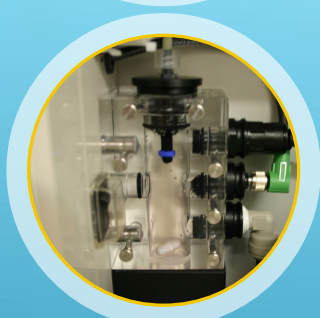


SYCON

Guardian for softeners



MANUAL
NOTICE D'UTILISATION
MANUALE DI INSTALLAZIONE
HANDLEIDING



**SYCON
2502**

Operation Manual

Sycon 2502



Analyser for automated monitoring of parameters in the process water

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Introduction

Thank you for your purchase of an analyser Sycon 2502 for online monitoring of the water hardness.

The analyser Sycon 2502 for monitoring of the water quality is part of the water treatment plant.

This manual is intended for the manufacturer and the operator of any such system. It contains instructions for the installation and operation of the device.

Please read this manual carefully before using the device.

We recommend that you always have the manual ready at hand near the appliance during operation.

Operate the device only in accordance with the instructions in this manual.

We shall not be liable for damages caused by operator errors or non-compliance with the instructions in this manual under any circumstances.

Some details and instructions in this manual may differ from your actually purchased device. We reserve the right to change technical specifications without prior notice.



The analyser Sycon 2502 recognises hardness breakthroughs of a water treatment plant automatically and displays a message when the limit is exceeded. This message can for instance be used to trigger a regeneration of the softening plant.



The analyser Sycon 2502 is not a device to help prevent hardening breakthroughs.

Conversion of the units of water hardness

		°dH	°e	°fH	ppm	mval/l	mmol/l
German degree	1 °dH =	1	1,253	1,78	17,8	0,357	0,1783
English degree	1 °e =	0,798	1	1,43	14,3	0,285	0,142
French degree	1 °fH =	0,56	0,702	1	10	0,2	0,1
ppm CaCO ₃ (USA)	1 ppm =	0,056	0,07	0,1	1	0,02	0,01
mval/l earth alkali ions	1 mval/l =	2,8	3,51	5	50	1	0,5
mmol/l earth alkali ions	1 mmol/l =	5,6	7,02	10	100	2	1

The unit 1 ppm is used here as opposed to the actual meaning of the word in term of 1 mg/l CaCO₃.



Brief description

With the analyser Sycon 2502, PWG offers a compact and very easy-to-operate analyser for the automatic online monitoring of water treatment plants.

The measuring device operates according to the principle of "limit monitoring with colour change" and provides all the key features for a reliable field use.

The analyser Sycon 2502 independently performs water analyses in adjustable intervals to determine the total hardness or carbonate hardness.

Based on the type of reagent used, a limit value is specified by the user. There are 11 reagents to monitor the total hardness and 4 reagents are available to monitor the carbonate hardness.

If the limit is exceeded, the device displays a message on a potential-free contact. This message can be further processed by a softening control. Thus, functions such as the automatic activation of regeneration can be realised.

The analyser Sycon 2502 is characterised by low maintenance costs. With a 500 ml reagent bottle, more than 5000 analyses can be performed. The inlet contact of the device can be used in addition to connect a flow meter to the device. Thus, the analysis interval is interrupted by Sycon 2502 in downtimes of the water softening and is resumed automatically upon restarting.

To prevent interferences due to the counter ion effect, suppression of the first measured value can be switched. This performs another check measurement in case of an exceedance of limit before a notification of hard water is displayed.

For use as a monitor for condensate recovery, the analyser Sycon 2502 features an additional relay for switching cooling water to a sample cooler.

Detailed information and many other data about your new analyser Sycon 2502 can be found in this manual.



Scope of supply

The scope of supply for a new device contains of following articles:

- ▶ device on wall holder without housing (optionally with housing)
- ▶ hose connection (reagent connection kit)
- ▶ manual (this booklet)
- ▶ starter kit (optionally)
 - throttle valves
 - 4 Phillips head screws PHx
 - 4 anchors
 - phase tester

General instructions

Labour protection
law

§§

Accident prevention
regulation

of the

Employer's Liability
Insurance
Association

Operation manual



This manual describes the installation and operation of the online analyser Sycon 2502 for automatic limit monitoring of water hardness concentration. The installation and commissioning are to be carried out by an authorised technician.

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

The analyser Sycon 2502 is used for the monitoring of limit values of total hardness or carbonate hardness in the process water. Proper operation can only be ensured if the reagents and spare parts recommended by the manufacturer are used.

Changes to the electrical wiring and the programming should be carried out only by a qualified professional.

The connection lines with the device are to be kept as short as possible and not to be laid together with power cables or in their direct 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 using this manual to be able to relate to the explained relationships and functions right away. As certain areas are interrelated, it is advisable to work through the chapters in the given order.

If problems or questions should arise during the operation of the analyser, you will receive support from us at any time. Try to pinpoint the problem as accurately as possible and record the actions and conditions leading to the problem. Thus they allow us a quicker and more targeted assistance.

Safety instructions and used symbols

In this control manual, specific safety instructions are given and it is referred to the unavoidable residual risks in the operation of the device. These residual risks include hazards to

- ▶ people
- ▶ devices / plants / machines
- ▶ environment

The symbols used in the operating manual should direct your attention to the safety instructions.

The most important objective of warnings is to prevent personal injury.



General instructions

The respectively used icon cannot replace the text of the safety warning. Therefore, the text is always to be read completely!



This symbol refers to information for better understanding of the device.



This symbol indicates hazards for people, products, equipment and machinery. A safety instruction with an exclamation mark indicates that dangers for people, plants, machinery, materials and the environment are not excluded.



This symbol indicates electrical and electronic hazards. These works may only be performed by personnel who are trained in electrical engineering. The local regulations are to be complied with.



This symbol indicates harmful or irritating substances. Please refer to the information in the safety data sheets. Personal protective equipment should be worn, as specified by the safety data sheets and the locally applicable accident prevention regulations.

Work on hydraulic and pneumatic systems



Maintenance and repair of hydraulic and pneumatic equipment may only be performed by qualified personnel.



Before starting with maintenance and repair works, pneumatic and hydraulic systems must be depressurised.



Cartridges for peristaltic pump should be regularly changed in routine maintenances, even if no visible damage or wear can be detected (follow manufacturer information).



Before restarting after maintenance or repair works:

- ▶ Check screw connections for tightness.
- ▶ Make sure that the plugs of the measuring chamber are secured with the locking pins.
- ▶ Make sure that all lids, strainers, filters and seals were re-installed in the correct order.

General instructions



Ensure after the completion of maintenance and repair works and before resuming operation of the system that you have followed the following instructions.

- ▶ Remove materials, tools and other equipment from the work site, which was required for the execution of maintenance and repair works.
- ▶ Remove spilled liquids.
- ▶ Make sure that the safety devices of the system are working properly again and are active.

Transport and storage



The device can be damaged by frost or high temperatures.

Use the original packaging or a sufficiently padded box for transporting.

Store the devices in a cool and dry place. The ambient temperature should be between 0 and 45 °C.

During transport and storage of already used devices, measuring chamber and hoses must be emptied at first in order to avoid frost damages.



Specifications

General specifications

Parameter	Value / range
Power supply	85 ... 264 VAC at 47... 440 Hz
Power consumption	25 VA (in operation)
Protection class	IP 43 – with housing IP 54
Ambient air temperature	5 ... 45 °C
Measuring water temperature	5 ... 40 °C
Humidity	20 ... 90 % relative humidity not condensing

Technical data

Parameter	Value / range
Installation	Wall mounting in closed rooms
Dimensions	▶ On wall holder: 280 × 250 × 140 mm³ (B × L × T) ▶ With housing: 300 × 300 × 190 mm³ (B × L × T)
Weight	▶ On wall holder: 1,9 kg ▶ With housing: 3,7 kg
Relay outputs	▶ 3 relays ▶ 250 VAC / VDC 4 A ▶ Potential-free outputs NC/NO ○ Limit value alarm ○ Device fault ○ Analysis active / cooling water
Signal input	▶ Potential-free contact input ▶ Electrical load 24 V, 10 mA ▶ Do not connect any external voltage!
Inlet connection	Hoses with 6 mm outer diameter
Drain connection	Hoses with 6 mm outer diameter; keep line short

Specifications

Analysis features

Parameter	Value / range
Measurement principle	Colometric method
The limit value alarm is defined by the used reagent	▶ <u>Total hardness limit value reagents:</u> 0,05 °dH 0,10 °dH 0,20 °dH 0,30 °dH 0,50 °dH 1 °dH 2 °dH 3 °dH 5 °dH ▶ <u>Carbonate hardness limit value reagents:</u> 1 °dH 1,5 °dH 2 °dH 3 °dH
Reagent consumption	▶ < 0,10 ml / analysis ▶ At least 5000 analysis per 500 ml reagent bottle
Shelf life of reagents	24 months from the date of manufacture
Water consumption	▶ Approx. 1000 ml / analysis ▶ Water consumption varies depending on the inlet pressure and flushing period.
Pressure of inlet water	▶ Approx. 0.5 - 5 bar ▶ At an inlet pressure greater than 2 bar, a pressure reducer / throttle is to be used.
Water sample	▶ Clear, colourless, free of solids, without gas bubbles ▶ pH 4 ... 10.5, iron < 3 ppm, copper < 0.2 ppm ▶ aluminium < 0.1 ppm, manganese < 0.2 ppm ▶ acid capacity $K_{s4.3}$ < 5 mmol/l



Performance features

Fully automatic

The device detects hardness breakthroughs fully automatically depending on the used reagent.
The analysis process is more effective than manual methods and more sustainable than other measuring methods that work only indirectly.

Intelligent and self-sufficient

The device does not need to be calibrated. External influences on the measurement due to contamination of the measuring chamber, turbidity of the sample and external light effects are recognised by the integrated measurement technology and a two-stage analysis process with zero point measurement and eliminated in the evaluation of the analysis.
The maintenance-free full-colour sensor is one of the key components for the autonomous operation of the device.

Selectable interval time

The interval time between two measurements can be adjusted in 4 steps: Interval times of 5/10/20/30 minutes can be selected. The analysis can also be started via an external switch or paused during plant standstill.

Self-calibrating

Hardness breakthroughs are reliably detected by using the limit value reagent. Select the reagent that matches your limit value. No further configuration or calibration is necessary.

Very high accuracy

After a bad measurement, a reference measurement can be carried out after 4 minutes to evaluate the result. This prevents false alarms due to the negative ion effect.

Extensive alarm functions

When a limit is exceeded, an alarm is issued by switching a potential-free relay. This alarm output can be assigned or used for indicating to a control room in order to actuate a horn, to close a valve or to activate a program for the regeneration of a softening plant.

Diagnostic program

Should technical problems occur to the device, a fault signal will be displayed by switching a potential-free relay. The detailed diagnostic program performs step by step through all the functions in an easy-to-understand manner. Thus, the device is thoroughly checked and the cause of the error message is clearly identified.



Performance features

Minimal maintenance effort

The measuring chamber must be cleaned depending on the set measurement interval or the frequency of the measurements. The suction lances and seals must be replaced typically only once or twice a year. No additional tool is required for maintenance. This can be performed very easily.

Efficient reagent consumption

The reagent bottle is easy to change. A 500 ml bottle allows about 5000 analyses.

Compact design

The device is simply hung on a wall or supporting structure. Installation and commissioning are straightforward.

Digital input, IN'

The potential-free switch of a flow meter, a timer or any other state switch can be connected to this input. When the contact is open, no analyses are run in the programmed interval. In the programmed interval is run.

