

Operating manual SYCON 2502



Analyzer for automated monitoring
of parameters in process water

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Introduction

Thank you for purchasing a Sycon 2502 analyzer for online monitoring of water hardness.

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

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

Please read this manual carefully before operating the device.

We recommend that you always keep the manual close to the device during operation.

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

Under no circumstances will we be liable for damage caused by operating errors or failure to follow the instructions in this manual.

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

On our website www.rls-wacon.de you will always find the latest version of our documentation.



The Sycon 2502 analyzer automatically detects hardness breakthroughs in a water treatment plant and issues a message when the limit value is exceeded. This message can be used, for example, to trigger a regeneration of the softening plant.



The Sycon 2502 analyzer is not a device that prevents hardness breakthroughs.

Conversion for the units of water hardness

		°dH	°e	°fH	ppm	mval/l	mmol/l
German degrees	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 Alkaline earth ions	1 mval/l =	2,8	3,51	5	50	1	0,5
mmol/l Alkaline earth ions	1 mmol/l =	5,6	7,02	10	100	2	1

The unit 1 ppm is used here contrary to the actual literal sense in the sense of 1 mg/l CaCO₃.

Brief description

RLS Wacon offers with the Sycon 2502 analyzer a compact and very easy to use analyzer for automatic online monitoring of water treatment plants.

The measuring device works according to the principle of "limit value monitoring with color change" and provides all important functions for reliable field use.

The Sycon 2502 analyzer automatically performs water analyses at adjustable intervals to determine total hardness or carbonate hardness.

A limit value is set by the user on the basis of the type of indicator used. There are 10 indicators for monitoring total hardness and 4 indicators for monitoring carbonate hardness.

If the limit value is exceeded, the device outputs a message on a potential-free contact. This message can be further processed by a softening control. This allows functions such as automatic regeneration triggering to be implemented.

The Sycon 2502 analyzer is characterized by low maintenance costs. With an inserted 500 ml indicator bottle more than 5000 analyses can be performed. The input contact of the device can also be used to connect a flow monitor to the device. This means that the Sycon 2502 interrupts the analysis interval when the softener is not in operation and automatically resumes the analysis interval when the softener is started up again.

In order to prevent interference from the counterion effect, a first value suppression can be switched on. If the limit value is exceeded, this carries out a further control measurement before a hard water message is output.

For use as a monitoring device for condensate recovery, the Sycon 2502 analyzer has an additional relay for switching cooling water to a sample cooler.

More detailed and many more information about your new Sycon 2502 analyzer can be found in this manual.

Scope of delivery

The following items are included in the scope of delivery of a new device:

- Device on wall bracket without housing (optionally with housing)
- Hose connection (indicator connection set)
- Manual (this booklet)
- Starter Kit (optional)
 - Throttle
 - 4 screws Phillips PHx
 - 4 dowels
 - Phase tester

Arbeitsschutzgesetz

§§

Unfallverhütungs-
vorschriften

der

Berufs-
genossenschaften

Betriebsanleitung



This manual describes the installation as well as the operation of the online analyzer Sycon 2502 for automatic limit value monitoring of water hardness concentration. Installation and commissioning must only be carried out by an authorized specialist

The device may only be operated under the conditions described in this manual. The device may only be used for the specified purpose. When installing and operating the analyzer, all locally applicable regulations (such as EN, DIN, VDE, UVV) must be observed.

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

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

The connecting cables to the unit should be kept as short as possible and should not be laid together with power cables or in their immediate vicinity. In the vicinity of strong electromagnetic radiators, the analysis may be disturbed, in this case separate interference suppression measures must be taken, in particular the EMC directives must be observed.

It is recommended that you always have access to the analyzer when familiarizing yourself with this manual in order to be able to immediately understand the explained relationships and functions. Since certain areas build on each other, it is useful to work through the chapters in the order given.

If problems or questions should arise during the operation of the analyzer, you will receive support from us at any time. Try to locate the problem as accurately as possible, or log the actions and conditions that cause the problem. This enables us to provide faster and more targeted assistance.

Safety instructions and symbols used

These operating instructions contain specific safety instructions and point out the unavoidable residual risks when operating the device. These residual risks include dangers for

- Persons
- Equipment / plants / machines
- Environment

The symbols used in the operating instructions are primarily intended to draw attention to the safety instructions.

The main objective of warnings is to prevent personal injury.

General notes

The respective symbol used cannot replace the text of the safety instructions. The text should therefore always be read in full.



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



This symbol indicates dangers for persons, products, systems and machines. A safety instruction with an exclamation mark indicates that hazards to persons, plant, machinery, materials and the environment cannot be excluded.



This symbol indicates electrical and electronic hazards. This work may only be carried out by personnel trained in electrical engineering. The locally applicable regulations must be observed.



This symbol indicates substances that are harmful to health or irritating. Please observe the information in the safety data sheets. Personal protective equipment must be worn in accordance with the information in the safety data sheets and the accident prevention regulations applicable on site.

Work on hydraulic and pneumatic systems



Maintenance and repair of hydraulic and pneumatic systems may only be carried out by qualified personnel.



Before maintenance and repair work, pneumatic and hydraulic systems must be depressurized.



Tube pump cassettes should be changed regularly during routine maintenance, even if no visible damage or wear is visible
(Observe manufacturer information).



Before restarting after maintenance or repair work:

- Check screw connections for tightness.
- Make sure that the plugs of the measuring chamber are secured with the locking pins.
- Ensure that all covers, strainers, filters and gaskets are reinstalled in the correct sequence.

General notes



After completing maintenance and repair work and before resuming operation of the system, make sure that you have observed the following instructions.

- Remove materials, tools and other equipment from the workplace that was needed to perform maintenance and repair work.
- Remove spilled liquids.
- Make sure that the safety devices of the system are working properly and are active again.

Transport and storage



The unit can be damaged by frost or high temperatures.

Use the original packaging or a sufficiently padded carton for transport.

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

When transporting and storing already used instruments, the measuring chamber and hoses must first be emptied to avoid frost damage.

Performance features

Fully automatic

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

Intelligent and self-sufficient

The device does not need to be calibrated. Thanks to the integrated measuring technology and a two-stage analysis sequence with zero-point measurement, external measurement influences caused by contamination of the measuring chamber, turbidity of the sample and extraneous light influences are detected and eliminated during the evaluation of the analysis.
The maintenance-free full color sensor is one of the central components for the self-sufficient operation of the device.

Selectable interval time

The interval time between two measurements is adjustable 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 when the plant is at a standstill.

Self-calibrating

Hardness breakthroughs are reliably detected by the use of limit value indicators. You select the indicator to match your limit value. No further configuration or calibration is necessary.

Very high accuracy

After a bad measurement, a reference measurement can be performed at intervals of 4 minutes to evaluate the result. This prevents false alarms due to the counter ion effect.

Extensive alarm functions

If a limit value is exceeded, an alarm is issued by a potential-free relay switching. This alarm output can be connected to a control room for signaling or used to operate a horn, close a valve or control a program for regeneration of a softening plant.

Performance features

Diagnostic program

If technical problems occur on the device, a fault message is output by a potential-free relay switching. The detailed diagnostic program guides you step by step through all functions in an easy to understand manner. Thus, the device is carefully checked and the cause of the error message is clearly identified.

Minimum maintenance effort

Depending on the set measuring interval or the frequency of the measurements, the measuring chamber must be cleaned. The indicator hoses and sealing rings typically only need to be replaced once or twice a year.
No additional tools are required for maintenance. It can be carried out very easily.

Efficient indicator consumption

The indicator bottle is easy to replace. A 500 ml bottle allows over 5000 analyses.

Compact design

The unit is simply suspended from a wall or supporting structure. Installation and commissioning are a simple process.

Digital input "Start/Stop Input"

For example, the potential-free switch of a flow monitor, a time switch or any other status switch can be connected to this input. When the contact is open, no analyses are performed at the programmed interval.
Alternatively, this input can be used as start input for analyses.

Three potential-free relay outputs

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

BOB operation

The abbreviation BOB stands for "operation without supervision", as it is mentioned in the special regulations of the TÜV for steam boiler houses. The Sycon 2502 analyzer indicates whether there is a sufficient supply of indicator for at least the next 72 hours.

Specifications

General specifications of the 24 V AC/DC version

24 V AC/DC Version

Parameters	Value / Range	
Power supply (24 V version)	21.6 - 26.4 VDC	
	21.6 - 26.4 VAC (50 Hz)	
Power consumption	25 VA (in operation)	3.5 VA (Standby)
Resilience	Load capacity of the relays with internal power supply 1 A from terminals 5 to 8	
	Load capacity of the relays with external power supply 2.5 A per relay.	
	Connection terminals 9 to 17	
Protection class	open wall mounting	IP43mounting
	in housing	IP54
Storage temperature	0 °C - 45 °C	
Ambient temperature	10 °C - 45 °C	
Sample water temperature	5 °C - 40 °C	
Air humidity	20 - 90 % RF (without ice or condensation water)	
Pressure inlet water	min: 0.5 bar - max: 5 bar / recommended 1 - 2 bar	
General inlet water	clear, colorless, solids-free, without gas bubbles	
Water quality requirements for measuring water hardness	pH:	4 - 10
	Iron:	< 3 ppm
	Copper:	< 0,2 ppm
	Aluminum:	< 0,1 ppm
	Manganese:	< 0,2 ppm
	Acid capacity:	KS 4.3 < 5 mmol/l

Specifications

General specifications of the 230 VAC version

230 VAC Version

Parameters	Value / Range	
Power supply (230 V version)	85 - 305 VAC (47...440 Hz)	
Power consumption	25 VA (in operation)	3.5 VA (Standby)
Resilience	Load capacity of the relays with internal power supply 1 A from terminals 5 to 8	
	Load capacity of the relays with external power supply 2.5 A per relay. Connection terminals 9 to 17	
Protection class	open wall mounting in housing	IP43mounting IP54
Storage temperature	0 °C - 45 °C	
Ambient temperature	10 °C - 45 °C	
Sample water temperature	5 °C - 40 °C	
Air humidity	20 - 90 % RF (without ice or condensation water)	
Pressure inlet water	min: 0.5 bar - max: 5 bar / recommended 1 - 2 bar	
General inlet water	clear, colorless, solids-free, without gas bubbles	
Water quality requirements for measuring water hardness	pH:	4 - 10
	Iron:	< 3 ppm
	Copper:	< 0,2 ppm
	Aluminum:	< 0,1 ppm
	Manganese:	< 0,2 ppm
	Acid capacity:	KS 4.3 < 5 mmol/l

Signal input and outputs of the 24 V AC/DC and 230 VAC version

24 V AC/DC and 230 VAC Version

Parameters	Value / Range
3 relay outputs	<p>Load capacity of the relays with internal power supply 1 A from terminals 5 to 8</p> <p>Load capacity of the relays with external power supply 2.5 A per relay.</p> <p>Connection terminals 9 to 17</p> <p>as potential-free outputs NC/NO</p> <p>The relays provide the following functions:</p> <ul style="list-style-type: none">• Limit value alarm• Device error or indicator message• Analysis active with switchable analysis delay time
Signal input "Start/Stop Input"	<p>galvanically isolated contact input</p> <ul style="list-style-type: none">• Start analysis• Flow monitors

Specifications

Technical data


Parameters	Value / Range
Installation	wall mounting in closed rooms
Dimensions	without housing: 274 x 275 x 129 mm (W x H x D)
	with housing: 332 x 345 x 190 mm (W x H x D)
Weight	without housing: approx. 1,9 kg
	with housing: approx. 3,8 kg

