s::can
Intelligent. Optical. Online.

Manual

condu::lyser V2

November 2010 Release

Handbuch

condu::lyser V2

Ausgabe November 2010

www.s-can.at

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 calibration of the device (chapter 6), data management (chapter 7), how to perform a functional check (chapter 8) and maintenance (chapter 9) can be found in this manual. Information regarding troubleshooting (chapter 10), the available accessories (chapter 11) and the technical specifications (chapter 12) complete the document.

Each term in this document that is marked _italic and underlined_, can be found on the display of your controller 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 and all information and figures contained therein are copyrighted. All rights (publishing, reproduction, printing, translation, storage) are reserved by s::can Messtechnik GmbH. Each reproduction or utilisation outside the permitted limits of the copyright law is not allowed without previous written consent from s::can Messtechnik GmbH. The reproduction of product names, registered trade names, designation of goods etc. in this manual does not imply that these names can be used freely by everyone; often these are registered trade marks, even if they are not marked as such.

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.

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 s::can manuals for the controller (con::lyte, con::stat or PC / notebook with con::nect), the operating software (ana::lyte, ana::pro or moni::tool) as well as the connected probes and sensors 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 conditions of business.

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.

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.

2.2   Special Hazard Warning

Because the s::can measuring systems are frequently installed in industrial and communal 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 condu::lyser is a probe designed for the continuous monitoring of the conductivity in water. This value indicates the capability of the medium to transmit electrical current and is expressed in µS/cm. As this value is highly correlated to the temperature in addition the sensor also measures the temperature of the medium and corrects the measured conductivity accordingly. Furthermore the salinity value is available.

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 Messtechnik 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 s::can 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

In general the conductivity is calculated from the result of the electrochemical resistance measured between two electrodes. The condu::lyser is equipped with two volatage electrodes additionally (4 electrodes measuring principle) which are used as potential. This enables a higher accuracy, especially in higher measuring ranges, and less influence of possible contamination. The sensor compensates the result due to actual temperature. The used reference temperature of the factory pre-calibrated cell constant is 25°C.

3.3   Device

The following device variants of the condu::lyser are available. Regarding detailed information of the device please refer to the technical specifications located at the end of this manual:

Type	Specification	Range
E-511-2-000	condu::lyser II (with plug, for flow cell installation)	0 - 500.000 µS/cm
E-511-2-075	condu::lyser II (with sensor cable, completely submersible)	0 - 500.000 µS/cm

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
- Item number (Type)
- Device serial number (S/N)
- Information for power supply
- Acceptable temperature limits
- CE label

s::can
Vienna
AUSTRIA
CE

Type: E-511-2-000
S/N: KWYYXXXX

DC 7...30V
-20...90°C
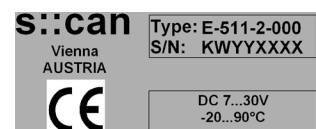
1	Sensor housing
2	Electrode guard (E-511-2-075)
3	Measuring electrode with current and potential electrodes
4	Connection of automatic cleaning (E-511-2-075)
5	Sensor cable (E-511-2-075) Connector (E-511-2-000)

Dimension of the sensor in mm

3.4   Storage and Transport

The temperature limits for device storage and transport, which are described in the section technical specifications, are 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 strong electromagnetic radiation. Transport should be done in the original packaging if possible.

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 of E-511-2-000:

■   s::can condu::lyser (item-no. E-511-2-000)
■   s::can manual condu::lyser

The following parts should be included in the delivery of E-511-2-075:

■   s::can condu::lyser (item-no. E-511-2-075)
■   Electrode guard (item-no. E-501-guard, including electrode guard, metal bracket for mounting of guard, connection fitting for automatic cleaning)
■   s::can manual condu::lyser

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

■   Connection cable (item-no. C-1-010-sensor for condu::lyser E-511-2-000)
■   Extension cable (item-no. C-210-sensor, C-220-sensor or C-230-sensor)
■   Probe carrier (item-no. F-12-sensor for condu::lyser E-511-2-075)
■   Flow cell setup tap water (item-no. F-45-sensor or F-45-four)
■   Connection set for automatic cleaning (item-no. B-41-sensor)
■   System panel for s::can sensors (item-no. F-50-x-eco or F-50-x-pro)

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.
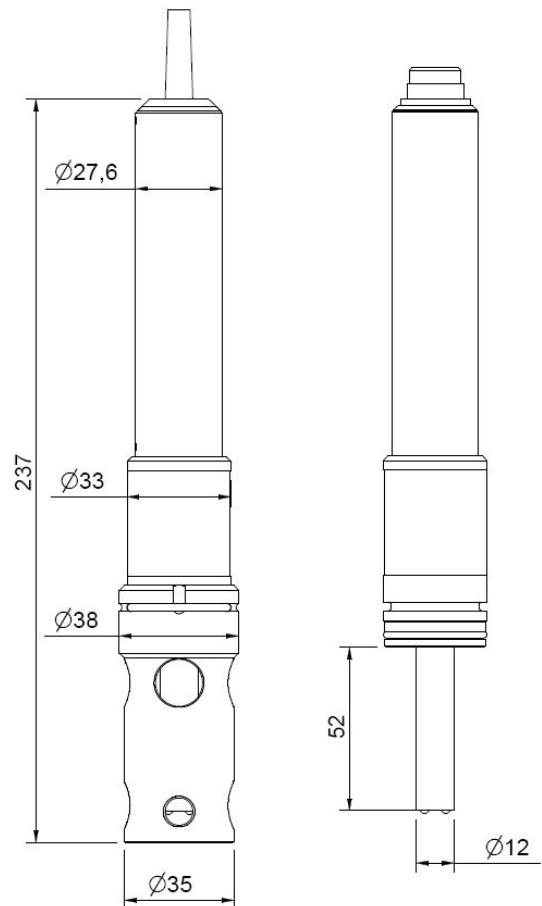
4   Installation

4.1   Environment

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

Installation site:

- Favourable flow conditions (little turbulence, acceptable flow rate, etc.)
- Unadulterated measuring medium, no intrusion of contaminating substances (due to nutrient dosage or flocculants)
- Representative composition of sample with respect to the medium (process, thorough mixing etc.)
- Measuring medium is in equilibrium state, e.g. no gas release, no precipitation etc.
- No external interferences (i.e. no electric and electro-magnetic interferences by leakage current, earth fault of pumps, electric motors, high voltage currents, etc.)
- Easy accessibility (mounting, sampling, functional check, demounting)
- Sufficient availability of space (condu::lyser, installation fitting, controller, etc.)
- Adherence to limit values (see technical specifications located at the end of this manual)

Infrastructure (energy, data and compressed air):

- Power supply for controller (operational reliability, voltage, power)
- Oil- and particle free compressed-air supply
- Best possible weather and splash water proof set-up
- Minimum distances between system components (probe – controller – compressed-air connection – energy supply)
- Best possible layout of cables (non-buckling, working dependability, no damage etc.)

4.2   Mounting

⚠️ Do not forget to remove protective cap from the measuring electrode before operation.