Three potential-free relay outputs

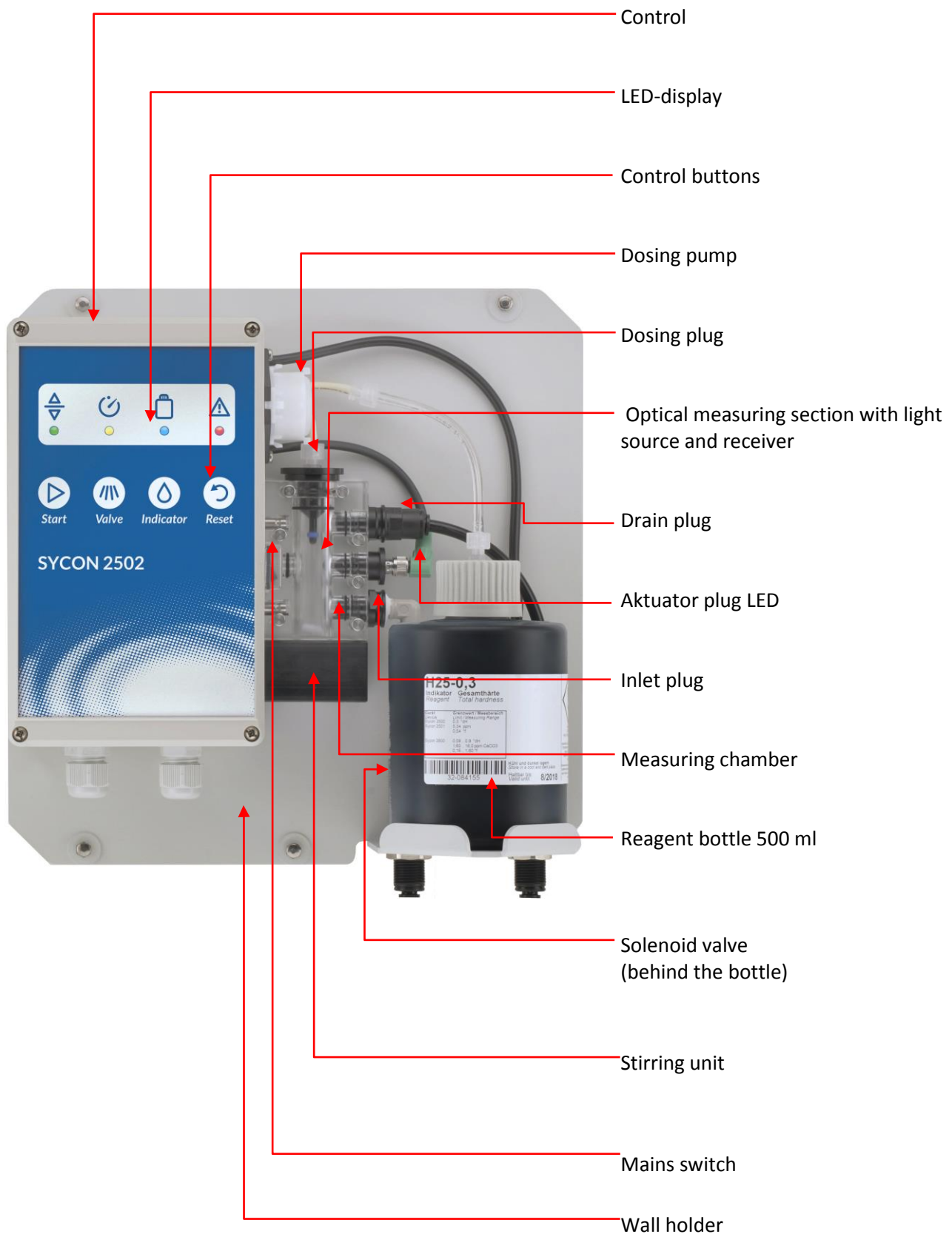
The potential-free relay outputs can be used to report a limit value alarm, a device fault or an active analysis as the state e.g. to a control room. Alternatively, signal devices or solenoid valves can be switched.

BOB-operation

The acronym "BOB" stands for Operation Without Supervision (Betrieb ohne Beaufsichtigung), as it is mentioned in the specific rules and regulations for boiler houses of the TÜV. The analyser Sycon 2502 indicates whether a sufficient stock of reagent is available for at least the next 72 hours.



Device overview



Device overview

Display and control panel

On the front side of the analyser Sycon 2502, 4 LEDs display the operating status and 4 buttons are available for operating the device.



The operating status is displayed by the LED display: from left to right, the LEDs of the respective colour show the following information:

LED	Colour	Information
1	Green	Fallen short of limit
1	Red	Limit exceeded
2	Yellow	Analysis active
2	Flashing yellow	Input contact open, e.g. via flow meter
3	Blue	Provide reagent
3	Flashing blue	BOB message
4	Red	Device fault

Device overview

Key functions

Start of analysis



- ▶ You can start an analysis by hand.
- ▶ If an analysis process has been triggered, you can switch to the next program step by pressing the START button.
- ▶ If an analysis is manually started, the possibly activated relays REL 1 and REL 2 are turned off.

Flushing and filling of the measuring chamber



- ▶ Outside an analysis process, you can flush the measuring chamber and the supply line to the measuring chamber.

Vent dosing pump



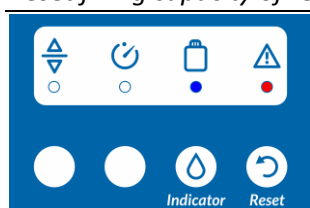
- ▶ Outside an analysis process, you can turn on the dosing pump, for example, to bleed the hose line during commissioning.
- ▶ The stirring unit is running simultaneously with the dosing pump.

RESET – functions



- ▶ Delete the relay REL 1 if the limit value is exceeded.
- ▶ Delete the relay REL 2 in case of a device fault or in case of the message "lack of reagent".
- ▶ You can cancel an analysis process with this button.

Reset filling capacity of reagent



- ▶ Reset the quantity measurement of the reagent by simultaneously pressing the INDICATOR and RESET button. The resetting is done if the LEDs "lack of reagent" (blue) and "alarm message" (red) light up simultaneously.

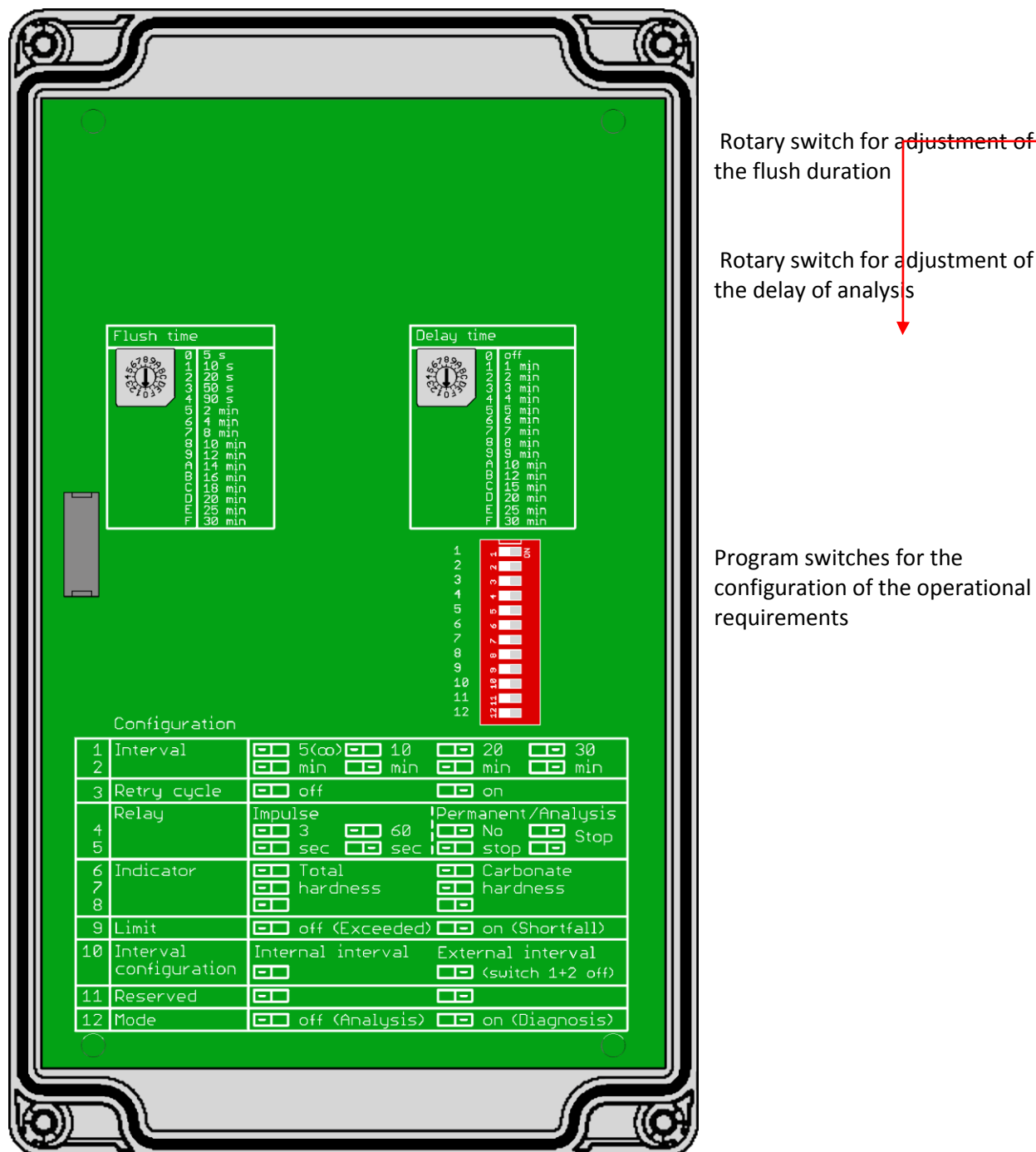


The resetting may only be performed if you have inserted a full 500 ml reagent bottle.

Device overview

Overview of the configuration elements

The analyser Sycon 2502 has three configuration elements, which are located on the inside of the housing cover.



Device overview

Trigger conditions for starting an analysis



- ▶ Automatically by the set time interval
- ▶ Manual analysis by pressing the START button
- ▶ 3 minutes after turning on the device
- ▶ 4 minutes after a limit is exceeded with activated suppression of the first measured value
- ▶ Switch-on of a connected flow meter after plant shut-down
- ▶ By a connected external controller

Analysis process

The analysis process consists of several steps. The duration of the respective steps depends on the configuration of the device and the reagent used. The first analysis is automatically started 3 minutes after switching on. In case the limit value has been fallen below, the next analyses will be carried out in accordance with the set analysis interval. The set analysis interval time can only be complied with, if the flush duration is set greater than the interval time.

In case limit is exceeded the subsequent measurements are carried out in the 5-minute interval to indicate the recovery of the plant after the regeneration promptly. The analysis will take 3 minutes plus the set flush duration. A control measurement with activated suppression of the first measured value takes place 4 minutes after completion of the initial measurement.

Delay time for start of analysis

In the monitoring of hot water samples, the sample must be cooled below 40 °C (<104 °F). A cooling water valve can be opened via the relay REL 3. Only if the sample is cooled down safely after an adjustable delay time, the inlet solenoid valve of the analyser opens and the analysis starts.

Flush of the measuring chamber and removal of water samples

The inlet solenoid valve opens. The measuring chamber and the supply line are flushed until it is ensured that there is water from the process to be monitored in the measuring chamber. The flushing time can be adapted to the length of the supply line.

Measurement of the zero sample

Before starting the actual measurement, a zero sample is taken. The zero sample is used to determine influential disturbances such as sample turbidity, contamination of the optics or extraneous light and to take them into account for evaluating the water sample. The actuator LED lights up. The solenoid valve is opened during the zero sample.

