

Operating manual SYCON 2702



Analyser for automated monitoring
of total hardness, residual hardness or carbonate hardness in process water

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General notes

This operating manual describes the installation and operation of the online analyser SYCON 2702. The installation and commissioning are to be carried out by an authorised specialist.

The device may only be operated under the conditions described in this operating manual. The device may be used only for the specified purpose of use. For the installation and operation of the analyser, all the provisions applicable on site (such as EN, DIN, VDE, UVV) are to be followed.

The analyser is used for automatic determination of total water hardness or carbonate water hardness in process water. Proper operation can only be guaranteed if the indicators and spare parts recommended by us are used.

Modifications to the electrical wiring and the programming may only be made by a trained specialist.

The water connection pipes to the device should be kept as short as possible and should not be laid together with network lines or in their immediate vicinity. In the vicinity of strong electromagnetic emitters, the analysis can become disturbed. In this case, separate interference suppression measures are to be taken; in particular the EMC directives are to be followed.

It is recommended to always have access to the analyser when familiarising oneself with these operating instructions in order to understand the described relationships and functions immediately. Since certain areas are built upon one another, it is advisable to work through the chapter in the specified order.

If there are any questions when using the analyser, you will receive support from our partners or us. You can reach us by phone during normal business hours or by email. You will find complete contact details of our technicians and our partners on our website.

Safety instructions and used symbols

This operating manual contain various safety instructions that indicate possible risks when using the analyser. This specifically concerns hazards for

- people,
- this product or related devices and installations,
- the working environment.

General notes

Various symbols in this manual indicate special hazards in order to avoid personal injury and equipment damage. Please read the entire text in full before starting work.



This symbol indicates useful tips for a better understanding of the device.



This symbol is a general warning that indicates circumstances that need to be considered.



Pressure

This symbol is a warning that you must expect lines under pressure.



Voltage

This symbol indicates the risk of electric current and the endangerment of people and electronic components and assemblies.

Transport



Check immediately after receipt that the device is complete and free from transport damage. The analyser is shipped in a manner safe for transport. Nevertheless, damage may occur during transport. Instruct the deliverer immediately about damage during transport.



Protect the analyser from possible damage during transport. If necessary, remove any liquids still in it in advance. Remove the indicator bottle and close it to prevent the indicator from leaking.

Storage



Store the analyser in a dry place at temperatures between 0 - 40 ° C and without direct sunlight.

Instruction on disposal

The device must not be disposed of as residual waste. Bring the device to a collection point. The battery should be disposed of separately.

Alternatively, you can return the analyser to your dealer or us for disposal.

SYCON 2702 in detail

The SYCON 2702 online analyser has the following features:

- reliable, accurate and fully automatic analyser
- monitoring of a programmable limit value
- total hardness or carbonate hardness can be measured with the same analyser
- simple commissioning via configuration wizard
- BOB operation (72 hours)
- self-calibrating and self-monitoring
- easy maintenance and cleaning
- compact design
- multicoloured, multilingual graphic display
- relay output for limit value
- relay output for error message
- analogue output 0/4 - 20 mA for measured value or status message
- digital input for flow monitor and starting analysis externally
- Measurement data memory and measurement data protocol on SD card
- no condensation in the optics
- Software updates via SD card



The SYCON 2702 is not a system that prevents hardness irruption.

Scope of supply

The SYCON 2702 is available in two versions:

1. *Wall-mounted analyser*

The analyser consists of a controller and the measuring chamber. Both are mounted on a wall bracket. This version is fully functional and includes connections for the water inlet and -outlet and a holder for holding an indicator bottle (Figure 1).

Article name	Article no.
Analyser SYCON 2702 with wall mounting 230 V version	30-010 162
Operating manual (German)	33-099 722

SYCON 2702 in detail

2. Analyser in housing

Optionally for wall-mounted analyser, a plastic housing is available in order to use the analyser in locations where more severe contamination is expected (Figure 2). The analyser on the wall mount can be quickly mounted in the housing with 4 screws. If the analyser and the housing are ordered together, the device is already mounted in the housing.

Article name	Article no.
Analyser SYCON 2702 with wall mounting 230 V version	30-010 162
Operating manual (German)	33-099 722
Housing for SYCON 2702 including wall mounting straps	33-099 005

The analyser can be operated intuitively via menu using the graphic display and 8 keys on the controller housing.



Figure 1:
Wall mounted SYCON 2702



Figure 2:
Wall mounted SYCON 2702 in housing



The wall mounted SYCON 2702 analyser is mounted in the housing with 4 supplied screws.

SYCON 2702 in detail

Device description

The analyser consists of the following components: The controller with graphic display and control panel is on the left side of the device. 4 cable bushings are provided on the lower controller housing. The dosing pump is on the right side and the measuring chamber is below the dosing pump.

The dosing pump is plugged onto the motor shaft of the motor and snaps into the receptacle. It can be removed without tools. The measuring chamber is attached to 2 guide pins on the controller housing. This can also be removed without tools and is undone with 2 captive locking pins. Dosing plugs, actuator plugs, inlet- and outlet plugs are attached to the measuring chamber in the same way and can be quickly undone.

The measuring chamber, which is always depressurised and always filled to prevent germs, is in the middle. The actuator plug with a white high-power LED is in the middle of the measuring chamber. The sensor system is located in the housing. The agitator (magnetic agitator), which is firmly connected to the housing, is below the measuring chamber.

The water connections for hoses with an outer diameter of 6 mm are below the indicator bottle. Inlet with sample water (left) and outlet (right). Both are firmly bolted to the wall bracket.

There is a solenoid valve in the supply line behind the indicator bottle.



Figure: View of the solenoid valve (no indicator bottle installed)



For a more detailed description of the components, see page 28.

SYCON 2702 in detail

Analysis properties


Parameter	Value/range	
Measurement method	Titration with colour change	
Measurement range	Total hardness	
	Carbonate hardness	
	ppm CaCO ₃	0.22 ... 534
	°dH	0.012 ... 30
	°f	0.022 ... 534
	°e	0.015 ... 37.6
mmol/l	0.0022 ... 5.34	
	The measuring range is defined by the indicator used. The entire measuring range of the total hardness is achieved by using different indicators.	
Accuracy	Measuring accuracy: ± 5% of the maximum reading of the respectively used indicator	
	Repeat accuracy: ± 2.5% of the maximum reading of the indicator used	
	Please note: Depending on the substances in the water, there may be shifts in the reading that affect the measurement accuracy. In such cases, we recommend performing a hardness measurement by hand titration and calibrating the analyser to this reading.	
Current interface	± 0.3 mA	
Indicator consumption	approx. 0.05 - 0.5 ml/analysis, depending on the measured water hardness	
Measuring duration	approx. 3 min, depending on the water hardness and the set flushing time	
Number of analyses	max. approx. 10,000 analyses / 500 ml of indicator at low water hardness. The consumption depends on the measured water hardness and the indicator used.	
Shelf life of the indicators	at least 2 years with proper storage (<25° C, dark)	
Water consumption	approx. 1 l/analysis with 2 bar The water consumption varies depending on the inlet pressure and the set flushing time.	

SYCON 2702 in detail

Inputs/outputs

Parameter	Value/range
2 relay outputs	max. 250 VAC / VDC 1 A as potential-free outputs NC/NO The relays provide the following functions: <ul style="list-style-type: none">• Limit alarm• Device error• Standby
Signal input	electrically separated contact input <ul style="list-style-type: none">• Start analysis• Flow monitor
Analogue output	0 – 20 mA / 4 – 20 mA Resolution: < 100 µA max. load: 750 Ω

Maintenance interval

Interval	Maintenance works
every 6 months	Cleaning of measurement chamber
	 At high ambient- and water temperatures or water with high organic load, the cleaning intervals may need to be shortened.
every 30,000 analyses or after 2 years of operation	Cleaning of measurement chamber (as above), Installation of maintenance kit: Changing the peristaltic pump cartridge and the gaskets

SYCON 2702 in detail

Indicators for monitoring total hardness

Name Indicator	Measurement ranges			Art.-no. 500 ml bottle	Art.-no. 4 x 500 ml bottles
	°dH	ppm CaCO ₃	°f		
H25-0.02	0.012 ... 0.12	0.22 ... 2.15	0.022 ... 0.214	32-084 115	32-484 115
H25-0.05	0.02 ... 0.2	0.36 ... 3.56	0.036 ... 0.356	32-084 125	32-484 125
H25-0.1	0.03 ... 0.3	0.53 ... 5.3	0.053 ... 0.53	32-084 135	32-484 135
H25-0.2	0.06 ... 0.6	1.1 ... 10.7	0.11 ... 1.07	32-084 145	32-484 145
H25-0.3	0.09 ... 0.9	1.6 ... 16	0.16 ... 1.6	32-084 155	32-484 155
H25-0.5	0.15 ... 1.5	2.7 ... 27	0.27 ... 2.7	32-084 165	32-484 165
H25-1	0.3 ... 3.0	5.3 ... 53.4	0.53 ... 5.34	32-084 175	32-484 175
H25-2	0.6 ... 6.0	11 ... 107	1.1 ... 10.7	32-084 185	32-484 185
H25-3	0.9 ... 9.0	16 ... 160	1.6 ... 16.0	32-084 195	32-484 195
H25-5	1.5 ... 15	27 ... 267	2.7 ... 26.7	32-084 205	32-484 205
H25-10	3 ... 30	54 ... 534	5.4 ... 53.4	32-084 215	32-484 215

Indicators for monitoring carbonate hardness

Name Indicator	Measurement range			Art.-no. 500 ml bottle	Art.-no. 4 x 500 ml bottles
	°dH	ppm CaCO ₃	°f		
C25-1	0.3 ... 7.5	5 ... 133	0.5 ... 13.3	32-086 125	32-486 125
C25-1.5	0.45 ... 11.5	8 ... 205	0.8 ... 20.5	32-086 135	32-486 135
C25-2	0.6 ... 15.0	11 ... 267	1.1 ... 26.7	32-086 145	32-486 145
C25-3	0.9 ... 22.5	16 ... 401	1.6 ... 40.1	32-086 155	32-486 155



The measured value to be monitored should be as close to the middle of the measuring range of the indicator as possible.

One bottle of indicator suffices for at least 10,000 analyses if the measurement point is in the lower range of the indicator type used.

The exact number of possible analyses with an indicator bottle depends on the respective degree of hardness and the indicator used.

Installation

The installation should be done in the following steps to avoid errors:

- Install the analyser in a dry, easily accessible and easily visible location.
- Fix the analyser or housing stably with screws according to the manual.
- Connect the device electrically and pay attention to the correct input voltage. Ensure this using the nameplate.
- Connect inlets and outlets according to the installation manual. Pay attention to a correct inlet pressure and free, short outlet.
- Insert the indicator and connect it to the dosing pump. Make sure that the connecting hoses are not twisted.
- Do not switch on the device until all preliminary works have been completed and the housing is closed.
- Now set the device settings on the device.



The sample water must be clear and free of solids. Otherwise, a filter should be provided in front of the analyser. Solids in the water can damage the solenoid valve or prevent it from closing. If the solenoid valve blocks or does not open or close any longer, the measuring chamber will not be flow-through properly. This leads to incorrect measurements.



Temperature of the sample water must be between 5 and 40 °C.



If the sample water has a higher temperature, a sample cooler should be used. This is available as an accessory.

Installation

Wall mounting without housing

The SYCON 2702 must be installed upright. The wall bracket has four 6 mm holes for attaching the analyser.

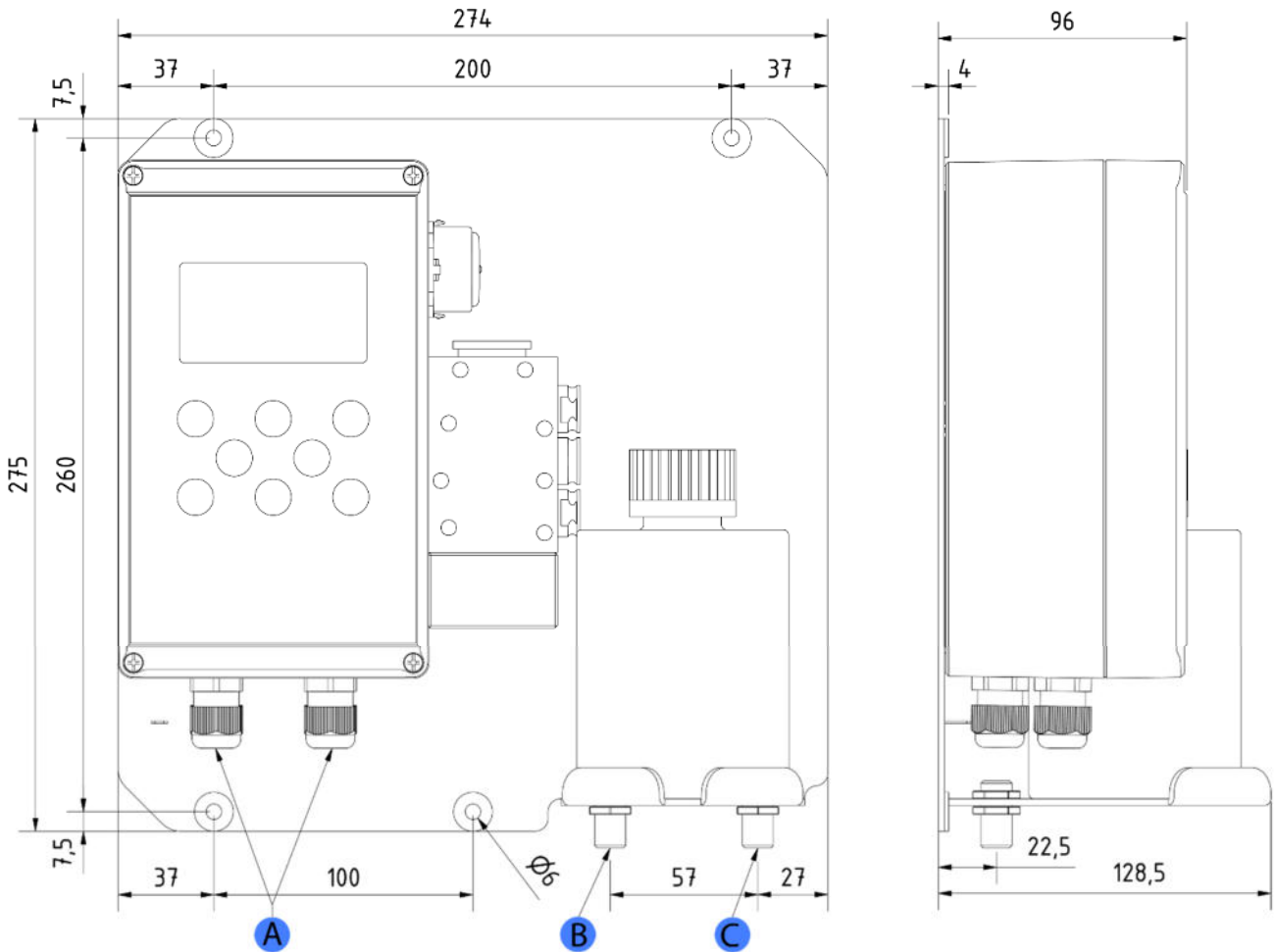


Figure: Drill guide for attaching the analyser without housing

Position	Description
A	Cable glands for electrical connection
B	Water inlet connection for hose with 6 mm outer diameter
C	Water outlet connection for hose with 6 mm outer diameter

Installation

Wall mounting with housing

The analyser is optionally supplied with a matching housing. As accessories kit you will receive 4 mounting lugs with 6.5 mm holes, which are attached to the rear side of the housing.

