



evoqua
WATER TECHNOLOGIES



WALLACE & TIERNAN[®] ELECTROLYTIC CHLORINATOR OSEC-B2

INSTRUCTION MANUAL



Note

Original manual!

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1. Introduction

1.1 Documentation

1.1.1 Target groups

This instruction manual is intended to provide assembly, operating, and maintenance personnel with the information they need for running and servicing the system.

This instruction manual is intended for the operating personnel. It contains important information which will enable the operator to run the system in a safe, reliable, trouble-free, and economical way. Carefully observing these instructions will help to avoid dangers, reduce repair costs and down times, improve the system's reliability, and prolong its service life.

The entitled „Installation and commissioning“ and „Maintenance...“ chapters are intended exclusively for instructed and authorized technicians. These sections contain important information on assembling, configuring, and commissioning the system and on maintenance and repair work.

All persons working with the system must have read and understood the instruction manual, in particular the safety instructions it contains.

Please consult the table of contents and the index to quickly find the information you require.

1.2 Conventions

Notes This Operating Manual contains a number of notes with different priorities marked with symbols.

Pictogram	Note	Meaning
	<i>Warning!</i>	Risk to life and limb
	<i>Warning!</i>	Risk of explosion! Smoking, flames, naked light, welding and work that may generate sparks is strictly prohibited.
	<i>Warning!</i>	Risk involving electric current. Switch the system OFF at the emergency stop switch, <ul style="list-style-type: none"> • before you open the control cabinet, • before starting any maintenance or repair work.
	<i>Caution!</i>	Failure to observe this instruction may result in damage to the system.
	<i>Note</i>	These notes facilitate work with the system.

2. Safety

2.1 Intended use

The OSEC-B2 chlorine electrolysis unit is intended for the generation of sodium hypochlorite by electrolysis of salt water. Any other or additional use is not in accordance with its intended purpose.

The manufacturer does not accept any liability for any resulting damage in such cases.

The operational safety of the device is only guaranteed if it is used in accordance with its intended application. The unit may only be used in accordance with its intended purpose as defined in the order and under the operational conditions stated in the technical specifications.

Compliance with the intended use also includes reading this operating manual and observing all the instructions it contains. Furthermore, all inspection and maintenance work must be performed at the prescribed intervals.

The operator bears full and sole responsibility if this device is put to any use which does not comply strictly and exclusively with this intended use.

2.2 General safety instructions

	The manufacturer places great emphasis on safety when working on or with the unit. This was already taken into account in the design of the system and by the integration of safety features.
<i>Safety instructions</i>	The safety instructions in this documentation must always be observed. These do not affect the validity of any additional national or company safety instructions.
<i>Safety instructions printed on the system</i>	All safety instructions attached to the unit itself must be observed. They must always be complete and easily legible.
<i>State of the art</i>	The unit has been constructed in accordance with state-of-the-art technology and the accepted safety regulations. However, if the unit is used by persons who have not been adequately instructed, risks to life and limb of such persons or third parties and damage to the unit itself or to other property cannot be ruled out. Work not described in this operating manual may only be performed by authorized personnel.
<i>Personnel</i>	The operator of the overall system must ensure that only authorized and qualified specialized personnel are permitted to work with and on the unit within their defined scope of authority. "Authorized technical personnel" refers to trained technicians employed by the operator, manufacturer or, if applicable, the service partner. Only qualified electricians may perform work on electrical components.
<i>Spare parts / components</i>	Trouble-free operation of the unit is only guaranteed if original spare parts and components are used in precisely the combination described in this operating manual. Failure to observe this instruction may incur the risk of malfunction or damage to the unit.
<i>Modifications and extensions</i>	Never attempt to perform any modifications, extensions or conversions on the unit that could have an adverse affect on safety.
<i>Electrical power</i>	During normal operation, the electrical cabinets must remain closed. Before starting any assembly, inspection, maintenance, or repair work, the unit must be switched off at the emergency stop switch and the switch must be secured against reactivation. Connect all cables in accordance with the wiring diagram.
<i>Disposal</i>	Ensure safe and environmentally-friendly disposal of agents and replaced parts.

2.3 Safety instructions specific to the unit



Warning

Sodium hypochlorite is corrosive.
If hydrochloric acid comes into contact with sodium hypochlorite, dangerous chlorine gas is released!
Put on safety goggles, protective clothing, rubber boots and gloves!
Avoid contact with concentrated hydrochloric acid or hydrochloric acid vapors!
Keep a fully functional eye wash to hand! Rinse any splashes in the eyes out immediately with copious amounts of water and seek medical attention without delay and wash any splashes off the skin with plenty of water.
Wash away any residue with plenty of water!
When diluting, never pour water into concentrated acid, always pour acid into water!
All containers or equipment which comes into contact with acid must be kept strictly separated from containers or equipment containing sodium hypochlorite.



Warning

Risk of hydrogen explosion!
The hydrogen produced while the unit is running is diluted to a safe concentration (<1.25%) using a fan and is released to the atmosphere via a vent pipe.
Do not block, modify or damage this vent pipe.
Smoking and naked light are strictly prohibited in the plant room and in the vicinity of the hypochlorite tank!

This system may only be installed and serviced by technically qualified individuals who are familiar with the content of the operating manuals for this system, the operating instructions and the regulations relating to the handling chlorine.
The operators must be given instruction on using the unit safely.
Everyone involved in operating the unit must be aware of the locally applicable operating and emergency procedures as well as the safety regulations.

3. Description

3.1 Description of the OSEC-B2

The OSEC-B2 chlorine electrolysis system is designed for the on-site production of sodium hypochlorite solution (NaClO) from diluted brine and direct current.

The sodium hypochlorite is produced at nominal solution concentration of 6 g/l chlorine. Approximately 4 kWh of electrical energy and 3,5 kg of salt (NaCl) are required for the production of 1 kg of equivalent chlorine.

The OSEC-B2 chlorine electrolysis system consists primarily of the following:

- 2 electrolyser cells with electrode channel
- Internal control cabinet for controlling and monitoring the entire sodium hypochlorite generating system, including the level controller for the external hypochlorite storage tank.
- Fully automatic water softener
- Automatic hydrochloric acid cleaning system, consisting of a 110 l PVC tank and an electric circulating pump
- Level monitoring device in the electrolyser cell that switches the unit off if the electrodes are not covered by electrolyte.
- Temperature monitoring of the electrolyte that switches the unit off if the temperature is too high or too low.
- Fittings for the dilution water inlet, adjustment, display and monitoring.
- Brine dosing pump with flowmeter and flow check.

The components listed above are mounted on a compact frame at the factory, with all piping and wiring connected.

The rectifier is installed in a separate equipment cabinet. The rectifier is described in a separate manual.

The brine solution is produced from salt (NaCl) in a separate brine tank.

The hypochlorite solution produced (NaClO) is stored in a separate storage tank and from there transferred to the points of application.

The fan and air flow monitor for the dilution of the produced hydrogen gas is mounted on the NaClO tank.

3.2 How it works

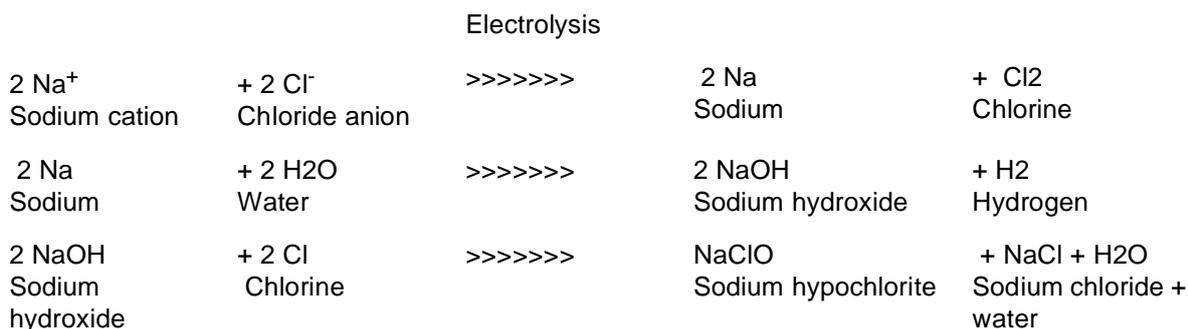
3.2.1 Electrolysis

Concentrated brine (26,5%) produced in the brine tank is fed to the electrolyser cell by the dosing pump and diluted with the completely softened water before entering the cell at the rate 1:15. The brine flowing into the electrolyser cell has a salt concentration of 19,5 g/l.

Once the electrolyser cell is completely filled with electrolyte the level monitoring device switches the rectifier on.

The NaCl dissolved in the salt water dissociates into its constituent ions: Na^+ and Cl^- . These ions are discharged by applying a voltage.

The following chemical reactions take place in the electrolyser cell when the sodium chloride solution is electrolyzed:



During electrolysis, chlorine is produced at the positive electrode (the anode) and sodium at the negative electrode (the cathode). The highly reactive sodium immediately reacts with the water, forming sodium hydroxide (caustic soda) and hydrogen, which is released as a gas.

The chloride anion produced at the anode reacts with the sodium hydroxide (NaOH) forming sodium hypochlorite (NaClO), sodium chloride (NaCl) and water (H_2O).

The amount of chemical that reacts at each electrode (M) is directly proportional to the amount of electrical charge used Q and is thus the product of the current (I) and the time (t).

$$M \sim I \times t$$

The hydrogen produced during this reaction is diluted to a safe concentration (<1.25%) using a fan and is released to the atmosphere via a vent pipe.

If the fan fails an air flow monitor switches the unit off immediately. The hydrogen dilution fan runs continuously while the unit is on and continues to run for a further 60 minutes after the unit is switched off.

The sodium hypochlorite solution produced is stored in a storage tank. Dosing is effected using dosing pumps that are governed by the chlorine demand.

Every time the sodium hypochlorite generating system is switched off the electrolyser cell is automatically flushed (see chapter 5.5 for details).

If the unit shuts down automatically during operation due to a failure it may restart automatically after a delay of approx. 3 minutes. If there are two failures within a single filling cycle of the storage tank the electrolyser cell is automatically flushed and the unit then remains off (see section 5.8 for details).

If the unit shuts down due to a power failure the unit resumes preparation as soon as power has been restored automatically in the same mode as it was in immediately before the power failure. For example, if a flushing cycle was currently underway the flushing cycle continues.

3.2.2 Water softener

To prevent calcification in the electrolyser cell, the water passes through a water softener.

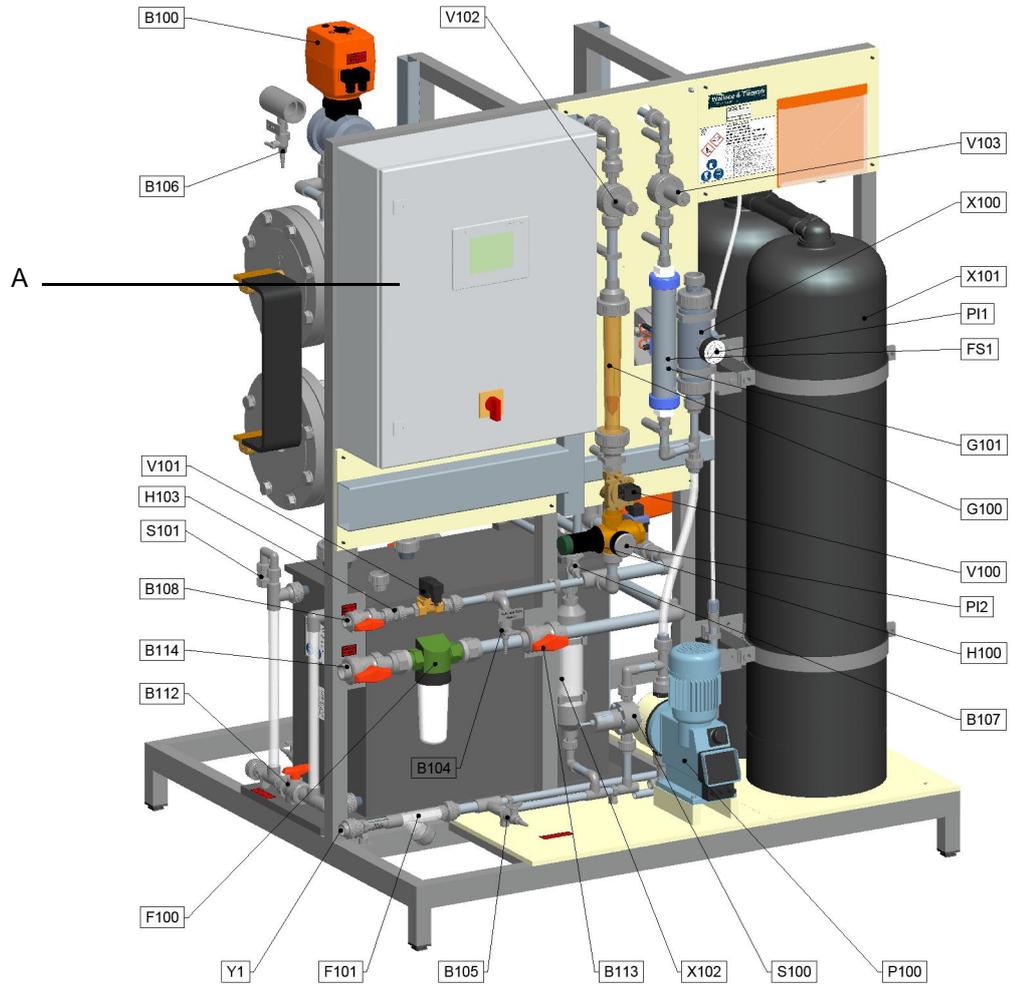
The water softener produces completely softened water from drinking water. The double water softener works without electricity, is quantity-controlled, and runs fully automatically in parallel mode and is suitable for softening water with a hardness of up to 40° dH.

Automatic regeneration is usage-based.

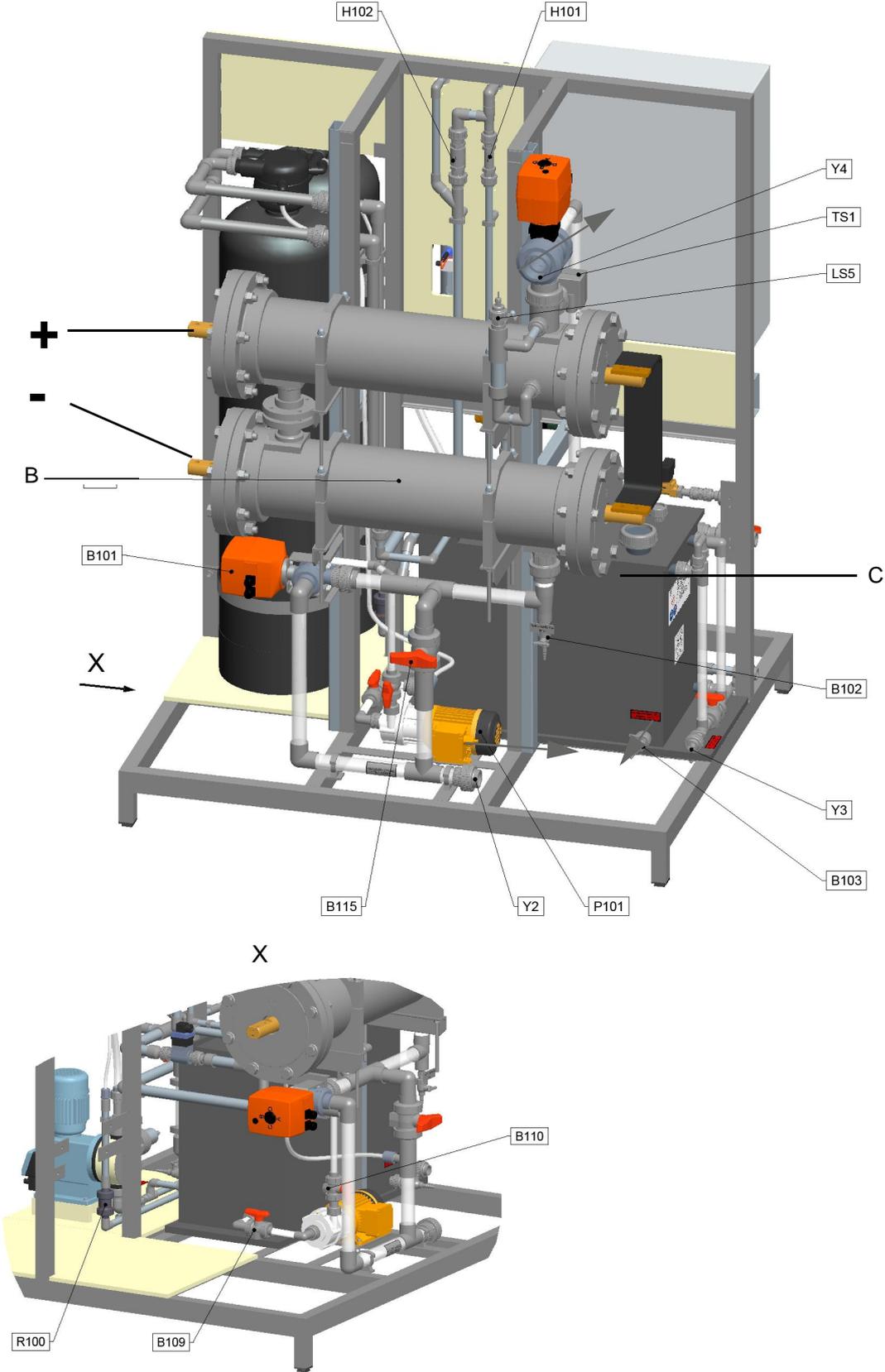
Conversion kits for softening water for a hardness of 40° to 60° are available as an optional extra.

3.3 View

3.3.1 View of OSEC B2-200



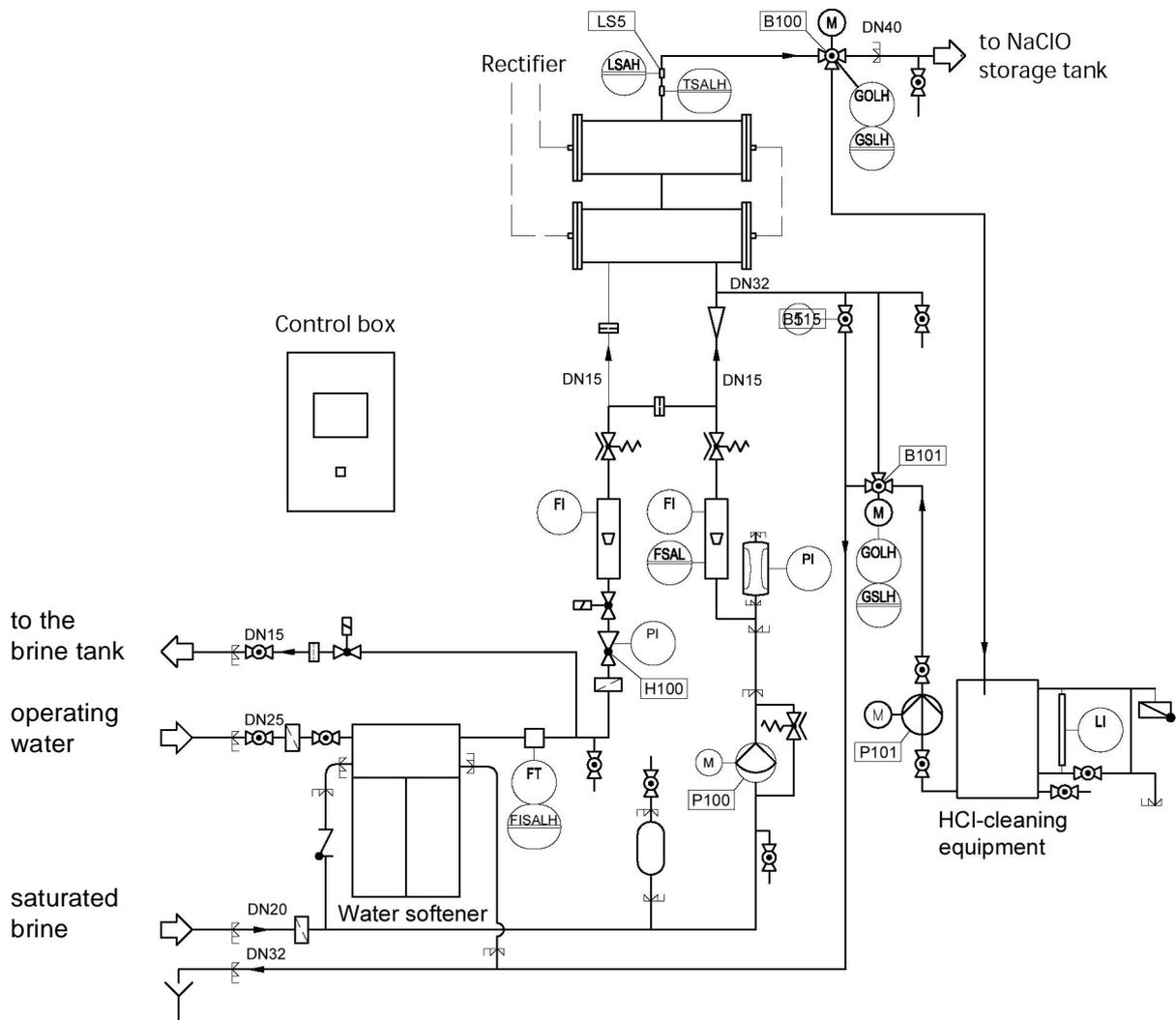
Ventilation, rectifier cabinet and power cables not shown.



