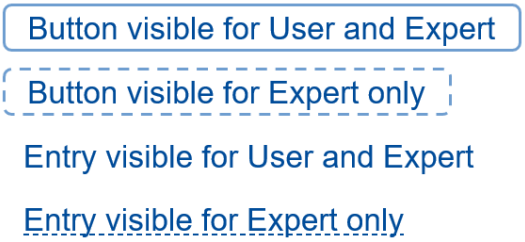


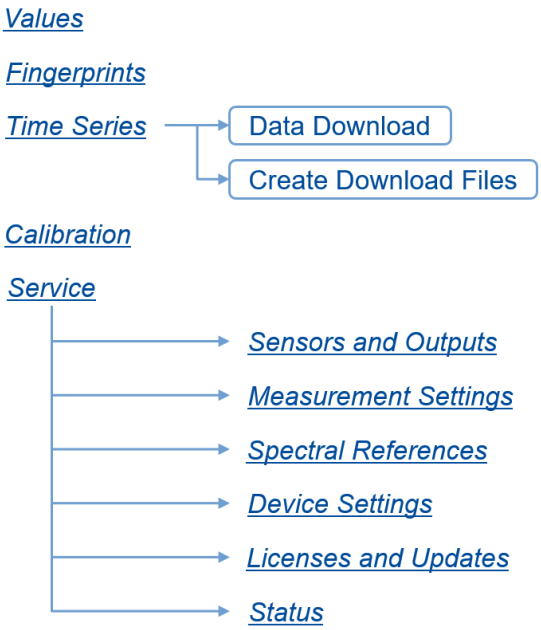
11 Click on the button *Perform Login* to login as new user.

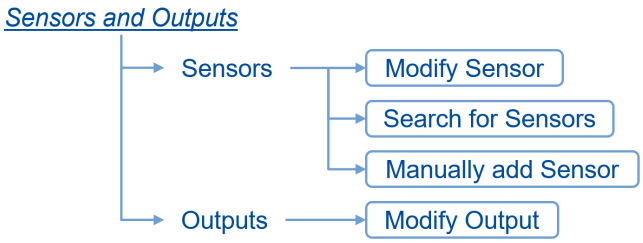
6.1 General Menu Overview of Io::Tool

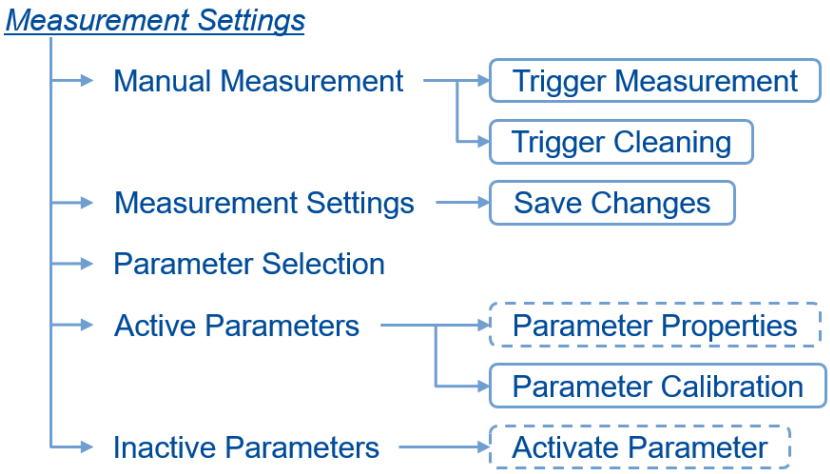
This section provides a general overview of the Io::Tool menu and the available functions. Beside the function name there is a reference to the section where a detailed description can be found.

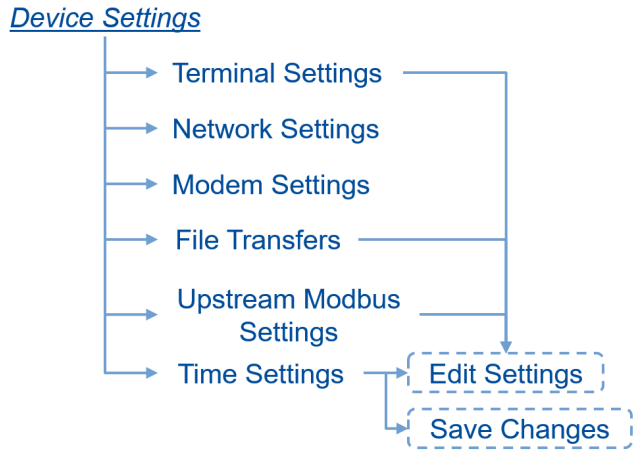
Legend:

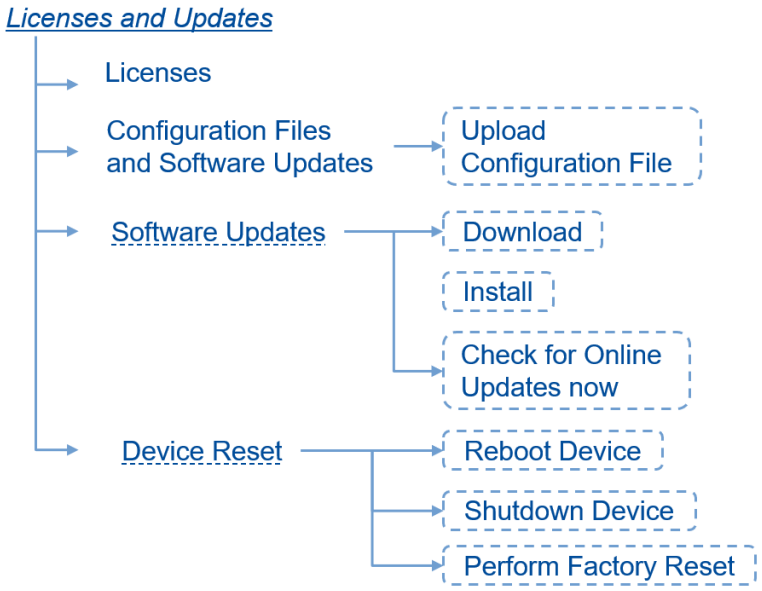


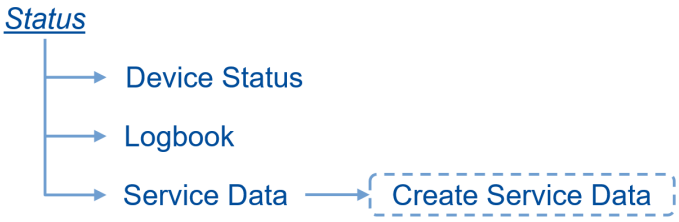








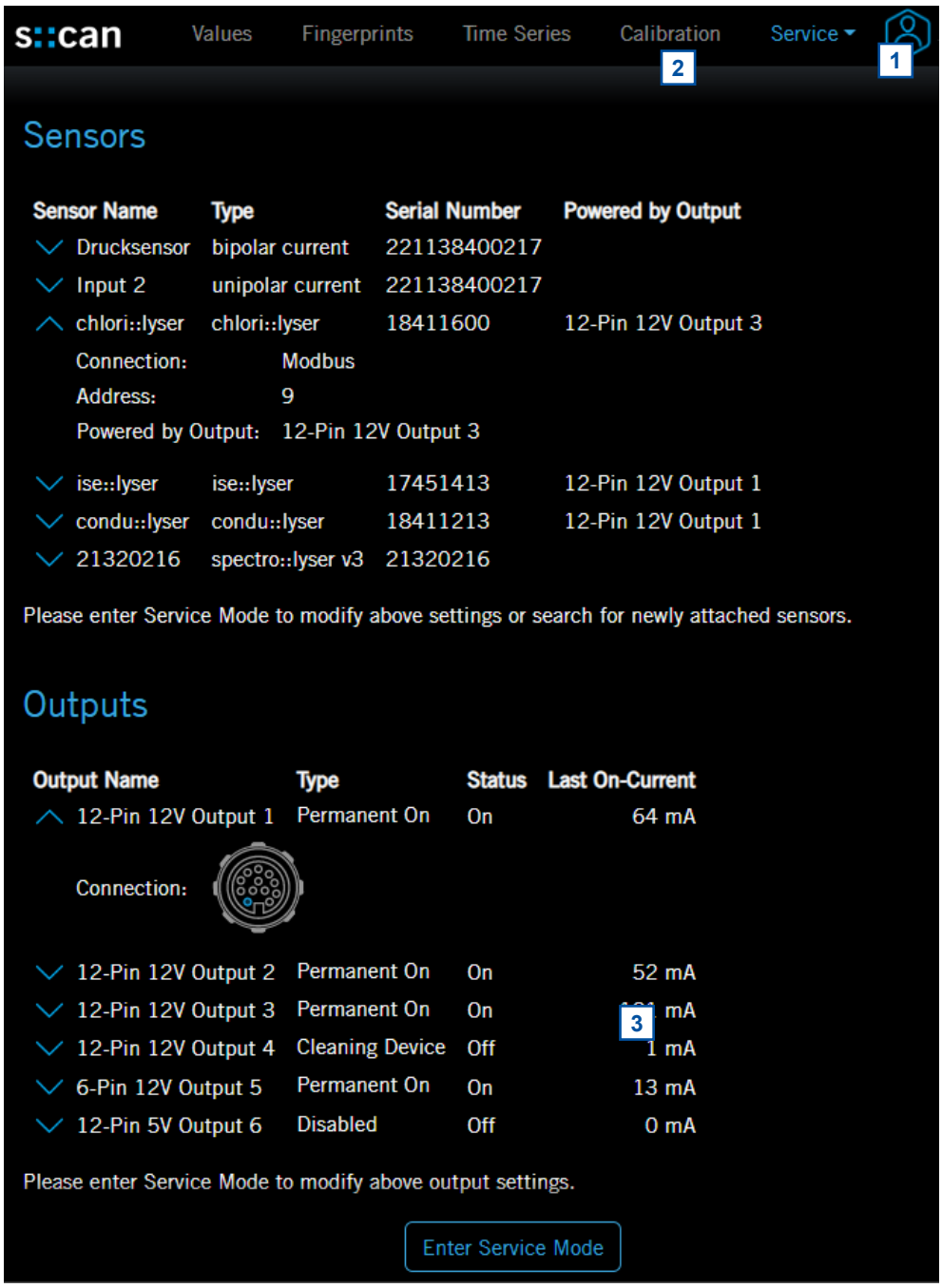




6.2 Sensor and Interface Initialisation [*Service \ Sensors and Outputs*]

The menu *Service \ Sensors and Outputs* provides an overview of all connected sensors and input devices (*Sensors*) as well as all available output devices (*Outputs*) (see figure below). This overview can be used to:

