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English
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Appendix

i::scan V1

Manual February 2014 Release

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English
Deutsch
Appendix

1 Table of Contents

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2 General

2.1 About this Document

This manual contains, firstly, general information, safety guidelines and hazard warnings as well as information regarding transport and storage of the product. In further chapters the installation, mounting, initial operation and calibration of the i::scan are explained. Furthermore, a technical description as well as technical specifications of the device itself can be found in this manual. Information regarding functional check, maintenance and trouble shooting complete the document.

2.2 Guidelines for this Document

All cross references in the text are marked in blue as follows: [Reference]. 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.

2.3 Validity of this Document

This manual, at the time of its publication (see release date printed on the top right/left of this document), concerns the following s::can products:

Type	Light Source	Application	Other	Parameters
Y01	1	d/df/r/rf		Turbidity NTU/FTU
Y02	1	d/df/r/rf		Turbidity NTU/FTU + Color
Y03	2	d/df/r/rf		UV254 + Turbidity NTU/FTU
Y04	2	d/df/r/rf		UV254 + Turbidity NTU/FTU + Color
Y05	3	d/df/r/rf		UV254 + Turbidity NTU/FTU + TOCeq
Y06	3	d/df/r/rf		UV254 + Turbidity NTU/FTU + TOCeq + Color
Y08	1	e/ef/i/if		TSSeq + Color
Y09	2	e/ef/i/if		UV254 + TSSeq
Y10	2	e/ef/i/if		UV254 + TSSeq + Color
Y11	3	e/ef/i/if		TSSeq + CODeq
Y12	3	e/ef/i/if		TSSeq + CODeq + Color
Application				
		d		Drinking water (35mm OPL)
		r		River water (35mm OPL)
		e		WWTP Effluent (5mm OPL)
		i		WWTP Inluent (5mm OPL)
Other specification				
			000	with plug connection IP68, for monting in flow cell and monitoring station
			075	7,5 m fixed feed through cable, IP68; required for submersed installation
Light source replacement parts				
	1			Vis (Color and/or NTU/FTU/TSS)
	2			UV254-Vis (UV254 and NTU/FTU/TSS and Color)
	3			UV-Vis

Designation	Item no as listed in the s::can price list
Flow-Cell installation	
F-46-four-iscan	multi flow-cell for i::scan and up to 3 s::can Sensors, POM -C
F-46-iscan	i::scan flow-cell (by-pass setup), POM-C
F-446-brush-iscan	Brush for flow-cell AutoBrush i::scan (spare part)
F-446-m-iscan	Brush unit for flow-cell AutoBrush i::scan

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Designation	Item no as listed in the s::can price list
Carrier installations	
F-14-iscan	Vertical probe carrier for i::scan
F-15-iscan	45 degree probe carrier for i::scan
F-13-iscan	Horizontal probe carrier for i::scan
F-15	Fixing adapter, stainless steel
Supporting equipment	
E-431-1	Multifunctional slide
B-60-2	Cleaning Brushes (for pathlength 5 and 15 mm)
Air cleaning	
B-41	s::can pressure connection set for V2 spectro::lyser and s::can sensors
B-32-230, B-32-110 or B-32-012	s::can compressor
Connection	
C-1-010-sensor	1m connection cable for s::can Sensor or s::can ISE probe (IP68 plug connection, RS485, 12VDC)
C-210-sensor	10 m extension cable for s::can s::can Sensor or s::can ISE probe (IP68 plug connection,RS485, 12 VDC)
C-220-sensor	20 m extension cable for s::can s::can Sensor or s::can ISE probe (IP68 plug connection,RS485, 12 VDC)

Information and technical specifications regarding these items in s::can manuals from earlier release dates are herewith replaced by this manual.

2.4 Declaration of Conformity

According to CE regulations. Supporting documents are available on request by s::can.

2.5 Product Updates, Other

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

3 Safety Guidelines and Hazard Warnings

3.1 General

Installation, electrical connection, initial operation, operation and maintenance of the i::scan 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 has to follow the instructions contained in this manual.

3.2 Special Hazard Warnings

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. Protective clothing, if not already required by local regulations, is recommended. All necessary precautions should be taken to prevent endangering of one's health during work with the measuring device.

3.3 Improper Usage / Guarantee / Warranty

All s::can i::scan are leaving our factory in immaculate technical and safety conditions. Inappropriate or not intended use of the sensor, however, can cause danger!

The manufacturer is not responsible for damage caused by incorrect or unauthorised use. 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.

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3.4 Duties of the Operator

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.

3.5 Precautions

Although the sensors are built from materials suitable for applications in drinking- and waste water the used materials shall be double checked for any known problems in this specific application. In case of any doubt on the suitability of the sensor immediately contact your s::can agent.

4 Technical Description

4.1 Intended Use

All i::scan probes are compact multiwavelength photometer probes, capable of online measurements of absorption spectra (UV, UV-Vis, UV-Vis-Nir, or derived parameters) with high quality either directly submersed in liquid media (in-situ) or in by-pass via flow cell setup. The probe can be operated also outside of the medium using a multifunctional slide. i::scan probes with a path-length of 35mm also have an additional 90 degree detector for scattered light measurements including suitable light sources. This allows measurements of turbidity according to ISO 7021 and similar to EPA 180.1.

In all types of applications, the respective acceptable limits, which are provided in the Technical Specifications sections 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.

4.2 Functional Principle

For absorption measurement the sensor works as a multi-wavelength photometer with narrow band light sources. The wavelengths have been carefully selected to best fit the intended applications. For organic parameters multiple wavelengths in the UV-A/UV-B and UV-C range are used. For colour, solids and turbidity measurements light sources in the visible and near infrared range are used.

In i::scan probes a path-length of 35mm, measurement of turbidity according to ISO 7021 is performed with a narrow band near infrared light source and a 90 degree detector for scattered light. Measurements comparable to EPA 180.1 are performed using a light source with a similar colour temperature as a tungsten lamp.

The sensor is equipped with an internal compensation detector which is used to compensate for temperature and aging of the integrated light sources.

4.3 Device Typification

Each instrument is typified by the type labels which contains the follwing information:

- Manufacturer's name
- Serial number (8-digit)
- Device type

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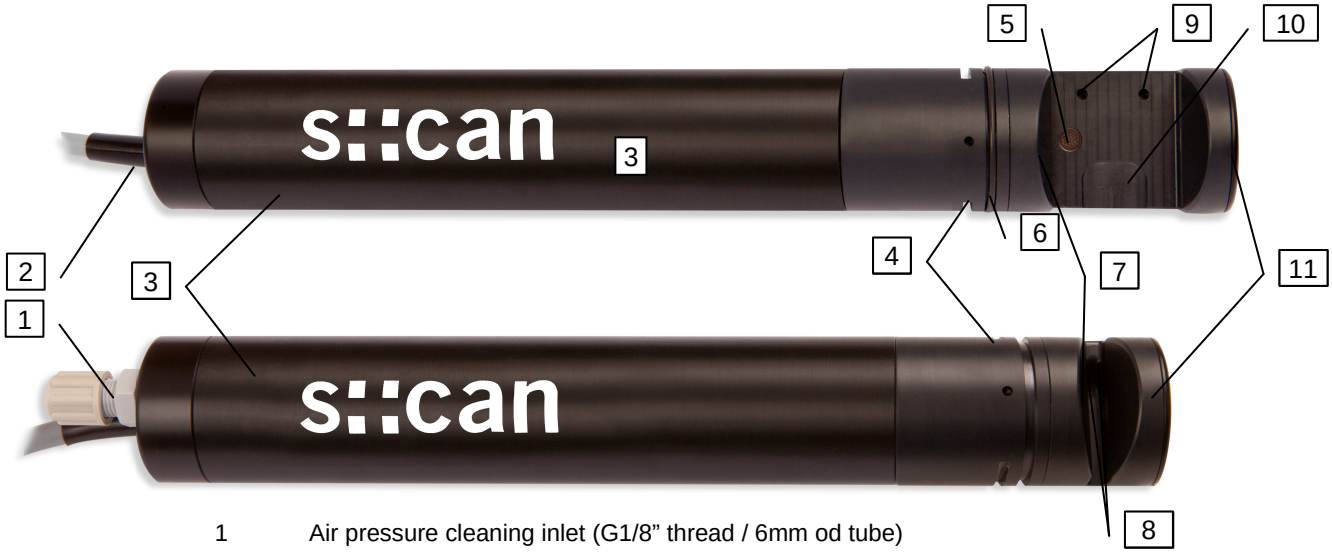
4.4 Device Parts – Overview



1	Air pressure cleaning inlet (G1/8” thread / 6mm od tube)
2	Sensor cable
3	Sensor housing
4	Notch for locking i::scan in flow-cell
5	90 degree scattered light detector
6	O-Ring for flow-cell
7	Transmission window
8	Pressure air cleaning nozzles
9	Mounting thread for air cleaning
10	Parking position for automatic cleaning unit
11	180 degree detector