A Control panel with main switch
B Electrolyser cell
C Acid storage tank

B100 Upper motor valve production/acid cleaning
B101 Lower motor valve drain/acid cleaning
B102 Diluted brine sample tap
B103 Hydrochloric acid sample tap
B104 Softened water sample tap
B105 Concentrated brine sample tap
B106 NaClO solution sample tap
B107 Ventilation pulsation damper X102
B108 Operating water to the brine tank stop cock
B109 Stop cock acid line
B110 Stop cock acid line
B112 Stop cock acid drain
B113 Operating water stop cock
B114 Operating water inlet stop cock
B115 Manual drain stop cock for electrolyser cell
F100 Operating water filter
F101 Brine filter
FT1 Softened water flow transmitter
G100 Dilution water flowmeter
G101+FS1 Concentrated brine flowmeter with limit switch
H100+PI2 Dilution water pressure reducing valve with pressure gauge
H101 Flow control valve
H102 Flow control valve
H103 Flow control valve softened water to the brine tank
LS5 Level switch MAX with sight glass
P100 Brine dosing pump
P101 Acid circulating pump
R100 Check valve at water softener inlet
S100 Pressure retention valve
S101 Hypochlorite solution storage tank vent valve
TS1 Thermostwitch
V100 Solenoid valve operating water/dilution water
V101 Solenoid valve operating water to the brine tank
V102 Pressure retention valve dilution water
V103 Pressure retention valve brine
X100+PI1 Pulsation damper brine with pressure gauge
X101 Water softener
X102 Pulsation damper brine
Y1 Brine from the brine tank
Y2 Drain electrolyser cells
Y3 Acid drain
Y4 Outlet NaClO solution

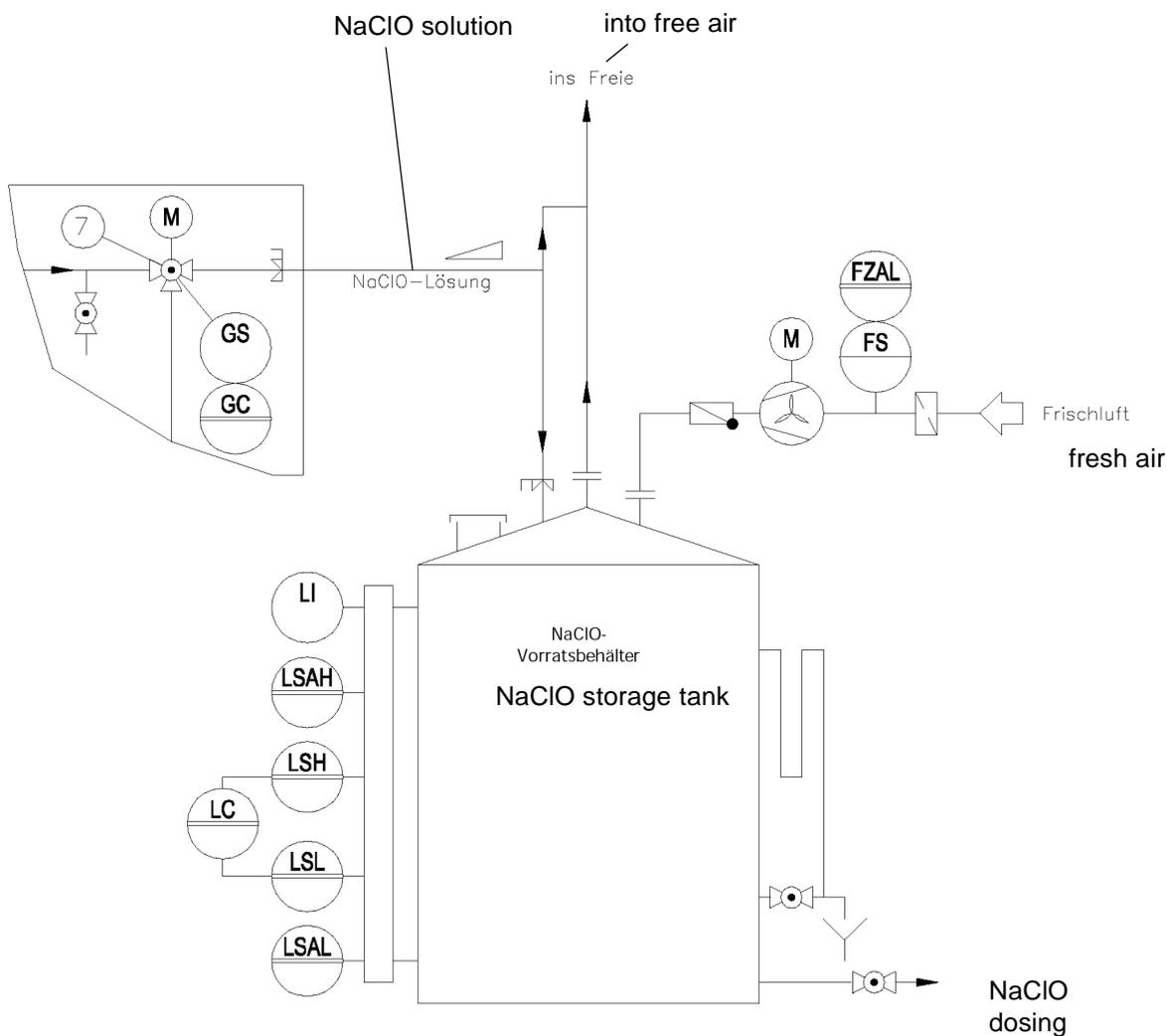
3.4 Schematic diagram



- B100 Upper motor valve production/acid cleaning
- B101 Lower motor valve drain/acid cleaning
- B112 Stop cock acid drain
- B115 Manual drain stop cock for electrolyser cell
- LS5 Sight glass and level switch
- P100 Brine metering pump
- P101 HCl circulating pump

- LSAH Level switch alarm HIGH
- TSAH Temperature switch alarm LOW/HIGH
- GOLH Gear position indicator
- GSLH Gear position switch
- FSAL Flow switch alarm LOW
- FISALH Flowmeter, limit switch, alarm LOW/ HIGH
- FT Flow transmitter
- PI Pressure indicator
- FI Flow indicator

3.5 Schematic diagram NaClO storage tank



LSAH	Level switch alarm HIGH
LSAL	Level switch alarm LOW
LSH	Level switch HIGH
LSL	Level switch LOW
LC	Level control
FS	Flow switch
FZAL	Flow alarm LOW (forced)
GS	Gear position switch
GC	Gear position control
LI	Level indicator

OSEC-B2: The fan of the hydrogen degassing unit is mounted on top of the NaClO storage tank.

The outlet pipe from the upper motor valve (B100) to the NaClO solution storage tank must have a continuous upward gradient.

3.6 OSEC-B2 scope of delivery

See also the drawings in chapters 3.4 and as well as the drawing of the specific unit in question.

- Compact frame with all piping and wiring connected:
 - Electrolyser cells with electrode channel
 - Internal control cabinet with system controls.
 - Automatic hydrochloric acid cleaning system
 - Automatic water softener
 - Fittings for the brine inlet, adjustment, display and monitoring.
- Rectifier installed in a separate equipment cabinet
- Separate NaClO storage tank (optional)
- Separate brine tank
- Hydrogen dilution fan
- Booster pump (optional)
- Hypochlorite solution dosing device (optional)
- Drip tray

3.7 Technical data

3.7.1 General data

Chlorine concentration in the sodium hypochlorite solution	approx. 6 g/l active chlorine
Operating water temperature	10 - 25°C
Operating water pressure	3.5 - 8 bar (g)
Water hardness	max. 40°dH. max. 60°dH when the corresponding kit is installed
Salt quality	calcium sulphate 0,14 % max. magnesium sulphate 0,02 % max. magnesium chloride 0,01 % max. sodium chloride 99,81 % min. not dissolved particles 0,01 % max. content of manganese not detectable

3.7.2 Performance-related data OSEC B2

OSEC-B2-200 L/G	W3T348745	W3T348746	W3T348747
Chlorine production	7,5 kg/h	10 kg/h	12 kg/h
Number of electrode pairs	2x 80	2x 108	2x 128
Anode current DC max.	1110	1495	1770
Electrolyser cell operating voltage	2x14 Volt DC		
Brine flow in l/h	80	108	128
Operating water flow in l/h	1200	1620	1920
Connecting cable rectifier to the electrolyser cell standard length 4 m	1000 mm ²	1260 mm ²	1500 mm ²
Acid tank	110 l		
Connections	Operating water inlet: d32 Brine inlet: d25 NaClO solution outlet: d63 Cell drain: d40 HCl drain: d25 to the brine tank: d20		
Dimensions (W x D x H) in mm	1500 x 1300 x 1950		
OSEC weight empty, (without rectifier)	ca. 625 kg		
Ambient temperature max.	OSEC-B2: 40°C rectifier 45°C		
Humidity	not condensing		

See separate operating manual for data of the rectifier.

4. Installation



Warning

To ensure safe operation and to avoid the risk of severe personal injury:

This system may only be installed and serviced by technically qualified individuals who are familiar with the content of the operating manuals for this system, the operating instructions and the regulations relating to the handling of the chemicals concerned.

4.1 **Transport, Storage**

- The unit is tested at the factory. There may therefore still be a small amount of water in the unit (not applicable if delivered in the winter). It is therefore very important to protect the unit from freezing during transportation, storage and, of course, during operation.
- Use suitable lifting gear to transport the unit.
Do not use a forklift (danger of tilting).
Follow the safety instructions on the packaging.
- When unpacking the unit, check the scope of delivery against the bill of materials or delivery note included. Complaints regarding the completeness of the shipment will only be accepted within three weeks of delivery.

4.2 Ambient conditions at the site



Please note

The position and equipment in the plant room must meet the requirements of the applicable national and regional regulations.

See also the operating manual for the rectifier and the drawings in chapter 7.

- The entire chlorine electrolysis system is mounted on a frame. The rectifier, the brine tank and the hypochlorite solution storage tank are separate.
- The unit is designed for indoor installation and must be protected against freezing.
- The unit should be installed in a location that provides sufficient accessibility to allow operation and maintenance.
- The room temperature must not exceed 35°C.
- The room in which it is installed must have a floor drain with an odor trap.
- The floor must be sufficiently level and strong enough to bear the weight of the chlorine electrolysis system, the rectifier cabinet and the hypochlorite solution storage tank.
- The plant room must be dry and be able to be locked, and must be capable of being well ventilated. The ventilation opening must be near to the ceiling to allow venting of any hydrogen that may be released.

4.3 Erection

4.3.1 OSEC-B1

- The unit must be erected in a position which allows at least 1 m clearance on either side to permit removal of the electrolyser cell.
- The unit must be easily accessible from the front.
- Secure the unit against tipping.

4.3.2 Rectifier unit

Refer to the project drawings and the drawings in chapter 7.

4.3.3 Hypochlorite storage tank

- 1 Place the hypochlorite storage tank on an even, level, and stable floor or foundation.
The maximum level in the tank may not be higher than the solution outlet at the OSEC-B.
Follow the instructions of the tank manufacturer.

4.3.4 Brine tank

- Install the brine tank so that there is a free flow towards the electrolyser unit (pressure min. 0,5 m head of water and max. 1,2 m, referred to the base of the OSEC unit, pay regard to the filling level).
- Install a stop valve at the outlet to the electrolyser unit.

4.4 Connecting the pipes

Connect the pipes to the unit in accordance with the assembly drawing of the specific unit and the drawings in chapter 7.

Operating water supply pipe:

- 1 Connect the operating water supply pipe to the OSEC-B unit. Adhere to the specified inlet pressure (3.5 - 8 bar) and the specified water quality. See also the technical data.

Hypochlorite outlet pipe

- 2 The hypochlorite outlet pipe from the "top" motor valve to the hypochlorite solution storage tank must be installed with a continuous upward gradient. Any hydrogen released must be able to rise towards the hypochlorite solution storage tank.

Drain pipes:

- 3 The HCl drain pipe (at the bottom of the OSEC-B frame) and the cell drain pipe (directly above it) must be drained separately to prevent backflow from one pipe into the other (which could result in chlorine gas being released).

4.5 Hydrogen venting



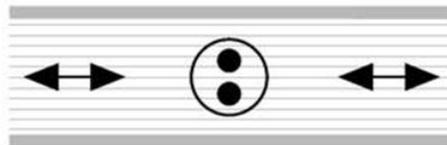
Warning

Risk of hydrogen explosion!
 The hydrogen produced while the unit is running is diluted to a safe concentration (<1.25%) using a fan and is released to the atmosphere via a vent pipe.
 Do not block, modify or damage this vent pipe.
 Smoking and naked light are strictly prohibited in the plant room and in the vicinity of the hypochlorite tank!

- 1 The hydrogen ventilation unit, which consists of a fan with a check valve, must be installed on the hypochlorite solution storage tank in such a way that the flow of air passes through the tank and into the vent pipe.
 Refer to chapter 7.
- 2 Install the vent pipe in such a way that it is as short as possible and has a continuous upward gradient without any sags.
 Maximum length: 60 m
 Min. cross-section along entire length: 100 mm.
 Lay in such a way that it is protected from damage.
 No other connections are permitted.
 The vent pipe must not end inside a building or in the immediate vicinity of areas where there is a fire hazard, e.g. naked light or fire.
 The vent opening must be above roof height or at least 3 m above ground level and must not be accessible to the public.
- 3 Affix a warning sign to the opening warning of the risk of fire and sparks.
- 4 Fit a coarsely meshed grille to the intake and exhaust nozzles to prevent debris from entering the system.
- 5 Install the air flow monitor in the ventilation duct leading to the fan (at least 1 m before the fan).

Ventilation duct

Orientation of the sensor elements in the air flow.



Please note

To prevent the plant room from cooling down too much (especially in the winter time) the air supply for dilution of the hydrogen should be from outdoors.
 The layout of the fan, ventilation and vent pipe must be agreed with Evoqua.

4.6 Electrical connection



Warning

Electrical hazard!
Work on the unit's electrical equipment may only be carried out by authorized electricians!
Follow the safety regulations.



Attention

The polarity of the electrodes must be observed.
Otherwise the electrodes will be damaged.

- 1 Connect the unit in accordance with the connection diagram and the separate operating manual for the rectifier.
- 2 Use the connecting cables or bus bars provided to connect the electrolyser cell to the rectifier.
Observe the polarity of the electrolyser cell when connecting it.
This is indicated by markings on the cell flanges and on the copper contact bolts.

Check the switching points on the double thermostat in the level and temperature control unit (on the outlet from the electrolyser cell) and adjust if necessary.

Settings:

T1 = 5°C

T2 = 50°C

4.7 Start-up

See also:

- Schematic diagram (see chapter 3.4)
- Operation of the touch panel see chapter 5.1.
- Rectifier unit operating manual

4.7.1 Preparation

After the actual unit has been set up:

- 1 Fill the brine tank with salt to 2/3 of the height.
- 2 Close the sample taps.
- 3 Check the stop valves:

Marking	Line	State
B108	Water to the brine tank	open
B109	Stop valve acid line	closed
B110	Stop valve acid line	closed
B112	Acid drain	closed
B113	Stop valve operating water	open
B114	Stop valve operating water	open
B115	Stop valve manual drain of the electrolyser cell	closed

- 4 Switch unit on at the rectifier main switch and then switch the unit on on the OSEC-B control cabinet.
- 5 The unit is primarily operated using the "SIMATIC S7" touch panel control unit, referred to below as the "TP".
Leave the main switch „ON" until start-up is continued.



Please note

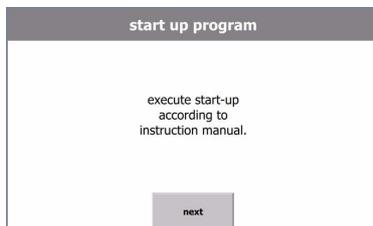
The plant can only run at full capacity if there is always enough saturated brine in the brine tank. After the brine tank has been filled with salt and softened water, it will take at least one day until enough salt has dissolved. Stirring will accelerate the solution. During operation add enough salt so that always undissolved salt is visible in the brine tank above the water level.

4.7.2 Initial start-up routine

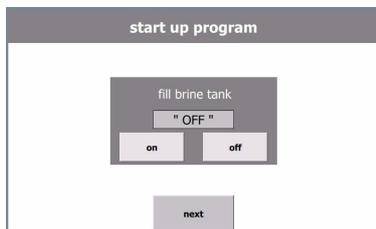
All of the unit's drives, motor valves and sensors are factory tested to ensure that they fully functional and correctly adjusted.

To check the sensors and drives installed on site, run the initial start-up routine using the text displayed on the TP. If initial start-up is not completed, all of the unit's functions are blocked.

When the unit is switched on at the main switch for the first time, the following text is displayed on the TP.



1 To continue start-up, press button "next".

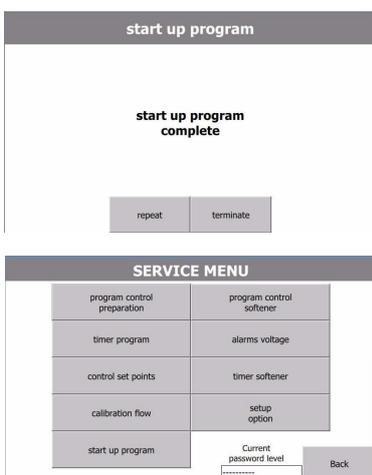
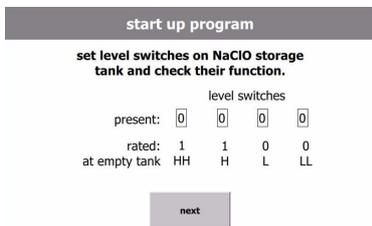
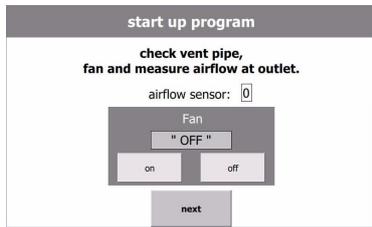


2 Determine the outlet water hardness (sample tap B104) with the measuring kit.

This value must be 0 or 1°dH if the system is ok.

3 Start the automatic filling of the brine tank.

4 Touch „next”.



- 5 Check the vent pipe to ensure that it has been laid correctly (with a positive gradient).
- 6 As soon as the fan and the air flow monitor are connected to the control cabinet they can be tested to ensure they are functioning correctly using the display.

Press "on"/"off" to test the fan:

Switching state of the air flow monitor

- 1=Air flow OK (only if the fan is running)
- 0=No air flow (only if the fan is not running)

- 7 If the fan and the air flow monitor are working properly, press "next".
- 8 As soon as all 4 of the level switches have been connected to the control cabinet they can be tested to ensure they are functioning correctly.

- HH=Overfilled
- H=MAX
- L=MIN
- LL=EMPTY

The "present" line indicates the current switching state of the level switch.

