s::can

Intelligent. Optical. Online.

Manual

soli::lyser V1

October 2010 Release

Handbuch

soli::lyser V1

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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 (part 1 of this document) and German (part 2 of this document) by s::can. This original manual serves as the reference in case discrepancies occur in versions of the manual after translation into third languages.

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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 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 operation – 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.

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.

2.1   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 soli::lyser is a probe designed for the continuous monitoring of the amount of total solids in water. This amount is expressed as TSS in ppm. In addition the sensor also measures the temperature of the medium.

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 mentioned above. 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

The determination of amount of total solids is performed optically by measuring of light absorption at 180°. Light is sent through the medium to be measured. Depending on the amount of suspended solids (TSS) light energy will be absorbed or defelected. The remaining light will be measured on the detector side of the measuring cell, and this signal is used to determine the TSS concentration. The sensor utilizes an infrared emitter to minimize effects of color on the measurement, and it compensates for emitter variations due to temperature by measuring source brightness as an internal reference.

3.3 Device

The following device variants of the soli::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-505-1	soli::lyser I	250 - 30.000 ppm
E-505-2	soli::lyser I	0 - 1.500 ppm

The device is typified by a type label as displayed on the right hand side which contains the following information:

- Manufacturer's name and country of origin
- Device serial number (S/N)
- Item number (Type)
- Information for power supply
- Environment rating
- Acceptable temperature
- CE label

s::can
Vienna/AUSTRIA

soli::lyser

S/N   *XXXX*

Type   *E-505-2*

12V DC/ 30mA
IP68 / 0-60ºC

CE
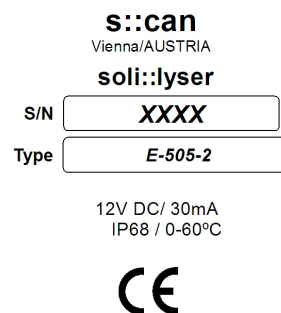
1   Sensor housing
2   Measuring gap
3   1 $^{1}/_{2}$ inch (outside) thread for mounting of the sensor
4   Sensor cable
5   Connection for hose of automatic cleaning
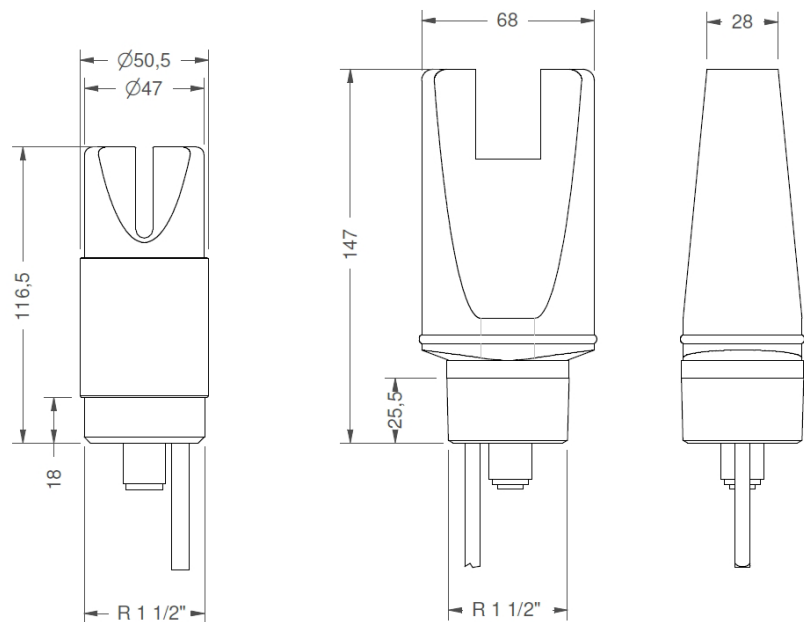
Dimension of the sensor in [mm]:

E-505-1 on left hand side
E-505-2 on right hand side

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 delivery:

- s::can soli::lyser (item-no. E-505-x)
- Connection set for automatic cleaning (item-no. B-41-sensor)
- s::can manual soli::lyser

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

- Extension cable (item-no. C-210-sensor or C-220-sensor)
- Probe carrier (item-no. F-11-oxi)
- Flow cell setup tap water (item-no. F-44-oxi)
- Flow cell setup waste water (item-no. F-47-oxi)

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 (soli::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):

- Oil- and particle free compressed-air supply
- Power supply for controller (operational reliability, voltage, power)
- 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

The soli::lyser can be mounted using the probe carrier.

- Separate probe carrier into different parts by unscrewing the connecting nut.
- Fix the insert part of the probe carrier without thread to the extension pipe (OD 50mm) using a PVC glue.
- The probe carrier will be screwed on top of the probe (cable side), please refer to pictures on the right hand side.
- Suggested minimum discharge height below sensors: 10 cm
  (to avoid swirling up of sediments when automatic cleaning is activated)
- Suggested minimum distance from walls: 10 cm
  (to ensure representative measurement).