Fig. 4-1: i::scan overview

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4.5 Device Dimensions

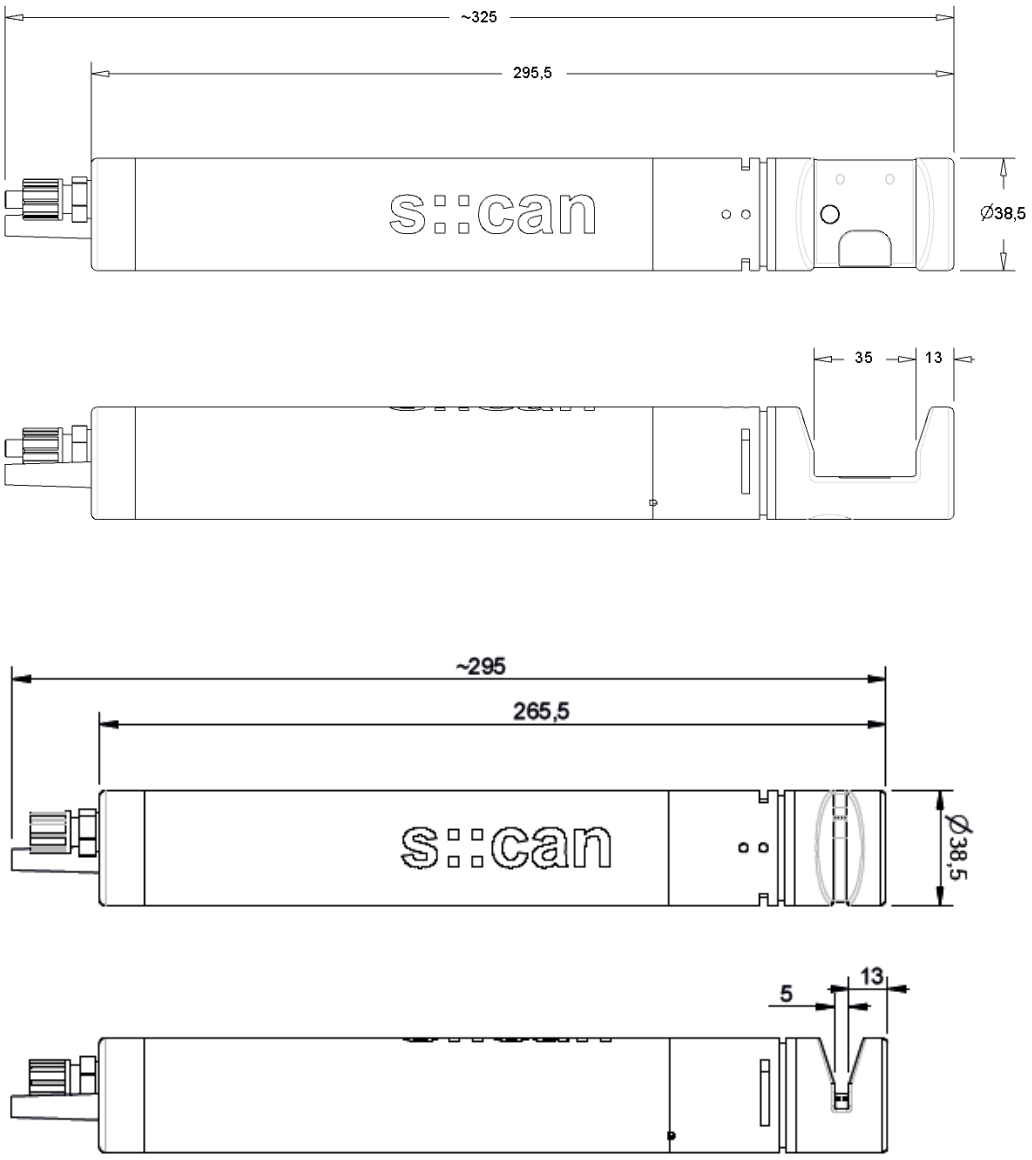

Fig. 4-2: Dimensions (not to scale, for illustration only, in mm)

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5 Storage and Transport

The temperature limits for device storage and transport, which are described in the section Technical Specifications [13], 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.

5.1 Check upon Receipt

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

Following parts should be included in delivery:
- i::scan sensor
- Multifunctional slide (for reference and laboratory use)
- Manual
- Packaging for transport

Following parts are optional:
- Cleaning brushes - 2 pieces (B-60-2 – only for 5mm pathlength)
- Connection set for automatic cleaning (B-41-sensor – only for option -07)
- See [12] for other possible accessories

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

5.2 Return Consignment

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.

6 Installation and Mounting

6.1 Tool- and Material List

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

Always necessary

- For installation of terminals (con::lyte, con::cube, con::nect)
  - Slotted screwdriver (2mm) for terminal block in controllers
  - Pozidrive screwdriver (6mm)
  - Allen screw driver 6mm
- 14mm open-end wrench

Immersed installation with probe carrier and air-pressure

- Air hose 6mm OD as necessary for installation
- 50mm OD PVC tube as necessary for installation
- PVC glue
- Fixing adapter in case no mounting possibility for 50mm tube exists
- F-13-iscan or F-14-iscan or F-15-iscan carrier
- B-42-sensor air cleaning set

Installation in flow-cell (with automatic cleaning)

- Torx T20 for converting between automatic cleaning with motor unit and simple flow-cell
- For mounting of panel and flow cell local requirements have to be checked
- F-46-iscan or F-46-four-iscan
- F-446-m-iscan (with automatic cleaning)

6.2 Choice of the Installation Site

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

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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)
- Availability of sufficient space (probe, sensor, 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 (optional for automatic probe / sensor cleaning)
- Best possible weather and splash water proof set-up
- Shortest possible distances between system components (probe – controller – compressed-air supply – energy supply)
- Best possible layout of cables (non-buckling, working dependability, no damage etc.)

6.3 Mounting

When mounting the s::can i::scan probe, please ensure that it is not possible that the measuring section (optical path) becomes blocked accidentally or by build-up of large particles present in the medium.

- Horizontal orientation (i.e. with measuring windows in vertical position) with the plane face of the measuring section in vertical position. This will ensure that no sedimentation of particles in the measuring section will take place and no gas bubbles will adhere to the measuring windows. The proper usage of an s::can probe carrier or s::can flow cell setup will ensure the correct position.
- Vertical orientation (i.e. with measuring windows in horizontal position) is only possible in applications with sufficient medium flow or automatic cleaning to ensure that no particles can sediment on the lower measuring window and no gas bubble might be captured within the measuring section. The proper usage of an s::can probe carrier will ensure the correct position.
- Flow velocity:
  - < 3 m/s to avoid cavitations and therefore deterioration of measuring quality
  - > 1 m/s when vertically mounted
- Avoid abrasive solids (sand). This is specially important if air-cleaning is used because abrasive solids will eventually damage windows and housing.
- Recommended water level: > 10 cm at horizontal installation
- The probe cable has to be protected appropriately against cuts or damage.
- In case of shallow water and / or low flow velocities the compressed-air cleaning system may swirl up sediments surrounding the measuring site (e.g. at the sewerage bottom). As a result the state of the measuring medium will not be representative of the normal water quality directly after cleaning. To avoid this from happening, the probe should be installed in such a way that the openings of the cleaning nozzles point towards the water surface.

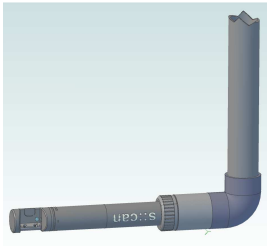

Fig. 6-1: horizontal orientation (measurement windows in vertical position)

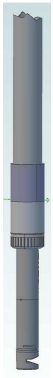

Fig. 6-2: vertical orientation (measurement windows in horizontal position)

Even though the cable entry of the i::scan is equipped with a protective mechanism against forces along the axis of the probe, the probe cable must never bear the weight of the probe!

6.3.1 Preparation for air-cleaning

If air-cleaning is used make sure that the cleaning block is attached to the i::scan (only required for OPL = 35mm). Shorter pathlengths have built-in nozzles and no modifications are necessary.The air-cleaning set consists of

- 2 x Screw

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- 1 x O-Ring
- 1 x Cleaning block 35mm

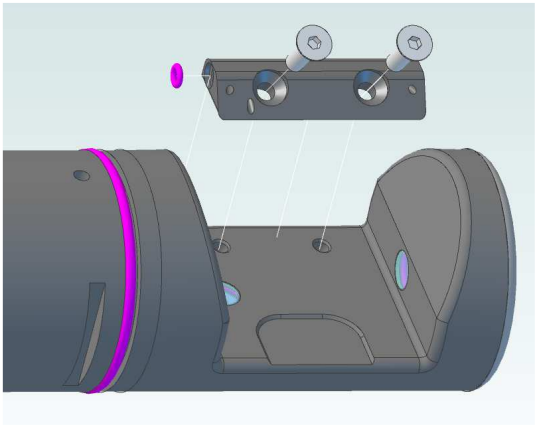

Fig. 6-3: air cleaning block

6.3.2 Mounting with Probe Carrier

The submersed installation of a spectrometer probe using the specific probe carrier (item-no. F-13-iscan, F-14-iscan and F-15-iscan) is performed by the following steps:

1. Normally the carrier is shipped assembled as shown within the circle in Fig. 6-5. In case the carrier is not assembled position the parts as shown in Fig. 6-4 and assemble parts 1, 3, 4, 6. Parts 4 and 6 shall be glued together.
2. Next glue parts 2 and 6 together. Make sure the locking nut [1] is loose.

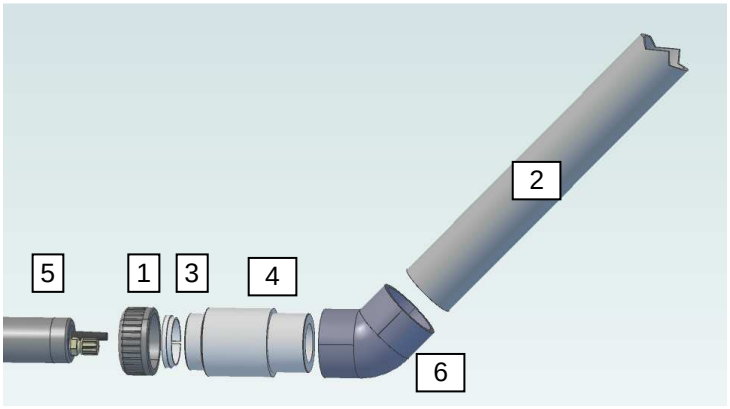

Fig. 6-4: Mounting with probe carrier

3. Subsequently the cleaning hose and the connection cable are inserted into the probe carrier
4. Now slide the i::scan into the carrier and fix it using the lock. The final assembly should look like Fig. 6-5.

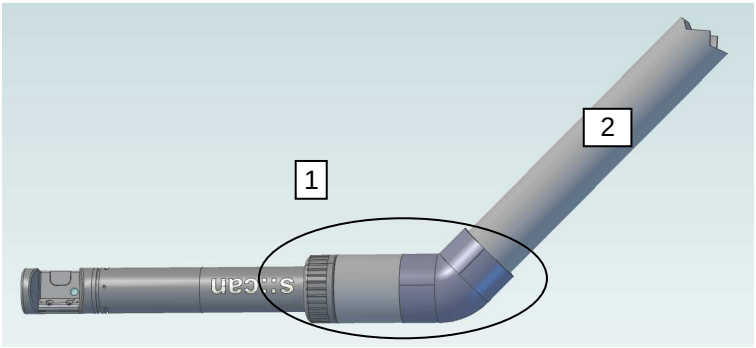

Fig. 6-5: Final assembly in carrier

In case of an horizontal carrier make sure that the measurement path is oriented vertically such that no sedimentation or air bubbles can block the optical path.

The following parts shall be contained in the kit

- Locking nut [1]
- Spacer ring [3]

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- Pre assembled carrier (horizontal, vertical or 45 degree) consisting of two parts [4], [6]. Acutal look might be different due to different carrier version.

Make sure that the sensor is installed such that the flow of water is in the direction as indicated below.
This will avoid clogging and will give the best measurement performance.

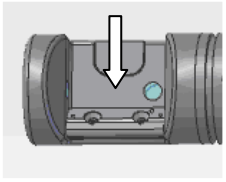


Fig. 6-6: Direction of flow

6.3.3 Mounting in Flow Cell for Tap-Water (F-46-iscan, F-46-four-iscan)

Insert the i-scan into the flow-cell such that you can see the small hole [1] through the hole within the flow-cell [2]. This is the position where the splint [3] can be inserted into the small grooves[4],which secures the i-scan in the flow cell under pressure and at the same time aligns it horizontally to ensure proper flow and proper orientation for the auto brush.