- 1=Contact ON
- 0=Contact OFF

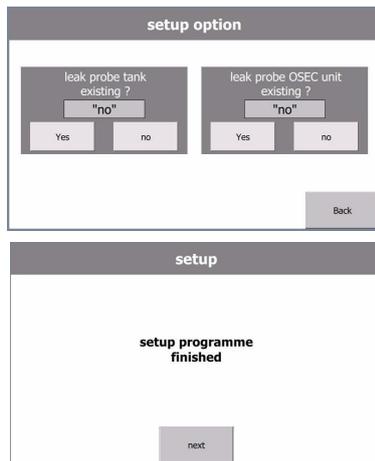
The "rated" line indicates the intended state when the tank is empty.

- 9 If the level switches are working properly, press "next".
- 10 Press "terminate" to end the start-up routine. The unit's basic functions are now active and the service menu is displayed.
- 11 Press "Back" to return to the basic display.

If there are any failures the alarm message indicator  is displayed and the alarm messages are displayed. See chapter 5.8.

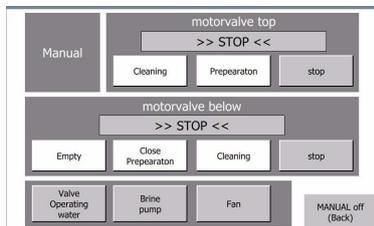
4.7.3 Setting up the optional accessories

If the unit is fitted with a booster pump or a leak detector for the hypochlorite tank or the OSEC-B plant, the leak monitoring function needs to be activated.



- 1 Press "Menu" then "Service menu"
- 2 Press "Setup options".
- 3 Activate the appropriate leak sensor.
- 4 Press "back".
- 5 This concludes setup.
Press "next".
- 6 Test the (optional) leak sensors:
Cause the leak sensors to trip. An alarm must be set off.

4.7.4 Adjusting the brine dosing pump



- 1 Touch „OSEC-B Data”.
The default settings are displayed. Take note of the „flow brine” value.
- 2 Open the brine inlet. Touch „Manual“ and „Brine Pump“.
The brine pump starts.
- 3 Adjust the brine flow at the pump P100 to the value indicated in the menu „OSEC-B Data”.
The present brine flow is displayed at the brine flowmeter G101.
- 4 Adjust the limit switch FS1 at the brine flowmeter at half of the adjusted flow.
- 5 Stop the brine pump by touching „MANUAL off“.

4.7.5 Adjusting the operating water flow

- 1 Touch „Manual“ and „Valve Operating water“.
The solenoid valve operating water V100 opens.
- 2 Adjust the dilution water flow at the pressure reducing valve H100.
The present operating water flow is displayed at the flowmeter G100 (also refer to the technical data enclosed or displayed in the menu "OSEC data").
- 3 Stop the operating water flow by touching „Manual OFF“.

4.7.6 Checking fan and air flow monitor



Attention

The safety of the unit depends on reliable monitoring of the hydrogen ventilation. The air flow monitor should therefore be checked with great care.

Check that it responds correctly when switched on and off and when the air flow is blocked several times.

Repeat the test after one hour.

- 1 Press "Manual".
- 2 Press "Fan".
The fan starts running.
- 3 Check the sensor for tight fit, tighten if necessary.
- 4 Turn the adjusting screw at the sensor with the small screwdriver (supplied with the sensor) until the LED lights green. Then turn back slowly to the switching point from green to red. Turn back ½ turn into the green range.
- 5 Stop the fan by touching „Fan“ again.
Within ca. 15 sec. the LED must turn red. If the time is longer turn the screw slightly back towards the red range.
- 6 Switch the fan on and off to check the adjustment.
- 7 Wait at least 2 min. after having switched-off the fan to stop the air flow and switch on the fan. Within ca. 30 sec. the LED must turn green (at 40 sec. the plant would switch-off and display alarm). If the time is longer turn the screw back. If a fault occurs, refer to chapter 5.8.
- 8 Switch the fan off and on to check the adjustment.
- 9 Hold a cardboard or similar in front of the air intake to stop the air flow. Within 35 sec. the LED must turn red.
- 10 Remove the cardboard.
Within 35 sec. the LED must turn green.
Otherwise repeat the adjustments of the points 5) to 9).
- 11 Switch off the fan by touching „Fan“ again.

4.7.7 Checking that the unit is functioning correctly

- 1 Switch preparation on (see also chapter 5.3.1).
- 2 As soon as the electrolyser cell is full and the rectifier has switched itself on:
Check the electrolysis current and voltage.
See chapter for the rated electrolysis current 5.10.1.
- 3 Check the hydrogen ventilation (chapter 4.7.6).
- 4 Check the external enabling signals (optional).
- 5 While the unit is running, check the temperature of the cell cable connecting terminals. The connecting terminals must not get hot. The voltage at the terminals is not dangerous.
If they do get hot:
Switch off both main switches.
Tighten the contacts, if necessary clean them.

4.8 Operator training and instruction

Provide the operator with training and instruction on the basis of the operating manual, and in particular the chapters on safety, operation and failures.



Please note

The operator of the overall system must ensure that only authorized and qualified specialized personnel are permitted to work with and on the chlorine electrolysis unit within their defined scope of authority.



Please note

All operators of the chlorine electrolysis unit must have read and understood the operating manual, in particular the safety instructions.

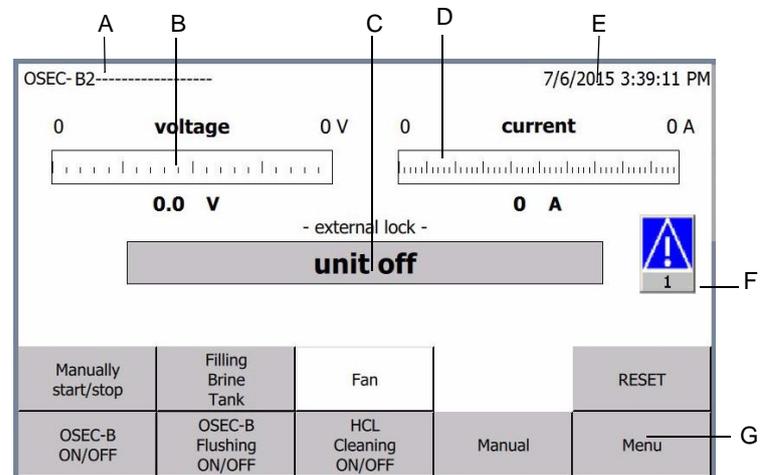
5. Operation

5.1 Operating the control unit

5.1.1 General information

- The control unit is operated by touching the marked buttons shown on the screen (touch panel).
- This can be done using a finger or the stylus supplied.
- Never touch the touch panel screen with a sharp or pointed object.
- Only touch one point on the screen at a time, otherwise you may accidentally trigger operations unintentionally.
- The buttons are indicated in the operating manual by being enclosed in quotation marks, e.g. "Menu".
- Some buttons are only displayed if the appropriate option is installed.

5.1.2 Basic display



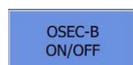
- A System type
- B Cell voltage display
- C Operating state display
- D Cell current display
- E Display of present date and time
- F Display of any failures, showing the number of failures currently pending
- G Menu selection buttons

Buttons The buttons are used to start functions and to switch between the menus and displays.

Some of the buttons have a switching function. The switching status is indicated as follows:



Button grey: Switching status "OFF"
Press the button to start preparation.



Button blue: Switching status "ON"
Press the button to stop preparation.

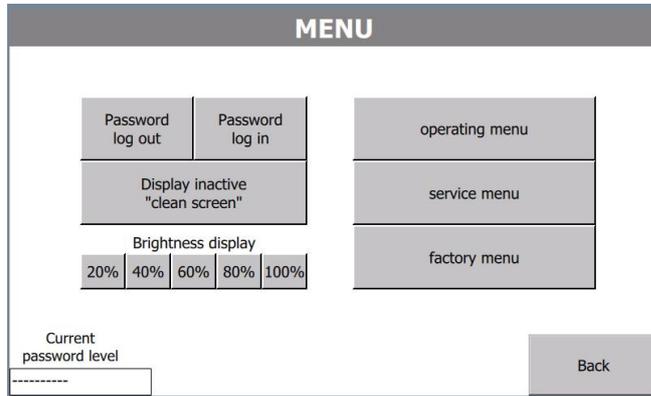


Please note

The rest of the displays are shown and described in the appropriate chapters.

5.2 Menu navigation

When the "Menu" button is pressed, the following screen is displayed.



- From this menu, you can access the other menu windows.
- A different password is required for each of the menus. The password prompt is displayed automatically when the appropriate menu is selected or you attempt to enter any data.

OPERATING MENU

- No password is required to operate the unit.
- The operator password 0940 is only required if you wish to change values or settings.

SERVICE MENU

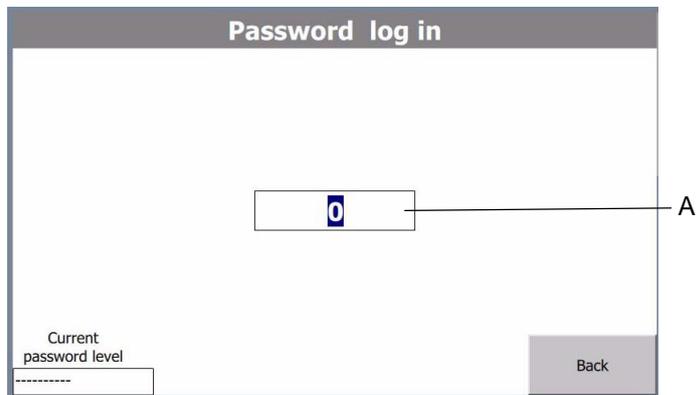
- This menu is used for the settings of the unit and for adjusting the sequence control.
- Access only for instructed installation and maintenance personnel.

FACTORY MENU

- SETUP of the unit.
- Only for start up program at the factory.

5.2.1 Entering a password

A password is requested whenever an entry protected by a password is to be made.



Press button "A".
The window displays a keyboard.



- A BSP, Backspace, delete the last character (to the left of the cursor)
- B RETURN, confirm the password entered
- C Move cursor left/right
- D ESC, leave the keyboard without storage

5 Enter the password using this keyboard and then press RETURN  to confirm.
Then press "Back".

The password level attained is displayed under "Current password level":

- Operator: Operator level
- Service: Service level
- Works: Works/factory level

If no buttons are pressed for 20 minutes the password needs to be entered again.

5.2.2 Password logout

- 1 Press "Password log out" (see 5.2).
Access is then blocked again.

5.2.3 Cleaning the screen

To clean the screen:

- 1 Press "Menu".
- 2 Press "Display inactive "clean screen".
- 3 Then wipe the screen's plastic film using only a soft, damp cloth.

After the indicated time has passed, the screen will return to its pressure-sensitive mode.

5.2.4 Adjusting the brightness of the screen

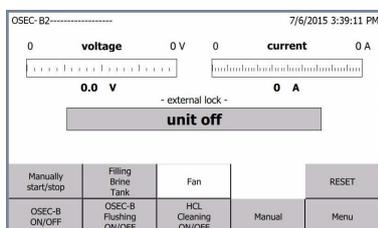
- 1 Press "Menu".
- 2 According to the need press "Brightness display 20% ... 100%".
- 3 Press „Back”.

5.3 Switching preparation on and off

Requirements:

- The unit must have been correctly installed and started up.
- The brine and operating water flow rate must be correctly adjusted.
- The air flow monitor must be correctly adjusted.
- Sufficient saturated brine in the brine tank.

5.3.1 Starting automatic preparation



1 Press button "OSEC-B ON/OFF".

The unit starts preparing product (unless the hypochlorite storage tank is full).

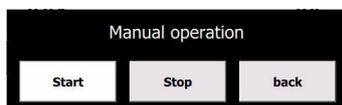
The ventilation fan starts. The required air flow rate must be established before hypochlorite preparation can begin. Next, the operating water valve opens and the brine dosing pump (N) starts. The electrolyser cell fills with diluted brine. As soon as the electrolyser cell is full the electrolysis current starts. The hypochlorite solution produced flows into the hypochlorite solution storage tank.

The unit stops automatically as soon as the hypochlorite solution storage tank is full. The electrolyser cell is then flushed automatically.

As soon as the level in the hypochlorite solution storage tank reaches MIN preparation starts again automatically.

5.3.2 Starting or stopping preparation manually

The unit can be started or stopped using this function when running in automatic mode.



1 Press button "Manually Start/Stop".

Once the button has been pressed, the following screen is displayed:

2 "Start":

Press button "Start" to start preparation, assuming that the level in the storage tank is below MAX.

3 "Stop":

Press button "Stop" to stop preparation, assuming that the level in the storage tank is above MIN.

Press button "back" to return to the normal operating mode on the display.

As soon as the level in the hypochlorite solution storage tank reaches MIN or MAX the unit reverts to automatic mode.

5.3.3 Switching preparation off

automatically: The unit stops automatically as soon as the hypochlorite solution storage tank is full. The electrolyser cell is then flushed automatically.

As soon as the level in the hypochlorite solution storage tank reaches MIN preparation starts again automatically.

manually: 1 Press "OSEC-B ON/OFF" to stop preparation. Preparation stops and the electrolyser cell is flushed automatically.

Press "OSEC-B ON/OFF" to start preparation again.

5.3.4 External stop/release contact

The control unit of the OSEC-B2 provides a digital input for external blocking/release of the sodium hypochlorite preparation. This allows the operator to turn off the preparation of sodium hypochlorite from a control room. This is possible in every operating state and is shown on the display.

If the chlorine electrolysis system is currently in preparation mode, preparation is interrupted, the system switches to the operating state "Preparation stop" and the electrodes are flushed. The system is still in automatic operation. However, the preparation of sodium hypochlorite will not start.

When the stop signal is cancelled, preparation will start as soon as the MIN level in the storage tank is reached.

5.4 Operation

If the unit was started up correctly it should operate fully automatically.

The maintenance work required to ensure trouble-free operation is outlined in the inspection and maintenance schedule.

What to do after a power failure:

- As soon as the power supply has been restored the unit resumes operation in the same mode as it was in immediately before the power failure.
- After a power failure while preparation was running the electrolyser cell is first flushed before preparation resumes as soon as the level in the storage tank falls below MIN.

5.5 Automatic flushing

The flushing cycle starts automatically when preparation is switched off.

How long a filling and draining cycle takes depends on various factors including the size of the electrolyser cell and is only given as an estimate here.

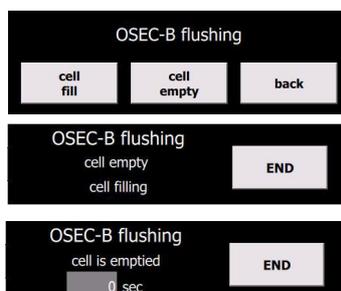
Each step of the flushing cycle is displayed on the text display.

The flushing cycle runs through the following steps:

- The operating water solenoid valve V100 opens or remains open, the brine dosing pump P100 and the transformer/rectifier are switched off. The hypochlorite solution in the electrolyser cell is displaced by water and flushed into the hypochlorite solution storage tank.
- The operating water solenoid valve V100 closes again after several minutes (depending on the size of the unit).
- Wait for 30 seconds.
- The lower motor valve B101 moves to the "EMPTY" position
- The electrolyser cells are emptied.
- The lower motor valve closes after 450 seconds.
- The operating water solenoid valve opens and the electrolyser cells fill (1st rinse).
- The operating water solenoid valve closes once the Max. level in the electrolyser cells is reached (once the "Cell level MAX." (LS5) is triggered) or once it has been filling for max. 4 - 25 min.
- The lower motor valve moves to the "EMPTY" position. The electrolyser cells are emptied.
- The lower motor valve closes after 450 seconds.
- After waiting for another 60 minutes the fan is switched off.

5.6 Manual flushing

To flush the electrolyser cell manually:



- 1 Press "OSEC-B flushing".
Once the button has been pressed, the following screen is displayed:
- 2 Press button "cell fill".
Once the button has been pressed the electrolyser cells are automatically filled with salt water until the "Cell MIN" level switch is reached.
Filling can be stopped by pressing "END".
- 3 Press "cell empty".
Once the button has been pressed the electrolyser cell is emptied automatically.
Emptying can be stopped by pressing "END".
The remaining time is displayed on the display.
Once it has finished the lower motor valve B101 closes again.

Once the filling or emptying process has finished, "OSEC-B flushing" is displayed again.

5.7 Shut-down

- 1 Before shutting the unit down for a prolonged period (more than 4 weeks), clean the electrolyser cell with hydrochloric acid (see chapter 5.12.2).
- 2 Shut off the main switches,



Caution!

The two tanks of the softener are filled with water. To prevent damage to the plant protect the plant from frost!

5.8 Failures and troubleshooting

5.8.1 Alarm messages

Incoming alarm messages are displayed on the touch panel as follows: (For example: FAILURE airflow).

FAILURE				
No.	Time	Date	Status	Text
13	10:12:31 AM	6/26/2015	K	FAILURE airflow or motor circuit breaker fan

The alarm message indicator  flashes. The number indicates the number of failures currently pending. You can move the alarm message indicator around the display with your finger.

Once the failure has been acknowledged by pressing the button  on the window in which the alarm message was displayed the message disappears again. The alarm message indicator remains visible, but stops flashing.

Press the alarm message indicator to display the list of the pending alarm messages.

No.	Time	Date	Status	Text
13	10:12:31 AM	6/26/2015	KQ	FAILURE airflow or motor circuit breaker fan

Wipe up or down to scroll through the list of the pending error messages.

Press  to close this window.



Warning

To avoid injury or damage to the system:
 Switch preparation off and wait for the flushing to be completed before performing any repairs or disassembling the unit. Always switch OFF at both main switches!
 Work on the unit's electrical equipment may only be carried out by qualified and authorized electricians!



Warning

Sodium hypochlorite is corrosive.

If hydrochloric acid comes into contact with sodium hypochlorite, dangerous chlorine gas is released!

Before disassembling any part of the unit:

Put on safety goggles, protective clothing, rubber boots and gloves!

Avoid contact with concentrated hydrochloric acid or hydrochloric acid vapors!

Keep a fully functional eye wash to hand! Rinse any splashes in the eyes out immediately with copious amounts of water and seek medical attention without delay and wash any splashes off the skin with plenty of water.

Wash away any residue with plenty of water!



Warning

Sodium hypochlorite solution may squirt out!

Before removing the level switch empty the cell until the level switch is no longer covered.

No. *)	Alarm message	Possible cause	Solution
009	FAILURE Operating water flow rate low	Flow rate incorrect	Correct the pressure reducing valve H100
		Operating water supply pipe shut off or blocked	check
		Pipe or fittings blocked	clean
		Calibration of the impeller flowmeter incorrect	calibrate (refer to 6.3.5)
		Impeller flowmeter defective	repair or replace
022	FAILURE Brine flow low	Dosing pump P100 misadjusted	check and adjust
		Brine tank empty	check the filling line
		Piping, strainer or valves blocked	clean
		Limit switch FS1 at the flowmeter G101 misadjusted	adjust
		Limit switch FS1 at the flowmeter G101 defective	repair or replace
021	FAILURE Cell voltage high/high	Brine flow rate too low or stopped	check and adjust
		Operating water flow too high	check and adjust
		Limescale deposits in electrolyser cells	Clean with hydrochloric acid. Check the hardness of the softened water (sample tap B104). Check the water softener.
		Water softener defective	Repair the water softener (specialist only)
016	FAILURE Cell level min	Manually operated "Empty cell" valve B115 is open	close
		Leakage from the fittings or the electrolyser cells	repair
		Level switch LS5 faulty	repair or replace

*) Number of the alarm message displayed

Response to failures 009, 021, 022, 016:

- Unit is switched off.
- After approx. 3 minutes the unit restarts automatically. If the alarm message repeats the unit switches itself off again, the flushing cycle starts and a common alarm is displayed. Once the flushing cycle has finished the unit can be restarted by pressing RESET.