To open the device, the available free space should be at least 450 x 350 mm (W x H).

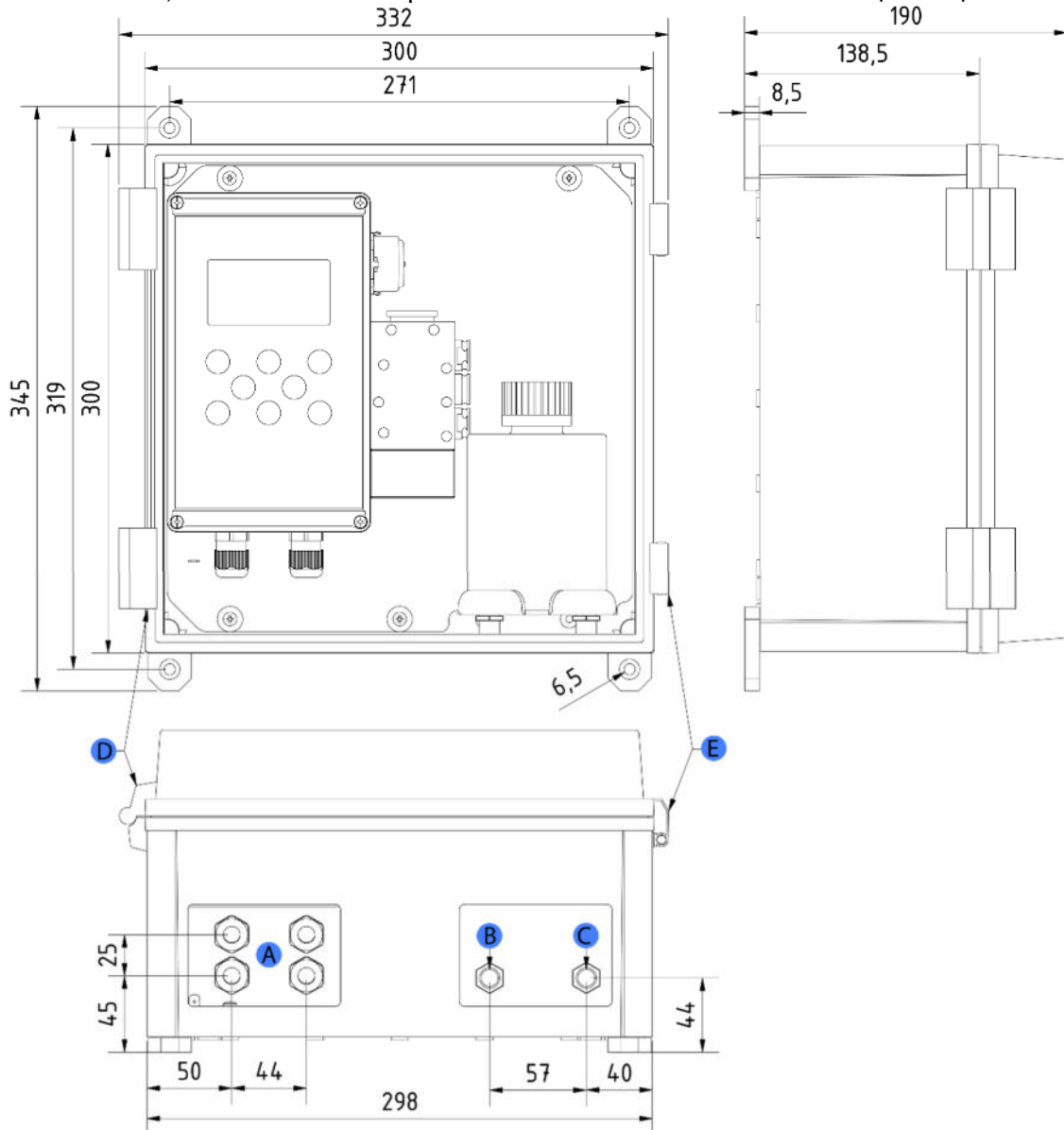


Figure: Drill guide for attaching the analyser in the housing

Position	Description
A	Cable glands for electrical connection
B	Water inlet connection for hose with 6 mm outer diameter
C	Water outlet connection for hose with 6 mm outer diameter
D	Door stop
E	Door locks

Installation

The mounting lugs can be attached perpendicularly, as shown in the picture, or as rotated by 45° or 90°.

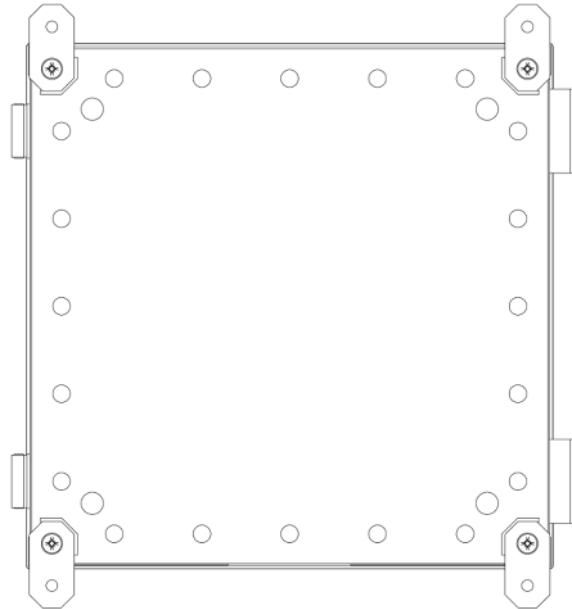


Figure: Rear view of the housing with vertically mounted mounting lugs

Work on pressurised water lines



Pressure

Maintenance and repair works should only be carried out by qualified personnel.

- Before starting work, make sure that all lines are depressurised.
- Hoses, connections and gaskets must be regularly checked and, if necessary, preventively replaced, even if they show no visible damage. Maintenance intervals must be complied with.
- Before commissioning after maintenance, make sure all connections, threaded fittings, and gaskets are properly installed. Check that all housing parts are closed and filters or other parts connected to the device are installed correctly.
- Remove all tools, spare parts or other materials required for maintenance prior to commissioning.
- Clean the device, take any leaked fluids and leave the device in a clean condition.
- Check that all safety devices are present and ready for operation.

Installation



The analyser has 2 connections with bulkhead fittings for plastic hoses with an external diameter of 6 mm for the water inlet (left) and water outlet (right). These are only inserted into the screwed connections.

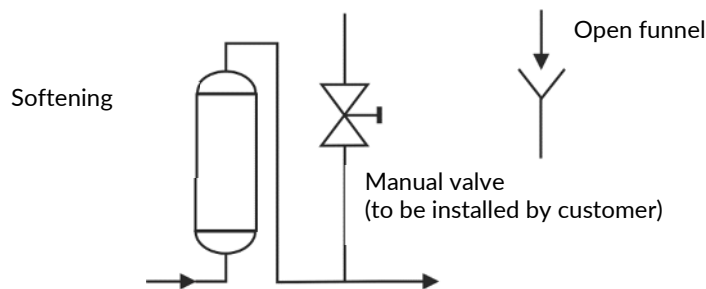


Figure: Connection of water inlet and -outlet



Pressure

The inlet pressure of the water sample must be between 0.5 and 5.0 bar.



The recommended inlet pressure of the water sample should be between 1 and 2 bar.



The hose length of the water outlet must not be longer than 2 m and must lead away vertically downwards. The system must be able to relax freely against the atmospheric pressure. There must be no back pressure greater than the inlet pressure. The water is drained without pressure in an open funnel or drain.

Operation with unpressurised sample water

If the sample water is depressurised, a pressure-controlled membrane or submersible pump is required to transport the sample water into the measuring chamber of the analyser.

Electrical installation



Work on electrical connections may only be carried out by authorised specialist personnel in compliance with the current regulations. All lines must be de-energised. The permissible supply voltage is 100 - 240 VAC (50/60 Hz).

Open the lid of the controller by loosening the four screws in the corners of the lid.

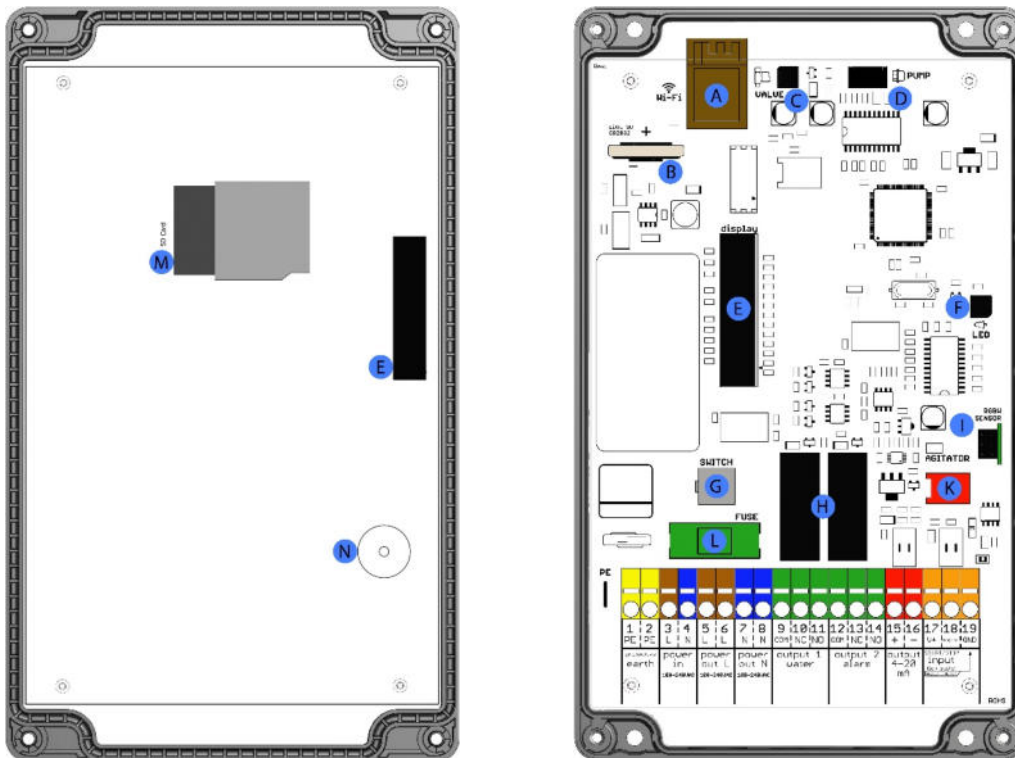


Figure: Back cover of the lid (left side), circuit board (right side)

Position	Description
A	Wi-Fi (optional)
B	Battery holder
C	Solenoid valve port
D	Indicator pump port
E	Display port
F	Actuator plug LED port
G	Main switch port
H	2 x relay
I	RGB sensor
K	Agitator port
L	Fuse (5 x 20 mm) 1 A time-lag
M	SD card base
N	Sound emitting device

Electrical installation

Connection of supply voltage

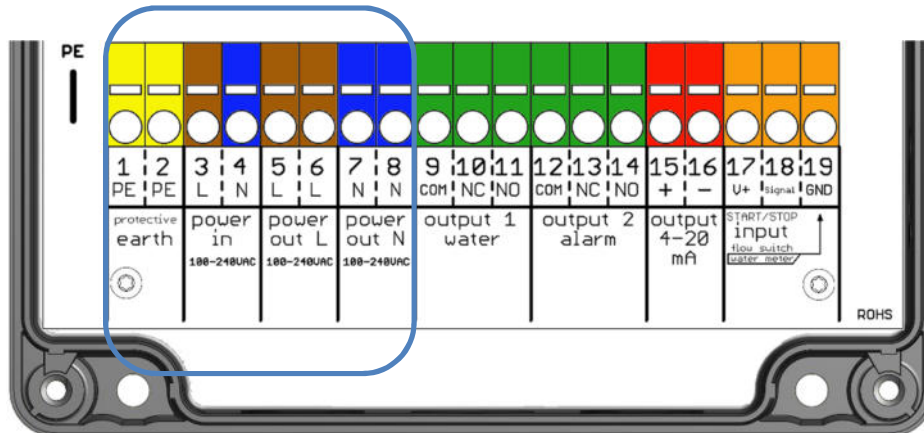


Figure: Terminals for the connection of the supply voltage (blue border)

Connection of supply voltage

Terminal designation	Description
1 PE	Earthing
2 PE	Earthing
3 L (power in)	Supply voltage between L and N 100 - 240 VAC
4 N (power in)	

Output terminals which are connected via the device switch

Terminal designation	Description
5 L power out	Switched supply voltage between L and N 100 - 240 VAC
6 L power out	
7 N power out	
8 N power out	



Voltage

The maximum connected capacity of all loads must not exceed 250 VAC / 1 A.

