s::can
Intelligent. Optical. Online.

Manual

con::cube V1.0

April 2011 Release

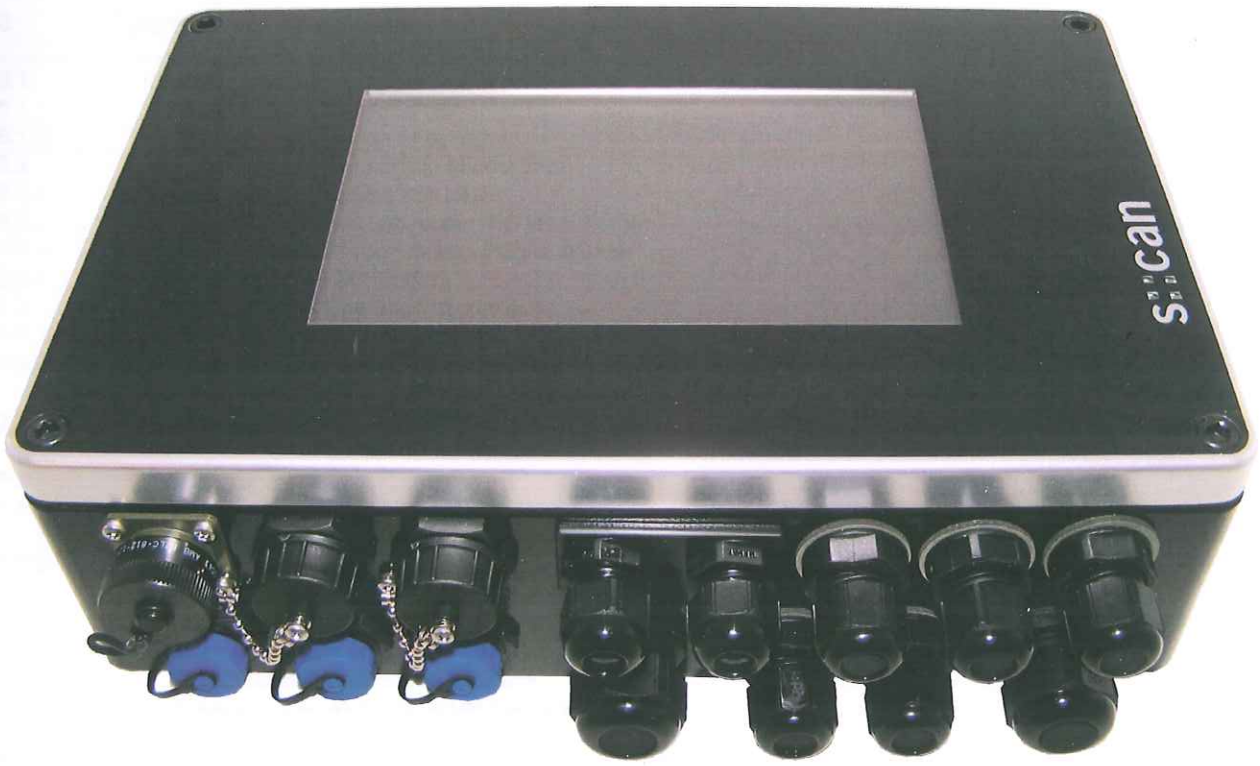


Table of Contents

1 General

This manual contains, firstly, general information (chapter 1) and safety guidelines (chapter 2). The next chapter (chapter 3) provides a technical description of the s::can product itself as well as information regarding transport and storage of the product. In further chapters the installation (chapter 4) and the initial startup (chapter 5) are explained. Furthermore information regarding operation 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 ducument.

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

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

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

2 Safety Guidelines

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

For proper initial operation of complete s::can measuring systems, the s::can manuals for the controller (con::lyte, con::stat, con::cube or PC / notebook with con::nect), the operating software (ana::lyte, ana::pro or moni::tool) as well as the connected spectrometer probes, ISE probes and sensors have to be consulted.

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

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

2.1 Declaration of Conformity

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

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

2.2 Special Hazard Warning

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

3 Technical Description

3.1 Intended Use

The con::cube is an high-performance, power efficient industrial computer for on-line operation of s::can spectrometer probes (G-Series and spectro::lyser) as well as s::can ISE probes (e.g. ammo::lyser) and all other s::can sensors (e.g. pH::lyser, oxi::lyser). Furthermore readings of third party sensors can be integrated via standard interfaces. Once connected to probes and sensors the con::cube fullfils all tasks of a complete monitoring station due to the following scope of functions:

- Numerical and graphical display of the readings from the connected measuring devices
- Simple initialisation of spectrometer probes, ISE probes and sensors
- Simple initialisation and parameterisation of s::can infrastructure (e.g. automatic cleaning devices)
- Parameter calibration of spectrometer probes, ISE probes and sensors
- Storage of measurement results and all other station information in a local database

- Transfer of measurement results via Modbus RTU/TCP interface
- Transfer of measurement results via analog outputs (optional)
- Transfer of measurement results via Profibus DP interface (optional)
- Transfer of measurement results via SDI12 interface (optional)
- Transfer of measurement results via FTP file transfer
- Potential free digital output relay triggered by current reading (optional)

- Integration of external sensor signals via RS485 input
- Integration of external sensor signals via analog input (optional)
- Integration of external sensor signals via digital input (optional)
- Integration of external sensor signals via SDI12 input (optional)

- Network connectivity via ethernet, WLAN or optional G3 modem
- Network connectivity with GPRS/UMTS or CSD (circuit switched data dialin)
- Remote control of s::can monitoring station via ethernet, WLAN or optional G3 modem
- Data synchronisation to central data collection systems via ethernet, WLAN or optional G3 modem
- Display of current and historical readings
- Alarming depending on water quality monitored
- Triggering depending on water quality monitored

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

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

3.2 Functional Principle

The con::cube is equipped with an operation software (moni::tool) that can be operated via a color graphical display with touch functionality. The software starts automatically when the con::cube is powered up. The con::cube collects readings for probes and sensors using a digital bus connection. It displays the data, stores all information and makes it available for further use.

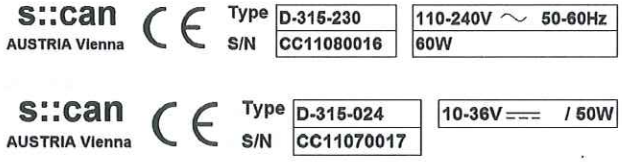
3.3 Product

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

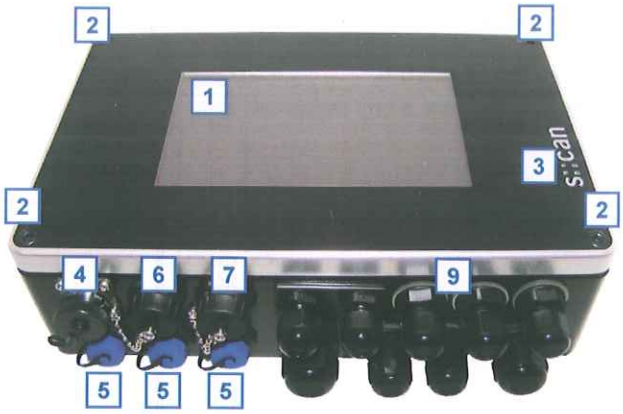
Type	Specification
D-315-230	Station control terminal with 110-240 VAC, 50-60 Hz power supply
D-315-024	Station control terminal with 10-36 VDC power supply
D-315-touch	Display and touch screen input module
D-315-3G-xx	3G modem (eu ... Europe / us ... USA)
D-315-out-mA	2 analog outputs (max. 8 modules / 16 outputs possible)
D-315-out-relay	4 digital outputs (max. 1 module / 4 outputs possible)
D-315-out-Profibus	Profibus DP (output module)
D-315-out-SDI12	SDI 12 (output module)
D-315-in-mA	2 analog inputs for integration of third party readings (max. 8 modules / 16 inputs possible)
D-315-in-relay	2 digital inputs for integration of third party readings (max. 7 modules / 14 inputs possible)
D-315-in-SDI12	SDI 12 for integration of third party readings (input module)
D-303	Licence MS-WindowsXP embedded (fix installed OS)

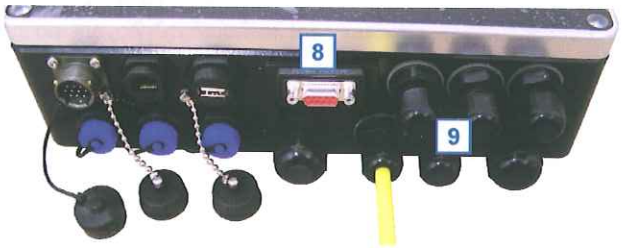
The device is typified by a type label, as shown on the right, that contains the following information:

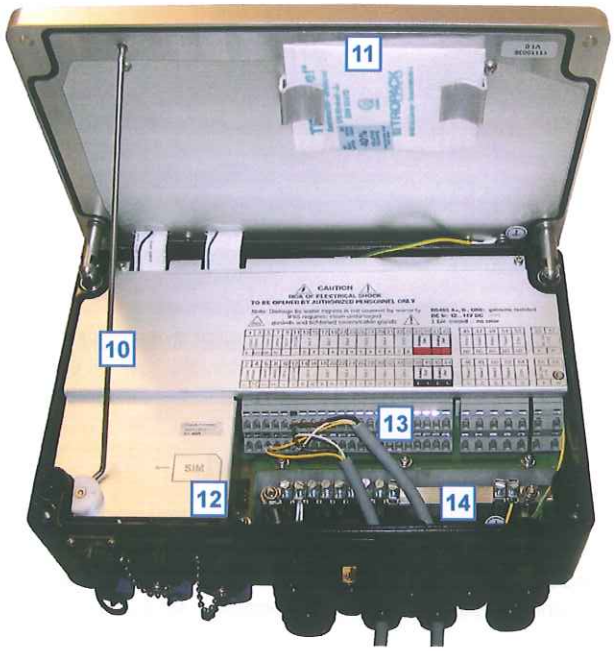
- Manufacturer's name and country of origin
- CE mark
- Item number (Type)
- Device serial number (S/N)
- Information on power supply