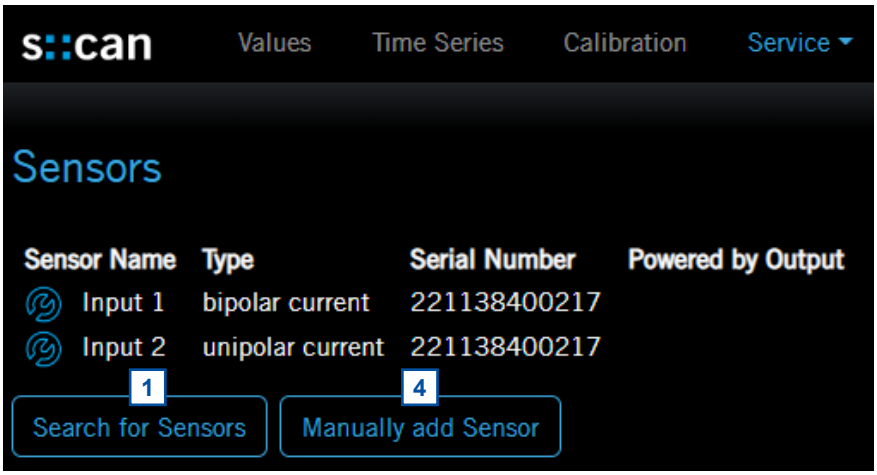
- Check details of already installed sensors and configured outputs. The details will be displayed when clicking on the blue arrow symbol on the left side.
- Check the actual status and the current of an output.
- Start automatic search for a new connected sensor (see section 6.2.1).
- Manually install a new connected sensor.
- Configure the input pin of an external sensor (see section 6.2.2).
- Configure the outputs of the con::line (see section 6.2.3)

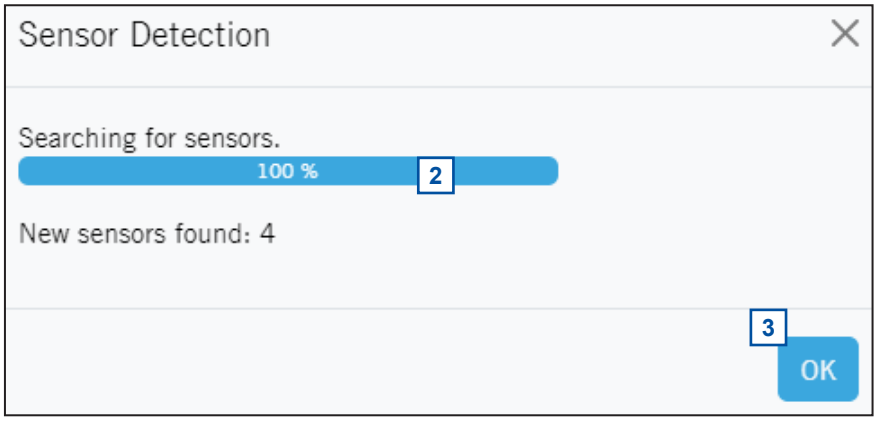


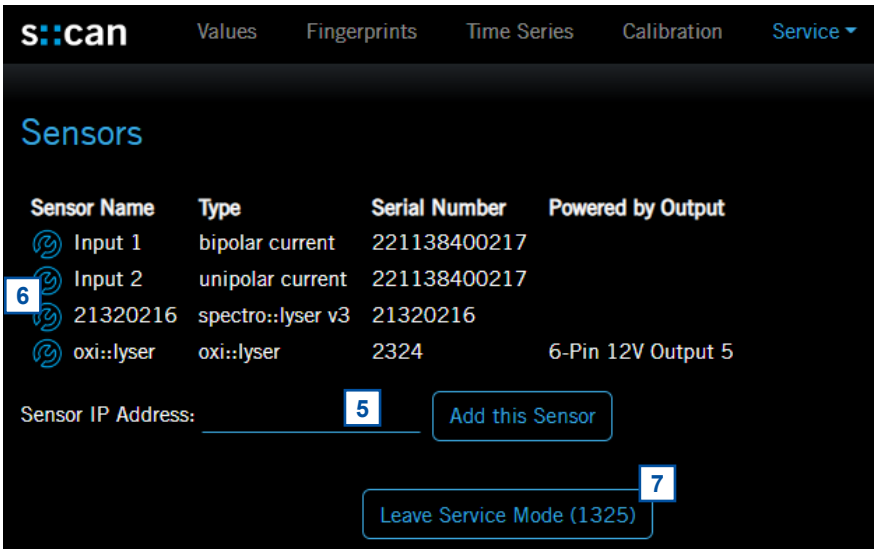
6.2.1 Sensor Initialisation and Configuration

The search for a new sensor and the initialisation is performed by the following steps:

1. Push the button *Search for Sensors* to search for any connected sensor.
2. An automatic procedure starts searching for all sensors which are connected directly to the con::line via sensor plug.
3. Click on the button *OK* to install the new sensors.
4. Push the button *Manually add Sensor* if a spectrometer probe is not connected via M-12 sensor plug but connected to the same network like the con::line.
5. Enter the IP Address of the spectrometer probe and push the button *Add this Sensor*.
6. All installed sensors will be displayed in the sensors list overview. Click the icon on the left side of each sensor if the sensor configuration shall be modified (see next page for more details).
7. Push the button *Leave Service Mode* to end the service mode.







8 The sensor settings can be checked or modified by clicking on the blue icon on the left side of the sensor name.

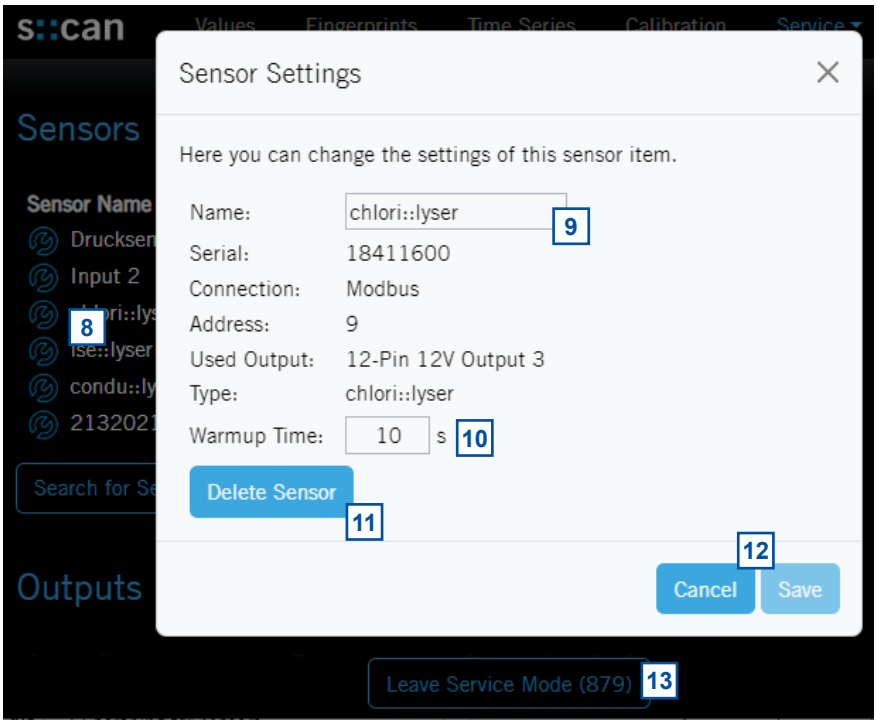
9 The display name of the sensor can be modified. In addition the serial number, the connection method, the address, the used output and the sensor type are displayed.

10 A *Warmup time* can be configured, if the power needs to be powered on for a certain time, before the measurement can be started.

11 Push the button *Delete Sensor*, if the sensor is not needed any more.

12 Push the button *Save* to store the modifications permanently or the button *Cancel* to avoid any changes.

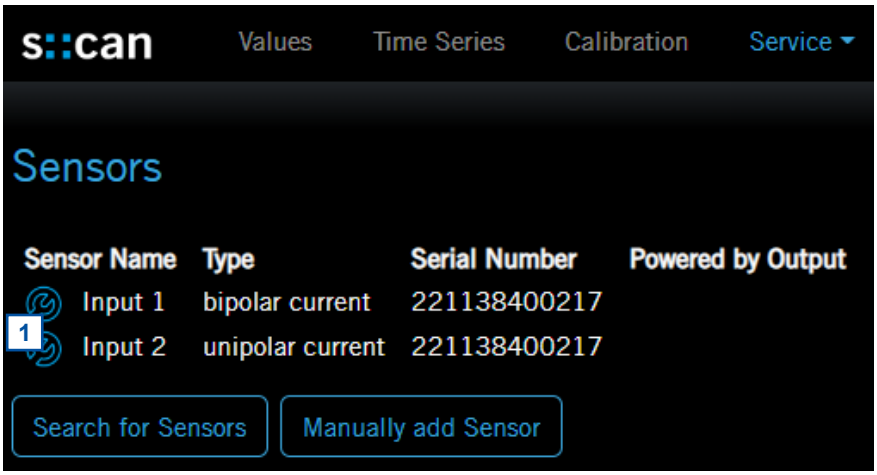
13 Push the button *Leave Service Mode* to end the service mode.

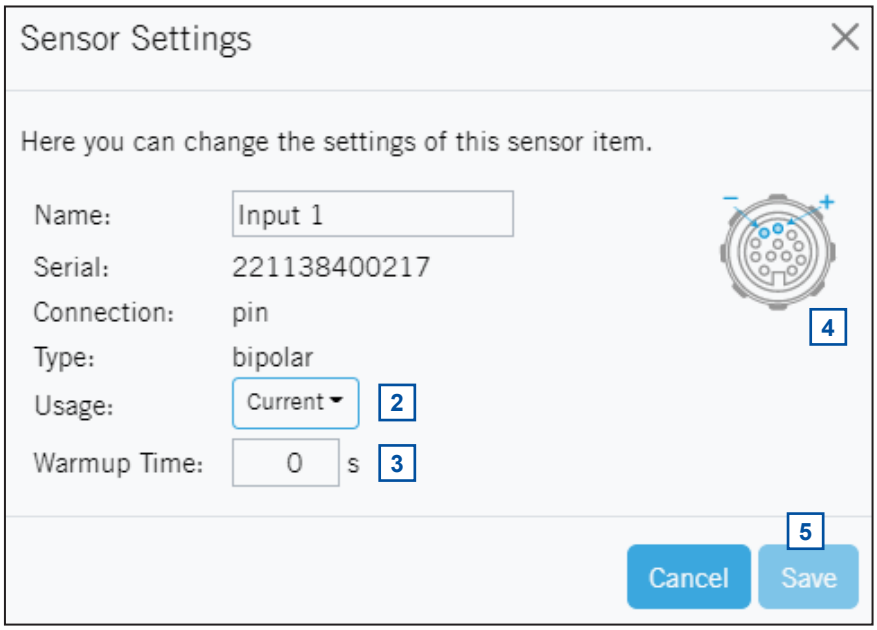


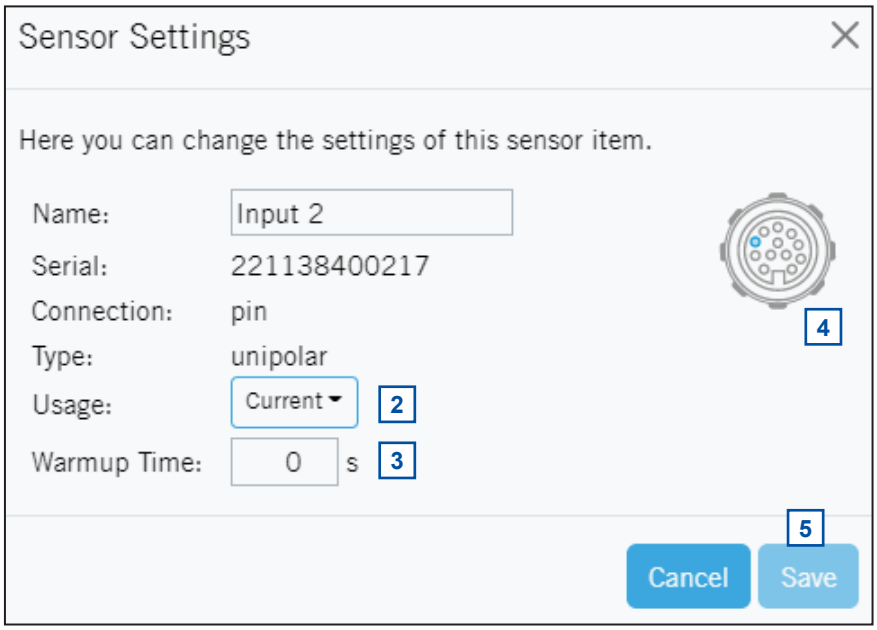
6.2.2 Configuration of internal Sensor Pin