Device overview

Dosing of the reagent into the water sample

The solenoid valve on the device is closed and the reagent is dosed into the water sample. By turning the magnetic stirrer, the reagent is dissolved in the water sample homogeneously.

Measurement of the water sample with reagent

In this step, the value of the colour of the water sample is determined. For this purpose, the magnetic stirrer is stopped. The actuator lights up and the sample is evaluated immediately. The result of the measurement is displayed on the LEDs on the device's front panel.

For incorrect values, e.g. missing addition of reagent, a fault is reported.

Flushing and cleaning of the measuring chamber

The solenoid valve opens, whereby the coloured water sample is flushed out. The measuring chamber remains filled with pure process water until the beginning of the next analysis.



Find out more on the reagents



The measuring device works with one-component reagents for different limits. The reagent can be kept for 24 months if properly stored (dark and cool).



Measuring water with temperatures above 40 °C must be cooled prior to the analysis.

Colour reaction in the measuring chamber

	 Water sample is evaluated as "good"  Limit not exceeded	 Water sample is evaluated as bad "  Limit is exceeded
Total hardness	 green	 red
Carbonate hardness	 yellow	 violet



If the program switch S9 is switched to "ON", a reversal of the analysis takes place, i.e. there is a message of the limit value being fallen short of.

Installation and commissioning

Installation prerequisites



The analyser Sycon 2502 may only be used for the determination of water parameters.



Changes to the electrical wiring and the programming should be carried out only by an authorised and experienced professional.

The plant to be monitored must meet the following conditions:

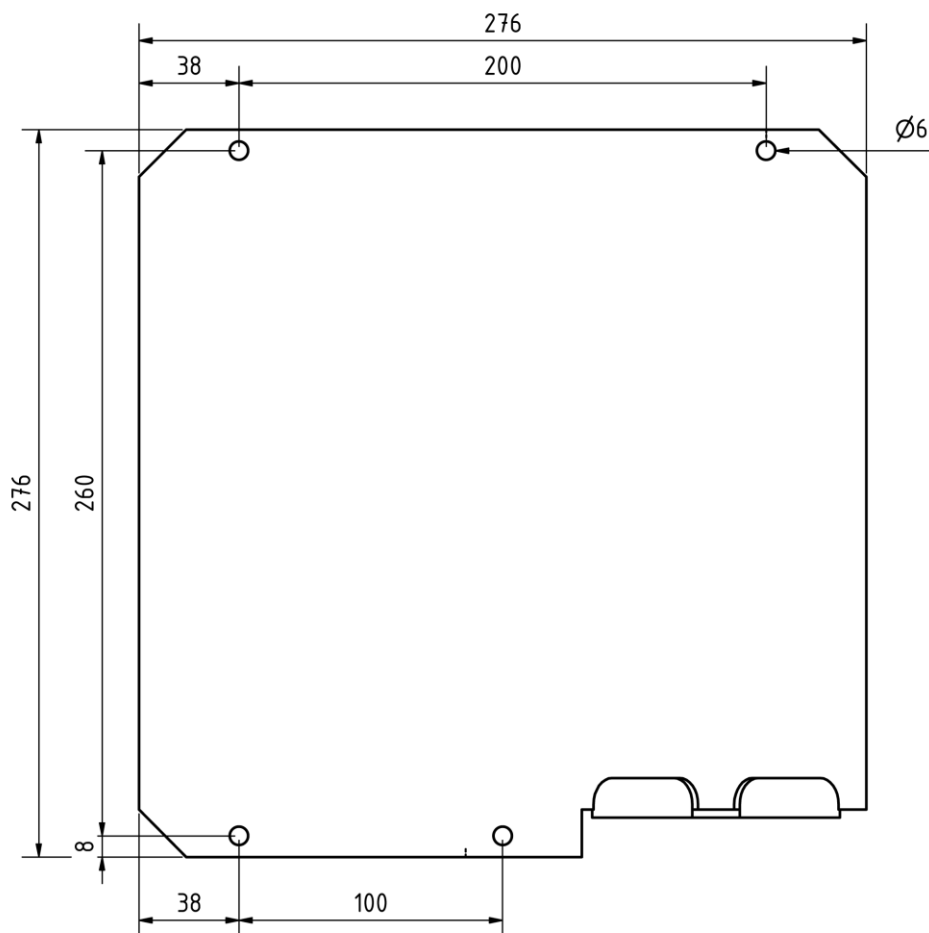
- ▶ The maximum permissible load-bearing capacity of the switch outputs and the total capacity of the plant may not be exceeded by the connected load.
- ▶ All inductive loads (valves, motors, contactors, transformers) of the plant must be equipped with suitable overvoltage protection (e.g. RC element, varistor, diode, etc.).
- ▶ If there are external devices with high network interference level in the spatial environment of the controller, these are to be reduced with appropriate measures, or corresponding external interference suppression measures (network filter) must be taken at the supply voltage input of the controller.

Installation and commissioning

Mounting

The analyser Sycon 2502 on wall holder can be mounted directly. To protect the device against dust and dirt, an additional housing is available as an option.

Sycon 2502 on wall mounting plate

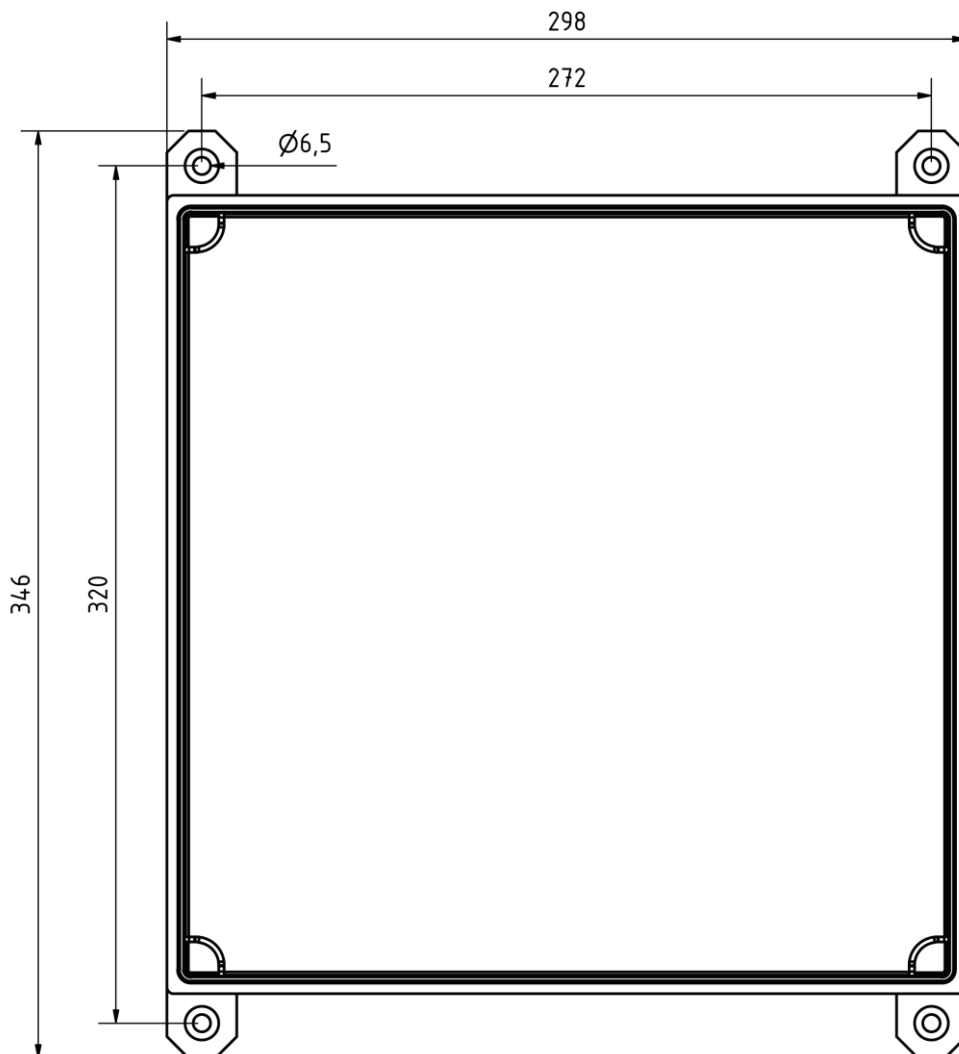


The device is fixed on a wall or suitable support structure using 4 screws (max. 6 mm).

All dimensions are given in mm.

Installation and commissioning

Sycon 2502 in the housing



The device is mounted in the housing using the enclosed 4 lugs. Those can be alternatively rotated by 45 ° or by 90 ° outwards.

All dimensions are given in mm.



Avoid direct sunlight and strong artificial light sources for both variants.

If you do not take this into account, the following effects can occur:

- ▶ Disturbance of the optical path in the measuring chamber
- ▶ Electromagnetic interference caused by artificial light sources



Do not install the analyser under dripping pipes.

Installation and commissioning

Set up supply line to the test water and the channel

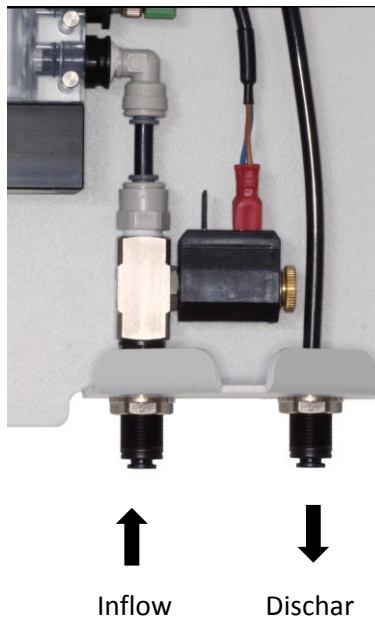


The connections for the inlet and outlet are designed for flexible hose with 6 mm outer diameter.

A manual shut-off valve is to be provided between the treatment plant and the analyser. The water connection must be done according to EN 1717. The drain must lead to an open sewer via a short connection. The drain line must remain depressurised.



Make sure that the inlet and outlet are not interchanged. The inlet is on the left side on the solenoid valve.



Installation and commissioning

Overview of electrical terminals

When working on the board, the following instructions must be followed:

- ▶ Upon actuation of the clamping lever, only the force required for this may be expended.
- ▶ Screwless terminals are suitable for receiving rigid single-core conductors up to 2.5 mm². Fine gauge conductors up to 1.5 mm² can be connected with wire end ferrule, with plastic sleeve, or up to 2.5 mm² without plastic sleeve. To undo a terminal, use a straight screwdriver SL with a maximum blade width of 3 mm.
- ▶ For all installation works, the appropriate VDE regulations must be followed.



Works on electrical equipment of the plant / machine may be carried out only by a qualified electrician!