(For removal of the i-scan, insert the splint fully into the hole and use it as a lever).

Make sure that the cover[5] is fully attached.

Two versions of Flow cells are available, with the following parts included.

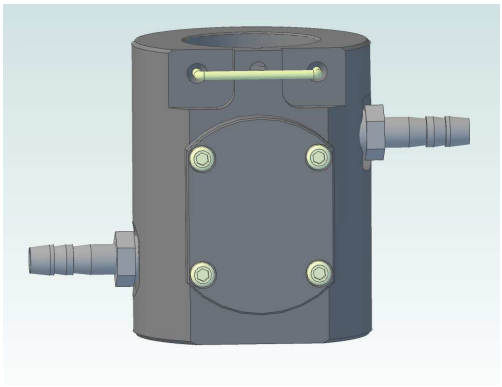
F-46-iscan (single cell for i-scan)

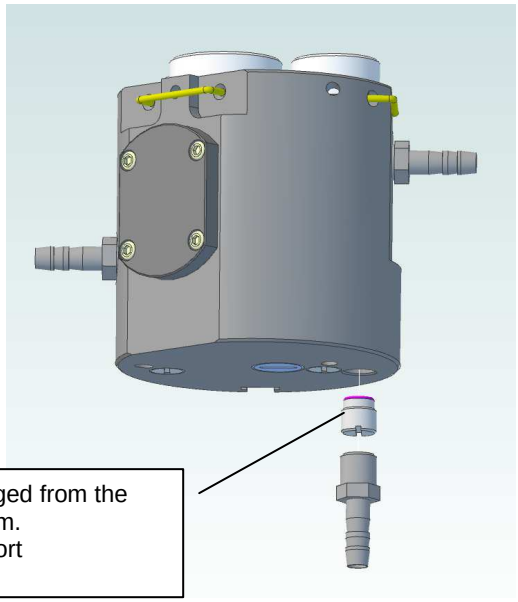
- U-shaped splint [2] (2off)
- Cover (including O-Ring) [5]
- screw PT 40 x 12, TX20 (4off)
- Mounting pod [6] (2off)

F-46-four-iscan (i-scan + 3 sensors)

- U-shaped splint [2] (1off)
- Cover (including O-Ring) [5]
- screw PT 40 x 12, TX20 (4off)
- Mounting pod [6] (2off)

For connection of the water supply use any fittings with G ¼" outside thread. To ensure water proofness you can either use fittings with O-Rings or Teflon tape. Water should flow from bottom to top.





The outlet oft the Flow Cell may be changed from the standard upper right position to the bottom.
Unscrew the plug and fit it to the upper port

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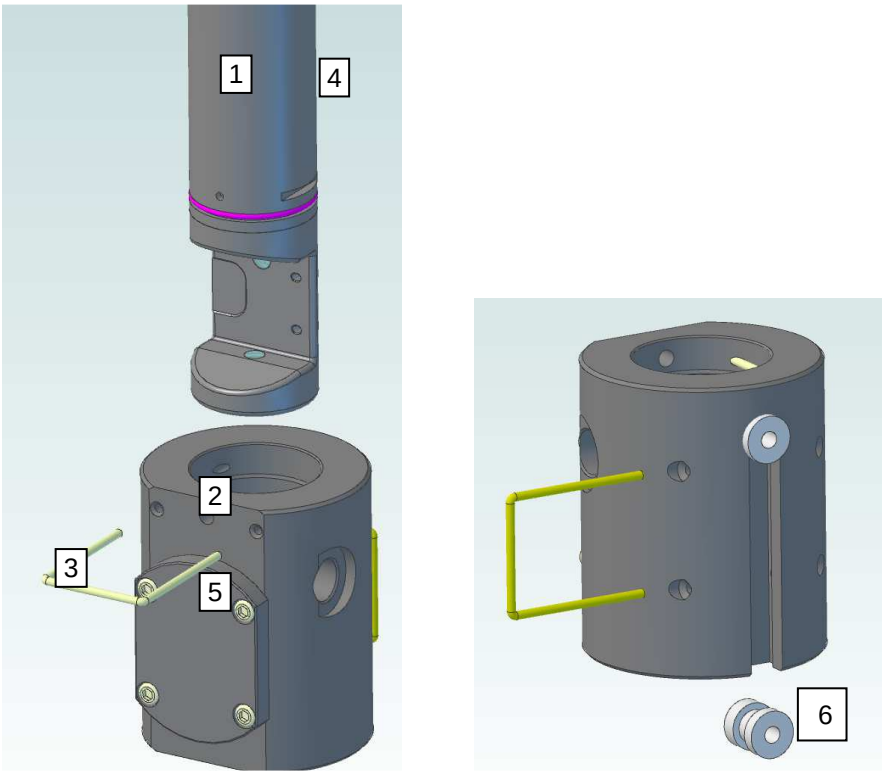

6.3.4 Mounting of F-446-M-iscan (Autobrush)

This installation will provide automatic cleaning for the i::scan using a motorized brush unit. For installation insert the i-scan into the flow-cell such that you can see the small hole [1] through the hole within the flow-cell [2]. This is the position where the splints [3] can be inserted and which will align the i::scan horizontally by the small groovings [4]. Now the automatic cleaning unit can be added. Make sure that it is correctly aligned with the notch [6]. After insertion fasten the lock [7].
After connection the motorized brush unit should be wired to the terminal as shown in Fig. 6-8. The yellow cable (trigger) is connected to valve 2 which is internally connected to the cleaning wire of the sensor or cleaning 2 on the con::cube.
White/brown are the power supply. Instructions are provided for the D-315 con::cube - For other terminals please consult the respective manuals (Flow cell autobrush, …)

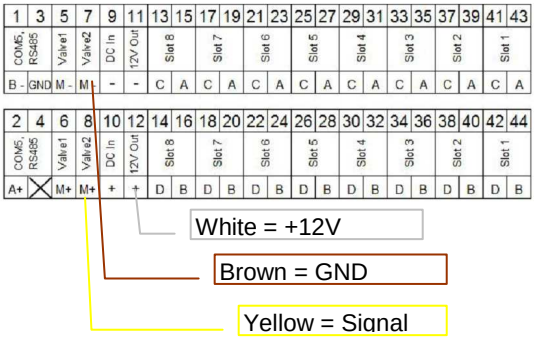

Fig. 6-8: connection of autobrush

The following parts shall be contained in the kit

- F-46-four-iscan
- Mounting bracket
- U-shaped splint
- F-446-1-iscan
    - 2 pieces 12V power supply adapter
    - 1 piece line strainer
    - 3 piece dead spot inserter sensors

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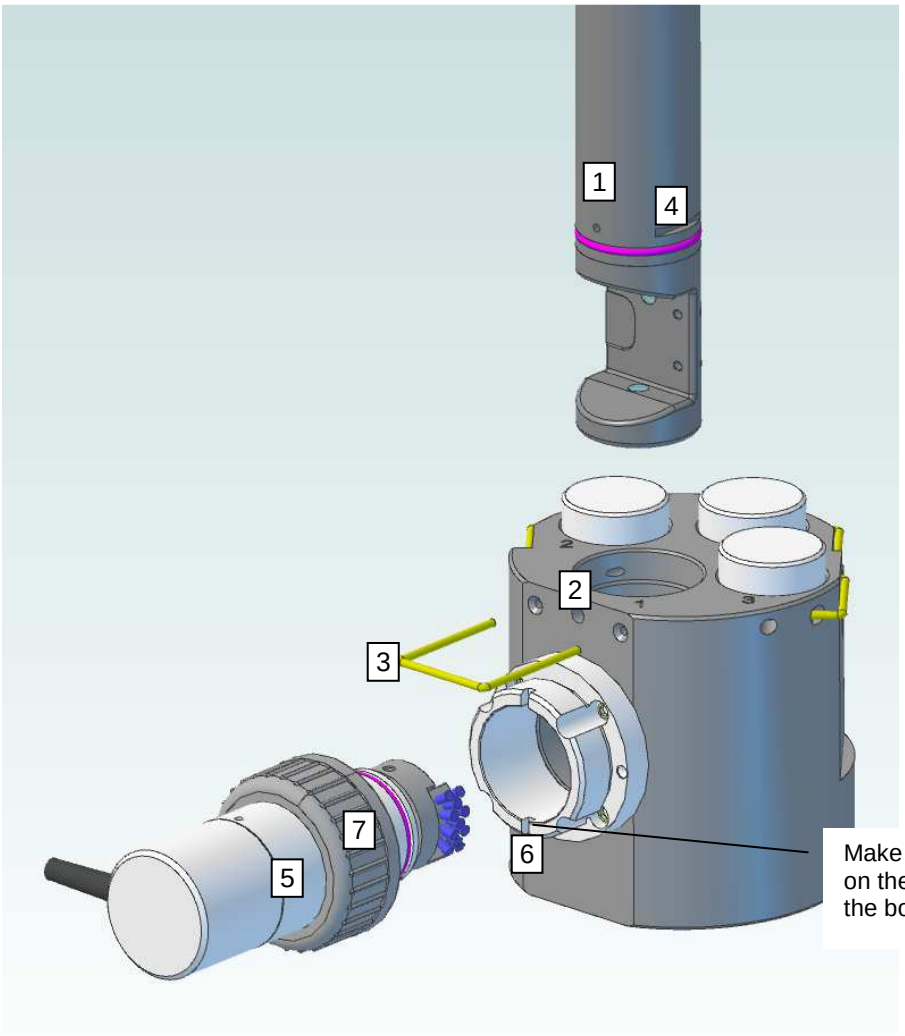
- 1 piece dead spot inserter i::scan
- 1 35mm brush unit i::scan



Make sure that the locating pin on the auto brush unit [5] is at the bottom position

Fig. 6-9: mounting in F-46-four with autobrush cleaning F-446-m-iscan

For assembly always mount the i::scan prior to the autobrush unit.
For disassembly always remove the autobrush unit prior to removing the i::scan.

6.3.5 Integrated flow-restrictor in F-46-four

The flow cell allows installation of an optional flow restrictor. The flow resistor is available with 0,5L/Min and 1L/Min (standard). It is located between flow chambers two and three. Therefore

- Sensors which can operate under line pressure (like condu::lyser) shall be installed in chamber 1 (i::scan) or 2 (Sensors).
- Sensors which are rated below line pressure s (like chlori::lyser) shall be installed in flow chamber 3 or 4. It is important in this case that there is no back pressure on the drain, e.g. open drain going to waste.
- For pH::lyser and Redo::lyser the chamber for mounting is equal.