Analysis properties

Parameters	Value / Range																																
Measuring principle	Colorimetric method																																
The limit value alarm is defined by the indicator used	<ul style="list-style-type: none">• <u>Total hardness limit indicators:</u><table><thead><tr><th>Indicator</th><th>Limit value</th></tr></thead><tbody><tr><td>H25 - 0.02 °dH</td><td>0.02 °dH</td></tr><tr><td>H25 - 0.05 °dH</td><td>0,05 °dH</td></tr><tr><td>H25 - 0,1 °dH</td><td>0,1 °dH</td></tr><tr><td>H25 - 0.2 °dH</td><td>0,2 °dH</td></tr><tr><td>H25 - 0.3 °dH</td><td>0,3 °dH</td></tr><tr><td>H25 - 0,5 °dH</td><td>0,5 °dH</td></tr><tr><td>H25 - 1 °dH</td><td>1 °dH</td></tr><tr><td>H25 - 2 °dH</td><td>2 °dH</td></tr><tr><td>H25 - 3 °dH</td><td>3 °dH</td></tr><tr><td>H25 - 5 °dH</td><td>5 °dH</td></tr></tbody></table>• <u>Carbonate hardness limit indicators:</u><table><thead><tr><th>Indicator</th><th>Limit value</th></tr></thead><tbody><tr><td>C25 - 1 °dH</td><td>1 °dH</td></tr><tr><td>C25 - 1.5 °dH</td><td>1.5 °dH</td></tr><tr><td>C25 - 2 °dH</td><td>2 °dH</td></tr><tr><td>C25 - 3 °dH</td><td>3 °dH</td></tr></tbody></table>	Indicator	Limit value	H25 - 0.02 °dH	0.02 °dH	H25 - 0.05 °dH	0,05 °dH	H25 - 0,1 °dH	0,1 °dH	H25 - 0.2 °dH	0,2 °dH	H25 - 0.3 °dH	0,3 °dH	H25 - 0,5 °dH	0,5 °dH	H25 - 1 °dH	1 °dH	H25 - 2 °dH	2 °dH	H25 - 3 °dH	3 °dH	H25 - 5 °dH	5 °dH	Indicator	Limit value	C25 - 1 °dH	1 °dH	C25 - 1.5 °dH	1.5 °dH	C25 - 2 °dH	2 °dH	C25 - 3 °dH	3 °dH
Indicator	Limit value																																
H25 - 0.02 °dH	0.02 °dH																																
H25 - 0.05 °dH	0,05 °dH																																
H25 - 0,1 °dH	0,1 °dH																																
H25 - 0.2 °dH	0,2 °dH																																
H25 - 0.3 °dH	0,3 °dH																																
H25 - 0,5 °dH	0,5 °dH																																
H25 - 1 °dH	1 °dH																																
H25 - 2 °dH	2 °dH																																
H25 - 3 °dH	3 °dH																																
H25 - 5 °dH	5 °dH																																
Indicator	Limit value																																
C25 - 1 °dH	1 °dH																																
C25 - 1.5 °dH	1.5 °dH																																
C25 - 2 °dH	2 °dH																																
C25 - 3 °dH	3 °dH																																
(See page 68 more information)																																	
Indicator consumption	<ul style="list-style-type: none">• < 0.10 ml / analysis• At least 5000 analyses per 500 ml indicator bottle																																
Accuracy	Measurement accuracy: <ul style="list-style-type: none">• ± 10 % of the limit value of the indicator used																																
Durability of the indicators	24 months from date of manufacture																																
Water consumption	<ul style="list-style-type: none">• Approx. 1000 ml / analysis• The water consumption varies depending on the inlet pressure and flushing time.																																

Specifications

Maintenance intervals

Interval	Maintenance
every 6 months	Cleaning the measuring chamber
	 In case of high ambient and water temperatures or water with high organic load, the cleaning intervals may have to be shortened.
every 30,000 analyses or after 2 years of operation	Clean the measuring chamber (as above), Installation Maintenance set: Replacement of the hose pump cassette and the seals

Further information can be found on pages 53 and 66

Installation requirements



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



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

The system to be monitored must meet the following conditions:

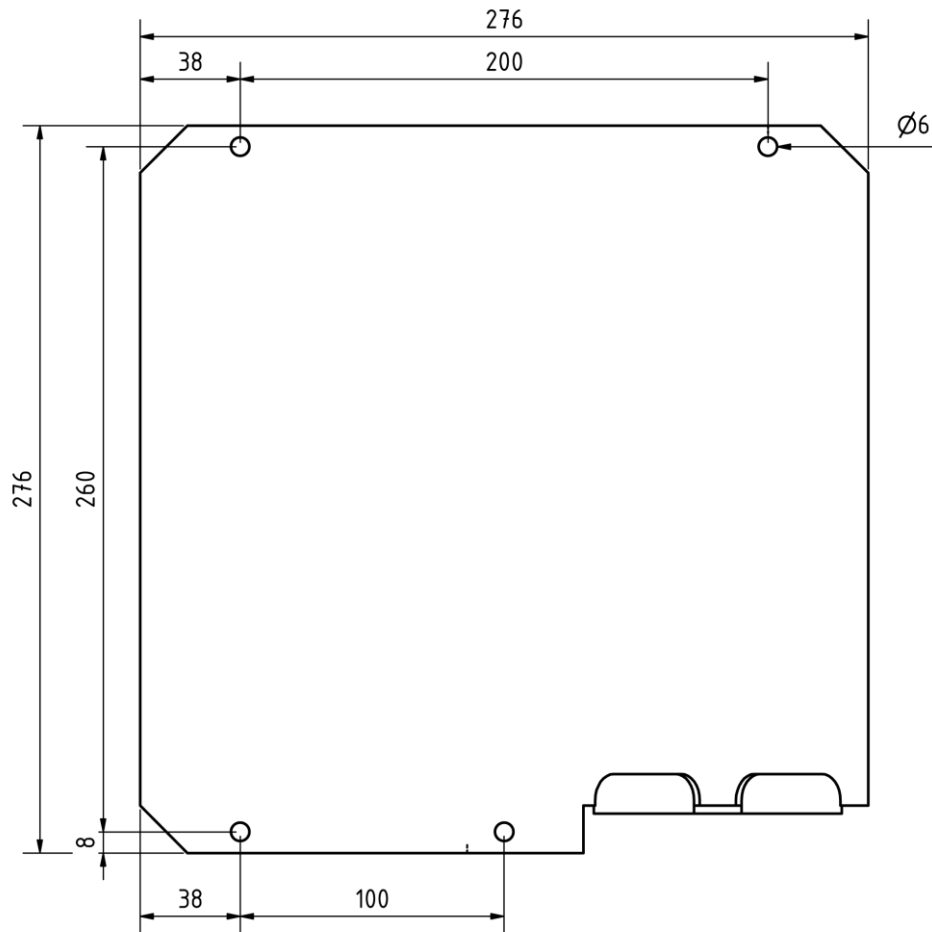
- The maximum permissible load capacity of the switching outputs and the total power of the system must not be exceeded by the connected load.
- All inductive loads (valves, motors, contactors, transformers) of the system must be equipped with suitable surge protection (e.g. RC element, varistor, diode, etc.).
- If there are external devices with a high mains interference level in the vicinity of the control unit, these must be reduced by means of suitable measures, or appropriate external interference suppression measures (mains filter) must be taken at the supply voltage input of the control unit.

Installation

Wall mounting without housing

The Sycon 2502 analyzer on wall bracket can be mounted directly. An additional housing is optionally available to protect against dirt and dust.

Sycon 2502 on wall mount



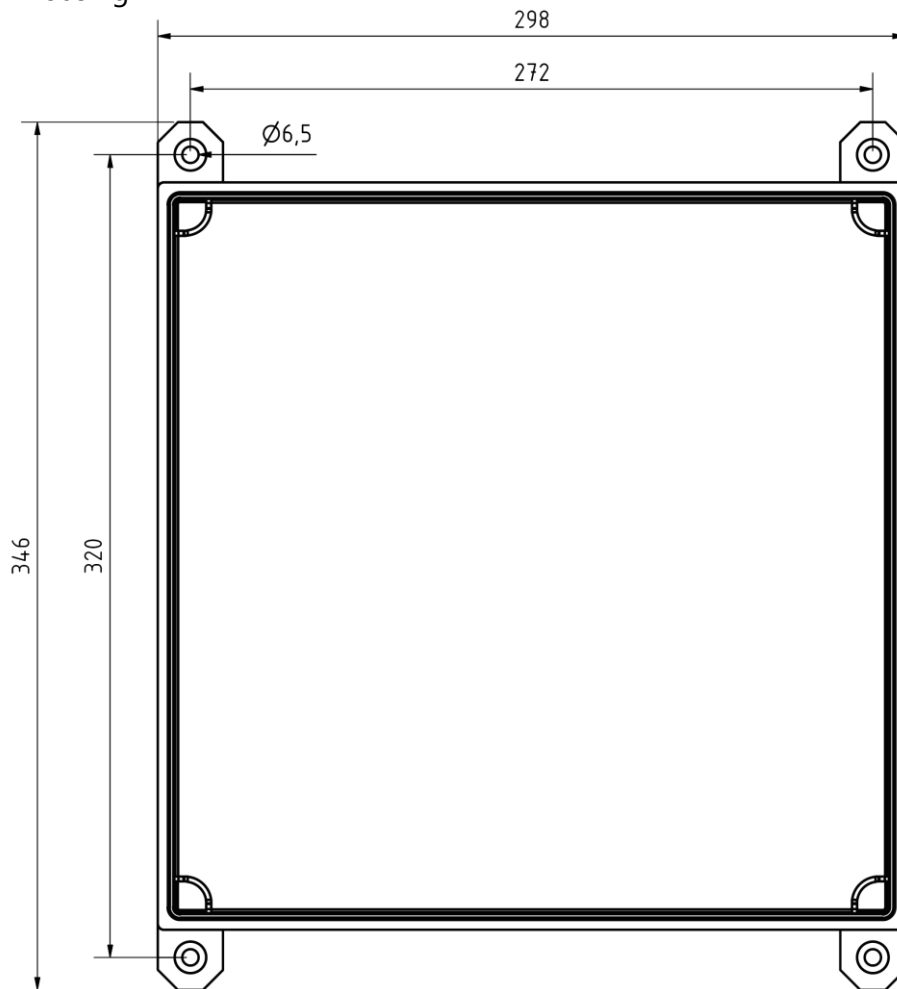
All figures are in mm.

The device is attached to a wall or suitable support structure with 4 screws (max. 6 mm).

Installation

Wall mounting with housing

Sycon 2502 in housing



All figures are in mm.

The device is mounted in the housing using the 4 brackets supplied. The tabs can be turned alternatively 45° or 90° outwards.

All figures are in mm.



Avoid direct sunlight and strong artificial light sources with both variants. If you do not take this into account, the following effects may occur:

- disturbance of the optical path in the measuring chamber
- Electromagnetic interference from artificial light sources



Do not install the analyzer under dripping lines.

Installation

Establish supply line to the test water and to the channel



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

A manual shut-off valve must be provided between the preparation plant and the analyzer. The water connection must be made according to EN 1717. The drain must lead into an open channel via a short connection. The drain line must remain unpressurized.



Make sure that the inlet and outlet are not mixed up. The inlet is located on the left side of the solenoid valve.

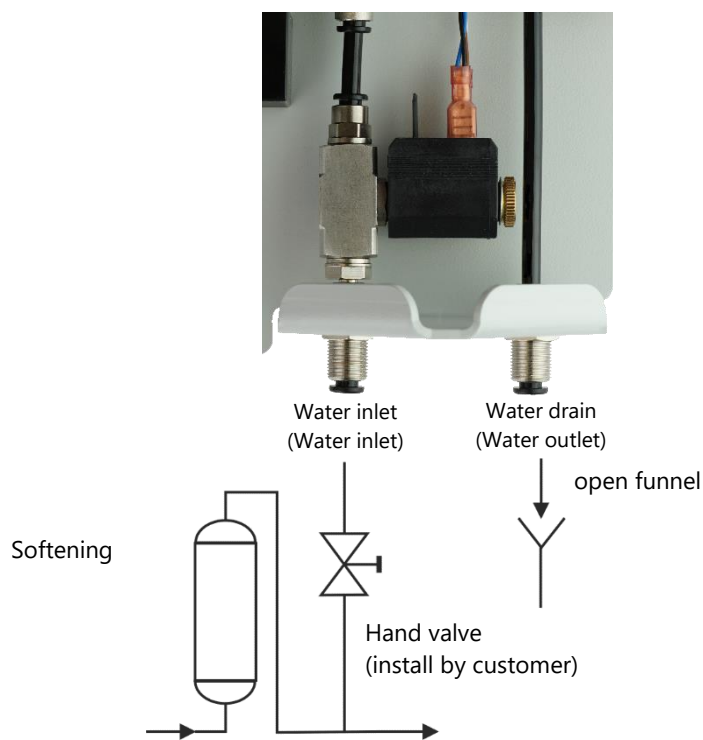


Figure: Connection of the water inlet and outlet



Print

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 drain must not be longer than 2 m and must lead vertically downwards. The system must be able to relax freely relative to atmospheric pressure. There must be no back pressure that is greater than the inlet pressure. The water is discharged without pressure into an open funnel or drain.

Device overview



Figure: Analyzer SYCON 2502 with installed indicator bottle

Position	Description
A	Control system
B	LED display
C	Control buttons
D	Cable bushing
E	On / Off switch
F	Dosing pump
G	Dosing plug (indicator plug)
H	Optical measuring section
I	Measuring chamber (The locking pins can only be pulled up and not out)
K	Stirrer (magnetic stirrer)
L	Drain plug
M	Actuator plug LED
N	Inlet plug
O	Solenoid valve (concealed behind the indicator bottle)
P	Wall Mount
Q	Indicator bottle 500 ml
R	Water inlet / sample water (plug connection for plastic hoses with 6 mm outer diameter)
S	Water drain (plug-in connection for plastic hoses with 6 mm outer diameter)

Device overview

Displays and operating front

On the front of the Sycon 2502 analyzer there are 4 LEDs to indicate the operating status and 4 keys to operate the device.