Electrical installation

Connection of the relay outputs

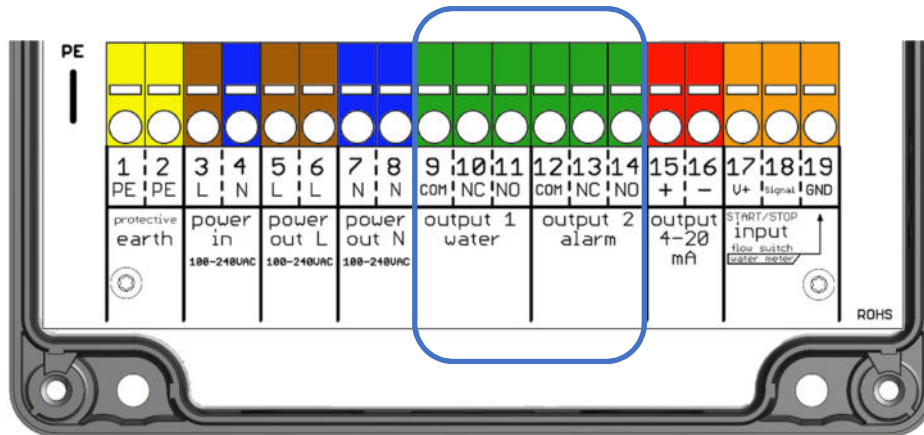


Figure: Terminals for connecting the relay outputs (blue border)

The relays are designed as change-over contacts, with a common connection and the switching outputs NC and NO.

Output 1 water (relay 1): Water hardness notification

Terminal designation	Description	Connection
9 COM	Relay 1 COM common connection	see page 9 "Load capacity"
10 NC	Relay 1 NC normally closed	
11 NO	Relay 1 NO normally open	

Output 1 / relay 1 function (notification of water hardness):

If the measured value of the sample falls below the limit set in the SYCON, relay 1 is deenergised and a connection from COM to NC is established. In addition, the symbol R1 is not marked in the display.

If the measured value of the sample exceeds the limit set in the SYCON, relay 1 is energised and a connection from COM to NO is established. In addition, the symbol R1 is highlighted in black on the display.

Output 2 alarm (relay 2): Device error notification

Terminal designation	Description	Connection
12 COM	Relay 2 COM common connection	see page 9 "Load capacity"
13 NC	Relay 2 NC normally closed	
14 NO	Relay 2 NO normally open	

Output 2 / relay 2 function (device error notification):

If a device error occurs or the device is switched off, the relay 2 is deenergised (connection from COM to NC). In addition, the symbol R2 is not marked in the display.

The relay 2 is energised in the error-free state of the device (connection from COM to NO), this serves the wire break safety. In addition, the symbol R2 is highlighted in black on the display.

Electrical installation

Current interface and input contact

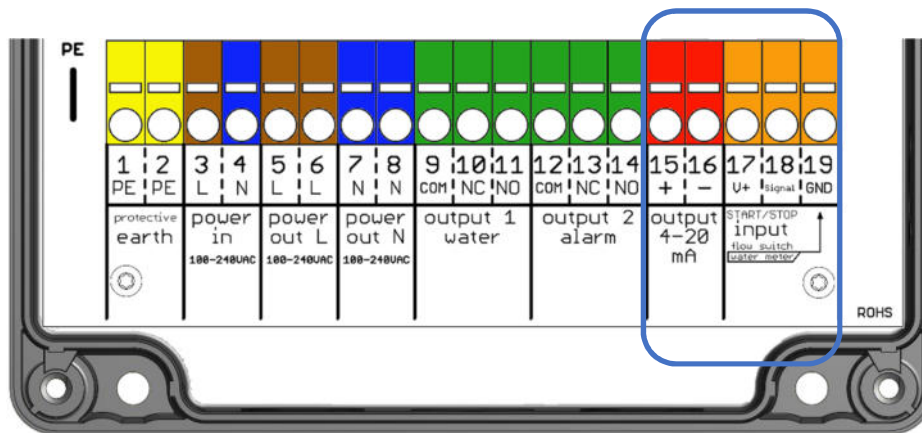


Figure: Terminals for connecting the current interface and the input contact (blue border)

Output 4 - 20 mA: Current interface

Terminal designation	Description
15 +	+ Output 0 - 20 mA or 4 - 20 mA
16 -	- Output 0 - 20 mA or 4 - 20 mA

Current interface function:

The current interface is used to provide the present water hardness or device status as current output. The current range can be selected between the settings 0 - 20 mA or 4 - 20 mA. The maximum load is 750 Ω.

Selection options for current interface type:

- From
- 0 - 20 mA value
- 4 - 20 mA value
- 0 - 20 mA status
- 4 - 20 mA status



For more information, see page 27.

Start/Stop Input: Start input contact for analysis / flow monitor

Terminal designation	Description
17 V+	+ 24 V auxiliary voltage to connect potential-free outputs
18 Signal	Signal input
19 GND	Ground connection for the + 24 V connection

Input contact function:

A flow monitor or other potential-free switches can be connected to the input contact. If the input contact is closed, the symbol IN is highlighted in black on the display.



For more information, see pages 23 through 24.

Connection of external components

To connect additional components, the device is equipped with an input, 2 relays and an analogue output (current interface 4 - 20 mA). A flow monitor, a potential-free switch or an electronic switch (open collector) can be connected to the input. An auxiliary voltage of 24 VDC at terminal 17 and GND at terminal 19 is available for the electronics. For signal detection, 24 VDC must be bridged to terminal 18. No external voltage sources may be connected to the input. If necessary, a potential separation must be made with a relay or optocoupler.

The connections of the relays are all brought out potential-free. For switching external devices, the internal network voltage or alternatively an external supply voltage can be used. The connection to external controllers is usually established via the potential-free contacts of the relays.

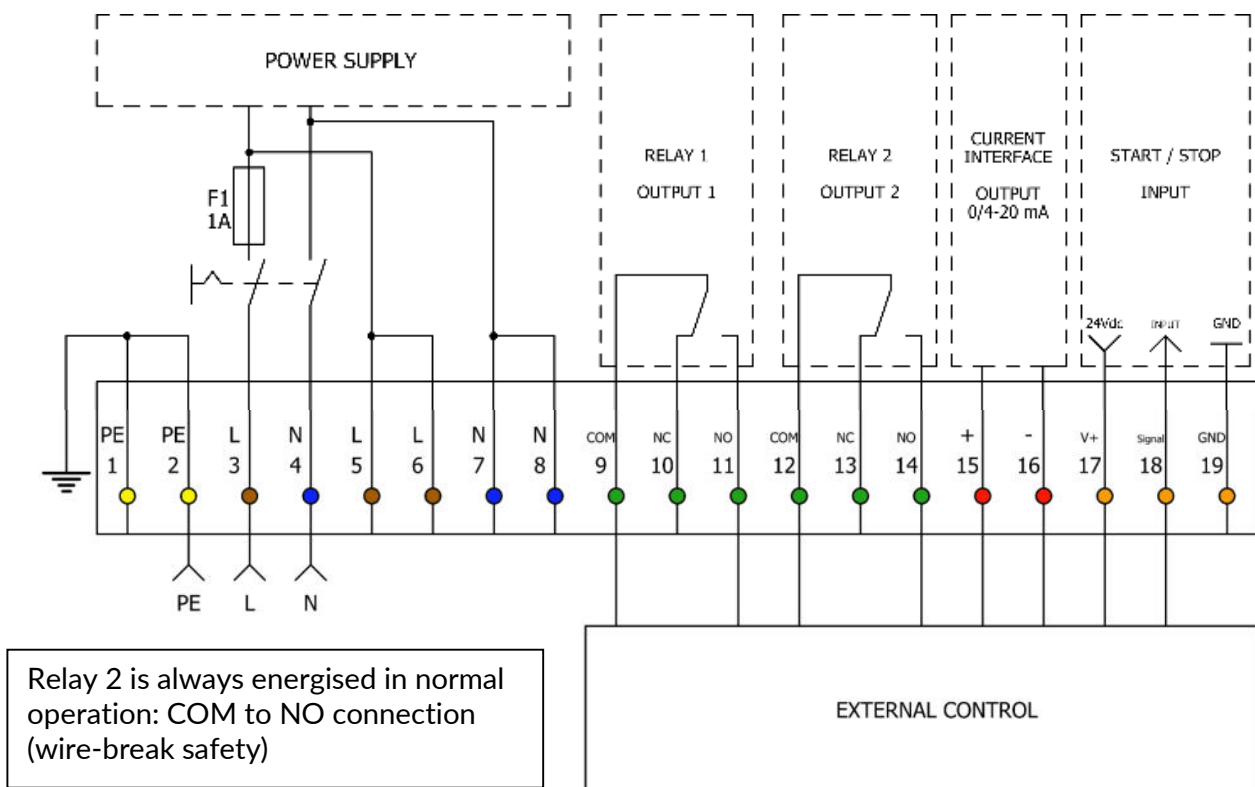


Figure: Schematic plan view of connection terminals



Voltage

The supply voltage connected through the device switch is applied to output terminals 5 to 8 and can be used on the output relay in order to actuate drive pumps, solenoid valves or other loads. The maximum total connected load to output terminals 5 to 8 must not exceed 250 VA. The output terminals are switched with the network switch of the analyser and protected by the fine-wire fuse of the device.

Connection of external components

Flow monitor

Typically, an ion exchanger is monitored every 10 minutes to ensure that hard water does not reach the load in the event of a sudden hardness irruption. When installed on a system where monitoring is required only during operating hours, the input contact can be used in combination with a flow monitor or a timer. Thus, the time interval can be paused during a system downtime, which can reduce indicator and power consumption.

As a flow monitor, a paddle can be used. Potential-free contact of a timer is also possible. The examples below show various connection options at the input contact.

When using a flow monitor, the analyses are only carried out if a defined signal is present at the input (input) (flow monitor reports flowing water).

Depending on the installed contact, the input can be configured as NC or NO type.

Programming: Menu> Parameters> Input> Flow monitor



This function must not be confused with the function "Start analysis" by external controller.

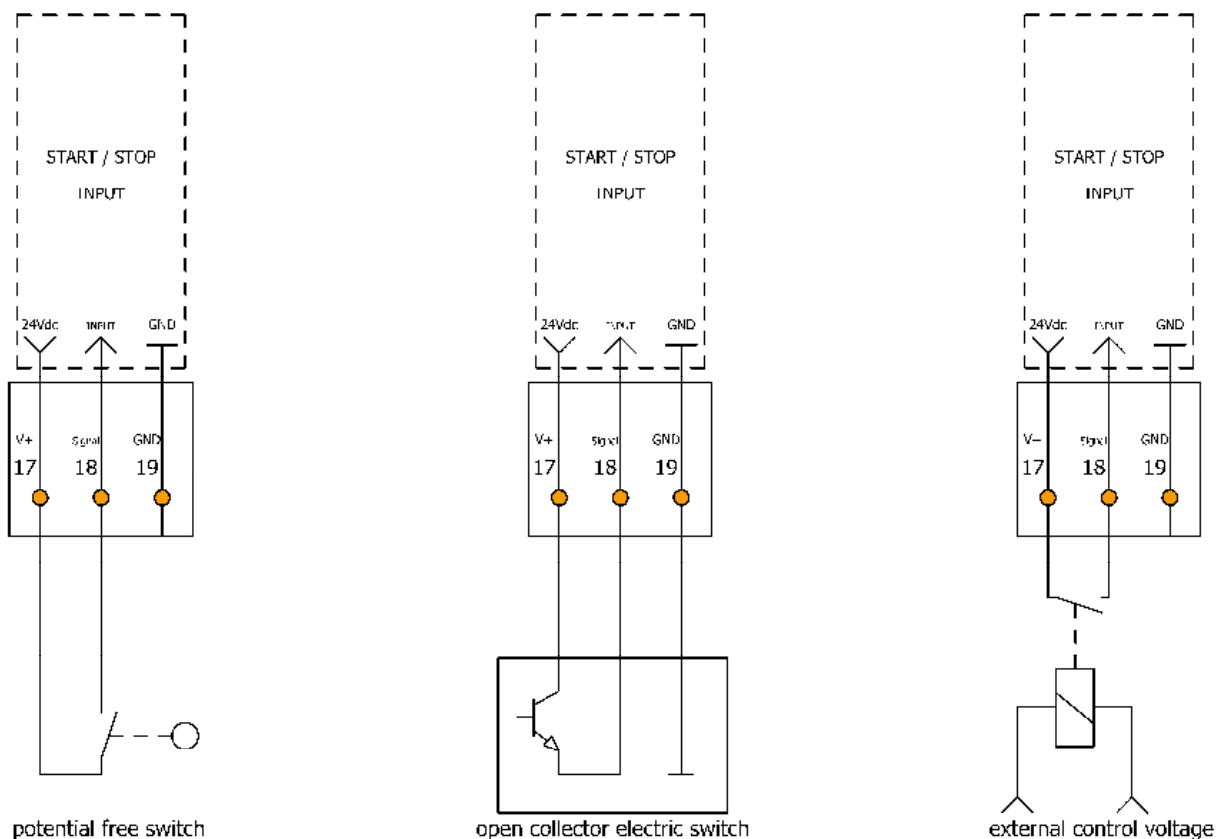


Figure: Three possible variants for connecting a flow monitor

Connecting external components

Switch for starting the analysis externally

In addition to the option of running an analysis on a time-dependent basis, there is also an option to trigger additional analyses using an external button. This can be a potential-free push-button or the relay output of a PLC controller or water softening controller.

The use of a switch at the input is intended as an addition to the normal time interval. The analyser operates at a set time interval. A signal can be delivered to the input via the switch and thus an additional analysis can be started.