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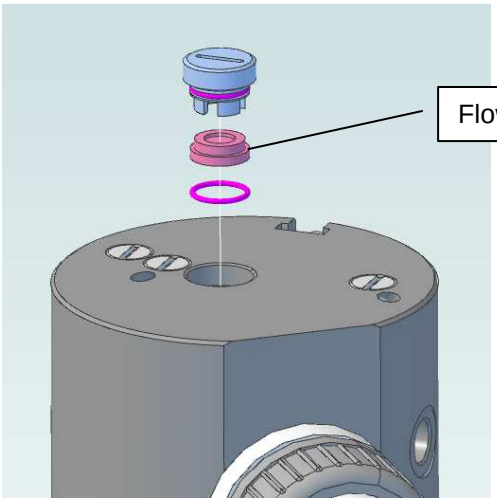


Fig. 6-10: installation of flow-restrictor

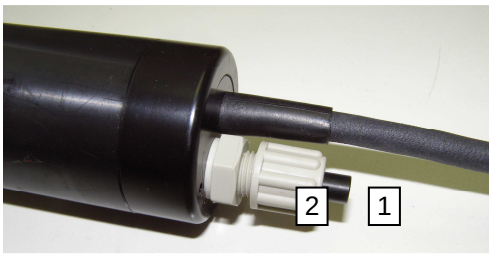
The flow restrictor requires a pressure difference of 1.2 bar. If the inlet pressure is too low the flow restrictor does not work according to the specification.

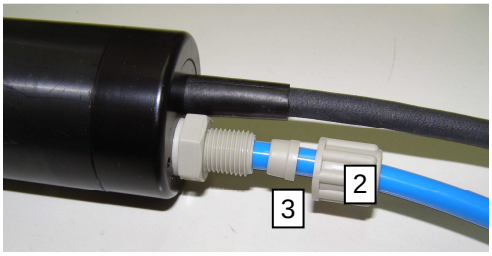
Damaged by over pressure is NOT covered by warranty

6.4 Connection of Automatic Cleaning

The compressed air connection set supplied with the system contains components necessary to connect the probe cleaning located on top of the spectrometer probe to the cleaning valve. The compressed air connection is performed by the following steps (see pictures on the right hand side also):

- Remove dummy insert [1] from pressure connection on top of probe be unscrewing the connecting nut [2].
- Put the connecting nut [2] and the conical part [3] over the cleaning hose.
- Push the cleaning hose over the pressure connection on top of the probe (warm up cleaning hose in hot water if necessary).
- Fasten connecting nut [2] by hand.
- A compressed air hose (to be provided by customer, ID 8 mm to 9 mm, 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).

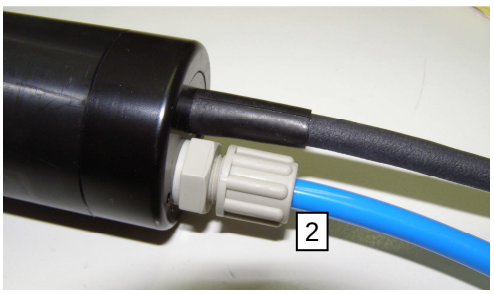




The cleaning valve should never be connected to the compressed air coupling of your compressor directly, i.e. without a pressure hose in between. The total length of hoses should be as short as possible to avoid unnecessary pressure loss.

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 articles, 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 the lowest maximum allowed pressure amongst the individual instruments is to be used to supply all instruments. Alternatively pressure reducing valves to supply each instrument with the correct pressure can be used. In order to ensure proper operation of automatic cleaning s::can highly recommends to use the s::can compressor optimized for compressed air supply of all probes and sensors.

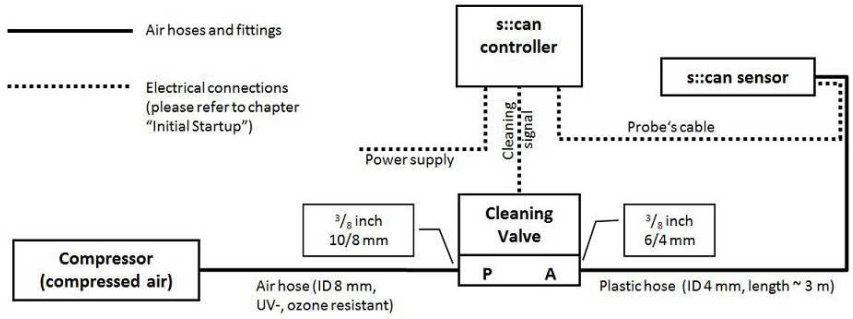


Fig. 6-11 Schematic drawing of cleaning connections

6.5 Connection of i::scan to the Controller

The i::scan 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.

6.5.1 Installation with con::cube, con::lyte and/or con::nect

When a con::cube is available moni::tool/ana::xxx can be run on the con::cube. No further terminals and software installations are necessary.

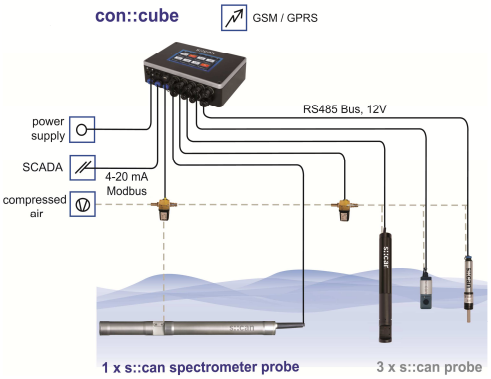


Fig. 6-12: i::scan on con::cube

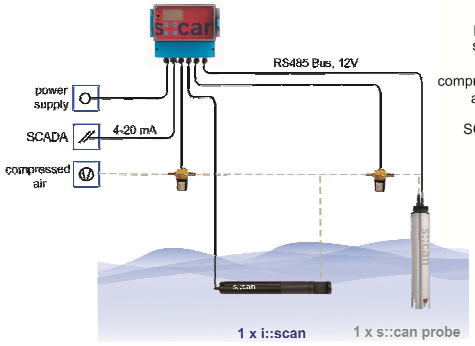


Fig. 6-13: i::scan on con::lyte

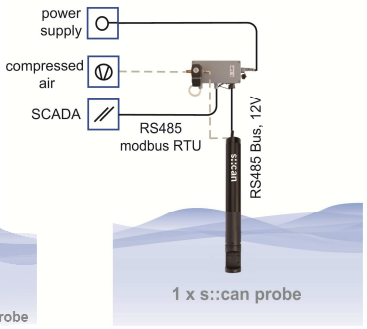


Fig. 6-14: i::scan on con::nect

7 Initial Operation

Once the mounting and installation of the i::scan have been completed and checked the initial operation of the s::can monitoring system will require the following actions, in the order presented below:

- Connect s::can controller to the power supply and wait for the software to boot.
- Perform probe initialisation and parameterisation of i::scan (refer to [7.2.1])
- Parameterisation of automatic cleaning (refer to [7.2.2]).
- 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 i::scan in stable water quality (see chapter [8]).

7.1 Measuring Parameters i::scan

Y01-1-d			**Y01-1-r**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3
Temp	°C	1	Temp	°C	1
Y02-1-d		**Y02-1-df**	**Y02-1-r**		**Y02-1-rf**

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Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
Y03-2-d			**Y03-2-df**			**Y03-2-r**			**Y03-2-rf**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 F	Abs/m	1	UV254	Abs/m	1	UV254 F	Abs/m	1
Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
T10		3	T10 F		3	T10		3	T10 F		3
Y04-2-d			**Y04-2-df**			**Y04-2-r**			**Y04-2-rf**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 F	Abs/m	1	UV254	Abs/m	1	UV254 F	Abs/m	1
Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
T10		3	T10 F		3	T10		3	T10 F		3
Y05-3-d			**Y05-3-df**			**Y05-3-r**			**Y05-3-rf**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 F	Abs/m	1	UV254	Abs/m	1	UV254 F	Abs/m	1
Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3
TOCeq	mg/l	1	DOCeq	mg/l	1	TOCeq	mg/l	1	DOCeq	mg/l	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
T10		3	T10 F		3	T10		3	T10 F		3
Y06-3-d			**Y06-3-df**			**Y06-3-r**			**Y06-3-rf**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 F	Abs/m	1	UV254	Abs/m	1	UV254 F	Abs/m	1
Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3	Turb ISO	FTU	3
Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3	Turb EPA	NTU	3
TOCeq	mg/l	1	DOCeq	mg/l	1	TOCeq	mg/l	1	DOCeq	mg/l	1
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
T10		3				T10		3			
Y08-1-e			**Y08-1-ef**			**Y08-1-i**			**Y08-1-if**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
Y09-2-e			**Y09-2-ef**			**Y09-2-i**			**Y09-2-if**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 f	Abs/m	1	UV254	Abs/m	1	UV254 f	Abs/m	1

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TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3
T10		3	T10 F		3	T10		3	T10 F		3
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
Y10-2-e			**Y10-2-ef**			**Y10-2-i**			**Y10-2-if**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
UV254	Abs/m	1	UV254 f	Abs/m	1	UV254	Abs/m	1	UV254 f	Abs/m	1
TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
T10		3	T10 F		3	T10		3	T10 F		3
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
Y11-3-e			**Y11-3-ef**			**Y11-3-i**			**Y11-3-if**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3
CODeq	mg/l	3	CODfeq	mg/l	3	CODeq	mg/l	3	CODfeq	mg/l	3
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1
Y12-3-e			**Y12-3-ef**			**Y12-3-i**			**Y12-3-if**		
Name	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*	*Name*	*Unit*	*Digits*
TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3	TSSeq	mg/l	3
CODeq	mg/l	3	CODfeq	mg/l	3	CODeq	mg/l	3	CODfeq	mg/l	3
Color T	Hazen	1	Color F	Hazen	1	Color T	Hazen	1	Color F	Hazen	1
Temp	°C	1	Temp	°C	1	Temp	°C	1	Temp	°C	1

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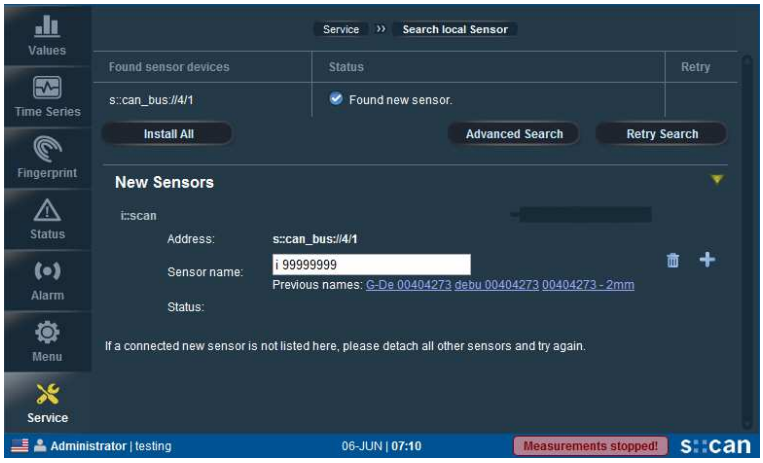
7.2 Probe Operation using moni::tool (From version V1.6)

7.2.1 Probe Search and Probe Initialisation

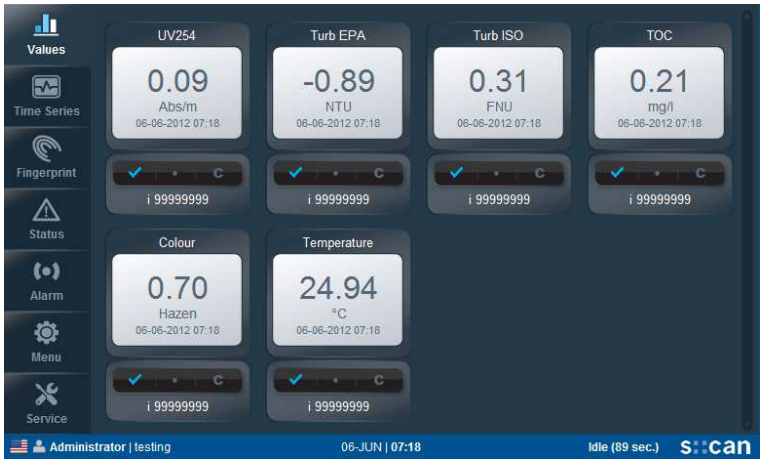
The installation of a new sensor is initiated by clicking on one of the empty sensor symbols on the main Service screen.