The LED display indicates the operating status:

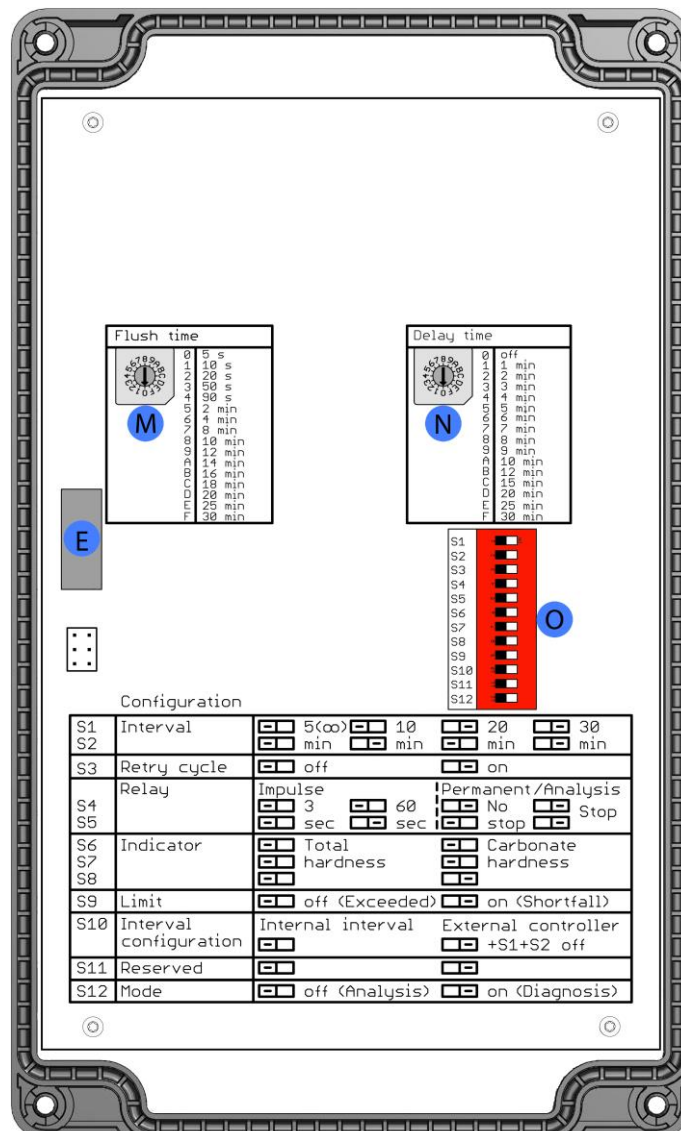
LED	Color	Information
A	Green	Limit value undershot
A	Red	Limit value exceeded
B	Yellow	Analysis active
B	Blinking yellow	Input contact open, e.g. by flow monitor
C	Blue	provide indicator
C	Flashing blue	BOB message
D	Red	Device fault

Further information can be found from pages 33 and 48.

Device overview

Overview of the configuration elements

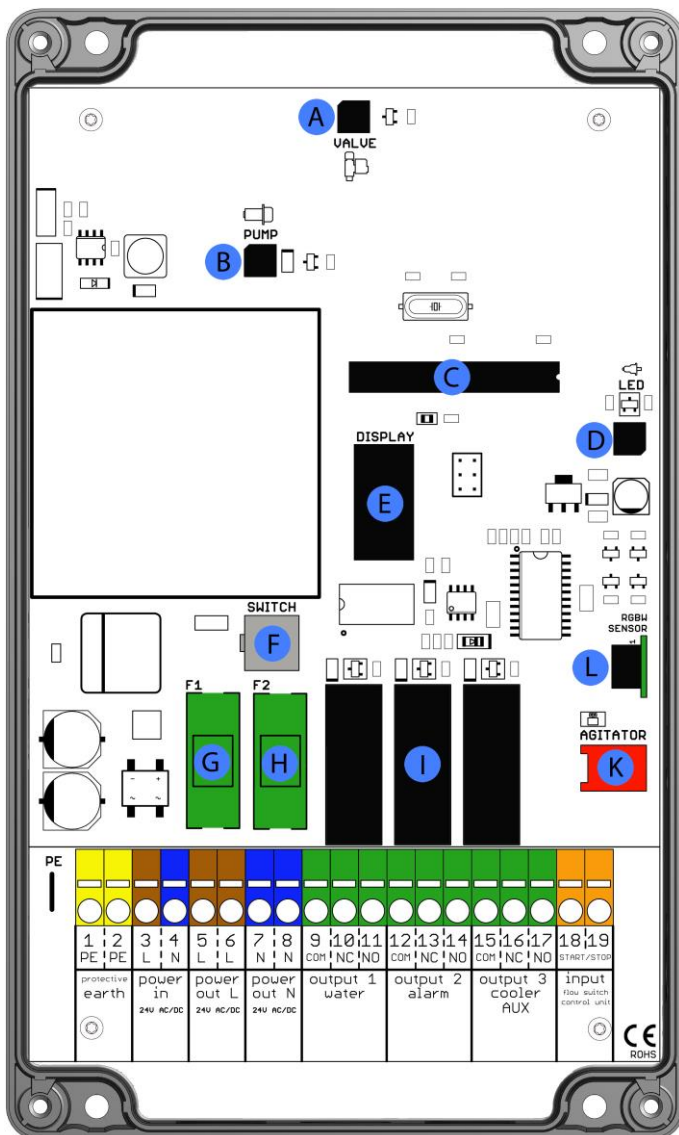
The Sycon 2502 analyzer has three configuration elements located on the inside of the housing cover.



Position	Information
M	Rotary switch for setting the flushing time
N	Rotary switch for setting the analysis delay
E	Display connection
O	Program switch for configuration of the operating requirements

Further information can be found from page 37.

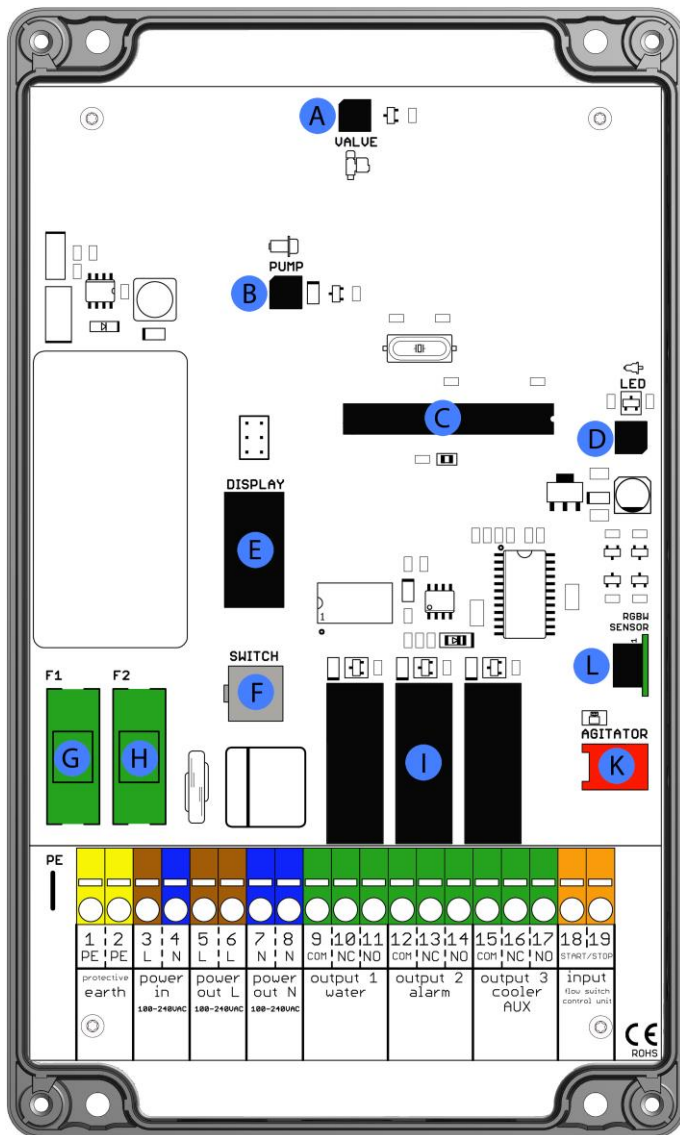
24 V AC/DC Version



Position	Assembly
A	Solenoid valve connection
B	Dosing pump connection
C	software chip
D	Actuator LED connection
E	Display connection
F	Power switch connection
G	F1 Fuse 2 A slow blow (5 x 20 mm)
H	F2 Fuse 1 A slow blow (5 x 20 mm)
I	3 x relay
L	Color sensor
K	Connection stirrer
Terminal	Assignment
1	Protective conductor PE
2	Protective conductor PE
3	Mains input L (24 V AC/DC)
4	Mains input N (24 V AC/DC)
5	Mains output L (24 V AC/DC)
6	Mains output L (24 V AC/DC)
7	Mains output N (24 V AC/DC)
8	Mains output N (24 V AC/DC)
9	Relay 1/Output 1 - COM
10	Relay 1/Output 1 - NC
11	Relay 1/Output 1 - NO
12	Relay 2/Output 2 - COM
13	Relay 2/Output 2 - NC
14	Relay 2/Output 2 - NO
15	Relay 3/Output 3 - COM
16	Relay 3/Output 3 - NC
17	Relay 3/Output 3 - NO
18	Start/Stop input contact
19	Start/Stop input contact

For more information on the terminals, see pages 11 to 13 and 26 to 32.

230 VAC Version



Position	Assembly
A	Solenoid valve connection
B	Dosing pump connection
C	software chip
D	Actuator LED connection
E	Display connection
F	Power switch connection
G	F1 Fuse 2A slow blow (5 x 20 mm)
H	F2 Fuse 400 mA slow (5 x 20 mm)
I	3 x relay
L	Color sensor
K	Connection stirrer
Terminal	Assignment
1	Protective conductor PE
2	Protective conductor PE
3	Mains input L (230 VAC)
4	Mains input N (230 VAC)
5	Mains output L (230 VAC)
6	Mains output L (230 VAC)
7	Mains output N (230 VAC)
8	Mains output N (230 VAC)
9	Relay 1/Output 1 - COM
10	Relay 1/Output 1 - NC
11	Relay 1/Output 1 - NO
12	Relay 2/Output 2 - COM
13	Relay 2/Output 2 - NC
14	Relay 2/Output 2 - NO
15	Relay 3/Output 3 - COM
16	Relay 3/Output 3 - NC
17	Relay 3/Output 3 - NO
18	Start/Stop input contact
19	Start/Stop input contact

For more information on the terminals, see pages 11 to 13 and 26 to 32.

Overview of the electrical connection terminals

The following instructions must be observed when working on the board:

- When actuating the clamping levers, only the force required for this may be applied.
- Screwless terminal blocks are suitable for rigid single-core conductors up to 2.5 mm². Fine-core conductors up to 1.5 mm² can be connected with wire end ferrule, with plastic collar or up to 2.5 mm² without plastic collar. To release a clamp, use a slotted screwdriver SL with a maximum blade width of 3 mm.
- The relevant VDE regulations must be observed for all installation work.



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

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



When removing the front panel, please note that there is a circuit board directly behind the cover, which is connected to the one below.

The distribution of the modules and the assignment of the terminals are shown in the following drawing:

Connection of the relay outputs

Relay 1/Output 1 - Terminal 9/10/11

Limit value excess

Relay 1/Output 1 is energized when a limit value is exceeded and switches the connection from COM to NO. This position can be programmed with switches S4 and S5 as permanent contact or as pulse contact. An indicator lamp or horn can be connected to relay 1/output 1 to signal that a limit value has been exceeded.

Permanent contact at relay 1/output 1:

If the limit value is exceeded, relay 1/output 1 remains in the position (connection from COM to NO) until the measured water hardness is below the limit value again. Afterwards the limit value excess is cancelled again and relay 1/Output 1 switches back (connection from COM to NC).

Pulse contact at relay 1/output 1:

In the event of a limit value being exceeded, relay 1/output 1 remains in the position (connection from COM to NO switched) only for a programmed pulse duration; as soon as the programmed pulse duration has expired, relay 1/output 1 switches back (connection from COM to NC). The next time the limit value is exceeded, relay 1/output 1 is switched again as a pulse. This function is often used in combination with pilot distributors.