4.2.1   Mounting with Probe Carrier

The submersed installation of a condu::lyser E-511-2-075 using the specific probe carrier (item-no. F-12-sensor) is performed by the following steps:

- Remove retaining clip [2] from the probe carrier [1].
- Put extension pipe OD 50mm [3] - to be provided by the customer - into the probe carrier.
- Drill two holes into the correctly positioned extension pipe. Use the two existing holes for the retaining clip in the probe carrier as guiding help (see black dashed marking in the figure below).
- Snap the retaining clip into both holes. Doing this the probe carrier will be fixed onto the extension pipe.
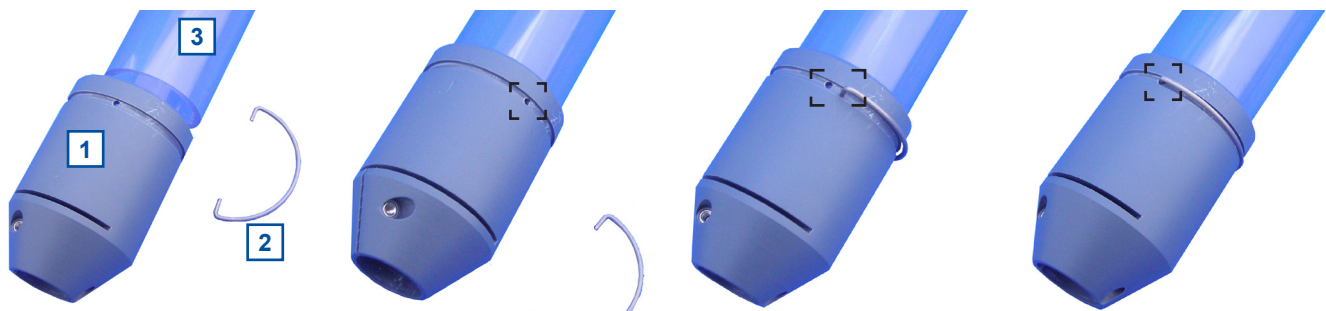
- Properly layout the sensor cable and the air hose for automatic probe cleaning within the probe carrier.
- Push the condu::lyser into the probe carrier as shown in the picture below.
- Tight the screw on the probe carrier using a screw driver until the condu::lyser is firmly fixed.

4.2.2   Mounting in Flow Cell Setup

This section explains how the condu::lyser E-511-2-000 can be installed in a flow cell using either the single sensor flow cell setup (item-no. F-45-sensor) or the four sensor flow cell setup (item-no. F-45-four). Regarding the dimensions of these two installation accessories please refer to section 11.1.4.

The installation of the condu::lyser in a flow cell is performed by the following steps::

- Remove protective cap from electrode.
- Insert condu::lyser [1] in one opening of the flow cell setup [2] and push sensor down carefully until O-ring snaps into the correct sensor position. (see left figure below).
- Push the metal bracket [3] into the two holes on the side of the flow cell setup to secure the sensor in place. The metal bracket can only be inserted if sensor is in the correct position.
- In case of F-45-four ensure that all other openings of the flow cell are covered with plugs [4].
- Connect pipes / tubes for medium supply to the inlet and to the outlet of the flow cell setup (please refer to section 11.1.4 for dimension of fittings).
- To demount the sensor use a flat screw driver [5] to remove the metal bracket first and pull the sensor out.
- To demount a plug [4] from one opening the metal bracket has to be removed also as explained above. Then insert a flat screw driver [5] into the small hole on the side of the flow cell setup and move the plug out by moving the screw driver down (see right figure below). This procedure can also be used to insert or demount any sensor if there is too less space to do this by hand.
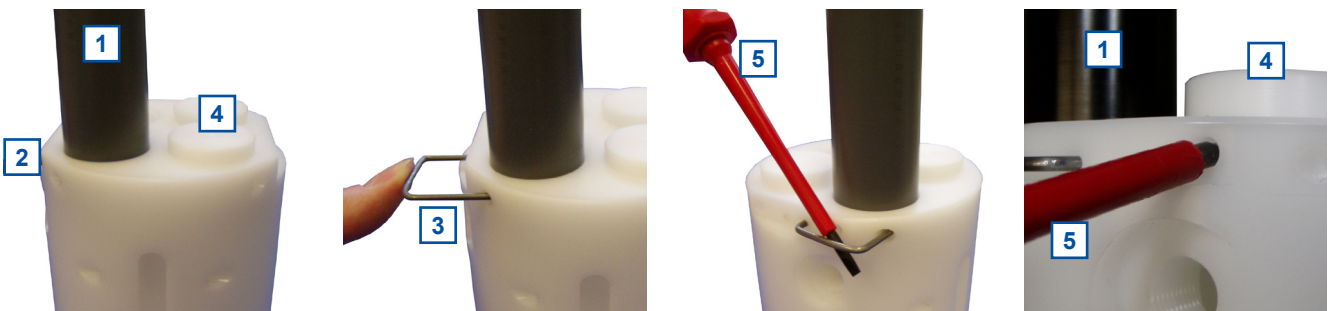
- There are two mounting holders [6] included in delivery of the flow cell setup that can be used to mount the device onto a flat wall.
- Mount the two holders one upon the other.
- Slip the flow cell [2] over the two fixed holders [6].
- Push the metal bracket [3] into the two holes on the side of the flow cell setup (see figure on the right side).
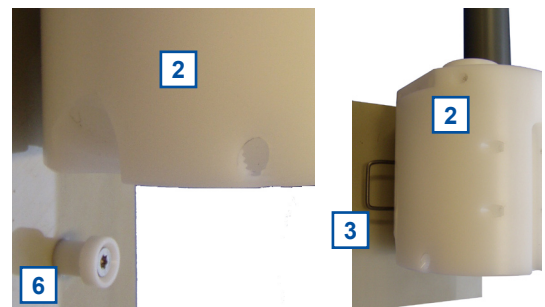
4.3   Connection of Automatic Cleaning Appliance

The compressed air connection set supplied with the system contains components necessary to connect the sensor cleaning located on the lower side of the electrode guard of the condu::lyser to the cleaning valve. The rectangular connection fitting [1] is included in the delivery of the electrode guard. All other parts are included in the delivery of the connection set for automatic cleaning.

The compressed air connection is performed by the following steps (see pictures on the right hand side):

- Screw the connection fitting with O-ring sealing [1] into the thread hole on the lower end of the electrode guard.
- Put the connecting nut [2] and the conical part [3] over the cleaning hose.
- Push the cleaning hose over the connection fitting [1] (warm up with hot water if necessary).
- Fasten connecting nut [2] by hand.
- A compressed air hose (to be provided by customer, ID 8mm to 9mm, UV- / ozone resistant) must be used to connect the adapter fitting of the pressure connection set to the output side of the cleaning valve (marked with *A*). Fasten the air hose with hose clamps.
- Another air hose and DIN 7.2 compressed air coupling are required to hook up the compressed air supply to the input side of the cleaning valve (marked with *P*).

The cleaning valve should never be connected to the compressed air coupling of your compressor directly, i.e. without a pressure hose in between. The total length of hoses should be as short as possible to avoid unnecessary pressure loss. In special occasions, drinking water may be used to operate the hydraulic-pneumatic cleaning appliance instead or compressed air – for more information please contact your local s::can sales partner.

Any foreign matter in the compressed air supply may impair the hydraulic-pneumatic cleaning process. If you have any doubts about the purity of the air used (contamination by particles, oil, etc.), please install an appropriate filter upstream from the solenoid valve.

In areas with extremely low outside air temperature, s::can recommends laying the compressed air hoses such that they remain frost-free to prevent freezing of condensed water in the compressed air hose.