If successful a new sensor with the name i::scan should show up in the list of found sensors. You should add the sensor to the list of installed sensors using the "+" sign on the right side.



If the installed i::scan probe provides turbidity measurements, a dialog will pop up asking which of the measured turbidity parameters should be installed. The user can select ISO or EPA. Clicking Cancel, will install both.

The sensor is now installed and you can leave the service mode. You can check the sensor parameter values in the *Values* tab.



7.2.2 Parameterisation of cleaning

As of version 1.6 moni::tool can not yet configure the cleaning functionality on the sensor.
If the integrated cleaning valves are configured it is important to note that the measurement and the cleaning is not synchronized. As this will invalidate the measurements on the sensor the waiting time after cleaning has to be at least two times the measurement interval of the sensor (!). This limitation will be removed with ongoing versions.

The moni::tool version 2.0 supports the cleaning for the i::scan. The i::scan cleaning has to be installed on valve 2 and can be configurated with moni::tool under cleaning device – valve 2. With the moni::tool version 2.0 the measurement and the cleaning is synchronizied.

8 Calibration

At each measurement the i::scan probe detects the absorbance and scattered light at different wavelengths caused by the measured medium. This data is used to calculate different parameters (e.g. COD, COLOUR) based on the global calibration the i::scan is equipped with. Global calibrations are standard algorithms available for specific conditions of typical applications (e.g. river water, drinking water) in such a way, that the i::scan can be used immediately after delivery.

With a local calibration the respective parameters can be adapted to the actual concentrations if required. A local calibration can be performed directly on site without demounting the probe or using standard solutions.

For the best possible results, s::can recommends to check the calibration when commencing operation in the specified application and subsequently perform a check for validity and correctness on a regular basis (please refer to section [11]).

8.1 General Notes for Performing the Calibration

When using calibration standards you have to keep in mind that these standards will always present a different background matrix compared to the real measuring medium. Therefore s::can recommends to use such calibration standards only for checking of sensor integrity and linearity.

- Before performing any kind of sample measurement the cleanliness of the measuring windows should be ensured (please refer to section [11.2]).
- Before performing the sample measurement in-situ, the probe has to be submersed into the medium (at least 5 min.).
- When performing the sample measurement with the multifunctional slide, rinse the slide serveral times with the calibration medium (sample) before measuring the sample. Perform the sample measurement immediately after filling the slide to avoid any effluence due to sedimentation. If you are using the multifunctional slide the i::scan should be rotated after filling to avoid water surface reflections. See [11.1] for more information.
- A sample measurement has to be triggered at the same time the sample for laboratory analysis is taken.
- The result of the laboratory analysis can be entered later.
- 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 a faulty calibration an error message will be displayed to the operator. Please refer to section [14.1] regarding possible error messages and notes for removal.
- On the spectrometer probe itself two sample readings and two corresponding laboratory results can be stored for each parameter. Furthermore the coefficients of the local calibration (offset and slope) are stored onto the probe.

Warning – The current firmware does NOT store the sample results permanently and therefore power cycling invalidates the sample and it is lost. This will be fixed in a later version of the firmware. For now we recommend manually writing down the sample value on a sheet of paper if the calibration process can not be performed immediately. In this case calibration can be performed later using the support tool.

8.2 Parameter Specific Notes for Performing the Calibration

8.2.1 Temperature

Adjustment of the temperature calibration is best performed in-situ against a suitable reference thermometer. The temperature sensor is the only one that can also be calibrated on air. For most of the applications a single point calibration of the temperature sensor is adequate.

8.2.2 Turbidity

Calibration of turbidity shall be performed using formacine standard and in the final installation. Depending on the turbidity values and application we recommend the following procedure:

At higher turbidity values (≥20 NTU or ≥20 FTU) only a span calibration is required. The span calibration can be performed using a formacine standard and the multifunctional slide. The zero points for such a measurement should be valid among a lot of different installations like probe carrier, flow cell and others.

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At low turbidity values not only the span needs to be calibrated but also the offset. Although the offset can be controlled under constant conditions and if a sample chamber is known there can be differences among the installation. If possible at all we recommend performing a two point calibration in the final installation using reference analysis.

If this is not possible we recommend calibration using formacine standard in the final installation and distilled water. The high value is the concentration of the formancine standard which is the same for the ISO 7027 and EPA 180.1 turbidity. For the low value the lab value should be set to 0.02.

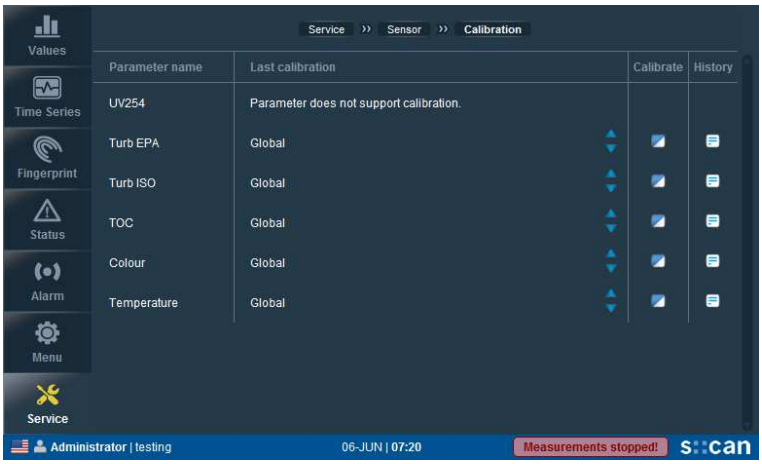
As a last resort we recommend a two point calibration where the high point Is calibrated with a known formacine standard in the multifunctional slide. The low point shall be calibrated in situ by reference analysis or by using distilled water.

8.2.3 Absorption parameters

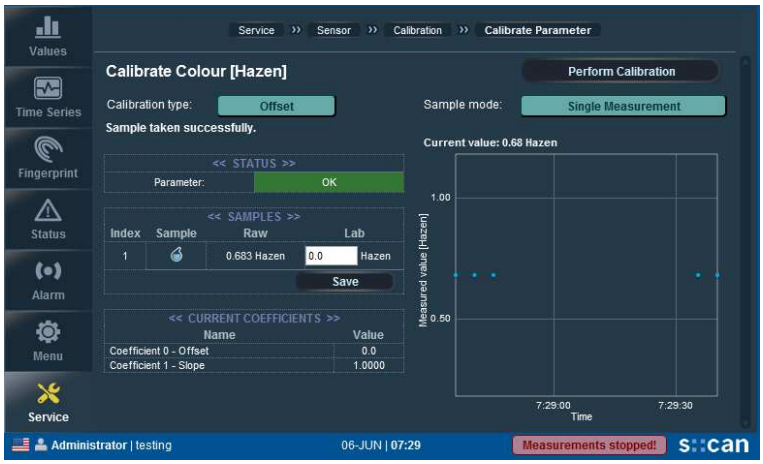
Parameters like TOC, DOC, COLOUR are best offset or linearly calibrated using reference analysis. The supported calibration types are *offset* and *linear*.

8.3 Calibration using moni::tool

This menu item provides the possibility to calibrate a measuring device. The calibration procedure starts by selecting the Parameter that needs to be calibrated.



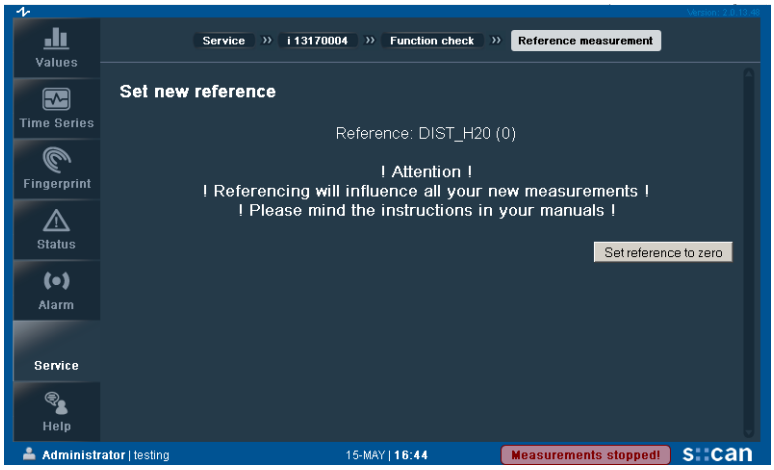
After the parameter is selected push the *Calibrate* button to open the calibration screen. The current parameter readings (Current value) will be displayed in the upper right hand side of the calibration screen. The values are actualized automatically and furthermore, the readings are displayed graphically in the time series (blue) as an indication of the measurement stability.



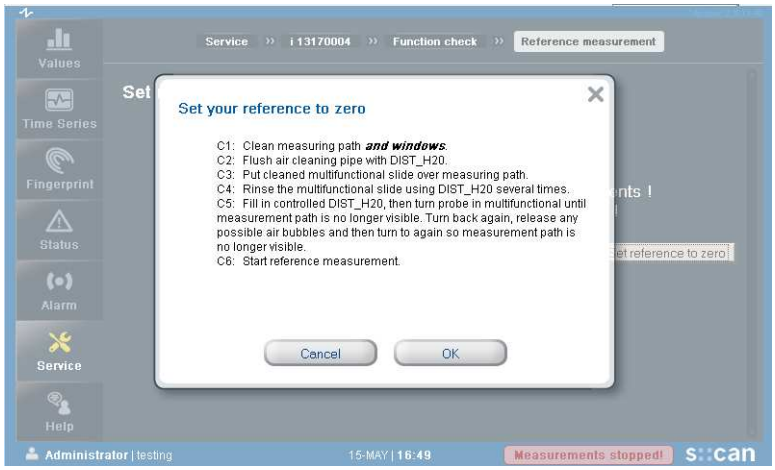
9 Reference (From moni::tool version V2.0)

If necessary you can make a new reference for the i::scan. But keep in mind that a new reference will influence all new measurements! It is very import to use only high quality distilled water!