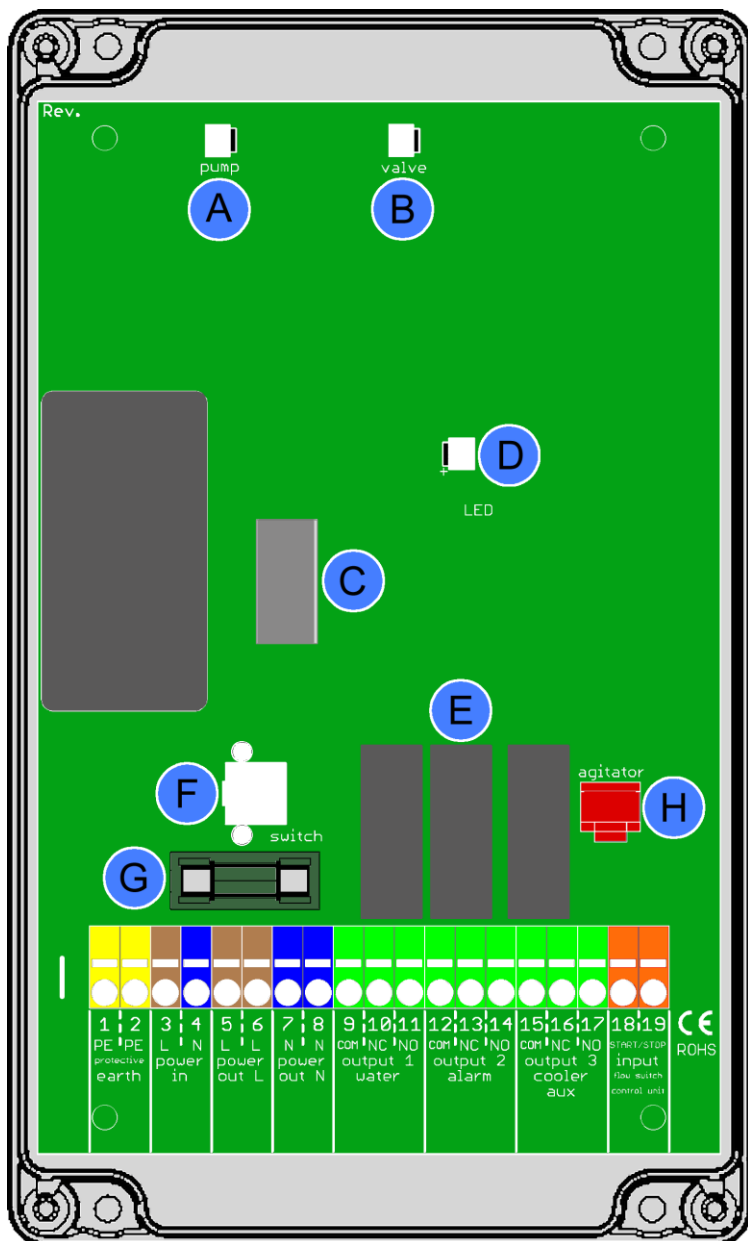
To connect the analyser Sycon 2502 electrically, the four screws on the front panel must be undone. All screws are secured against falling.



When removing the front panel, please note that there is a board, which is connected to the subadjacent parts, just behind the lid.

The distribution of the components and the configuration of the terminals are shown in the following drawing:

Installation and commissioning

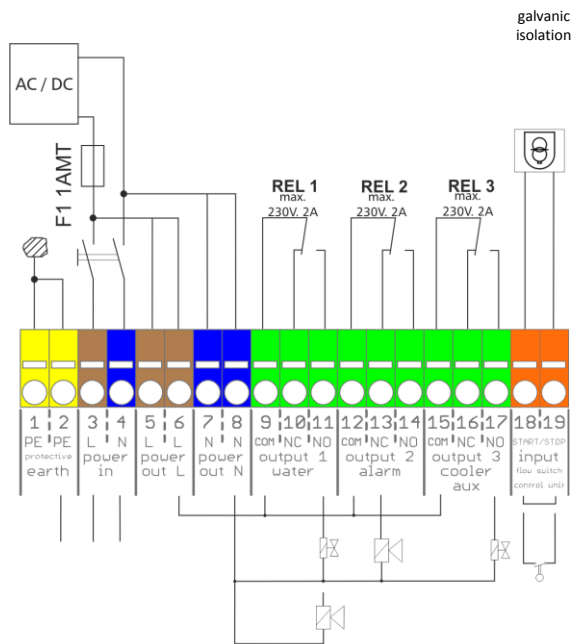


Position	Module
A	Connection for dosing pump
B	Connection for solenoid valve
C	Connection for display
D	Connection for actuator-LED
E	3 x relay (230 V, 2 A)
F	Power switch connection
G	Fuse (1 A slow-blow)
H	Connection for motor of stirrer drive

Terminal	Configuration
1	Earth conductor PE
2	Earth conductor PE
3	Network input L
4	Network input N
5	Network output L
6	Network output L
7	Network output N
8	Network output N
9	Relay REL 1 – COM
10	Relay REL 1 – NC
11	Relay REL 1 – NO
12	Relay REL 2 – COM
13	Relay REL 2 – NC
14	Relay REL 2 – NO
15	Relay REL 3 – COM
16	Relay REL 3 – NC
17	Relay REL 3 – NO
18	Input contact
19	Input contact

Installation and commissioning

Example of wiring



Drawn position for
REL 1, REL 2 and REL 3:

Device currentless - deactivated

Attention

- ▶ REL 1 activated when limit is exceeded
- ▶ REL 2 deactivated in case of device fault
- ▶ REL 3 activated during analysis active

When inlet contact is open and
program switch S10 = OFF

- ▶ No analyses

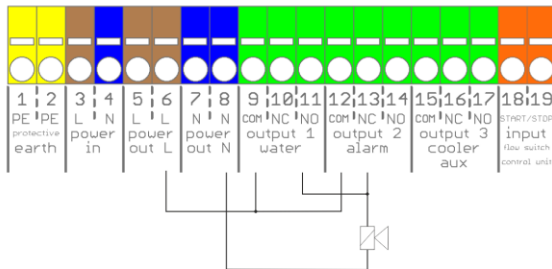
When inlet contact is closed and
program switch S10 = OFF

- ▶ Analyses in the set interval time

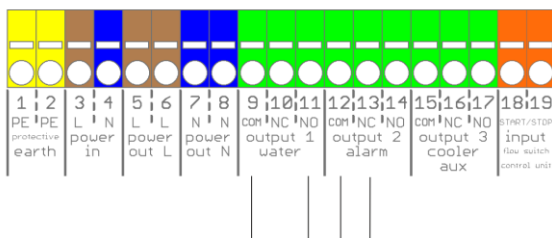
Alternative inlet contact

Program switch S10 = ON

- ▶ Start of analysis when inlet contact is closed

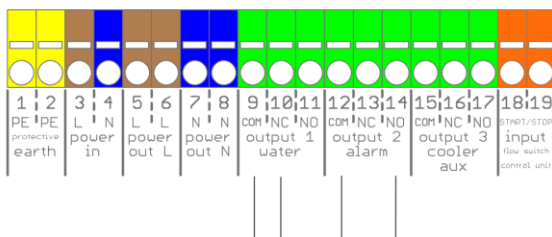


- ▶ Parallel switching of REL 1 and REL 2
- ▶ Link-up to a horn



Connection of potential-free contacts for control
room or controller

- ▶ Contacts open at:
 - Exceedance of limit value
 - Device fault

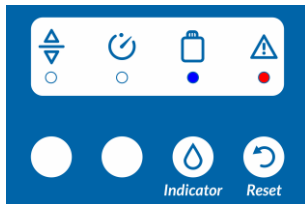


Connection of potential-free contacts for control
room or controller

- ▶ Contacts open at:
 - Exceedance of limit value
 - Device fault

Installation and commissioning

Inserting a full reagent bottle



Open the reagent bottle by turning the cap. Insert the suction lance of the Sycon 2502 into the bottle and fix the connection nut by hand with the screw thread of the bottle.

Set the fill level of reagent to 100% by holding the INDICATOR and RESET button until the reagent- and fault LED light up continuously.



The reagent bottle is not supplied with the device.

- ▶ Use only genuine reagent of the type H25 or C25 in the 500 ml bottle.
- ▶ Check the shelf life of the reagent used.



Risk of contamination

When handling the reagent, make sure that your eyes, your skin and your clothes do not come into contact with the liquid.

- ▶ Please refer to the instructions in the safety data sheets.

We accept no liability for permanent contaminations by dyes in the reagent and personal injuries resulting from the improper handling of the reagent.



We recommend that you wear suitable protective clothing when handling the reagent:

- ▶ Work clothes
- ▶ Laboratory gloves
- ▶ Eye protection / safety goggles

Connection of the relay outputs

Exceedance of limit value (relay REL 1 - terminal 9/10/11)

Signal devices and valves can be switched when the limit is exceeded. The relay switches as

- ▶ permanent contact or alternatively as
- ▶ pulse contact for starting a controller for the regeneration of a water treatment plant

Installation and commissioning

Different functions for the relay REL 1 can be set using the sense switches S4 and S5 (see chapter "limit relays REL 1").

- ▶ Pulse contact (3 seconds or 60 seconds)
 - The relay closes for the preset duration and opens after that again.
- ▶ Permanent contact without stopping analysis
 - Analyses are continuously conducted in the set interval.
 - The alarm is cancelled if the limit value is not fallen short of.
- ▶ Permanent contact with stopping analysis
 - No further analyses are carried out until the alarm is acknowledged.
 - Alarm is active and must be acknowledged until the RESET button is pressed.

Device fault (relay REL 2 - terminal 12/13/14)

The relay REL 2 indicates faults of the analyser. It is in the activated state, if there is no fault.

The following faults are indicated:

- ▶ Power outage
 - The analyser is switched off (relay deactivated).
- ▶ Lack of reagent
 - The content of the reagent bottle is less than about 10% (see "BOB operation").
- ▶ Error in zero sample (no sufficient brightness before adding reagent)
 - The measuring chamber is dirty.
 - The measurement sample / sample water is dirty or cloudy.
 - The electronic system is defective.
- ▶ Error in measurement (no sufficient difference of the measured value before and after the addition of reagent)
 - No reagent was dosed.
 - There is no water in the measuring chamber.
 - There was no mixing (magnetic stirrer unit missing or stirring unit defective).

Analysis process (relay REL 3 - terminal 15/16/17)

Signal devices and valves can be connected. The relay switches during the analysis.

Using the rotary switch "delay time", a delayed sampling can be programmed. Thus, it can be ensured that the sample is securely cooled down before removal when using a sample cooler.



Installation and commissioning

Connecting the contact signals

Inlet contact (IN - terminal 18/19)

False alarms can arise if analyses are performed in a one-filter system during the regeneration.

Also a longer service life of the treatment plant can lead to erroneous measurements due to formation of channels in the resin bed or due to the negative ion effect. An exceedance of the limit value is displayed - but the softener is not yet exhausted.

The Sycon 2502 uses two methods to eliminate false alarms:

Method 1

Using a potential-free switch at the contact input IN. If the contact is closed, analyses are carried out within the set interval. If the contact is opened, no analyses are carried out.

Flow meters or potential-free switching contacts of time switches, controllers of the softening plant or of the osmosis plants are used as switches.

Method 2

The first exceedance of the limit value is ignored and a second measurement is performed after 4 minutes for verification. This method can be used in addition or as an alternative to the method 1.

Alternative inlet contact (IN - terminal 18/19)



If the program switch S10 is turned to ON, the inlet operates as a start input for analyses. In addition to the programmed analysis intervals, an analysis can be started any time by closing the contact.

Note

Usually, the sense switches S1 and S2 are both set to OFF (5-minute interval) in the alternative use of the inlet contact. A start of analysis is only possible via the inlet contact or manually.



It is recommended to connect the inlet contact accordingly to avoid unnecessary reports of a limit value being exceeded.

Particularly in the case of direct connection to a treatment plant, no premature regenerations should be started due to faulty measurements.



Connect only potential-free switches to the terminals 18 + 19. The connection of an external voltage source can cause damage to the device.

The proper functioning of a connected switch can be checked in the diagnostic program step 13.

If the input is not used, the terminals 18 + 19 must be bridged and the sense switch S10 must be set to OFF.

Operation and control

Before the commissioning



Assure yourself that the device is well mounted to a wall or suitable suspension.



Make sure that the water quality meets the specified requirements.