4.3   Connection of Automatic Cleaning Appliance

The compressed air connection set supplied with the system contains all components necessary for connector for the sensor cleaning located on top of the soli::lyser to the cleaning valve of the s::can controller. The compressed air connection is performed by the following steps (see pictures on the right hand side):

- Remove dummy insert from pressure connection on sensor head (push-pull connection).
- Push the cleaning hose into the pressure connection.
- The compressed air hose (provided by customer, ID 8mm to 9mm, UV- / ozone resistance) used for connection cleaning appliance to the cleaning valve can be fastened to the connecting fitting on the cleaning valve by means of a commercial hose clamp.
- Another air hose and DIN 7.2 compressed air coupling are required to hook up the compressed air supply to the cleaning valve.
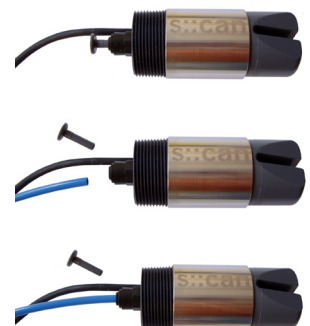
The cleaning valve should never be connected to the compressed air coupling of your compressor directly, i.e. without a pressure hose in between. The total length of hoses should be as short as possible to avoid unnecessary pressure loss. In special occasions, drinking water may be used to operate the 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.
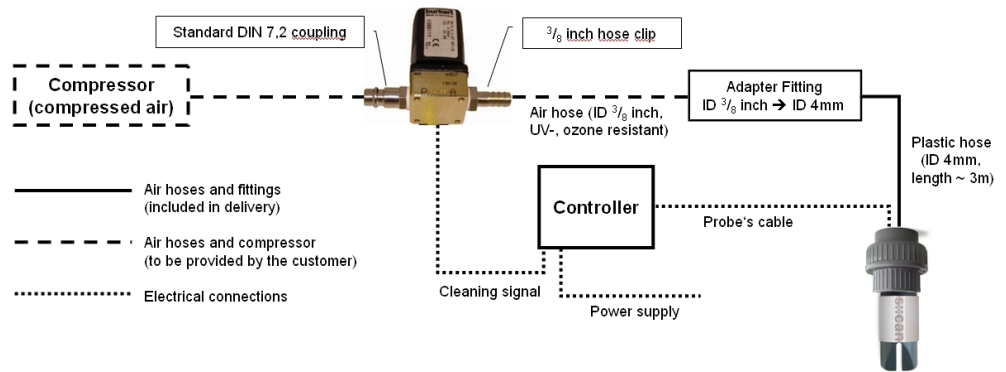
5   Initial Startup

Once the mounting and installation of the soli::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 soli::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 soli::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 a con::stat or PC.
■ Perform parameterisation of the soli::lyser. Refer to section 5.4.1 in case of using a con::lyte and refer to section 5.4.2 in case of using a con::stat or PC.
■ 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 TSS readings of the soli::lyser in stable water quality (see chapter 6).

5.1   Controller for Operation

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

Controller	Type	Software
con::lyte	D-316, D-317, D-318, D-319	V4.0 or higher
con::stat	D-312, D-313, D-314	ana::xxx V5.6 or higher
PC + con::nect		ana::xxx V5.6 or higher

⚠ s::can recommends to use the most actual version of the operating software on the controller.

5.2   Connection to the Controller

The soli::lyser will be delivered with 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.

Using an older version of controller the soli::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 soli::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           Install probe 1           Install probe 1
Connect only              Searching for probe       Probe search finished
probe 1                                             soli::lyser found
Continue with ENTER                                 Continue with ENTER
Stop with ESC                                       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 the Controller con::stat (ana::lyte / ana::pro)

If the s::can monitoring system will be operated without spectrometer probe ana::lyte starts in offline mode, and the serial number 00000000 will be created by default. If this doesn't happen automatically the offline mode can be selected in the selection field COM-port and started by pushing the button *Search*.