Push the Button *Set reference to zero* and follow the instruction.



The sensor should be cleaned prior according to the cleaning instructions shown in chapter [11.2]. Also see chapter [11.1] for the step-by-step instruction for makeing a reference. Then press the *OK* to start the reference measurement.



When the measurement was successful the new reference is saved on the i::scan. To control the quality of the reference measurement you can make a function test [10]. When the function check failed – and the i::scan was clean and there were no air bubbles in the slide – you should make a new reference.

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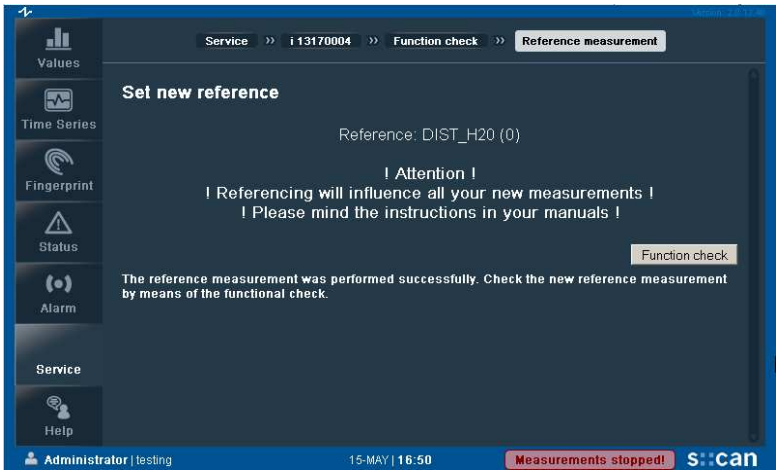
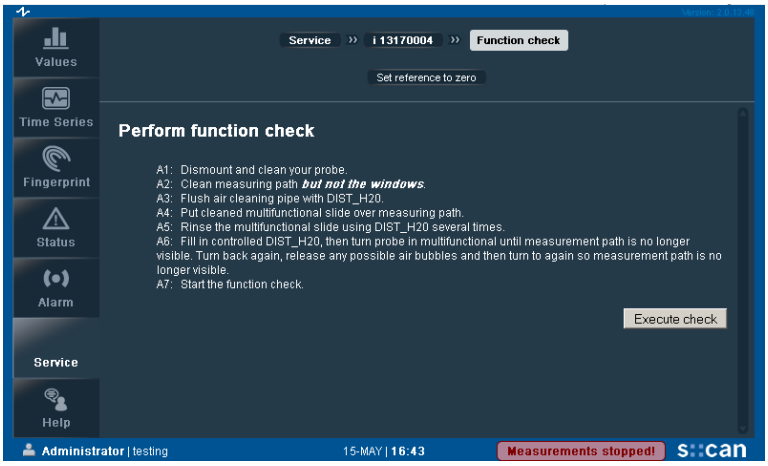


10 Function ckeck (From version V2.0)

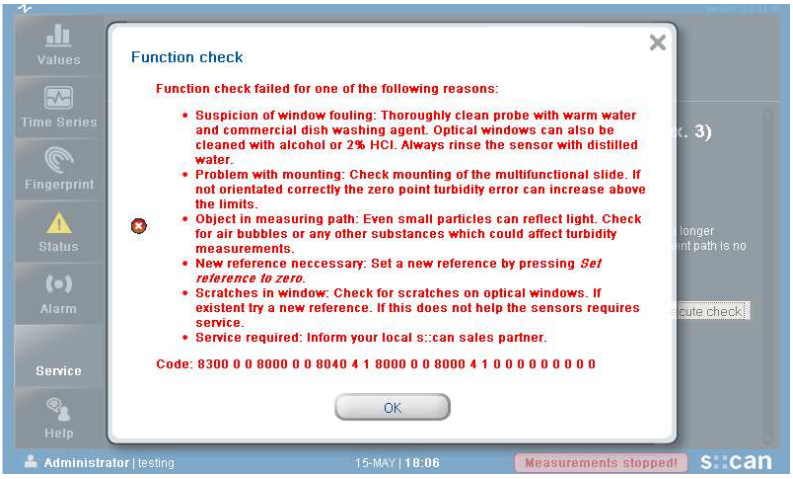
The function check tests the probe against the saved reference on the i::scan.

Follow the instruction, clean the i::scan – but not the windows. The steps A3 – A6 are the same as like the steps for the reference, so you can see also chapter [11.1] for the step-by-step instruction for makeing a reference. **But don't clean the window!**

Then press *Execute check* to start the function check.



After the test has finished the sensor will report its status, which in this example has failed:



Read the possible reasons for the failed function check, press OK and follow the proposals for solution to find the problem. For repeating the function check follow the instruction again – it's the same as before, but you have to clean the windows too.

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When the function check was successful, after failing at the first (and second) time, you get suggestions how you can optimise your station (cleaning interval,...).

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11 Maintenance

11.1 Reference

Before taking a new reference and in case the sensor has been in operation for some time make sure that the sensor is clean. Refer to [11.2] in this case. For a proper reference high quality distilled water has to be used.

- Clean the i::scan with distilled water. Make sure that you clean the measurement path, any screws or threads, the cleaning socket and integrated air hose.
- Use isoproanol or ethanol and a microfiber rag for cleaning the windows. Apply force and wash thoroughly from left to the right side. Wait until all liquids are evaporated and double check that there is nothing left on the windows. If the windows are not perfectly clean try again.
- Clean the i::scan with distilled H_20. Clean the measurement path, any screws or threads, the cleaning socket and the integrated air hose.
- If the sensor has an integrated air cleaning it is important to clean the cleaning path as well because it can become dirty during operation if media back-flows into the air cleaning pipes. For this it is best to remove air cleaning and use a nozzle filled with distilled H_20 to clean it.

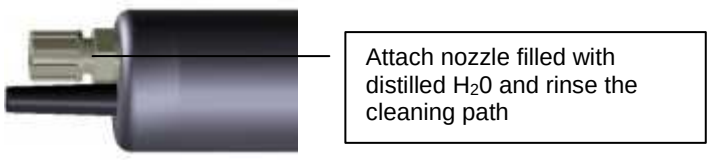

Fig. 11-1: Cleaning of air cleaning path

- Clean the multifunctional slide multiple times using distilled H_20.
- Apply the multifunctional slide and add distilled H_20.

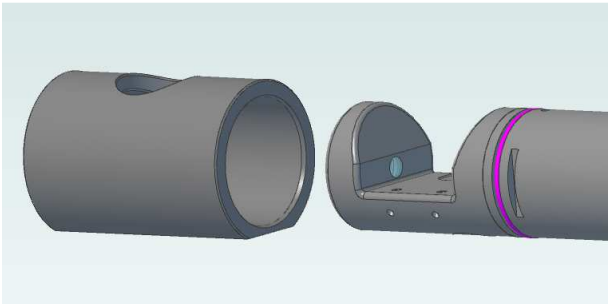

Fig. 11-2 Application of multifunctional slide

- Slowly add distilled H_20 to prevent air bubbles. Double check for air bubbles after filling.
- Slowly rotate the i::scan by 180 degree such that the measurement path can no longer be seen. Rotate back and make sure that all air bubbles are removed. Now rotate again the i::scan by 180 degree. This step is necessary for a high quality turbidity reference cause the water surface reflects the light.

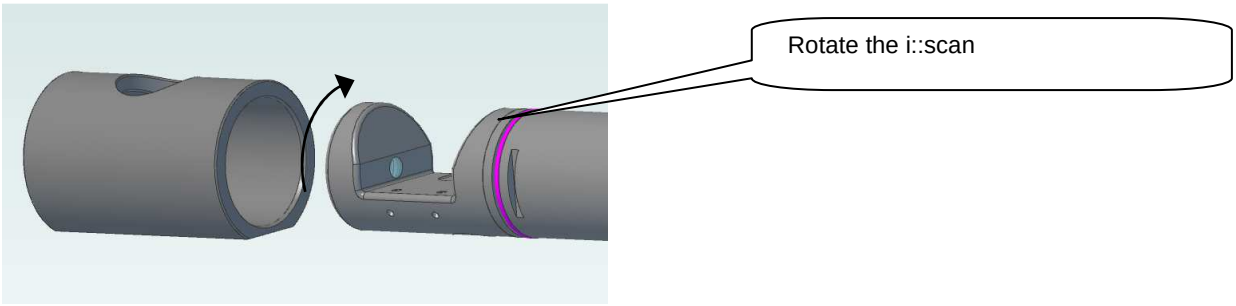

Fig. 11-3 Application of multifunctional slide

- Start the reference measurement. See [9] for more information on this.

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11.2 Cleaning

During routine operation the cleaning of the i::scan probe, i.e. the optical measuring windows of the instrument, is performed automatically either via compressed air system or via rotating brush (autobrush) in the flow cell. To clean the probe manually the following is recommended:

Before demounting the probe be sure that automatic air cleaning is deactivated via operating software and air supply line is depressurised to avoid dirt and / or injury by suddenly escaping pressurized air.

- Rinse sensor with drinking water to remove course deposits.
- Put the probe in a bucket of drinking water (optional 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.

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

The cleaning of the measuring windows is performed using a soft cloth (one that does not leave behind fibres), cotton swabs or paper tissues that are moistened with cleaning liquid before they are applied. Furthermore, cleaning tissues for eye glasses, e.g. available in supermarkets, are suited. For the removal of strongly adhering fouling, s::can cleaning brushes are available.

The use of the following liquids is allowed for cleaning of the windows. The liquids are listed in the order in which they are to be used in case fouling is persistent.

- Water (can be mixed with a commercial liquid dishwashing agent)
- Pure alcohol (Ethanol or Isopropanol)
- s::can cleaning agent
- 3% Hydrochloric acid (HCl) in case of mineral film on the windows

All cleaning liquid must only be applied on the windows using cleaning cloth or tissue. Rinse with distilled water directly after the cleaning. Otherwise the residue of cleaning agents may change the optical characteristics of the windows under UV light and thus lead to a distortion of measurements.

For a proper reference it is important to perform the cleaning process at least twice before measurement.

After every step undertaken in the cleaning process, the measuring compartment must be rinsed with sufficient amounts of distilled water.