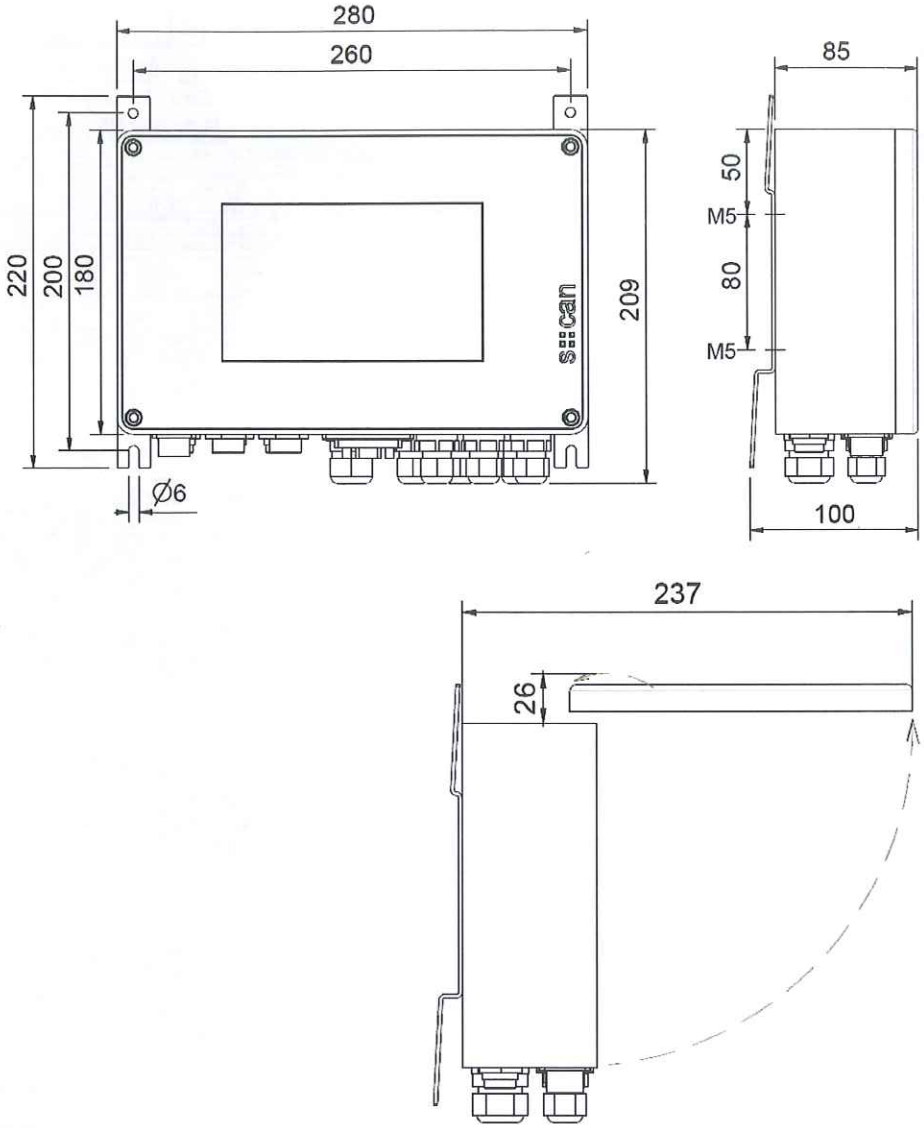


1	Color graphical display with touch screen
2	Screw to open housing cover
3	Control LED (blue and red)
4	1 connector for s::can spectrometer probe
5	3 sys plugs for s::can ISE probes or sensors
6	Ethernet connector
7	USB connector
8	Sub D plug (optional for Profibus)
9	Cable bushings
10	Holder for housing cover
11	Desiccant package
12	Insert for SIM card
13	Cable terminals
14	Grounding bar









Dimensions of con::cube in mm

3.4 Storage and Transport

The temperature and humidity limits for device storage and transport, which are described in the section technical specifications, are to be observed at all times. The device shall not be exposed to strong impacts, mechanical loads or vibrations. The device should be kept free of corrosive or organic solvent vapours, nuclear radiation as well as strong electromagnetic radiation. Transport should be done in the original packaging if possible.

3.5 Scope of Delivery

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

The following parts should be included in the delivery:

- s::can con::cube (item-no. D-315-xxx)
- Pen for touch screen
- Mounting rail (2 pieces) with 4 screws (M5x8)
- s::can manual con::cube (item-no. S-45-m)

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

- Display and touch screen (item-no. D-315-touch)
- Cleaning valves (solenoid valves, item-no. B-44, depending on the configuration of the complete s::can measuring system)
- Cable for power supply (item-no. C-31-xx)
- Gateway to 3G (item-no. D-315-3G)
- Analog output module (item-no. D-315-out-mA)
- Digital output module (item-no. D-315-out-relay)
- Gateway to Profibus DP (item-no. D-315-Profibus)
- SDI 12 output module (item-no. D-315-out-SDI12)
- Analog input module (item-no. D-315-in-mA)
- Digital input module (item-no. D-315-in-relay)
- SDI 12 input module (item-no. D-315-in-SDI12)
- s::can weather shield for con::cube (item-no. F-51)

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.

With the purchase of the s::can con::cube the customer accepts the Microsoft ® licence agreement for the embedded XP operation system. The licence agreement can be provided upon request.

4 Installation

4.1 Environment

The con::cube is designed according to environmental protection rating IP 65 and is resistant against effects of the weather (only in case of the housing cover is securely closed, see section 9.3). Nevertheless, please avoid extreme conditions (e.g. excessive heat, strong electromagnetic fields, corroding chemicals, mechanical loads, vibrations).

Additional protection against extreme weather conditions is provided by the separately available weather shield.

To ensure that the IP65 grade protection of the instrument is not compromised; gaskets and case edges should be undamaged and must remain free from contact with foreign bodies. Furthermore the housing cover must be tightly screwed closed and the cable bushings, filled with cable or fitting plugs, must also fitted tightly. The connectors for the spectrometer probe, ISE probes and sensors (see figure in section 3.3) must be covered with corresponding caps when not in use. Any damage caused by intrusion of water will not be covered by the warranty.

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 the installation, allowing the s::can monitoring system to operate properly.

Installation site:

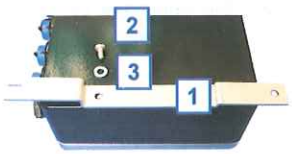
- Easy accessibility (mounting, sampling, functional check, demounting)
- Availability of sufficient space (probe, sensor, installation fitting, controller, etc.)
- Adherence to limit values (see technical specifications located at the end of this manual)
- Protection against splash water and extreme weather conditions

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)
- 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.)

4.2 Mounting

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



- Hexagonal wrench key (size 5) to open housing cover
- Torx wrench key (size TX 25) for mounting screws
- 2 s::can mounting rails (included in delivery)
- 4 screws (M5) and 4 washers for fixing the two mounting rails onto the con::cube (included in delivery)
- 4 screws for fastening the con::cube on the wall (if required)
- Weather shield (F-51, if required)
- Power supply cable (C-31-xx, if required)
- Stripping tool for power supply line
- Cable end sleeves and crimper

The con::cube can be mounted quickly and easily onto a flat wall with the two mounting rails [1] included in delivery. Fasten the two mounting rails onto the backside of the con::cube using the four screws [2] and the four spring washers [3] as shown on the right.

The four threaded holes on the backside of the con::cube can also be used to mount the device directly from the backside onto a flat wall or panel (M5 screws, not included in delivery).

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

5 Initial Startup

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

- Connect the s::can spectrometer probe (see section 5.2).
- Connect s::can ISE probes and / or s::can sensors (see section 5.3).
- Connect the cleaning devices to the proper terminal connections in the cable terminal compartment (see section 5.4).
- Establish power supply to the con::cube (see section 5.5) and wait until the operation software moni::tool has started up (see section 5.6).
- Logon by pushing the *Menu* tab on the left side (please refer to s::can manual moni::tool for further details).
- Set correct language, correct timezone, etc. (please refer to s::can manual moni::tool for further details).
- Start probe initialisation (see section 5.7).
- Configure the measurement and cleaning settings (please refer to s::can manual moni::tool and section 5.8).
- Check whether the cleaning system works properly (please refer to s::can manual moni::tool for further details).
- Connection and parameterisation of data transfer lines when desired (please refer to s::can manual moni::tool and section 7.2).
- Check LED (red = system error, blue = system ok)

⚠ When handling the cable terminal cover, please make sure that the cord gasket and the seals inside the cover are not damaged by sharp-edged objects. Also ensure that the wires for the display and the earth grounding are not damaged and positioned correctly before closing the terminal cover (see section 9.3)

5.1 Plan of Terminal Connections

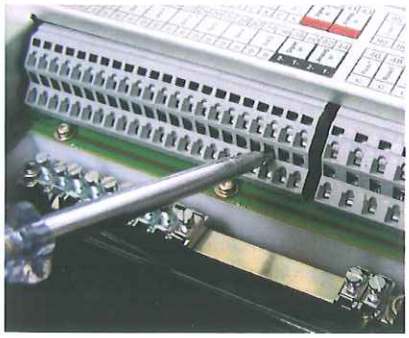
Once the cover has been opened (four hexagonal head screws removed) you have access to the cable terminal compartment of the con::cube.

⚠ Opening of the cable terminal compartment of the con::cube must be carried out by authorised persons only (see section 2) and after disconnecting the power supply!

Be aware that cable clamps of relay contacts you have connected to the device might also have power supply (230 VAC), depending on how they have been interconnected!

The con::cube is equipped with spring terminals that enable quick and easy wiring.