An additional analysis can also be triggered by pressing down the [OK] key for 3 seconds.



With a permanently connected input contact in the analysis start mode, analyses are carried out permanently.

Programming: Menu > Parameters > Input > Start analysis

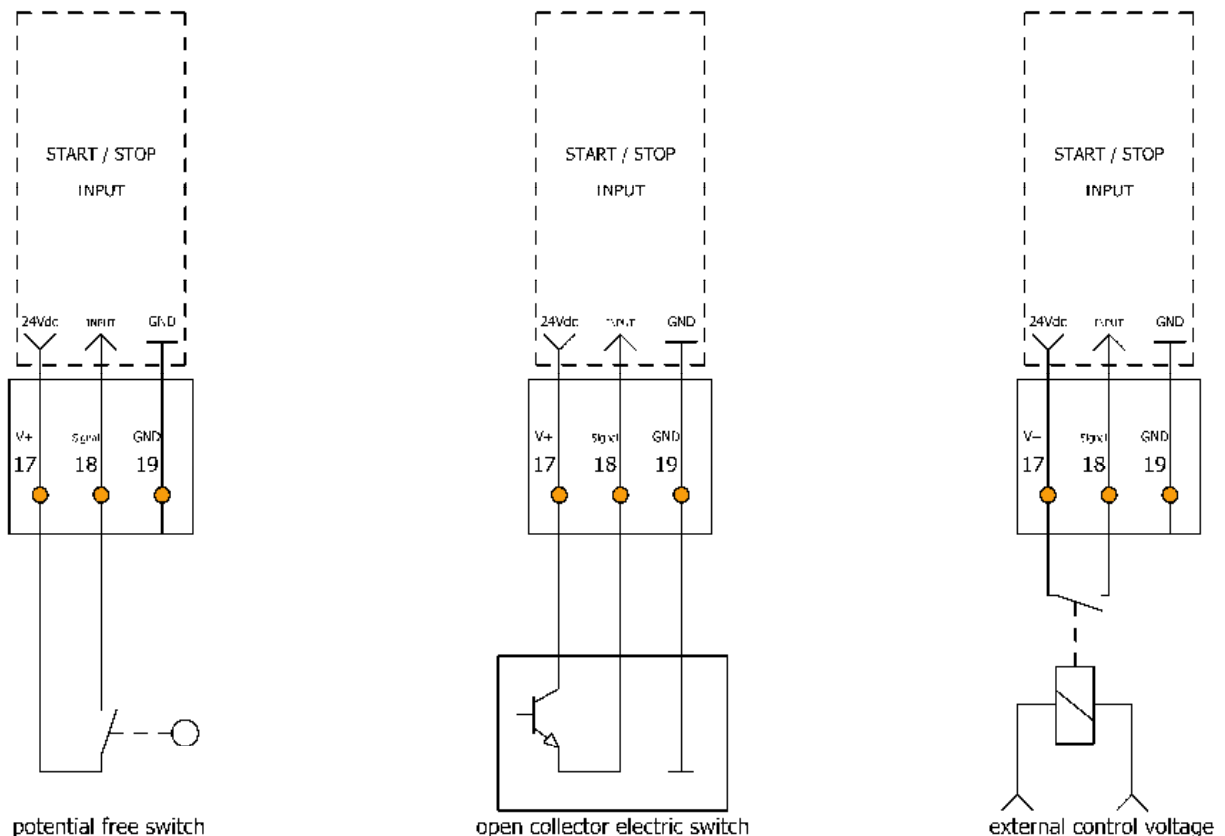


Figure: Three possible connection variants to start the analyser with an external controller

Connection of external components

Indicator light / horn

An indicator light or horn to signalise a limit violation can be connected to relay 1 / output 1.

The relay 2 / output 2 is used to report detected errors (e.g. optical error, faulty zero sample, missing supply voltage at the analyser). If the analyser is in normal operation and there is no fault, relay 2 / output 2 is energised and the connection from COM to NO is made. If an error is detected, the relay 2 / output 2 is deenergised and the connection from COM to NC is established.

Relay 1 / output 1 is energised when the limit value is exceeded and the connection from COM to NO is made. This position can be programmed in the program as a permanent contact or as a pulse contact.

Continuous contact on relay 1 / output 1:

Relay 1 / output 1 remains switched in the position (connection from COM to NO) when the limit value is exceeded until the measured water hardness is below the limit again. Next, the limit value exceedance is lifted and relay 1 / output 1 is switched back (connection from COM to NC).

Pulse contact on relay 1 / output 1:

Relay 1 / output 1 remains switched in the position (connection from COM to NO) only for a programmed pulse duration when the limit value is exceeded. Once the programmed pulse duration expires, relay 1 / output 1 switches back (connection from COM to NC). The next time the limit is exceeded, relay 1 / output 1 is switched again as a pulse. This function is often used in combination with pilot distributors.

Programming: Menu > Parameters > Outputs > Relay 1

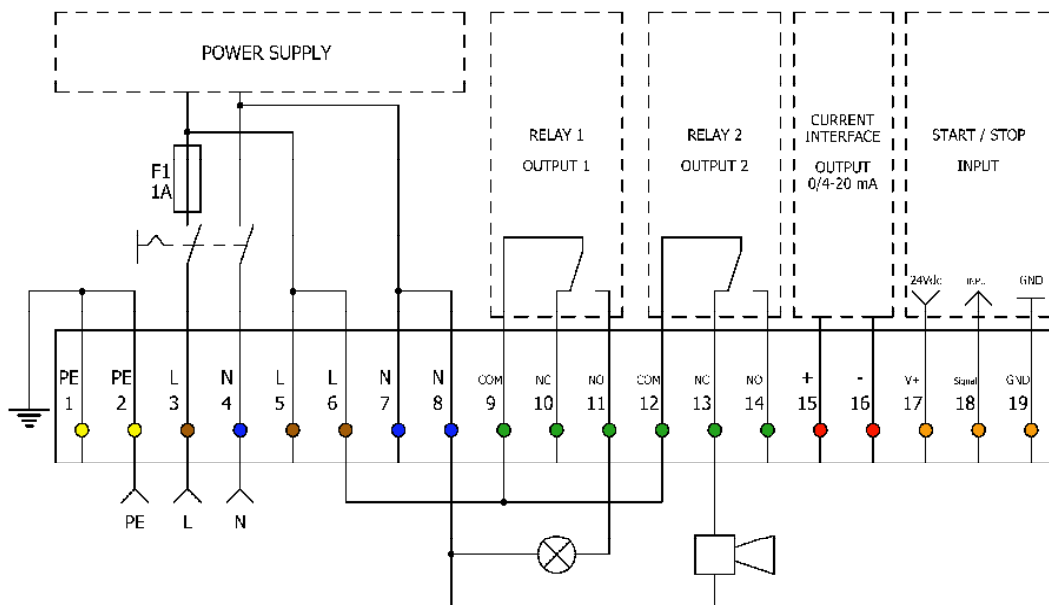


Figure: Terminal assignment when connecting indicator light / horn

Connection of external components

Regeneration system for demand-controlled regeneration triggering

Preparation plants are usually regenerated according to their capacity according to a constant flow rate. To ensure that no hard water reaches the load, the regeneration takes place before the actual exhaustion of the plant. If regeneration is triggered by an analyser, regenerants and water are saved. In the case of strongly fluctuating raw water hardness, a qualitative regeneration triggering via an analyser is unavoidable.

The pulse output for the regeneration triggering takes place via relay 1 / output 1. Due to longer service life or due to excessive load, premature regeneration can be triggered by the counter ion effect. It is therefore recommended to repeat the measurement if the limit value is exceeded with a control measurement.

Programming: Menu > Parameters > Analysis > Limit

Programming: Menu > Parameters > Analysis > Control measurement

Analogue measuring device

The present measured value is available as an analogue value at terminals 15 and 16. Recorders or external devices can be connected to process the measured value. You can choose between a current output 0 - 20 mA value or 4 - 20 mA value. In addition, you must specify which current value of 20 mA corresponds to which total hardness / carbonate hardness.

Programming: Menu > Parameters > Outputs > Current interface type

Programming: Menu > Parameters > Outputs > Calibrate current interfaces.

(Enter the total hardness / carbonate hardness value that should correspond with 20 mA.)

The supplied current of the current loop for the displayed measured value is calculated as:

$$I = I_0 + \frac{(20 \text{ mA} - I_0) \cdot \text{Messwert}}{\text{oberer Härtegrad}} [\text{mA}]$$

Here, I_0 is to be set to 0 or 4 mA depending on the operating mode.

The number "upper degree of hardness" corresponds to the entered water hardness value for 20 mA.

Usually, the end of the measuring range of the indicator deployed is used.



We recommend setting the upper degree of hardness to the end of the indicator measurement range.

Example of calculation:

For the analysis, an indicator H25-0.3 is used. Measuring range 0.09° dH to 0.9° dH.

Upper hardness is set to 0.9° dH, which corresponds to 20 mA.



For the current interface type "0 - 20 mA", 0 mA corresponds to 0° dH.
For the current interface type "4 - 20 mA", 4 mA corresponds to 0° dH.

External component connection

Calculation for current interface type "0 - 20 mA"

$$I = 0 \text{ mA} + \frac{(20 \text{ mA} - 0 \text{ mA}) \cdot 0,42 \text{ }^\circ\text{dH}}{0,9 \text{ }^\circ\text{dH}} [\text{mA}]$$
$$I = 9,3 \text{ mA}$$

9.3 mA corresponds to 0.42° dH.

Calculation for current interface type "4 - 20 mA"

$$I = 4 \text{ mA} + \frac{(20 \text{ mA} - 4 \text{ mA}) \cdot 0,42 \text{ }^\circ\text{dH}}{0,9 \text{ }^\circ\text{dH}} [\text{mA}]$$
$$I = 11,46 \text{ mA}$$

11.46 mA corresponds to 0.42° dH.

Operating status via analogue current interface

The operating status of the device can be transmitted via the current interface terminals 15 and 16.

Programming: Menu > Parameters > Outputs > Current interface type

Selection options:

- 0 - 20 mA status
- 4 - 20 mA status

Operating status	Current interface	
	0 - 20 mA status	4 - 20 mA status
Mode	3.5 mA	6.8 mA
Fallen short of limit	7.5 mA	10.0 mA
Limit exceeded	12.5 mA	13.6 mA
Indicator fill level < 10%	16.5 mA	16.8 mA
Fault	0 mA	4 mA



The information given here may vary by a deviation of ± 0.3 mA.

Operation



Figure: SYCON 2702 analyser with installed indicator bottle

Position	Description
A	Controller
B	Graphic display
C	Control panel
D	Cable grommet
E	On/Off switch
F	Dosing pump
G	Dosing plugs (indicator plugs)
H	Optical measurement path
I	Measurement chamber
	(The locking pins can only be pulled up and cannot be pulled out)
K	Agitator (magnetic agitator)
L	Drain plug
M	Actuator plug LED
N	Inlet plug
O	Solenoid valve (concealed behind the indicator bottle)
P	Wall bracket
Q	Indicator bottle 500 ml
R	Water inlet / sample water (Plug connection for plastic hoses with 6 mm outer diameter)
S	Water outlet (plug connection for plastic hoses with 6 mm outer diameter)

Operation

Display and keypad

The analyser has a graphic display in which both the measured values and the menu can be displayed for operation. Depending on the state of the device, the background colour of the display changes:

Background colour	State
White	Device operates correctly
Red	Limit value exceedance or device error

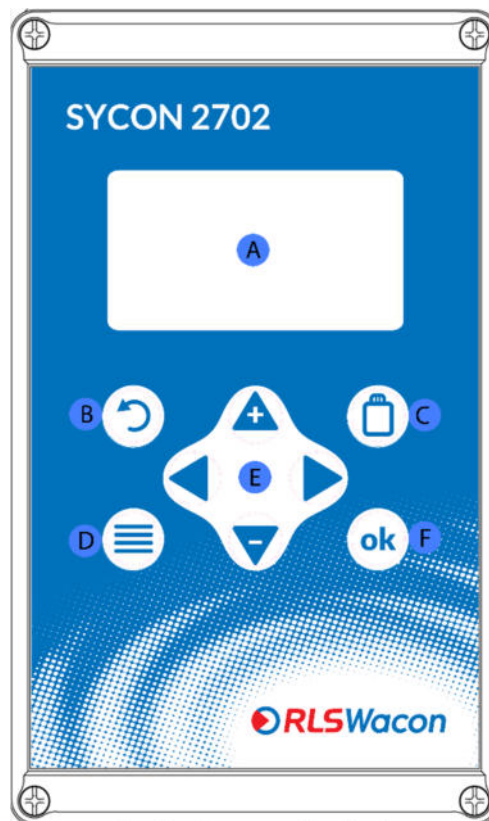


Figure: Structure of the front cover of the controller

Settings can be set via 8 keys.

Position	Description
A	Display
B	Back / discard input / aborting a running analysis
C	Inserting a new indicator bottle
D	Main menu / switching between main menu and analysis display
E	Arrow keys for navigation / entry of value
F	OK / confirm

Operation

Display menu

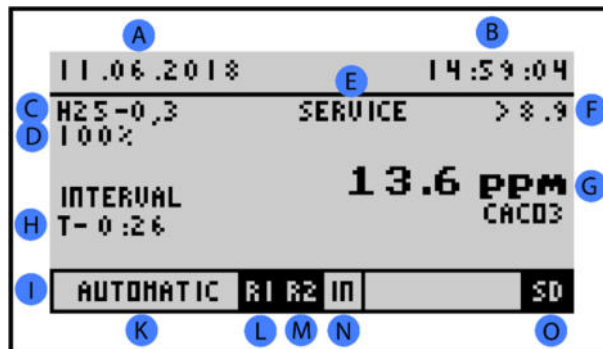
The following selection options are available in the menu window:



Menu item	Description
Automatic	To activate and deactivate the automatic analysis operation.
Parameter	Under this menu item, all device settings can be made.
Info	Informs about: Hardware- and software versions, analysis counter, maintenance counter, maintenance date, good- and bad measurements.
Service	Start analysis (manual), Pump indicator (new bottle inserted), Manual flushing, acknowledge maintenance, Reset good- and bad counter, Diagnostic program (testing of the actuators and sensors installed in the SYCON including the hardware)
Assistant	The wizard guides you through all settings in the device and facilitates the commissioning.
History	Displays the history of the last 100 measurements as a graph.