12 Spare Parts / Accessories

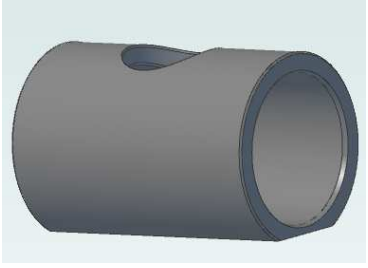
12.1 Pressure Connection Set

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

Name	Specification	Remark
Item-no.	B–41	
Cable length	3 m	
Assembling	ex works	
Material	PU Nickel-plated brass	tube connection fitting
Process connection	$^{3}/_{8}$ inch	
Operating pressure	14.5 to 87 psi	1 to 6 bar

12.2 Multifunctional slide

For easy and proper functional check and reference measurements of the spectrometer probe a multifunctional slide is available.



Name	Specification	Remark
Item-no.	E-431-1	
Material	POM-C	
Dimensions	d 50 x 73 mm	
Volume	28 ml	With i::scan
Weight	50g	

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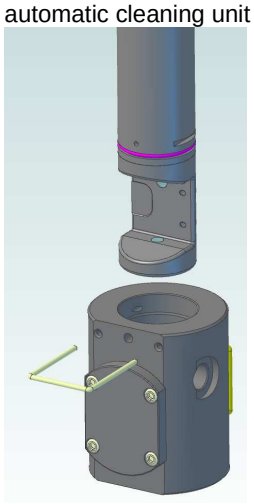
12.3 Cleaning brushes

For easy and proper manual cleaning of the measuring windows of the spectrometer probes specific brushes are available. They are especially suited for mechanical removal of persistent window fouling.

Name	Specification	Remark
Item-no.	B-60-2	Only allowed for <= 5mm path length
Dimensions		

12.4 Flow-cell setup tap water

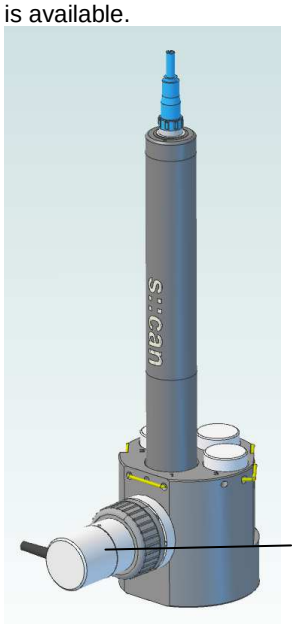
For measurement of sample stream outside the medium with a i::scan probe. An optional automatic cleaning unit can be installed as well.



Name	Specification	Remark
Item-no.	F-46-iscan	
Material	POM-C	
Dimensions	d 70 x 86 mm	
Weight	270 g	
Process connection	G ¼”	
Installation / mounting	2 slide-on brackets	
Operating pressure	0 to 6 bar (0 to 87 psi)	

12.5 Multi sensor flow-cell setup tap water

For measurement of sample stream outside the medium with a i::scan probe in such applications, where fouling of the measuring windows may occur and automatic cleaning is not sufficient or not applicable, a separate flow-through installation with an automatic brush is available.



Name	Specification	Remark
Item-no.	F-46-four-iscan	
Material	POM-C	
Dimensions	D 106 x 103 mm	
Weight	1kg	
Power Supply	10.5 to 13.5 VDC 1,2W	Separate Auto-brush unit
Process connection	G1/4”	
Installation / mounting	2 slide-on bracketts	
Operating temperature	0 to 40 °C (32 to 104 °F)	
Operating pressure	0 to 6 bar (0 to 87 psi)	
Flow-restrictor 1l/min	F-45-flow-1-insert	

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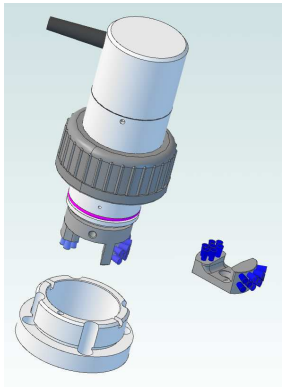
12.6 Auto-brush unit

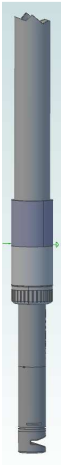
Automatic cleaning unit for use with Flow-cells F-46-iscan and F-46-four-iscan



Name	Specification	Remark
Item-no.	F-446-m-iscan	Mounting adapter included
Material	POM-C	
Dimensions	d 60 x 128 mm	
Weight	250 g	
Power Supply	12V 1,2W	from controller
Replacement brush	F-446-brush-iscan	

12.7 i::scan Probe Mounting (vertical)

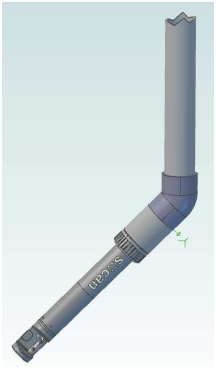
For proper, horizontal submersed installation of the i::scan probe a seperate probe carrier is available. This part can be extended by a pipe (to be provided by the customer), if necessary. For length > 1 m stainless steel pipes are preferred



Name	Specification	Remark
Item-no.	F-14-iscan	
Material	PVC	
Dimensions	d 58 x ~155 mm	
Weight		

12.8 i::scan Probe Mounting (45 degree)

For proper, 45 degree submersed installation of the spectrometer probe a seperate probe carrier is available. This part can be extended by a pipe (to be provided by the customer), if necessary. For length > 1 m stainless steel pipes are prefered.



Name	Specification	Remark
Item-no.	F-15-iscan	
Material	PVC	
Dimensions	d 58 x ~180 mm	
Weight		

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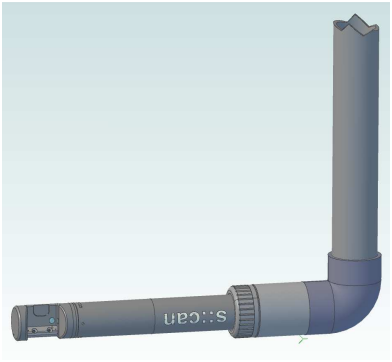
12.9 i::scan Probe Mounting (horizontal)

For proper, vertical submersed installation of the spectrometer probe a seperate probe carrier is available. This part can be extended by a pipe (to be provided by the customer), if necessary. For length > 1 m stainless steel pipes are prefered.



Name	Specification	Remark
Item-no.	F-13-iscan	
Material	PVC	
Dimensions	d 58 x ~170 mm	
Weight		

12.10 Fixing adapter

For proper and easy mounting of installation pipes onto the railing a seperate fixing adapter carrier is available.

Name	Specification	Remark
Item-no.	F-15	
Material	Stainless steel	
Dimensions	158 / 267 / 73 mm	
Weight	Approx. 2,6 kg	
Process connection	ID 50 mm	
Installation/mounting	OD up to 64 mm	

12.11 Extension cable

Name	Specification	Remark
Item-no.	C-210-sensor C-220-sensor	
Cable length	10 m 20 m	
Assembling	ex works	
Material	PUR	
Environmental rating	IP68	Rating only valid if plugged

12.12 Connection cable

Name	Specification	Remark
Item-no.	C-1-010-sensor	
Cable length	1 m	
Assembling	ex works	
Material	PU	
Environmental rating	IP 68	Rating only valid if

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For sensor with a plug this cable can be used to connect the sensor to a terminal

plugged

13 Technical Specifications

13.1 All variants

Name	Specification	Remark
Device specification		
Housing material	PEEK, POM-C	
Material other	Saphire, Fused Silica, PVC, PA	
Cable length (If option -075)	7,5m	
Cable type (If option -075)	PUR (11Y, flame-resistant)	
Power supply	10V - 18V	
Power consumption (typical)	20mA @ 12V	Measuring Interval 5 min
Power consumption (max.)	200mA @ 12V	
Power consumption (min.)	9mA @ 12V	
IP rating	IP 68	
Installation / mounting	Immeresed or flow-cell	
Memory	512MB factory fitted	
Data transfer	MODBUS/RS485	
Digital interfaces	Digital control signal cleaning Low = < 1V High = > 0.9 * VSUP @ 100k load	
Conformity - EMC	According to 2004/108/EC EN 61326-1 EN 61326-2-3	
Conformity - safety	-	
Operating condition		
Operating temperature limits	0°C - 45°C	Non freezing media only
Operating pressure limits	-0,2Bar - 6Bar	
Min. flow rate	> 1m/s (immersed)	
Max. flow rate	< 3m/s (immersed)	
Automatic air cleaning		
Allowed pressure range	4 - 6 Bar	
Recommended duration	2 seconds, 20 seconds waiting time	
Recommended interval	Application dependent, Starting value approx. every 15 minutes.	
Automatic brush cleaning		
Allowed pressure range	F-446-m-iscan + F-46-iscan	
Recommended duration	5 seconds, 10 seconds waiting time	
Recommended interval	application dependent, Starting value approx. every 5 minutes.	
Manual cleaning		
allowed substances	alcohol, isopropanol, HCL 2%	

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Name	Specification	Remark
prohibited substances	strong acids, oxidising substances	
Storage		
Temperature limits	-20°C - 60°C	
Humidity limits	IP 68	
Typical lifespan (application)	1 year service, 3 year instrument	
Typical life time (storage)	3 year	

13.2 YXX-1/2/3/4/5/6-d/r-xxx (OPL = 35mm)

Name	Specification	Remark
Weight (excl. cable / total)	330 g / 780 g	
Dimensions	38,5 x 296 mm	

The parameters below can be verified in the according standard for precision and accuracy. Performane in target application can be different depening on the background.

Measuring parameter EPA 180.1	
Measuring principle	90 degree scattered light
Measuring range	0 - 800 NTU
Compensation	dual-beam and 180° path
Response time	measurement interval
Resolution	0,001 NTU
Precision (3 x σ)	0,05 NTU
Accuracy (without offset adjustment)	0.8 NTU or +-7%

Measuring parameter ISO 7027	
Measuring principle	90 degree scattered light
Measuring range	0 - 800 FNU
Compensation	dual-beam and 180° path
Response time	measurement interval
Resolution	0,001 FNU
Precision (3 x σ)	0,05 FNU
Accuracy (without offset adjustment)	1.5 FNU, +-2.5%

Measuring parameter Colour (Hazen Standard)	
Measuring principle	Absorption
Measuring range	1 - 70 mg/l
Compensation	dual-beam
Response time	measurement interval
Resolution	0,01 mg/l
Precision (3 x σ)	0,1 mg/l
Accuracy (without offset adjustment)	1 mg/l or +-2,5%

Measuring parameter TOC (KHP Standard)

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Measuring principle	Absorption
Measuring range	0,1 - 25 mg/l
Compensation	dual beam
Response time	measurement interval
Resolution	0,01 mg/l
Precision (3 x σ)	0,03 mg/l
Accuracy (without offset adjustment)	0,3mg/l or +-3%

Measuring parameter UV254 (KHP Standard)

Measuring principle	Absorption
Measuring range	0 - 60Abs/m
Compensation	dual beam
Response time	measurement interval
Resolution	0,015 Abs/m
Precision (3 x σ)	0,03 Abs/m
Accuracy (without offset adjustment)	0,3 Abs/m or +-10%

Measuring parameter Temperature

Measuring principle	Semiconductor
Measuring range	-20°C - 70°C
Compensation	None
Response time	measurement interval
Resolution	0,0625°C
Precision (3 x σ)	0,0625°C
Accuracy (without offset adjustment)	0,5°C (0°C-65°C) 1°C (-20°C - 70°C)

13.3 YXX-8/9/10/11712-e7i-xxx (OPL = 5mm)

Name	Specification	Remark
Weight (excl. cable / total)	approx. 310 g / 760 g	
Dimensions	38,5 x 266 mm	

The parameters below can be verified in the according standard for precision and accuracy. Performane in target application can be different depening on the background.