The configuration of the usage for internal sensor pin is performed by the following steps:

1. Click on the icon located on the left side of *Input x* to configure the input pins of the sys plug for the connected external sensor. Use *Input 1* for a bipolar current sensor and *Input 2* for an unipolar current sensor.
2. Depending on the type of the used sensor select *Current* (4-20 mA sensor), *Digital* (digital sensor) or *Voltage* (sensor with mV output).
3. Enter a *Warmup time*, if the sensor needs to be powered on some time in advance to be ready for measure. This setting is important for operation in power save mode.
4. On the figure of the system plug the used pins are marked in blue.
5. Push the button *Save* to store the modifications permanently. Then push the button *Leave Service Mode* to end the service mode.







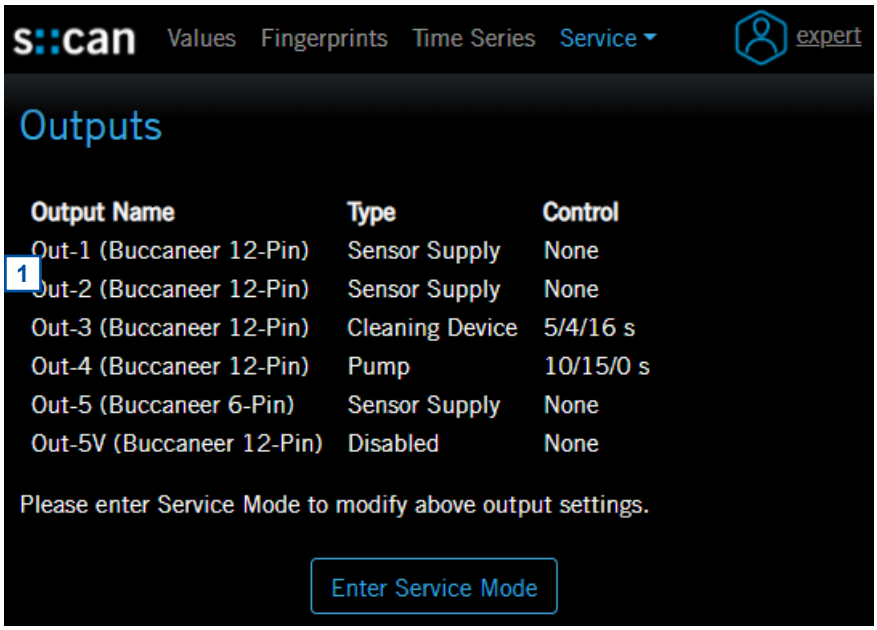
6.2.3 Configuration of Outputs

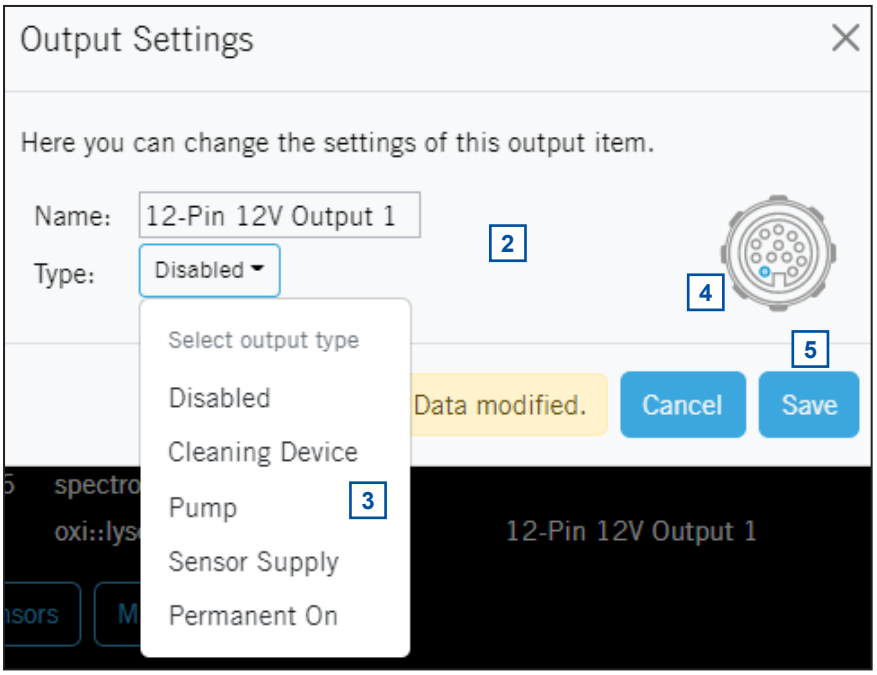
The con::line is equipped with several outputs, which can be configured individually. Four 12 VDC outputs (Out-1 to Out4) are linked to the 12 pin sys-plug. One 12 VDC output is linked to the 6 pin sys-plug . A special 5 VDC output is linked to the 12 pin sys-plug and can be used to operate ATI-sensors connected to the con::line. The outputs are configured ex works as described below:

- Output 1, 2 and 3 (12 pin sys-plug) are *Permanent On*
- Output 4 (12 pin sys-plug) is set to *Cleaning Device*
- Output 5 (6 pin sys-plug) is *Permanent On*
- Output 6 (12 pin sys-plug) is *Disabled*

A change of the output configuration is performed by the following steps in general:

1. Click on the icon located on the left side of the output that has to be configured (e.g. *Out-1*).
2. Now the configuration window pops up and the *Name* and the *Type* of the output can be configured.
3. Change the Type to the needed setting (*Disabled*, *Cleaning Device*, *Pump*, *Sensor Supply* (output is powered at least during warm-ip time and ,easuring duration) or *Permanent On* (output is always powered, even during sleep mode).
4. A scheme of the sys-plug shows the related pins in blue that are used for this output.
5. Push the button *Save* to store the modifications permanently.





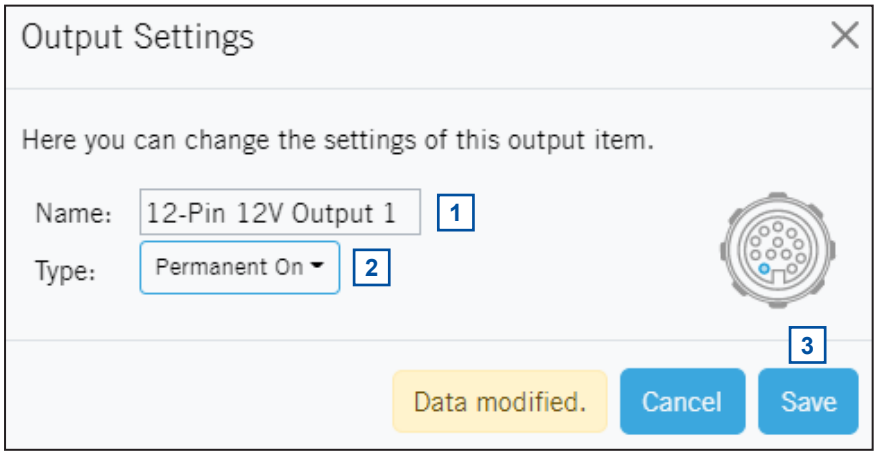
- Output Type: *Permanent On*

If the output is configured to type *Permanent On*, there is DC power supply all the time. Also during sleep mode the output is powered.

1 Enter a *Name* for the used output (e.g. name of the device).

2 Select *Permanent ON* to have power supply all the time for a connected device.

3 Push the button *Save* to store the modifications permanently.



12 VDC						
Idle / Sleep	Cleaning	Mesurement	Idle / Sleep	Measurement	Idle / Sleep	Cleaning

- Output Type: *Cleaning Device*

1 Enter a *Name* for the used output (e.g. cleaning valve).

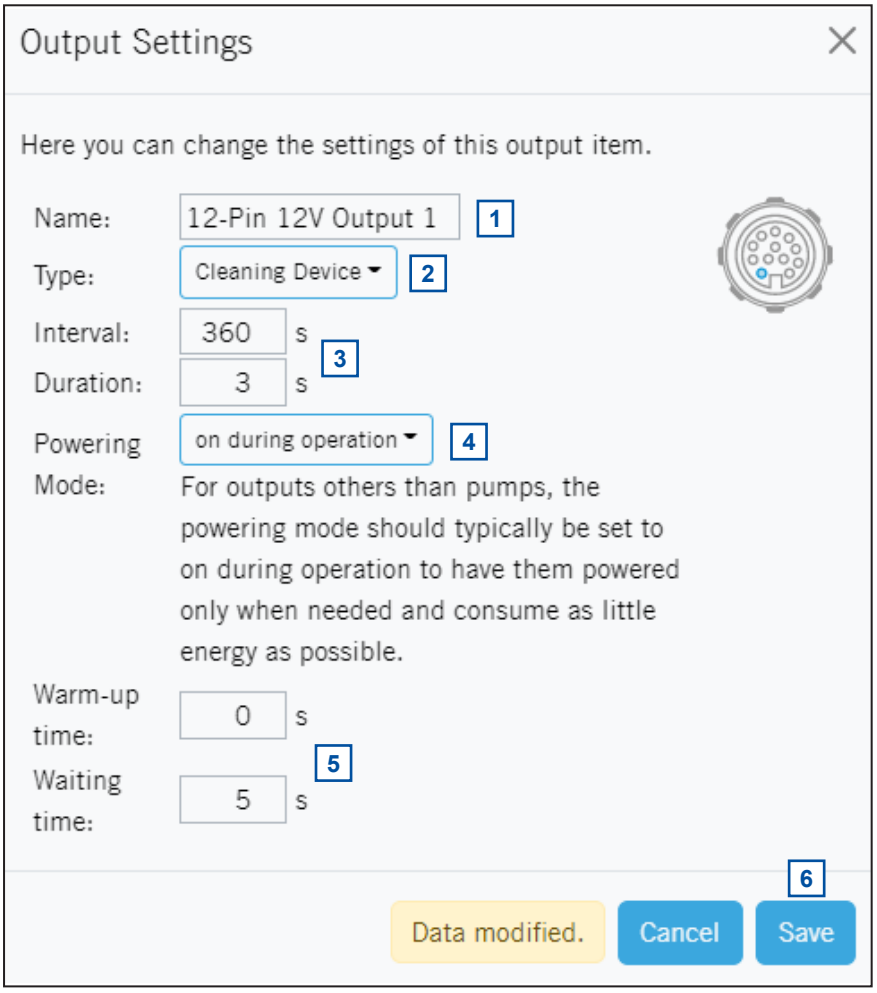
2 Select *Cleaning Device* if this output shall trigger an automatic cleaning device (cleaning signal).