Signal devices and valves can be switched when the limit value is exceeded. Relay 1 switches as

- Permanent contact or alternatively as
- Pulse contact (3 seconds or 60 seconds) to start a controller for the regeneration of a water treatment plant
 - The relay closes for the set pulse duration and then opens again.
 - Analyses are still carried out automatically.
- Permanent contact without analysis stop
 - Further analyses are performed automatically.
 - The alarm cancels itself when the value falls below the limit value again.
- Permanent contact with analysis stops
 - No further analyses are performed until the alarm is acknowledged.
 - Alarm is pending and must be acknowledged with the Reset button.

relay 2/output 2 - terminal 12/13/14

Device fault or lack of indicator

Relay 2/Output 2 is used to signal detected errors or lack of indicator.

If the analyzer is in normal operation and there is no error, then relay 2/output 2 is energized and the connection from COM is switched to NO. If an error is detected, the Relay 2/Output 2 off and establishes the connection from COM to NC.

The following faults are signaled:

- Power failure
 - The analyzer is switched off (relay 2 is de-energized).
- Indicator deficiency
 - The content of the indicator bottle is less than approx. 10 % (see page 46).
- Error zero sample (insufficient brightness before indicator addition)
 - The measuring chamber is dirty.
 - The test sample/measuring water is dirty or turbid.
 - The electronics are defective.
- Error measurement (no sufficient difference of the measured value before and after the indicator addition)
 - No indicator was dosed.
 - There is no water in the measuring chamber.
 - There was no mixing (stirring blade missing or stirrer is defective).

relay 3/output 3 - terminal 15/16/17

Analysis/analysis delay

Relay 3 can be used to signal that an analysis has been started.

Signal devices, pumps or valves can be connected. Connection to a control room is also possible. There is a choice between:

Relay 3 is active during the analysis:

In this mode, for example, a feed pump can be connected to the relay to feed pressure-free sample water into the measuring chamber.

Relay 3 is active before and during analysis: (Analysis delay)

The analysis delay is set with the rotary switch (see page 39). This time is waited until the solenoid valve on the Sycon 2502 opens. Meanwhile, relay 3 is switched, allowing functions such as switching cold water on sample coolers. Relay 3 remains switched until the analysis is finished.

Wiring Example 1

Attention

- Relay 1 picked up when limit value is exceeded
- Relay 2 dropped out in case of device fault / lack of indicator
- Relay 3 actively energized during analysis



With input contact open and program switch S10 = OFF

No analyses



With closed input contact and program switch S10 = OFF

Analyses in set interval time (adjustable via switches S1 and S2)

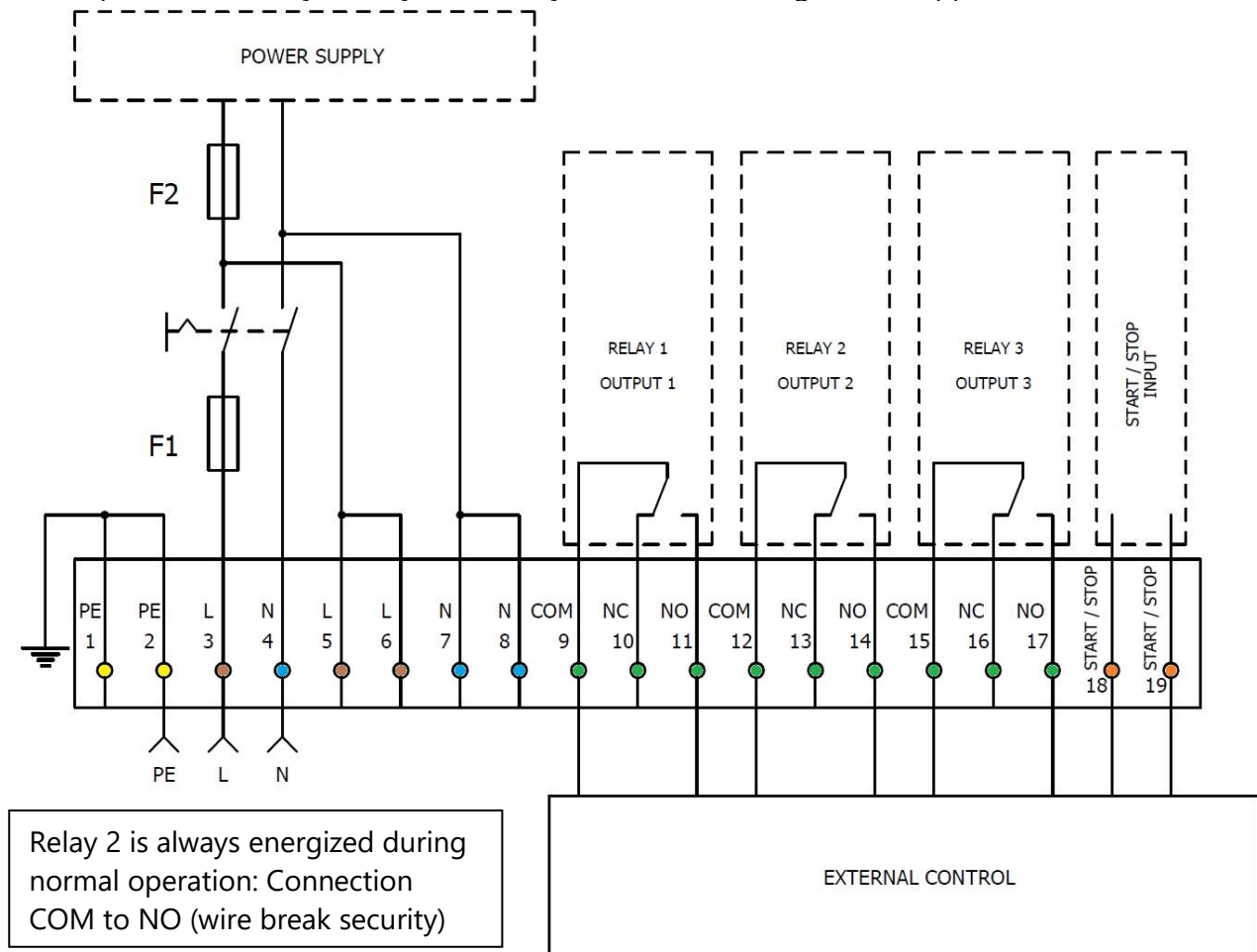
Further information on page 40



Alternative input contact Program switch S10 = ON

Analysis start with closed input contact

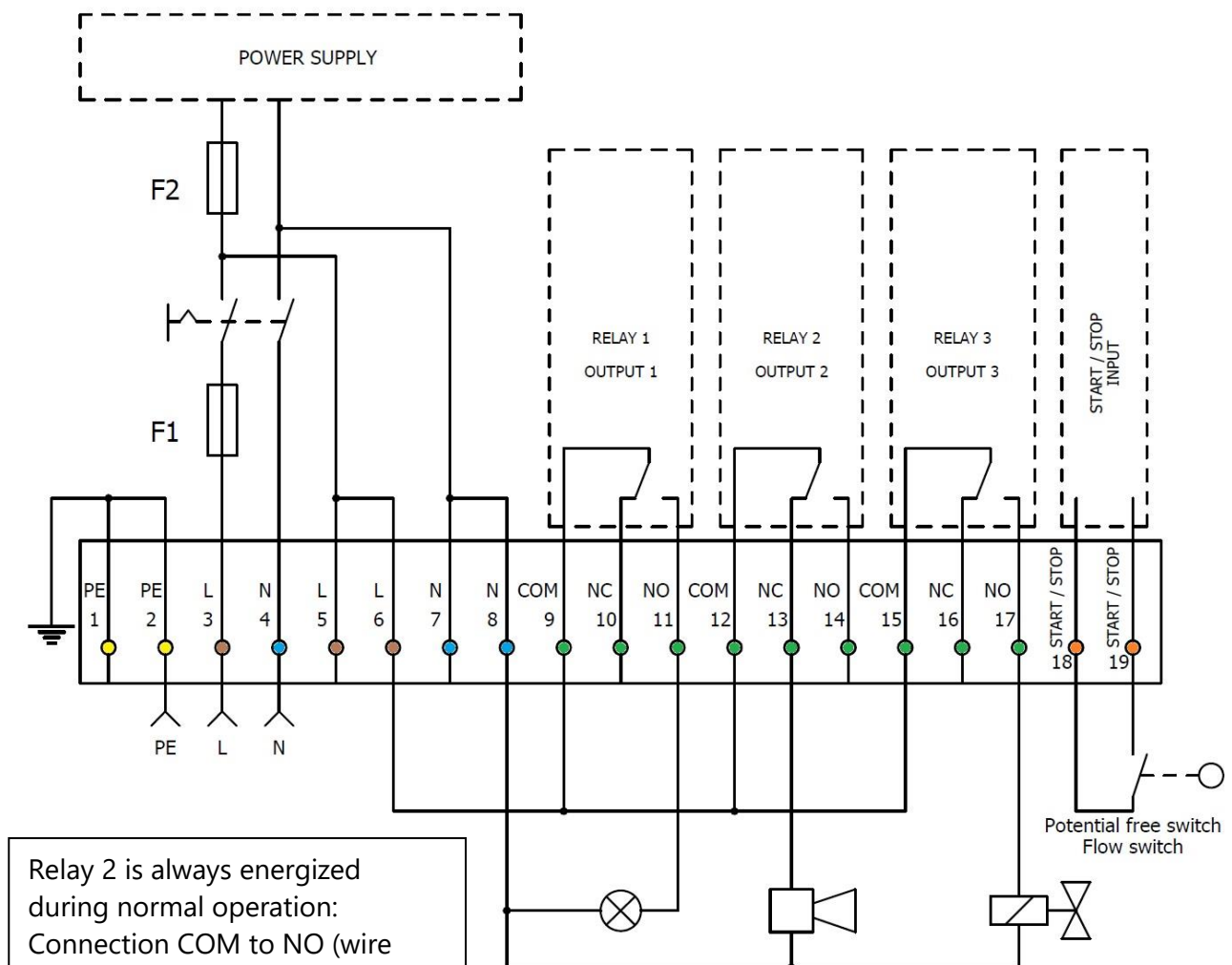
Drawn position for relay 1, relay 2 and relay 3: device de-energized - dropped out



Wiring Example 2

- Relay 1:** Indicator light active when limit value exceeded
- Relay 2:** Horn active in case of device fault or lack of indicator
Relay 2 is always energized during normal operation: Connection COM to NO (wire break security)
- Relay 3:** During and additionally before an analysis (analysis delay) relay 3 is energized and the external solenoid valve is switched to open e.g. the cooling water for a sample cooler.
- Input contact:** A potential free switch, a flow monitor or a wire bridge (delivery condition) can be connected.

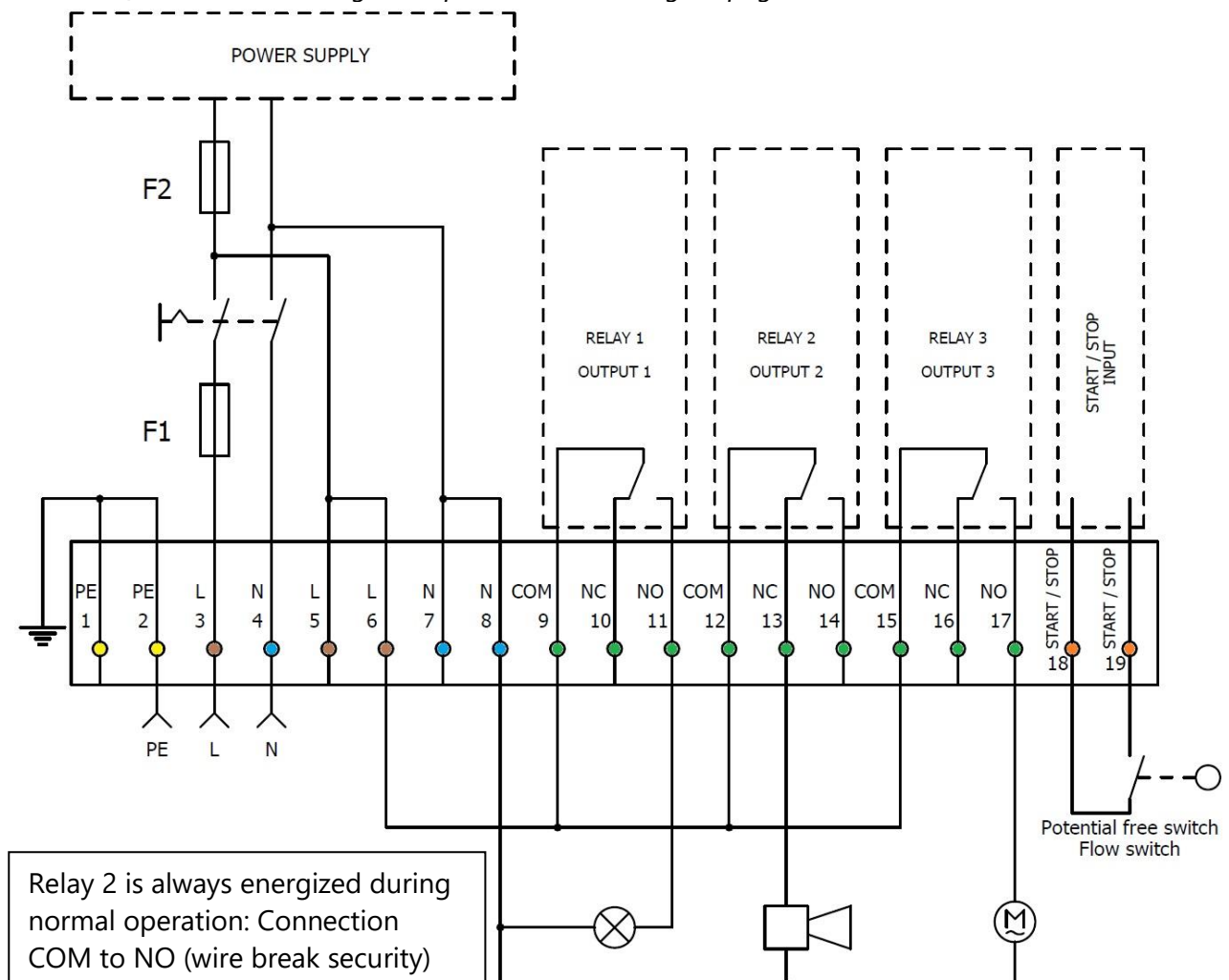
Further information on wiring the input contact starting on page 31.