After the operating software has booted you will be asked to create a new measuring point (s::canpoint) or select an existing one. If only an soli::lyser will be operated a new s::canpoint based on the Global Calibration *SENSOR00V150. glb* can be used. Please refer to s::can maual ana::lyte for more detailed information.
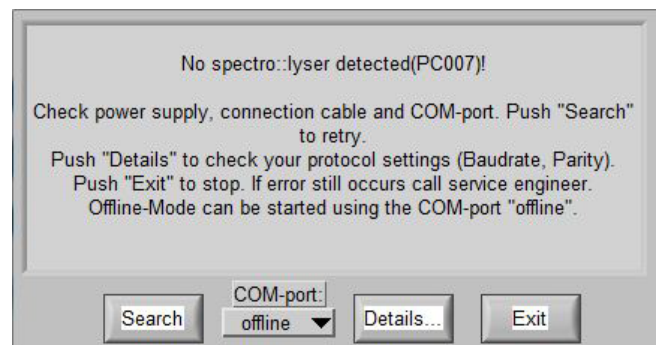
In the operating software ana::xxx the soli::lyser can be initialised in the advanced mode of ana::lyte or in ana::pro over the menu item *Parameter / Settings*. In case the parameters of interest are not yet displayed by default in the Parameter Settings window, they can be selected as follows: double click on the parameter field that you want to correspond with the parameter to be displayed. After double clicking, the window will enlarge and show detailed information belonging to this parameter. Now select *Non-spectral parameter* in the upper selection bar and select *oxi/soli::lyser* under *Device*. The *COM-Port* is the interface to which the soli::lyser is connected. The appropriate port should be selected here (COM 4 in case of con::stat D-314-x with plug connection). Finally, under the entry *Address* the address allocated to the instrument in the RS 485 network has to be entered (default setting = 8).

When the button *Search…* is pressed, the software will search for the instrument at the selected COM-Port and when the instrument is found information about the instrument will be shown in the grey text field in the lower part of the dialogue window (model and serial number, version, electrodes and measuring range).

When an incorrect COM port and / or sensor address are selected, the *Search…* function will still find the probe if only one instrument is connected to the controller.

The button *Calibrate…* provides access to the windows that will guide you through the calibration process of the parameters measured by the soli::lyser (please refer to chapter 6 for details about calibration).

The button *Config…* provides access to the dialogue window where basic settings of the soli::lyser can be changed. As this can affect the performance of your instrument, changes in these settings should only be made after consulting s::can or your local s::can sales partner (please refer to section 10.2 for details about sensor settings).
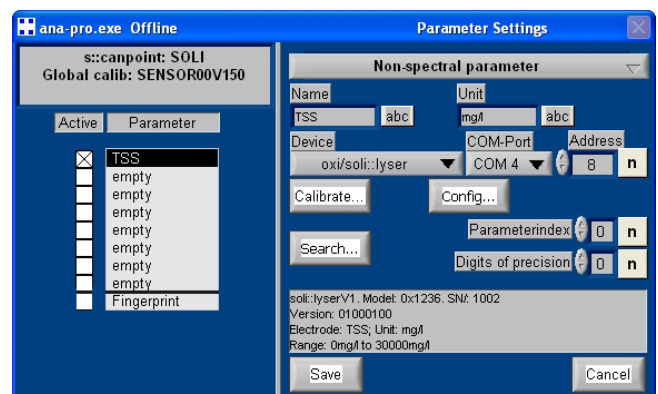
5.4 Probe Parameterisation

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

Parameter	Parameterindex	Name [Unit]	Decimal places (default)
Total suspended solids	0	TSS [mg/l]	0

⚠ s::can recommends to check configuration of any digital and analogue output should the number of decimal places of the parameters be reconfigured.

5.4.1 Probe Parameterisation using the Controller con::lyte

After successful probe initialisation (see section 5.3.1) the measuring parameters of the soli::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*.

```
Parameter 1
Probe:      soli::lyser
Address:              1
Index:                0
Unit:             mg/l
```

The name of the *Probe* or sensor used as a source of the parameter is displayed in the upper line (e.g. soli::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).

5.4.2 Probe Parameterisation using the Controller con::stat (ana::lyte / ana::pro)

After successful probe initialisation (see section 5.3.2) under *Parameterindex* the parameter read out from the soli::lyser is selected (regarding allocation of the parameter please refer to the table in section 5.4). Under *Digits of precision* the number of decimal places for displaying the parameter readings can be set.
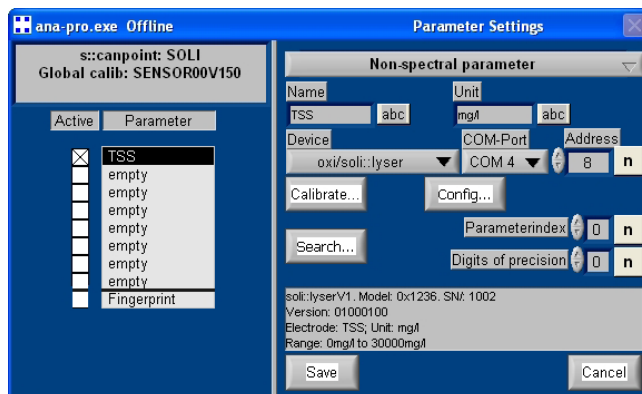
6 Calibration

The soli::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 probe should be ensured (please refer to section 8).
- Before performing any kind of calibration the probe 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 10.1 regarding possible error messages and notes for removal.

6.1 Types of Calibration

For calibration of the TSS parameter either a zero-point (ZERO) or a slope calibration (SPAN) can be performed.