3 Enter the needed *Interval* and the *Duration* for the cleaning signal. The *Duration* is the time in seconds the output is powered on.

4 The *Powering* can be either *on during operation* or *on until end of schedule* or. For cleaning devices the typical settings is *on during operation* to have low energy consumption.

5 A *Warm-up time* is typically not needed for cleaning devices. The *Waiting time* between end of cleaning and strat of meaurement must be set (e.g. to *5*).

6 Push the button *Save* to store the modifications permanently.



	12 VDC				on until end of schedule
	12 VDC				on during operation
Warm-up time	Duration	Waiting time	Measurement	Idle / Sleep	

- Output Type: *Pump*

1 Enter a *Name* for the used output (e.g. pump).

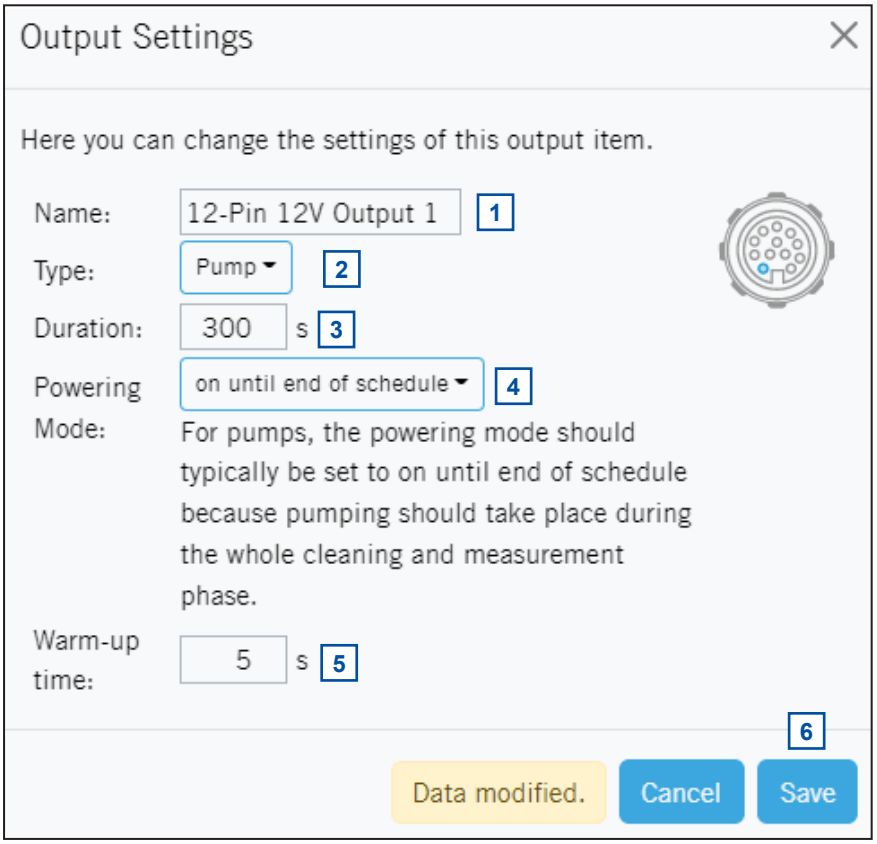
2 Select *Pump* if this output shall trigger an pump for water supply (e.g. nano pump).

3 Enter the needed *Duration* the pump shall be powered on.

4 Set the *Powering* to *on until end of schedule*. This ensures the pump is on until the end of the measuring cycle.

5 A *Warm-up time* can be set in addition (e.g. to *5*).

6 Push the button *Save* to store the modifications permanently.



	12 VDC				on until end of schedule
	12 VDC				on during operation
Warm-up	Duration	Measurement	Idle / Sleep	Warm-up	

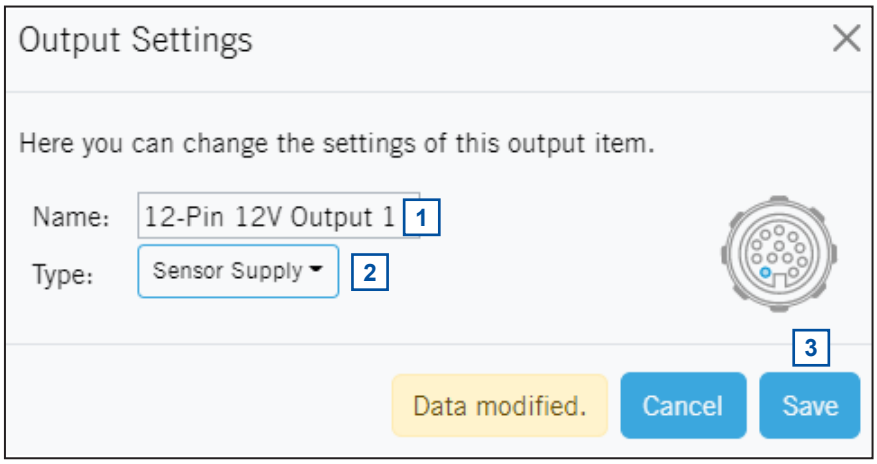
- Output Type: *Sensor supply*

If the output is configured to type *Sensor supply*, there is DC power supply at least during warm-up time and measurement time of the sensor. Please note that the warm-up time can be configured in the sensor configuration. During sleep mode the output is powered off.

1 Enter a *Name* for the used output (e.g. name of the sensor).

2 Select *Sensor Supply* if this output shallprovide permanent power supply for a connected sensor.

3 Push the button *Save* to store the modifications permanently.



12 VDC			12 VDC			12 VDC
Warm-up	Measurement	Idle / Sleep	Warm-up	Measurement	Idle / Sleep	Warm-up

6.3 Measurement and Parameter Settings [*Service \ Measurement Settings*]

A change of the measurement settings and the displayed parameters is performed by the following steps:

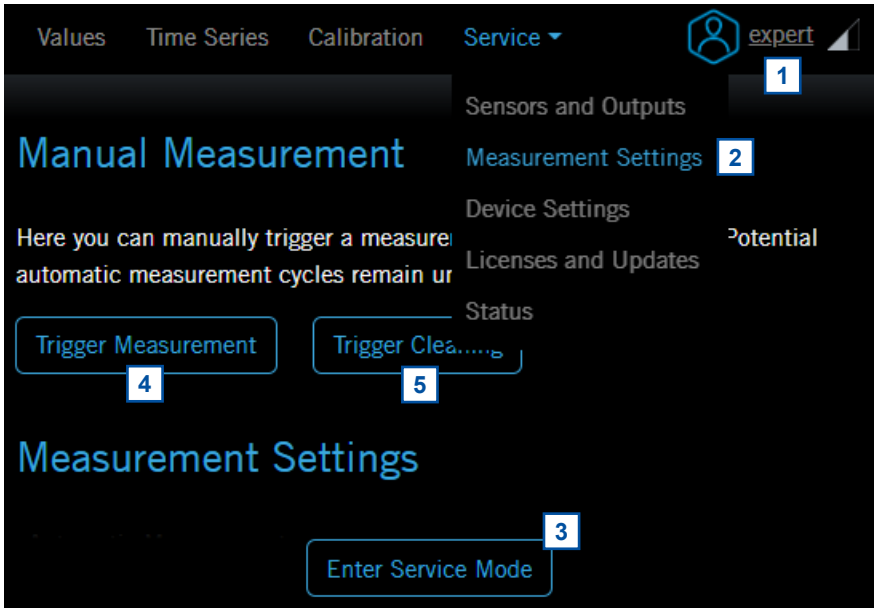
1 Start Io::Tool and logon as *user* or *expert*.

2 Select menu *Service \ Measurement Settings*.

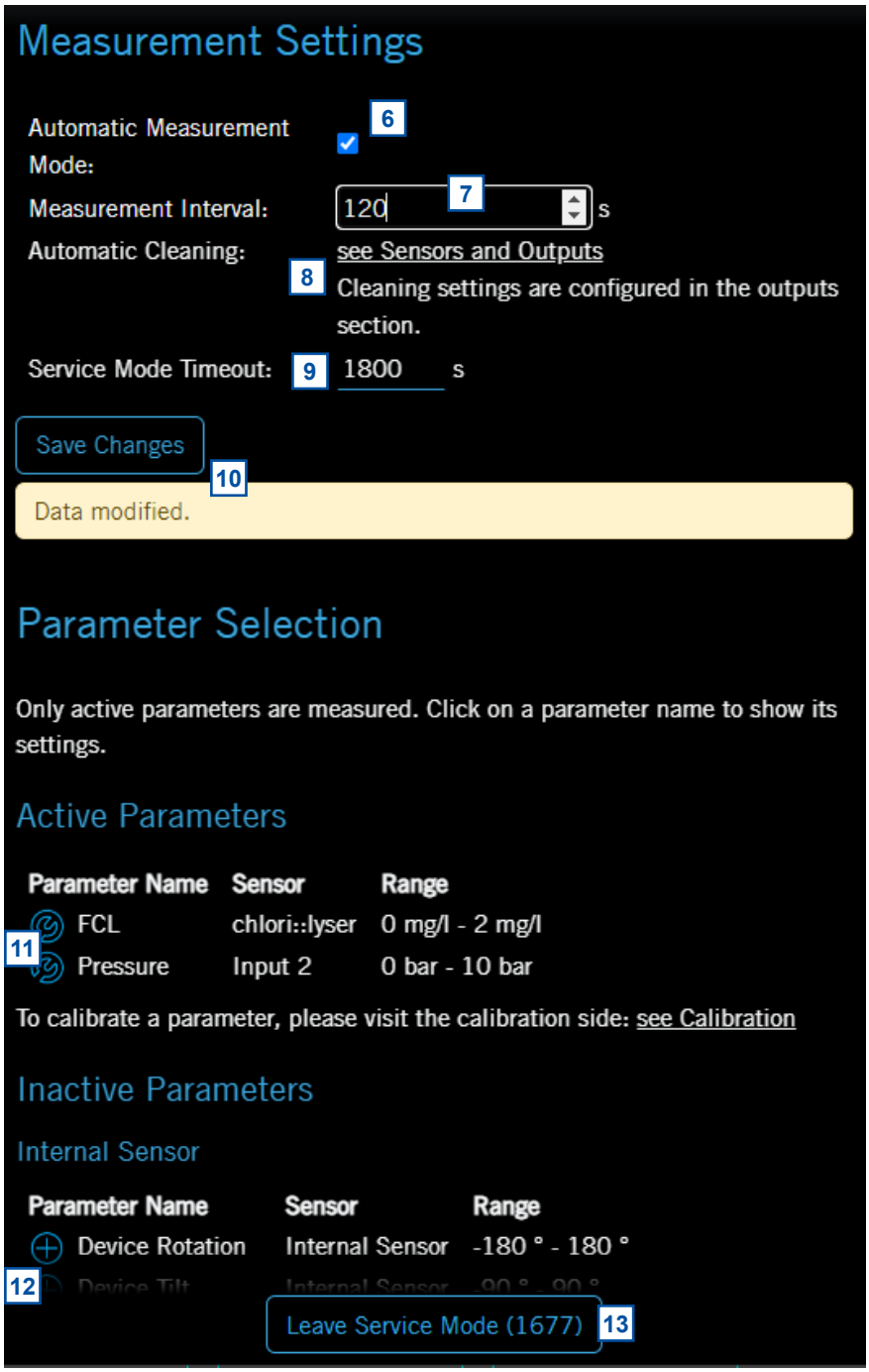
3 Push the button *Enter Service Mode*.