Wiring Example 3

- | | |
|-----------------------|--|
| Relay 1: | Indicator light active when limit value exceeded |
| Relay 2: | Horn active in case of device fault or lack of indicator
<i>Relay 2 is always energized during normal operation: Connection COM to NO (wire break security)</i> |
| Relay 3: | During and additionally before an analysis (analysis delay) relay 3 is energized, this can be used to feed sample water into the analyzer by means of a pump. |
| Input contact: | A potential free switch, a flow monitor or a wire bridge (delivery condition) can be connected. |

Further information on wiring the input contact starting on page31.



Connection of the input contact

Start/Stop Input - Terminal 18/19

Input contact

False alarms can occur if analyses are carried out during regeneration in a single filter plant.

A longer service life of the treatment plant can also lead to incorrect measurements due to channel formation in the resin bed or counter ion effects. An exceeding of the limit value is indicated - but the softener is not yet exhausted.

The Sycon 2502 has two methods to prevent false alarms:

Method 1

Use of a potential-free switch at the contact input Input. When the contact is closed, analyses are performed at the set interval. If the contact is open, no analyses are performed.

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

method 2

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

Alternative input contact on the next page.

Start/Stop Input - Terminal 18/19

Alternative input contact



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



NOTE:

Normally, when using the input contact alternatively, the programming switches S1 and S2 are both set to OFF (5-minute interval). An analysis start then only takes place via the input contact or manually.



It is recommended that the input contact is wired accordingly to avoid unnecessary messages of limit value exceedance.

Especially when directly connected to a treatment plant, no premature regenerations should be started due to faulty measurements.

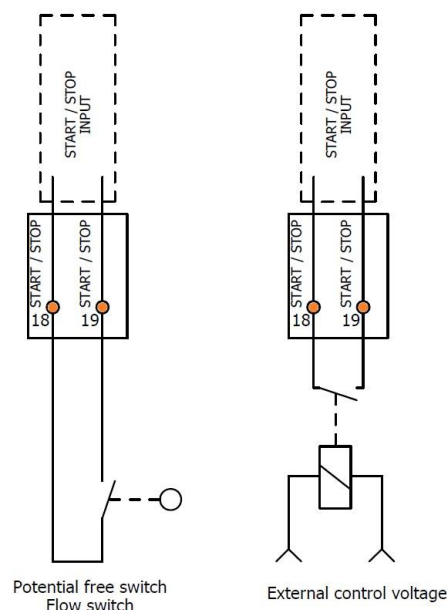


Only connect potential-free switches to terminals 18 and 19. Connecting an external power source may damage the unit.

The correct function of a connected switch can be checked in the diagnostic program.

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

Wiring of the input contact



Operation and handling

Key functions

Analysis start



- You can start an analysis manually.
- If an analysis sequence has been triggered, you can switch to the next program step by pressing the START key.
- If an analysis is started manually, the possibly activated relays 1 and 2 are also deleted.

Flushing and filling the measuring chamber



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

Bleed the dosing pump



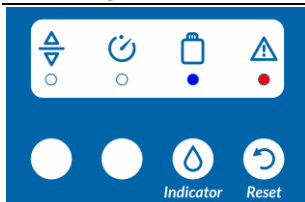
- Outside an analysis sequence, you can switch on the indicator pump, e.g. to vent the tubing line during commissioning.
- The agitator runs simultaneously with the indicator pump.

RESET - Functions



- Delete relay 1 if the limit value is exceeded.
- Delete relay 2 in the event of a device fault or the message "Low indicator".
- You can cancel an analysis sequence with this button.

Resetting the indicator filling quantity



- By pressing the INDICATOR and RESET buttons simultaneously, you reset the quantity measurement of the indicator. This is necessary after inserting a new full indicator bottle. The reset is complete when the LEDs "Indicator low" (blue) and "Device fault" (red) light up simultaneously.



The reset may only be performed if you have used a full 500 ml indicator bottle.

Operating principle

The SYCON 2502 based on the SYCON series is an online analysis device for the automatic determination of water parameters according to the colorimetric limit value method. By adding an indicator to the water sample a color reaction is generated. Depending on the indicator used, the device evaluates the intensity of the color. By changing the color of the sample after the indicator is added, SYCON 2502 monitors the limit value of the water content. The device can only determine one parameter at a time. Parameter and limit value are determined by the indicator used.

Analysis process

The analysis procedure consists of several steps. The duration of each step depends on the configuration of the device and the indicator used. The first analysis is started automatically 3 minutes after switching on. If the value falls below the limit, the next analyses are carried out at the set analysis interval. The set analysis interval time can only be maintained if the flushing duration is not set to a value greater than the interval time. If the limit value is exceeded, the following measurements are carried out at 5-minute intervals to indicate the readiness of the plant after regeneration.

The analysis takes 3 minutes plus the set flushing time. A control measurement with activated initial value suppression takes place 4 minutes after completion of the initial measurement.

Analysis delay time for analysis start

When monitoring hot water, the sample must be cooled to below 40 °C (< 104 °F). A cooling water valve can be opened via relay 3. Only when the sample has cooled down safely after an adjustable analysis delay time, the input solenoid valve of the analyzer opens and the analysis begins.

Flushing the measuring chamber and taking water samples

The input 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

A zero sample is always taken before starting the actual measurement. The zero sample is used to determine influencing disturbance variables such as sample turbidity, contamination of the optics or extraneous light influences and to be able to take them into account for the evaluation of the water sample. The actuator LED lights up. The solenoid valve is open during the zero sample.

Dosing the indicator into the water sample

The solenoid valve on the device is closed and the indicator is dosed into the water sample. By turning the stirring paddle, the indicator is homogeneously dissolved in the water sample.

Operation and handling

Measurement of the water sample with indicator

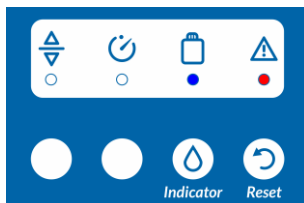
In this step, the value is determined from the color of the water sample. For this purpose, the agitator blade is stopped. The actuator lights up and the sample is evaluated immediately. The result of the measurement is displayed on the LEDs on the front panel.

In case of incorrect values, e.g. missing indicator addition, a fault is reported.

Flushing and cleaning the measuring chamber

The solenoid valve opens, which rinses out the colored water sample. The measuring chamber remains filled with pure process water until the next analysis starts.

Inserting a full reagent bottle



Open the indicator bottle by twisting off the cap. Insert the suction lance of the Sycon 2502 into the bottle and fix the union screw by hand with the screw thread of the bottle.

Set the indicator level to 100% by holding down the INDICATOR and RESET buttons until the indicator and fault LEDs are permanently lit.



The indicator bottle is not included in the scope of delivery of the device.

- Only use original indicator type H25 or C25 in the 500 ml bottle.
- Check the durability of the indicator used.



Danger of pollution

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

- Observe the instructions in the safety data sheets.

We accept no liability for permanent contamination by the dyes in the indicator and personal injury resulting from improper use of the indicator.



We recommend wearing suitable protective clothing when handling the indicator:

- Workwear
- Laboratory gloves
- Eye protection / safety glasses

Operation and handling

Before commissioning



Ensure that the unit is securely fastened to a wall or suitable suspension.



Make sure that the water quality meets the specified requirements.

If necessary, take suitable measures to improve the inlet water quality (e.g. installation of a dirt filter).



Make sure that a full reagent bottle is inserted.

Check the bottle cap for tightness and whether it is correctly screwed to the thread of the bottle.

Check that the correct indicator type is used for the application.

Check that the expiry date of the indicator has not expired.



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



Make sure that all hose connections carrying water and indicator are correctly and firmly connected in the measuring chamber system.



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



If in doubt, consult a specialist or contact your supplier or the manufacturer.



Make sure that the input and output contacts of the analyzer are connected to the water treatment plant to be monitored in the desired way.



Make sure that the hydraulic connections are correctly installed.



Make sure that the maximum permissible operating pressure on the water supply line is not exceeded.

Install a throttle valve if necessary.



Make sure that the electrical connections are correctly installed.

If in doubt, consult a specialist or contact your supplier or the manufacturer.

Operation and handling

Device settings

The Sycon 2502 analyzer is programmed via small slide switches (programmed switches S1 - S12) and adapted to the operating requirements.



Switch off the device and open the cover of the control unit
(supply voltage)

The program switches are located on the back of the display board. This is screwed onto the cover and must not be removed. Also, on this board are the two 16-step rotary switches for setting the flushing time and the analysis delay time for the start of the analysis.



Setting	Factory setting	
Flushing time <i>flush time</i>	4 minutes	Position 6
Analysis delay time <i>Delay time</i>	Off / 0 minutes	position 0

Setting	Factory setting	
Analysis interval	10 minutes	S1 OFF S2 ON
Initial value suppression	Yes	S3 ON
Functions relay 1	Permanent contact / without analysis stops	S4 ON S5 OFF
Measurement parameters	Total hardness	S6 OFF S7 OFF S8 OFF
Monitoring	Message when exceeded	S9 OFF
Input contact	Function flow monitor	S10 OFF
Operating mode	Analytical operation	S11 OFF S12 OFF



Work on electrical connections may only be carried out by authorized specialist personnel in compliance with the locally applicable regulations.



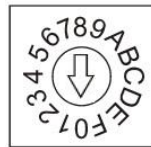
You will need a small screwdriver to operate the rotary switches and to set the slide switches. Please use only suitable and tested tools to avoid damage to the sensitive components.

Operation and handling

Setting the flushing time

The flush time before the start of an analysis is set in the range from 5 seconds to 30 minutes using the left-hand rotary switch "Flush time".

flush time



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

Select the flushing time depending on the length of the supply line to ensure that the water from the softener flushes the supply line and fresh water is analyzed.

A long rinsing time additionally reduces build-up in the measuring chamber.

The local conditions of a plant can be very different: different pipe cross-sections to the softener, fluctuating pressure conditions due to strong consumers, etc.

Measure the amount of flushing water at the currently set flushing time and compare it with the theoretically calculated amount of water based on the pipe cross-sections. Take into account an extra charge for the resin bed volume.

This ensures that a representative water sample is always analyzed.



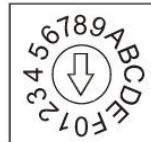
We recommend a flushing time of at least 50 seconds.

Operation and handling

Setting the analysis delay time

The analysis delay time before a sample is taken is set with the right-hand rotary switch "Delay time" in the range from 0 seconds to 30 minutes. The delay time is used to cool down the water sample before the analysis. During the delay time relay 3 is energized. This can be used to control a cooling water valve on the sample cooler so that the sample is already cooled down before the solenoid valve of the Sycon 2502 analyzer is opened.

Delay time



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



Select the analysis delay time so that no hot water flows into the measuring chamber at the start of an analysis.