- Insert a small screwdriver into the slot above the cable clamp you want to connect (see left picture below).
- Move the screwdriver upwards, which opens the cable clamp, and insert the wire (see middle picture below).
- Move the screwdriver downwards and remove it. Now wire is locked in the cable clamp (see right picture below)



⚠ s::can recommends to use wires with isolated end sleeves for power supply and dater transfer.

CAUTION

RISK OF ELECTRICAL SHOCK
TO BE OPENED BY AUTHORIZED PERSONNEL ONLY

-20...50°C
5...90% RH
non condensing

Note: Damage by water ingress is not covered by warranty!
IP65 requires: clean undamaged gaskets and tightened covers/cable glands!

RS485 A+, B-, GND: galvanic isolated
DC In: 12...14V ⎓
Σ Err: closed ... no error

1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
COM5, RS485		Valve1	Valve2	DC In	12V Out	Slot 8		Slot 7		Slot 6		Slot 5		Slot 4		Slot 3		Slot 2		Slot 1	
B -	GND	M -	M -	-	-	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A

45	47	49	51	53
Relay1	Relay2	Relay3	Relay4	Σ Err
NO	NO	NO	NO	NO

55	57
110-240 V ~	
P	N

2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
COM5, RS485		Valve1	Valve2	DC In	12V Out	Slot 8		Slot 7		Slot 6		Slot 5		Slot 4		Slot 3		Slot 2		Slot 1	
A+	X	M+	M+	+	+	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B

46	48	50	52	54
Relay1	Relay2	Relay3	Relay4	Σ Err
C	C	C	C	C

56	58
110-240 V ~	
P	N

Plan of terminal connections for con::cube D-315-230

CAUTION

RISK OF ELECTRICAL SHOCK
TO BE OPENED BY AUTHORIZED PERSONNEL ONLY

-20...50°C
5...90% RH
non condensing

Note: Damage by water ingress is not covered by warranty!
IP65 requires: clean undamaged gaskets and tightened covers/cable glands!

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1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43
COM5, RS485		Valve1	Valve2	DC In	12V Out	Slot 8		Slot 7		Slot 6		Slot 5		Slot 4		Slot 3		Slot 2		Slot 1	
B -	GND	M -	M -	-	-	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A

45	47	49	51	53
Relay1	Relay2	Relay3	Relay4	Σ Err
NO	NO	NO	NO	NO

55	57
9...36 V ⎓	
V+	V-

2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
COM5, RS485		Valve1	Valve2	DC In	12V Out	Slot 8		Slot 7		Slot 6		Slot 5		Slot 4		Slot 3		Slot 2		Slot 1	
A+	X	M+	M+	+	+	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B

46	48	50	52	54
Relay1	Relay2	Relay3	Relay4	Σ Err
C	C	C	C	C

56	58
9...36 V ⎓	
V+	V-

Plan of terminal connections for con::cube D-315-024

5.2 Connection of s::can Spectrometer Probe

An s::can spectrometer probe can be connected to the external connector for spectrometer probes (COM-1) marked with no.4 in the figure of section 3.3. If an extension cable is used the total length of the probe's cable should not be more than 50 m.

5.3 Connection of s::can ISE Probes and s::can Sensors

Alternative or additional to the s::can spectrometer probe it is possible to connect s::can ISE probes and / or s::can sensors via the sys plug connectors (COM-4) located on the con::cube. These connectors are marked with no.5 in the figure of section 3.3. If an extension cable is used the total length of the probe's cable should not be more than 50 m.

5.4 Connection of Cleaning Devices

The con::cube has three connections for 12 VDC power supply, to which a cleaning device (cleaning valve or autobrush - see section 11.2) can be connected.

No of terminal / clamp	Labelling	Assignment	Colour of wire
6	M+ / Valve 1	Cleaning valve 1	Blue
5	M- / Valve 1	Cleaning valve 1	Brown
8	M+ / Valve 2	Cleaning valve 2	Blue
7	M- / Valve 2	Cleaning valve 2	Brown
6	M+ / Valve 1	Autobrush	Yellow
11	- / 12V Out	Autobrush	Brown
12	+ / 12V Out	Autobrush	White

Once the cleaning device has been electrically connected, the device needs to be parameterised within the moni::tool software (please refer to manual moni::tool).

5.5 Connection of Power Supply

This type of work must be performed by authorised persons only! (see section 2).

Depending on the device type, the con::cube has to be connected to the appropriate power supply. The connection of power supply (AC or DC, respectively), must be done with an earthed conductor wire (PE - „potential earth")!

The power supply earth (PE) is to be made properly. Process medium (e.g. waste water) must be connected to the same earth ground with less than 0.5 Ohm.

The connection has to be performed as displayed on the right side. The ground wire (PE) has to be connected to the grounding bar.

Connection of power supply for con::cube D-315-230	
No / [Labelling]	Assignment
55 / [P] or 56 / [P]	Conductor or phase, resp.
57 / [N] or 58 / [N]	Neutral wire

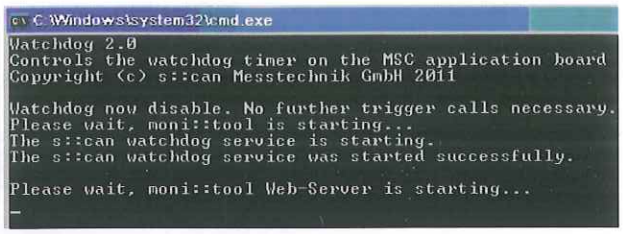
Connection of power supply for con::cube D-315-024	
No / [Labelling]	Assignment
55 / [V+] or 56 / [V+]	+ 24 VDC
57 / [V-] or 58 / [V-]	- 24 VDC

Furthermore the cable clamps 10 (*+ DC In*) and 9 (*- DC In*) provide the possibility to connect an external battery for back-up power supply (UPS) in case the main power supply is interrupted. Please consider the following limitations when using this specific power supply input:

- The power supply of the battery has to be 12 - 15 VDC when connected via clamps 10 and 9.
- Only batteries that enable total discharge or that are equipped with automatical switch off must be used.
- This battery supply input provides only protection against inverse polarity and short circuit.
- This battery supply input provides no galvanic isolation and no protection against ligthning.

5.6 Starting up of Operation Software

Once the con::cube has been connected to the power supply, it will show the s::can logo for a few seconds and then continue starting up the operation software. During the startup of the web browser a message as shown on the right hand side is visible. Please consider that the complete start up procedure will require 1.5 - 2.5 minutes.



When no probes and sensors have been installed yet (initial startup), only the main window and the menu tabs are visible on the display (see figure on the right hand side).

5.7 Probe Initialisation

For operating the con::cube with one or several probes it is necessary to install every single probe on the con::cube. This can be done using the software supported initialisation process. Please refer to section 6.11.2.1 of the manual moni::tool where the menu item *Service / Sensor / Installing New Sensor* is explained in detail.

5.8 Cleaning Device Initialisation

For operating the con::cube with one or several cleaning devices it is necessary to install every single cleaning device on the con::cube. This can be done using the software supported initialisation process. Please refer to section 6.11.3.1 of the manual moni::tool where the menu item *Service / Sensor / Installing New Cleaning Device* is explained in detail.

6 Operation of con::cube

The s::can con::cube controllers use multi touch technology. This means the operating software moni::tool can be operated directly on the touch screen of the controller with your fingers and / or a touch pen without the need for a keyboard or mouse. When connecting to moni::tool using a remote web browser, mouse and keyboard can be used to operate the software.

The main frame of the moni::tool display contains the items that are visible at all times.

1 Tabs for navigating between the main views

2 Clicking on this item will open the login window or logout window

3 Name of the monitoring station

4 Current system date and time - clicking on this icon will display date / time of the last measurement also

5 Clicking on the s::can logo will callup information on the installed software version and the controller

6 Scrollbar to scroll the display up and down

6.1 Direct Operation

6.1.1 Operation via Touch Screen

The operating software moni::tool can be operated directly on the touch screen of the controller with your fingers and/or a touch pen. Regarding notes for calibration of the touch screen please refer to s::can manual moni::tool.

6.1.2 Operation via Mouse / Keyboard

The operating software moni::tool can also be operated with a USB mouse and / or a USB keyboard. The device can be connected to the USB-socket (marked with no.7 in the figure of section 3.3) of the con::cube. Using a USB-hub it is also possible to connect several devices (e.g. keyboard and mouse) to the USB interface simultaniously.

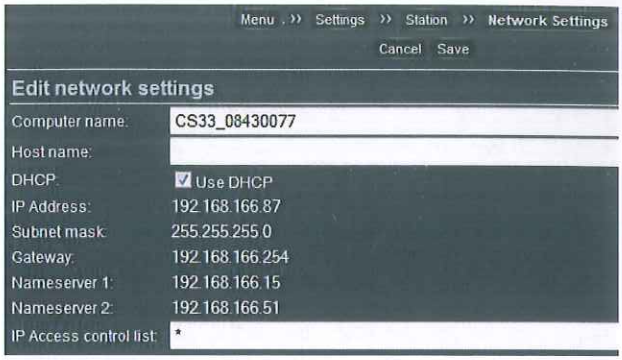
6.2 Remote Control - Connection to con::cube

For operating the software moni::tool via remote control it is necessary to establish a network connection to the con::cube. This can be done as follows:

- Integration of con::cube into a local area network (LAN) via ethernet cable (see section 6.2.1)
- Direct connection con::cube - PC via ethernet cable (see section 6.2.2)
- Direct connection con::cube - PC via wireless network (WLAN) (see section 6.2.3)
- Optional connection con::cube - PC via the internal 3G modem (see section 6.2.4)

If you have little or no experience in the installation of computer networks, we recommend that you consult your network administrator.

6.2.1 Integration con::cube into LAN



Connect the con::cube into your local area network (LAN) by plugging a network cable of your LAN into the ethernet socket of the con::cube (RJ45 - marked with no.6 in the figure in section 3.3). By default the DHCP service is activated on the con::cube, therefore an IP address for the con::cube will be allocated automatically from the DHCP server of your LAN.