4 Push the button *Trigger Measurement* to execute a single measurement.

5 Push the button *Trigger Cleaning* to execute a single cleaning process according to the actual settings.



Configure the settings for measurement as explained below:



6 *Automatic Measurement Mode*: Tick this check-box to activate automatic measurements.

7 *Measurement Interval*: Can be set between 15 and 86400 sec. (1 measurement per day). In case the measurement process needs more time, single measurements will be skipped.

8 The *Automatic Cleaning* is configued in the output settings. The link will open this menu.

9 The *Service Mode Timeout* defines the time the service mode will be left automatically. Ensure to have your changes saved before the service mode ends. This time can be set between 600 and 86400 sec.

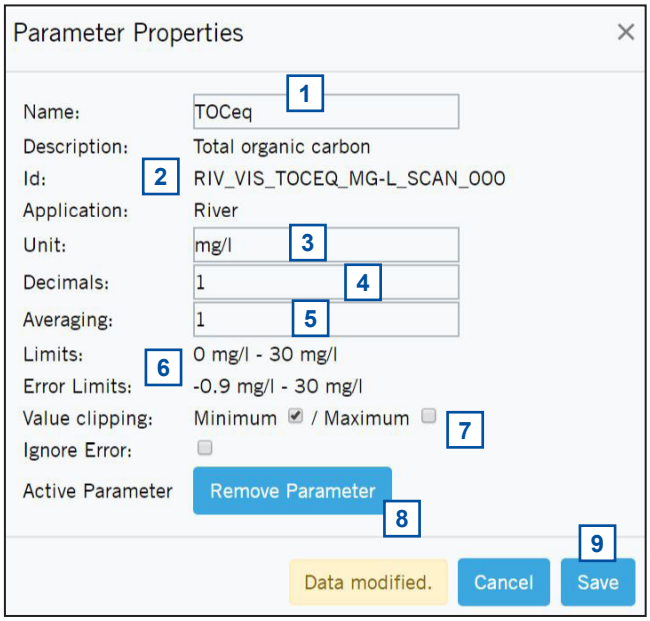
10 As soon as any setting has been changed, the text *Data modified* is visible on the display. Push the button *Save Changes* to store the new settings permanently.

11 Below the entry *Active Parameters* all parameters are listed which are measured and displayed. Pushing on the blue icon on the left side of the parameter name will display further parameter details (see next page).

12 Below the entry *Inactive Parameters* all parameters are listed which can be measured but are not used. Pushing on the blue plus icon on the left side of the parameter name will move the parameter to the active parameters.

13 Push the button *Leave Service Mode* to stop the Service Mode and to start the normal measuring process again.

Configure the settings for a single parameter as explained below:



1 *Name* displays the used parameter name. This can be changed if needed.

2 *Description* is the exact description of the parameter. *Id* and *Application* are the identification of the calculation algorithm (Global Calibration).

3 *Unit* displays the used parameter unit. This can be changed if necessary.

4 *Decimals* is the number of displayed decimal places of the parameter. This can be changed if necessary.

5 *Averaging* displays the number of used readings to calculate the average. The number 1 (factory setting) deactivates the averaging.

6 *Limits* displays the defined measuring range for the used parameter. *Error Limits* displays the range outside of that an error message for this parameter will be displayed.

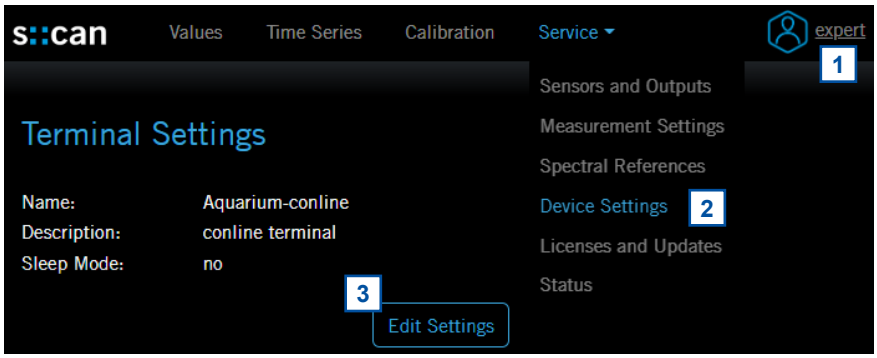
7 The following check boxes define if the reading display will be limited to the measuring range (*Value clipping*) and if the exceed of the measuring range will cause an error or not (*Ignore Error*).

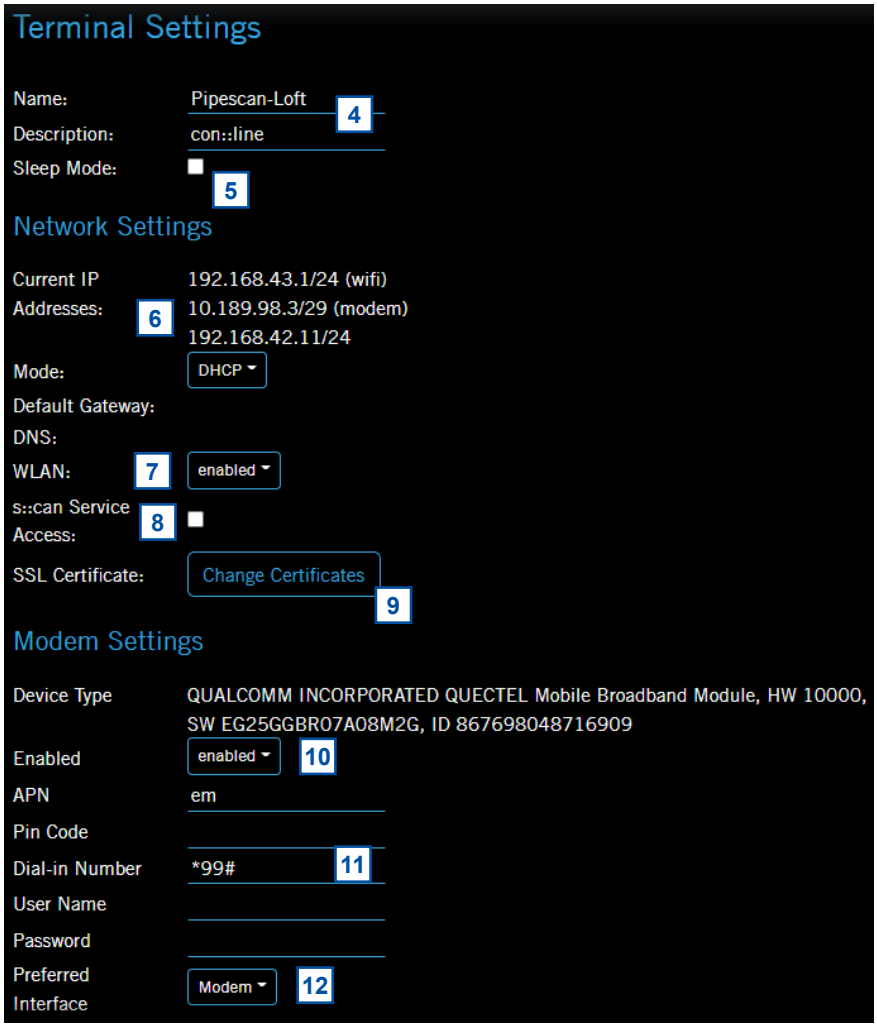
8 Pushing the button *Remove Parameter* will not display readings of this parameter anymore and move the parameter to the inactive parameters.

9 Any changes made must be confirmed by pushing the button *Save*.

6.4 Device Configuration [*Service \ Device Settings*]

A change of the con::line configuration is performed by the following steps:





1. Start Io::Tool and logon as *user* or *expert*.
2. Select menu *Service \ Device Settings*.
3. Push the button *Edit Settings*.
4. The display *Name* of the con::line can be enteredhere. The Description below is fixed.
5. Tick the check box if *Sleep Mode* shall be activated. con::line will go to sleep automatically after the measurement. The device will wake up again before measurement starts depending on the output settings (see section 6.2.3).
6. Depending on the selected *Mode*, which can be *DHCP* or *statc*, the current IP addresses are displayed. When selecting *Mode* static a *Static IP Address*, *Netmask*, *Default Gateway* and *DNS* can be enetered.
7. The *WLAN* is activated *at startup only* per default. The configuration can be changed to *enabled* (WLAN active all the time) or WLAN can be swiched off (*disabled*).
8. Tick the check box *s::can Service Access*, if VPN connection for service activities is needed.
9. Push the button *Change Certificates* to generate a new or upload an existing SSL certificate.
10. Push the selection button to change the modem configuration. The modem can be *disabled*, *enabled* or set to active *during server upload only*.
11. In these entry fields the *APN*, the *Pin Code*, the *Dial-in Number*, an optional *User Name* and a *Password* can be set.
12. Push this button to select the preferred interface for data upload. It can be either via *Modem* or via *Ethernet*.

13 Active *File Transfers* will be dsiplayed here. Push the blue icon on the left side to check or modify the configuration.

14 Push the button *Add new file Upload* to configure a new data transfer. See section 7.2.2 for further details.

15 Change this selection button to *Modbus*, if the M12 plug shall be used for data upload from the conline to a SCADA system.