No.	Alarm message	Possible cause	Solution
008	FAILURE Cell temperature	Operating water temperature too low	Heat the operating water
		Operating water or brine flow rate incorrect	check and adjust
		Outlet temperature too high (par exemple dilution water temperature too high, deposits on the electrodes)	Check the cause and repair, if necessary perform acid cleaning
		Sensor faulty, set incorrectly	repair or replace, adjust
013	FAILURE Air flow, vent or motor circuit breaker fan	Fan failure	repair or replace
		Ventilation duct blocked	clean
		Ventilation duct interrupted	Check the ventilation duct and repair
		Air flow monitor misaligned or failed	adjust, repair or replace Refer to 4.7.6
		Fan motor faulty	Check fan motor, repair
		Motor protecting switch setting incorrect	check, correct setting
012	FAILURE Plausibility level probes NaClO storage tank	Switching status of the level probes at the NaClO storage tank wrong	Check the switching status
014	FAILURE Water meter defective no pulses	Impeller flowmeter defective	repair or replace
018	FAILURE Measuring circuit cell voltage	Miniature fuse on the fuse terminal faulty	Determine cause, replace fuse
		Broken wire in the voltage measuring circuit	Check the measuring circuit
017	FAILURE Rectifier unit	Fault signal from the rectifier unit	Refer to the rectifier manual
		Broken wire at the contact to the rectifier	repair
004	FAILURE NaClO tank leak	Storage tank leak monitor tripped	Check the storage tank for leaks
010	FAILURE OSEC unit leak	OSEC-B unit leak monitor tripped	Check the OSEC-B unit for leaks

Response to failures 008, 013, 012, 014, 017, 018, 004, 010:

- The unit switches itself off, the flushing cycle starts and a common alarm is displayed. Once the flushing cycle has finished the unit can be restarted by pressing RESET.

No.	Alarm message	Possible cause	Solution
005	FAILURE NaClO tank overflow	MAX level switch setting too close to the switching point of the "Overflow" level switch	Adjust the level switch
		MAX level switch failure	Check the level switch and the controller
		Operating water valve does not close	Check the controller, repair or replace the solenoid valve V100

Response to failure 005:

- The unit switches itself off, the flushing cycle starts and a common alarm is displayed. Once the flushing cycle has finished the unit can be restarted by pressing RESET.

No.	Alarm message	Possible cause	Solution
002	FAILURE Level switch cell contact not open	Cell level switch blocked or faulty	loosen or replace
		Cell outlet blocked, cell cannot be drained	Check the cell outlet and unblock
003	FAILURE Level switch cell contact not closed	Electrolyser cell level switch LS5 blocked or faulty	loosen or replace
		Leakage from the electrolyser cells or fittings	repair
		Manually operated "Empty cell" valve B115 is open	close

Response to failure 002, 003:

- The unit gets stuck on the current step in the cycle during flushing or cleaning.
- Common alarm.
- Once the failure has been corrected, press RESET.

No.	Alarm message	Possible cause	Solution
006 007	FAILURE Motor valve run time bottom/top	Motor valve drive faulty	repair or replace
		Motor valve position switch drive faulty or misaligned	repair or readjust (Only to be performed by Evoqua customer service or an authorized electrician)

*Response to failure 006 and
007:*

- The unit gets stuck on the current step in the cycle.
- Common alarm.
- Once the failure has been corrected, press "RESET".

No.	Alarm message	Possible cause	Solution
011	FAILURE Operating water flow high	Pressure reducing valve misadjusted or defective	check and adjust repair or replace
019	FAILURE Cell voltage MIN	Brine flow rate too high	check the dosing pump and adjust
		Operating water flow too low	check and adjust
		"Current" set point too low	Check setting and correct if necessary
020	FAILURE Cell voltage MAX	Brine flow rate too low or stopped	check the dosing pump and adjust
		Operating water flow too high	check and adjust
		Limescale deposits in electrolyser cell	Clean with hydrochloric acid

*Response to failures 011, 019
and 020:*

- The system will not switch off.
- A common alarm is displayed.

No.	Alarm message	Possible cause	Solution
026	FAILURE airflow sensor indicating OK when fan is off	Air flow sensor misadjusted or defective	adust (refer to 4.7.6), repair or replace
027	FAILURE level switch, cell unit locked	Level switch of the electrolyser cell blocked or defective	Loosen the level switch (open and close) or replace

Response to failures 026 and 027:

- Preparation cannot be started as long as the failure is not remedied.

5.9 Emergency operation

using commercially available sodium hypochlorite solution.



Warning

Sodium hypochlorite solution is corrosive. When handling commercial sodium hypochlorite solution always wear safety goggles and rubber gloves. Observe the manufacturer's instructions.

- 1 Switch off the sodium hypochlorite dosing mechanism.
 - 2 Pour a measured amount of softened water into the hypochlorite storage tank.
 - 3 Add the appropriate amount of commercial hypochlorite solution, for example with a drum pump:
24 liters of softened water
and
1 liter of commercial sodium hypochlorite solution
(150 g/l of chlorine = approx. 12%)
give
25 liters of sodium hypochlorite solution at the OSEC-B concentration of 6 g/l chlorine).
 - 4 Switch the hypochlorite dosing back on after approx. 5 minutes.
-



Please note

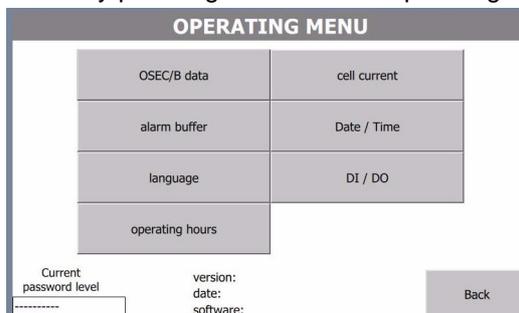
If no softened water is available:
Since sodium hypochlorite solution (NaClO) is strongly alkaline (pH > 9.5) it will cause precipitation of hardeners when mixed with tap water. This may cause problems by blocking the dosing lines, filters or valves.

To avoid this, add 0.15 g of sodium tripolyphosphate (order No. W3T171314) per liter of dilution water per degree of German hardness (total water hardness, °dGH).

Add the sodium tripolyphosphate to the dilution water and stir to dissolve before pouring it into the sodium hypochlorite solution.

5.10 Other displays in the operating menu

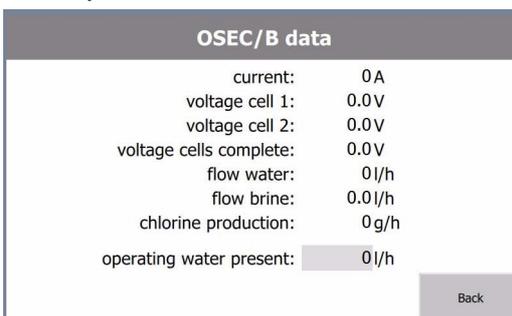
Select by pressing "Menu" then "operating menu"



5.10.1 OSEC-B data display

1 Press button "OSEC-B data".

This menu allows you to check the unit's default settings such as the salt water flow rate, cell current and operating voltage of the electrolyser cell as well as the current salt water flow rate.



2 Press „Back” to return to the operating menu.

5.10.2 Adjusting the cell current

- 1 Press button "cell current".
- 2 Enter the operator password

The current cell current is displayed.

To reduce the cell current, press the box in which the current is displayed and enter the desired value.

Press "ENTER" to save.

Press "Back" to close the window.

5.10.3 Displaying the alarm buffer

- 1 Press button "alarm buffer".

The messages in the alarm buffer are displayed, giving the date, time the fault occurred and its status (come, gone, acknowledged).

Example:

No.	Time	Date	Status	Text
15	10:15:30 AM	6/26/2015	KQG	FAILURE fill cell
13	10:15:30 AM	6/26/2015	KQG	FAILURE airflow or motor circuit breaker fan
13	10:15:23 AM	6/26/2015	KQ	FAILURE airflow or motor circuit breaker fan
15	10:15:22 AM	6/26/2015	KQ	FAILURE fill cell

K: Message received (come).

G: Message is gone

Q: Message acknowledged.

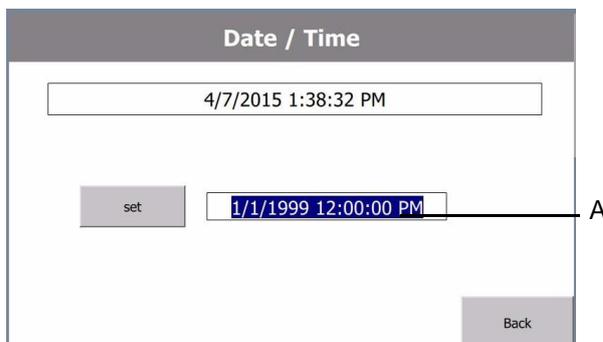
Swipe across the touch panel to scroll through the list of failures.

Press "Back" to close the window.

5.10.4 Setting the clock

- 1 Press button "Date / Time".

For the alarm buffer to be displayed correctly the clock needs to be right.



- 2 Press the box "A" to set the date and time. A keyboard is displayed.
- 3 Use this keyboard to enter the date and time in the following format:
dd/mm/yyyy hh:min:sec
- 4 Press  to confirm. The display reverts to the window shown above.
- 5 Press button "set". The clock is then set. Updating the date and time in the box at the top of the window may take up to 10 seconds. The clock does not automatically switch between summertime and wintertime.

5.10.5 Language selection

Here you can select the language used for the corresponding buttons on the touch panel.

- 1 Press button "language".



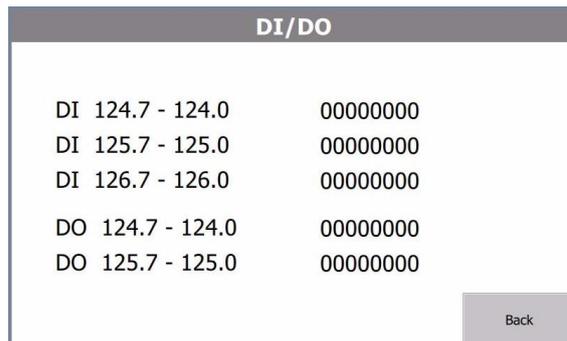
- 2 Press the button for the language you wish to select.
- 3 Press "Back".

5.10.6 Displaying digital inputs and outputs

1 Press "DI / DO".

This menu is used to monitor the inputs, outputs and alarm inputs of the control.

- 3 x 8 inputs
- 2 x 8 outputs



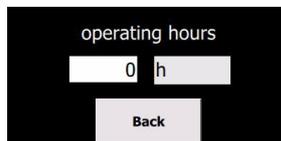
DI/DO	
DI 124.7 - 124.0	00000000
DI 125.7 - 125.0	00000000
DI 126.7 - 126.0	00000000
DO 124.7 - 124.0	00000000
DO 125.7 - 125.0	00000000

Back

5.10.7 Displaying the number of operating hours

1 Press "operating hours".

The operating hours are displayed



5.11 Water softener

The water softener operates automatically. The regeneration cycle is started after a preset throughput volume.

5.12 Maintenance by the operator

5.12.1 OSEC-B inspection and maintenance schedule

OSEC-B inspection and maintenance schedule

Period/ Interval	Maintenance level*	Work to be performed	Resources	OK	Not OK	Corrected
Daily	1	<ul style="list-style-type: none"> Visual check of the system for possible leaks and of the settings (flow rates, current, voltage) to ensure that the unit is functioning correctly. 				
Weekly	1	<ul style="list-style-type: none"> Check water hardness of the softened water, start regeneration if necessary (6.5.1) Check the flow meter and filter for debris or contamination and clean if necessary 				
Monthly	1	<ul style="list-style-type: none"> Fan: Drain any condensation (Unscrew the cap at the bottom of the fan casing) Check the free blow in the hydrogen exhaust pipe, check for leaks 				
after 4 months each	1	<ul style="list-style-type: none"> Clean the electrolysis cell with HCl Empty the pulsation damper X102 Check the pressure at the pulsation damper X100: ca. 1 bar 				
after 6 months each	1	<ul style="list-style-type: none"> Clean the brine filter F101 				
Annually	2	<ul style="list-style-type: none"> Replace the operating water filter cartridge F100 NaClO dosing pump maintenance (See separate operating manual) 				

Maintenance level 2 must be performed by technicians specially trained by the manufacturer or customer service technicians of the manufacturer.

Before performing any other work, always contact specially trained customer services of the manufacturer.

Document all modifications and other work performed in the logbook!

5.12.2 Cell cleaning

The electrolysis cell should be cleaned with 5% HCl solution

- at the latest after 4 months.
- If the unit is not going to be used for an extended period of time,
- If there is a marked increase in the cell voltage.

While it is being cleaned, which takes approx. 30 minutes, a 5% HCl solution is pumped around the system and through the electrolysis cells.

The HCl tank holds approx. 90-100 l.



Warning

Risk of injury!

Always follow the manufacturer's safety instructions when handling acid!

Wear safety goggles and/or a full face shield, protective clothing and gloves!

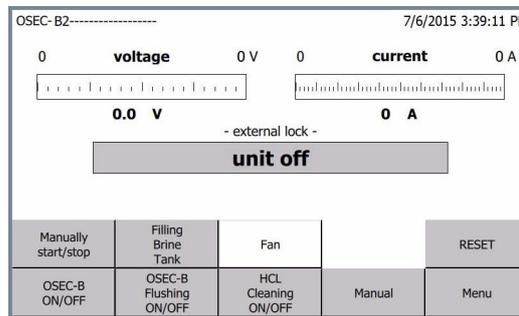
The HCl cleaning program can be started at any time by touching "HCl Cleaning ON/OFF".

When started during operation, the OSEC continues until the NaClO tank is filled. Then the cell is flushed and subsequently cleaned with HCl. After the cleaning, operation restarts as soon as the level in the NaClO tank is down to LOW.

All the steps of the cleaning program as well as the remaining running time are displayed.

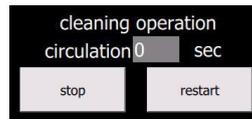
- 1 Before starting the cleaning cycle, check the hydrochloric acid in the tank „C” and top up if necessary.
The minimum level is 40 cm (= approx. 80 l).
The test box supplied with the unit can be used to check the activity of the acid.
Half fill the test tube with the acid you wish to test using the pipette provided (from tap B103). If the acid is still active, bubbles should be produced when a test tablet is dropped into the test tube.
If the acid has been consumed, and is thus no longer active, no bubbles will be produced. If this is the case, dispose of the consumed acid safely and refill the tank with fresh 5% hydrochloric acid.
- 2 Check that the taps and stop cocks B103, B109, B110 and B112 are closed.

Starting HCl cleaning 1 Press "HCl Cleaning ON/OFF" to start the cleaning program.



Wait for 240 seconds. During this time the lower motor valve B101 is in the "Empty" position so that any remaining water can drain from the electrolysis cells. The top motor valve B100 moves to the "Cleaning" position. The lower motor valve B101 moves to the "Cleaning" position. The HCl pump P101 starts. Cleaning takes 30 minutes.

(The 30 minute cleaning cycle can be aborted by pressing "stop" or can be extended by an additional 30 minutes by pressing "restart").



The HCl pump stops.
 Wait for 600 seconds, during which time the HCl solution continues to flow back into the HCl tank.
 The lower motor valve closes.
 The operating water solenoid valve opens and the electrolyser cells fill with water (1st flush).
 The operating water solenoid valve closes once the Max. level in the electrolyser cells is reached (once the "Cell level max." (LS5 is triggered) or once they have been filling for max. 4 - 25 min.
 The top motor valve moves to the "preparation" position.
 The lower motor valve moves to the "Empty" position and the electrolyser cells are drained.
 The lower motor valve closes after 240 seconds.
 The operating water solenoid valve opens and the electrolyser cells fill with water (2nd rinse).
 The operating water solenoid valve closes once the Max. level in the electrolyser cells is reached (LS5 is triggered) or once they have been filling for max. 10 - 25 min.).
 The lower motor valve switches to the "Empty" position.
 After another 240 seconds the cleaning program ends.

5.12.3 Replacing the operating water filter

Every year or if necessary

Material required: Spare filter cartridge W2T517586

- 1 Stop production (press OSEC-B ON/OFF).
- 2 Wait for the flushing to stop.
- 3 Close the stop cocks B113 and B114.
- 4 Unscrew the filter F100.
- 5 Replace the filter cartridge and close the filter.
- 6 Open the stop cocks B114 and check for leaks.
- 7 Open the stop cock B113.
- 8 If necessary restart production.

5.12.4 Cleaning the brine filter

Every 6 months

- 1 Stop production (press OSEC-B ON/OFF).
- 2 Close the brine line.
- 3 Place a bucket or similar under the brine filter F101.
- 4 Unscrew the filter tube.
- 5 Clean the filter tube and close the filter.
- 6 Open the stop cocks AD and check for leaks.
- 7 Open the brine line.
- 8 If necessary restart production.

6. Maintenance by specialists

See also the inspection and maintenance schedule.

We recommend concluding a service contract with Evoqua customer service for annual maintenance.

For the maintenance of the rectifier refer to the separate instruction manual.

6.1 Maintenance of the OSEC

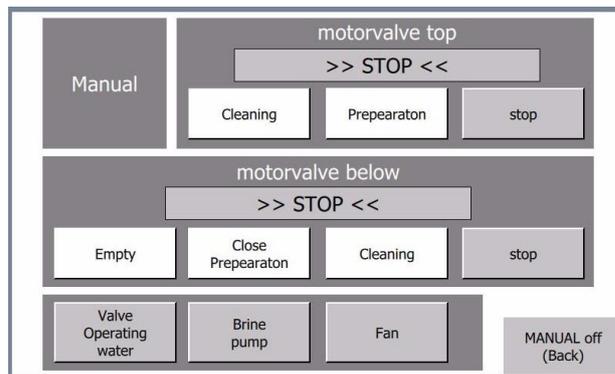
Regular service of the system is part of the liability for defects. Level 2 maintenance must be carried out by Evoqua service personnel or by personnel that have been trained and authorized by Evoqua.

The parts required for the maintenance are included in the maintenance parts set.

Differents sets are required for the maintenance every year and every 5 years (refer to 6.6).

6.2 Manual operation

The manual operating mode is intended for performing setting and maintenance work on the motor valves and drives. This function is only active if the unit is not in automatic mode.



Press "MANUAL off (Back)" to hide the manual operating controls again. All of the systems that were switched on in Manual mode are then switched off.

6.2.1 Fan

Press "Fan" to switch the fan on or off. Its operating state is indicated by the button changing color:

- Button grey: off
- Button blue: on

6.2.2 Operating water solenoid valve

Press "Valve Operating water" to open or close the valve. Its operating state is indicated by the button changing color:

- Button grey: closed
- Button blue: open

6.2.3 Brine dosing pump

Press "Brine pump" to switch the pump on or off. Its operating state is indicated by the button changing color:

- Button grey: stopped
- Button blue: on

6.2.4 Motor valve below

The manual operating options for the "Down" motor valve are then displayed.



"Empty" The motor valve moves to the Empty position

„Close/Preparation“ The motor valve moves to the Close/Preparation position

„Cleaning“ The motor valve moves to the Cleaning position

„stop“ The motor valve drive stops.

The current position of the valve is displayed on the second line of the display:

>> stop << The drive is stopped

< ---- > Drive running

>> Empty << Valve is in the Empty position

>> Cleaning << Valve is in the Cleaning position

>> Close/Preparation << Valve is in the Close/Preparation position

6.2.5 Motorvalve top

The manual operating options for the upper motor valve are then displayed.



„Cleaning“ The motor valve moves to the Cleaning position

„Preparation“ The motor valve moves to the Preparation position

„stop“ The motor valve drive stops.

The current position of the valve is displayed on the second line of the display:

>> stop << The drive is stopped.

< ---- > The drive is running.

>> Cleaning << Valve is in the Cleaning position

>> Preparation << Valve is in the Preparation position

6.2.6 Stopping manual operation

Press „MANUAL off (Back)“.

The display „Manual operation“ is no longer shown.

All functions switched on in the manual function are switched off resp. closed.

6.3 Service menu

These functions can be used to intervene in the chlorine electrolysis unit's sequential control system (status operation). It also allows all of the timing parameters and limit values for operation of the unit to be changed.