Operation

Display during a measurement



Position	Description
A	Date
B	Time
C	Selected indicator
D	Bottle fill level in %
E	Device status (maintenance: maintenance counter expired, cleaning: optics dirty)
F	Set limit for relay 1
G	Analysis result
H	Analysis step (T - 5:00 remaining time in minutes until next analysis)
I	Status bar
K	Manual mode or automatic mode
L	Relay 1 de-energised
M	Relay 2 energised (fields highlighted in black are active)
N	Digital input (IN) inactive
O	SD card present



Simple starting of analysis.
press down the [OK] key for 3 seconds to start an analysis.



The analysis can be started in manual and automatic mode.

Display of measured value history (history)

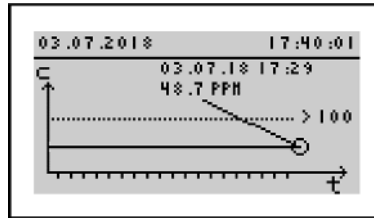
With the aid of the arrow keys [←] and [→] the last 100 measurements with date and time stamp can be read in the display mode. The set limit is drawn as a dotted line in the history.



To analyse the measured values on a PC, the trend.csv file is available on the SD card.

Operation

You can open the history using the Menu> History keys. Press the [Back] key to return to the measured value display.



Display of selection menu

When selecting, you can change the selection with the [Up] and [Down] keys. The setting is confirmed with the [OK] key. If you do not want to change the setting, you can leave the selection with the [Back] key.

In the picture below, the active selection is the [Yes] key highlighted in black.

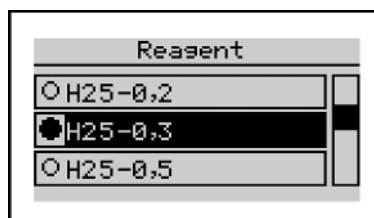


Display of selection list

You can change the selection in a selection list using the [Up] and [Down] keys. The setting is confirmed with the [OK] key. If you do not want to change the setting, you can leave the selection with the [Back] key. If the selection list offers more than three options, a scroll bar is displayed on the right edge of the display.

The currently selected indicator type is highlighted in black (H25-0.3).

The circle to the left of the indicator type filled in black indicates which indicator is currently programmed for analysis.



Operation

Display with value entry

The numbers are entered via a display keypad. You can move the cursor with the arrow keys [←], [→], [↑] and [↓] of the device. The input mask additionally displays the currently set numerical value and the valid input range.

You will see an input keypad. Now use the arrow keys to move the black cursor to the desired digit and press the [OK] key.

The selected digit appears on the left side in a frame. Repeat the entry until the desired number is in the frame. Now move the cursor to the OK field in the keyboard and press the [OK] key.

You will see the following information:

Current: currently set value

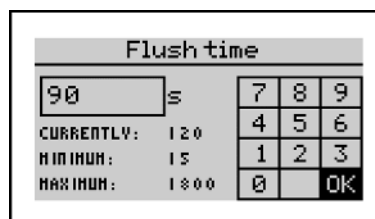
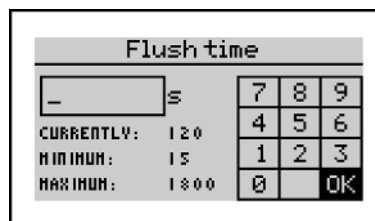
Minimum: smallest settable value

Maximum: largest settable value



Should the value at "Current" corresponds to your request, then you do not need to re-enter the number and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

In the lower example of flushing time, a flushing time between 15 and 1800 seconds can be set. The currently programmed flushing time is 120 seconds.



After entering a flushing time of 90 seconds, confirming with the [OK] key overwrites the current flushing time with 90 seconds.

Configuration

Factory settings

The following factory settings are stored in the device:

Menu items		Factory settings
General	Language	German
	Unit	°dH
	Indicator	H25-0.3
	Limit value	0.5 °dH
Analysis	Flushing time	120 seconds
	Auto. Time interval	5 minutes
	Stop analysis	No
	Control measurement	No repetition
	Calibration factor	100 %
Input	Input	Start analysis
	Flow monitor	From
Outputs	Current interface type	4 ... 20 mA values
	Calibrate current interface	0.9 °dH
	Relay 1	Limit as permanent contact
	Relay 2	Reporting of errors



Reset the factory settings with
Programming: Menu> Parameters > General> Factory settings

Configuration

Configuration assistant

The configuration wizard is designed for simplified commissioning. The menu-driven device accompanies you step by step through all necessary settings. It also checks whether the device is working properly.



Later, all settings can be changed separately in Menu > Parameters again.

To start the wizard, select:

Programming: Menu > Wizard



The following steps are executed:

Automatic mode	If the automatic mode is still active, it must now be quit. Select [Yes] or [No] with the arrow keys [←] and [→] and confirm with [OK] key.
-----------------------	------------------------------------------------------------------------------------------------------------------------------------------------

[Yes] Terminate the automatic mode.
[No] Return to measured value view

Language selection	Please choose your language Press [OK] key.
---------------------------	------------------------------------------------

Selectable languages:
German, English, French, Italian, Spanish

Select language with [←] and [→] and confirm with [OK] key.

Configuration

Assistant

Would you like to start the configuration wizard?



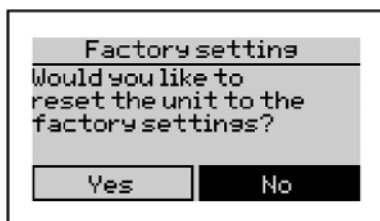
Select [Yes] or [No] with [↔] and [↔] and confirm with [OK] key.

[Yes] Start the configuration wizard.

[No] Go back to the main menu.

Factory settings

Do you want to reset the device to factory settings first?



Select [Yes] or [No] with [↔] and [↔] and confirm with [OK] key.

[Yes] Reset the device to the recommended factory settings

[No] The device retains the settings programmed by the user.

The factory settings can be found on page 34.

Date

Today is: XX/XX/XX - XX:XX

Do you want to set date and time?

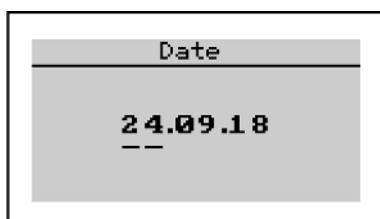


Select [Yes] or [No] with [↔] and [↔] and confirm with [OK] key.

[Yes] Set date and time.

[No] The device keeps the date and time unchanged.

Adjust date

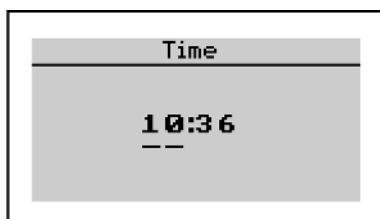


Use the arrow keys [↔] and [↔] to move the date.

Confirm with the [OK] key and change step by step from day to month and further to the year until the date is set.

Press [OK] key.

Setting the time



You can move the hour with the arrow keys [↔] and [↔].

Confirm the hour with the [OK] key and program the minutes in the second step. The seconds are set to 0 seconds upon completion.

Press [OK] key.

Configuration

Maintenance counter

Is a maintenance / initial installation carried out?



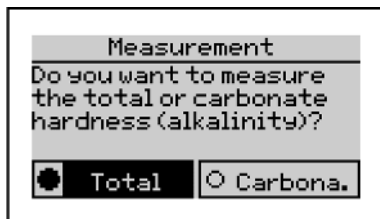
Select [Yes] or [No] with [?] and [?] and confirm with [OK] key.

[Yes] Maintenance counter is set to 30,000 analyses and the maintenance date is set to 24 months.
(Can be read in the Menu > Info)

[No] The device retains the previous data.

Parameter

Would you like to measure the total hardness or carbonate hardness (alkalinity)?



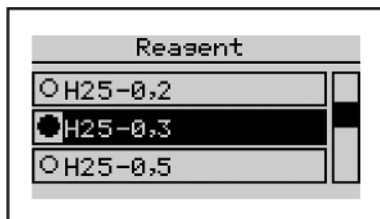
Select [Total] or [Carbonate] with [?] and [?] and confirm with [OK] key.

[Total] The total or residual hardness will be measured.

[Carbonate] The carbonate hardness will be measured.

When selecting total hardness

Please select a total hardness indicator.



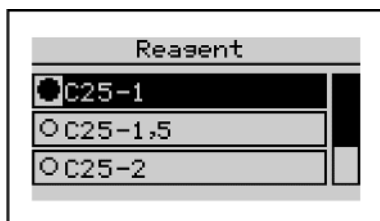
Select the indicator H25 used for total hardness monitoring with [?] and [?] from the displayed list.

Measuring ranges of the indicators can be found in the table on page 12.

After selecting, press the [OK] key.

When selecting carbonate hardness

Please select a carbonate hardness indicator.



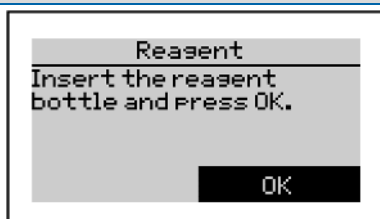
Select the indicator C25 for carbonate hardness monitoring with [?] and [?] from the displayed list.

Measuring ranges of the indicators can be found in the table on page 12.

After selecting, press the [OK] key.

Indicator

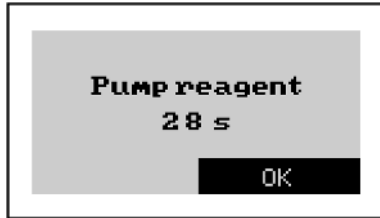
Insert a new indicator bottle and press OK.



Insert new indicator bottle and press the [OK] key.

Configuration

Indicator

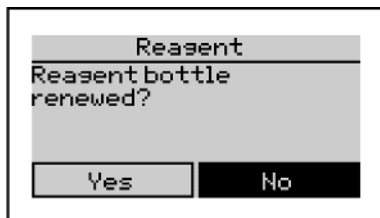


Indicator is pumped into the measuring chamber. The pumping process can be stopped by pressing the [OK] key before the time has elapsed.



Make sure that the indicator has been pumped bubble-free into the measuring chamber.

Indicator



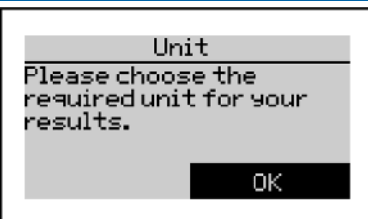
Has a full indicator bottle been used?

Select [Yes] or [No] with [↑] and [↓] and confirm with [OK] key.

[Yes] The bottle fill level is set to 100%.

[No] The previous bottle fill level in % is maintained.

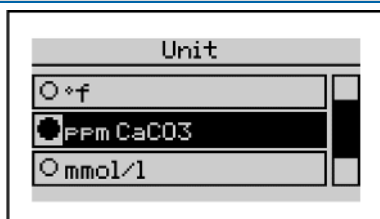
Unit



Select the displayed hardness unit.

Press [OK] key.

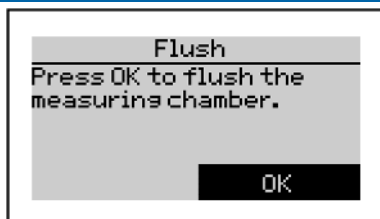
Unit



Use [↑] and [↓] to select the desired unit for display and SD card measurement protocol from the displayed list.

After selecting, press the [OK] key.

Flushing

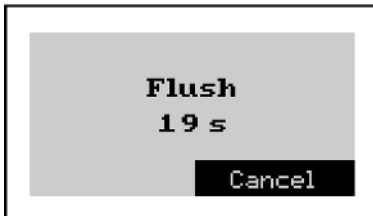


Press OK to flush the supply line and the measuring chamber.

Press [OK] key.

Configuration

Flushing



The solenoid valve opens and flushes the measuring chamber. Here, the previous flushing time is shown in the display. This can be used as reference time to set the flushing time before analysis.

The flushing process is ended with the [OK] key. The solenoid valve closes.



Make sure the sample water is clear and free of bubbles.

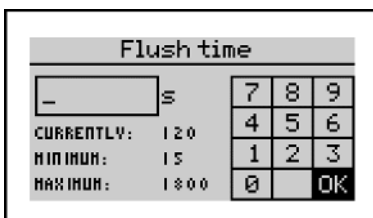
Flushing time

Set the flushing time in the following mask.



Press [OK] key.

Flushing time



You will see an input keyboard on the right side. Use the arrow keys ([←], [→], [↑] and [↓]) to move the black cursor to the desired digit and press the [OK] key. The selected digit appears on the left side in a frame. Repeat the entry until the desired flushing time is within the range. Now move the cursor to the OK field in the keyboard and press the [OK] key.



You will see the following information on the left:

Current: currently programmed value
Minimum: smallest settable value
Maximum: largest settable value

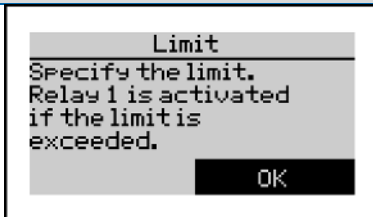


Should the value at "Current" corresponds to your request, then you do not need to re-enter the digits and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

Configuration

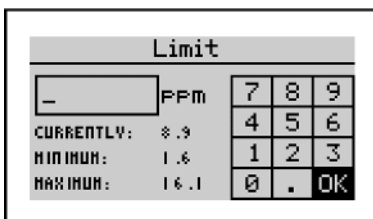
Limit value

Enter the limit, above which relay 1 should be switched.



Press [OK] key.