6.1.1 Zero Point Calibration

- The zero point of the soli::lyser will be calibrated ex factory before delivery.
- Before performing a zero point calibration the soli::lyser has to be cleaned thoroughly (see section 9.1).
  For the calibration itself either distilled water or tap water without any turbidity shall be used.
- The result of the zero point calibration will be stored onto the probe and used until a new zero point calibration will be performed.
- For zero point calibration no lab value can be entered as the lab value is fixed to be zero.

6.1.2 Slope Calibration

- The soli::lyser is equipped with a global slope (default) ex factory. You can switch back to this factory setting at any time.
- The local slope calibration shall be performed directly in the medium (in-situ) best, within two steps.
  First the actual measured reading has to be stored onto the probe (sample) when taking a sample.
  Later, as soon as the result of the laboratory analysis or the comparison value is available, this value can be entered and the calibration can be executed.
- The result of the slope calibration will be stored directly onto the probe and will be used until a new slope calibration is performed successfully or you switch back to the default slope.
- To achieve best possible measurement s::can recommends to use only real medium for the slope calibration and no ready for use calibration standards.
- For slope calibration only one sample is needed because the zero point will be used for the calibration also.

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 soli::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. TSS) in the selection field *Param Calibration*.

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

The entry *Calib.* shows *local* and below this entry *Type* shows the type of calibration. For a zero point calibration the type *Zero* has to be displayed. The entry *Sample* shows the reading actually measured. This value will be calibrated to zero after confirming the entry *Calibrate!*

For calibration of the sensor slope the entry *Span* has to be selected from the calibration menu (*Type*).

The display shows the reading actually measured and below the information whether a *valid* reading is stored onto the probe or not (*invalid*). When *Enter* is pushed, the actual measured value will be stored on the probe. At least now the entry valid should be displayed. 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.

To switch back to factory default the calibration type *Default Span* has to be selected and the entry *Type* and has to be confirmed by pushing *Calibrate!*

```
Param Calibration
Local cal.:        TSS
Local cal.:      ?????
```

```
Local cal.    TSS
Calib.:        local
Type:           Zero
Sample:            4
Calibrate!
```

```
Local cal.    TSS
Calib.:        local
Type:           Span
Sample:         1250
Sample:      invalid
Lab:          ------
Calibrate!
```

```
Local cal.    TSS
Calib.:        local
Type:           Span
Sample:         1250
Sample:        valid
Lab:            1400
Calibrate!
```

```
Local cal. TSS
Calib.:        local
Type:    Default Span
Calibrate!
```

### 6.2.2   Calibration using the Controller con::stat (ana::lyte / ana::pro)

The calibration of the measuring parameters of the soli::lyser can be performed directly in the measuring screen via the menu entry *Local Calibration*. After selecting this menu entry, a user window appears which shows all parameters. Besides the parameter name (*Name*) also the unit of the parameter (*Unit*), the probe used to measure this parameter (*Device*), the *COM port* to which the probe is connected and the address of the probe (*Address*) are displayed. The parameter selected for calibration has a blue background and can be confirmed with the *Ok* button.

Furthermore the local calibration can also be started in advanced mode of ana::lyte and ana::pro, respectively using the menu entry *Parameter / Settings*. Access to the calibration screens is achieved by selecting the parameter to be calibrated by double clicking on it. In the window that opens, the button *Calibrate…* should be selected to start the calibration procedure.

Once the calibration window is opened the current readings of the selected parameter will be displayed in the upper right hand side of the calibration screen. The values are actualised automatically and furthermore, the readings are displayed graphically in the time series (black line) as an indication of the measurement stability.

Using the button *Calib Type* enables you to select the calibration procedure (*ZERO*, *SPAN* or *default SPAN*) to be executed.

When selecting *ZERO* for zero-point calibration only the actual value will be displayed. As soon as the readings are stable the calibration procedure will be started by pushing the button *Calibrate!* i.e. the actual reading will be calibrated to zero.
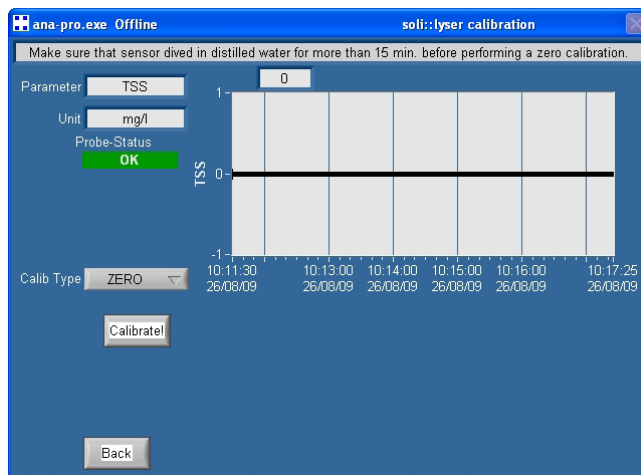
When selecting *SPAN* for slope calibration a table with the columns *Sample ID*, *Probe result* and *Laboratory result* is displayed on the right lower side of the calibration screen. The display *Invalid* below the entry *Probe results* indicates that no valid reading for performing a calibration is stored onto the probe.