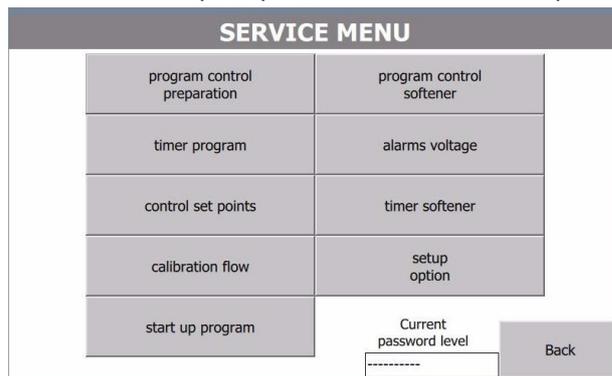
Attention

These service functions may only be performed by authorized personnel (service personnel of the manufacturer or service personnel trained and authorized by the manufacturer) familiar with how the unit functions, the operating procedure and the hazard involved.

No guarantee can be given for the correct functioning or safety of the unit if certain parameters are incorrectly configured.

Press "Menu" and „Service Menu“.

You will then be prompted to enter the service password.



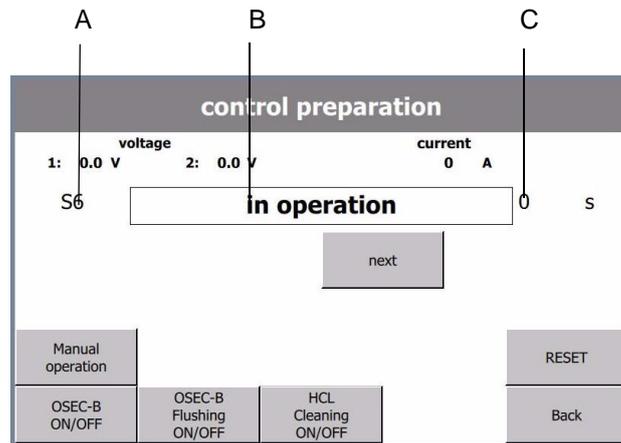
To enter or change the settings on the screen, proceed as follows:

- 1 Select the parameter you wish to change.
- 2 Press the input box.
- 3 Enter the value using the numeric keypad.
- 4 Press RETURN  to confirm and save.

6.3.1 "Control preparation" menu

This function can be used for single-step execution of the program.

This function is only intended for monitoring and for manual intervention in the program when performing configuration or maintenance work.



A Current step number in the program.

B Description of the current step (see also the next chapter)

C For time-related functions: Display of the remaining time.

- 1 Press „program control preparation“.
 - If it is possible to proceed within the current step of the program then the "next" button is displayed.
 - Press "next" to proceed to the next step in the program.

6.3.2 "Timer program" menu

This function can be used to adjust the time settings for the program sequence.

The screenshot shows a menu titled "timer program" with the following settings:

- monit. filling cell: 0 s
- time displacement: 0 s
- waiting time after displacement: 0 s
- time to empty cell: 0 s
- time HCl cleaning: 0 s
- time HCl reflux: 0 s
- time auto restart: 0 s
- run-out time fan: 0 s

A "Back" button is located at the bottom right of the menu.

Monitor fill cell

Monitoring time for filling the electrolysis cell:
Value depends on the system capacity

Time displacement

Displacement time of the contents of the cell (flushing):
Value depends on the system capacity

Waiting time after displacement

(flushing): Factory setting: 30 s

Time to empty cell

The time taken to empty the cell (flushing):
Value depends on the system capacity

Time HCl cleaning

The circulation time for HCl cleaning:
Factory setting: 1800 s

*Time HCl reflux
After cleaning*

The time taken for the HCl to flow back into the HCl tank from the electrolysis cell:
Value depends on the system capacity

*Time auto restart
alarm deactivation*

The time taken to restart the unit after an incident (1 x restart):
Factory setting: 180 s

Run-out time fan

The time the ventilation fan continues turning for after preparation is switched off:
Factory setting: 3600 s

6.3.3 "Alarms voltage" menu

Limit value settings for voltage monitoring.

The screenshot shows a menu titled "alarms voltage" with the following settings:

- Limit value cell voltage MIN: 0.0 v
- cell voltage MIN indication delayed: 0 s
- cell voltage MIN alarm delayed: 0 s
- Limit value cell voltage MAX: 0.0 v
- cell voltage MAX indication delayed: 0 s
- cell voltage MAX alarm delayed: 0 s
- Limit value cell overvoltage: 0.0 v
- cell overvoltage alarm delayed: 0 s
- monit. meas.-circuit: 0.0 v

A "Back" button is located at the bottom right of the menu.

<i>Limit value cell voltage MIN</i>	Value depends on the system capacity
<i>Cell voltage MAX alarm delayed</i>	Factory setting: 30 s
<i>Cell overvoltage alarm delayed</i>	Factory setting: 300 s
<i>Limit value cell voltage MAX</i>	Value depends on the system capacity
<i>Cell voltage MAX alarm delayed</i>	Factory setting: 30 s
<i>Cell overvoltage alarm delayed</i>	Factory setting: 300 s
<i>Limit value cell overvoltage</i>	Unit is switched off. Value depends on the system capacity
<i>Cell overvoltage alarm delayed</i>	Factory setting: 3 s
<i>Limit value MIN/MIN Voltage measuring circuit</i>	Limit value minimum voltage for monitoring the measuring circuit: Factory setting: 1.5 V

6.3.4 "Control set points" menu

Monitoring time settings:

The screenshot shows a 'control set points' menu with the following settings:

- Limit value operating water MIN: 0 l/h
- operating water MIN start alarm: delayed: 0 s
- operating water MIN alarm delayed: 0 s
- Limit value operating water MAX: 0 l/h
- operating water MAX alarm delayed: 0 s
- brine flow MIN start alarm: delayed: 0 s
- brine flow MIN contact off: delayed: 0 s
- cell MIN contact off: delayed: 0 s
- air flow MIN start alarm: delayed: 0 s
- motorvalve below monitoring time: 0 s
- motorvalve top monitoring time: 0 s

A 'Back' button is located at the bottom right of the menu.

<i>Limit value operating water MIN</i>	Value depends on system size.
<i>Operating water MIN start alarm: delayed</i>	Startup delay for the flow MIN alarm after opening the solenoid valve: Default value 10s
<i>Operating water MIN alarm delayed</i>	Alarm delay time for operation water flow MIN: Default value 10s
<i>Limit value operating water MAX:</i>	Value depends on system size.
<i>Operating water MAX alarm delayed</i>	Alarm delay time for operation water flow MIN: Default value 10s
<i>Brine flow MIN start alarm: delayed</i>	Start delay time "brine flow MIN" alarm after start of the brine pump: Value depends on system size.
<i>Brine flow MIN contact off: delayed</i>	Delay time for the cell level MIN contact: Default value 2 s
<i>cell MIN contact off: delayed</i>	Delay time for the cell level MIN contact: Default value 2 s
<i>air flow MIN start alarm: delayed</i>	Startup delay of airflow MIN alarm after start of fan: Default value 60 s
<i>motorvalve below monitoring time</i>	Running time monitor for the bottom motor valve: Default value 30s
<i>motorvalve top monitoring time</i>	Running time monitor for the upper motor valve: Default value 30s

6.3.5 “Calibration flow” menu

The operation water flow rate is measured by an impeller flowmeter.

This flowmeter has been calibrated at the factory. The following text describes in case calibration is needed (after replacing the sensor, for example).

Calibration requires shutting off the system first.

The water softener must not be in a regeneration cycle.

- 1 Press „Service menu” and then „Calibration flow”.
- 2 Press „Start calibration”.

The screenshot shows a menu titled 'calibration flow'. In the center, there is a button labeled 'Start calibration'. In the bottom right corner, there is a button labeled 'Back'.

The screenshot shows the 'calibration flow' menu with step 1: '1. open solenoid valve'. To the right of this step is a button labeled 'Valve Operating water'. A 'Back' button is located in the bottom right corner.

The screenshot shows the 'calibration flow' menu with step 2: '2. Set flow rate as flow rate is stable'. The value '0 l/h' is displayed next to the step. A button labeled 'Finished' is to the right of the value. A 'Back' button is in the bottom right corner.

The screenshot shows the 'calibration flow' menu with step 3: '3. calibration ?'. The value '0 IMP' is displayed next to the step. A button labeled 'yes' is to the right of the value. A 'Back' button is in the bottom right corner.

The screenshot shows the 'calibration flow' menu with step 4: '4. close solenoid valve'. To the right of this step is a button labeled 'Valve Operating water'. A 'Back' button is in the bottom right corner.

- 3 To open the operating water solenoid valve press „Valve operating water”.
- 4 Use the pressure reducing valve (H100) and the rotameter (G100) to exactly adjust the flow to the displayed value.
- 5 When the flow is set to the displayed value press „Finished”.
- 6 To perform calibration press „yes”.
- 7 To close the operating water solenoid valve press „Valve operating water”.
- 8 This concludes the calibration process.
Press “Back” to return to the service menu.

6.4 Unit function monitoring

Preparation is controlled by a sequential control system. (SIMATIC S7-GRAPH)

The detailed display on the touch panel allows the process of preparation, flushing and cleaning to be monitored.

It follows the functional sequence outlined below:

Step	Function
	Preparation, flushing
S1	Preparation off
S2	Unit is in stand-by (ready to start)
	Once preparation has been started (by the level switch or by being switched on manually):
S3	The motor valves top and below move to the "Preparation" position.
S4	The ventilation fan is started
S5	The electrolysis cell is filled
S6	The rectifier fan is started. The unit starts generating product.
	When preparation is switched off, the flushing program starts.
S7-9	The contents of the cell are displaced into the target container.
S10-12	The electrolysis cell is emptied
S13	The electrolysis cell is filled with water up to the electrolysis cell MIN level switch (flushing)
S14-15	The electrolysis cell is emptied
S16	The flushing program ends. The sequential control system returns to S1 or S2.
	Cleaning
	The automatic cleaning cycle can start either from step S2 or by being preselected from S16.
S30	The motor valves top and below move to the "Cleaning" position.
S31	The HCl circulation pump starts. Dilute hydrochloric acid is pumped through the electrolysis cell. The circulation time can be shortened or extended.
S32	The circulation pump stops. The acid remaining in the electrolysis cell flows back through the pump into the HCl tank.
S33	The motor valves top and below return to the "Preparation" position.

Step	Function
S34	The electrolysis cell is filled with water up to the electrolysis cell MIN level switch (1st flush)
S35-36	The electrolysis cell is emptied (1st flush)
S37-38	The electrolysis cell is filled with water up to the electrolysis cell MIN level switch (2nd flush)
S39-40	The electrolysis cell is emptied (2nd flush)
S41	The cleaning program ends. The sequential control system returns to S1 or S2.

6.5 Water softener

The double water softener works without electricity, is quantity-controlled, runs fully automatically and is suitable for softening water with a hardness of up to 40° dH.

The regeneration process lasts about 90 minutes per cylinder.

If the hardness measurement shows that the softened water has a hardness above 1° d.H. regeneration must be started manually. If the dilution water hardness still remains above 1° d.H. even after regeneration, the water softener has to be replaced.

6.5.1 Manually start regeneration

Proceed as follows:

- 1 Operating water must be open, saturated brine must be available.
- 2 Using a Phillips screwdriver, push down firmly on the softener valve screw (D) in the middle of the control disc and slowly turn clockwise until the black indicator dot (F) has been advanced to the „5.00 o'clock" (Backwash) position (C).
- 3 Wait for the regeneration to be finished (ca. 90 minutes). During regeneration the water flow through the cylinder can be heard. After regeneration the black indicator dot (F) has been advanced to the „6.00 o'clock" (Operation) position (E).
- 4 Using the Phillips screwdriver, push down firmly on the softener valve screw (D) in the middle of the control disc and slowly turn clockwise until the black indicator dot (F) has been advanced to the „11.00 o'clock" (Backwash) position (A).
- 5 Wait for the regeneration of the other cylinder to be finished (ca. 90 minutes). After regeneration the black indicator dot (F) has been advanced to the „12.00 o'clock" (Operation) position (B).



Water softener control disc
(top view)

- A Position „11.00 o'clock" (Backwash)
- B Position „12.00 o'clock" (operating position)
- C Position „5.00 o'clock" (Backwash)
- D Softener valve screw
- E Position „6.00 o'clock" (operating position)
- F Black indicator dot

6.5.2 Replacing the water softener

If the hardness measurement shows that the softened water has a hardness above 1° d.H. regeneration must be started manually. If the dilution water hardness still remains above 1° d.H. even after regeneration, the water softener has to be replaced.

Replacing the water softener must be handled by qualified and authorized service specialists.

Before replacing the water softener shut off the OSEC-B2 at both main switches and stop the water supply.

Commissioning the new water softener

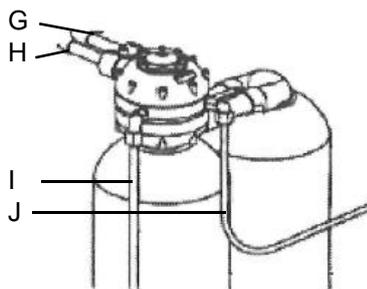
Before commissioning both cylinders of the softener must be purged and flushed.

Purge the softener:

Proceed as follows:



Water softener control disc
(top view)



- 1 Loosen the outlet pipe „softened water” and fix a ball valve (D25) to the outlet with a hose at the other end leading to a gully. Keep the ball valve closed.
- 2 To purge the cylinder 1:
Using a Phillips screwdriver, push down firmly on the softener valve screw (Philips screw) (D) in the middle of the control disc and slowly turn clockwise until the black indicator dot (F) has been advanced to the „5.00 o'clock” (Backwash) position (C).
- 3 Open the operating water inlet.
The cylinder 1 fills with water. Air and water escape through the regeneration hose (I).
Wait until only water flows out of the regeneration hose (I).
Cylinder 1 is now purged.
- 4 Purge cylinder 2 in the same way.
Keep the ball valve closed.
Turn the black indicator dot to position „11.00 o'clock” (Backwash, A).
Continue as above.

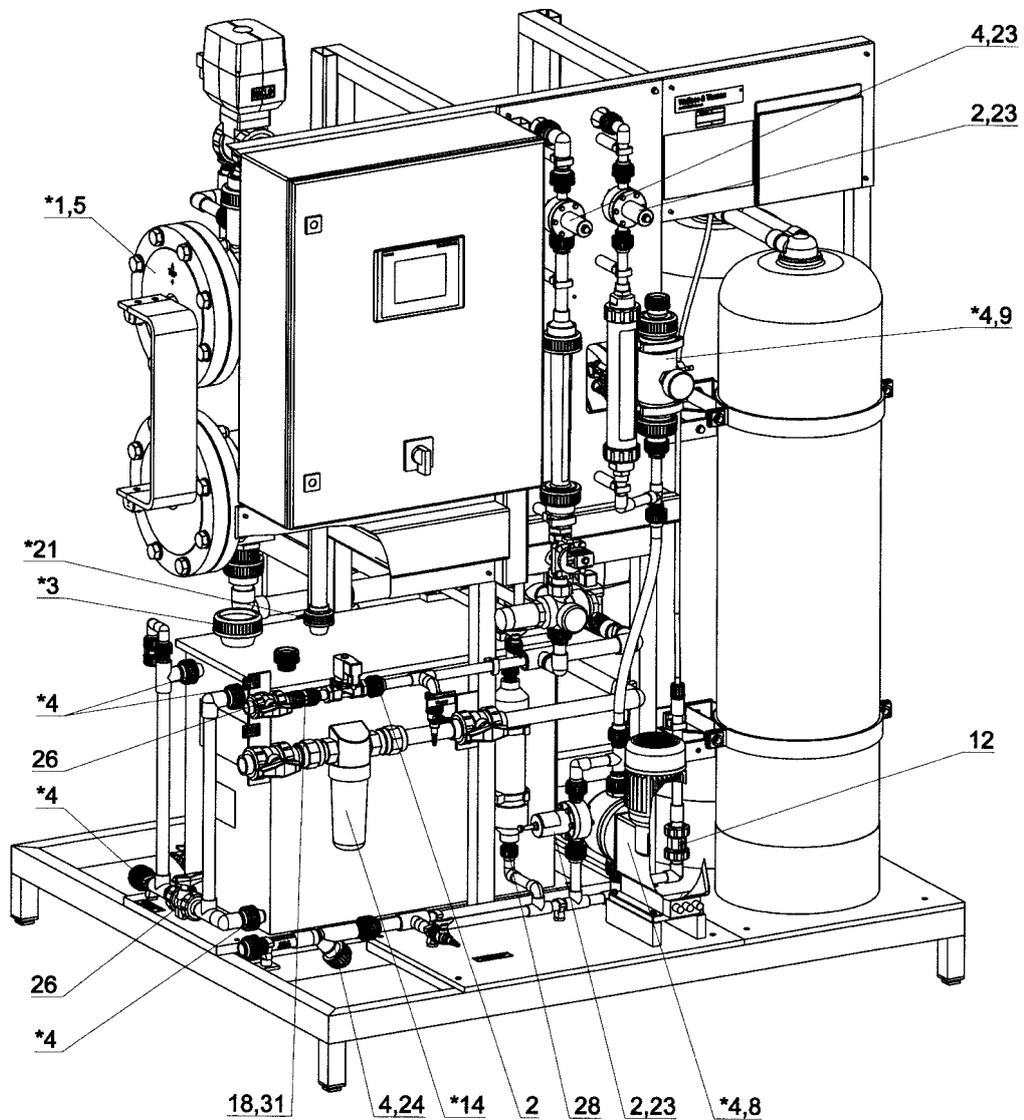
- A Position „11.00 o'clock” (Backwash cylinder 2)
B Position „12.00 o'clock” (operating position)
C Position „5.00 o'clock” (Backwash cylinder 1)
D Softener valve screw
E Position „6.00 o'clock” (operating position)
F Black indicator dot
G Outlet softened water
H Inlet raw water
I Regeneration hose
J Brine hose

Flush the softener:

- 1** Flush cylinder 1:
After having finished purging turn the black indicator dot (F) to the „6.00 o'clock" (Operation) position (E).
After about 2 minutes water should stop coming out of the regeneration hose (I). If water doesn't stop, push down firmly on the softener valve screw (D) several times.
- 2** Stop the operating water supply.
- 3** Open the ball valve at the softened water outlet to let the flushing water flow into the gully.
- 4** Open the operating water supply.
- 5** Let the water flow until clear water flows out of the softened water outlet (about 10 minutes).
Flushing of cylinder 1 is now finished.
- 6** Flush cylinder 2 in the same way.
Turn the black indicator dot (F) to the „12.00 o'clock" (Operation) position (B).
- 7** Stop the operating water supply.
- 8** Remove the ball valve at the softened water outlet. Re-connect the tube to the softened water outlet.
- 9** Open the operating water supply.
- 10** Check the water pressure.
- 11** Check the water hardness.