Limit value



You will see an input keyboard on the right side. Use the arrow keys ([←], [→], [↑] and [↓]) to move the black cursor to the desired digit and press the [OK] key. The selected digit appears on the left side in a frame. Repeat the entry until the desired limit is within the range. Now move the cursor to the OK field in the keyboard and press the [OK] key.



You will see the following information on the left:

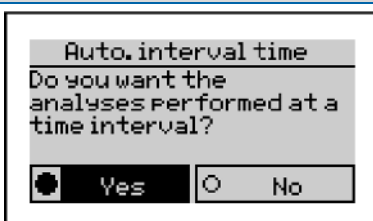
Current: currently programmed value
Minimum: smallest settable value
Maximum: largest settable value



Should the value at "Current" corresponds to your request, then you do not need to re-enter the number and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

Auto. Time interval

Do you want the analyses to run in a time interval?



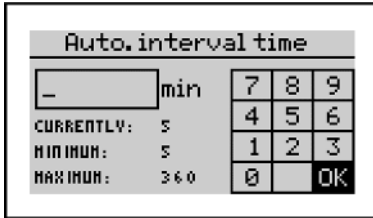
Select [Yes] or [No] with [←] and [→] and confirm with [OK] key.

[Yes] Analyses are performed in an automatic time interval.
[No] Do not perform any analyses in the automatic time interval.

Configuration

Auto. Time interval

Set the automatic interval time, in which the analyses are to be carried out.



You will see an input keyboard on the right side. Use the arrow keys (←, →, ↑, ↓) to move the black cursor to the desired digit and press the [OK] key. The selected digit appears on the left side in a frame. Repeat the entry until the desired analysis interval time is within the range. Now move the cursor to the OK field in the keyboard and press the [OK] key.



You will see the following information on the left:

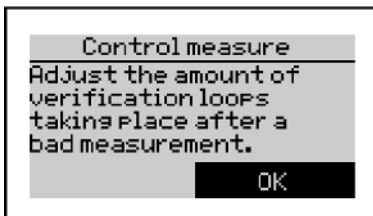
Current: currently programmed value
Minimum: smallest settable value
Maximum: largest settable value



Should the value at "Current" corresponds to your request, then you do not need to re-enter the number and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

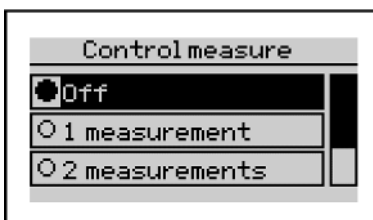
Control measurement

How often should a limit exceedance be verified before notification?



Press [OK] key.

Control measurement



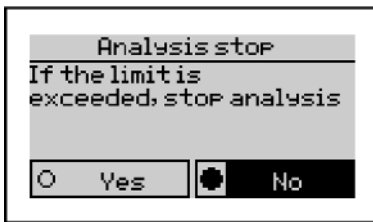
Use ← and → to set the number of control measurements that should be performed before any exceedance of limit value should be reported. These are carried out after a limit value exceedance in a 3-minute interval to avoid false alarms due to the counter-ion effect of the water softening system.

Make a selection and confirm with the [OK] key.

Configuration

Stopping the analysis

Auto. Stop interval after limit exceedance?



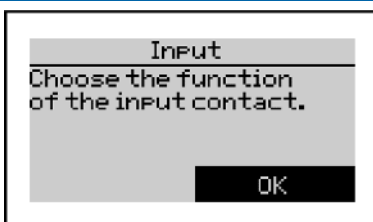
Select [Yes] or [No] with [↑] and [↓] and confirm with [OK] key.

[Yes] Auto. Interval is paused after a limit exceedance. (In order to carry out further analyses, the automatic mode must be reactivated on the device).

[No] Further analyses are also carried out after a limit has been exceeded.

Input

Select the function of the input.

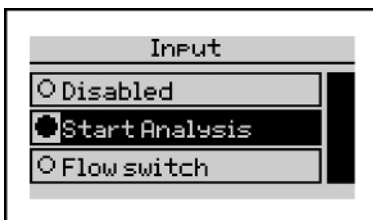


Press [OK] key.

Input

You have the following options at the input:

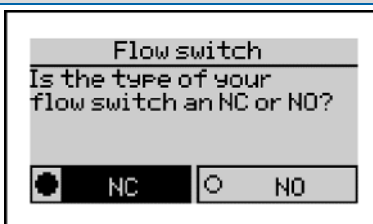
- Deactivated
- Start analysis
- Flow monitor



Make a selection and confirm with the [OK] key.

When selecting flow monitor

Is the flow monitor an NC or NO type?



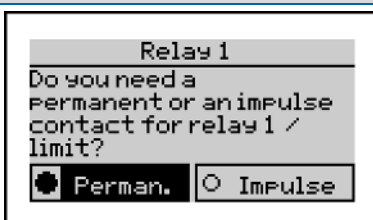
[NC] Analysis interval paused: start of next analysis waits for a closed input contact.

[NO] Analysis interval paused: start of next analysis waits for an open input contact.

Make a selection and confirm with the [OK] key.

Relay 1

Do you need a permanent or pulse contact at relay 1 / limit?



[Duration] or select [Pulse] and press the [OK] key.

[Duration] The relay switches to a permanent contact if the limit value is exceeded until an analysis that falls below the limit value takes place.

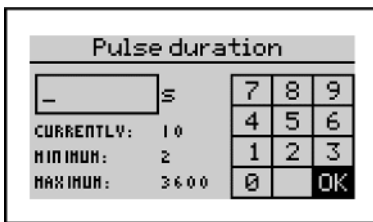
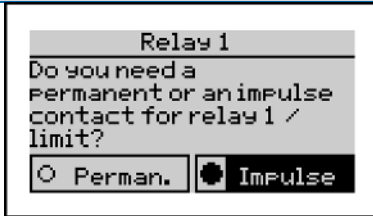
[Pulse] The relay switches for a set pulse time.

Configuration

If pulse contact is selected

Relay 1 pulse duration

Set the pulse duration for relay 1.



You will see an input keyboard on the right side. Use the arrow keys ([←], [→], [↑], [↓]) to move the black cursor to the desired digit and press the [OK] key. The selected digit appears on the left side in a frame. Repeat the entry until the desired pulse duration is within the range.

Now move the cursor to the OK field in the keyboard and press the [OK] key.



You will see the following information on the left:

Current: currently programmed value
Minimum: smallest settable value
Maximum: largest settable value



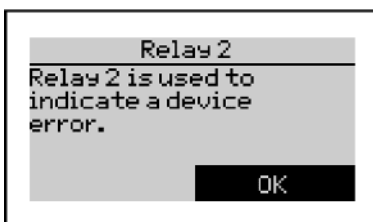
Should the value at "Current" corresponds to your request, then you do not need to re-enter the number and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

Relay 2

Relay 2 is used to indicate a device error.

Press [OK] key

Relay 2 is used to indicate a device error and can not perform any other functions.



Relay 2 is always energised in normal operation, connection from COM to NO (wire break safety).

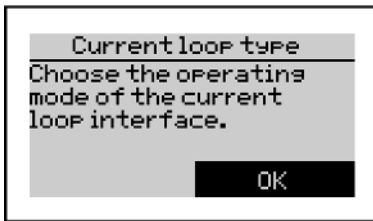


In the event of a device error, relay 2 is de-energised and establishes the connection from COM to NC.

Configuration

Current interface type.

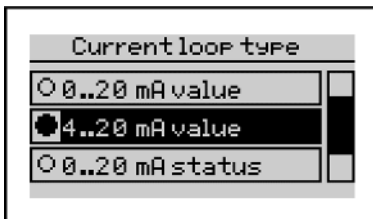
Select the operating mode of the current interface.



Press [OK] key.

Current interface type.

Use [↑] and [↓] to select the setting of the current interface type from the following options:



- From
- 0 bis 20 mA value
- 4 bis 20 mA value
- 0 to 20 mA status
- 4 to 20 mA status

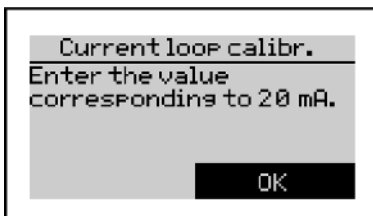
(When selecting status, see further information on page 27.)

Make a selection and confirm with the [OK] key.

When selecting value

Calibrate current interface

Enter the value corresponding to 20 mA.

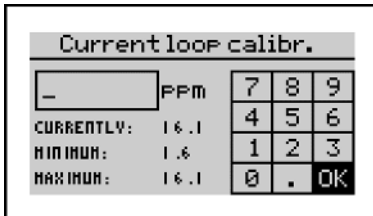


Press [OK] key.

Configuration

Calibrate current interface

Enter the value corresponding to 20 mA.



Here you can enter the measured value, up to which the current interface should be scaled. We recommend setting the value for 20 mA at the end of the measurement range of the indicator, but you can also set values below it. For more information, see page 27.

You will see an input keyboard on the right side. Use the arrow keys ([←], [→], [↑], [↓]) to move the black cursor to the desired digit and press the [OK] key. The selected digit appears on the left side in a frame. Repeat the entry until the desired number is in the frame. Now move the cursor to the OK field in the keyboard and press the [OK] key.



You will see the following information on the left:

Current: currently programmed value
Minimum: smallest settable value
Maximum: largest settable value



Should the value at "Current" corresponds to your request, then you do not need to re-enter the number and you can immediately move the cursor to the OK field in the keyboard and confirm with the [OK] key.

Assistant

The configuration is complete. The wizard is terminated.



Press [OK] key.

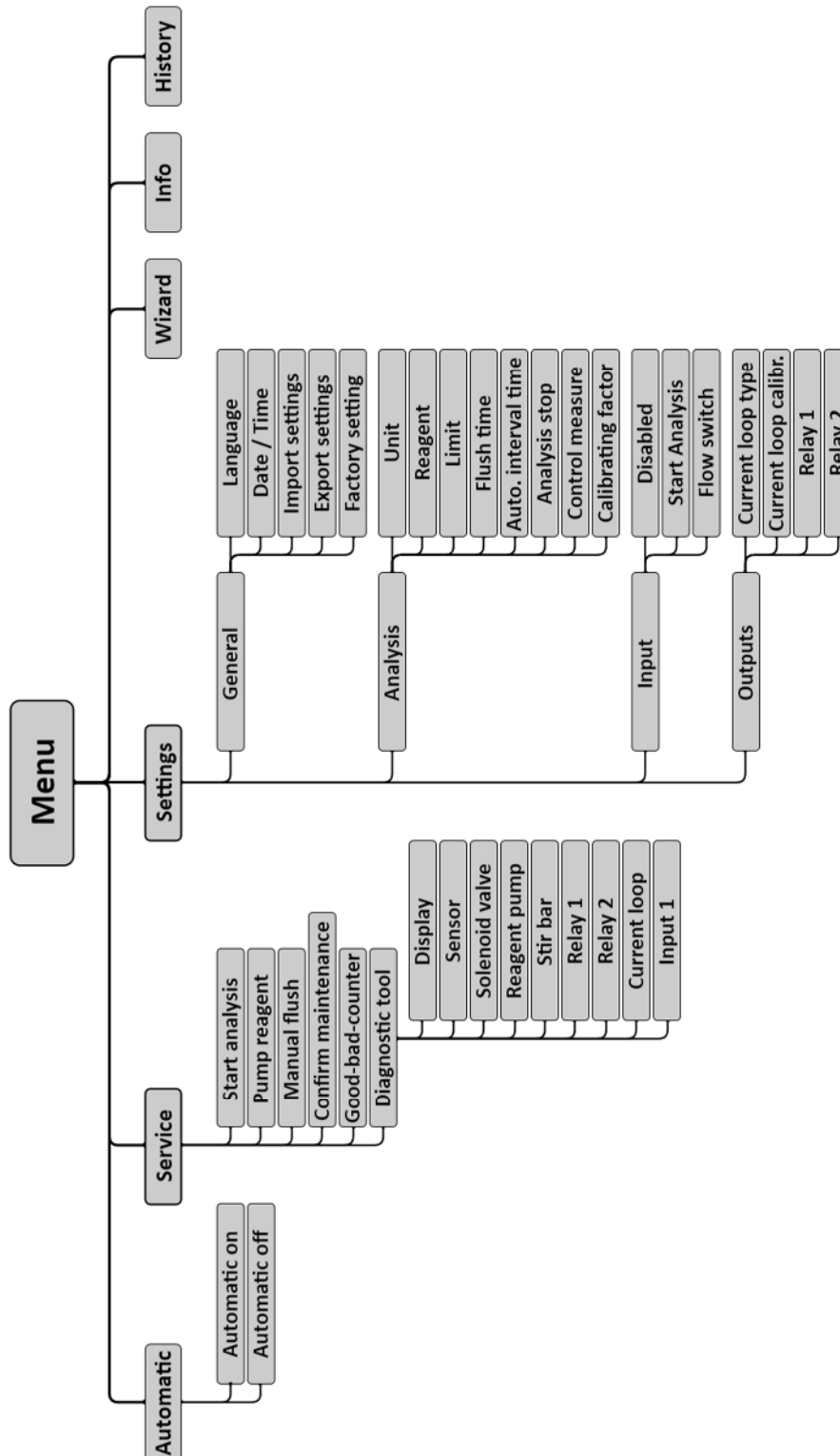
This completes the configuration of the device.

If necessary, individual settings can also be set without the wizard.
Programming: Menu > Parameters

Configuration

Menu structure

The following is an overview of the menu structure to give you an overview of all the functions of the analyser.



Mode

Manual and automatic mode

The analyser can be started in automatic mode (Menu> Automatic), depending on the time or via an external button or flow monitor. In manual mode (automatic off), functions such as starting analysis, conveying indicator or flushing can be manually controlled. In addition, a diagnostic function is included in manual mode to test individual device components.

In automatic mode, analyses are carried out at the programmed interval or by external starting. After switching on, the automatic mode is active. The first analysis is started after switching on at the programmed internal interval after 3 minutes. All subsequent analyses are performed in the programmed interval.

Main menu

The main menu can be opened by pressing the [Menu] key from the measured value view.