As soon as the readings are stable the button *Sample* will be pushed. Doing so the actual displayed reading will be stored onto the probe and the display switched to *Valid*. If a valid reading has already been stored onto the probe before starting the calibration procedure (i.e. the display has already been valid when the calibration window was opened) the stored reading will be overwritten any time the button *Sample* is pushed.
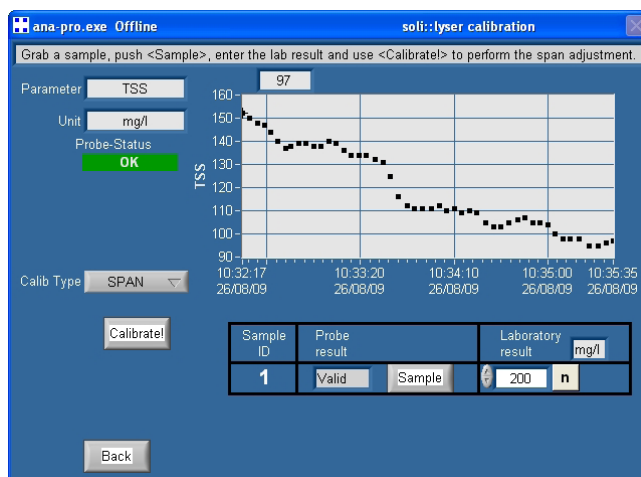
As soon as the result of the laboratory analysis or another corresponding value used for calibration is available it can be entered into the field *Laboratory results* by means of the *n*-button. Pushing the button *Calibrate!* will start the calibration procedure.

When selecting the calibration type *Default SPAN* and pushing the button *Calibrate!* the default slope (factory default) will be activated again.

7   Data Management

The measurements are performed on the sensor and the readings are transfered to the controller via the sensor cable using RS485. There is no possibility to store readings onto the sensor itself.

The following information are stored directly on the sensor:

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

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	ana::xxx	Remark
System status	Any error messages or Symbol ▽ displayed?	Yellow, blinking *Status* icon on upper navigation bar displayed?	System status displayed on measuring screen is *Warning* or *Failure*?	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.	Activate *Show context help* and move cursor to system status.	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?	Time stamp of the last measurement is 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	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 compressor
Monitoring station (by-pass)	All tubes and fittings are tight and all sensors and probes are supplied with medium
Installation (in-situ)	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 (- - - -,- -) displayed. Use operating keys to scroll through all displayed parameters.	No *NaN* displayed.	No *NaN* displayed, no grey background of displayed readings.
Current parameter status of displayed readings	Check logbook entries since last functional check.	Red background for parameter indicates alarm or warning.	Activate *Show context help* if grey background or *NaN* and move cursor over displayed reading.

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 inter- ruptions 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 soli::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:

```
         Check of    ──Ok──►  ┌─────────────────────┐
         results               │ Further verification of │
          ◆                    │ 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? │
└───────────────────────────┘
          │
          ▼
         Check of    ──Ok──►  ┌─────────────────────┐
         results               │ Improve installation │
          ◆                    │ 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 drinking water │
└───────────────────────────┘
```

Check if reading = 0 ──Ok──► Install probe again ──► Check of results ──Ok──► Sensor integrity is ok. Improve automatic cleaning

Check if reading = 0 │ Not ok

Clean sensor once again thoroughly
Perform ZERO point calibration
(see section 6.1.1)

Check if reading = 0 ──Ok──► Install probe again ──► Perform SPAN calibration (see section 6.1.2)

Check of results │ Not ok

Check if reading = 0 │ Not ok

Please contact s::can sales partner for further support

Check of results ──Ok──► Sensor Integrity is ok

Check of results │ Not ok

Please contact s::can sales partner for further support

⚠ On a half year interval the zero point of the sensor should be checked in a medium free of suspended solids (e.g. distilled water or drinking water). If necessary a zero point calibration shall be performed (please refer to section 6.1.1).

9 Maintenance

9.1 Cleaning

During routine operation the cleaning of the soli::lyser, i.e. the optical measuring windows of the instrument, is performed using the automatic pressurised air system. To clean the probe manually the following is recommended:

- Rinse sensor with hand-hot drinking water to remove course deposits.
- Put the probe in a bucket of hand-hot drinking water for several minutes to remove deposits on and in between the measuring gap.
- To clean the sensor housing (not the measuring gap with the measuring windows) a soft cleaning agent (e.g. dish-washing detergent) can be used.
- To clean the measuring gap a soft cloth, tissue or a soft brush can be used.
- Resistant fouling can be treated with a 2% aqueous solution of hydrochloric acid (HCl) or alcohol.