If you want to integrate several con::cube into one LAN each device needs it's own IP address and also it's own computer name. If needed, both can be configured via the moni::tool menu item *Menu / Settings / Station / Network Settings* (see manual moni::tool and screenshot on the right). The actual IP address of your con::cube will also be displayed when pushing on the s::can logo on the lower right hand side of the moni::tool display.

6.2.2 Direct Connection con::cube - PC via Ethernet

To establish a direct connection of a con::cube to your PC / Notebook via network cable (RJ45) both devices must be set to a fixed IP address. Please perform the steps as follow:

- Deactivate DHCP Server on con::cube and set the device to a fixed IP address (use moni::tool menu item *Menu / Settings / Station / Network Settings*).
- Ensure your PC is equipped with a properly installed network card and you have the user rights required to change network settings.
- Configure the IP address of your PC in the *Network environment* also to a fixed one, using the same settings as for the con::cube except the last number of the IP address. The example below shows a possible configuration:
  IP address of the con::cube: 192.168.0.12
  IP address of the PC: 192.168.0.20
  Subnet mask for both devices: 255.255.255.0
- Connect your network cable (RJ45) to the con::cube and to the PC.
- Search for the con::cube in the *Network environment* of the PC. You can either use the IP address or the computer name of the con::cube (default = *CONCUBE*) for searching.
- In case a logon is needed use:
  User: scan
  Password: scan (case sensitive)

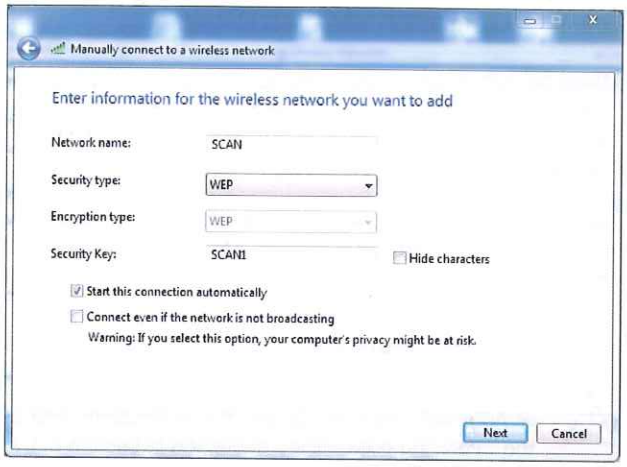
To ensure proper operation also with older types of PC / notebook s::can recommends to use a cross-linked RJ45 cable for connection.

Moreover, „Client for MS Network" has to be installed on your PC if you want to use windows filesharing. For changing settings of your PC please refer to the technical documentation of your PC or contact your system administrator.

6.2.3 Direct connection con::cube - PC via WLAN

The con::cube is equipped with an internal WLAN modem. The antenna is included in the housing cover and the WLAN is configured by default as follows:

- WEP encryption
- SSID = SCAN
- Password = SCAN1
- IP address = 192.168.100.1
- Subnet mask = 255.255.255.0



To setup a WLAN connection from your PC (Windows 7) to the con::cube perform the following steps:

- Open the *Network and Sharing Center* on your PC by clicking on the icon the the command line (*Control Panel / Network and Internet / Network and Sharing Center*)
- Select menu item *Manage wireless networks*
- Add a new wireless network by selecting menu item *Add*
- Create a new network profile (either *manually* or *ad hoc*)
- Enter the required settings as shown below and in the figure on the right
  Network name: SCAN
  Security type: WEP
  Security key: SCAN1
- Push the button *Next*. Now the message *Successfully added SCAN* will appear. Push the button *Close* on this message.
- The new network will be displayed in the *Network and Sharing Center*

6.2.4 Connection via 3G Modem

Optionally the con::cube can be equipped with an internal 3G modem. The antenna for this modem is already integrated in the housing cover. To start using the 3G modem a SIM card will be necessary. The holding to insert the SIM card is signed with no.12 in the figure of section 3.3 . This SIM card needs to support GPRS / 3G. Make sure that the PIN query has been deactivated.

If you also want to use GSM functionality (remote control, remote data transmission) the SIM card needs to support the data transfer CSD (circuit switched data). You will get a separate telephone number for this type of communication (data line = data phone number).

Please contact your local GSM-network provider (e.g. telecom company) to clarify issues of compatibility, connection and admission as the pertinent rules may vary from region to region. When in doubt, your local s::can sales partner will also be glad to help you.

If you create a new remote data transmission connection via the modem of your commercial notebook / PC, it has to have the following characteristics:

- Remote data transmission connection
- Data phone number of the SIM card installed in con::cube
- Activation of all dialling options (status display; password-, name- etc. queries, Windows registration domain, phone number query).
- Activation of redialling (at least 3 times).
- Deactivation of the *speed dialling* and *V.44* features of your modem. This configuration can be modified in *System control* under the *Network properties* or *Network connections*.
- Establish the connection, using the user name „scan", the password „scan" (case-sensitive)

After establishing the connection the con::cube can be reached. Therefore all services the con::cube offers via this protocol are available. The IP address of the con::cube within the remote data transmission connection can be checked like explained below:

- The IP address default setting of the con::cube is DHCP active.
- The status information of the remote data transmission connection displays the IP address of the con::cube.

If you are unable to set up the proper connection or require further information about one or several of the steps described above, please consult your network administrator whom the local s::can sales partner will be glad to support when required.

6.3 Remote Control - Operation of con::cube

6.3.1 Operation via Web Browser

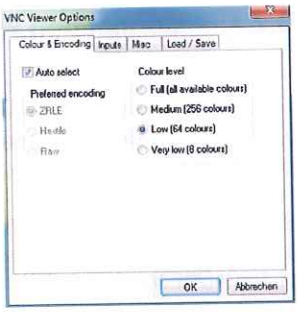
When the con::cube is connected to a network or to a PC, the moni::tool software can be operated from any computer that has access to the con::cube. Simply enter the IP address of the con::cube into the address bar of your web browser.

Several users can view the moni::tool software simultaniously but only one user can be logged in. Depending on the user rights it is possible to kick other users out (see manual moni::tool section 6.10.5.4).

Please keep in mind that a few service actions (e.g. taskmanager, touch calibration) can not be used in a remote web browser. To use these functions one of the operating possibilities explained in section 6.1.1, 6.1.2 and 6.3.2 has to be used.

6.3.2 Operation via Terminal Program (VNC-Viewer)

It is possibile to control the con::cube remotely via network or modem connection using the terminal program VNC-Viewer, which is available from s::can. In this case keyboard, mouse and monitor of the computer which is connected to the con::cube in such a way, can be used to remotely operate the con::cube.



The first prerequisite is a proper connection between a notebook / PC via a network interface or modem (dial-up connection) and the con::cube (please refer to section 6.2) taking into consideration the specified system settings and conditions of the used note-book / PC.

Copy the file *vncviewerV4.1-x86_32.exe* from the folder *Addon \ Connectivitytool* of the s::can installation-CD onto your PC (e.g. C:\programs\vncviewer\). The terminal program can be started by double clicking the file *vncviewer.exe*.

In the appearing dialog window of the VNC-Viewer the correct IP address of the con::cube (*Server:*) has to be entered. Please be aware that the IP address of your con::cube might either be a fixed one or a dynamic allocated one. For further details please refer to section 6.2.

In case of slow connection a reduction of the colour depth to the minimum is recommended. This can be done via the button *Options...* in the log in window.

After confirming the *Connection Details* by pushing *Ok* the password to be entered in the pop-up window is „scan" (case-sensitive).

After that, the screen content of the con::cube will be displayed on your notebook / PC. As long as the mouse pointer of your computer is located inside the window of this application (*concube*), all mouse-controlled actions will be related directly to the remote controlled con::cube. Any action taken outside the window will continue to control your own local computer. All buttons and input boxes in moni::tool as applicable, can now be operated via the keyboard and mouse of your notebook / PC.

As soon as the desired settings have been made or the readings have been checked, the terminal programme may be closed using the button *x* right above.

7 Data Management

7.1 Data Storage

The moni::tool software uses an SQL database for storage of all measurement results, configuration data and information. The size of the database depends on the storage capacity of the flash disk in the con::cube (see technical specifications).

Performing a database dump provides the possibility to save or archive all data stored in the database. Please refer to manual moni::tool for further details.

7.2 Data Transfer

The monitoring station system con::cube with moni::tool provides several possibilities to transfer measurement results and other data and information to external devices.

Continuous transfer of measurement results:
- via analog power outputs (optional D-315-out-mA)
- via digital relay interfaces (optional D-315-out-relay)
- via Modbus TCP/IP interface (Ethernet RJ45)
- via Modbus RTU interface (COM-5)
- via Profibus DP interface (optional D-315-out-Profibus)
- via SDI12 interface (optional D-315-out-SDI12)
- via TML stream (see manual moni::tool menu item *Menu / ana::tool / Edit TML Settings*)

Discontinuous transfer:
- of stored measurement results and logbook information using the moni::tool menu item *Menu / Data Export* to a USB-stick or a connected computer
- of the complete database using the moni::tool menu item *Menu / Data Export / Database Dumps* to a USB-stick or a connected computer

7.2.1 Data Transfer via Analog Power Outputs

For continuous transfer of the current readings the con::cube can be equipped with up to eight 4-20 mA output modules optionally (D-315-out-mA, see section 11.5.5)

7.2.2 Data Transfer via Digital Relay Outputs

For value depending steering and control the con::cube can be equipped with up to four digital output modules optionally (D-315-out-relay, see section 11.5.6)

7.2.3 Data Transfer via ana::gate to Modbus, Profibus, SDI12

The s::can service ana::gate can be used for continuous transfer of measurement results in digital format. The service ana::gate is already installed onto the con::cube ex factory and supports the following protocols:

- Modbus TCP/IP - activated by default, can always be used (see section 7.2.6 for further details)
- Modbus RTU - can be activated manually (see section 7.2.6 for further details)
- Profibus - can be activated manually (see section 7.2.7 for further details)
- SDI12 - can be activated manually (see section 7.2.8 for further details)

By default only Modbus TCP/IP is activated. Modbus RTU is deactivated by default, therefore COM-5 can be used for different If you have ordered an optional module (Profibus DP or SDI12) the appropriate module is activated instead of Modbus RTU. This means no modification is needed at the ana::gate interface and the modules are ready to use. If you order an optional module later or if you want to change the module type the ana::gate interface has to be modified. For changing the configuration of ana::gate please proceed as follows:

- Establish connection to con::cube via mouse / keyboard (see section 6.1.2) or via remote control (see section 6.2).
- Establish a FTP access (e.g. via Windows Explorer) using the address
  ftp://administrator:password@xxx.xxx.xxx.xxx
  (password = s::can service password, uncapitalisised),
  IP address (xxx.xxx.xxx.xxx) has to be the actual one of your con::cube.