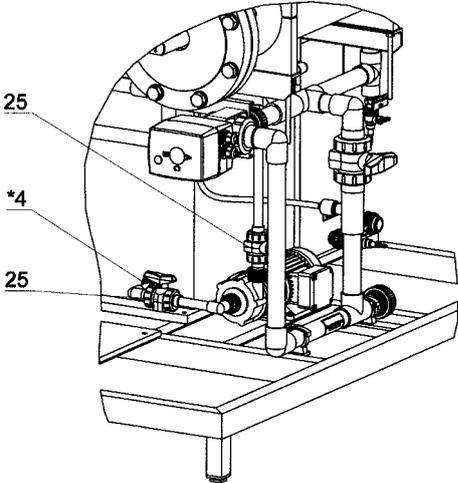
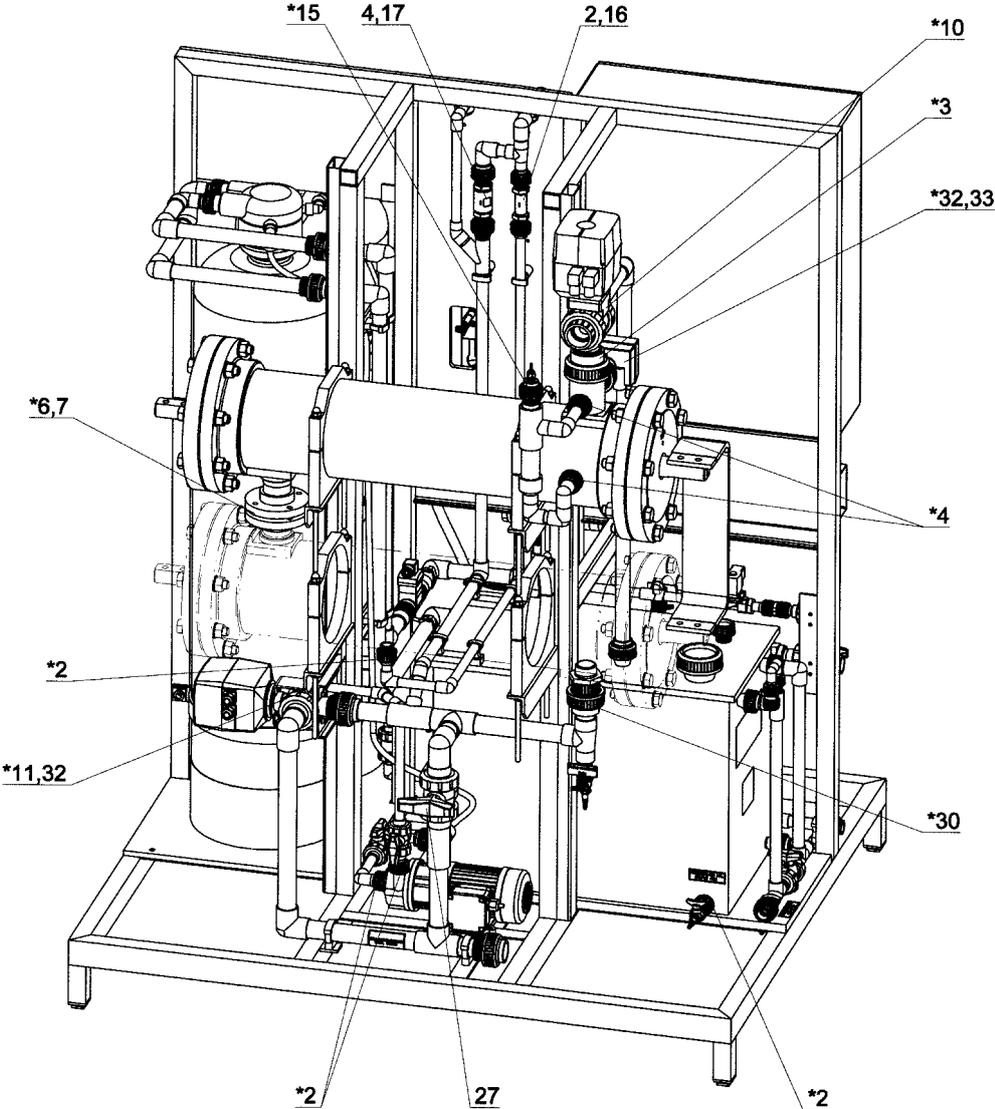
6.6 Maintenance kits

OSEC-B2	W3T348745 7,5 kg/h chlorine	W3T348746 10 kg/h chlorine	W3T348747 12 kg/h chlorine
for annual maintenance	W3T151150	W3T151150	W3T151150
maintenance for 5 years	W3T151201	W3T151202	W3T151203



*) replace every year

Replace all other parts of the maintenance kits every 5 years.



6.6.1 Maintenance kit OSEC-B2, annual (W3T351150)

(7,5/10/12 kg/h)

Pos.	part no.	Description	Qty.
1	W3T168944	O-ring d42,52x2,62/FPM	8 ea.
2	W3T172724	O-ring d20,22x3,53/FPM	4 ea.
3	W3T169199	O-ring d59,69x5,33/FPM	2 ea.
4	W3T173010	O-rng d28,17x3,53/FPM	9 ea.
5	W3T167087	Flat gasket FPM; D275xd204x3	4 ea.
6	W3T171997	O-ring d53,57x3,53/FPM	4 ea.
7	W3T169196	Flat gasket	1 ea.
8	W3T164345	Service kit Series C; 120/h; PVFPKE	1 ea.
9	W3T160716	Tubular diaphragm PDS250 Hypalon	1 ea.
10	W3T350911	Sealing kit Type 543V; d40;FPM	1 ea.
11	W3T350912	Sealing kit Type 543V; d50; FPM	1 ea.
14	W2T517586	Filter cartridge 80µm; FS1-1/4	1 ea.
15	W3T168863	O-ring d12x3/FPM	1 ea.
21	W3T172725	O-ring d32,92x3,53/FPM	1 ea.
30	W3T169199	O-ring d59,69x5,33/FPM	1 ea.
32	W3T173047	O-ring d40,64x5,33/FPM	2 ea.
33	W3T168857	O-ring d17,3x2,4/FPM	2 ea.
40	W3T165054	Test box CILLIT-SEK	1 ea.

6.6.2 Maintenance kit, 5 years (7,5 kg/h, W3T351201)

Pos.	part no.	Description	Qty.
1	W3T168944	O-ring d42,52x2,62/FPM	8 ea.
2	W3T172724	O-ring d20,22x3,53/FPM	13 ea.
3	W3T169199	O-ring d59,69x5,33/FPM	2 ea.
4	W3T173010	O-ring d28,17x3,53/FPM	19 ea.
5	W3T167087	Gasket FPM; D275xd204x3	4 ea.
6	W3T171997	O-Ring d53,57x3,53/FPM	4 ea.
7	W3T169196	Gasket	1 ea.
8	W3T164345	Service kit Series C; 120l/h; PVFPKE	1 ea.
9	W3T160716	Tubular diaphragm PDS250 Hypalon	1 ea.
10	W3T350911	Sealing kit Type 543V;d40;FPM	1 ea.
11	W3T350912	Sealing kit Type 543V;d50;FPM	1 ea.
12	W2T552515	Central part vvType;d16/20;PVC/FPM	1 ea.
14	W2T517586	Filter cartridge 80µm; FS1-1/4	1 ea.
15	W3T163929	Level switch PVC/PVDF; L=150 mm; 5 m blue	1 ea.
16	W3T346694	Flow control valve 3,5l/min; PVC/NBR; 1/2"	1 ea.
17	W3T346533	Flow control valve 18l/min; PVC/NBR; G3/4	1 ea.
18	W3T321615	Flow control valve 4,0l/min;PVC/NBR;1/4"	1 ea.
21	W3T172725	O-ring d32,92x3,53/FPM	3 ea.
23	W3T171199	Diaphragm D50x3,5/PTFE/EPDM	3 ea.
24	W3T169108	Filter screen 305; d25; 0,5mm; PVC-U; red	1 ea.
25	W2T504819	Sealing kit type 546;d16/20;FPM	3 ea.
26	W2T504820	Sealing kit type 546;d25;FPM	1 ea.
27	W2T504822	Sealing kit type 546;d40;FPM	1 ea.
30	W3T169194	O-ring d46,99x5,33/FPM	3 ea.
31	W3T169066	O-ring d12,37x2,62/FPM	2 ea.
32	W3T173047	O-ring d40,64x5,33/FPM	2 ea.
33	W3T168857	O-ring d17,3x2,4/FPM	2 ea.
40	W3T165054	Test box CILLIT-SEK	1 ea.

6.6.3 Maintenance kit , 5 years (10 kg/h, W3T351202)

Pos.	part no.	Description		Qty.
1	W3T168944	O-ring	d42,52x2,62/FPM	8 ea.
2	W3T172724	O-ring	d20,22x3,53/FPM	13 ea.
3	W3T169199	O-ring	d59,69x5,33/FPM	2 ea.
4	W3T173010	O-ring	d28,17x3,53/FPM	19 ea.
5	W3T167087	Flat gasket	FPM; D275xd204x3	4 ea.
6	W3T171997	O-ring	d53,57x3,53/FPM	4 ea.
7	W3T169196	Service kit		1 ea.
8	W3T164345	Service kit	Serié C; 120l/h; PVFPKE	1 ea.
9	W3T160716	Tubular diaphragm	PDS250 Hypalon	1 ea.
10	W3T350911	Sealing kit	type 543V;d40;FPM	1 ea.
11	W3T350912	Sealing kit	type 543V;d50;FPM	1 ea.
12	W2T552515	Central part	type 561; d16/20; PVC/FPM	1 ea.
14	W2T517586	Filter cartridge	80µm; FS1-1/4	1 ea.
				ea.
15	W3T163929	Level switch	PVC/PVDF; L=150 mm; 5m blue	1 ea.
16	W3T269141	Flow control valve	4,5l/min; PVC/NBR; 1/2"	1 ea.
17	W3T346534	Flow control valve	23l/min; PVC/NBR;G3/4	1 ea.
18	W3T321615	Flow control valve	4,0l/min; PVC/NBR;1/4"	1 ea.
21	W3T172725	O-ring	d32,92x3,53/FPM	3 ea.
23	W3T171199	Diaphragm	D50x3,5/PTFE/EPDM	3 ea.
24	W3T169108	Filter screen 305	d25; 0,5mm; PVC-U; red	1 ea.
25	W2T504819	Sealing kit	type 546;d16/20;FPM	3 ea.
26	W2T504820	Sealing kit	type 546;d25;FPM	1 ea.
27	W2T504822	Sealing kit	type 546;d40;FPM	1 ea.
30	W3T169194	O-ring	d46,99x5,33/FPM	3 ea.
31	W3T169066	O-ring	d12,37x2,62/FPM	2 ea.
32	W3T173047	O-ring	d40,64x5,33/FPM	2 ea.
33	W3T168857	O-ring	d17,3x2,4/FPM	2 ea.
40	W3T165054	Test box	CILLIT-SEK	1 ea.

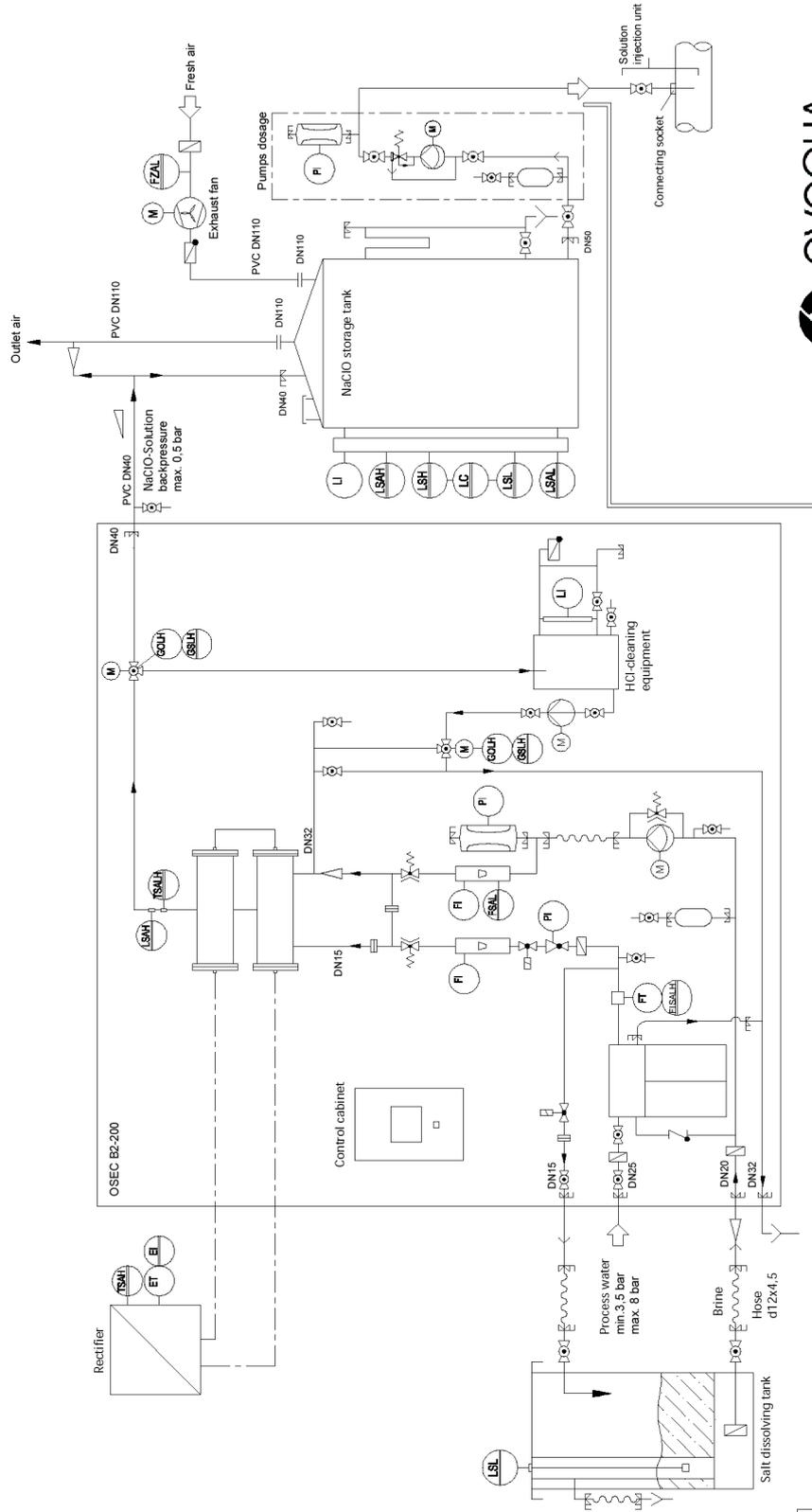
6.6.4 Maintenance kit , 5 years (12 kg/h, W3T351203)

Pos.	part no.	Description	Qty.
1	W3T168944	O-ring d42,52x2,62/FPM	8 ea.
2	W3T172724	O-ring d20,22x3,53/FPM	13 ea.
3	W3T169199	O-ring d59,69x5,33/FPM	2 ea.
4	W3T173010	O-ring d28,17x3,53/FPM	19 ea.
5	W3T167087	Flat gasket FPM; D275xd204x3;	4 ea.
6	W3T171997	O-ring d53,57x3,53/FPM	4 ea.
7	W3T169196	Flat gasket	1 ea.
8	W3T164345	Service kit Serie C; 120l/h; PVFPKE	1 ea.
9	W3T160716	Tubular diaphragm PDS250 Hypalon	1 ea.
10	W3T350911	Sealing kit Typ 543V; d40; FPM	1 ea.
11	W3T350912	Sealing kit Typ 543V; d50; FPM	1 ea.
12	W2T552515	Central part Typ 561; d16/20; PVC/FPM	1 ea.
14	W2T517586	Filter cartridge 80µm; FS1-1/4	1 ea.
15	W3T163929	Level switch PVC/PVDF; L=150mm; 5m blue	1 ea.
16	W3T346695	Flow control valve 5,5l/min; PVC/NBR; 1/2"	1 ea.
17	W3T346535	Flow control valve 28l/min; PVC/NBR; G3/4	1 ea.
18	W3T321615	Flow control valve 4,0l/min; PVC/NBR; 1/4"	1 ea.
21	W3T172725	O-ring d32,92x3,53/FPM	3 ea.
23	W3T171199	Diaphragm D50x3,5/PTFE/EPDM	3 ea.
24	W3T169108	Filter screen 305; d25;0,5mm; PVC-U; red	1 ea.
25	W2T504819	Sealing kit Typ 546; d16/20; FPM	3 ea.
26	W2T504820	Sealing kit Typ 546; d25; FPM	1 ea.
27	W2T504822	Sealing kit Typ 546; d40; FPM	1 ea.
30	W3T169194	O-ring d46,99x5,33/FPM	3 ea.
31	W3T169066	O-ring d12,37x2,62/FPM	2 ea.
32	W3T173047	O-ring d40,64x5,33/FPM	2 ea.
33	W3T168857	O-Ring d17,3x2,4/FPM	2 ea.
40	W3T165054	Test box CILLIT-SEK	1 ea.

7. Typical installations

Exemples with air cooled rectifier

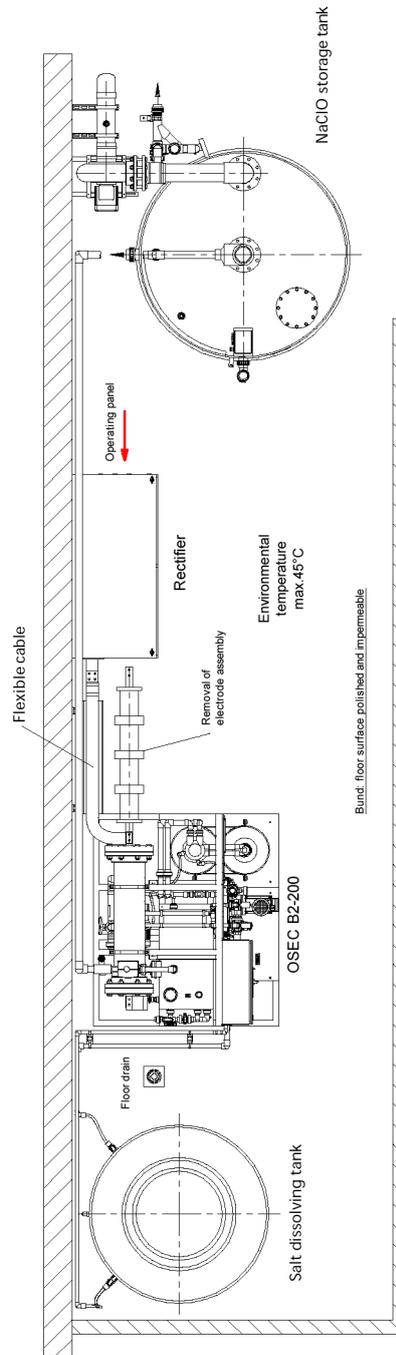
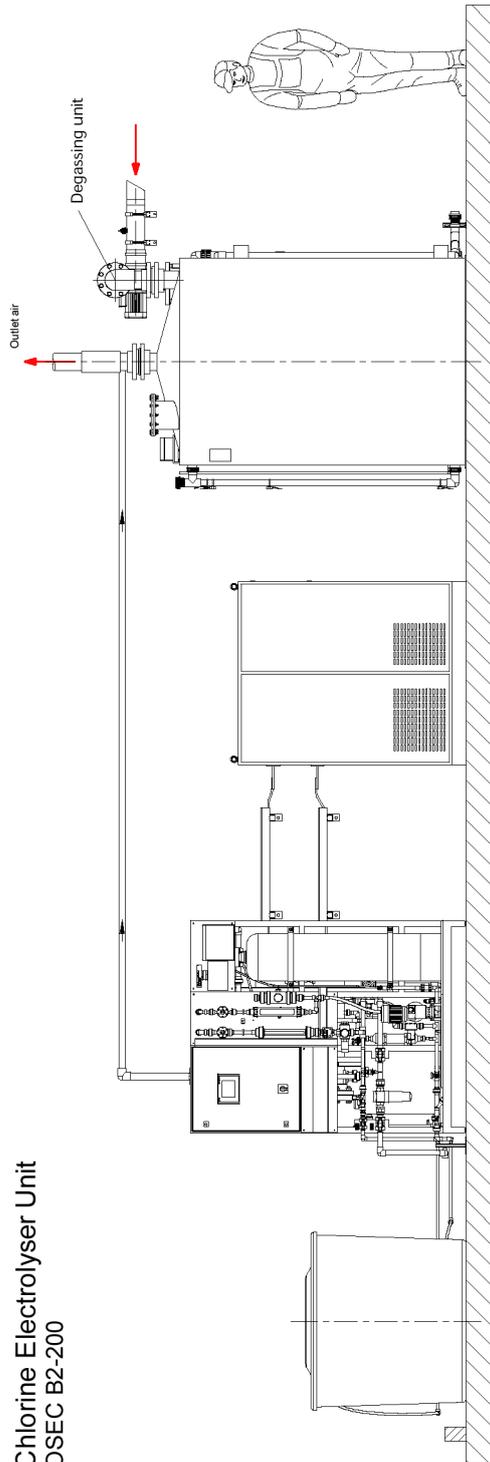
Chlorine Electrolyser Unit
 OSEC B2-200 7,5 kg/h, 10 kg/h, 12 kg/h