Please note that depending on the s::can probe and sensor type you are using, different maximum allowed pressures may be specified. In case a central pressurised air supply is used in such a case the lowest maximum allowed pressure amongst those specified for the individual instruments is to be used to supply all instruments or the use of pressure reducing valves to supply each instrument with the correct pressure is necessary.
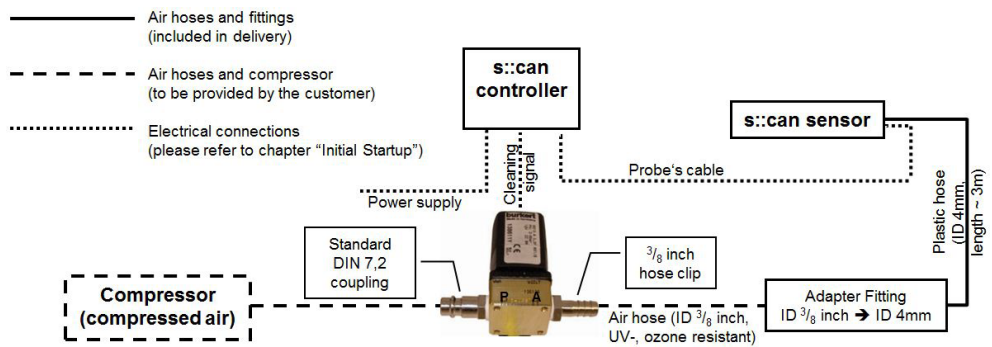
5   Initial Startup

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

- Connect the condu::lyser to the controller used for operation (see section 5.1 and 5.2).
- Connect the cleaning valve to the according terminal connections in the cable terminal compartment of the used controller (please refer to the manual of the controller).
- Connect s::can controller to the power supply (please refer to the manual of the controller) and wait for the software to boot.
- Perform probe initialisation of the condu::lyser. Refer to section 5.3.1 in case of using a con::lyte and refer to section 5.3.2 in case of using moni::tool.
- Perform parameterisation of the condu::lyser. Refer to section 5.4.1 in case of using a con::lyte and refer to section 5.4.2 in case of of using moni::tool.
- Configure the measuring interval and the settings of the automatic cleaning. Refer to the technical specifications regarding cleaning settings. Additional information can be found in the respective manual of the controller.
- Check whether the cleaning system works properly.
- In case required, configure the digital and analogue outputs of the controller.
- Check the readings obtained for plausibility after sufficient running-in time (at least 15 minutes).
- If necessary calibrate the conductivity readings of the condu::lyser in stable water quality (see chapter 6).

5.1   Controller for Operation

For proper operation of the condu::lyser you will need one of the following controller and operating software respectively.

Controller	Type	Software
con::lyte	D-318, D-319	V5.01 or higher
con::stat	D-313, D-314	moni::tool V1.2 or higher
con::cube	D-315	moni::tool V1.2 or higher

⚠ s::can recommends to use the most actual version of the operating software on the controller. This sensor is not supported by ana::lyte / ana::pro.

5.2   Connection to the Controller

The condu::lyser E-511-2-075 will be delivered with a fix mounted sensor cable and a plug that can be connected to a compatible socket provided on the controller. Ensure that the sensor plug and the connector are dry and clean. Otherwise communication errors and / or device damage might occur.

In case of condu::lyser E-511-2-000, that will be delivered with a plug connection on the sensor itself only, the connection cable C-1-010 has to be used to connect the condu::lyser to the controller in the same way as explained above.

Using an older version of controller the condu::lyser can either be connected via an adapter cable (s::can item number C-40) or directly in the terminal compartment of the controller. Regarding definition of cable strands please refer to the technical specifications located at the end of this manual.

5.3   Probe Initialisation

5.3.1   Probe Initialisation using the Controller con::lyte

For operating of one or several probes using the con::lyte it is necessary to allocate an individual address to every probe. This can be done manually (supported by the software) as explained below. The corresponding address will be stored on the respective probe. For s::can probes and sensors, respectively the address can be set between 1 and 9. Be aware the procedures required will depend on the configuration of your s::can monitoring system.

⚠ The con::lyte should not be powered down or switched off during the initialisation process. In case of rebooting of the con::lyte during the initialisation process (e.g. caused by loss of power supply) the complete procedure of sensor initialisation has to be repeated.

- Establish the power supply to the con::lyte and select entry *Settings / Parameterconfig / Install Probes* in the main menu.
- Connect the condu::lyser to the con::lyte (see section 5.2).
- Push the button *Enter*, which starts the automatic search procedure for the connected probe. Once the probe is found, address 1 will be allocated. This procedure can last several seconds (see figures below).
- The successful completion of the initialisation will be displayed over a user message. If this message is displayed the initialisation procedure can be finished by pushing the button *Esc*.

```
Install probe 1
Connect only
probe 1
Continue with ENTER
Stop with ESC
```

```
Install probe 1
Searching for probe
```

```
Install probe 1
Probe search finished
condu::lyser found
Continue with ENTER
Stop with ESC
```

A user message will also be displayed when no probe is detected. In this case please check the following before repeating the procedure for sensor initialisation:

```
Install probe 1
Probe search finished
No probe found
Continue with ENTER
Stop with ESC
```

- Is only one probe connected to the con::lyte?
- Is the probe connected in properly?

5.3.2   Probe Initialisation using moni::tool

- Click the *Service* tab of the moni::tool screen and logon as *Administrator*.

- Click on an empty sensor icon (*Add new Sensor*) to initiate the initialisation process.

- Select the correct *Driver* (*Modbus RTU* for sensors directly connected, *Modbus TCP* for sensors connected over Ethernet and RTU/TCP converter).

- Enter correct *COM-Port* and *Address*. If unknown moni::tool will search all COM-Ports and addresses for the sensor.

- Click the button *Start search*. The moni::tool screen will show the message *Please wait: Search in progress: modbus_rtu://x/y-z*.

- As soon as sensor has been detected moni::tool will show the *Install sensor* screen. This screen lists up all information received from the sensor.

- Enter a name for the sensor (*Sensor name)* which can be any descriptive name you desire or select one of the previous names listed below this entry field.

- Finish the initialisation process by clicking on the button *Save* located in the middle of the screen below the navigation line.