- Copy the configuration file ana-gate.ini from the con::cube (folder ftp://xxx.xxx.xxx.xxx/Programme/s-can/ana-lyte/ana-gate/ onto your local PC.
- Edit the settings in the configuration file ana-gate.ini on your local PC according to the script in the table below.
- Copy the modified configuration file via FTP access back to the con::cube and remove the old file.
- Reboot the con::cube either via menu (see manual moni::tool) or by disconnecting the power supply.

Entry	Default	Profibus DP	SDI12
[Serial]			
Serial active=	false	true	true
Mode=	RTU	RTU	SDI12
COM Port=	5	11	12
Baudrate=	19200	38400	9600
Parity=	odd	odd	even
Address=	1	1	0
ProfibusDP_Address=		1	
[TCP]			
TCP active=	true	true	false
[Ana_ProResult]			
Use Database=	true	true	true
ResultDirectoryName=	D:\s-can\results\Original\	D:\s-can\results\Original\	D:\s-can\results\Original\

When using ana::pro instead of moni::tool the entry *Use Database* has to be set to *false* and the path for result files (*ResultDirectoryName*) has to be set correctly.

7.2.4 Data Types

All s::can interfaces use a common representation of data types. Each accessible data item can be allocated to one of the types shown in the table below. The type of a given item can always be found by checking the Modbus mapping. In addition the name of the data item are prefixed by one or two letters to indicate the data type. Data types which are non standard need special attention and are marked specially. Data from Modbus mapping are directly mapped to the according Profibus address space.

Type	Description	Size (Register / Bytes)	Prefix
unit16	unsigned 16 bit integer	1 / 2	ui
int16	signed 16 bit integer	1 / 2	i
pointer	pointer to modbus register	1 /2	p
enum	enum type	1 / 2	e
bitmask	bitmask of 16 bits	1 / 2	bm
char	character	1 / 1	c
char[x]	string	X / 2 x X	ab
Float	IEEE754 floating pints	2 / 4	f
TAI64n	timestamp format	64 bit	t

- An unsigned 16bit integer = 0xXXYY (unit16) has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0xXX								0xYY							

For example 45311 = 0xB0FF has the mapping

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0xB0								0xFF							

- An signed 16bit integer = ±0xXXYY (int16) has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0xXX								0xYY							

For example -17289 = 0xBC77 has the mapping

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0xBC								0x77							

- A pointer can point to any of the four different register spaces in Modbus (holding register = 00, input register = 01, discrete input register = 10 and coil register = 11). This information is encoded in the lower four bits of the register value. A pointer has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	address high bits								address lower bits						type	

For example a pointer to input register with address 4844 = 0x12EC has the mapping

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0x12								0x3B = 0xEC >> 2						0	1

For example a pointer to holding register with address 216 = 0x00D8 has the mapping

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0x00								0x36 = 0xD8 >> 2						0	0

- The bitmask is used to represent up to 16 logical states. Unused states are zero by convention. A logical state with bits a15 to a0 has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	a15	a14	a13	a12	a11	a10	a9	a8	a7	a6	a5	a4	a3	a2	a1	a0

For example bitmask with a15:0 = (1100 1010 0011 0110) has the mapping

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	1	1	0	0	1	0	1	0	0	0	1	1	0	1	1	0

- Characters are represented in ASCII. A single character (for example „a“) with ASCII code 0x61 has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0x61 = ‘a‘								0x00							

- Character strings are represented in ASCII and have a fixed size. If not all bytes are needed the string must be filled with trailing spaces. A 3 character string (for example “abc”) of size 4 has the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	0x61 = ‘a‘								0x62 = ‘b‘							
0xXXXX + 1	0x63 = ‘c‘								0x20 = ‘ ‘							

- Floats are represented in IEEE-754 format with 32bit standard precision and have the following mapping:

	Modbus register															
Register address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0xXXXX	s	e7	e6	e5	e4	e3	e2	e1	e0	f22	f21	f20	f19	f18	f17	f16
0xXXXX + 1	f15	f14	f13	f12	f11	f10	f9	f8	f7	f6	f5	f4	f3	f2	f1	f0

- Timestamps are presented in TAI64n format, which is an unsigned integer counting the seconds from 1.1.1970 using the big-endian format. 1.1.1970 = 0x4000 0000 0000 0000 + 0x0000 0000, e.g. 400000004d9b3395 = 2011-04-05 15:21:47 (for further details please refer to www.tai64.com).

7.2.5 Data Mapping

For all datatypes the big endian encoding is used. The details of the register mapping for the device (controller or measuring instrument) and for the parameters are described in the following tables. Please note that all input registers are mirrored to holding registers starting at address 1800 to support limited Modbus master devices. Data from Modbus mapping are directly mapped to the according Profibus address space.

The representation of the parameter / device / system status and denotation of the single bits (b_{15} ... b_0) is shown in the tables below. Bits that are not represented in the table are not supported or reserved. Each bit of the status integer reperesents a condition (1=error, 0=o.k.)

Mapping of Parameter Status (bmPxStatus)		
Bit	Display (xPxValue)	Description
b15	NaN or value	Parameter reading out of measuring range
b14	value	Status of alarm parameter is warning
b13	value	Status of alarm parameter is alarm
b5	NaN	Parameter not ready or not available
b4	NaN	Incorrect calibration, at least one calibration coefficient invalid
b3	NaN	Parameter error, the sensor is outside of the medium or in incorrect medium
b2	NaN	Parameter error, calibration error
b1	NaN	Parameter error, hardware error
b0	NaN or value	General parameter error, at least one internal parameter check failed

Mapping of Device Status (bmDeviceStatus)	
Bit	Description
b15	Device maintenance required
b14	Device cleaning required
b13	Device busy
b3	Data logger error, no readings can be stored because datalogger is full
b2	Missing or defect component detected, in case of soli::lyser TSS reading negative, in case of condu::lyser incorrect calibration
b1	Probe misuse, operation outside the specified temperature range
b0	s::can device reports error during internal check

Mapping of System Status	
Bit	Description
b6	mA signal is outside of the allowed input range
b5	Validation results are not available
b1	Învalid probe / sensor; serial number of probe / sensor is different
b0	No communication between probe / sensor and controller

7.2.6 Data Transfer via Modbus Interface

The con::cube is equipped with a Modbus interface which support the standardized Modbus protocol via RTU or TCP/IP. This interface enables the integration of the con::cube into other networks and supports the following features:

- Reading of parameter results (see table - Parameter specific Input Register)
- Reading of parameter status information (see section 7.2.5 - Mapping of Parameter Status)
- Reading of parameter configuration settings (see table - Mapping of Parameter specific Holding Register)
- Reading of device configuration settings (see table - Mapping of Device specific Holding Register and Device specific Input Register)
- Reading of device status information (see section 7.2.5 - Mapping of Device Status)
- Reading of system status information (see section 7.2.5 - Mapping of System Status)

Access to this information is possible by reading input registers and / or by reading holding registers. The type and the location of the registers is described in the following sections.

The con::cube Modbus supports the following Modbus function codes:

Function	Function code	Description (used for)
Read Input Register	0x04	Parameter readings Parameter status Device status
Read Holding Register	0x03	Device and parameter configuration settings, Mirrored input registers (for support of limited Modbus master devices)

	Mapping of Parameter specific Input Register						
Input register, 16bit, RO	Tag name	Address	Type	Length	R/W	Description	Address
parameter 1 result	bmP1Status	0x0080	bitmask	1	R	Para.1 status [1]	128
	bmP1PrivStatus	0x0081	bitmask	1	R	Para.1 private status	129
	xP1Value	0x0082	-	2	R	Para.1 result	130
	xP1PrivValue	0x0084	-	2	R	Para.1 result privat	132
	Reserved	0x0086	-	2	R		134
parameter 2 result	bmP2Status	0x0088	bitmask	1	R	Para.2 status [1]	136
	bmP2PrivStatus	0x0089	bitmask	1	R	Para.2 private status	137
	xP2Value	0x008A	-	2	R	Para.2 result	138
	xP2PrivValue	0x008C	-	2	R	Para.2 result privat	140
	Reserved	0x008E	-	2	R		142
parameter 3 result	bmP3Status	0x0090	bitmask	1	R	Para.3 status [1]	144
	bmP3PrivStatus	0x0091	bitmask	1	R	Para.3 private status	145
	xP3Value	0x0092	-	2	R	Para.3 result	146
	xP3PrivValue	0x0094	-	2	R	Para.3 result privat	148
	Reserved	0x0096	-	2	R		150
parameter 4 result	bmP4Status	0x0098	bitmask	1	R	Para.4 status [1]	152
	bmP4PrivStatus	0x0099	bitmask	1	R	Para.4 private status	153
	xP4Value	0x009A	-	2	R	Para.4 result	154
	xP4PrivValue	0x009C	-	2	R	Para.4 result privat	156
	Reserved	0x009E	-	2	R		158
.....							
parameter 8 result	bmP8Status	0x00B8	bitmask	1	R	Para.8 status [1]	184
	bmP8PrivStatus	0x00B9	bitmask	1	R	Para.8 private status	185
	xP8Value	0x00BA	-	2	R	Para.8 result	186
	xP8PrivValue	0x00BC	-	2	R	Para.8 result privat	188
	Reserved	0x00BE	-	2	R		190