Take appropriate measures, if required, to improve the feed water quality (e.g. installing a dirt filter).



Make sure that a full reagent bottle is inserted.

Check the bottle cap for leaks and check whether it is properly screwed to the thread of the bottle.

Verify that the correct type of reagent is used for the application.

Verify that the use-by date of the reagent has not expired.



Make sure that all the plugs of the measuring chamber are tight, are sitting in the appropriate sockets and are secured with locking pins.



Make sure that all water- and reagent-carrying hose connections in the measuring chamber system are connected correctly and securely.



Make sure that the water treatment plant to be monitored is in operation and supplies measuring water.



Consult a professional technician if in doubt or consult your supplier or the manufacturer.



Make sure that the inlet- and outlet contacts of the analyser are connected in the desired manner with the water treatment plant to be monitored.



Make sure that the hydraulic connections are correctly installed.



Make sure that the maximum allowable operating pressure in the water supply line is not exceeded.

Assemble a throttle valve optionally.



Make sure that the electrical connections are correctly installed.

Consult a professional technician if in doubt or consult your supplier or the manufacturer.

Operation and control

Device settings

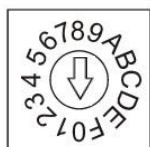
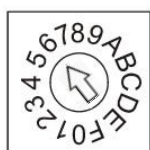
The analyser Sycon 2502 is programmed and adapted to the operational requirements via small slide switch (program switches S1 - S12).



Switch off the device and open the lid of the controller.
(Supply voltage between 85 ... 264 VAC at 47 ... 63 Hz)

The program switches are located on the back side of the display board. This is screwed on the lid and may not be removed.

Likewise the two 16-position rotary switches for setting the flush duration and the delay time for the start of the analysis are on this board.



Adjustment	Factory setting	
Flush time	4 minutes	Position 6

Delay time	Off / 0 minutes	Position 0
------------	-----------------	------------



Adjustment	Factory setting	
Analysis interval	10 minutes	S1 OFF
		S2 ON
Suppression of the first measured value	Yes	S3 ON
Functions of relay 1	Permanent contact / without stopping analysis	S4 ON
		S5 OFF
Measurement parameters	Total hardness	S6 OFF
		S7 OFF
		S8 OFF
Monitoring	Report if exceeded	S9 OFF
Input contact	Function of flow meter	S10 OFF
Operation mode	Analysis operation	S11 OFF
		S12 OFF



Works on the electrical connections may only be carried out by authorised technicians in compliance with the local regulations in force.

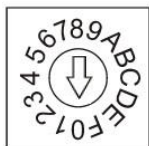


For the operation of the rotary switches and for setting the slide switches, you need a small screwdriver. Only use suitable and tested tool, so that you avoid damages to the sensitive components.

Operation and control

Setting the flush duration

The flush duration is adjusted before beginning with an analysis using the left rotary switch "Flush time" in the range of 5 seconds to 30 minutes.



Pos	Time	Pos	Time	Pos	Time	Pos	Time
0	5 sec	4	90 sec	8	10 min	C	18 min
1	10 sec	5	2 min	9	12 min	D	20 min
2	20 sec	6	4 min	A	14 min	E	25 min
3	50 sec	7	8 min	B	16 min	F	30 min

Select the flush duration depending on the length of the supply line to ensure that the water from the softener flushes the supply line and fresh water is analysed.

With a long flush duration, adhesions in the measuring chamber are additionally reduced.

The local conditions of a plant may be very different: different cable cross-sections for the softener, fluctuating pressure conditions due to high loads etc.

Measure the amount of flush water in the currently set flush duration and compare it with the theoretically calculated amount of water due to the cable cross-sections. Consider a supplement for the volume of resin bed.

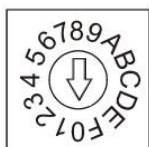
Make sure that always a representative water sample is analysed.



We recommend a flush duration of at least 50 seconds.

Adjusting the delay time

The delay time before a sampling is adjusted using the right rotary switch "Delay time" in the range of 0 seconds to 30 minutes. The delay time is used for cooling down the water sample prior to the flushing of the analysis. During the delay time, the relay REL 3 is activated. Thus, a cooling water valve on the sample cooler can be activated, so that the sample is already cooled down prior to opening of the solenoid valve of the analyser Sycon 2502.



Pos	Time	Pos	Time	Pos	Time	Pos	Time
0	0 min	4	4 min	8	8 min	C	15 min
1	1 min	5	5 min	9	9 min	D	20 min
2	2 min	6	6 min	A	10 min	E	25 min
3	3 min	7	7 min	B	12 min	F	30 min

Operation and control



Select the delay time in such a way that it is ensured that no hot water flows into the measuring chamber at the beginning of an analysis.

- ▶ For the monitoring of condensate, it is necessary to cool down the sample to a temperature below 40 °C.
- ▶ The value of the delay time has to be determined on site. It is dependent on the temperatures of the condensate, of the cooling water and the pressure- and flow conditions in the system. Start with a high value for the delay time.

Analysis interval



There are 4 fixed interval times, which are set via the program switches S1 and S2. The interval time determines the frequency of an analysis. It is the time between 2 consecutive starts of analyses.

- ▶ If the inlet contact (terminal 18 + 19) is open, no analyses are started within the set analysis interval. Therefore, this input is bridged during delivery. Make sure that this bridge is present or an external switch (e.g. flow meter) has been connected. This switch must be closed if water flows and analyses should be carried out automatically.
- ▶ The inlet contact (terminal 18 + 19) of the flow meter function can be switched to the start function (switch to ON) via the sense switch S10. Here, the 5-minute interval is disabled.

Attention: If the inlet function has been programmed as an external analysis interval (S10 = ON) and the bridge at the inlet contact is not removed, analyses are carried out continuously.

ON

1	2	3	4	5	6	7	8	9	10	11	12
☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

S1	S2	Time
OFF	OFF	5 (∞) ^(A) min
OFF	ON	10 min
ON	OFF	20 min
ON	ON	30 min

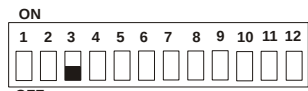
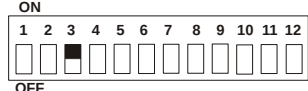
^(A) If the inlet contact is configured with the program switch S10 to ON and S1 and S2 are set to OFF, the interval function for starting the analysis is disabled.

Operation and control

Suppression of the first measured value

If the water hardness is exceeded, it can be determined whether a second analysis should still take place for the verification (suppression of the first measured value). Only if two consecutive analyses indicate that a limit value is exceeded, the relay REL 1 is activated.

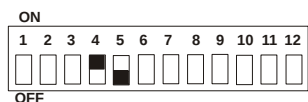
The second analysis takes place 4 minutes later regardless of the set analysis interval. If a flow meter should be connected to the inlet contact, the analysis also takes place when no water flow is indicated.

S1		Function
		OFF
		No suppression of the first measured value
		ON
		Suppression of the first measured value

Limit value relay REL 1

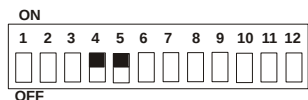
The relay REL 1 (terminal 9 + 10 + 11) indicates the exceeding of the limit value. You can choose between a pulse contact with a pulse duration of 3 or 60 seconds for the activation of a controller or a permanent contact. In case of a permanent contact, it is decided between two alternatives:

1. Permanent contact without stopping analysis



- ▶ If the program switches are set to S4 = ON and S5 = OFF, analyses are continuously conducted in the set time interval.
- ▶ If the limit value is exceeded, the relay REL 1 is **activated**.
- ▶ If the limit value is fallen short of, the relay REL 1 is **deactivated**.

2. Permanent contact / with stopping analysis



- ▶ If the programming switches S4 and S5 are set to ON, no further analysis is started after the limit is exceeded. The relay REL 1 is **activated**.
- ▶ If the RESET button is pressed or the inlet contact contains a pulse, the REL 1 is **deactivated**.
- ▶ If the sense switches S10, S4 and S5 are set to ON and the inlet contact is permanently bridged, the analysis is not stopped.

Operation and control

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

S4	S5	Time
OFF	OFF	Pulse contact 3 seconds
OFF	ON	Pulse contact 60 seconds
ON	OFF	Permanent contact without stopping analysis
ON	ON	Permanent contact with stopping analysis

Measurement parameters

The analyser Sycon 2502 can be used for determining different parameters.



The respective limit value is determined by the type of reagent used. The set parameter must match the used reagent.

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

ON

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

OFF

S6	S7	S8	Measurement parameters
OFF	OFF	OFF	Total hardness
OFF	OFF	ON	Carbonate hardness
OFF	ON	OFF	Minus M-value
OFF	ON	ON	Plus M-value

Operation and control

Limit value monitoring

Usually, a message is generated if a limit value is upwardly exceeded. Here, e.g. an ion exchanger is monitored for hardness breakthrough.

In the position of program switch S9 = OFF, the monitoring takes place for exceedance.
Relay REL 1 is switched when the limit value is exceeded.

In the position of the program switch S9 = ON, the monitoring takes place for undercut of the limit value.
This option is used for example to monitor mixing units, where a limiting hardness is expected.
Relay REL 1 is switched if the limit value is fallen short of.



All the functions described in this manual in relation to notifications and responses of the device shall apply, however, always if a limit value is fallen short of.

ON

1

2

3

4

5

6

7

8

9

10

11

12

OFF

ON

1

2

3

4

5

6

7

8

9

10

11

12

OFF

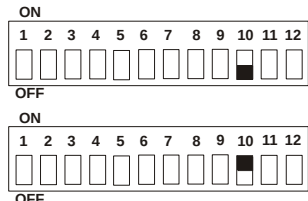
S9	Function
OFF	Report if exceeded
ON	Report in case of shortfall



Operation and control

Input contact

Two different functions can be assigned to the inlet contact (terminal 18 + 19).

S10		Function
	OFF	 Flow meter or bridge  no analysis when inlet contact is open
	ON	 Start of external analysis  Start of analysis when inlet contact is closed

Flow meter

This function is used if analyses should only be carried out once a water sampling takes place. This is particularly useful with intermittent operation, i.e. filling of a reservoir at longer time intervals or for plants that are only in operation a few hours a day.

The function is also used when no analysis is wanted, e.g. during the regeneration of a one-filter system.

Start of external analysis

The inlet contact is used in conjunction with a controller in the operating mode "external start of analysis". By closing the inlet contacts, an analysis is started.



Please note that it always has to be a potential-free switch for the activation of the inlet contact. The connection of an external voltage source can cause damage to the device.



Instead of a flow meter, you can also use any other potential-free contact of a time switch or a relay (osmosis control, softening control).



When delivered, the program switch S10 = OFF and the inlet contact is bridged. Therefore, the internal analysis interval is active.



If the inlet contact is permanently bridged, while the program switch S10 is at ON, analyses are continuously performed. The analyses are carried out successively. Here, the set analysis interval is disabled.



If the sense switches S10, S4 and S5 are set to ON and the inlet contact is permanently bridged, the analysis is not stopped.



In case the inlet contact is configured as external analysis start, there is no stop of analysis if the limit value has been exceeded. In case the inlet contact



Ist der Eingangskontakt als externer Analysenstart konfiguriert erfolgt bei Grenzwertüberschreitung kein Analysenstopp.
Beim erneuten Schließen des Eingangskontakts wird eine weitere Analyse gestartet.

Operation and control

The following examples should help you to choose the right configuration:

Example 1: Analyses should be carried out continuously in a fixed time interval

In this case, the program switch S10 is set to OFF (no flow meter is connected). The inlet contact is provided with a bridge.