Typical installation
 WT.085.035.010.DE.CN.0715

Germany
 +49 8221 9040
 wiger@evoqua.com

Chlorine Electrolyser Unit
OSEC B2-200



Bund: floor surface polished and impermeable



Typical system
WT.085.035.030.DE.CN.0715

Model	Capacity [kg/h]	Rectifier air	Flexible cable	Salt dissolving tank	NaClO storage tank	Degassing unit
WAE8964	7.5	WAE8990	WAE9057	WAE3652	WAE8994	WAE9058
OSEC B2-200-7.5	7.5	D400 G34/1200	1000 mm ²	1000 / 2000 / 3800	3200 - 7000	DN110 / d125
OSEC B2-200-10	10	D400 G34/1600	1260 mm ²	1000 / 2000 / 3800	3200 - 7000	DN110 / d125
OSEC B2-200-12	12	D400 G34/1900	1500 mm ²	1000 / 2000 / 3800	3200 - 7000	DN110 / d125

Germany:
+49 8221 9040
wiger@evoqua.com

8. Wiring diagrams

Project: OSEC-B2

order number:

Customer:

Drawing number:

Date: 19.06.2015

Plant: =A1

Place: +S1

Remark:

wiring diagram DE: WAE9010
wiring diagram EN: WAE9011
wiring diagram FR: WAE9012

Description:

Chlorine Electrolyser
OSEC-B2
2 Electrolysis cells

Issue	Revision	Date	Name	Checked	Norm
1	—	19.06.15	BTG		
2	LAE9402	01.03.17	BTG	Drawn	PB
3	LAE9467	29.06.17	BTG	Date	release

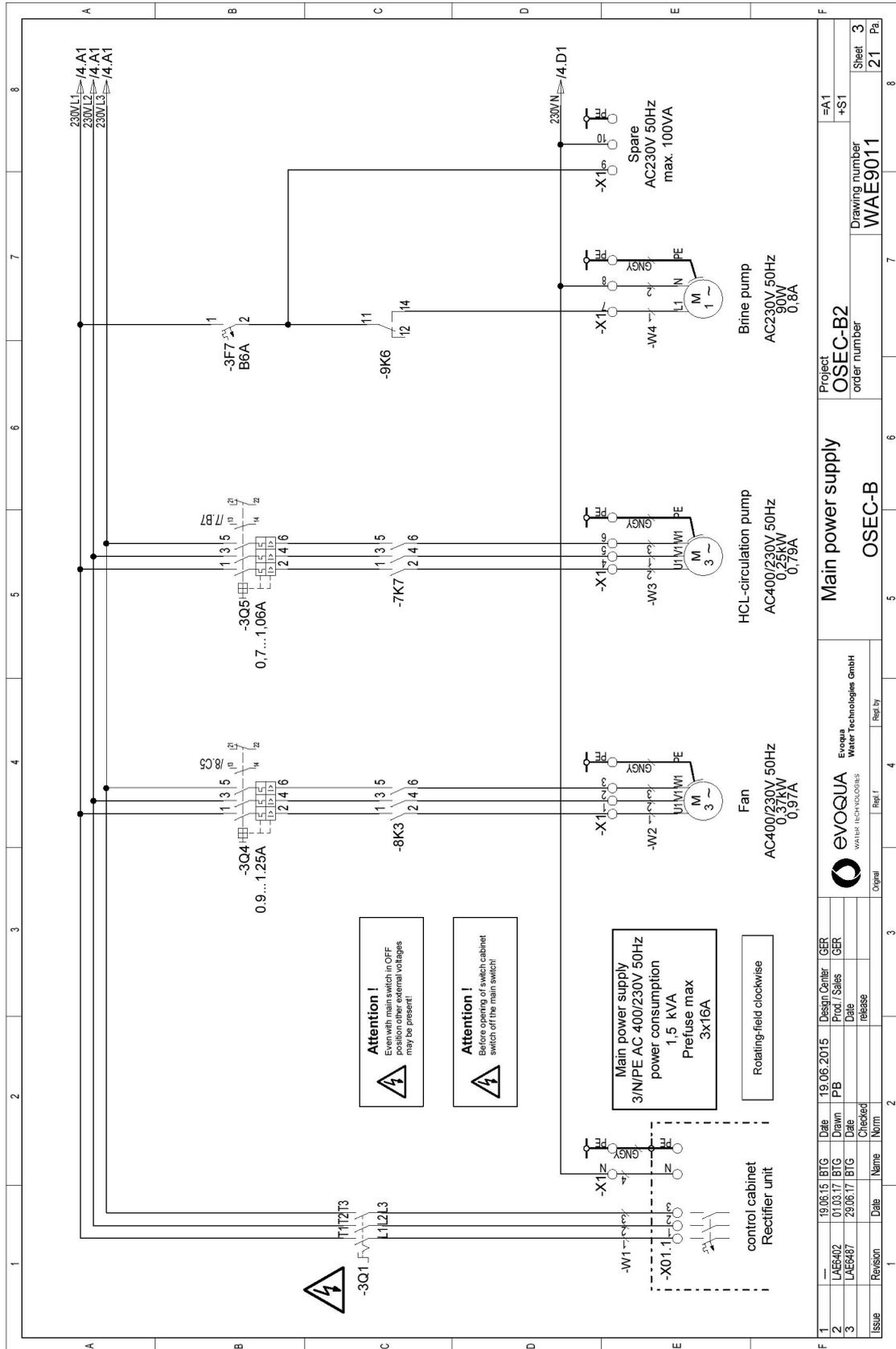
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Prof./Sales	GER		
Date			
release			

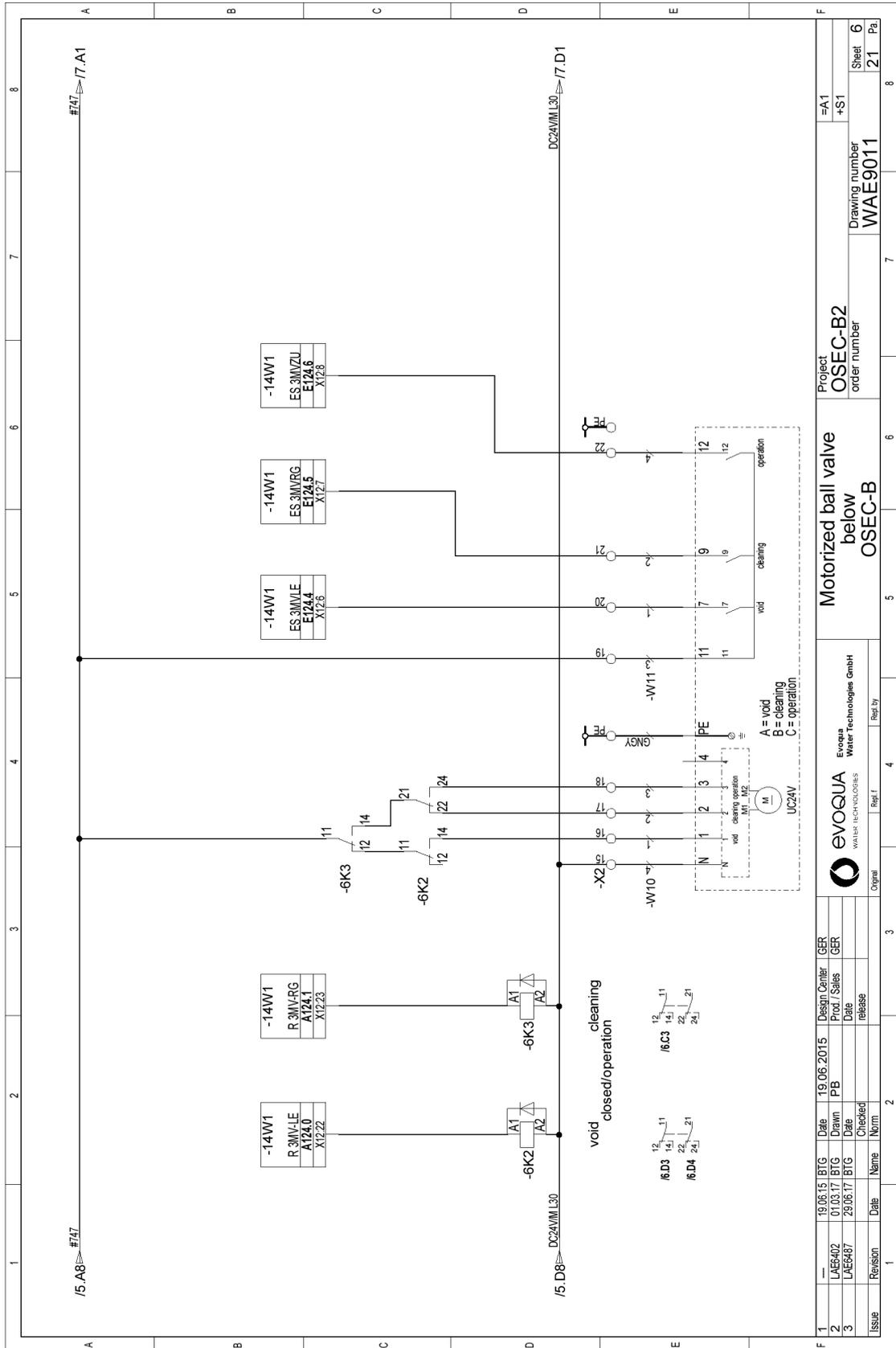
Original	Rep. I	Rep. II	Rep. by

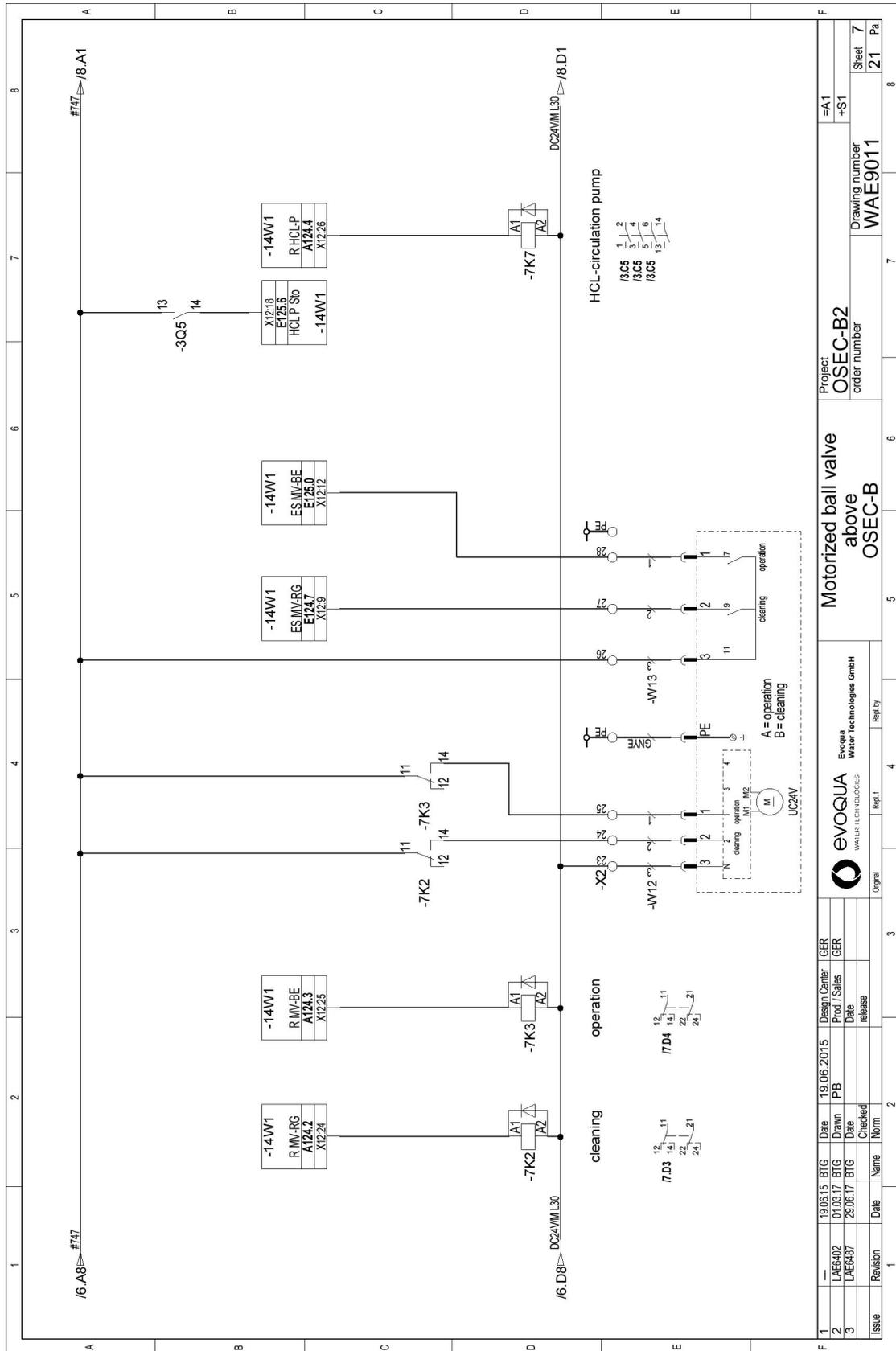
	EVOQUA WATER TECHNOLOGIES	Evoqua Water Technologies GmbH
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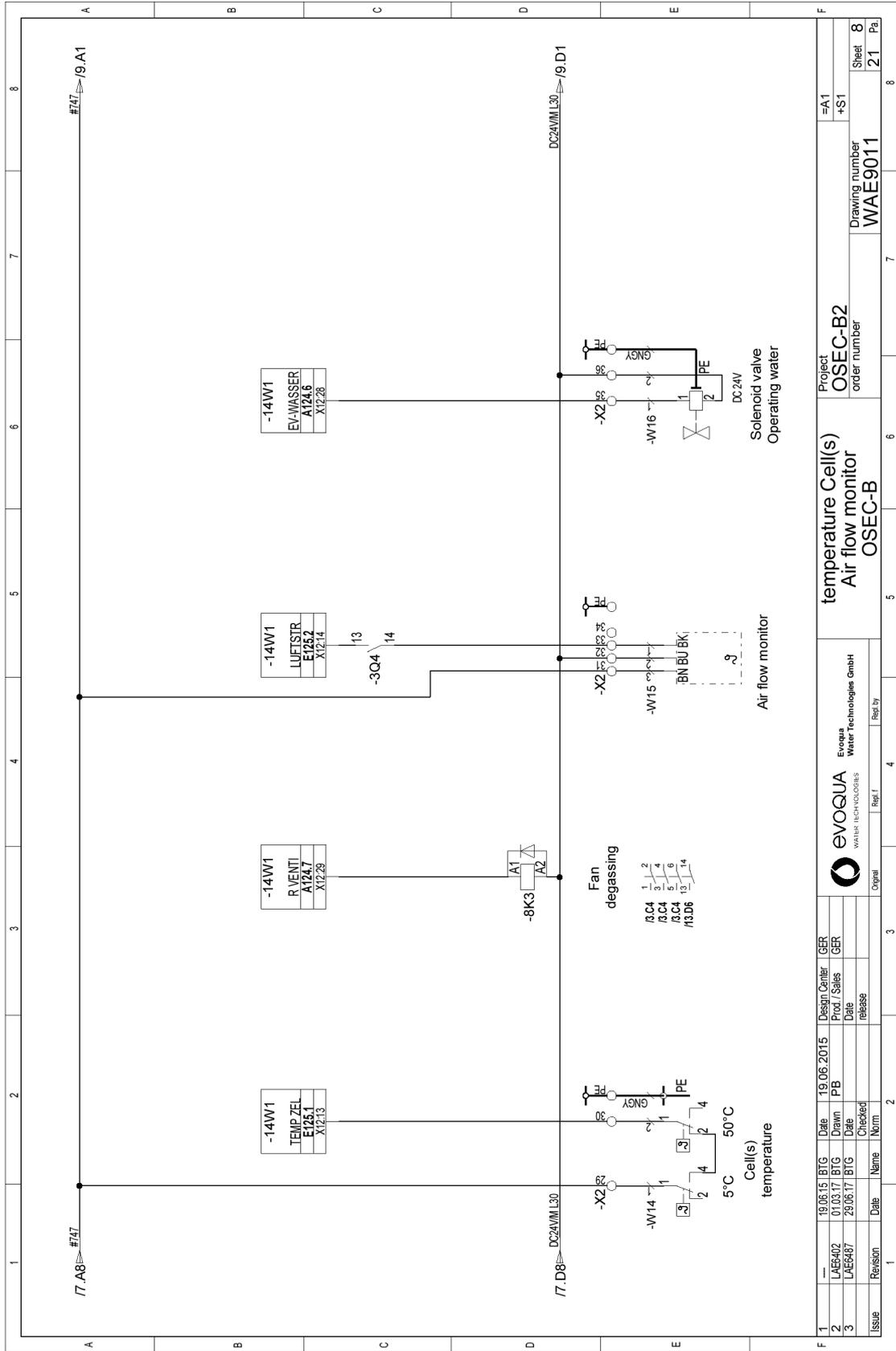
Cover page	OSEC-B
Project order number	OSEC-B2
Drawing number	WAE9011
Sheet	1
Pa	21

1		2		3		4		5		6		7		8	
Contents															
Plant: =A1 Place: +S1															
Sheet	Description	Issue	Date	Document type											
1	Cover page OSEC-B	3	29.06.17	Cover page											
3	Main power supply OSEC-B	3	29.06.17	wiring diagram											
4	power supply DC24V OSEC-B	3	29.06.17	wiring diagram											
5	Level switch NaClO Tank OSEC-B	3	29.06.17	wiring diagram											
6	Motorized ball valve below OSEC-B	3	29.06.17	wiring diagram											
7	Motorized ball valve above OSEC-B	3	29.06.17	wiring diagram											
8	temperature Cell(s) Air flow monitor OSEC-B	3	29.06.17	wiring diagram											
9	Cell(s) MIN Brine pump OSEC-B	3	29.06.17	wiring diagram											
10	Operating water flow rate Brine tank OSEC-B	3	29.06.17	wiring diagram											
11	Spare OSEC-B	3	29.06.17	wiring diagram											
12	voltage-free contact OSEC-B	3	29.06.17	wiring diagram											
13	Electrolysis cells Rectifier unit OSEC-B	3	29.06.17	wiring diagram											
14	SPS S7-300 OSEC-B	3	29.06.17	wiring diagram											
15	Panel control cabinet OSEC-B	3	29.06.17	Design control panel											
16	Panel gland plate OSEC-B	3	29.06.17	Design control panel											
17	Cable list OSEC-B	3	29.06.17	Cable list											
18	Cable list OSEC-B	3	29.06.17	Cable list											
19	bill of materials OSEC-B	3	29.06.17	bill of materials											
20	bill of materials OSEC-B	3	29.06.17	bill of materials											
21	bill of materials OSEC-B	3	29.06.17	bill of materials											
Contents															
Project OSEC-B2															
Drawing number WAE9011															
order number															
Sheet 2															
Z1 Pa															
8															