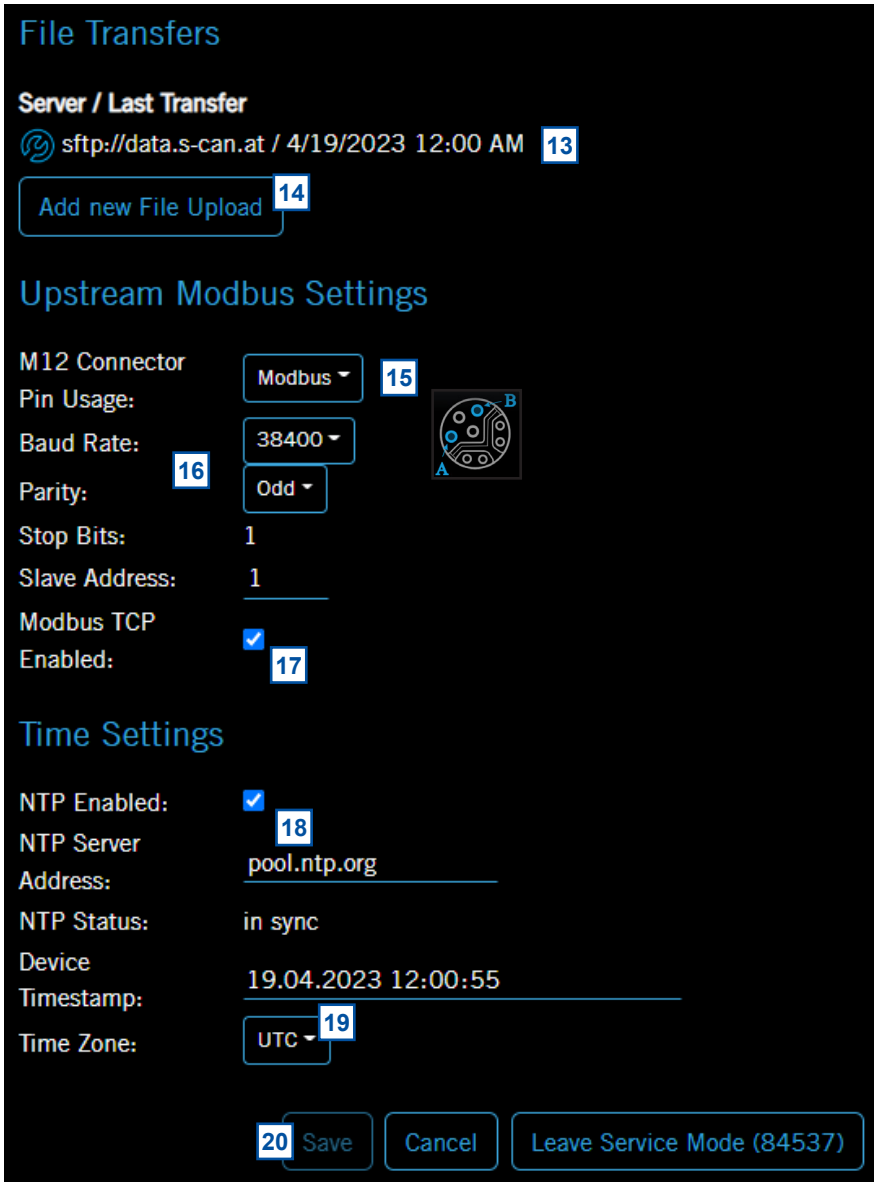
16 The *Baud rate*, the *Parity*, the number of *Stop Bits* as well as the used *Slave Address* can be enetered here.

17 Tick the check box, if *Modbus TCP* shall be used. Otherwise Modbus RTU will be active.

18 Tick this check box, if a NTP time server shall beused. The *Address* can be enetered below.

19 Push the button to select the local time zone.

20 Any changes made must be confirmed by pushing the button *Save*.



6.5 Device Licenses and Updates [*Service \ Licenses \ Updates*]

Within this submenu all installed licenses are displayed. Additional licenses or software updates can be uploaded. Also a reset of the conline can be performed.

1 Start Io::Tool and logon as *user* or *expert*.

2 Select menu *Service \ Licenses and Updates*.

3 Below the header line *Licenses* all installed licenses with the expire date are displayed.

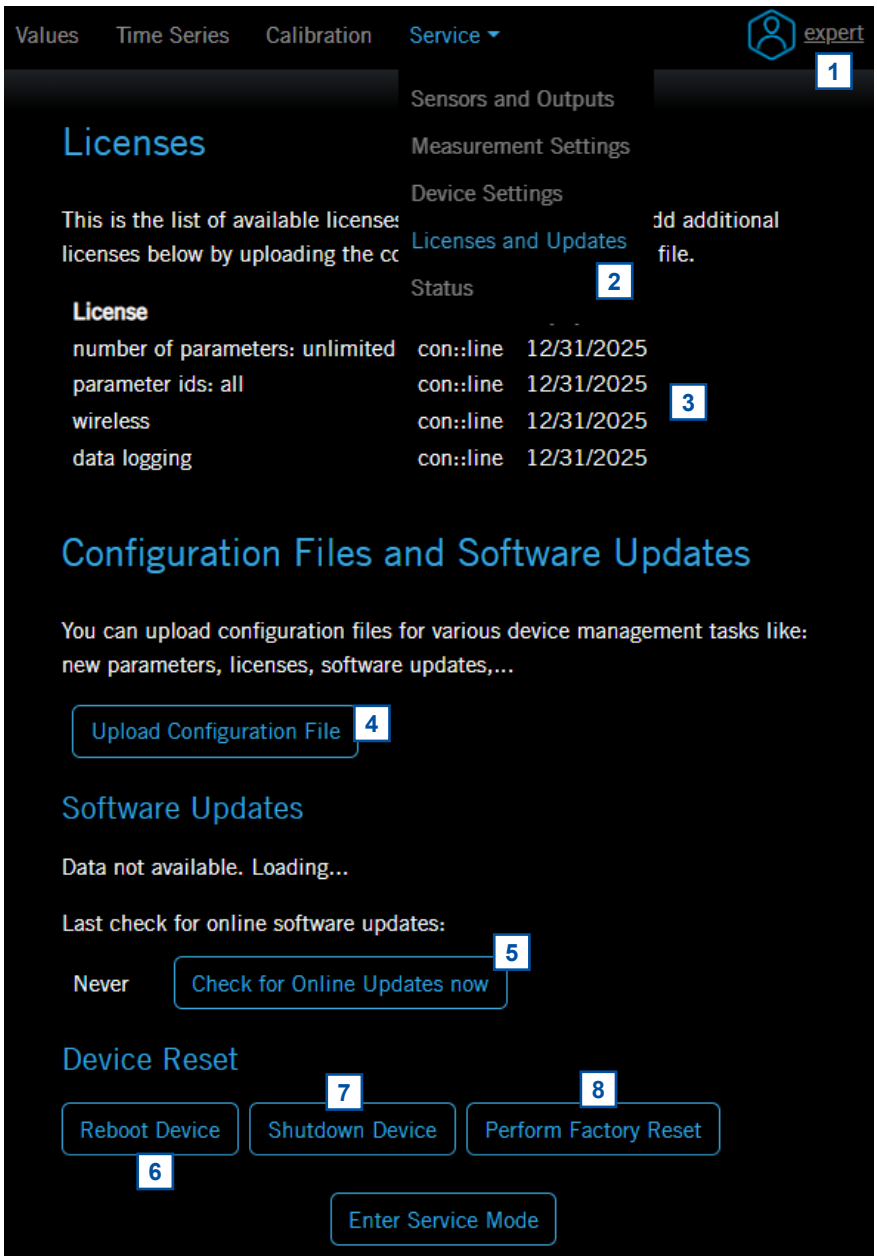
4 A new license file or a software update file can be uploaded from a connected mobile device. Push the button *Upload Configuration File* to select the file on the mobile device.

5 Push the button *Check for Online Updates now* to search for actual updates..

6 Push the button *Reboot Device* to restart the con::line.

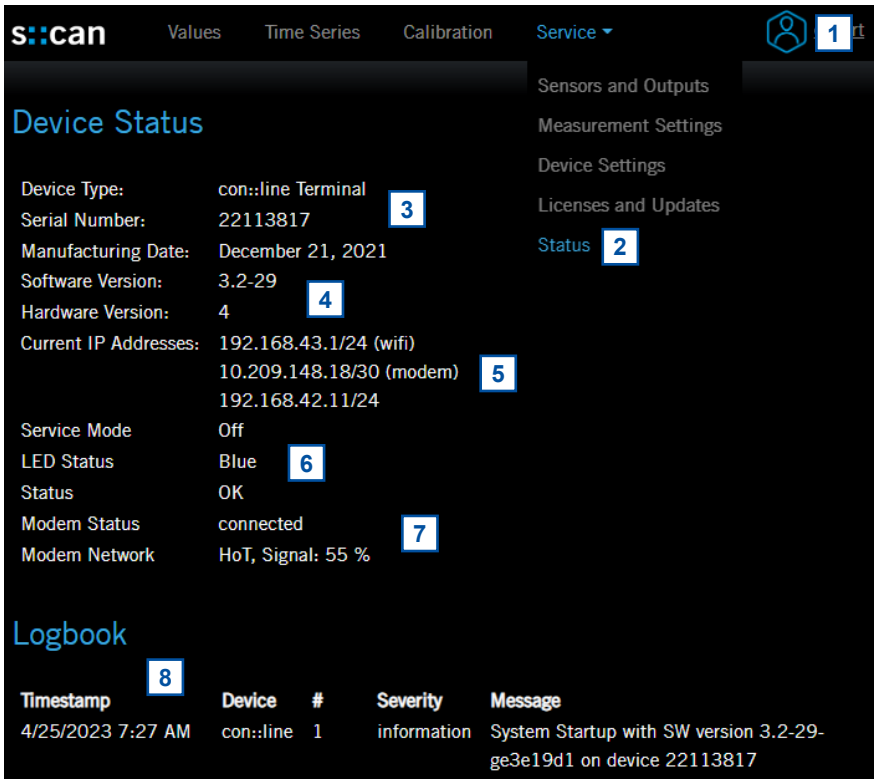
7 Push the button *Shutdown Device* to shut down the con::line. Please note that an interruption of the power supply is needed to power up the con::line again.

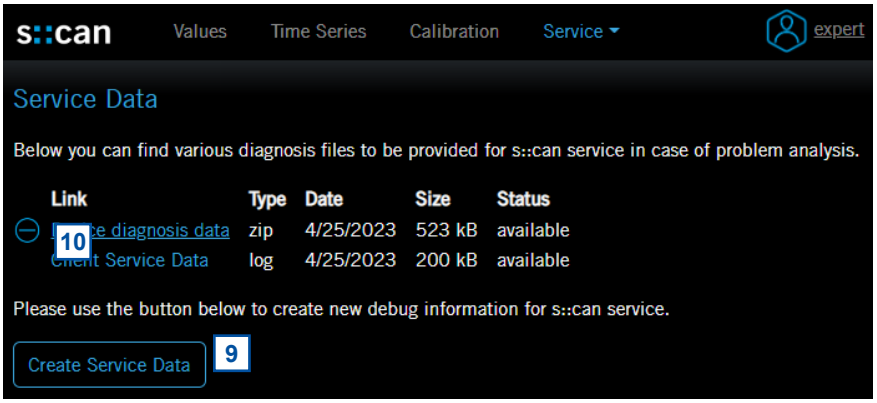
8 When pushing the button *Perform Factory Reset* the con::line will be reset to the state at delivery. All customer specific settings and configurations are lost.



6.6 Device Status [*Service \ Status*]

Within this submenu the actual device status of the con::line is displayed. In addition the most actual logbook entries are visible. Finally all error and status messages as well as additional information for s::can support can be downloaded from the con::line directly via Io::Tool.