Example 2: Analyses are carried out in a fixed time interval, if a flow meter reports flowing water

The program switch S10 is in the OFF position. The flow meter is connected to the inlet contact IN instead of the bridge. The first analysis after switching on the device takes place after 3 minutes, even if the flow meter indicates no flowing water. The subsequent analysis will take place only with flowing water at a set interval. Pausing the analysis interval by the flow meter is displayed by the yellow LED with a flash. For reporting of running water after a downtime by the flow meter, a limit value analysis is performed immediately.

Example 3: The analysis is started by a controller

In order to specify the analysis interval by a controller, the controller is connected to the inlet contact using a potential-free switch. The program switch S10 is brought to the ON position (start of external analysis) to disable the internal measurement interval of the device.

Usually, the program switches S1 and S2 are set to OFF and therefore, no interval-controlled analysis takes place.

Operation and control

BOB-operation

The acronym BOB stands for Operation Without Supervision (Betrieb ohne Beaufsichtigung), as it is mentioned in the specific rules and regulations of the TÜV for boiler houses. The requirement indicates that the measuring device must have at least a sufficient stock of reagent for the next 72 hours and is thus ready for operation.

The relay output REL 2 (terminal 12 + 13 + 14) can be used to transmit an alarm e.g. to a superordinate control room, if the reagent stock is no longer sufficient for the minimum time interval.

The analyser Sycon 2502 is designed specifically for the BOB-operation. Steam boiler systems require a qualitative monitoring of the water quality, especially the concentration of the water hardness in the boiler feed water in accordance with the technical guidelines for steam boiler systems TRD 604 (Technical rules for steam boilers, published by TÜV).

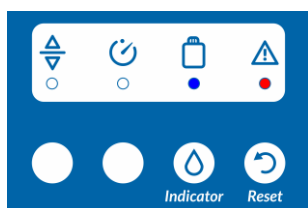
The analyser Sycon 2502 detects the consumption of reagent to ensure that in times of an unattended operation, a sufficient amount of reagent is always available for a reliable analysis operation.

The adequate reagent stock is calculated depending on the set analysis interval for the next 72-hours-BOB-operation.

If the next 72-hours-BOB-operation can no longer be reliably ensured, the alarm "lack of reagent" is triggered on the relay output REL 2. This message can be suppressed at short notice by pressing the RESET button. The message is displayed again if the device is turned on repeatedly. To disable the BOB-alarm permanently, a new reagent bottle must be inserted and the counter must be reset.



The reagent stock can only be calculated correctly if the internal counter is reset after inserting a new 500 ml reagent bottle by pressing the button combination of RESET and INDICATOR.



The device does not recognise the content of a bottle. With a reset, an internal counter of the reagent pump is reset, which then counts backward again starting at 500 ml. The counter can only be reset to "a filling level of 100 %". If the button combination is pressed during operation without inserting a new full bottle, the reagent stock is not calculated exactly, and the alarm is not issued or is issued at the wrong time. This also applies,

should the resetting be forgotten after inserting a full bottle.

Operation and control

Commissioning

Make sure that the device is installed according to the manual and that the program switches are programmed according to the requirements.

Turning on the device

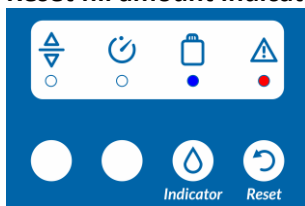
- ▶ Turn on the power switch.
- ▶ The calculated fill level of the reagent bottle is displayed for one second.

After turning on



- ▶ The green LED "ANALYSIS RESULT" flashes, since no measurement has been performed yet.

Reset fill amount indicator



- ▶ Press the INDICATOR and RESET buttons simultaneously.



Reset only the capacity, if you have inserted a full bottle (for this, see also the descriptions on page 35).

Fill the measuring chamber with water



- ▶ Press the VALVE button until the measuring chamber is filled and free of air bubbles.

Vent dosing pump



- ▶ Press the INDICATOR button until the reagent continuously flows into the measuring chamber.
- ▶ During this time, the magnetic stirrer rotates.

Start analysis



- ▶ Press the START button to start the first analysis.
- ▶ An analysis starts with the flushing of the measuring chamber.

LED-displays

The analyser Sycon 2502 displays information about the operating status and results of measurements and information about the fill level of the reagent using the LEDs.

The setting of the device is indicated by 4 LEDs on the front of the device.

The following displays can be displayed during the operation depending on the set configurations.

The display variants of the blue LED (reagents notes) can occur in combination with the other LEDs, depending on the level of the indicator bottle.

Operation and control

Analysis result

Flashing green



There is no analysis result, because the device has just been turned on.

Green



The water quality is below the predetermined limit value.

Flashing-green + yellow



There is no analysis result because the device has just been switched on. The input contact is open, therefore, the analysis interval is on hold.

Red



The limit has been exceeded, however, the relay REL 1 has not yet been activated (suppression of the first measured value is active).

Flashing red



The predetermined limit value has been exceeded and the relay REL 1 has been activated.

During the analysis

Yellow



The display lights up permanently, thus indicating a started analysis.

Flashing yellow



The display flashes to indicate that the analysis interval has expired, however, the start of analysis is blocked via the inlet contact IN (flow meter function).

Flashing yellow + red



The yellow LED flashes, signalling that no analyses are started automatically. The device was programmed in such a way that an analysis stops after a limit value is exceeded. At the same time, the red display "analysis result" lights up (see sense switches S4 and S5).

Rapidly flashing yellow



The display flashes at a high frequency and indicates that the start of the analysis is delayed, for example, to cool down the sample water before sampling.

► Meanwhile, the relay REL 3 is activated.

Operation and control

Alarms for limit - exceedance

Flashing red + flashing red



Analysis result (red-flashing) and simultaneous alarm report (red-flashing): the display flashes and indicates that the specified limit value is exceeded.

▶ The relay REL 1 "Exceedance of limit value" is activated.

Flashing red + flashing yellow + flashing red



The yellow LED is flashing and indicates that no analyses will be started automatically. The device is programmed in that way that an analysis stop will happen after the limit value has been exceeded. At the same time the red display „analysis result“ is glowing (see program switch S4 and S5).

▶ The relay REL 1 "Exceedance of limit value" is activated.

Flashing red + red



Analysis results (red-flashing) and simultaneous alarm report (red lights up): the display lights up permanently and indicates that the predetermined limit value is exceeded in conjunction with the flashing red display "analysis result".

▶ The relay REL 1 "exceedance of limit value" is deactivated if the RESET button is pressed or a pulse control of the inlet contact takes place.

Flashing red + flashing yellow + red



Analysis results (red-flashing) and simultaneous alarm report (red lights up): the display lights up permanently and indicates that the predetermined limit value is exceeded in conjunction with the flashing red display "analysis result".

▶ The relay REL 1 "exceedance of limit value" is deactivated if the RESET button is pressed after an activated analysis stop or a pulse control of the inlet contact takes place.

Red + flashing yellow



The limit value has been exceeded, but the relay REL 1 is not activated (suppression of the first measured value – the analysis will be repeated after 4 minutes).

Operation and control

Notes on reagent

Blue



The display lights up permanently, signalling that the reagent stock is less than about 30%. The remaining quantity allows an operation for the next 72 hours with the set analysis interval.

- ▶ Provide a new reagent.

Flashing blue + flashing red



The BOB-alarm is active. The display indicates a fill level of reagent, which could no longer be sufficient for an unsupervised operation (BOB) for over 72 hours.

- ▶ The relay REL 2 "Fault" is **deactivated**.



To acknowledge the BOB-alarm, press the RESET button.

Flashing blue + red



The display indicates a fill level of reagent, which could no longer be sufficient for an unsupervised operation for over 72 hours.

- ▶ The BOB-message has already been acknowledged.
- ▶ The relay REL 2 "Fault" was **activated**.

Device fault

Flashing red



The display indicates a device fault:

- ▶ Incorrect zero sample or faulty measurement
- ▶ All other indicators are switched off.
- ▶ The relay REL 2 "Fault" is **activated**.



To acknowledge the device fault, press the RESET button or turn the power off and on again.

Red



The display indicates a device fault:

- ▶ Incorrect zero sample or faulty measurement
- ▶ All other indicators are switched off.
- ▶ The relay REL 2 "Fault" is **deactivated**.

Operation and control

Display of the calculated fill level

After turning on the analyser Sycon 2502, the calculated fill level is displayed for 1 second:



Immediately after resetting the reagent counter:
More than 5000 analyses are possible.



Fill level 100 % to 75 %:
More than 3750 analyses are possible.



Fill level 75 % to 50 %:
More than 2500 analyses are possible.



Fill level 50 % to 25 %:
More than 1250 analyses are possible.



Fill level 25 % to 0 %:
Less than 1250 analyses are possible until the reagent bottle has to be exchanged.

Maintenance and service

To ensure long-term and trouble-free operation of the analyser Sycon 2502, it is necessary to clean the measuring chamber and replace wear parts. Therefore, we recommend a weekly visual inspection of the device and a maintenance at intervals of 6 months.



Maintenance can be carried out in a simple manner. We recommend that you have the maintenance carried out by a trained professional. In any case, please pay attention to the following safety instructions.



Perform the maintenance works ideally in conjunction with the maintenance of the treatment plant or during a pause in operation.



Turn off the device before maintenance by pressing the power button.



An opening of the control is not required.



If the lid of the controller has been opened, the terminals 1 - 8 and 9 - 17 can be supplied with 230 volts depending on the wiring.

A contact may have serious consequences:

- ▶ Threat to life
- ▶ Danger of injury
- ▶ Damage to the device due to improper handling



During the maintenance, no analyses are carried out, and thus a possible hardness breakthrough cannot be detected.



Close the inlet valve to the analyser before working on the hydraulic system.

- ▶ Water spray could damage the electronics.



Make sure that your eyes, your skin and your clothes do not come into contact with the reagent.

- ▶ Follow the instructions in the safety data sheets.
- ▶ During maintenance works, appropriate protective clothing is required:
 - Work clothes
 - Laboratory gloves
 - Eye protection

Maintenance and service

Maintenance

Requirements

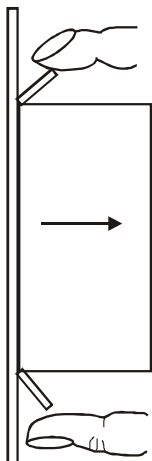
Time:	approx. 30 minutes
Material:	Maintenance kit for Sycon 2500/2501/2502 Cleaning kit Sycon Clean Paper towels
Tools:	Screwdriver Bowl or small bucket



Always turn off the device before beginning with the maintenance.

Change cartridge for the peristaltic pump

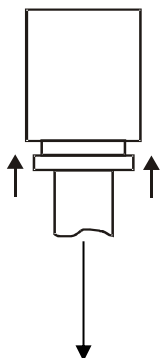
To ensure the measuring accuracy of the analyser Sycon 2502, the cartridge for the peristaltic pump should be replaced after 6 months.



- ▶ Squeeze the locking latches together with your thumb and forefinger and pull out the cartridge to the right from the motor shaft.
- ▶ Undo the bayonet catch of the LUER connectors.
- ▶ Pull up the fixing pins of the reagent plug and remove the plug.
- ▶ Replace the blue O-ring of the reagent plug.
- ▶ Insert the dosing plug into the measuring chamber and secure it with the fixing pins.
- ▶ If reagent fluid leaks out, remove it with a paper towel.
- ▶ Insert a new cartridge in the reverse order.
- ▶ Bleed pump: Turn on the device and press the INDICATOR button until the peristaltic pump pumps the reagent into the measuring chamber without bubbles.