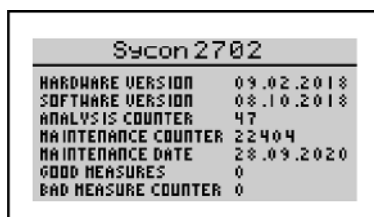


Menu item	Description
Automatic	Changing between automatic and manual mode
Parameter	Setting the device and analysis parameters
Info	Overview of hardware- and software version and display of counter readings
Service	Functions for maintenance, diagnostics, and changing indicator
Assistant	Setup wizard for a guided parameterisation of the device
History	Display of the last 100 measurement results with date and time

Mode

Info display

The Info menu item in the main menu displays additional information about the device and the measuring point:



```
Sycon 2702
-----
HARDWARE VERSION 09.02.2018
SOFTWARE VERSION 08.10.2018
ANALYSIS COUNTER 47
MAINTENANCE COUNTER 22404
MAINTENANCE DATE 28.09.2020
GOOD MEASURES 0
BAD MEASURE COUNTER 0
```

Information	Description
Hardware version	Version of the hardware used
Software version	Installed software version
Analysis counter	Number of analyses performed since commissioning
Maintenance counter	Number of remaining analyses - service life of the peristaltic pump cartridge: will be set to 30,000 analyses when the maintenance is acknowledged in the service menu.
Maintenance date	Expiry date of the peristaltic pump cartridge used: is set to 2 years when the maintenance is acknowledged in the service menu.
Good counter	Number of analyses without limit exceedance: can be reset in the service menu under the item good/bad counters.
Fail counter	Number of analyses with limit exceedance: can be reset in the service menu under the item good/bad counters.

Behaviour in the event of power failure

All settings of the device are stored on the SD card or in the internal memory. In the event of a power failure, all settings are available again after switching on the device. If the device has been in automatic mode, the analyser automatically restarts after a short dwell time with an analysis according to the set interval times.

Relay 2 (ready for operation / error) is energised after switching on the device. For example, an external controller indicates whether the device is ready for operation or whether there is a fault such as a device malfunction, power failure or defective line.

If a device fails and you need to replace the device, you can export the settings from the old device (Parameters > General > Settings Export settings). After inserting the SD card in the new device, the settings can be imported (Parameter > General > Import settings). The measurement protocol on the SD card will be continued by the new device.

SD-card

The analyser contains an SD card. The following information is stored on this memory card: measured values, error messages, device configuration, device firmware.

The data is stored on the SD card as .csv files. These files can be opened with an editor or spreadsheet program (e.g. MS Excel, OO Calc) and the data can be processed further. Furthermore, system files are present on the SD card (.bin).

The analyser is fully functional even without an SD card, but only the last 100 readings are saved internally.

If you want to use a different SD card than the one supplied, make sure that it is formatted as follows:

Storage capacity: max. 2.0 GB
File system: FAT16
Size of the allocation files: 32 kB

The following files are stored on the card:

File name	Type	Content
trend.csv	Data	Measured values in tabular form with date, time and measured value The data becomes filed in the following format: YYYY.MM.DD [Tab] hh.mm [Tab] x.xxx [Tab] Unit [LF] The measured values (x.xxx) are stored on the device in the unit displayed.
error.csv	Data	Error messages in tabular form with time, date and error The data becomes filed in the following format: YYYY.MM.DD [Tab] hh.mm [Tab] Error code [LF].
history.dat	System	Time-stamped analysis results The device loads these into the internal memory at start-up.
setting.dat	System	Complete device setting of the analyser (optional file) Before replacing the analyser, you can transfer the saved device configuration directly to the new device. The export is located in the menu under Parameters> General> Export settings. The device configuration can be imported in the menu under: Parameters> General> Import settings.
logfile.dat	System	Date, time stamp and device start This file is needed for internal purposes.
TA27xxx.bin	Operating system	By default, this file does not exist on the SD card. Should there be software updates for your analyser, these will be provided by our distribution partners. These are also available for download on our homepage. You can copy this file to the SD card. Hold down the [OK] key when turning on the analyser. For more information about installing a software update, see page 54. We recommend deleting the file from the SD card again after importing an update.

Maintenance and service

In order to enable a long and trouble-free operation of the analyser, maintenance on the device must be carried out at regular intervals. Make sure the device is turned off before performing any maintenance. During this time no analyses are carried out. As a general rule, wear protective goggles and gloves during maintenance to avoid contact with indicator, cleaning fluid or other liquids.

The following maintenance intervals must be complied with:

Interval	Maintenance and service
every 6 months	Cleaning of measurement chamber At high ambient- and water temperatures or water with high organic load, the cleaning intervals may need to be shortened.
every 30,000 analyses or after 24 months	maintenance as after 6 months and installing maintenance kit

Cleaning the measuring chamber

It takes about 20 minutes to clean the measuring chamber. To clean the measuring chamber, proceed as follows:

- Remove the peristaltic pump cartridge from the holder by releasing it from the clips at the top and bottom.
- Loosen the connection to the indicator plug and the indicator bottle.
- Pull the locking pins slightly forwards until all the connection plugs are unlocked (the locking pins can only be pulled up and cannot be pulled out).
- Pull the measuring chamber to the side from the retaining bolts on the control housing.
- Remove the agitator blade.
- Clean the measuring chamber using the SYCON Clean cleaning kit as described on the instruction leaflet.

When assembling, please ensure the following sequence:

- Put the cleaned measuring chamber on the retaining bolts and lock afterwards.
- Insert agitator blades into the measuring chamber.
- Insert all plugs and lock with the locking pins. Make sure that all plugs are inserted into the measuring chamber until they abut and locked only then, otherwise the plugs can be damaged! All cables must be free and must not be twisted.
- Switch the device on again.
- Flush the measuring chamber (programming: Menu > Service > Manual flushing).
- Feed the indicator into the measuring chamber (programming: Menu > Service > Pump indicator).

Has a full indicator bottle been used?

Select [Yes] or [No] and press the [OK] key.

[Yes] The bottle fill level is set to 100%.

[No] The previous bottle fill level in % is maintained.

- Flush the measuring chamber again (programming: Menu > Service > Manual flushing).

The device is again ready for operation.

Maintenance and service

Changing the peristaltic pump cartridge and gaskets

Replacement of the hose pump cartridge is required at regular intervals. This is included in the "Maintenance kit for SYCON 2702". The service takes about 10 minutes.

Proceed as follows:

- Remove the peristaltic pump cartridge from the holder by releasing it from the clips at the top and bottom.
- Loosen the connection to the indicator plug and the indicator bottle.
- Pull the locking pins slightly forwards until all the connection plugs are unlocked (the locking pins can only be pulled up and cannot be pulled out).
- Remove the measuring chamber from the retaining bolts on the controller housing.
- Remove the agitator blade.
- Clean the measuring chamber using the SYCON Clean cleaning kit as described on the instruction leaflet.
- Replace the gaskets/O-rings.
- Coat the gaskets with technical Vaseline before inserting them into the measuring chamber.



The blue dosing O-ring on the dosing plug must not be coated with Vaseline.

When assembling, please ensure the following sequence:

- Put the cleaned measuring chamber on the retaining bolts and lock afterwards.
- Insert agitator blades into the measuring chamber.
- Insert all plugs and lock with the locking pins. Make sure that all plugs are inserted into the measuring chamber until they abut and locked only then, otherwise the plugs can be damaged! All cables must be free and must not be twisted.
- Now replace the suction lance in the bottle and the bottle connector, which leads from the bottle to the peristaltic pump cartridge.
- Switch the device on again.
- Flush the measuring chamber (programming: Menu > Service > Manual flushing).
- Feed the indicator into the measuring chamber (programming: Menu > Service > Pump indicator).

Has a full indicator bottle been used?

Select [Yes] or [No] and press the [OK] key.

[Yes] The bottle fill level is set to 100%.

[No] The previous bottle fill level in % is maintained.

- Flush the measuring chamber again (programming: Menu > Service > Manual flushing).
- Move the maintenance counter back to 24 months / 30,000 analyses (programming: Menu > Service > Acknowledge maintenance).

The device is again ready for operation.

Maintenance and service

Changing the indicator bottle

First check the expiry date of the new indicator bottle. Use only the indicator whose shelf life has not been exceeded.



Always use indicator bottles with 500 ml content.

Proceed as follows:

- Switch off the device.
- To replace the indicator bottle, undo the screw cap on the bottle and insert the new indicator bottle. Absorb drip quantities if necessary.
- Switch the device on again.
- Flush the measuring chamber (programming: Menu > Service > Manual flushing).
- Feed the indicator into the measuring chamber (programming: Menu > Service > Pump indicator) until the indicator reaches the measuring chamber free of bubbles. Then press the [OK] key to stop purging the indicator line.

Has a full indicator bottle been used?

Select [Yes] or [No] and press the [OK] key.

[Yes] The bottle fill level is set to 100%.

[No] The previous bottle fill level in % is maintained.

- Flush the measuring chamber again (programming: Menu > Service > Manual flushing) to clean the measuring chamber.
- Test the sequence of analysis by starting an analysis. To do this, hold down the [OK] key for 3 seconds in the measured value view.

The device is again ready for operation.

Maintenance and service

Calibrating the device

The device is calibrated at the factory at a room temperature of 20° C. When operating in very hot or cold places, we recommend to calibrate the device during commissioning.

To calibrate the device, proceed as follows:

- Perform an analysis on the device. Water hardness of the sample must be within the measuring range of the indicator used. A reading such as < 0.012° dH cannot be used.
- Analyse the water in the laboratory in parallel.
- Calculate the correction factor for the analyser using the following formula:

$$\text{Korrekturfaktor} = \frac{\text{Messwert}_{\text{Labor}}}{\text{Anzeigewert}} \cdot 100 \%$$

- Set the correction factor in the device under the specified path.
(Programming: Menu> Parameters> Analysis> Calibration factor)

Example of calculation:

Measured value_{Laboratory} = 0.55° dH

Display value from the SYCON display = 0.61° dH

$$\text{Korrekturfaktor} = \frac{0,55 \text{ } ^\circ\text{dH}}{0,61 \text{ } ^\circ\text{dH}} \cdot 100 \%$$
$$\text{Korrekturfaktor} = 90,1 \%$$

90.1% rounded => Correction factor = 90%

Only integers can be entered as input, so round off / round up and enter the correction factor in the input mask on the device.

Changing the battery

If the device does not display any time after switching off and switching on again, the internal back-up battery must be replaced.

Proceed as follows:

- Switch off the device and disconnect the power supply.
- Open the controller housing with 4 screws. On the inside you will see the battery holder.
- Replace the battery with a new one of CR2032 type.
- Close the controller again. Make sure that the connection cable between the indicator circuit board and the controller has not come loose.
- Dispose of the battery in a collection point for batteries.

Maintenance and service

Software update

The analyser offers the option of a software update. As part of the product improvement, you will receive software updates via your dealer or our website. Should this be required, your dealer will send you a file called TA27xxx.bin.

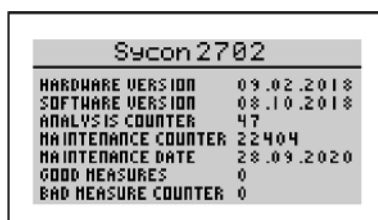
To perform a software update, proceed as follows:

- Switch off the device and disconnect the power supply.
- Open the controller housing with 4 screws and remove the SD card.
- Copy the TA27xxx.bin file to the SD card using a computer and reinsert it.
- Close the controller again. Make sure that the connection cable between the indicator circuit board and the controller has not come loose.
- Hold down the [OK] key and turn on the power. When software update appears on the display, release the [OK] key. The device updates the software and finally starts measurement mode again.
- Turn off the device, remove the SD card, and delete the TA27xxx.bin file from the SD card.
- Insert the SD card back into the device.
- Check the device configuration of the device.

Good- and bad counter

The good and bad counters are used to count the analysis results. They are displayed in the info screen.

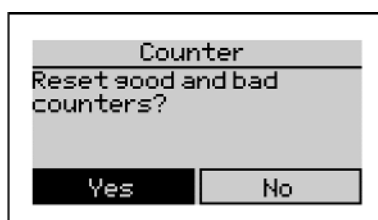
Programming: Menu > Info



Sycon 2702	
HARDWARE VERSION	09.02.2018
SOFTWARE VERSION	08.10.2018
ANALYSIS COUNTER	47
MAINTENANCE COUNTER	22404
MAINTENANCE DATE	28.09.2020
GOOD MEASURES	0
BAD MEASURE COUNTER	0

If the limit is exceeded, the bad counter is increased, and if the limit is undershot, the good counter is increased. This counter can be used to assess the function of a water softening system. Here, the number of bad measurements should be much smaller than that of the good measurements. The counters can be reset in the menu.

Programming: Menu> Service> Good/bad counter



Diagnosis functions

Here, pay attention to possibly connected controllers and peripherals.
Follow the valid safety regulations.

Call up the following program function:
Programming: Menu> Service> Diagnostic program

Display

The display changes colour between red, green and blue.
To exit, press the [OK] key.

Sensor

The LED in the measuring chamber is switched on and off. If this is not the case, check the electrical connection of the LED on the actuator plug and in the device. If the connectors are properly seated, the actuator must be replaced.

To exit, press the [OK] key.

Solenoid valve

The solenoid valve in the water inlet can be opened and closed via the [OK] key. If this is not the case, check the electrical connection of the solenoid valve in the device. If the connectors are properly seated, measure the voltage with "valve open" between the connections on the valve. This should be at 24 VDC. If this is the case, a fault in the electronics is to be excluded and the solenoid valve is defective.

To exit, move the cursor to Exit and press the [OK] key.

Indicator

When starting the indicator pump, the peristaltic pump cartridge is driven for 2 seconds. Here, rotation of the rollers in the peristaltic pump cartridge is visible and the turning of the motor can be heard. If this is not the case, check the four-pole connection of the motor on the circuit board. If only the noise is noticeable, the peristaltic pump cartridge is defective. Otherwise, a fault of the motor or the control circuit board is possible.