[1] Please refer to section 7.2.5 - Mapping of Parameter Status

Mapping of Parameter specific Holding Register							
Holding register, 16bit, RW	Tag name	Address	Type	Length	R/W	Description	Address
parameter 1	abP1Name	0x0078	char[8]	4	RW	Name of parameter 1[1)]	120
configuration	abP1Unit	0x007C	char[8]	4	RW	Unit of parameter 1[1)]	124
public	xP1UpperLimit	0x0080	-	2	RW	Upper measuring range of parameter 1	128
	xP1LowerLimit	0x0082	-	2	RW	Lower measuring range of parameter 1	130
parameter 2	abP2Name	0x00F0	char[8]	4	RW	Name of parameter 2[1)]	240
configuration	abP2Unit	0x00F4	char[8]	4	RW	Unit of parameter 2[1)]	244
public	xP2UpperLimit	0x00F8	-	2	RW	Upper measuring range of parameter 2	248
	xP2LowerLimit	0x00FA	-	2	RW	Lower measuring range of parameter 2	250
parameter 3	abP3Name	0x0168	char[8]	4	RW	Name of parameter 3[1)]	360
configuration	abP3Unit	0x016C	char[8]	4	RW	Unit of parameter 3[1)]	364
public	xP3UpperLimit	0x0170	-	2	RW	Upper measuring range of parameter 3	368
	xP3LowerLimit	0x0172	-	2	RW	Lower measuring range of parameter 3	370
parameter 4	abP4Name	0x01E0	char[8]	4	RW	Name of parameter 4[1)]	480
configuration	abP4Unit	0x01E4	char[8]	4	RW	Unit of parameter 4[1)]	484
public	xP4UpperLimit	0x01E8	-	2	RW	Upper measuring range of parameter 4	488
	xP4LowerLimit	0x01EA	-	2	RW	Lower measuring range of parameter 4	490
.....							
mirrored input	uiVersion	0x0708	unit16	1	R		1800
registers 0 - 144	...			186			...
	xP8Value	0x07C2	float	2	R		1986
	xP8PrivValue	0x07C4	-	2	R		1988

[1)] filled with spaces when name is shorter than 8 characters

Mapping of Device specific Input Register							
Input register, 16bit, RO	Tag name	Address	Type	Length	R/W	Description	Address
	uiVersion	0x0000	unit16	1	R	Version of Modbus mapping protocol. For all changes in public registers: 0xAABB AA ... Major version BB ... Minor version -compatible	0
device id.	eVendor	0x0001	enum	1	R	Vendor code	1
	eModel	0x0002	enum	1	R	Device model	2
device description	abModel	0x0003	char[20]	10	R	Description of device model, filled with spaces	3
	abSerialNumber	0x000D	char[8]	4	R	Serial number, filled with spaces	13
	abHWRelease	0x0011	char[4]	2	R	Hardware release: 0xAABB AA ... Major version BB ... Minor version	17
	abSWRelease	0x0013	char[4]	2	R	Software release: 0xAABB AA ... Major version BB ... Minor version	19
	uiHWStarts	0x0015	unit16	1	R	Device rebooter counter	21
	uiParameterCount	0x0016	unit16	1	R	Number of parameters	22
	eParameterType	0x0017	enum	1	R	Data type of parameter and parameter limits (check for compatibility)	23
	uiParameterScale	0x0018	unit16	1	R	Parameter scale factor. Used for all parameter values which depend on eParameterType.	24
device status public	tSampleTime	0x0068	timestamp	6	R	Time when the parameter results have been updated. Timestamp of logged status and results	104

Mapping of Device specific Holding Register							
Holding register, 16bit, RW	Tag name	Register	Type	Length	R/W	Description	Address
device configuration public	uiAddress	0x0000	unit16	1	RW	Serial mode: Modbus address of device TCP mode: Portnumber of device	0
	eCommMode	0x0001	enum	1	RW	Shows the mode of the device 0 ... Modbus RTU 1 ... Modbus serial ASCII 2 ... Modbus TCP	1
	eBaudrate	0x0002	enum	1	RW	Serial mode: baudrate 0 ... 9600 baud 1 ... 19200 baud (default) 2 ... 38400 baud TCP mode: 0 (readonly)	2
	eParity	0x0003	enum	1	RW	Serial mode: parity 0 ... no parity 1 ... even parity 2 ... odd parity (default) TCP mode: 0 (readonly)	3
	eChangeSettings	0x0004	enum	1	RW	General changes on all settings (e.g. reset all settings to default)	4
	pDeviceConfigPrivate	0x0005	pointer	1	R	Pointer to startaddress of device configuration private	5
	abDeviceLocation	0x0006	char[12]	6	RW	Installation location (s::canpoint) of the device, filled with spaces	6
	eCleanMode	0x000C	enum	1	RW	Cleaning mode configuration: 0 ... no cleaning supported, manual OFF 1 ... manual ON 2 ... automatic cleaning	12
	uiCleanInterval	0x000D	unit16	1	RW	Cleaning interval 0 ... automatic disabled	13
	uiCleanDuration	0x000E	unit16	1	RW	Cleaning duration in seconds	14
	uiCleanWait	0x000F	unit16	1	RW	Waiting time between end of cleaning and start of measurement	15
	tSystemTime	0x0010	timestamp	6	RW	Current system time	16
	uiMeasInterval	0x0016	unit16	1	RW	Measurement interval in sec. 0 ... as fast as possible	22
	Reserved	0x0017	-	1	R		23
	uiLogInterval	0x0018	unit16	1	RW	Logging interval for data logger in minutes 0 ... no datalogger active	24
	uiIndexLogResult	0x001A	unit16	1	RW	Index device status public+ private & parameter results from logger storage to Modbus registers. If no stored results are available results are NaN, Device status bit3 is set.	26
	Reserved	0x001B	-	93	R		27
	uiNLogResultsTotal	0x0019	unit16	1	RW	Available number of logged results in datalogger (since last clearing)	25

7.2.7 Data Transfer via Profibus DP Interface

The Profibus DP output module (D-315-out-Profibus) provides a Profibus DP compatible fieldbus interface (According to IEC 61158) for the integration of the con::cube into Profibus DP networks. Profibus DP supports up to 244 Bytes of output data. This enables the transfer of readings and status information for up to eight parameters as well as the system status. The location and type of the values are shown in the table below.

Profibus Position	Data Type	Name	Description
0x02 – 0x03	Bitmask	bmDeviceStatus	System status of con::cube
0x04 – 0x05	Bitmask	bmP1Status	Status of parameter 1
0x06 – 0x09	Float	xP1Value	Reading of parameter 1
0x0A – 0x0B	Bitmask	bmP2Status	Status of parameter 2
0x0C – 0x0F	Float	xP2Value	Reading of parameter 2
0x10 – 0x11	Bitmask	bmP3Status	Status of parameter 3
0x12 – 0x15	Float	xP3Value	Reading of parameter 3
0x16 – 0x17	Bitmask	bmP4Status	Status of parameter 4
0x18 – 0x1B	Float	xP4Value	Reading of parameter 4
0x1C – 0x1D	Bitmask	bmP5Status	Status of parameter 5
0x1E – 0x21	Float	xP5Value	Reading of parameter 5
0x22 – 0x23	Bitmask	bmP6Status	Status of parameter 6
0x24 – 0x27	Float	xP6Value	Reading of parameter 6
0x28 – 0x29	Bitmask	bmP7Status	Status of parameter 7
0x2A – 0x2D	Float	xP7Value	Reading of parameter 7
0x2E – 0x2F	Bitmask	bmP8Status	Status of parameter 8
0x30 – 0x33	Float	xP8Value	Reading of parameter 8
0x34 – 0x40	TAI64n	tSampleTime	Time of last measurement

Please use the moni::tool menu item *Service / Controller / Modbus Slave* to define which Parameters will be transfered (see manual moni::tool for further details).

To activate the Profibus DP output module the connection via ana::gate has to be established (see section 7.2.3). In case of any problems please check if version of ana-gate is V1.8.0 or higher and configuration of ana-gate.ini file is correct.

7.2.8 Data Transfer via SDI12 Interface

The SDI12 module (D-315-xxx-SDI12) provides a SDI12 compatible fieldbus interface for the integration of the con::cube into SDI12 networks. The module enables the transfer of readings and status information for up to eight parameters as well as the system status. The location and type of the values are shown in the table in section 7.2.6.

Please use the moni::tool menu item *Service / Controller / Modbus Slave* to define which Parameters will be transfered (see manual moni::tool for further details).

Parameter readings can be queried via a SDI12-Master connected to the con::cube using a simple terminal programm (e.g. Docklight). For reading of measurement results the following commands are needed (ASCII-code):

Action	Command	Description
Send	0M!<CR><LF>	Start measurement parameter 1
Answer	00001<CR><LF>	
Send	0D!<CR><LF>	Query of measurement result
Answer		Measurement result of parameter 1
Send	0M1!<CR><LF>	Start measurement parameter 2
Answer	00001<CR><LF>	
Send	0D!<CR><LF>	Query of measurement result
Answer		Measurement result of parameter 2
...		
Send	0M7!<CR><LF>	Start measurement parameter 8
Answer	00001<CR><LF>	
Send	0D!<CR><LF>	Query of measurement result
Answer		Measurement result of parameter 8

<CR> ..... Carriage Return
<LF> ..... Line feed

To activate the SDI12 module the connection via ana::gate has to be established (see section 7.2.3). In case of any problems please check if version of ana-gate is V1.8.0 or higher and configuration of ana-gate.ini file is correct.