Maintenance and service

Cleaning the measuring chamber



- ▶ Depressurise the inlet pipe.
 - Close the manual valve to the processing plant.
 - Switch on the device briefly.
 - Press the VALVE button. By opening the solenoid valve, the supply line is declamped.
- ▶ Hold a small container under the inlet.
- ▶ Press the black ring of the connector upwards and pull the inlet hose.
 - Press the VALVE button. By opening the solenoid valve, the measuring chamber is completely emptied.
 - Let the leaking water run into a vessel.
 - **Switch off the device again.**
- ▶ Pull the 7 safety pins out of the measuring chamber by about 8 mm, until you feel a slight resistance.
 - Attention: Do not remove the safety pins completely from the measuring chamber.
 - Pull the 4 black plug connections from the measuring chamber - possibly with cautious support of a screwdriver.
- ▶ Pull the measuring chamber from the retaining bolts.
 - Put the measuring chamber in the cleaning liquid "Sycon Clean" for at least 10 minutes.
 - Clean the measuring chamber under running water with the brush of the cleaning kit.
- ▶ Clean the plug-in connections and the LED actuator plug.
- ▶ Replace the measuring chamber in reverse order again.
- ▶ Replace wear parts by the parts supplied in the maintenance kit.
- ▶ Roll the O-rings carefully onto the first groove of the plugs during assembly.

Maintenance and service

Replacement of components

Follow the applicable accident prevention regulations.

The device and the lead to the device must be disconnected and secured against reconnection.

Wear appropriate protective equipment to avoid skin contact with the reagent.

Shut off the water inlet before beginning the works.

Replace solenoid valve

- ▶ Shut off the inlet and drain the measuring chamber.
- ▶ Undo the electrical connection.
- ▶ Remove the inlet plug from the measuring chamber.
- ▶ Undo the connection on the inlet side of the valve.
- ▶ Install the new valve in the reverse order.

Replace motor for stirring unit

- ▶ Disconnect the device from the mains and open the lid.
- ▶ Undo the ribbon cable to the drive.
- ▶ Undo the mounting bolts of the drive.
- ▶ Install the drive in reverse order.

Replacing the motor for peristaltic pump

- ▶ Switch the device to zero potential and open the lid of the controller.
- ▶ Disconnect the cartridge for peristaltic pump.
- ▶ Undo the mounting bolts of the peristaltic pump.
- ▶ Disconnect the connector of the motor.
- ▶ Install the new pump in the reverse order.

Maintenance and service

Diagnostic functions

The diagnostic program is used to control the device features.

This test may only be called up by qualified persons. Please observe the following safety instructions!

-  Note the positions of the program switches before the diagnosis and switch all the program switches back to the original position after the conducted diagnostic program.
-  Use the service booklet to take note of your settings.

The test must be carried out with the lid open. Here, all buttons and switches are operated.



- If the lid of the control is opened:
- ▶ The terminals can be connected depending on the wiring with mains voltage.
 - ▶ A contact can cause serious injury.
 - ▶ Risk of death!
 - ▶ The device can be damaged due to improper handling.

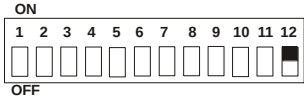


The activation of the relay REL 1 to REL 3 may lead to desirruption in operation.



Note that the supply line is pressurised.
Avoid splashing water that may spill into the open electronics and destroy them.

The switch S12 is switched to the ON position. Subsequently, the diagnostic functions described below can be called up in sequence. The device is in diagnostic step 1 at the beginning.

S12		Function
		ON
		Diagnostic program
		Each time you press the START button, the program will switch to the next diagnostic step.



Maintenance and service

Checking the LED-displays

After turning on the device, diagnostic step 1 begins. The LEDs light up in sequence.



Fallen short of limit



Limit exceeded



Analysis active



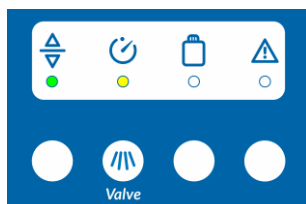
Lack of reagent



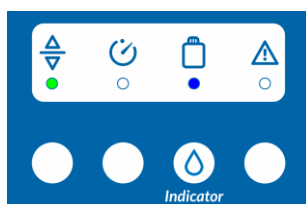
Device error

Checking the buttons

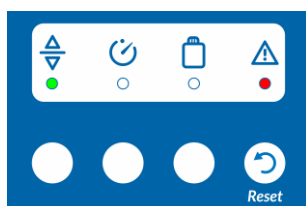
After the 1st operation of the START button, the buttons are checked. Pressing the following buttons will light up the following LEDs:



VALVE button



INDICATOR button



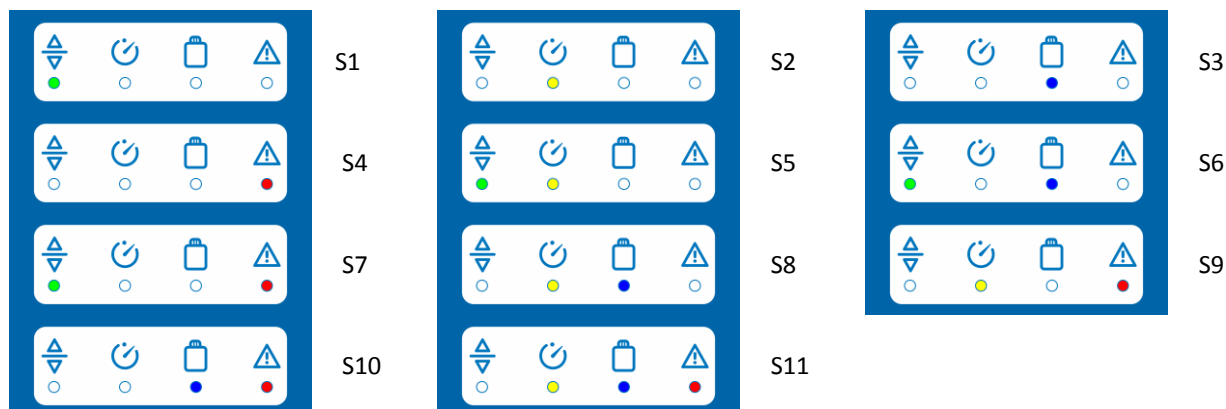
RESET button

Maintenance and service

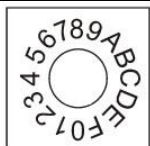
Check the program switches

After the 2nd operation of the START button, the program switches are checked.

A combination of the LED indicators is assigned to each of the program switches S1 - S11:

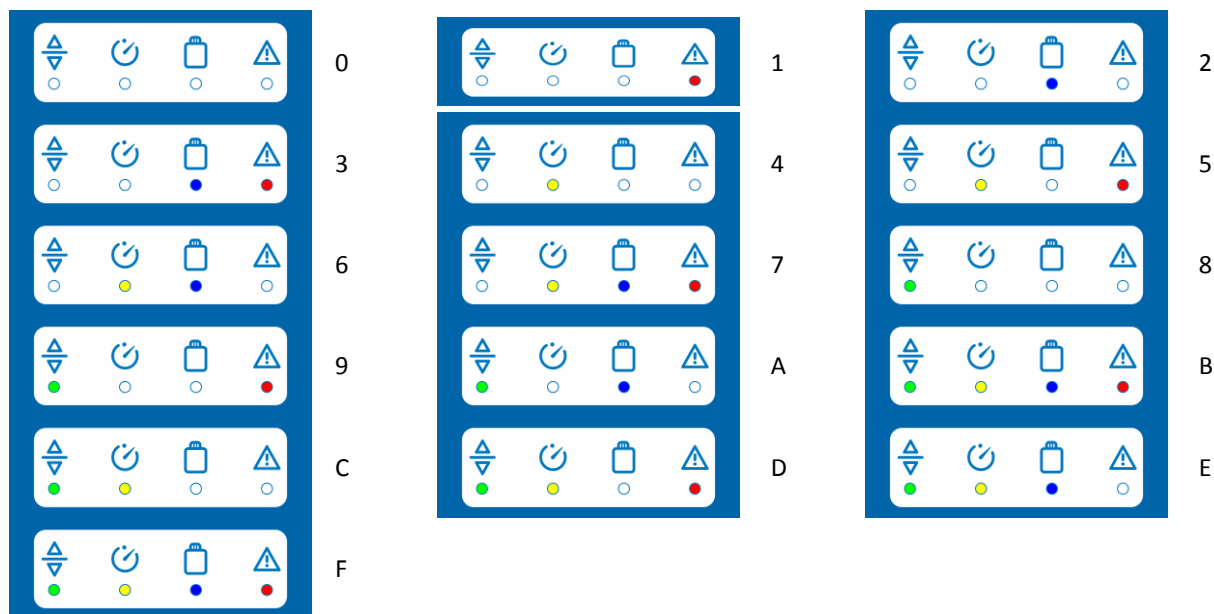


Check the rotary switch for the flush duration (flush time)



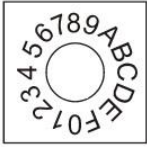
After the 3rd operation of the START button, the rotary switch "flushing duration" is checked.

- ▶ Turn the switch in succession to the 16 positions from 0 to F. In each position a LED combination is displayed according to the HEX code.
- ▶ 16 positions of rotary switch
 - Green = 8
 - Yellow = 4
 - Blue = 2
 - Red = 1



Maintenance and service

Check the rotary switch for the delay time



After the 4th operation of the START button, the rotary switch "delay" is checked.

- ▶ Turn the switch in succession to the 16 positions from 0 to F. In each position a LED combination is displayed according to the HEX code.
- ▶ 16 positions of rotary switch
 - Green = 8
 - Yellow = 4
 - Blue = 2
 - Red = 1

The LED indicators of the rotary switch positions are identical to the displays from the previous test.

Check the relay REL 1



After the 5th operation of the START button, the relay REL 1 is checked.

- ▶ The red LED flashes, REL 1 is switched on and off every second.
- ▶ Check the function of the relay on the terminals depending on the wiring with a continuity tester or a voltmeter.
- ▶ Terminals 9/10/11

Check of relay REL 2



After the 6th operation of the START button, the relay REL 2 is checked.

- ▶ The green LED flashes, REL 2 is switched on and off every second.
- ▶ Check the function of the relay on the terminals depending on the wiring with a continuity tester or a voltmeter.
- ▶ Terminals 12/13/14

Check of relay REL 3



After the 7th operation of the START button, the relay REL 3 is checked.

- ▶ The green and the yellow LED flash, REL 3 is switched on and off every second.
- ▶ Check the function of the relay on the terminals depending on the wiring with a continuity tester or a voltmeter.
- ▶ Terminals 15/16/17

Maintenance and service

Check the inlet valve



After the 8th operation of the START button, the input solenoid valve is checked.

- ▶ The yellow LED flashes, and the valve is opened and closed every second.

Check the measurement LED (actuator)



After the 9th operation of the START button, the white actuator LED is checked.

- ▶ The blue LED flashes, and the measurement LED is switched on and off every second.

Check the peristaltic pump



After the 10th operation of the START button, the peristaltic pump is checked.

- ▶ The red LED flashes, and the peristaltic pump is switched on and off every second.

Check the stirring unit



After the 11th operation of the START button, the stirring unit is checked.

- ▶ The red and the blue LED flash, and the stirring unit is turned on.

Check the inlet contact IN

After the 12th operation of the START button, the input contact is checked.

- ▶ Connection terminals 18 / 19
- ▶ The inlet terminal is bridged to the contacts 18 and 19 and opened. The inlet contact can be checked on the display LEDs.



Inlet contact open

- ▶ no connection between terminals 18 and 19



Inlet contact bridged

- ▶ conductive connection between terminals 18 and 19

Maintenance and service

Measure zero value of the water sample



Please close the lid of the controller before you proceed with the next test steps, since the incidence of light on the sensor can affect the measurement.