⚠ When cleaning the measuring windows, care has to be taken that the windows are not damaged in the process (do not use abrasive materials such as scouring sponges or stiff brushes).

10   Trouble Shooting

10.1   Error Messages

During execution of a measurement or a parameter calibration the device itself and the result will be checked for possible errors and for plausibility. In case of an error a user message will be displayed to the operator. There are error- and status messages belonging to the device itself (device status) as well as error- and status messages belonging to the individual parameter (para status). The parameter status is seperated into a general part (public, valid for all sensors) and an individual part (private, valid for the respective sensor). In case of faulty calibration an error message will be displayed to the operator.

Depending on the used controller these messages will be shown on the display (_Show Context Help_ and _System-Status_ in case of ana::xxx or _Logbook_ in case of con::lyte) and stored in the logfile (in case of ana::xxx). Additional to the general error reason the detailled error code (status code) will be displayed in binary form or as a hex number.

⚠️ If several errors occur at the same time the con::lyte will add up all the status codes (status code 0003 0000 means that error 0001 0000 and error 0002 0000 have occured at the same time).

The table below shows all possible errors 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.

xxxx   ......   Device status (bm DeviceStatus)
yyyy   ......   Parameter status general (bmParaXStatus)
zzzz   ......   Parameter status individual (bmParaXPrivStatus)

The table below shows possible errors regarding the monitoring system (ES = error system), the error messages and notes for trouble shooting.

Error	Display con::lyte	Message ana::xxx	Reason	Removal
ES006	Protocol failure. Code: Probe with RS485 Reset your probe!		Communication error between sensor and controller.	Check compatibility of sensor and controller. Check sensor cable and plug connection. Dis- and reconnect sensor.
ES007	Probe not detected. Check power-supply and connection cable.		No communication between sensor and controller. Replacement sensor was not installed correctly.	Check sensor cable and plug connection. Dis- and reconnect sensor.
ES100	0001 yyyy zzzz (b0)	Device error b 0000 0000 0000 0001	Hardware error	Dis- and reconnect sensor.

The table below shows possible errors regarding the measured parameters (EP = error parameter), the error messages and notes for trouble shooting.

Error	Display con::lyte	Message ana::xxx	Reason	Removal
EP100	xxxx 0001 zzzz (b0) Param.Status error. Status Code:	Parameter error general b 0000 0000 0000 0001	General parameter error. At least one internal parameter check faulty.	Note error code and additional message.
EP100	xxxx 0010 zzzz (b4)	Parameter error calibration not ok b 0000 0000 0001 0000	Incorrect calibration; at least one calibration coefficient is invalid.	Check readings and lab values; set back to factory settings; repeat calibration.
EP100	xxxx yyyy 0004 (b3)	TSS negative b 0000 0000 0000 1000	Reading below zero	Clean sensor; perform zero calibration
EP100	xxxx yyyy 0003 (b2)	TSS value too high b 0000 0000 0000 0100	Reading higher than upper measuring range.	Check plausibility of the measurement results; clean sensor; check calibration.

10.2   Sensor Settings

10.2.1   Check of Sensor Settings

The ana-xxx operation software enables you to reconfigure internal sensor settings. This should only be done by s::can service or after instruction from s::can.