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

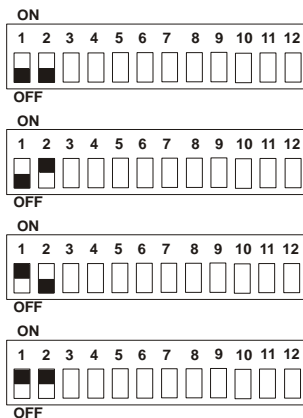
Analysis interval



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

- If the input contact (terminals 18 and 19) is open, no analyses are started at the set analysis interval. Therefore, this input is bridged in the delivery state. Make sure that this bridge is present or that an external switch (e.g. flow monitor) has been connected. This switch must be closed if water flows and analyses are to be carried out automatically.
- The input contact (terminals 18 and 19) can be switched over from the flow monitor function to the start function (S10 = ON) via program switch S10. The 5-minute interval is deactivated.

Attention: If the input contact was programmed as an external analysis interval (S10 = ON) and the jumper on the input contact is not removed, analyses are carried out permanently.



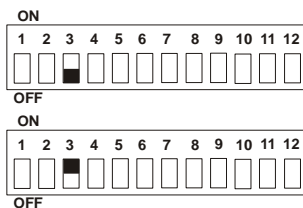
S1	S2	Time
OFF	OFF	5 (^(A) ∞) min
OFF	ON	10 min
ON	OFF	20 min
ON	ON	30 min

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

Initial value suppression

If the water hardness is exceeded, it can be determined whether a 2nd analysis should be carried out for verification (first value suppression). Only when two consecutive analyses indicate that the limit value has been exceeded is relay 1 energized.

The second analysis takes place 4 minutes later, independent of the set analysis interval. If a flow monitor is connected to the input contact, the analysis is also performed if no water flow is signaled.

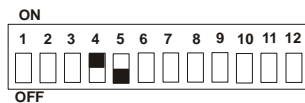


S3	Function
OFF	No initial value suppression
ON	Initial value suppression

Limit value relay 1

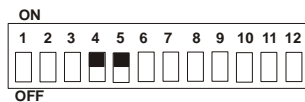
Relay 1 (terminal 9/10/11) signals that the limit value has been exceeded. It is possible to choose between a pulse contact with a pulse duration of 3 or 60 seconds for the activation of a controller or a permanent contact. In case of a permanent contact, a decision is made between two alternatives:

1. Permanent contact without analysis stop



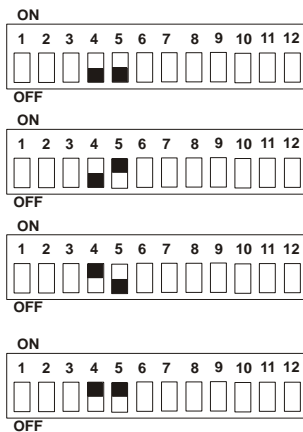
- If the program switches are set to S4 = ON and S5 = OFF, analyses are performed continuously at the set time interval.
- If the limit value is exceeded, relay 1 is **energized**.
- If the value falls below the limit value, relay 1 has **dropped out**.

2. Permanent contact with analysis stops



- If the program switches S4 = ON and S5 = ON, no further analyses are started after the limit value has been exceeded. Relay 1 is **energized**.
- If the RESET button is pressed or the input contact receives a pulse, relay 1 is **de-energized**.
- If the program switches S10, S4 and S5 are set to ON and the input contact is permanently bridged, there is no analysis stop.

Operation and handling



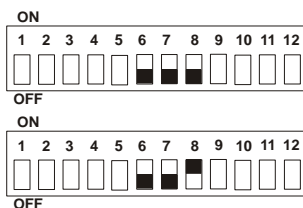
S4	S5	Time
OFF	OFF	Pulse contact 3 sec.
OFF	ON	Pulse contact 60 seconds.
ON	OFF	Permanent contact without analysis stop
ON	ON	Permanent contact with analysis stop

Measurement parameters

The Sycon 2502 analyzer can be used to determine various parameters.



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



S6	S7	S8	Measurement parameters
OFF	OFF	OFF	Total hardness
OFF	OFF	ON	Carbonate hardness

Limit value monitoring

As a rule, a message is issued when an upper limit value is exceeded. For example, an ion exchanger is monitored for hardness penetration.

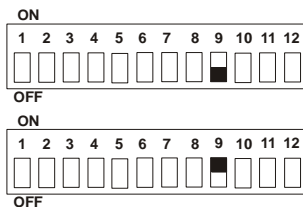
In the position of the program switch S9 = OFF the monitoring for overrun is carried out. Relay 1 is switched when the limit value is exceeded.

In the position of the program switch S9 = ON the monitoring for falling below a limit value is carried out. This option is used, for example, to monitor a blending device where a minimum hardness is expected.

Relay 1 is switched when the value falls below the limit value.



All functions described in this manual apply with regard to messages and reactions of the device, but always when the value falls below a limit value.

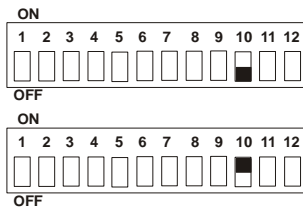


S9	Function
OFF	Message when exceeded
ON	Notification in case of underrun

Operation and handling

Input contact

Two different functions can be assigned to the input contact (terminal 18/19)



S10	Function
OFF	<ul style="list-style-type: none">• Flow monitor or bridge• no analysis with open input contact
ON	<ul style="list-style-type: none">• External analysis start• Analysis start with closed input contact

Flow monitors

This function is used if analyses are only to be carried out as soon as water is drawn off. This is particularly useful for discontinuous operation, i.e. refilling a storage tank at longer intervals or for systems that are only in operation for a few hours a day.

The function is also used when no analyses are required, e.g. during the regeneration of a single filter plant.

External analysis start

The input contact is used in conjunction with a controller in the "external analysis start" operating mode. An analysis is started by closing the input contacts.



Please note that the input contact must always be a potential-free switch. Connecting an external power source may damage the unit.



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



On delivery, the program switch S10 = OFF and the input contact is bridged, thus the internal analysis interval is active.



If the input contact is permanently bridged while the program switch S10 is set to ON, analyses are carried out continuously. The analyses are carried out consecutively. The set analysis interval is deactivated.



If the input contact is configured as an external analysis start, there is no analysis stop if the limit value is exceeded. A further analysis is started when the input contact is closed again.



If first value suppression is activated, the repeat measurement is started even if the input contact is open.

The following examples should make it easier for you to select the correct setting:

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

In this case the program switch S10 = OFF and no flow monitor is connected. Instead, the input contact is provided with a bridge.

Example 2: Analyses are carried out at a fixed time interval if a flow monitor reports flowing water



The program switch S10 is in position OFF. The flow monitor is connected to the input contact Input instead of the bridge. The first analysis after switching on the device takes place after 3 minutes, even if the flow monitor does not report running water. The

subsequent analyses only take place with running water at the set interval. The pause of the analysis interval by the flow monitor is indicated by a flashing yellow LED. If the flow monitor signals running water after a standstill period, an analysis is carried out immediately.

Example 3: The analysis is started by a controller

To specify the analysis interval by a controller, the controller is connected to the input contact by means of a potential-free switch. Program switch S10 is set to the ON position (external analysis start) to start analyses by a switching pulse at the input contact. With a permanently bridged input contact, analyses are carried out continuously.

Usually, the program switches S1 and S2 are also set to OFF, thus deactivating the internal analysis interval.

Operation and handling

BOB operation

The abbreviation BOB stands for operation without supervision, as mentioned in the special regulations of the TÜV for steam boiler houses. The requirement states that the measuring instrument must have a sufficient supply of indicator for at least the next 72 hours and thus be ready for operation.

The relay output relay 2 (terminal 12/13/14) can be used to transmit an alarm, e.g. to a higher-level control room, if the indicator supply is no longer sufficient for the minimum time interval.

The Sycon 2502 analyzer is specially designed for BOB operation. Steam boiler systems require a qualitative monitoring of the water quality, especially of the concentration of water hardness in the boiler feed water according to the technical guidelines for steam boiler systems TRD 604 (Technical Rules for Steam Boilers, published by the TÜV).

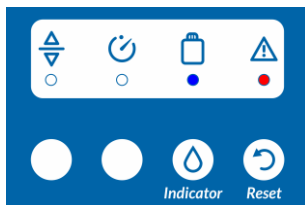
The Sycon 2502 analyzer records the consumption of indicator to ensure that during periods of unattended operation, a sufficient amount of indicator is always available for reliable analytical operation.

The sufficient indicator supply is calculated for the next 72-hour BOB operation depending on the set analysis interval.

If the next 72-hour BOB operation can no longer be reliably guaranteed, the "Low indicator" alarm is triggered at relay output relay 2. This message can be suppressed briefly by pressing the RESET button. The message is displayed again when the device is switched on again. To permanently disable the BOB alarm, a new indicator bottle must be inserted and the counter reset.



The indicator stock can only be calculated correctly if the internal counter is reset by pressing the RESET and INDICATOR key combination after a new 500 ml indicator bottle has been inserted.



The device does not detect the contents of a bottle. With a reset, an internal counter of the indicator pump is reset, which then counts backwards starting at 500 ml again. The counter can only be reset to 100% fill level. If the key combination is pressed during operation without a new full bottle being inserted, the indicator supply is not calculated exactly and the alarm is not given or is given at the wrong

time. This also applies if the reset is forgotten after inserting a full bottle.

Operation and handling

Trigger conditions for an analysis start



- Automatically by the set time interval
- Manual analysis by pressing the START button
- 3 minutes after switching on the device
- 4 minutes after a limit value has been exceeded with activated first-up suppression
- Switching on a connected flow monitor after system standstill
- Through a connected external control

Commissioning



Make sure that the analyzer is installed according to the instructions and that the program switches are programmed according to the desired requirements.

Switching on the device

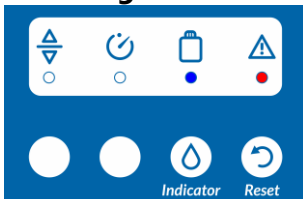
- Turn on the power switch.
- The calculated level of the indicator bottle is displayed for one second.

After switching on



- The green LED "ANALYSIS RESULT" flashes, because no measurement has been performed so far.
- When the input contact is open, the yellow LED "Analysis active" also flashes.

Resetting the indicator filling quantity



- Press the INDICATOR and RESET buttons simultaneously.



Only reset the filling quantity if you have inserted a full bottle
(Further information on pages 35 and 46)

Filling the measuring chamber with water



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

Bleed the dosing pump



- Press the INDICATOR button until indicator flows continuously into the measuring chamber.
- During this time the agitator blade rotates.

Operation and handling

Start analysis



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

LED displays

By means of the LEDs, the Sycon 2502 analyzer displays information on the operating status and results of the measurements and informs about the level of the indicator.

The device status is indicated by 4 LEDs on the front panel.

The following displays can be shown during operation depending on the configuration. The display variants of the blue LED (indicator notes) can appear in combination with the other LEDs depending on the fill level of the indicator bottle.

Analysis result

Green flashing



No analysis result is available because the instrument has just been switched on.

Green



The water quality is below the specified limit value.

Green-blinking + yellow



No analysis result is available because the instrument has just been switched on. The input contact is open; therefore, the analysis interval is paused.

Red



The limit value has been exceeded, but relay 1 has not yet been energized First-up suppression measurement active.

Red flashing



The specified limit value has been exceeded and relay 1 has been energized.

Operation and handling

During the analysis

Yellow



The display is permanently lit and thus signals that an analysis has been started.

Yellow flashing



The display flashes to indicate that the analysis interval has expired, but the analysis start is blocked via the input contact Input (flow monitor function).

Yellow flashing + red



The yellow LED flashes to indicate that no analyses are started automatically. The device has been programmed so that an analysis stop is performed after a limit value has been exceeded. At the same time the red display "Analysis result" lights up (see program switches S4 and S5).

Yellow fast flashing



The display flashes at a high frequency to indicate that the analysis start is delayed (analysis delay active), e.g. to cool down the sample water before sampling.

- Relay 3 is energized during this time.

Red flashing + red flashing



Analysis result (red-blinking) and alarm message (red-blinking) at the same time: the display flashes and signals that the specified limit value has been exceeded.

- Relay 1 "Limit value exceeded" is energized.

Red flashing + yellow flashing + red flashing



The yellow LED flashes to indicate that no analyses are started automatically. The device has been programmed so that an analysis stop is performed after a limit value has been exceeded. At the same time the red display "Analysis result" lights up (see program switches S4 and S5).

- Relay 1 "Limit value exceeded" is energized.

Red flashing + red



Analysis result (red-blinking) and alarm message (red-lighting) at the same time: the display is permanently lit and signals that the specified limit value has been exceeded in conjunction with the flashing red display "Analysis result".

- Relay 1 "Limit value exceeded" is released when the RESET key is pressed or a pulse is applied to the input contact.

Red flashing + yellow flashing + red



Analysis result (red-blinking) and alarm message (red-lighting) at the same time: the display is permanently lit and signals that the specified limit value has been exceeded in conjunction with the flashing red display "Analysis result".