7.3 Data Visualisation

The actual readings of the parameters being monitored by the installed probes and sensors are displayed on the con::cube itself when equipped with touch screen (D-315-touch) or on any device with web browser functionality (e.g. Notebook, Iphone, Ipad). For more information please refer to manual of the operating software moni::tool.

8 Functional Check

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

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

Depending on the application (water composition), the specific probes and sensors connected and the environmental conditions a regular functional check (weekly to monthly) is recommended. The following sections provide an overview of all the actions that have to be performed to check the monitoring system quickly (see section 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

Device	Check	con::cube / moni::tool	Remark
con::cube	Power supply	LED is on	
con::cube	System status	Check if LED is blue and *Status* icon of moni::tool is not blinking.	LED is linked to digital OUT 5. Please refer to manual moni::tool for further details on Status icon
con::cube	System running (up-to-date)	Click on system clock at the bottom of the moni::tool screen and check if current time and time of last measurement is current.	Please remind that polling of results needs several seconds.
con::cube	System stability	Check *Logbook* entries since last functional check	Logon and select menu item *Menu / Menu / Logbook*. (see manual moni::tool)
con::cube	Installation	Housing, touch screen, cables	Look for damage (see section 4.1 regarding IP65)
Automatic cleaning	Function of automatic cleaning	Use function *Clean now* or wait for next cleaning	Watch for air bubbles when cleaning is activated
I/O devices	Correct function	For output devices moni::tool enables a test procedure via button *Send value*	Use menu item *Service / Controller / Analog Outputs*

Check	Remark
Compressed air supply for automatic cleaning	All tubes and fittings are tight?
Function of compressor and storage tank	Drain condensed water from storage tank of compressor (not necessary for s::can compressor B-32). Check pressure.
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 in *Value* screen if current readings of all parameters are displayed completely. Check historical readings in *Time Series* screen.

Regarding further check of the measuring results please refer to the manual of the according probe or sensor that monitors this reading.

8.3 Check of Probe - Sensor Integrity

Select *Status* tab and check if there is no red circle on any device in the system overview. When there is any doubt regarding the integrity of a specific probe or sensor connected please refer to the manual of this instrument.

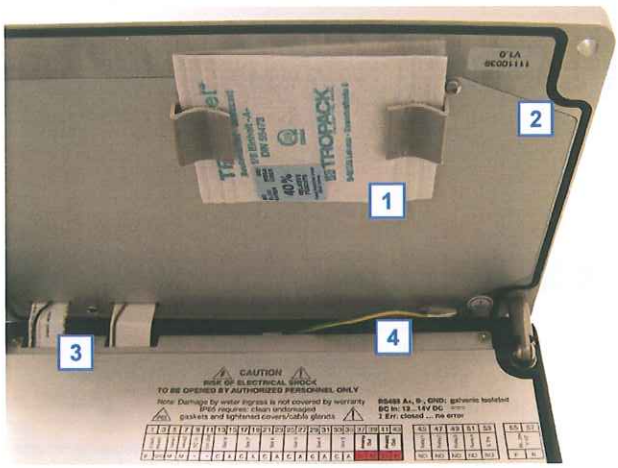
9 Maintenance

9.1 Cleaning

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

9.2 Desiccant Package

To avoid malfunctions due to condensing humidity, one desiccant package [1] has been built into the cover of the con::cube (see picture on the right hand side). When the package has reached the maximum humidity absorption capacity (the blue-coloured label will turn pink in that case), it has to be exchanged. Before closing the con::cube, every time check the desiccant package.



The desiccant package is not intended for the continuous absorption of humidity but only for the reduction of humidity below the dew point in a completely closed case. For this reason, properly closed housing covers and tightly screwed cable bushings are a prerequisite for correct functioning. In case of damage to the cord gasket in the housing cover it has to be repaired.

Used desiccant packages can be regenerated using normal drying processes (e.g. drying chamber at max 60°C or nitrogen). In this context, care must be taken that the cartridges cool down and are stored in an absolutely dry environment after the drying process.

Desiccant Packages are also available as spare parts (see section 11.4.1)

9.3 Housing

To ensure IP65 grade protection, gaskets and case edges have to be checked for cleanliness, possible damage and dirt or foreign bodies before closing the housing cover every time. In case of damage to the cord gasket [2] in the housing cover it has to be repaired! Please ensure that the wires for the display [3] and the earth grounding [4] are positioned correctly (see picture above).

The cover must be tightly screwed and the cable glands filled with cable or fitting plugs, must also be tight. All sockets not in use (USB, MIL, etc.) must be covered with corresponding caps. Damage caused by intrusion of water will not be covered by the warranty.

9.4 Calibration Touch Screen

Every touch screen requires calibration so that each point on the touch surface is assigned to the corresponding spot on the display as accurately as possible.

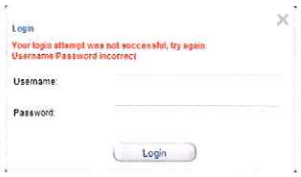
Calibration has to be repeated if necessary because the touch screen properties may change due to environmental impacts, in particular repeated temperature fluctuations, and ageing.

The touch screen calibration programme can be started up directly in moni::tool. For a description of the functionality, please refer to the s::can manual moni::tool.

In case the con::cube can no longer be operated via its touch screen, the calibration procedure can be started via web browser, via VNC-Viewer or via mouse / keyboard connected to USB and the calibration can be carried out on the touch screen of the con::cube.

10 Troubleshooting

10.1 Typical Error Pattern



Reason	Removal
Login to operating software moni::tool was not correct.	■ Close message window by pushing on x in the upper right corner. ■ Repeat login with correct user and password.

10.2 Device Settings

The con::cube settings will be displayed when clicking on the s::can logo in the lower right hand side of the screen.

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.

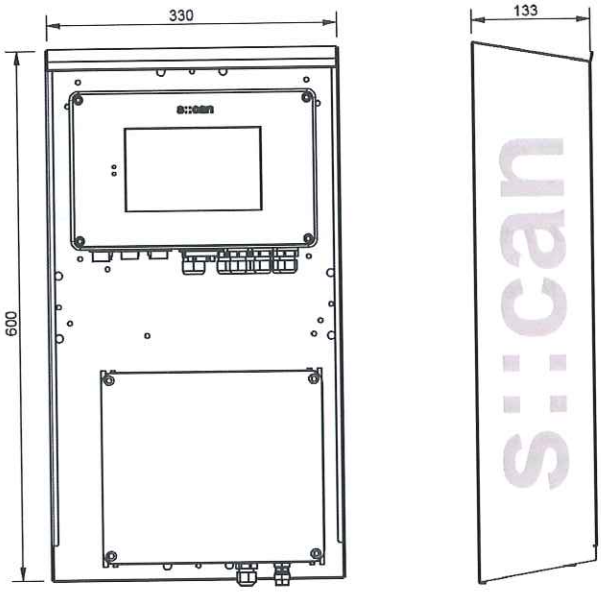
11 Accessories

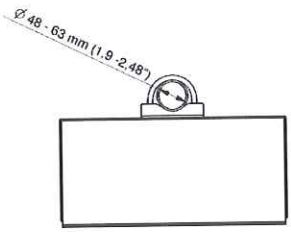
11.1 Installation

11.1.1 Weather Shield

For protection of the con::cube against severe weather conditions and for easy mounting on walls or railings a specific housing is available.

Name	Specification	Remark
Item-no.	F-51	
Housing material	stainless steel (1.4301)	
Dimensions	363 / 553 / 170 mm	W / H / D
Weight	5 kg	
Mounting bracket accessories	2 x M8 U-bolt with screw nut and spring washer 4 x M5 flange nut (on welded on bolt)	included in delivery for mounting onto rails





11.1.2 Power Supply Cord

For connection of the con::cube to power socket a power supply cable is available.

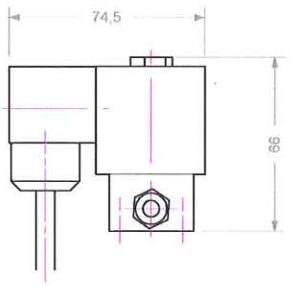
Name	Specification	Remark
Item-no.	C-31-eu or C-31-us	
Cable length	2 m	
Weight	approx. 300 g	
Assembling	ex works	
Housing material	PU	jacket
Process connection	CEE-7 shockproof plug NEMA 5-15 plug	C-31-eu C-31-us
Environment rating (IP)	IP 44 IP 55	C-31-eu C-31-us

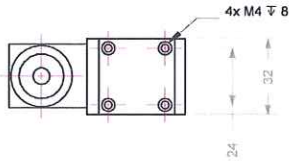
11.2 Automatic Cleaning

11.2.1 Cleaning Valve

For steering of the automatic air cleaning system a cleaning valve is available.

Name	Specification	Remark
Item-no.	B-44 B-44-1	compatible to B-32-xxx compatible to B-33-xxx
Cable length	2.4 m 10 m	B-44 B-44-1
Assembling	ex works, with cable end sleeves	+ blue - brown
Dimensions	85 / 75 / 70 mm	W / H / D
Material	Brass,stainless steel 1.4305 FPM	Housing Sealing material
Environment rating (IP)	IP 65	
Media that can be handled	neutral gases and liquids	
Temperature limits	-10 to 90°C (14 to 194°F) -30 to 60°C (-22 to 140°F)	of medium of environment
Operation voltage	12 VDC	supply by con::cube
Connection fitting compressed air side	B-44: Standard DIN 7.2 coupler B-44-1: coupler screw connection 6/4 mm, nickel-plated brass	P inlet pipe compressor (compressed air side)
Connection fitting probe side	B-44: Hose ID $^{3}/_{8}$ inch B-44-1: plug-in fitting (6 mm OD)	A inlet pipe probe (probe side)
Direct connection valve	$^{1}/_{8}$ inch	if fittings supplied ex works are removed





11.2.2 Flow Cell Autobrush

For automatic cleaning of spectrometer probes with 35 and 100 mm optical path length (OPL) a specific flow cell setup with automatic cleaning is available (see manual flow cell autobrush).