- moni::tool screen will switch to screen *Service / Sensor* and show the message *Sensor has been installed successfully*.
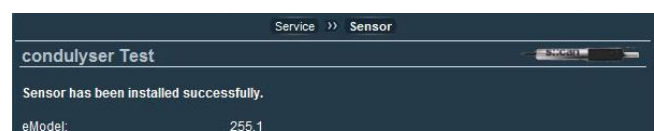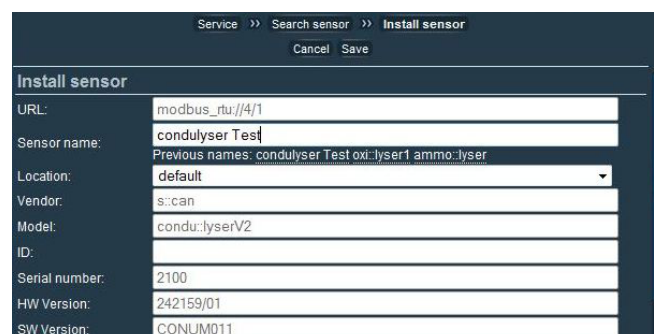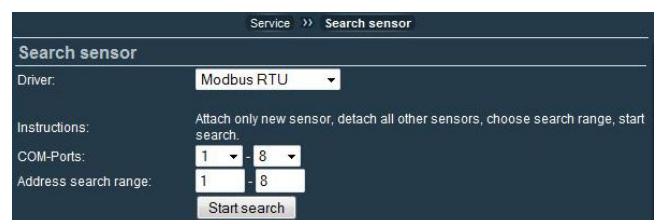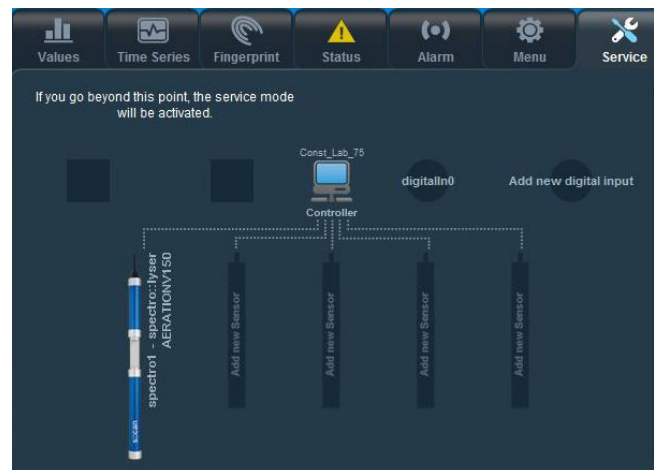
■ Clicking on the main menu of the *Service* tab will show the overview of the monitoring system including the new initialised sensor.

■ Leave the *Service* tab by clicking on the message displayed on the upper left side (*Service mode active, measurements are suspended, all values are frozen. Click here to leave the service mode.*)

5.4   Probe Parameterisation

The following table is an overview of the parameters that can be measured with the condu::lyser:

Parameter	Parameterindex	Name [Unit]	Decimal places (default)
Conductivity	0	Cond [µS/cm] - default	0
		Cond [mS/cm]	2
		Cond [kOhm]	0
		Cond [MOhm]	2
Temperature	1	T [°C] - default	2
		T [K]	2
Salinity	2	Salinity [PSU]	1

5.4.1   Probe Parameterisation using the Controller con::lyte

After successful probe initialisation (see section 5.3.1) the measuring parameters of the condu::lyser will be displayed on the display of the con::lyte automatically. If needed the measuring parameters can be configured individually using the menu item *Settings / Parameterconfig / Parameter n*.

The name of the *Probe* or sensor used as a source of the parameter is displayed in the upper line (e.g. condu::lyser). If several probes or sensors are installed the instrument from which a parameter needs to be displayed can be selected here. Under the entry Probe the *Address* that has been allocated to that probe is displayed as an additional information. The *Index* specifies the place of the corresponding parameter onto the allocated probe. The *Unit* of the selected parameter can be chosen in the line below (see section 5.4). The item *Decimal places* enables settings of the number of displayed decimal places (between *0* and *4*). With the default setting *auto* the number of decimal places will be automatically set by the sensor.

```
Parameter 1
Probe:      condu::lyser
Address:             1
Index:               0
Unit:            µS/cm
Decimal places:  auto
```

5.4.2   Probe Parameterisation using moni::tool

After successful probe initialisation (see section 5.3.2) all parameters available on the probe will be installed and automatically displayed on the _Value_ screen of moni::tool. If you want to configure the measuring parameters induvidually this can be done using the menu item _Menu / Settings / Parameter_.

After selecting that menu item a list of all installed parameters is displayed. After selcting one or several parameters by clicking on them the following activities can be performed:

- Moving the selected parameter to a higher position in the _Value_ display by pushing the entry _Up_.

- Moving the selected parameter to a lower position in the _Value_ display by pushing the entry _Down_.

- Deleting the selected parameter from _Value_ display by pushing the entry _Remove Parameter_.

- A new parameter can be added by pushing the entry _Add Parameter_. After selecting the icon _Install Parameter_ a table of all possible parameters that are available is displayed.
- Click on the blue wheel on the right hand side of the parameter you want to add to the _Value_ display.
- A new screen showing the configuration of the selected parameter will pop up. Confirm this screen by pushing the entry _Save_.
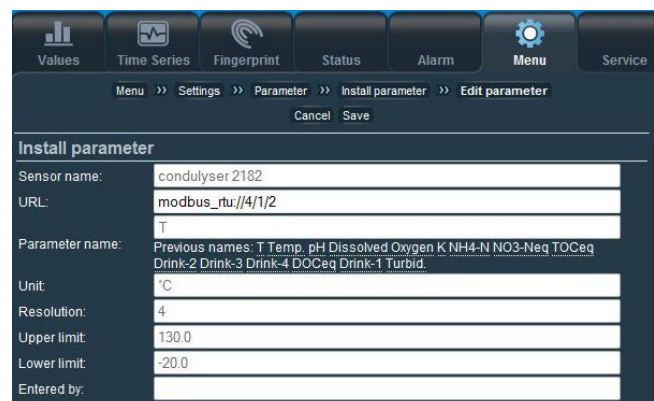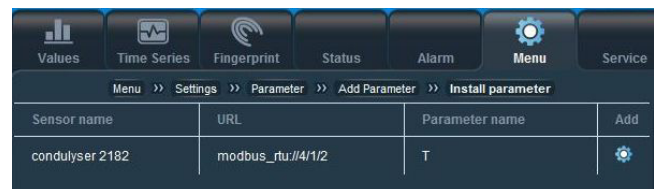
6   Calibration

The condu::lyser is precalibrated in the factory and as such can be used immediately after delivery. However, for the best possible results, s::can recommends to check the calibration when commencing operation in the specified application and subsequently perform a functional check for validity and correctness on a regular basis (please refer to chapter 8).

- Before performing any kind of calibration the correct function of the sensor should be ensured (please refer to section 8).
- Before performing any kind of calibration the sensor has to be adapted to the calibration medium (at least 15 minutes).
- Existing (stored) readings (sample) are overwritten whenever a new sample measurement is triggered.
- The calibration will not be executed and used till the menu item *Calibrate!* is selected.
- When performing a parameter calibration the result will be checked for plausibility. In case of faulty calibration an error message will be displayed to the operator. Please refer to section 10.2 regarding possible error messages and notes for removal.

⚠ When calibration in small beaker ensure that distance between top of electrode and bottom of beaker is > 1cm and diameter of beaker is > 3 cm.

6.1   Types of Calibration

For calibration of the conductivity and salinity parameter a slope calibration (SPAN) can be performed. This local calibration adapts the global calibration (cell constant) to the actual monitored medium. The temperature parameter cannot be calibrated because it is used to monitor the sensor condition.

6.1.1   Slope Calibration

- The condu::lyser is equipped with a global calibration (cell constant) ex factory. You can switch back to this factory setting at any time.
- The local calibration shall either be performed directly in the medium or in a calibration standard.
- When using a calibration standard the conductivity value of the used standard shall be closed to the measuring range of the application.
- For slope calibration only one sample is needed. This sample will be stored onto the sensor.
- The corresponding value (laboratory result) entered for local calibration has to be adapted to 25°C.
- The result of the slope calibration will be stored directly onto the sensor and will be used until a new slope calibration is performed successfully or you switch back to the default slope.
- The slope calibration will be acepted if the global calibration is changed not more than 70% of the original value.

6.2   Performing a Calibration

6.2.1   Calibration using the Controller con::lyte

The *Calibration* entry in the con::lyte main menu leads you into the menu that enables the calibration of the condu::lyser. When *Calibration* is selected a password must be entered (password = 1) before the calibration can be started. The next step is selection of the parameter to be calibrated (e.g. Cond) in the selection field *Param Calibration*.