- Relay 1 "Limit value exceeded" is de-energized if the RESET key is pressed after an analysis stop has been activated or if the input contact is pulse-controlled.

Red + yellow flashing



The limit value has been exceeded, but relay 1 has not yet picked up (first value suppression - the analysis is repeated in 4 minutes).

Operation and handling

Indicator Notes

Blue



The indicator lights up permanently, thus signaling that the indicator supply is less than approx. 30 %. The remaining quantity of indicator allows operation for a further 72 hours at the set analysis interval.

- Provide a new indicator.

Blue flashing + red flashing



The BOB alarm is active. The display indicates an indicator level that may no longer be sufficient for unattended operation at the set analysis interval (BOB) over 72 hours.

- Relay 2 "Fault" has **dropped out**.



To acknowledge the BOB alarm, press the RESET button.

Blue flashing + red



The display signals an indicator level that may no longer be sufficient for unattended operation for 72 hours.

- The BOB message has already been acknowledged.
- Relay 2 "Fault" has been **energized**.

Device fault

Red flashing



The display signals a device fault:

- Incorrect zero sample or incorrect measurement
- All other displays are switched off.
- Relay 2 "Fault" is **energized**.



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

Red



The display signals a device fault:

- Incorrect zero sample or incorrect measurement
- All other displays are switched off.
- Relay 2 "Fault" has **dropped out**.

Operation and handling

Display of the calculated filling level

After switching on the Sycon 2502 analyzer, the calculated level is displayed for 1 second:



Directly after resetting the indicator counter:
More than 5000 analyses are possible.



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



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



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



Level 25 % to 0 %:
Less than 1250 analyses are possible until the indicator bottle is changed.

Maintenance and service

In order to ensure long-term and trouble-free operation of the Sycon 2502 analyzer, it is necessary to clean the measuring chamber and replace wearing parts. Therefore, we recommend a weekly visual inspection of the device and maintenance at 6-month intervals.



Maintenance can be carried out in a simple manner. We recommend that maintenance be carried out by a trained specialist. In any case, please observe the following safety instructions.



Ideally, carry out the maintenance work in connection with the maintenance of the treatment plant or during a break in operation.



Switch off the unit before maintenance by operating the mains switch.



It is not necessary to open the control unit.



If the cover of the control unit has been opened, terminals 1 - 8 and 9 - 17 may be charged with 230 V depending on the wiring.

Touching them can have serious consequences:

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



No analyses are carried out during maintenance and therefore a possible hardness breakthrough cannot be detected.



Close the inlet valve to the analyzer before working on the measuring chamber.

- Water splashes could destroy the electronics.



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

- Follow the instructions in the safety data sheets.
- Suitable protective clothing is required for maintenance work:
 - Workwear
 - Laboratory gloves
 - Eye protection

Maintenance and service

Maintenance

Requirements

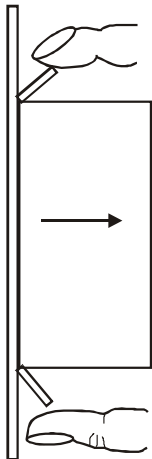
Time:	approx. 30 minutes
Material:	Maintenance kit for Sycon 2500/2501/2502/2602 Cleaning kit Sycon Clean Paper towels
Tools:	Screwdrivers Bowl or small bucket



Always switch off the appliance before starting maintenance.

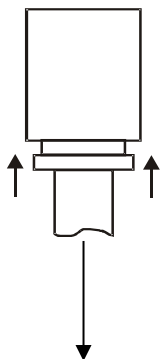
Replacing the peristaltic pump cassette

To ensure the accuracy of the Sycon 2502 analyzer, the tubing pump cassette should be replaced after 6 months.



- Press the locking tabs together with your thumb and index finger and pull the cassette off the motor shaft to the right.
- Loosen the bayonet locks of the LUER connectors.
- Pull up the fixing pins of the indicator plug and remove the plugs.
- Replace the blue O-ring of the indicator plug.
- Insert the indicator plug into the measuring chamber and secure it with the fastening pins.
- If indicator fluid leaks, remove it with a paper towel.
- Insert a new cassette in reverse order.
- Bleeding the pump: Switch on the instrument and press the INDICATOR key until the peristaltic pump pumps bubble-free indicator into the measuring chamber.

Cleaning the measuring chamber



- Depressurize the supply line.
 - Close the hand valve to the treatment plant.
 - Switch on the device briefly.
 - Press the VALVE button. By opening the solenoid valve, you relax the supply line.
- Hold a small container under the inlet.
- Push the black ring of the connector upwards and pull the supply hose.
 - Press the VALVE button. By opening the solenoid valve, the measuring chamber is completely emptied.
 - Let the leaking water run into a container.
 - **Switch the device off again.**
- Pull out the 7 locking pins of the measuring chamber by approx. 8 mm until you feel a slight resistance.
 - Attention: Do not remove the locking pins completely from the measuring chamber.
 - Pull the 4 black connectors out of the measuring chamber - if necessary, with the careful support of a screwdriver.
- Pull the measuring chamber from the retaining bolts.
 - Place the measuring chamber in the Sycon Clean cleaning liquid for at least 10 minutes.
 - Clean the measuring chamber under running water with the brush of the cleaning set.
- Clean the connections and the LED actuator plug.
- Reassemble the measuring chamber in reverse order.
- Replace wearing parts with the spare parts supplied in the maintenance set.
- Carefully roll the O-rings onto the first groove of the connections during assembly.

Maintenance and service

Exchange of components

Observe the applicable accident prevention regulations.

It is imperative that the device and the supply line to the device are disconnected from the power supply and secured against being switched on again.

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

Shut off the water supply before starting work.

Replace magnetic valve

- Shut off the inlet and empty the measuring chamber.
- Disconnect the electrical connection.
- Remove the inlet plug from the measuring chamber.
- Loosen the connection on the inlet side of the valve.
- Install the new valve in reverse order.

Replacing the agitator drive

- Disconnect the device from the power supply and open the cover.
- Disconnect the connector of the ribbon cable from the main board.
- Loosen the fixing screws of the actuator.
- Install the drive in reverse order.

Replacing the peristaltic pump motor

- Disconnect the device from the power supply and open the cover of the control unit.
- Pull off the peristaltic pump cassette of the peristaltic pump.
- Loosen the fixing screws of the peristaltic pump.
- Disconnect the connector plug of the motor.
- Install the new pump in reverse order.

Diagnostic functions

The diagnostic program is used to check the device functions.

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



Make a note of the positions of the program switches before the diagnosis and switch all program switches back to their original position after the diagnosis program has been executed.



Use the service booklet to note down your settings.

The test must be performed with the lid open. All buttons and switches are operated.



When the cover of the control unit is opened:

- Depending on the wiring, the terminals may be connected to mains voltage.
- Touching it can cause serious injuries.
- His life is in danger.
- The device can be damaged by improper handling.



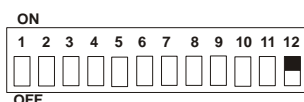
Activation of relays 1 to 3 can lead to malfunctions.



Note that the supply line is under pressure.

Avoid splash water that could get into the open electronics and destroy them.

Switch S12 is switched to the ON position. Afterwards the diagnostic functions described below may be called one after the other. The device is in diagnostic step 1 at the beginning.



S12

Function

ON

Diagnostic program



Each press of the START button switches to the next diagnostic step.

Maintenance and service

Checking the LED displays

When the device is switched on, diagnostic step 1 begins and the LEDs light up one after the other.



Limit value undercut



Exceeding of limit values



Analysis active



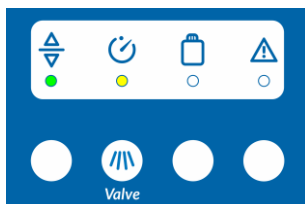
Indicator deficiency



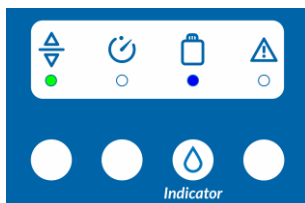
Device fault

Testing the buttons

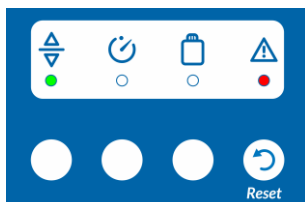
After the 1st press of the START button, the buttons are tested. By pressing the following buttons, the following LEDs will light up:



VALVE button



INDICATOR button



RESET button

Maintenance and service

Checking the program switches

After pressing the START button 2 times, the program switches are checked. Each of the program switches S1 - S11 is assigned a combination of the LED displays:

	S1		S2		S3
	S4		S5		S6
	S7		S8		S9
	S10		S11		

Check the flush time rotary switch



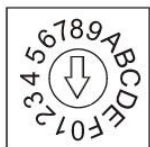
After pressing the START button 3 times, the rotary switch "Flushing duration" is checked.

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

	0		1		2
	3		4		5
	6		7		8
	9		A		B
	C		D		E
	F				

Maintenance and service

Check the rotary switch for the analysis delay time



After pressing the START key 4 times, the rotary switch "Analysis delay time" is checked.

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

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

Testing of relay 1



After pressing the START button 5 times, relay 1 is checked.

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

Testing of relay 2



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

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

Testing of relay 3



After pressing the START button 7 times, relay 3 is checked.

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

Maintenance and service

Checking the solenoid valve



After pressing the START button 8 times, the solenoid valve is checked.

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

Check the measuring LED (actuator)



After pressing the START button 9 times, the white actuator LED is checked.

- The blue LED flashes and the measuring LED is switched on and off every second.

Checking the peristaltic pump



After pressing the START button 10 times, the peristaltic pump is checked.

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

Checking the agitator



After the 11th pressing of the START button, the agitator is checked.

- The red and blue LEDs flash and the stirrer is switched on.

Check the start/stop input input contact

After pressing the START button for the 12th time, the input contact is checked.

- Connection terminals 18 and 19
- The input terminal is bridged and opened at contacts 18 and 19. The input contact can be checked at the display LEDs.



Input contact open

- no connection between terminal 18 and 19



Input contact bridged

- conductive connection between terminal 18 and 19

Maintenance and service

Measure zero value of the water sample

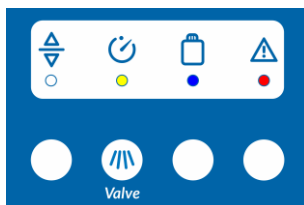


Please close the lid of the control unit before you start the next test steps, as the incidence of light on the sensor can influence the measurement.



This test step is necessary to determine the zero value of the sample for the following color recognition test.

Please note that for the measurement the switch positions of the program switches S6, S7 and S8 are taken into account for the measurement parameters.



After pressing the START button 13 times, the zero value of the optical path is measured with a colorless water sample.

- The last 3 LEDs are flashing.
- The measuring chamber must be filled with clear water to test the measuring section. The VALVE key can be pressed to flush the measuring chamber.

Checking the color recognition



After pressing the START button for the 14th time, the color recognition of the optical path is checked.

- The last 3 LEDs light up.

The first LED indicates whether the measured value is below or above the limit value.



- Measured value below the limit value



- Measured value above the limit value



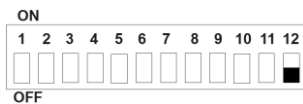
- Use the INDICATOR button to dose indicator into the measuring chamber.
- Depending on the water hardness and the dosed amount of indicator, you will get a color change, e.g. from red to green for the total hardness.
- The transition point is not a measure of water hardness, as an undefined quantity of indicator is dosed.
- The positions of the program switches S6 - S9 are taken into account in the evaluation.



- With the VALVE key, the indicator can be flushed out of the measuring chamber.

Exiting the diagnostic program

After checking the instrument functions, switch program switch S12 back to the OFF position = analysis mode.