This test step is necessary to determine the zero point of the sample for the following testing of detection of colours.

Please note that for the measurement, the switch positions of the sense switches S6, S7 and S8 are considered for the measurement parameters.

After the 13th operation of the START button, the zero value of the optical path is measured with a colourless water sample.



▶ The last 3 LEDs flash.

▶ For the testing of the measuring section, the measuring chamber must be filled with clear water. The VALVE button can be pressed to flush the measuring chamber.

Testing of the colour detection

After the 14th operation of the START button, the colour detection of the optical section is checked.



The first LED indicates whether the measured value falls below or exceeds the limit.



below the limit value



exceeds the limit value



▶ Use the INDICATOR button to dose reagent into the measuring chamber.

▶ Depending on the water hardness and dosed amount of reagent, you will get a colour change, for example for the total hardness from red to green.

▶ The transition point is not a measure of the water hardness, since an undefined amount of reagent is dosed.

▶ The positions of the program switches S6 - S9 are considered in the analysis.

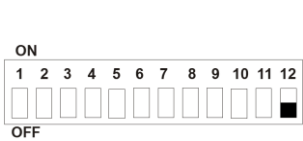


▶ The reagent can be flushed out of the measuring chamber with the VALVE button.

Maintenance and service

End diagnostic program

After checking the device functions, turn the program switch S12 back to the OFF position = analysis operation.



S12	Function
OFF	End diagnostics program / analysis operation

Close the lid of the controller.



Reset all program switches to the original position after the conducted diagnostic program, respectively according to the local operating conditions.

Fault clearance

After switching on the device, no LEDS light up on the device

Cause	Measure
The mains voltage is not connected properly or not turned on.	Check the power supply / electrical connections. Switch on the device.
The ribbon cable between control panel and main board is not plugged.	Check the ribbon cable.
The fuse on the main board is defective.	Check the fuse.

The device is permeable.

Cause	Measure
An O-ring on one of the connection plugs of the measuring chamber is missing.	Check the O-rings of the plugs on the measuring chamber.
The water pressure is outside the specification.	Check the water pressure and install a pressure reducer or a throttle.
A connection plug is not properly inserted into the measuring chamber.	Check the tightness of the connection plugs and the locking of the plugs.
A connection plug / O-ring is defective.	Check the connection plugs and the O-rings.

No analyses are started

Cause	Measure
The reagent is used up, or the reagent counter has not been reset after changing bottle.	Check the fill level of the reagent bottle.
The inlet contact is in the "flow meter" mode, and the inlet contacts are not bridged.	Check whether the inlet contact is properly configured and connected.

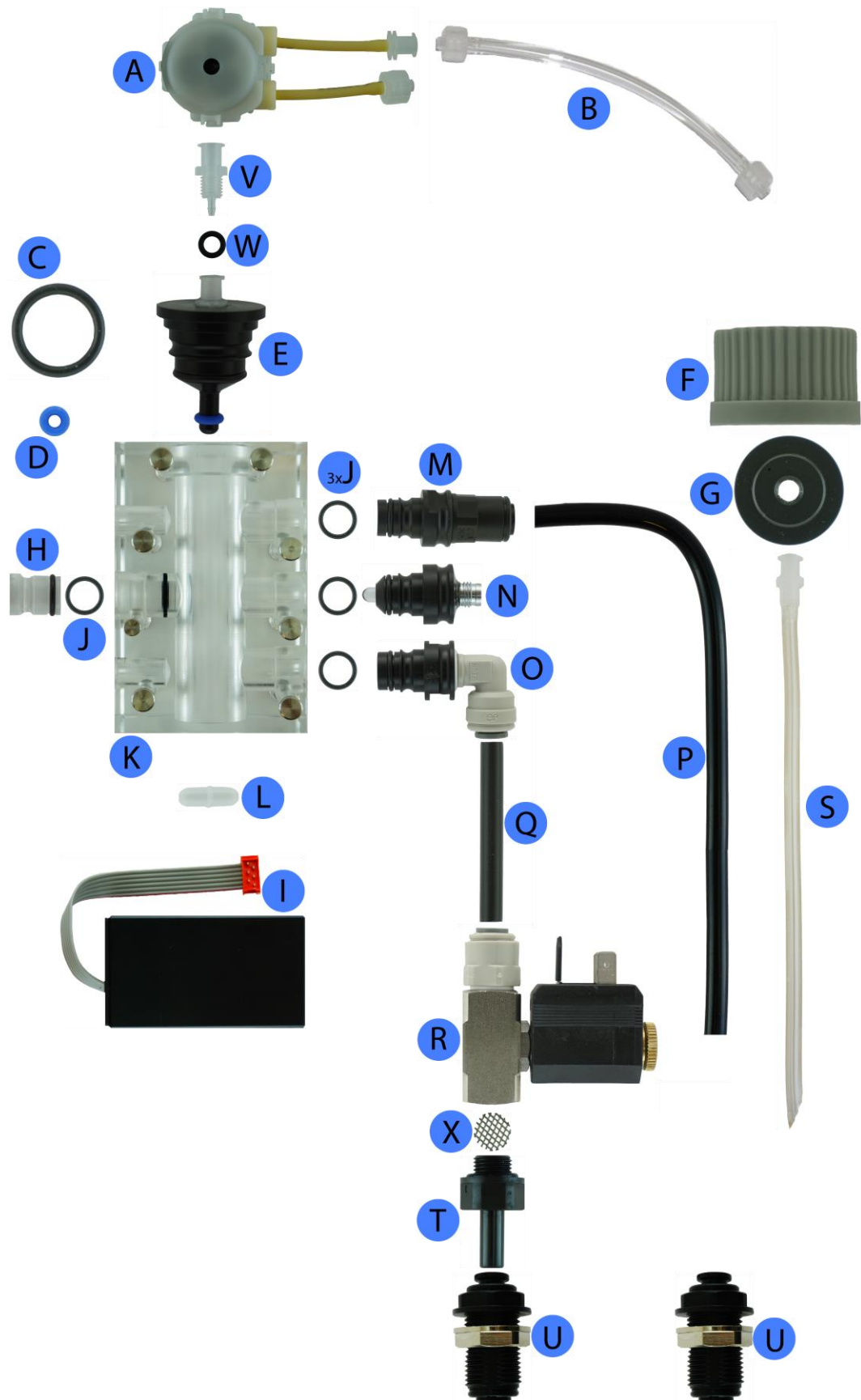
Error in the zero sample

Cause	Measure
The reagent is used up, or the reagent counter has not been reset after changing bottle.	▶ Insert a new reagent bottle. ▶ Reset the fill level counter.
The reagent is not dissolved.	Check whether a magnetic stirrer is located in the measuring chamber.
No reagent is dosed.	Check the dosing pump using the diagnostic program and check the electrical connection inside the device.

Incorrect measured value

Cause	Measure
The reagent is not dissolved.	▶ Check whether a magnetic stirrer is located in the measuring chamber. ▶ Run the diagnostic program.
No reagent is dosed or too little reagent is dosed.	▶ Check the function of the dosing pump. ▶ Clean the motor shaft. ▶ Replace the cartridge for peristaltic pump.
An incorrect reagent is used, or the reagent has expired.	▶ Insert a new reagent bottle. ▶ Reset the fill level counter.
The blue O-ring on the dosing plug is missing or defective.	Replace the O-ring.
Water permanently runs through the drain.	Remove foreign bodies from the solenoid valve so that it closes properly.
The sample water contains high levels of iron or other chemicals that interfere with the measurement.	Examine the water of the system regarding the compliance with the device specifications.

Spare parts



Spare parts

Item	Article name	Article number
A	Cartridge for peristaltic pump Sycon 2500/2501/2502	33-090 038
B	Bottle connector	33-090 008
C	O-ring 16 x 2	33-090 217
D	O-ring 3.2 x 2.5	33-090 218
E	Dosing plug including pos. C, D, V, W	33-090 716
F	Screw cap	33-093 060
G	Bottle adapter	33-090 009
H	Light rod plug for measuring chamber including pos. J	33-090 719
I	Stirring unit	33-090 056
J	O-ring 9 x 1.5	33-090 210
K	Measuring chamber incl. position H	33-090 731
L	Magnetic stirrer	33-090 002
M	Drain plug 6 mm including pos. J	33-090 712
N	Actuator plug LED including pos. J	33-090 713
O	Inlet plug ¼" including pos. J	33-090 711
P	Drain connection 6 mm	33-090 015
Q	Inlet connection ¼ "	33-090 013
R	Solenoid valve with connections including pos. X	33-090 014
S	Suction lance	33-090 011
T	Screw neck 6 mm for solenoid valve	33-091 003
U	Bulkhead fitting 6 mm	33-090 016
V	Connector for peristaltic pump	33-090 414
W	O-ring 5.28 x 1.78	33-090 215
X	Sieve	33-090 132

Article name	Article number
Measuring chamber including plugs (H, E, M, N, O, L)	33-090 700
Display board 2502	33-090 098
Main board Sycon 2502	33-090 093
Cartridge for peristaltic pump with motor	33-090 226

Accessories and reagents

Accessories

Article name	Article number	Remark
Housing	33-099 005	Additional housing for protection against dirt and dust
Pressure reducer / throttle	33-090 730	For an inlet pressure greater than 2 bar
PC 200	30-015 100	Small pre-cooler
PC 400	30-015 200	Large pre-cooler
Maintenance kit Sycon 2502	33-090 028	Spare parts kit for the semi-annual maintenance, including cartridge for peristaltic pump
Sycon Clean	30-010 900	Cleaning kit for measuring chambers - including FIT 3000 (1000 ml) and cleaning accessories
FIT 3000 (1000 ml)	32-089 100	Cleaner for measuring chambers

Reagents for monitoring the total hardness ^(A)

Article name	Single bottle (500 ml)	Economy pack (4x 500 ml)	°dH	°f	°e	ppm (CaCO ₃)	mmol/l
H25 - 0,02	32-084 115	32-484 115	0.02	0.036	0.03	0.36	0.004
H25 - 0,05	32-084 125	32-484 125	0.05	0.089	0.06	0.89	0.009
H25 - 0,1	32-084 135	32-484 135	0.1	0.178	0.13	1.78	0.018
H25 - 0,2	32-084 145	32-484 145	0.2	0.356	0.25	3.56	0.036
H25 - 0,3	32-084 155	32-484 155	0.3	0.534	0.38	5.34	0.053
H25 - 0,5	32-084 165	32-484 165	0.5	0.89	0.63	8.90	0.089
H25 - 1	32-084 175	32-484 175	1	1.78	1.25	17.8	0.178
H25 - 2	32-084 185	32-484 185	2	3.56	2.50	35.6	0.357
H25 - 3	32-084 195	32-484 195	3	5.34	3.76	53.4	0.535
H25 - 5	32-084 205	32-484 205	5	8.9	6.3	89	0.89

Reagents for monitoring the carbonate hardness ^(A)

Article name	Single bottle (500 ml)	Economy pack (4x 500 ml)	°dH	°f	°e	ppm (CaCO ₃)	mmol/l
C25-1	32-086 125	32-486 125	1	1.78	1.25	17.8	0.357
C25-1,5	32-086 125	32-486 125	1.5	2.67	1.87	26.7	0.535
C25-2	32-086 135	32-486 135	2	3.56	2.50	35.6	0.714
C25-3	32-086 145	32-486 145	3	5.34	3.76	53.4	1.071

^(A) The measuring device works with one-component reagents for different limit values. The reagents can be kept for 24 months if properly stored. The reagents can also be used in the analysers Sycon 2500, Sycon 2501 and Sycon 2800.