Param Calibration	
Local cal.:	Cond
Local cal.:	Temp.

Now the menu for local calibration will appear as displayed on the right hand side.

As long as condu::lyser is working with factory calibration (default) the entry *Calib.* shows *global* and no *Type* can be selected.

Local cal.:	Cond
Calib.:	global
Type:	None
Calibrate!	

To perform a local calibration the entry *Calib.* has to be changed to *local*. Then below the entry *Type* will show *Span* as possible type of calibration.

The display shows the reading for conductivity actually measured (*Act.Value*) as well as the actual temperature of the medium (*Temperature*). On the entry *Lab* the results corresponding to the readings stored under *Sample* can be entered here.

When the entry *Calibrate!* is confirmed by pushing *Enter*, a calibration is performed. Successful calibration is shown in a user message (*o.k.*). If the calibration was not successful (user message Error) the calibration used up to now will be used further on.

When selecting the parameter *Temp.* for local calibration a user message as displayed on the right hand side will inform you that this paramter cannot be calibrated locally.

```
Local cal.:    Cond
Calib.:        local
Type:          Span
Act.Value:     1300
Temperature:   23.29
Sample:        1413
Lab:           ------
Calibrate!
```

```
Local cal.  Temp.
Calibration with
parameter
not supported.
Leave with ENTER
```

6.2.2   Calibration using moni::tool

- Click the *Service* tab of the moni::tool screen and logon as *Administrator*.

- Click the icon of the condu::lyser you want to calibrate in the shown systemoverview.

- Click the icon *Calibrate sensor* in the next screen.

- Now the screen will show the selected condu::lyser. Select the parameter conductivity (*Cond*) in the selection field *Parameters* and push the button *Start calibration* to open the calibration screen.

- Check if selction field *Calibration:* is set to *Local* for performing local calibration and selection field *Calibration type:* is set to *Span*.

- Watch the current readings for conductivity being displayed numerically and graphically on the upper right hand side od the calibration screen. Wait until readings are stable.

- Push the button *Sample* as soon as conductivity readings are stable. The sample value actually being stored onto the sensor is displayed on the left hand side of the *Sample* button.

- Enter the real value of the sample (e.g. the conductivity value of the standard solution) into the field located on the right side of the *Sample* button and confirm it by pushing the button *Save*. Please ensure that this value has to be the corresponding value for medium temperature of 25°C.

- Push the button *Perform calibration* to execute the local calibration and watch the displayed readings.

- Push the button *Exit calibration* to close the calibration screen.
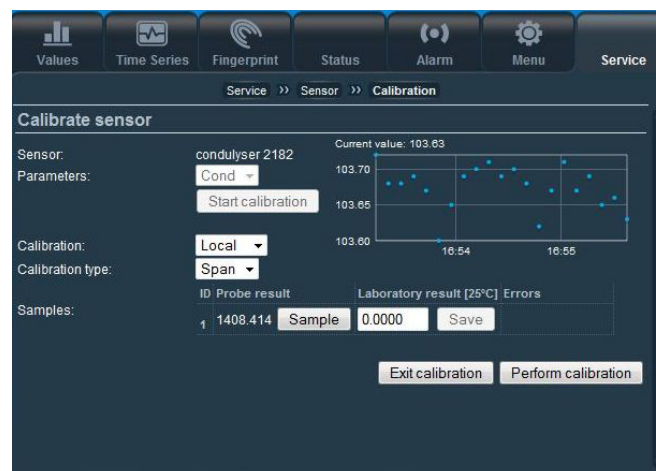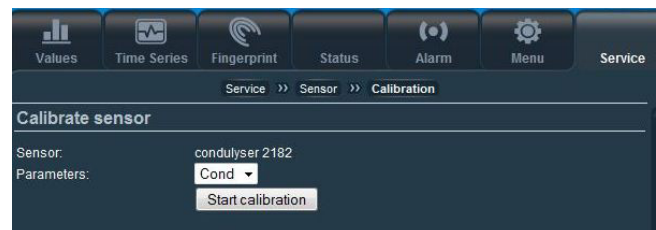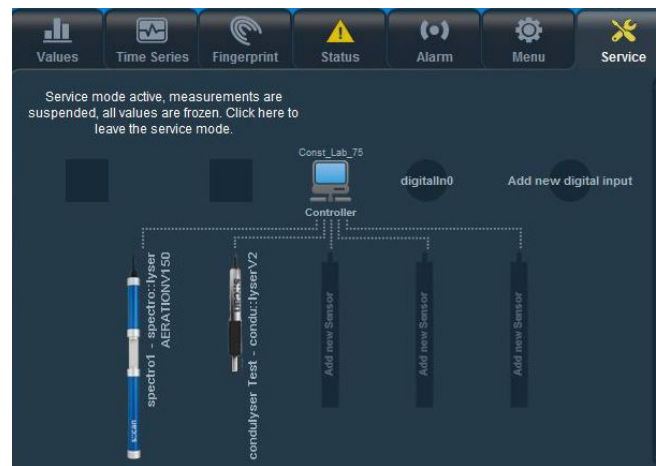
7   Data Management

7.1   Data Storage

The following information are stored directly on the sensor:

- Result of slope calibration
- Default slope
- Measured sample used for slope calibration
- Device information (e.g. type, serialnumber, address, please refer to section 10.2)

There is no possibility to store readings onto the sensor itself.

7.2   Data Transfer

The measurements are performed on the sensor and the readings are transfered to the controller via the sensor cable using RS485.

7.3   Data Visualisation

For visualisation of the sensor readings one of the following s::can controller can be used:

- con::lyte
- con::stat
- con::cube

8 Functional Check

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

- 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) and the environmental conditions a regular functional check (every week after initial operation, later every month) 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 8.1), to check the plausibility of the collected readings (see section 8.2) and to check the integrity of a single probe or sensor (see section 8.3).

8.1 Check of System

Check	con::lyte	moni::tool	Remark
System status	Any error messages or Symbol ▽ displayed?	Yellow, blinking *Status* icon on upper navigation bar displayed?	Green LED on con::stat should be on. Red LED indicates failure or interruption of automatic mode.
Reason for bad system status	Check logbook entries since last functional check.	Open status window and select symbol of affected sensor for more information.	See section 10.1 for error messages.
System running (up-to-date)	Displayed system time is current and is updated every second?	Click on system clock at the bottom of the screen shows current time and last measurement. Both are current?	
Function of automatic cleaning	Use function *Clean now* or wait for next cleaning cycle	Use function *Clean now* or wait for next cleaning cycle	Watch for air bubbles when cleaning is activated

Check	Remark
Compressed air supply for automatic cleaning	All tubes and fittings are tight?
Function of compressor and storage tank	Drain storage tank of external compressor; s::can compressor drains automatically if installed correctly
Monitoring station (E-511-2-000)	All tubes and fittings are tight and all sensors and probes are supplied with medium
Installation submersed (E-511-2-075)	Mounting equipment of all devices is ok and all probes and sensors are submersed.