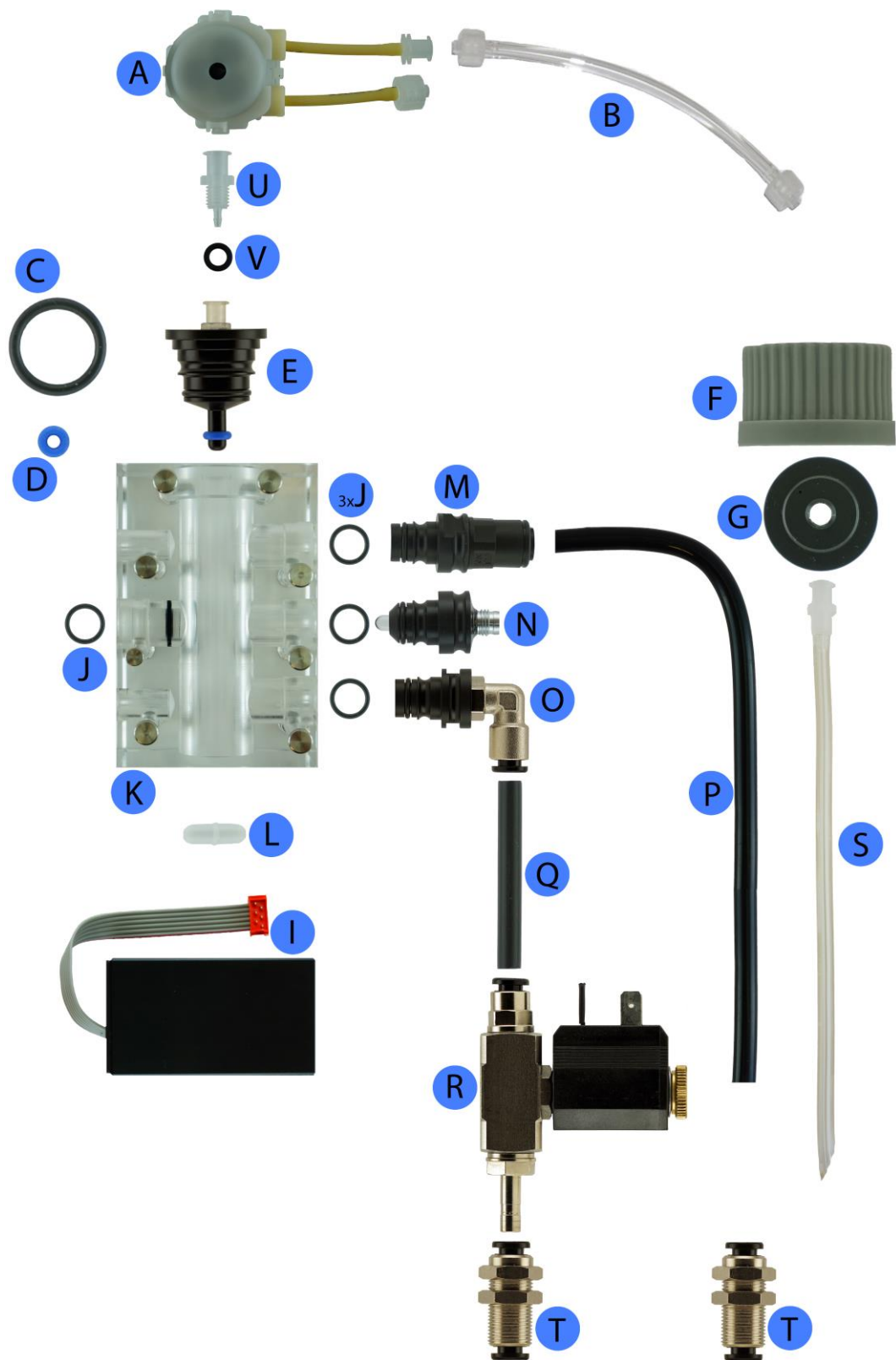


S12	Function
OFF	Exit diagnostic program / Analysis mode

Close the cover of the control unit.



Switch all program switches back to their original position after the diagnostic program has been executed, or according to the local operating conditions.



Spare parts

pos.	Article description	Order number
A	Hose pump cassette 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	Indicator plugs incl. pos. C, D, V, W	33-090 716
F	bottle cap	33-093 060
G	bottle adapter	33-090 009
I	Agitator	33-090 056
J	O-ring 9 x 1.5	33-090 210
K	Measuring chamber	33-090 731
L	Agitator blade	33-090 002
M	Drain plug 6 mm incl. item J	33-090 712
N	Actuator plug LED incl. Pos. J	33-090 713
O	Inlet plug 1/4" incl. item J	33-090 711
P	drain connection 6 mm	33-090 015
Q	supply connection 1/4"	33-090 013
R	Solenoid valve with connections incl. pos. X	33-090 014
S	Suction lance	33-090 011
T	Bulkhead screw connection 6 mm	33-090 016
U	Hose pump connection	33-090 414
V	O-ring 5.28 x 1.78	33-090 215

Spare parts without illustration

Article description	Order number
Measuring chamber incl. plug (E, M, N, O, L)	33-090 700
Display board Sycon 2502	33-090 098
Main board Sycon 2502 (24 V AC/DC version)	33-091 185
Main board Sycon 2502 (230 VAC version)	33-090 093
Hose pump cassette with motor SYCON 2502	33-090 227
Maintenance set SYCON 2502 incl. position A, B, C, D, S, 4 x J, L	33-090 028
Cleaning set SYCON CLEAN (For contents of the set, please refer to the chapter Spare parts > Maintenance sets)	30-010 900
Cleaner FIT 3000 (1000 ml) for cleaning the measuring chamber	32-089 100

Maintenance sets

Maintenance sets

The SYCON 2502 operates largely maintenance-free. A **maintenance set is available** for the analyzer. It is recommended to change the tubing pump cassette, tubing and O-rings after 30,000 analyses or 24 months. After the maintenance interval has expired, the unit shows a maintenance note on the display. The maintenance counter must be reset or acknowledged after maintenance has been carried out.



It is also recommended to clean the measuring chamber regularly, at least every 6 months. The **SYCON Clean** cleaning set is offered for this purpose. It contains all auxiliary materials required for cleaning and the cleaning fluid **FIT 3000**.

For information on performing maintenance, see page 53 onwards.

Article description	Order number
Maintenance set for SYCON 2502	33-090 028
Contains 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 33-090 038 Hose pump cassette• 1 x 33-090 002 Stirring blade	
Cleaning set SYCON Clean	30-010 900
Cleaning set for measuring chambers, contains the following articles:	
<ul style="list-style-type: none">• 10 pairs of gloves XL• 1 x funnel made of PP• 1 x FIT 3000 cleaner (1000 ml)• 1 x pipette brush• 1 x test tube brush• 1 x container with lid	
Measuring chamber cleaner FIT 3000 (1000 ml)	32-089 100



Accessories

Article description	Order number
<p>Pressure regulator with wall bracket</p> <p>Contains the following articles:</p> <ul style="list-style-type: none"> • Pressure regulator with wall bracket • 2 x hose connection outer diameter 6mm <p>Technical data:</p> <ul style="list-style-type: none"> • Max. inlet pressure 8 bar • Control range 0.8 to 3.9 bar • A pressure gauge can be mounted optionally 	<p>33-090 734</p> 
<p>Connection set SYCON</p> <p>Contains the following articles:</p> <ul style="list-style-type: none"> • Reduction nipple stainless steel 1.4408 V4A 1/2 inch to 1/4 inch (male tapered thread) • Socket ball valve stainless steel 1.4408 V4A with 1/4 inch (cylindrical internal thread) • Straight screw-in fitting, nickel-plated brass. 1/4 inch (cylindrical male thread with sealing ring), hose connection outer diameter 6 mm • 5 meter plastic hose outer diameter 6 mm 	<p>33-000 701</p>  <p>+ 5 meter plastic hose outer diameter 6 mm</p>
<p>Sample cooler</p> <p>The maximum inlet temperature of the sample water is 40°C. If the sample water is at a higher temperature, an upstream cooler should be used. Depending on the temperature of the water and the cooling water, upstream coolers are offered for flow cooling.</p> <p>You can find further information and data sheets on our website.</p>	

Indicators

Indicators for monitoring overall hardness ^(A)

Designation Indicator	Measuring range			Item no. 500 ml bottle	Item no. 4 x 500 ml bottles
	°dH	ppm CaCO ₃	°f		
H25-0.02	0.02	0.2	0.04	32-084 115	32-484 115
H25-0.05	0.05	1	0,1	32-084 125	32-484 125
H25-0.1	0.1	2	0,2	32-084 135	32-484 135
H25-0.2	0.2	4	0,4	32-084 145	32-484 145
H25-0.3	0.3	6	0,6	32-084 155	32-484 155
H25-0.5	0.5	10	1,0	32-084 165	32-484 165
H25-1	1.0	20	2,0	32-084 175	32-484 175
H25-2	2.0	40	4,0	32-084 185	32-484 185
H25-3	3.0	60	6	32-084 195	32-484 195
H25-5	5	100	10	32-084 205	32-484 205

Indicators for monitoring carbonate hardness ^(A)

Designation Indicator	Measuring range			Item no. 500 ml bottle	Item no. 4 x 500 ml bottles
	°dH	mmol/l	°f		
C25-1	1	0.4	2	32-086 125	32-486 125
C25-1,5	1.5	0.6	3	32-086 135	32-486 135
C25-2	2	0.8	4	32-086 145	32-486 145
C25-3	3	1.2	6	32-086 155	32-486 155

The dosing quantities of the indicator are adjusted to the unit set on the device. They differ according to the selected unit of water hardness.

One bottle of indicator is sufficient for at least 5,000 limit value analyses.

- (A) The measuring instrument works with single-component indicators for different limit values. The indicators have a shelf life of 24 months when stored properly. The indicators can also be used in the Sycon 2500, 2501, 2502, 2602, 2702, 2800, 2802 analyzers.

Indicators

Interesting facts about the indicators



The measuring instrument works with single-component indicators for different limit values. The indicators have a shelf life of 24 months when stored properly (dark and cool).



Measuring water with temperatures above 40 °C must be cooled before analysis.

Color reaction in the measuring chamber

	<ul style="list-style-type: none">• Water sample is rated as "good"• Limit value not exceeded	<ul style="list-style-type: none">• Water sample is evaluated as "poor"• Limit value is exceeded
Total hardness	green	red
Carbonate hardness	yellow	purple



If the program switch S9 is set to "ON", the analysis evaluation is reversed, i.e. a message is issued when the value falls below the limit value.

Note on oxidizing agents:

Oxidizing agents such as calcium hypochlorite, chlorine, chlorine dioxide, sodium hypochlorite or ozone above the limits permitted in "TrinkwV 2012" attack the dye contained in the indicator and interfere with the measurement. An exact determination of the water hardness is therefore no longer guaranteed. An activated carbon filter upstream of the analyzer can remove these oxidizing agents from the sample water and thus enable the correct determination of the water hardness. The capacity of an activated carbon filter is used up during operation. Therefore, the activated carbon filter must be replaced at regular intervals. The effectiveness of the activated carbon filter can be tested with the aid of Caldur® test sets.

No LEDs on the device light up after switching on

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

The device is leaking

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 throttle.
A connection plug is not correctly inserted in 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 indicator is used up, or the indicator counter has not been reset after changing the cylinder.	Check the fill level of the indicator bottle.
The input contact is in "flow monitor" mode and the input contacts are not bridged.	Check that the input contact is correctly configured and connected.

Error during zero sample

Cause	Measure
The indicator is used up, or the indicator counter has not been reset after changing the cylinder.	<ul style="list-style-type: none"> Insert a new reagent bottle. Reset the level counter.
The indicator is not dissolved.	Check whether there is a stirring blade in the measuring chamber.
No indicator is dosed.	Check the dosing pump in the diagnosis program and the plug connectors in the device.

Incorrect measured value

Cause	Measure
The indicator is not dissolved.	<ul style="list-style-type: none"> Check whether there is a stirring blade in the measuring chamber. Execute the diagnostic program.
No or too little indicator is dosed.	<ul style="list-style-type: none"> Check the function of the peristaltic pump. Clean the motor shaft. Replace the hose pump cassette.
An incorrect indicator has been inserted, or the indicator has expired.	<ul style="list-style-type: none"> Insert a new reagent bottle. Reset the level counter.
The blue O-ring on the dosing plug is missing or defective.	Replace the O-ring.
Water runs permanently through the drain.	Remove any foreign matter from the solenoid valve so that it closes properly.
The sample water contains high concentrations of iron or other chemicals that interfere with the measurement.	Examine the water of the system for compliance with the device specification.



EG-KONFORMITÄTSERKLÄRUNG

EC-Declaration of Conformity

Hersteller
Manufacturer

RLS Wacon GmbH

Anschrift
Address

Eduard-Ahlborn-Str. 1
D-31137 Hildesheim

Produktbezeichnung
Product specification

SYCON 2502

Wir erklären in alleiniger
Verantwortung, dass das oben
bezeichnete Produkt mit folgenden
Europäischen Richtlinien
übereinstimmt:
*We declare that the above product is in
conformity with the following directives:*

2014/35/EU

Niederspannungsrichtlinie
Low Voltage Directive

Angewandte harmonisierte Normen
und technische Spezifikationen:
*Applied harmonised standards and
technical specifications:*

DIN EN 6100-3-2
DIN EN 6100-3-3
DIN EN 61326-1

Qualitätssicherung der Produktion
angelehnt an:
Production Quality Assessment
according to:

DIN EN ISO 9001:2015

RLS Wacon GmbH

Eduard-Ahlborn-Str. 1
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