1 Start Io::Tool and logon as *user* or *expert*.

2 Select menu *Service \ Status*.

3 On top of the device status information the type (*Device Type*) and the serial number (*Serial Number*) are displayed.

4 Below the *Manufacturing Date* of the device and the actual used *Software Version* and *Hardware Version* are displayed.

5 Within the group *Current IP Addresses* the WIFI. modem and LAN fall back address are displayed.

6 Below the IP addresses the Status of the *Service Mode*, the color of the LED (*LED Status*) and the general device *Status* are displayed.

7 The status of the modem (*Modem Status*) and the used network as well as the signal strength (*Modem Network*) are displayed.

8 The *Logbook* shows all information, status and error messages of the different devices.

9 The complete logbook as well as additional information for s::can support can be downloaded from the con::line directly via Io::Tool. After pushing the button *Create Service Data* a zip file and a log file will be created and displayed.

10 These files (*Device Diagnosis Data.zip* and *Client Servicedata.log*) can be downloaded by clicking on the file name. Old service data files can be deleted by clicking on the blue icon on the left side of the file name.

7 Function Check

A function check might be required for one of the following reasons:

- Initial startup
- Routine functional check
- Suspicion of monitoring system malfunction
- Modification of monitoring system (e.g. integration of additional sensor or device)
- Change of measuring location

Depending on the application (water composition), the probes and sensors connected and the environmental conditions a regular function check (weekly to monthly) is recommended. The following sections provide an overview of all the actions that have to be performed to check the monitoring system quickly (see section 7.1). To check the plausibility of the displayed and collected readings and the integrity of a single probe or sensor, please refer to the according manuals of the connected probes and sensors.

7.1 Check System / Monitoring Station

What to check	How to check	What to do, if check failed
Power supply	LED of con::line are on or blinking	Check power supply Dis- and reconnect power supply
System running (up-to-date)	Check system clock at the bottom of the Io::Tool screen if current time and time of last measurement is current.	Check time and measurement settings. Please remind that polling of readings needs several seconds. Check UTC zone.
Automatic measurement active	Readings are actualized? Service mode not active?	Check measuring settings Leave Service mode
System status	LED of con::line are blue?	See manual for further details.
Installation	Housing, cable connections and plugs are undamaged and tight?	Repair or replace damaged parts, that might influence the IP 67 protection (see section 4.1)
Function of automatic cleaning	Wait for next cleaning cycle or activate cleaning manually. Watch for air bubbles or listen if brush is rotating.	Check configuration, electrical connection, air tubes and cleaning device itself.
Efficiency of automatic cleaning	Perform functional check of the probes and sensors connected to the automatic cleaning.	Improve automatic cleaning settings. Replace cleaning brush
Datatransfer	Compare the readings displayed on the s::can terminal for operation with those readings received by the used SCADA system.	Check data transfer settings. Use test function to check data transfer.

8 Maintenance

8.1 Cleaning

The device housing is made of polycarbonate. Only use a wet cloth tissue and drinking water and / or mild detergents (e.g. dish washing soap) for cleaning.

8.2 Housing

To ensure IP 67 grade protection, gaskets and case edges have to be checked for cleanliness, possible damage and dirt or foreign bodies before closing the housing cover every time. In case of damage to the cord gasket in the housing cover it has to be repaired!

The cover must be tightly screwed (tightening torque 2.5 Nm). All sockets not in use (e.g. M12) must be covered with corresponding caps. Damage caused by intrusion of water will not be covered by the warranty.

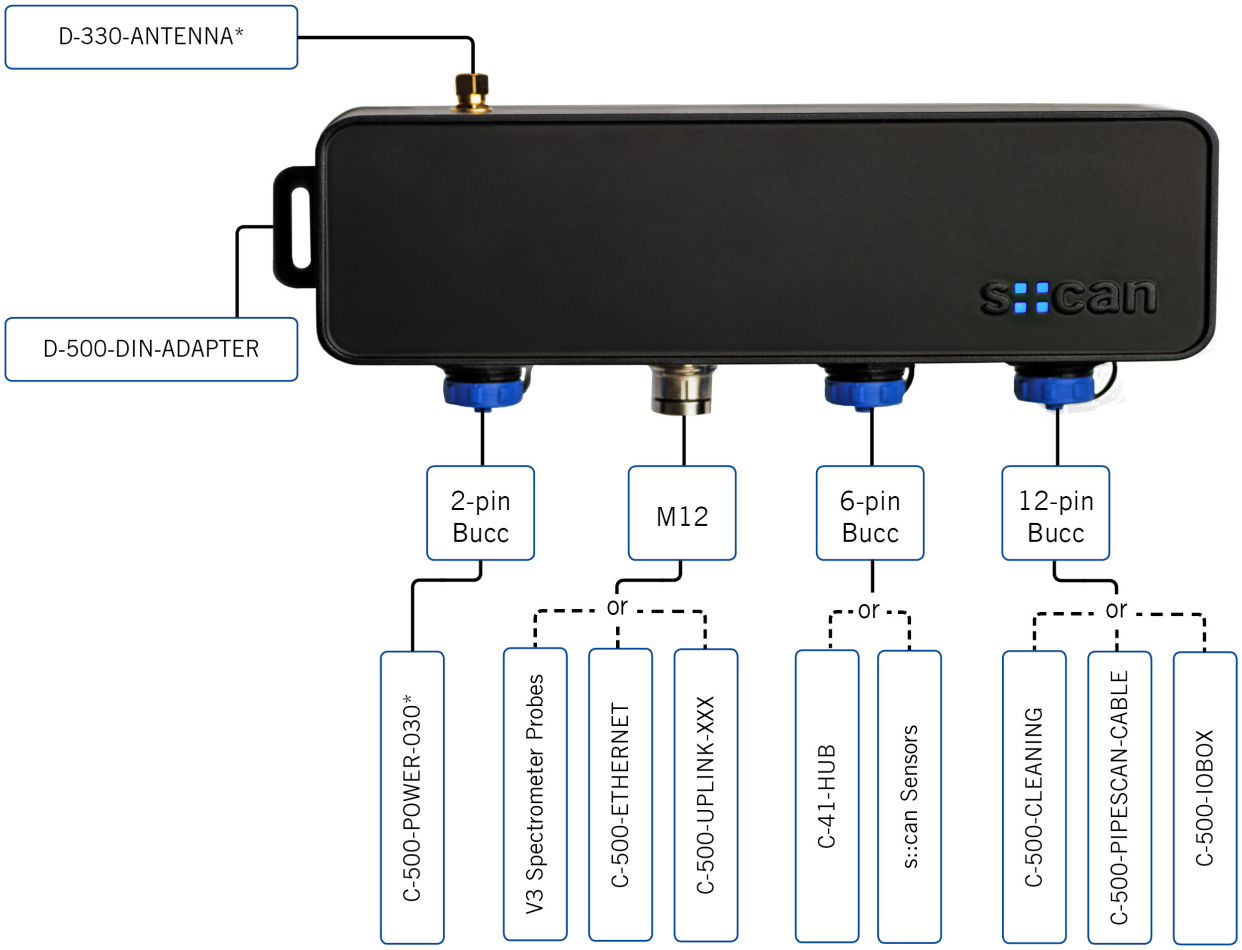
9 Troubleshooting

9.1 Return Consignment (RMA - Return Material Authorization)

Return consignments of the s::can monitoring system, or parts of the system, shall be done in a packaging that protects the device (original packaging or protective covering if possible). Before returning a consignment, you have to contact your s::can sales partner or s::can customer support (support@s-can.at). A RMA number will be assigned for each device, independent if the reason of the return consignment is service, repair or demo equipment.

RMA numbers can be requested from the s::can Customer Portal available on the s::can website directly. Return consignments without an RMA number will not be accepted. The customer always has to bear the costs for return consignment.

10 Accessories



* Included in the scope of delivery

10.1 Power Supply Cable (C-500-POWER-030)

For the connection of the power supply to the con::line a seperate power supply cable is available.

Name	Specification	Remark
Part-no.	C-500-POWER-030	
Cable lenght	3 m	
Cable type	PUR (polyurethane jacket), 6.3 mm (outside diameter), -30 to 80 °C (-22 to 176 °F)	
Cable assignment	PIN 1: GND PIN 2: 10 - 18 VDC	black wire red wire
Environment rating (IP)	IP 67	
Device connection	sys-plug with 2 pins 2 wires	to con::line to external power supply

10.2 Network Adapter (C-500-ETHERNET)

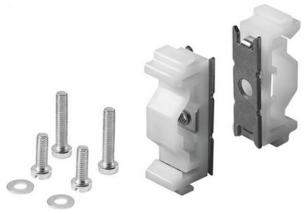
For the connection of the con::line to a local network via RJ45 cable a seperate network adapter is available.

Name	Specification	Remark
Part-no.	C-500-ETHERNET	
Cable lenght	approx. 0.25 m	
Cable type	PUR (polyurethane jacket)	
Assembling	ex works	
Environment rating (IP)	IP 67	
Device connection	M12 plug RJ45	to con::line to external LAN

10.3 Mounting Clips (D-500-ADAPTER)

For fixing of the con::line onto a DIN-rail (35 mm top-hat rail) a seperate mounting adapter is available.

Name	Specification	Remark
Part-no.	D-500-DIN-ADAPTER	
Mounting	on DIN-rail	screws included in delivery



10.4 Connection Cable pipe::scan (C-500-PIPESCAN-CABLE)

For direct connection of the pipe::scan hub to the con::line a specific connection cable is available.

Name	Specification	Remark
Part-no.	C-500-PIPESCAN-CABLE	
Cable lenght	10 m	
Cable type	PUR (polyurethane jacket)	
Assembling	ex works	
Environment rating (IP)	IP 67	
Device connection	sys-plug with 12 pins M12	to con::line to hub of pipe::scan

10.5 Automatic Cleaning Adapter (C-500-CLEANING)

For the direct connection of an automatic cleaning device (autobrush, ruck::sack or cleaning valve) to the con::line a specitic cable is available.

Name	Specification	Remark
Part-no.	C-500-CLEANING	
Cable lenght	0.5 m	
Cable type	PUR (polyurethane jacket), 6.3 mm (outside diameter), -30 to 80 °C (-22 to 176 °F)	
Cable assignment	+ 12V (red) - GND (black) M+ TRIGGER 	
Configuration	12V via *12-Pin 12V Output 3* TRIGGER via *12-Pin 12V Output 4*	
Environment rating (IP)	IP 67 IP 68	sys-plug connection box
Device connection	sys-plug with 12 pins cable terminals	to con::line to cleaning device

10.6 Cable connection Box (C-500-IO-BOX)

For individual configuration of the sys-plug with 12 pins on the con::line a seperate wiring box is available.