- Push button *Config…* in menu entry *Parameter / Settings*.
- Push button *Search* in register card *Com*. As soon as probe will be detected the status source is ok (green check mark) and register card *Descript* can be selected.
- Now the other register cards become visible also (*Results*, *deviceconfig*).
- In register card *Descript* the sensor type (*SensorModel*), the actual software version (*SW-Version*) and the serial number of the sensor (*Sensor-S/N*) are displayed.
- You can finish the configuration menu by pushing the button *Exit*.
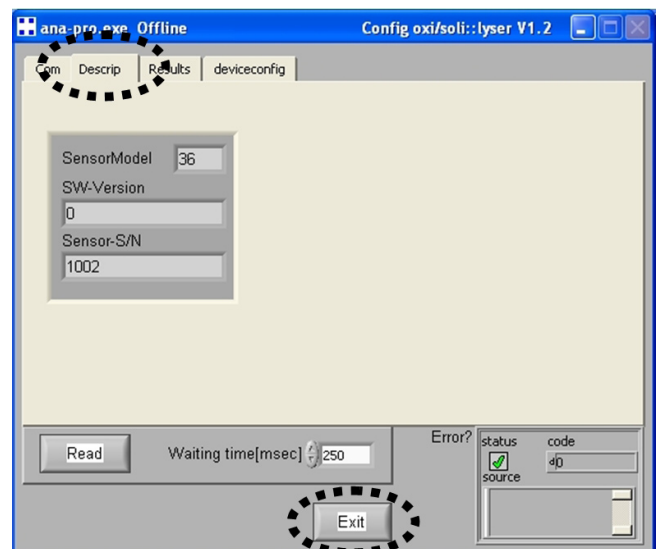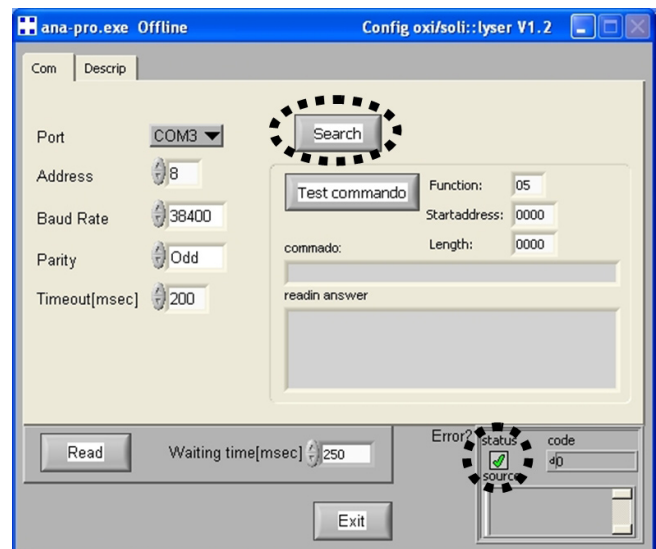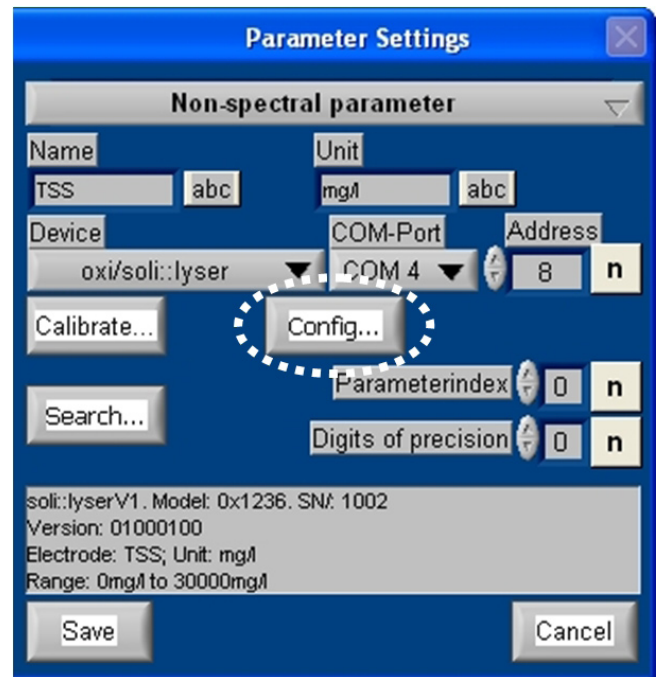
10.2.2   Changing Sensor Address

⚠ All changes in the register card (e.g. new address) shall be done directly in the display field using the mouse and the keyboard. The scrollbar labelled with two small triangles beside the display field shall not be used.

After a value has been changed the mouse cursor has to be positioned outside the according entry field onto any place of the register card before selecting another register card. Only then the modifications will be stored onto the probe / sensor automatically. This procedure can also be recognized by the user message "*Please wait while settings will be written to the sensor…*" on top of the selected register card. When using an older version of ana::xxx (before V5.9) all modifications have to be stored manually using the entry *save settings* in the register card *Device config*.

Selection of entries (e.g. save settings) can be done by positioning the mouse pointer over the display field and selecting the according entry while pushing the left mouse button.

To change the actual used address the following steps have to be performed:

- Enter the configuration menu as explained in section 10.2.1.
- Select the register card *deviceconfig*.
- Enter the new address in field *Address* using the *n*-button.
- Push button *Exit* to finish the configuration menu.
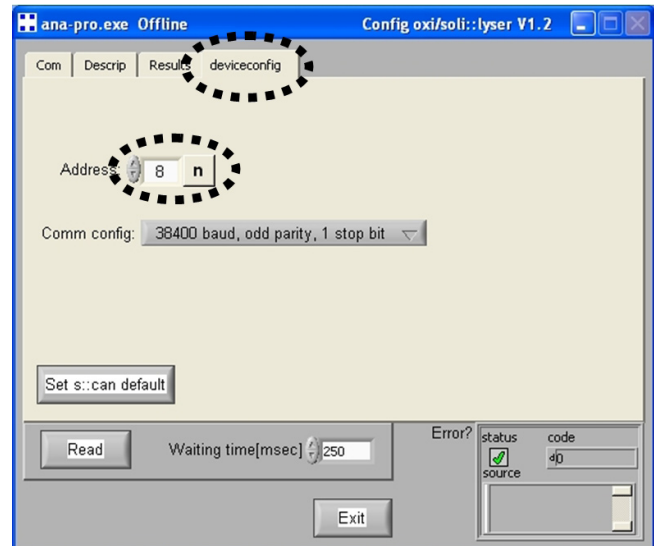
10.3   Software Update