To exit, move the cursor to Exit and press the [OK] key.

Diagnosis functions

Agitator blade

The agitator blade in the measuring chamber is actuated and slowly increases its speed to the maximum. If the agitator blade does not turn, check the correct seating of the drive motor connector on the control circuit board (red plug connector).

Remove the measuring chamber and check whether the drive disc (which has two silver-coloured magnets) in the agitator does not drag or rest on the motor housing.

If none of these causes can be determined, the drive motor must be replaced.

To exit, press the [OK] key.

Relay 1 and 2

When the diagnostic function relay is started, the selected relay is switched between the two contacts NC and NO via the [OK] key.

Use a continuity tester to check the contact between the COM and NC connection and COM and NO connection. If the switching operations are not measurable, replace the control circuit board.

To exit, move the cursor to Exit and press the [OK] key.

Current interface

An ammeter is required to test the current interface. Measurements are made between terminals 15 (+) and terminal 16 (-).

The output current is shown in the display as $I = xx \text{ mA}$. The same value should also be measured at the two terminals. Tolerance $\pm 0.2 \text{ mA}$. Please note the accuracy of your current ammeter.

Pressing the [OK] key increases the output current by 2 mA respectively, until the maximum value of 20 mA is reached.

To exit, move the cursor to Exit and press the [OK] key.

Input

To test the input, you will need a ladder or multimeter that is set for continuity testing.

If there is no jumper between terminals 17 and 18, the display shows "opened".

If a jumper is set between terminals 17 and 18, the display shows "closed".

(Should you wish to make the jumper with a multimeter, the COM port of the multimeter must be connected to terminal 17 and the Volt port of the multimeter must be connected to terminal 18.

Otherwise, no bridge will be made by the multimeter

Press the [OK] key to exit.

The diagnostic mode has ended.

Error analysis

Analysis does not start

- Check if a flow monitor is configured and connected.
- Check if an interval time has been entered.
- Check if a water meter is fully configured and connected.
- If necessary, check the connection from an external controller to the device.

Zero sample is faulty

- Check that there is water in the measuring chamber and the water supply line and drain are connected the right way around.
- Check the measuring chamber for contamination, gas bubbles or foreign bodies.
- Check the water inlet for function and pressure (recommended 1 - 2 bar).
- Check that the water outlet is clear and that no foreign matter has stuck in the solenoid valve.
- When using a pump for conveying samples, check whether the pump is correctly connected.
- Use the diagnostic menu to check the sensor and the solenoid valve.

Titration is not carried out correctly

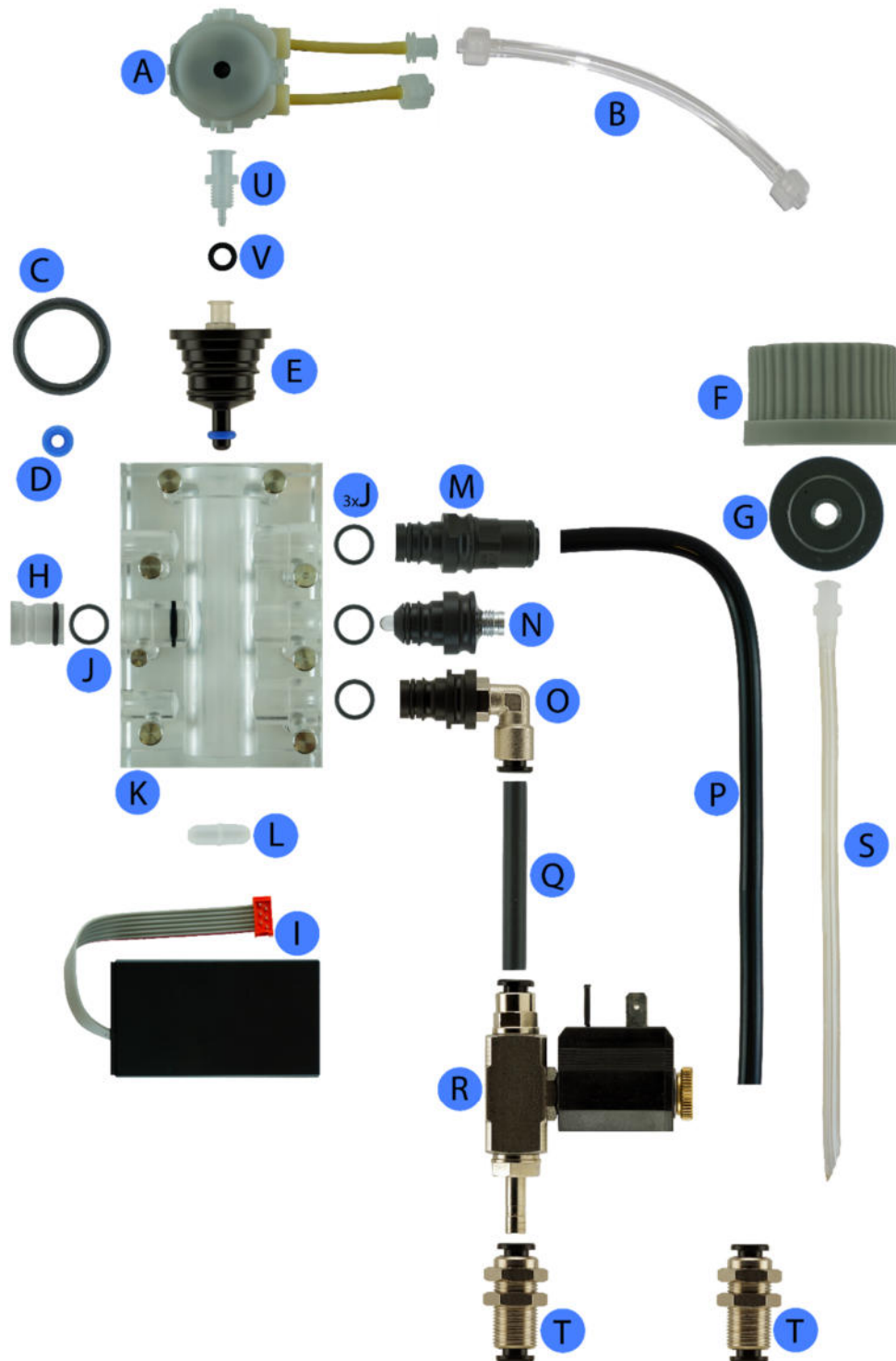
- Check whether there is sufficient indicator in the indicator bottle.
- Check the connection hose between the indicator bottle and the hose pump for air bubbles. If necessary, convey the indicator until the hose is completely filled with the indicator.
- Check that the blue O-ring is on the dosing stopper.
- Check if there is water in the measuring chamber.
- Check if the agitator blade is in the measuring chamber.
- Check the indicator feed, the sensor, and the agitator blade in the diagnostics menu.

Measurement deviates

- Check whether the programmed indicator type corresponds to the one used.
- Check the indicator hose for air bubbles.
- Check the sample water for discoloration due to foreign matter and turbidity due to air bubbles during the zero sample.
- Check that the water connection and the outlet are not mixed up.
- Check if the agitator blade is present.
- Check that the blue O-ring is present on the dosing plug and is seated correctly.
- Calibrate the device and enter the newly determined correction factor.
- Check that the solenoid valve is closing neatly.
- Replace the peristaltic pump cartridge.

Annex

Spare parts



Annex

Position	Article name	Article no.
A	Peristaltic pump cartridge complete	33-030 614
B	Bottle connector	33-090 008
C	O-ring 16 x 2	33-090 217
D	Dosing O-ring 3.2 x 2.5 blue	33-090 218
E	Indicator plug including position U, V, C, D	33-090 716
F	Bottle cap	33-093 060
G	Bottle adapter SYCON	33-090 009
H	Light rod plugs for measuring chamber including O-ring	33-090 719
I	Agitator	33-090 056
J	O-ring 9 x 1.5	33-090 210
K	Measuring chamber pre-assembled including position H	33-090 731
L	Agitator blade	33-090 002
M	Outlet plug 6 mm including O-ring	33-090 712
N	Actuator plug (LED) including O-ring	33-090 713
O	Inlet plug with angle connection including O-ring	33-090 156
P	Outlet hose 200 mm long \varnothing 6 x 4 mm	33-090 124
Q	Inlet hose 50 mm long \varnothing 6 x 4 mm	33-090 112
R	Solenoid valve SYCON 24 V	33-090 157
S	Suction lance	33-090 011
T	Bulkhead plug connector straight	33-090 116
V	O-ring 5.28 x 1.78	33-090 215
U	Luer lock connection	33-090 414

Spare parts without illustration

Article name	Article no.
Measuring chamber including position H, E, M, N, O, L	33-190 700
Display circuit board	33-033 607
Main circuit board SYCON 2702	33-030 641
Peristaltic pump cartridge with motor complete, SYCON 2702	33-030 625
Connecting cable of solenoid valve SYCON series	33-090 079
Connecting cable of actuator	33-090 074
Maintenance set SYCON 2702 including position A, B, C, D, S, 4 x J	33-090 034
SYCON CLEAN cleaning kit (please read the contents of the set in chapter Spare parts > Maintenance kits)	30-010 900
FIT 3000 (1000 ml) cleaner for cleaning the measuring chamber	32-089 100

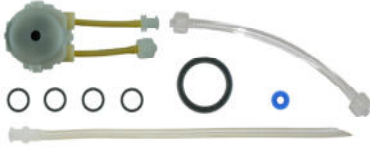

Further information can be found in the chapter Spare parts > Maintenance kits.

Annex

Maintenance kits

SYCON 2702 works largely maintenance-free. A maintenance kit is available for the analyser. It is recommended to change the peristaltic pump cartridge, tubing and O-rings after 30,000 analyses or 24 months. The device displays a maintenance message on the display after expiry of the maintenance interval. This counter must be reset when changing the peristaltic pump cartridge on the device.

In addition, it is recommended that the measuring chamber be cleaned regularly, however, at least every 6 months. For this purpose the cleaning kit SYCON Clean is offered. It contains all the tools and cleaning fluid required for cleaning FIT 3000.

Article name	Article no.
Maintenance kit for SYCON 2702	33-090 034
Includes the following articles:	
<ul style="list-style-type: none">• 1 x 33-090 008 bottle connector• 1 x 33-090 011 suction lance• 1 x 33-090 217 O-ring 16x2• 4 x 33-090 210 O-ring 9x1.5• 1 x 33-090 218 O-ring blue• 1 x 33-030 614 peristaltic pump cartridge	
SYCON Clean cleaning set	30-010 900
Cleaning set for measuring chambers, contains the following items:	
<ul style="list-style-type: none">• 10 pairs of gloves XL• 1 x funnel made of PP• 1 x cleaner FIT 3000 (1000 ml)• 1 x pipette brush• 1 x reagent glass brush• 1 x container with lid	
Measuring chamber cleaner FIT 3000 (1000 ml)	32-089 100

Accessories

Article name	Article no.
Pressure reducer with wall mounting	33-090 734

Includes the following articles:

- Hose connection with outside diameter 6 mm
- Regulating range 0.8 to 3.9 bar
- Optionally a pressure gauge can be mounted



Connection set SYCON	35-090 701
----------------------	------------

Includes the following articles:

- Reducing nipple made of stainless steel 1.4408 V4A 1/2 inch to 1/4 inch (conical external thread)
- Ball valve with socket ends made of 1.4408 V4A stainless steel with 1/4 inch (cylindrical internal thread)
- Straight screwed connection, nickel-plated brass. 1/4 inch (cylindrical external thread with sealing ring), hose connection with outer diameter of 6 mm
- 5 meters of plastic hose with outer diameter of 6 mm




+ 5 meters of plastic hose with outer diameter of 6 mm

Sample cooler

The maximum inlet temperature of the sample water is 40° C. If the sample water has a higher temperature, use an upstream cooler. Upstream coolers are offered for flow cooling depending on the temperature of the water and the cooling water.

Further information and data sheets can be found on our website.

Declaration of conformity



EG-KONFORMITÄTSERKLÄRUNG

EC-Declaration of Conformity

<p>Hersteller <i>Manufacturer</i></p>	<p>RLS Wacon GmbH</p>
<p>Anschrift <i>Address</i></p>	<p>Eduard-Ahlborn-Str. 1 D-31137 Hildesheim</p>
<p>Produktbezeichnung <i>Product specification</i></p>	<p>SYCON 2702</p>

<p>Wir erklären in alleiniger Verantwortung, dass das oben bezeichnete Produkt mit folgenden Europäischen Richtlinien übereinstimmt: <i>We declare that the above product is in conformity with the following directives:</i></p>	<p>2014/35/EU</p>	<p>Niederspannungsrichtlinie <i>Low Voltage Directive</i></p>
<p>Angewandte harmonisierte Normen und technische Spezifikationen: <i>Applied harmonised standards and technical specifications:</i></p>	<p>DIN EN 6100-3-2 DIN EN 6100-3-3 DIN EN 61326-1</p>	<p>EMV Richtlinien <i>EMC Directives</i></p>
<p>Qualitätssicherung der Produktion angelehnt an: <i>Production Quality Assessment according to:</i></p>	<p>DIN EN ISO 9001:2015</p>	

<p><u>Hildesheim, 26.09.2018</u></p> <p><i>Ort, Datum der Ausstellung</i> <i>Place, date of issue</i></p>	<p><u>Dr. Sascha Matern</u> </p> <p><i>Name und Unterschrift des Befugten /</i> <i>Dokumentenbevollmächtigter</i> <i>Name and signature of authorized person /</i> <i>Document manager</i></p>
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Photo back: Vitali Vidnevski (employee RLS Wacon GmbH), 2015

Subject to modifications and errors.

20181109

Safety reliably produced.





The RLS Wacon GmbH is a family-owned enterprise based in Hildesheim, Germany. For more than 40 years, we are developing and manufacturing robust and safe measurement and sensor technology for demanding applications. We hereby consistently focus on quality and well-known products. Our particular interest is the dialogue with customers, partners and suppliers. That's how *safety is reliably produced*.

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