Name	Specification	Remark
Part-no.	C-500-IO-BOX	
Cable length	0.5 m	
Cable assignment	1 [Bip-In+] Input 2 [Bip-In-] Input 3 [Unip-In+] Input 4 [Out 5V] 5 VDC 5 [Out1] 12 VDC 6 [Out2] 12 VDC 7 [Out3] 12 VDC 8 [Out4] 12 VDC 9 [B485(-)] RS485 10 [A485(+)] RS485 11 [GND] Ground	
Environment rating (IP)	IP 67	
Device connection	sys-plug with 12 pins cable terminals	to con::line to external (e.g. sensor, pipe::scan)

10.7 Modbus RTU Adapter (C-500-UPLINK-XXX)

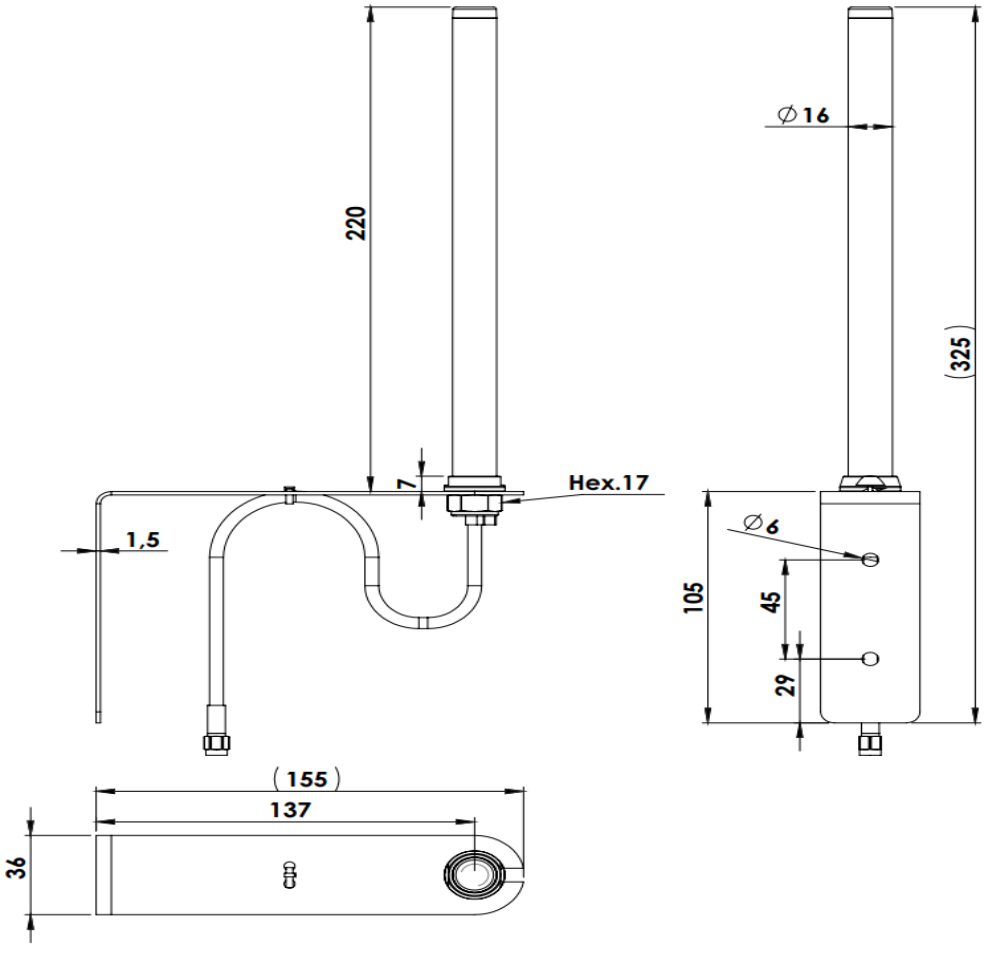
For data transfer via Modbus RTU to an external SCADA system a specific connection cable is available.

Name	Specification	Remark
Part-no.	C-500-UPLINK-010 C-500-UPLINK-075	
Cable lenght	1 m 7.5 m	C-500-UPLINK-010 C-500-UPLINK-075
Cable type	PUR (polyurethane jacket)	
Assembling	ex works	
Environment rating (IP)	IP 67	
Device connection	M12 open wires	to con::line to external SCADA

10.8 External Antenna (D-330-ANTENNA)

For a con::cube equipped with internal modem an external antenna is available. To connect this antenna to the con::cube a seperate plug will be mounted.

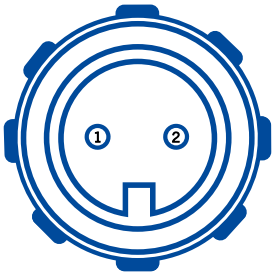
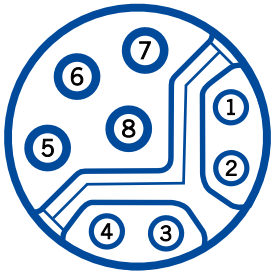
Name	Specification	Remark
Part-no.	D-330-ANTENNA	Antenna for 4G modem
Cable length	3 m	
Cable type	LL 195 Standard CFD200 (4.80 mm)	Antenna Extension cable
Dimension	325 / 36 / 155 mm 220 / 16 mm	W / H / D Length / diameter
Connection	RF-plug	
Frequency range	698 - 960 MHz 1710 - 2170 MHz 2500 - 2700 MHz	2G 3G 4G
Polarization	Linear	
Impedance	50 Ohm	
Environment rating (IP)	IP 67	
Operating temperature	-40 bis 85 °C (-40 bis 185 °F)	
Mounting	Wall mounting	stainless steel bracket



11 Technical Specifications

Name	Specification	Remark
Part-no.	D-500-012	con::line
Dimensions housing	226 / 64 / 60 mm 8.9 / 2.56 / 2.4 inch 226 / 95.5 / 61 mm 8.9 / 3.75 / 2.4 inch	W / H / D (only housing) W / H / D (incl. connectors)
Required space	250 / 200 / 65 mm 9.84 / 7.87 / 2.56 inch	W / H / D
Weight	approx. 0.5 kg (1.1 lbs)	
Material housing	Polyurethane	
Material other	acrylic glass brass	LED window M12 connector
Environment rating (IP)	IP 67	
Operation humidity	5 to 90 %	non condensing
Operation temperature	-20 to 60°C (-4 to 140°F)	
Mounting	wall / panel mounting DIN-rail (35 mm top-hat rail)	with M4 countersunk head screws with D-500-DIN-ADAPTER
Power supply	9 - 18 VDC, <1.5 A via external 2-pin sys-plug	use a certified limited power source (LPS) according EN 62368-1 with max. 40 W.
Power consumption	1.5 W typical 18 W max 50 mW during sleep mode	without sensors with full sensor load without sensors
Power supply cable	2 pin sys-plug connector	C-500-POWER-030
Interface to s::can sensors	1 x 6 pin sys-plug RS485 1 x 12 pin sys-plug RS485	to sensor or hub to pipe::scan hub
Interface to third party sensors	2 x multi-purpose inputs current or voltage or pulse counting	
Interface to SCADA / PC	SFTP server upload, Modbus RTU and TCP through M12 connector	
Interface to operator	WLAN, 4G Modem	Io::Tool software
Operating software	Io::Tool S-500-04-IO S-500-08-IO S-500-24-IO	Web based s::can firmware 4 parameter license (default) 8 parameter license 24 parameter license
Functional display	4 x RGB LED	Status indication
Remote configuration	config file pull from server	
Network connection	4G LTE Modem, Cat 4 GSM, DCS, WCDMA, LTE, GNSS	built-in
SIM card format	full-size (1FF) 85.6 x 53.98 mm	
Antenna internal	Cellular, GNSS, WLAN	built-in
Antenna external	CELLULAR. 2J2124B-B05H	see section 10.8
Antenna connector	SMA (f) plug	to D-300-ANTENNA-PRO
WLAN	2.4 GHz Frequency 20 MHz Bandwith	

Name	Specification	Remark
Modem Frequency bands	850, 900, 1800, 1900 MHz Band I, II, IV, V, VIII Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 25, 26, 28 Band 38, 39, 40, 41	GMS UMTS FDD E-UTRA-FDD E-UTRA TDD
Maximum Transmit Power	33 dBm 23 dBm 23 dBm 23 dBm 17.5 dBm	GMS UMTS E-UTRA-FDD E-UTRA TDD WLAN
Analog input	2 x 0 - 20 mA 150 Ohm input resistance 12 bit resolution of reading < 1 ms response time	shared with other inputs via 2 pins of 12 pin sys-plug
Digital input	2 x pulse counter 100 kOhm input resistance 1000 Hz max. input frequency 12 V voltage for open-colector	shared with other inputs via 2 pins of 12 pin sys-plug
Analog input voltage	-10 to +10 V bipolar 0 to +10 V unipolar (internally grounded) 100 kOhm input resistance 12 bit resolution of reading < 1 ms response time	shared with other inputs via 2 pins of 12 pin sys-plug
Supply output	1 x 12 V via 6 pin sys-plug 4 x 12 V via 12 pin sys-plug 1 x 5 V via 12 pin sys-plug max. 1 A / 12 V (single) max. 1 A / 12 V (total)	 shared between sensors, cleaning devices (valve, autobrush, ruck-sack) and other devices (nano-pump) individually switchable,
Onboard memory	8 GB	
Back-up battery RTC	6 years life duration without external power supply	exchange by s::can Service only
Data transfer	4G LTE connection, Ethernet, Modbus RTU, Modbus TCP, REST API	
Data security	TLS 1.3, SSH encryption, hardware encryption of data	
Firmware update	offline via web interface and WLAN online via LTE server connection	
Storage temperature	-20 to 60°C (-4 to 140°F)	
Conformity - ECM	EN 61326-1 EN 301 489-1	Laboratory use Standard for radio equipment
Conformity - safety	EN 62368-1	
Conformity - GSM	EN 301 511	
Conformity - UMTS/LTE	EN 301 908-1	
Conformity - WLAN 2.4GHz	EN 300 328	
Conformity - GNSS	EN 303 413	
Conformity - Multi radio / combined radio	EN 203 367	

Name	Specification	Remark
Conformity - cellular operation	PTCRB	US, Canada
Certified according to	FCC, ISED, UK CA, MIC	US, Canada, UK, Japan
Assignment 2 pin sys-plug	1 ..... 10 - 18 VDC 2 ..... GND	 plug socket view of con::line
Assignment M12 plug	1 ..... Ethernet (green) 2 ..... Ethernet (green / white) 3 ..... Ethernet (orange / white) 4 ..... Ethernet (orange) 5 ..... A + 6 ..... 10 - 18 VDC 7 ..... B - 8 ..... GND	 plug socket view of con::line
Assignment 6 pin sys-plug	1 ..... B - 2 ..... CLEAN 3 ..... GND 4 ..... 12 VDC 5 ..... A + 6 ..... GND	 plug socket view of con::line
Assignment 12 pin sys-plug	1 ..... Input + (bipolar) 2 ..... B - 3 ..... Output 4 (12 V) 4 ..... Output 3 (12 V) 5 ..... Output 2 (12 V) 6 ..... Output 1 (12 V) 7 ..... Output 5 (5 V) 8 ..... Input (uniploar) 9 ..... Input - (bipolar) 10 ... A + 11 ... GND 12 ... GND	 plug socket view of con::line

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