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

10.4   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   Extension Cable

The cable of the soli::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

11.1.2   soli::lyser Sensor Mounting

For proper and easy submersed installation of the soli::lyser a separate sensor mounting 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-11-oxi	carrier soli::lyser
Housing material	PVC-U	
Dimensions	85 / 66 mm	diameter / lenght
Weight	min. 200 g	
Process connection	G $1\frac{1}{2}$ inch (R)(BSP) parallel, inside DN 50 inside	sensor's side for extension pipe
Installation / mounting	submersed	

11.1.3   Flow Cell Setup Tap Water

For measurement of sample stream outside the medium a separate flow –through installation is available.

Name	Specification	Remark
Item-no.	F-44-oxi	
Housing material	POM-C	
Dimensions	155 / 106 mm	diameter / lenght
Weight	min. 500 g	
Process connection	$\frac{1}{2}$ inch inside	
Installation / mounting	flow-through	
Operating temperature	0 to 50 °C (32 to 122 °F)	
Operating pressure	0 to 10 bar (0 to 145 psi)	
Accessories	Hose nozzle 12 mm	F-47-process

11.1.4 Flow Cell Setup Waste Water

For measurement of waste water sample stream outside the medium a separate flow-through installation is available.
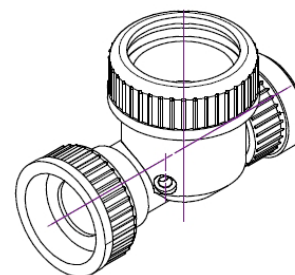
Name	Specification	Remark
Item-no.	F-47-sensor	
Housing material	PVC	
Dimensions	170 / 177 mm	hight / lenght
Process connection	ID 40 mm	
Installation / mounting	flow-through	
Measuring medium	waste water	

11.1.5 System Panel Basis

For easy attachment of a complete s::can monitoring system (controller con::stat or con::lyte with soli::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-44-oxi) a separate system panel is available.

Name	Specification	Remark
Item-no.	F-50-3-pro F-50-3-eco	pro: incl. by-pass pipes
Material	PP	
Dimensions	195 / 750 / 103 mm	W / H / D
Weight	min. 2.3 kg	

11.2   Maintenance

No accessories for maintenance are nesessary.

11.3   Spare Parts

This sensor is not equipped with any consumables that need to be replaced periodically. Therefore there is no need to store any spare parts.

11.4   Automatic Cleaning

11.4.1   Pressure Connection Set

For connection of the automatic air cleaning system of the soli::lyser a specific pressure connection set is available.

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

12 Technical Specifications

Name	Specification	Remark
Item-no.	E-505-1 (soli::lyser I) E-505-2 (soli::lyser I)	see section 3.3
Measuring parameter	total suspended solids (TSS)	
Measuring principle	optical (180° transmitted light)	Light source near infrared (880nm)
Measuring range E-505-1	250 to 30000 mg/l	
Measuring range E-505-2	0 to 1500 mg/l	
Resolution	1 mg/l up to 1000 mg/l 10 mg/l up to 10000 mg/l 100 mg/l above 10000 mg/l	
Response time	60 sec.	
Accuracy E-505-1	+/- 5 % of current reading or +/- 100 mg/l	after calibration in real medium, whichever is greater
Accuracy E-505-2	+/- 5 % of current reading or +/- 2 mg/l	after calibration in real medium, whichever is greater
Repeatability E-505-1	+/- 1 % or +/- 20 mg/l	whichever is greater
Repeatability E-505-2	+/- 1 % or +/- 2 mg/l	whichever is greater
Automatic compensation	Temperature	directly on the device
Power supply	6 to 16 VDC	
Power consumption	0.32 W (max.)	
Length of sensor cable	10 m	
Type of sensor cable	22 AWG, polyurethane jacket	
Interface connection	System plug, IP 68, RS 485, 12 VDC	to s::can controller
Sensor material	Epoxy, stainless steel	
Weight	0.6 kg (approx.)	
Dimension E-505-1	51 / 160 mm	diameter / length
Dimension E-505-2	51 / 68 / 160 mm	W / D / L
Operating limits	0 to 60 °C (32 to 140 °F) max. 6.8 bar (max. 100 psi) max. 68 m	Temperature Pressure Submersed depth
Storage limits	0 to 60 °C (32 to 140 °F)	Temperature
Mounting	R $1^1/_2$ inch outside	
Housing environment rating	IP 68	
Automatic cleaning - sensor connection	G $^1/_8$ inch for air hose AD 6 mm	
Automatic cleaning - specification	Compressed air min. 2 bar (29 psi) max. 4.5 bar (65.3 psi)	Medium Allowed pressure at sensor cleaning connection
Automatic cleaning - settings	4 to 12 sec. 5 min. to 4 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

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