8.2   Check of Results

Check	con::lyte	moni::tool	ana::xxx
Current readings displayed completely	No *NaN* and no dashes (- - - -,- -) or plus sign (++++,++) displayed. Use operating keys to scroll through all displayed parameters.	No *NaN* displayed.	condu::lyser not supported
Current parameter status of displayed readings	Check logbook entries since last functional check.	Red background for parameter indicates alarm or warning.	condu::lyser not supported

Check	Reason	Remark
Up-to-date: Readings actualised on regulary base?	- Measuring interval is too long - Automatic measurement has been stopped manually	Consider measuring interval and smoothing
Continuity: Check historical data (timeseries) for interruptions or discontinuities	- Change of medium - Local calibration - Maintenance of probe / sensor (cleaning, etc.) - Readings out of range - System failure (loss of power, communication error, etc.)	Only possible if timeseries are availbale
Plausibility: Timeseries look plausible with daily or seasonal fluctuation	- Drift of readings (can be caused by fouling) - Increasing noise (can be caused by flow conditions or fouling) - Fixed readings / no fluctuation	Check logbook of plant operator if possible
Measuring range: Readings are within the specified and calibrated measuring range?		Quality of results might be reduced outside the specified range of the device
Accuracy: Difference between laboratory values and readings of the condu::lyser	In case of significant difference a slope calibration (span) has to be performed (please refer to section 6.1.2)	To verify the accuracy of the displayed readings only a reliable comparison method shall be used.

8.3   Check of Probe - Sensor Integrity

When there is any doubt regarding the integrity of the sensor, please use the following flowchart to check sensor and installation:

```
        ┌─────────────┐    Ok     ┌──────────────────────┐
        │  Check of   │──────────▶│ Further verification of│
        │  results    │           │ integrity not necessary│
        └─────────────┘           └──────────────────────┘
               │ Not ok
               ▼
┌──────────────────────────────────┐
│ Check installation:              │
│    Mounting of sensor damaged?   │
│    Sensor or mounting clogged?   │
│ Check medium supply:             │
│    Sensor is submersed?          │
│    Water supply to flow cell ok? │
└──────────────────────────────────┘
               │
               ▼
        ┌─────────────┐    Ok     ┌──────────────────────┐
        │  Check of   │──────────▶│ Improve installation  │
        │  results    │           │ and medium supply.    │
        └─────────────┘           │ Further verification of│
               │ Not ok           │ integrity not necessary│
               ▼                  └──────────────────────┘
┌──────────────────────────────────┐
│ Dismount sensor                  │
│ Inspect sensor visually          │
│ Clean sensor (see section 9.1)   │
│ Start measurement in bucket with │
│ distilled water or calibration standard│
└──────────────────────────────────┘
               │
               ▼
   ┌───────────────────────┐  Ok   ┌─────────────┐   ┌─────────────┐  Ok   ┌──────────────────┐
   │ Check if reading is   │──────▶│Install sensor│──▶│  Check of   │──────▶│ Sensor integrity │
   │ close to 0 (dist. water)│      └─────────────┘   │  results    │       │ is ok            │
   │ close to standard value│               ▲         └─────────────┘       └──────────────────┘
   └───────────────────────┘               │                │ Not ok
               │ Not ok                     │                ▼
               ▼                            │         ┌─────────────┐
┌──────────────────────────────┐           │         │ Perform slope│
│ Clean sensor once again thoroughly│       │         │ calibration  │
│ Perform slope calibration    │           │         │ (see section 6.1.1)│
│ (see section 6.1.1)          │           │         └─────────────┘
└──────────────────────────────┘           │                │
               │                            │                ▼
               ▼                            │         ┌─────────────┐  Ok   ┌──────────────────┐
        ┌─────────────┐   Ok               │         │  Check of   │──────▶│ Sensor Integrity │
        │  Check of   │────────────────────┘         │  results    │       │ is ok            │
        │  results    │                              └─────────────┘       └──────────────────┘
        └─────────────┘                                     │ Not ok
               │ Not ok                                     ▼
               ▼                                     ┌──────────────────────┐
┌──────────────────────────┐                        │ Please contact s::can sales│
│ Please contact s::can sales│                       │ partner for further support│
│ partner for further support│                       └──────────────────────┘
└──────────────────────────┘
```

9   Maintenance

9.1   Cleaning

If necessary the condu::lyser can be cleaned automatically using the automatic pressurised air system or manually during the functional check.

To clean the probe manually the following is recommended:

- Rinse sensor with hot drinking water to remove course deposits.
- Put the sensor in a bucket of hot drinking water with a soft cleaning agent (e.g. dishwashing detergent) for several minutes to remove deposits on the sensor and the electrode.
- For cleaning a soft cloth, tissue or a soft brush can be used.
- Resistant fouling can be treated with weak acid or weak basic cleaning solutions.

For manual cleaning of the condu::lyser E-511-2-075 the electrode guard can be removed from the sensor. For this purpose the metal bracket for fixing the guard onto the sensor housing has to be pulled out. This can easily be done by means of a flat screw driver.

In general for cleaning of the condu::lyser electrode itself (not for the complete sensor) sterilization and autoclaving procedure is possible. Nevertheless high frequence of such intensive manual cleaning procedures will reduce the life time.

⚠ When cleaning the condu::lyser electrode, care has to be taken that the electrical contacts on the tip are not damaged (do not use abrasive materials such as scouring sponges or stiff brushes).

10   Trouble Shooting

10.1   Typical Error Pattern
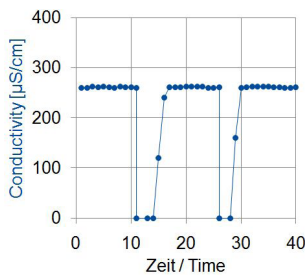
Reason	Removal
Sensor not continuously submersed. Sensor temporarily on air.	■ Improve installation ■ Ensure sensor head is submersed all the time

10.2   Error Messages

During execution of a measurement or a parameter calibration the monitoring system (system status), the measuring device itself (device status) and the result (parameter status) will be checked for possible errors and for plausibility. The parameter status is seperated into a general part (valid for all measuring devices) and an individual part (valid for the respective measuring device). In case of an error or a faulty calibration (status bit will be set from 0 to 1) a user message will be displayed to the operator.

Depending on the used controller these messages will be shown on the display (_Logbook_ in case of con::lyte, _Status_ tab in case of moni::tool). Additional to the general error reason the detailed status code will be displayed in binary form (0000, 0001, 0010, 0011, 0100, etc.) or as a hex number (0001, 0002, 0004, 0008, 0010, etc).

⚠ If several errors occur at the same time the con::lyte will add up all the status codes (status code 8000 means that only error bit b15 is active whereas status code 4011 means that error bits b0 (0001), b4 (0010) and b14 (4000) are active at the same time).

The table below shows all possible errors regarding the monitoring system (ES = error system) incl. the user message, the reason of the error and notes for trouble shooting. If the error can't be removed although the suggested procedure was executed several times please contact your s::can sales partner.

Error	Display con::lyte	Message moni::tool	Reason	Removal
ES007	Probe not detected. Check power-supply and connection cable.	No communication between probe and controller.	No communication between condu::lyser and controller. Replacement condu::lyser was not installed correctly.	Check sensor cable and plug connection. Dis- and reconnect sensor.
ES100 - b0	Probe reports an error. Call service! Code: 0001 yyyy zzzz	Temperature out of range	The temperature of the medium is too high or too low.	Check medium temperature and operation limits.
ES101	MISUSE: Medium temperature. Take probe out of the medium immediately!	PROBE MISUSE - Medium temperature. Take probe out of the medium immediately	The temperature of the medium is too high or too low.	Take the probe out of the medium. Check the temperature of the medium.