Measuring parameter Colour

Measuring principle	Absorption
Measuring range	7 - 350 mg/l
Compensation	dual-beam
Response time	measurement interval
Resolution	0,07 mg/l
Precision (3 x σ)	0,7 mg/l
Accuracy (without offset adjustment)	7 mg/l or +-2,5%

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Measuring parameter COD (KHP standard)	
Measuring principle	Absorption
Measuring range	0 - 450 mg/l
Compensation	dual beam
Response time	measurement interval
Resolution	0.035 mg/l
Precision (3 x σ)	0.105 mg/l
Accuracy (without offset adjustment)	5 mg /l or +/- 2.5 %

Measuring parameter TSS	
Measuring principle	Absorption
Measuring range	0 - 1000 mg/l
Compensation	dual beam
Response time	measurement interval
Resolution	0.09 mg/l
Precision (3 x σ)	0.25 mg/l

Measuring parameter UV254 (TOC standard)	
Measuring principle	Absorption
Measuring range	0 - 420Abs/m
Compensation	dual beam
Response time	measurement interval
Resolution	0,105 Abs/m
Precision (3 x σ)	0,21 Abs/m
Accuracy (without offset adjustment)	2,1 Abs/m or +-10%

Measuring parameter Temperature	
Measuring principle	Semiconductor
Measuring range	-20°C - 70°C
Compensation	None
Response time	measurement interval
Resolution	0,0625°C
Precision (3 x σ)	0,0625°C
Accuracy (without offset adjustment)	0,5°C (0°C-65°C) 1°C (-20°C - 70°C)

14 Trouble Shooting / Service

14.1 Common Problems

14.1.1 Turbidity values are wrong

Special care has to be taken for obtaining correct turbidity measurements. Because the sensor is constructed without a special sampling chamber reflections from nearby surfaces or inproper installation can be a problem. Especially the following things have to be considered:

Do not use the measurement values in air. The refractive index between air and the windows is complety different and results are not representative.

English
Deutsch
Appendix

If mounted in a special flow cell or if automatic cleaning units are applied they can create additional reflections. To account for these we recommend an offset calibration by sample and lab analysis. The sample should be taken in its final installation.

14.1.2 Turbidity measurements too noisy or NaN

In case turbidity measurements are too noisy the first thing to check is the installation. Make sure there are no air bubbles. To test if the sensor is working correctly you can always apply the multifunctional slide and measure the turbidity level without any flow. The turbidity values in this case will drift, for example if you are using formancine standard because the sediments will settle down.

If the turbidity values are NaN then most likely the reference is not valid. This can happen are very low turbidity values. The reference contains a correction term for stray light which directly couples into the 90 degree detector from the transmission window. Although very small the sensor has to refuse turbidity calculation if this correction term is no longer valid. If the problem can not be solved by a new reference please contact s::can.

Good results for turbidity measurements should look similar to

Fig. 14-1 Example for good turbidity measurement with expected noise levels in drinking water

Note: In the current generation noise levels for EPA 180.1 turbidity are higher than for ISO 7027 turbidity measurements. This will be resolved in future generations.

14.1.3 Sensor values are drifting

If measurements are suspected to drift first automatic cleaning should be checked. If no cleaning was available install air cleaning or automatic cleaning. For verification we recommend taking out the sensor of operation and verifying values in distilled water. Parameter values and turbidity values should show zero levels. If this is not the case the sensor should be cleaned according to [11.2] and a function check should be performed with moni::tool version 2.0 [10] or with the service tool. If cleaning does not help a new reference can be taken.

14.2 General 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.

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.

Error	con::lyte	ana::xxx	Moni::tool	Reason	Removal
ES 007				No communication	Dis- and reconnect sensor. Reinstall sensor
ES 100	0001 yyyy zzzz	Device error 0000 0000 0000 0001		Hardware error	Dis- and reconnect sensor.

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Error	con::lyte	ana::xxx	Moni::tool	Reason	Removal
ES 100	0002 yyyy zzzz	Device misuse 0000 0000 0000 0010		Device operation outside the specification	Check measuring medium. Check power supply of sensor.
EP 100	xxxx 0001 zzzz	0000 0000 0000 0001		General error	Is set when the parameter result is NaN. See specific error codes.
EP 100	xxxx 0002 zzzz	0000 0000 0000 0010		Hardware error	Dis- and reconnect sensor. If problem persists contact s::can
EP 100	xxxx 0004 zzzz	0000 0000 0000 0100		Config error	Selected new global calibration. Update firmware
EP 100	xxxx 0010 zzzz	0000 0000 0001 0000		Calibration not okay	Switch parameter back to global. Retry calibration.
EP 100	xxxx 0020 zzzz	0000 0000 0010 0000		Parameter not ready	Parameter not yet ready. Wait or reduce averaging in case its enabled.
EP 100	xxxxx 8000 zzzz	1000 0000 0000 0000		Parameter out of range	Check measuring medium and optical path. Check calibration. Perform function check

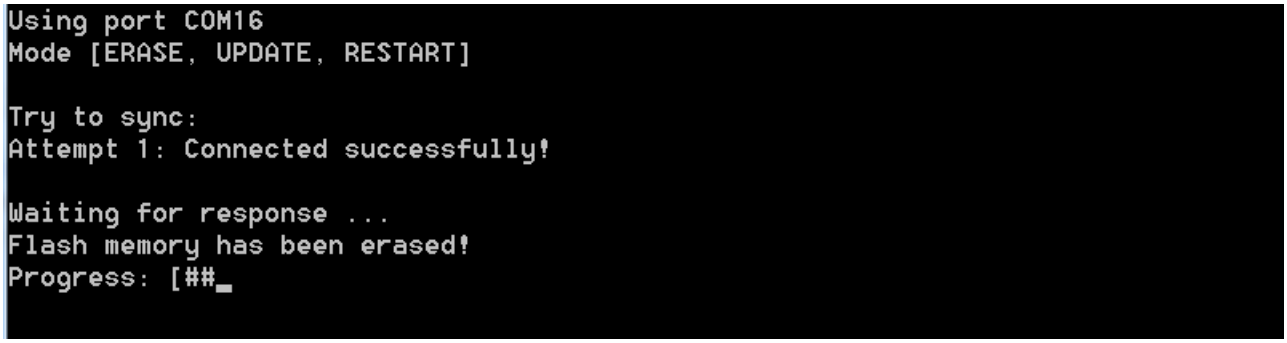
xxxx ….. Device Status (bmDeviceStatus)
yyyy ….. Parameter Status general (bmParaXStatus)
zzzz ….. Parameter Status individual (bmParaXPrivStatus)

14.3 Instruction for Sensor Software Update (Firmware update)

14.3.1 Con::nect using PC

The following section explains the procedure for updating the operating software of the i::scan using a PC / notebook and a s::can connect.

- Connect the con::nect to the power supply.
- Connect the con::nect to your host computer using the supplied USB cable.
- Execute the batch file supplied with the firmware (iscan_console_v04_120605.bat or iscan_console_v04_120605-x64.bat). Two versions are available to account for 64-bit versions of Microsoft Windows.
- Select the correct COM-port and press “OK”
- Now connect the sensor. The software should automatically detect the sensor and should start upgrading the firmware.

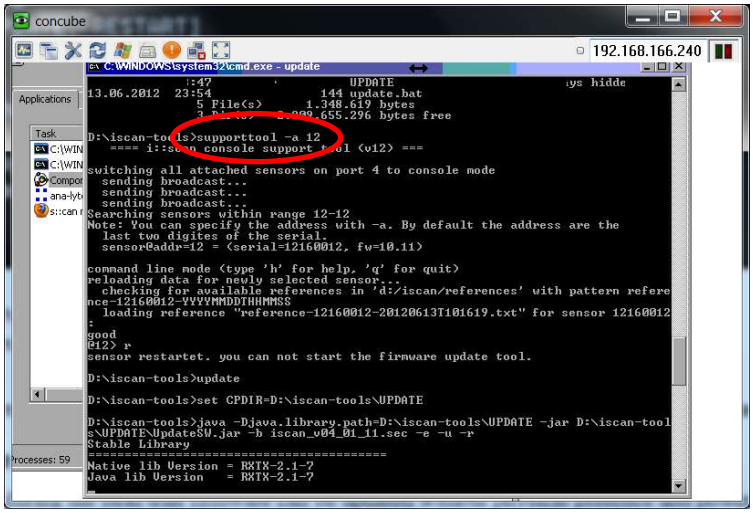


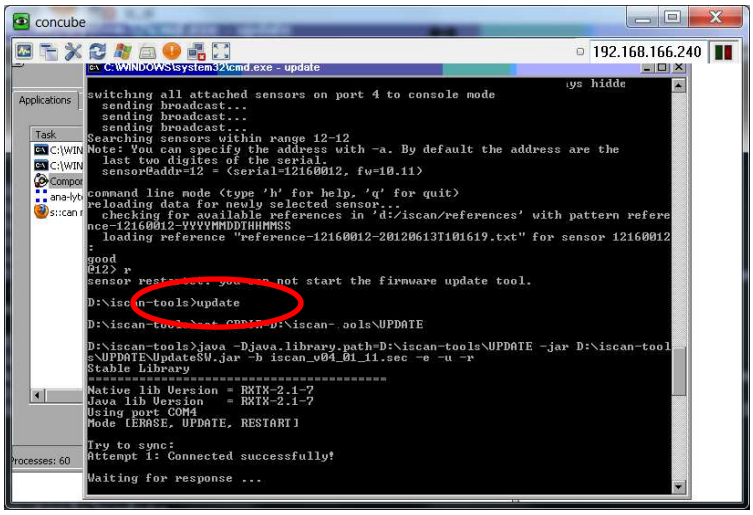
- After the firmware has been updated the sensor will start automatically.
- Then close the command line window.

In case of any problems during the software update or any other questions please contact your local s::can sales partner.

14.3.2 Con::cube

On the con::cube and during the field trial firmware can be updated without physical presence and power cycling. Start a remote connection using VNC and start the support tool and execute the command *r*. Afterwards immediately excute the update.bat *batchfile* and the firmware update process will start.





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