Name	Specification	Remark
Item-no.	F-446-1 F-446-2	for 35 mm OPL for 100 mm OPL

11.3 Maintenance

No accessories for maintenance are necessary.

11.4 Spare Parts

11.4.1 Desiccant Package

To avoid condensing humidity inside the con::cube a desiccant package is built in. The desiccant packages is available as spare part.

Name	Specification	Remark
Item-no.	B-43-2	10 pieces
Dimensions	70 / 5 / 80 mm	W / H / D
Weight	approx. 10 g	

11.4.2 Touch Pen

For easy operation of the touch screen a touch screen is included in delivery of the con::cube. Further touch pen can be ordered as spare part.

Name	Specification	Remark
Item-no.	D-312-pen	3 pieces
Dimensions	87 mm	Length

11.5 Optional Features

The con::cube can be equipped with several optional features explained in the sections below. Regarding detailed information of the optional features please refer to the technical specifications located at the end of this manual.

11.5.1 Display & Touch Screen

This optional device (item-no. D-315-touch) provides VGA color display and touch screen (7 inches) for direct operation of the moni::tool software on the con::cube. This optional feature has to be ordered at the same time as the con::cube because later modification is not possible.

11.5.2 Gateway to 3G Modem

This optional device (item-no. D-315-3G) provides internal modem for wireless remote control and / or data transfer. This optional feature has to be ordered at the same time as the con::cube because later modification is not possible.

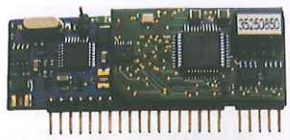
11.5.3 Analog Output Module

This optional device (item-no. D-315-out-mA) provides 2 analog outputs (4-20mA) for data transfer to PLC systems. The module can be plugged into one of 8 extension slots of the con::cube. The module can be plugged into one of 8 extension slots of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can (see section 10.4).

11.5.4 Digital Output Module

This optional device (item-no. D-315-out-relay) provides 4 configurable relay outputs for triggering functions. This optional feature has to be ordered at the same time as the con::cube because later modification is not possible.

11.5.5 Profibus DB Module

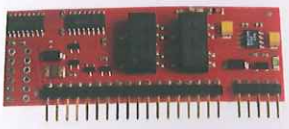


This optional device (item-no. D-315-out-Profibus) provides Profibus DP interface for data transfer to PLC systems. The module can be plugged into extension slot no.6, no.7 or no.8 of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can (see section 10.4).

11.5.6 SDI 12 Output Module

This optional device (item-no. D-315-out-SDI12) provides SDI 12 interface for data transfer to PLC systems. The module can be plugged into one of 8 extension slots of the con::cube. The module can be plugged into extension slots no.6, no.7 or no.8 of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can.

11.5.7 Analog Input Module



This optional device (item-no. D-315-in-mA) provides 2 analog inputs (4-20mA) for integration of third party readings into the s::can monitoring system. The module can be plugged into one of 8 extension slots of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can (see section 10.4).

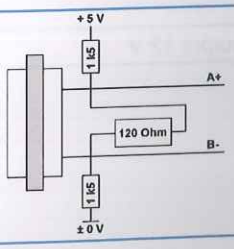
11.5.8 Digital Input Module

This optional device (item-no. D-315-in-relay) provides 2 digital inputs (0/1) for integration of third party readings into the s::can monitoring system. The module can be plugged into extension slot no.2, no.3, no.4, no.5, no.6, no.7 or no.8 of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can (see section 10.4).

11.5.9 SDI 12 Input Module

This optional device (item-no. D-315-in-SDI12) provides SDI 12 interface for integration of third party readings into the s::can monitoring system. The module can be plugged into one of 8 extension slots of the con::cube. A later upgrading of the con::cube with this optional feature on site is possible with help of qualified personal authorized by s::can.

12 Technical Specifications

Name	Specification	Remark
Item-no.	D-315-230 D-315-024	con::cube with AC power supply con::cube with DC power supply
Dimensions housing	280 / 209 / 85 mm	W / H / D
Required space	290 / 280 / 240 mm	W / H / D
Weight	approx. 4 kg	with display (D-315-touch)
Operation temperature	-20 to 50°C (-4 to 122°F)	at max. temperature sun shield recommended
Storage temperature	-20 to 60°C (-4 to 140°F)	Device has to be acclimatised to operation temperature before initial operation
Humidity	5 to 90%	non-condensing
Material housing	Aluminium alloy, powder coated	
Environment rating (IP)	IP 65 if customer's cable connections are sealed off and housing cover closed tightly.	Protection from direct sun, ice, rain, etc. recommended to assure best visibility of the display and functionality of the touch screen. Weather shield appliance of s::can (item-no. F-51) recommended.
Mounting	4 x M5 thread holes on backside 2 mounting brackets and 4 screws (included in delivery)	for direct mounting on panels (F-501) for wall mounting from front side
Power supply D-315-024	10 to 36 VDC	
Power supply D-315-230	110 to 240 VAC / 50 to 60 Hz	wide range power supply unit
Galvanic isolation power input	3000 V 1500 V	D-315-230 D-315-024
Power consumption	max. 1.70 A at 115V max. 0.85 A at 230 V 30 W (typical) / 60 W (max.) 10 W (typical) / 20 W (max.) 3 W (min.)	D-315-230 D-315-230 fully equipped no display, no I/O ports no display, no I/O ports, no cleaning, with 15 min. measuring intervall
Electric potential	Grounding for D-315-024 and D-315-230	The power supply earth (PE) is to be made properly. Process medium (e.g. waste water) must be connected to the same earth ground with less than 0.5 Ohm.
Conformity	EN 61326-1:2006 EN 61010-1:2001	EMC Safety
Fuse	internal	replacement by s::can Service only
Connection of s::can spectrometer probe	1 x MIL-Spec (IP 68, RS485, 12 VDC) electrically isolated 1 kV internal network termination 120 Ohm	
Connection of s::can ISE probes or s::can sensors	3 x sys plug connector (IP 68, RS485, 12 VDC) electrically isolated 1 kV internal network termination 120 Ohm	
RS485	electrically isolated 1 kV internal network termination 120 Ohm	

Name	Specification	Remark
Display (optional)	VGA TFT color display (800x480), 7 inches, (approx. 150 x 90 mm)	D-315-touch
User interface (on device itself)	USB (keyboard, mouse) Touch screen	D-315-touch (optional)
User interface (remote control)	Web-browser (TCP/IP) VNC (TCP/IP)	
Network connection (TCP/IP)	WLAN / WIFI 802.11n a/b/g (300Mb/s) Ethernet LAN (100 Mb/s, RJ45) 3G Modem	 D-315-3G (optional)
USB	USB connector (type A, 2.0)	for data transfer, software update, keyboard, mouse
Operating system	embedded XP	installed ex works (D-303)
Main memory	1 GB RAM	
Onboard memory	4 GB	
Functional display (LED)	4 x LED (blue / red)	linked to digital OUT 5 by default
Interface to SCADA	Modbus RTU Modbus TCP	max. 8 parameters max. 8 parameters
Interface to SCADA (optional)	Profibus DP for max. 8 parameters (according IEC 61158, up to 11 Mbit/s) SDI 12 OUT for max. 8 parameters Analog OUT (4 to 20 mA active) Resolution = 12bit (5 µA) Accuracy = 30 µA Max. load = 500 Ohm, Electrically isolated = 1 kV	D-315-out-Profibus (blue module), address = 1 D-315-out-SDI12 D-315-out-mA (black module), one module provides 2 outputs, to be plugged into a module slot, max. 8 module slots available.
Interface to third party devices (optional)	SDI 12 IN Analog IN (4 to 20 mA) Input resistance = 100 Ohm Isolation = 1 kV Resolution = 12 bit (5 µA)	D-315-in-SDI12 D-315-in-mA (red module), one module provides 2 inputs, to be plugged into a module slot, max. 8 module slots available.
3G Modem (optional)	3G: 900 and 2100 MHz 3G: 850, 1900 and 2100 MHz EDGE/GPRS: 850, 900, 1800 and 1900 Mhz	D-315-3G-eu D-315-3G-us both types
Digital OUT (optional) (relay on)	Max: 230 V / 500 VA (AC 15) 24 V / max. 2 A (DC 1) Min: 5 V / 100 mA	D-315-out-relay 4 modules normally open COM-3, address 33
Digital OUT sum error (relay on)	Max: 230 V / 500 VA (AC 15) 24 V / max. 2 A (DC 1) Min: 5 V / 100 mA	1 module normally open COM-3, address 33 LED: red = open, blue = closed
Digital IN	Logic levels: low < 5 V high > 10 V Max. voltage = 14 V Isolation > 1 kV	D-315-in-mA (white module), one module provides 2 inputs, to be plugged into a module slot, max. 7 module slots available (slot 1 cannot be used for this module type).
Digital OUT (relay change)	for 2 cleaning devices	
Power supply output 12 V	12 VDC, max. 8 W	

12.1 Module Address Mapping

Slot	mA Output	mA Input	Digital Input
Slot 1	49 and 50	17 and 18	not to be used
Slot 2	51 and 52	19 and 20	35 and 36
Slot 3	53 and 54	21 and 22	37 and 38
Slot 4	55 and 56	23 and 24	39 and 40
Slot 5	57 and 58	25 and 26	41 and 42
Slot 6	59 and 60	27 and 28	43 and 44
Slot 7	61 and 62	29 and 30	45 and 46
Slot 8	63 and 64	31 and 32	47 and 48

12.2 Pin Assignment for Profibus DP connector (Sub-D9)

Pin	Specification
1	not connected
2	not connected
3	PB +
4	not connected
5	Profibus GND
6	Profibus 5 V
7	not connected
8	PB -
9	not connected