The table below shows all possible errors regarding the measured parameters (EP = error parameters) incl. the user message, the reason of the error and notes for trouble shooting. If the error can't be removed although the suggested procedure was executed several times please contact your s::can sales partner.

Error	Display con::lyte	Message moni::tool	Reason	Removal
EP100 - b0	Param.Status error. Status Code:	General parameter error	At least one internal parameter check failed.	For details see additional status message below. In case no further messages are shown, note the Error code and contact your s::can sales partner.
EP100 - b1	Parameter failure, hardware failure	Parameter error, Hardware error	Electrode signal not ok. An electrode is missing, too old or defect.	Check the electrode or replace the electrode.
EP100 - b2	Parameter failure, software- / configuration failure	Parameter error, Configuration error	Configuration of the sensor is not ok.	Change the local calibration or switch back to global calibration (default settings)
EP100 - b3		Parameter error, the probe is outside of the medium or in incorrect medium		Check water supply, check if probe is submersed, perform system check.
EP100 - b4	Parameter failure, calibration failure	Incorrect calibration, at least one calibration coefficient is invalid		Check readings and lab values; set back to factory settings; repeat calibration.
EP100 - b5		Parameter not ready	Sensor still in warm up phase	Wait until sensor is fully operational
EP100 - b15		Reading out of measuring range	Measured parameter is outside the defined measuring range	Check if sensor is in the medium, perform functional check

10.3   Device Settings

10.3.1   Check / Modification of Device Settings using the Controller con::lyte

The main menu entry *Information* of the con::lyte operation software enables you to check internal sensor settings. After selecting the parameter of your interest by pushing the *Enter* button the display will show the *upper limit* and the *lower limit* of the selected parameter.

Cond	[µS/cm]
Upper limit:	600000
Lower limit:	0
Probe	

When confirming the lowest entry *Probe* with *Enter* the following information will be displayed:

- Serialnumber of the condu::lyser (*Serial*)
- Software version of the condu::lyser (*SWVer*)

Probe	
Serial:	0002182
SWVer:	CONUM011

There is no need to modify any device settings of the condu::lyser.

10.3.2   Check / Modification of Device Settings using moni::tool

Selecting *Menu / Settings / Sensor* will list up all devices actually installed on the monitoring system. When clicking on the blue wheel located on the right hand side of the condu::lyser the following information will be displayed:

- Interface (COM-port, address) of the sensor (*URL*)
- *Sensor Name* allocated to the device by the operator
- Measuring location of the condu::lyser (*Location*)
- Manufacturer name of the condu::lyser (*Vendor*)
- Type of the sensor (*Model*)
- Internal number of the sensor (*ID*)
- Serial number of the condu::lyser (*Serial Number*)
- Actual hardware version of the condu::lyser (*HW Version*)
- Actual software version of the condu::lyser (*SW Version*)
- Number of available parameters (*Parameter count*)
- Supported moni::tool functions for the condu::lyser (*Service actions*)
- Cleaning valve allocated to the condu::lyser (*Cleaning device*)
- Information regarding the purchase (*Purchase date*, *Warranty expiry date*)
- Name of operator who has installed the condu::lyser (*Entered by*)
- Internal type number of the condu::lyser (*eModel*)
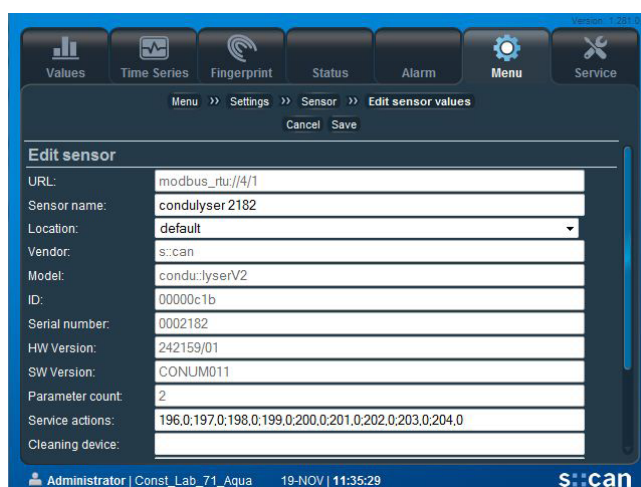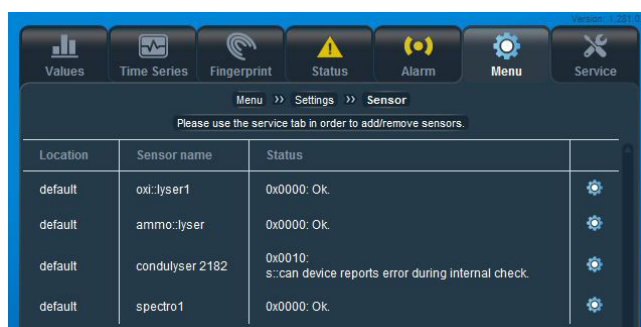
There is no need to modify any device settings of the condu::lyser.

10.4   Software Update

Please contact your s::can sales partner or s::can in case a software update is needed.

10.5   Return Consignment (RMA)

Return consignments of the s::can measuring system, or parts of the system, shall be done in the original packaging. Before returning a consignment, you have to contact your s::can sales partner or s::can (sales@s-can.at).

In case servicing of your s::can system is required, you also have to contact your s::can sales partner or s::can (service@s-can.at) in advance. You will be assigned an RMA number, without which return consignments for service will not be accepted.

The customer has always to bear the costs for return consignment.

11   Accessories

11.1   Installation

11.1.1   Connection Cable

For operation of condu::lyser with plug connection (E-511-2-000) a connection cable is necessary.

Name	Specification	Remark
Item-no.	C-1-010-sensor	
Cable lenght	1 m	
Assembling	ex works	
Material	PU	Cable sheathing
Housing environment rating	IP 68	
Interface connection	IP 67, RS 485, 12 VDC	to s::can sensors

11.1.2   Extension Cable

The cable of the condu::lyser can be elongated when necessary with an extension cable (10 m or 20 m length). The extension cable is attached using the sensor connector plug.

Name	Specification	Remark
Item-no.	C-210-sensor C-220-sensor	
Cable lenght	10 m 20 m	C-210-sensor C-220-sensor
Assembling	ex works	
Material	PU	Cable sheathing
Housing environment rating	IP 68	
Interface connection	IP 68, RS 485, 12 VDC	to s::can sensors

11.1.3   Sensor Mounting

For proper and easy submersed installation of the condu::lyser E-511-2-075 a separate sensor carrier is available. This part can be fixed to the sensor directly and can be extended by a pipe (to be provided by the customer).

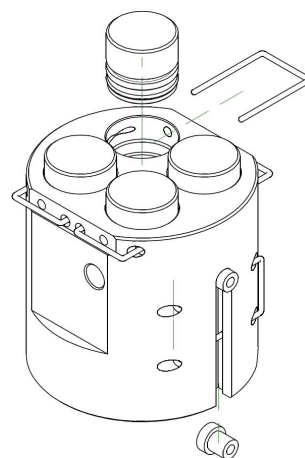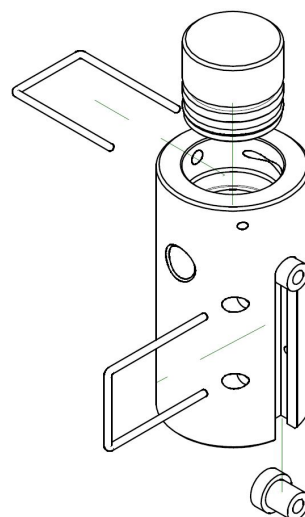| Name	Specification	Remark
Item-no.	F-12-sensor	
Material	PVC, stainless steel	
Dimensions	60 / 91 mm	Diameter / height
Weight	approx. 150 g	
Process connection	DN 50 inside	for extension pipe
Installation / mounting	submersed	

11.1.4 Flow Cell Setup Tap Water

For measurement of sample stream outside the medium with condu::lyser E-511-2-000 a separate flow –through installation is available.

Name	Specification	Remark
Item-no.	F-45-sensor F-45-four	for one single sensor for up to four sensors
Housing material	POM-C	
Dimensions	F-45-sensor: 50 / 96 mm F-45-four: 106 / 103 mm	Diameter / lenght
Weight	F-45-sensor: ~ 0,25 kg F-45-four: ~ 1.0 kg	
Process connection	$^1/_4$ inch inside	for inlet and outlet
Installation	flow-through	
Mounting	2 mounting holders	
Operating temperature	0 to 50 °C (32 to 122 °F)	
Operating pressure	0 to 10 bar (0 to 145 psi)	
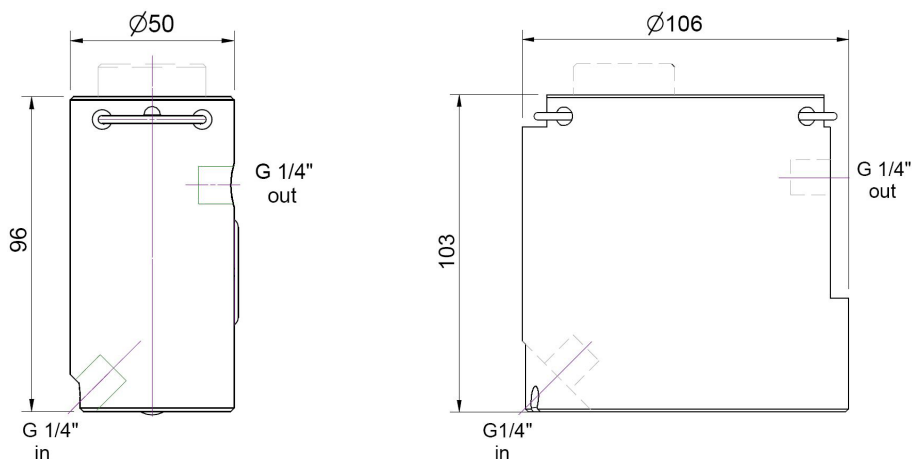
Dimension of flow cell setup in mm (F-45-sensor left side, F-45-four right side)

11.1.5 System Panel Basis

For easy attachment of a complete s::can monitoring system (controller con::cube, con::stat or con::lyte with condu::lyser in flow cell setup) a separate system panel is available.

Name	Specification	Remark
Item-no.	F-50-1-pro F-50-1-eco	pro: incl. by-pass pipes
Material	PP	
Dimensions	400 / 750 / 103 mm	W / H / D
Weight	min. 3.5 kg	

11.1.6   System Panel s::can Sensor

For easy attachment of s::can sensor in flow-through installation (F-45-sensor or F-45-four) a separate system panel is available.

Name	Specification	Remark
Item-no.	F-50-x-pro F-50-x-eco	pro: incl. by-pass pipes
Material	PP	
Dimensions	195 / 750 / 103 mm	W / H / D
Weight	min. 2.3 kg	

11.2   Automatic Cleaning

11.2.1   Pressure Connection Set

For connection of the automatic air cleaning system of the condu::lyser E-511-2-075 a specific pressure connection set is available.

Name	Specification	Remark
Item-no.	B-41-sensor	
Cable length	3 m	
Assembling	ex works	
Material	PU Nickel-plated brass	tube connection fitting
Process connection	$^3/_8$ inch	
Operating pressure	1 to 6 bar (14.5 to 87 psi)	

11.3   Maintenance

11.3.1   Calibration Standard

For proper calibration of the condu::lyser a specific calibration standard is available.

Name	Specification	Remark
Item-no.	E-511-STD-500	Safety data sheet (MSDS) included
Nominal value	500 µS/cm	at 25°C
Accuracy	+/- 1%	
Volume	500 ml	
Lifespan (storage)	1 $^1/_2$ year	

11.4   Spare Parts

11.4.1   Electrode Guard

Name	Specification	Remark
Item-no.	E-501-guard	including electrode guard, metal bracket for mounting of guard, connection fitting for automatic cleaning

12   Technical Specifications

Name	Specification	Remark
Item-no.	E-511-2-075 E-511-2-000	see section 3.3
Measuring parameter	Conductivity Salinity Temperature	
Measuring principle	4 electrode contacting	
Automatic compensation	Temperature	directly on the device
Measuring range	0 to 500.000 µS/cm 2 to 42 PSU -20 to 130 °C	Conductivity Salinity Temperature
Resolution	1 µS/cm or 0.01 mS/cm 0.1 PSU 0.01 °C	Conductivity Salinity Temperature
Accuracy conductivity	+/-0.1 % of current reading	in standard solution
Response time	60 sec.	
Dimension	38 / 237 mm	Diameter / length (see section 3.3)
Weight	230 g (approx.)	
Power supply	7 to 30 VDC	
Power consumption	0.06 W (typical) 0.15 W (max)	
Interface connection	System plug, IP 68, RS 485, 12 VDC	to s::can controller
Length of sensor cable	E-511-2-075: 7.5 m E-511-2-000: plug connector	on top of sensor
Type of sensor cable	22 AWG, polyurethane jacket	
Housing material	Stainless steel 1.4404, POM-C	
Electrode material	Stainless steel 316 / DIN 1.4435 FDA-approved PEEK and EPDM	Medium contacted
Housing environment rating	E-511-2-075: IP 68 E-511-2-000: IP 67	due to connection plug on top
Operating limits	-20 to 90 °C (-4 to 194 °F) 0 to 20 bar (0 to 290 psi)	Temperature Pressure
Storage limits	0 to 60 °C (32 to 140 °F)	Temperature
Storage	with protective cap	to avoid contamination of electrode
Installation	E-511-2-075: submersed E-511-2-000: in flow cell setup	1 cm: min. distance of medium below electrode top 3 cm: min. diameter of medium beside electrode
Automatic cleaning - sensor connection	G $\frac{1}{8}$ inch for air hose AD 6 mm	
Automatic cleaning - specification	Compressed air min. 2 bar (29 psi) max. 6 bar (87 psi)	Medium allowed pressure at sensor cleaning connection
Automatic cleaning - settings	2 to 10 sec. 15 min. to 6 hours	Duration of cleaning Intervall (depending on application)
Conformity - EMC	EN 61326-1:2006 EN 61326-2-3:2006	General requirements Particular requirements
Assignment of sensor cable	Pin 1: Data - Pin 2: Data + Pin 3: 6 to 16 VDC Pin 4: Ground Pin 5: not used Pin 6: Shielding	green cable strand white cable strand red cable strand black cable strand blank cable strand

scan Messtechnik GmbH

Brigittagasse 22-24, 1200 Vienna, Austria
Tel.: +43 (0) 1 219 73 93 - 0
Fax: +43 (0) 1 219 73 93 - 12
office@s-can.at
www.s-can.at