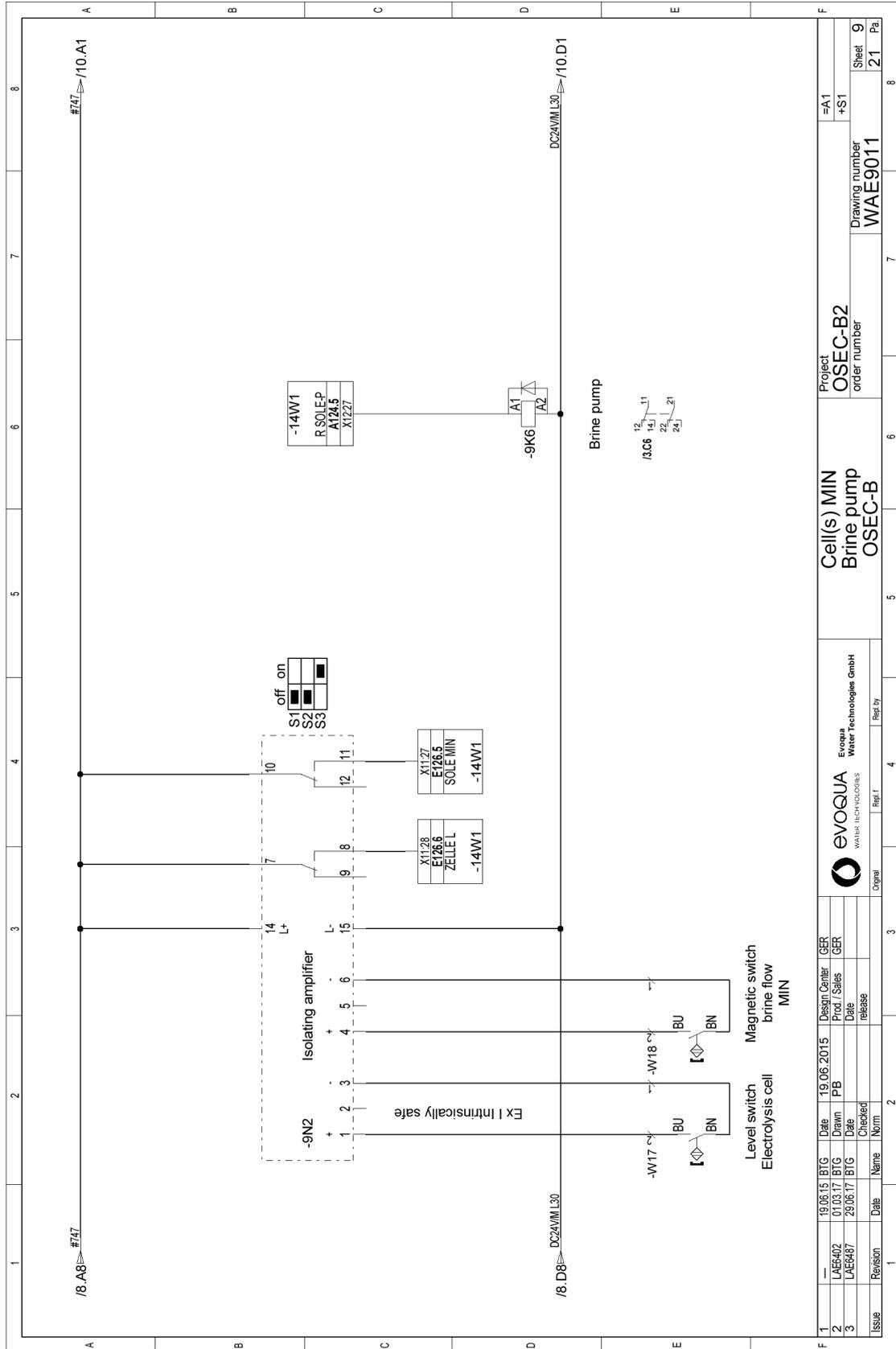


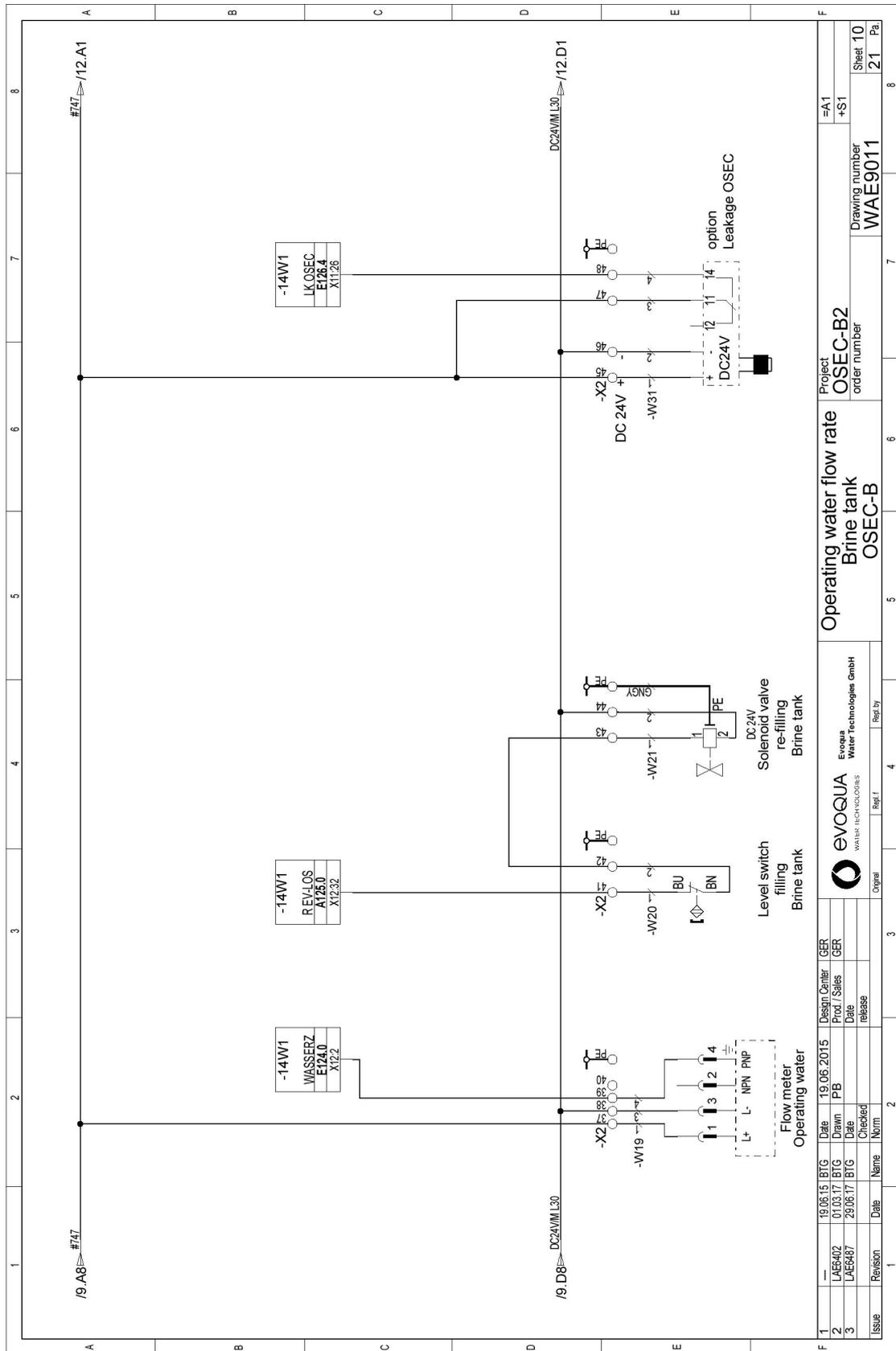


Issue	Revision	Date	Name	Norm	Checked	Drawn	Date	Design Center	GER
1		19.06.15	BTG				19.06.2015	GER	GER
2	LA6402	01.03.17	BTG					GER	GER
3	LA6487	29.06.17	BTG					release	release

Original	Reg. I	Reg. II	Reg. III
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		Evoqua Water Technologies GmbH WASSER TECHNOLOGIES	
Project OSEC-B2		Drawing number WAE9011	
temperature Cell(s)		order number	
Air flow monitor		Sheet 8	
OSEC-B		Z1 Pg	

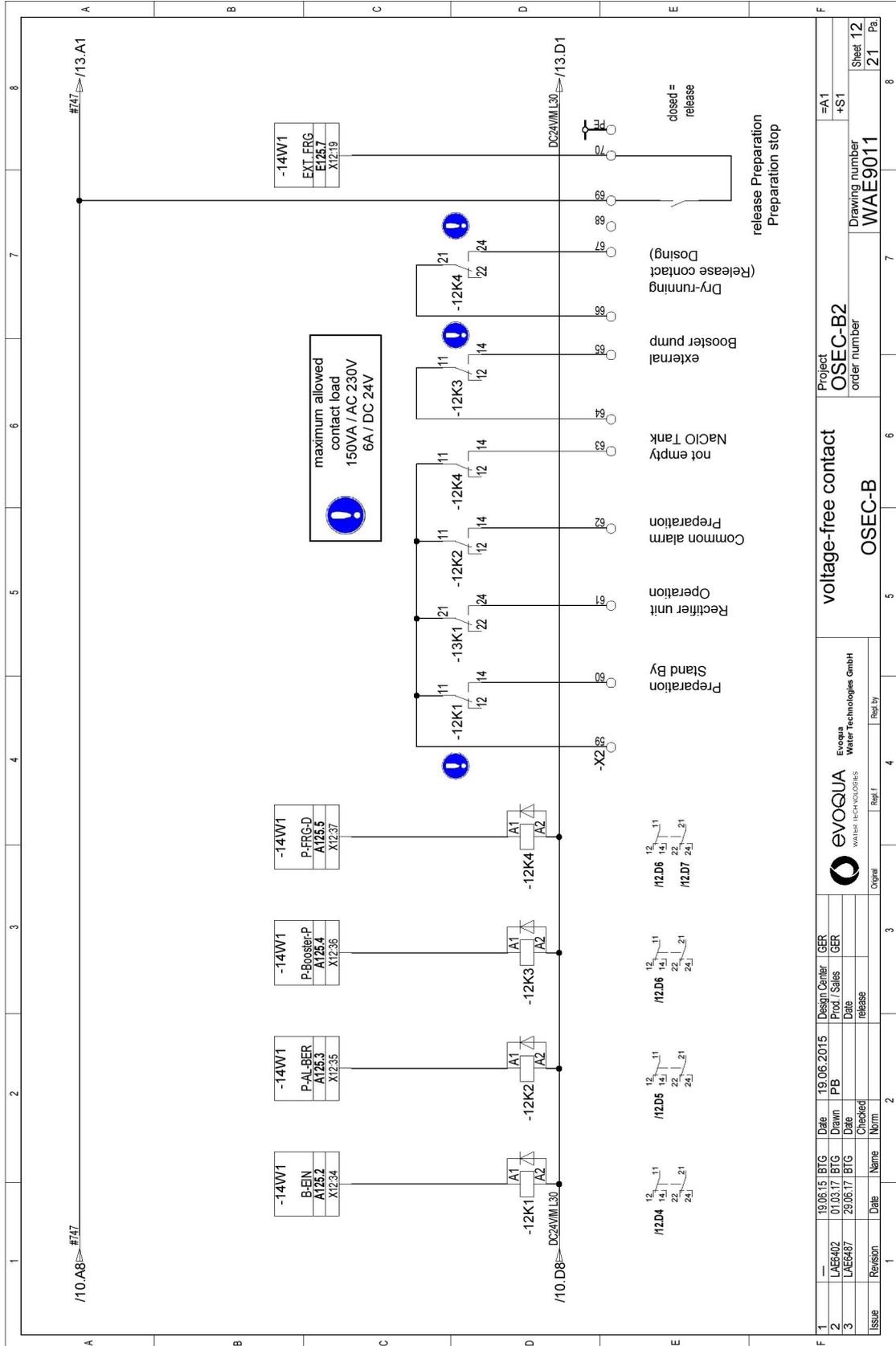


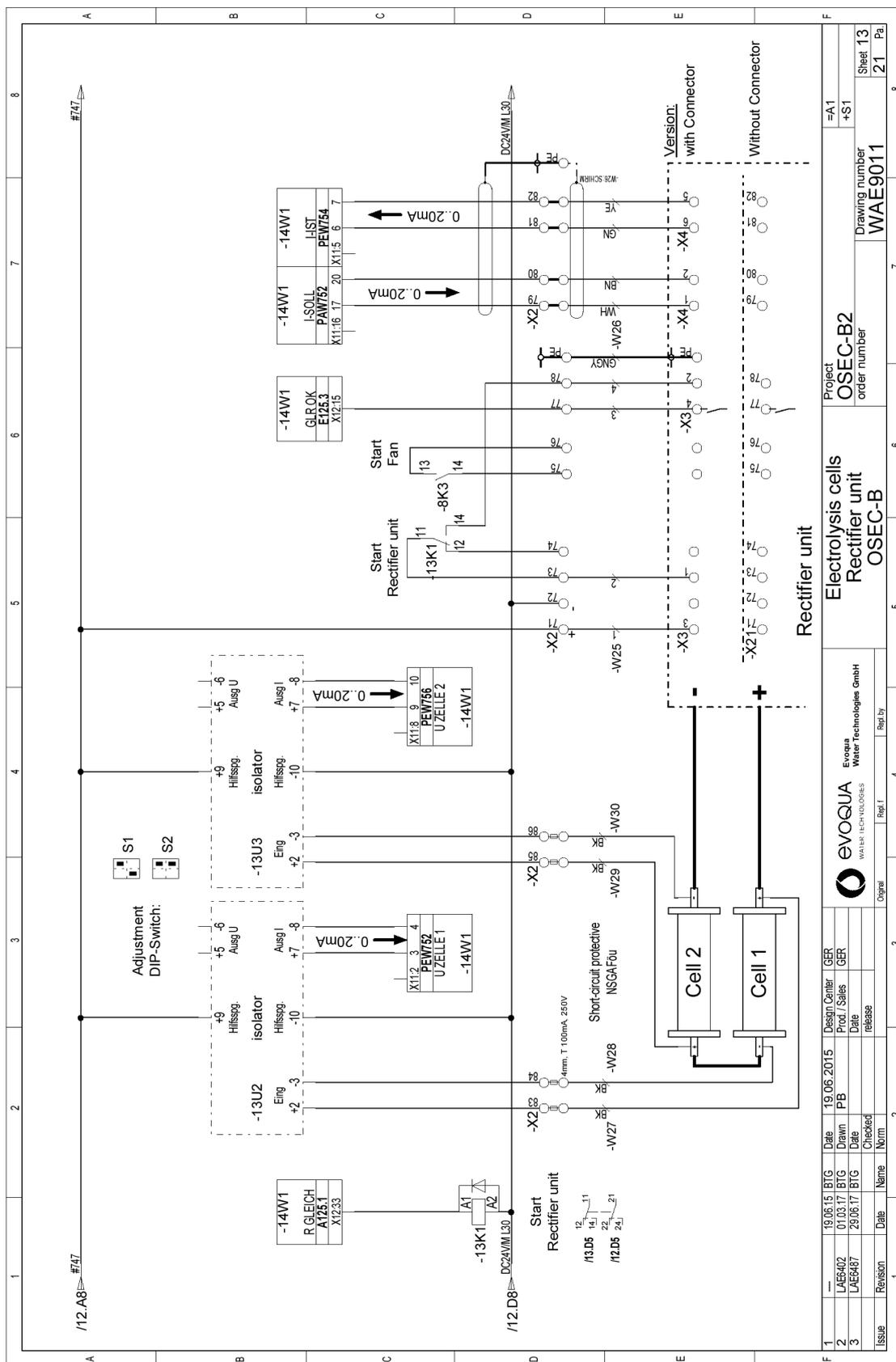


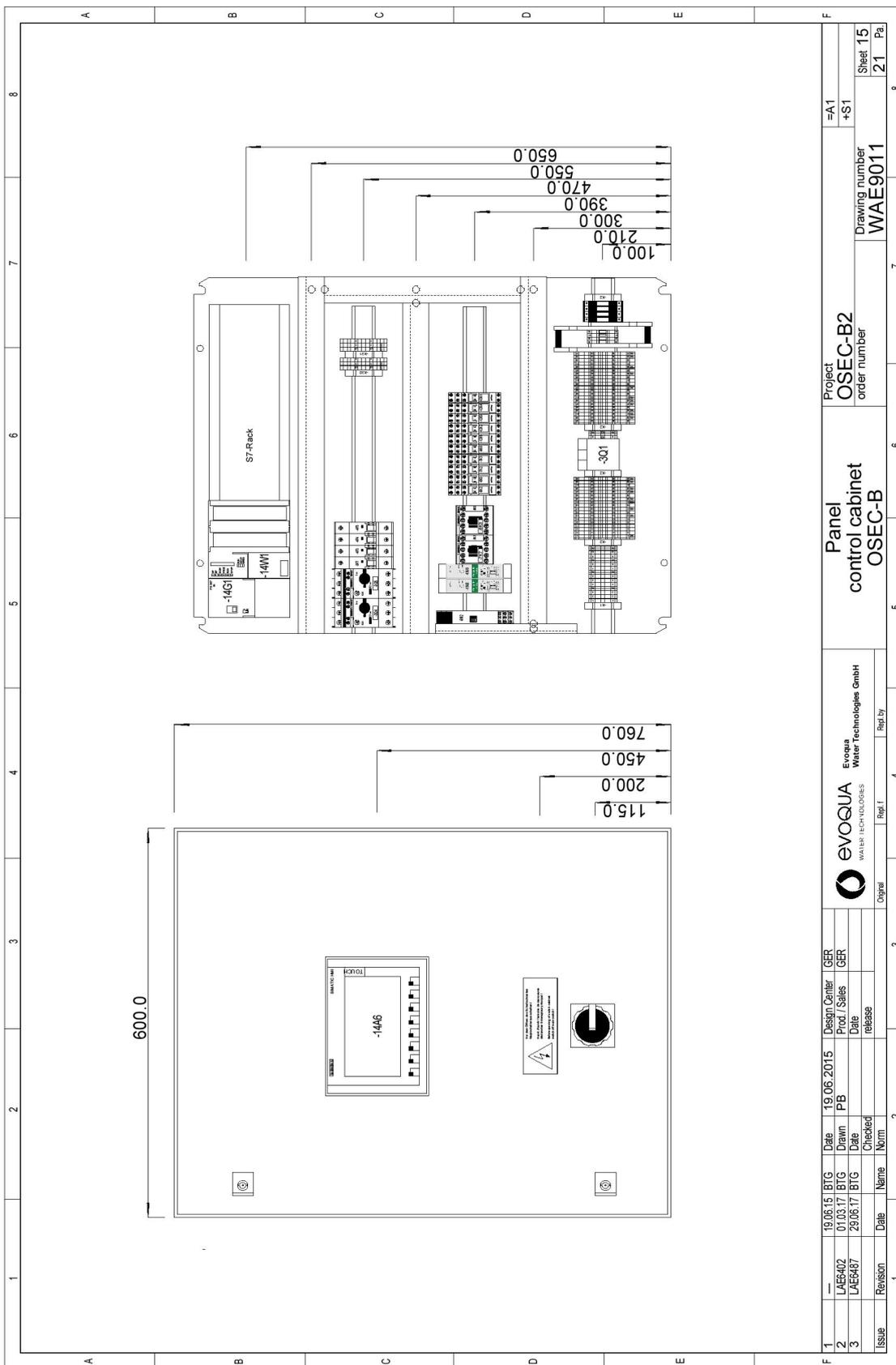
1	19.06.15	BTG	19.06.2015	Design Center	GER
2	LA6402	01.03.17	BTG	Prod./Sales	GER
3	LA6487	29.06.17	BTG	release	
Issue	Revision	Date	Name	Norm	

Original	Reg. I	4	Reg. II	4	Reg. III	4	Reg. IV	4	Reg. V	4	Reg. VI	4	Reg. VII	4	Reg. VIII	4	Reg. IX	4	Reg. X	4
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Project	OSEC-B2
order number	WAE9011
Drawing number	WAE9011
Sheet	10
Page	21







bill of materials: W3T348822										
No.	Qty.	Equipment identifier	Pat.no.	Description	Manufacturer	Order no.				
1	2	-7K7 -8K3	W2T826187	Surpression diode S00						
2	1	-3Q1	W2T505430	emergency stop switch 16A 3-p						
3	4	-16X6.1 -16X6.2 -16X6.3 -16X6.4	W2T825281	Jumper FBS-2-5, red						
4	1	-16X6	W2T825283	Jumper FBS-10-5, red						
5	7	-16X2 -16X2.1 -16X3.1 -X1 -X2 -X30 -X31	W2T503943	labelling KLIM1						
6	1	-X2	W2T504187	cover terminal MTK						
7	7	-X1 -X2 -X30 -X31	W2T504797	end bracket Clip-Fix 35						
8	2	-16X5	W2T505378	Jumper 10-pol. 6.2mm						
9	4	-0ZB	W2T506403	support, 95.5mm						
10	2	-0X -0X.1	W2T825279	End cover D-UTI/3						
11	3	-16X3	W3T161830	Ground clamp SK8						
12	6	-X30 -X31	W2T503947	potential terminal DIDK1.5						
13	4	-X2	W2T505555	Plug-in fuse terminal UK-SI						
14	5	-X1	W2T505730	PE terminal USLKG2.5						
15	3	-X1	W2T506348	terminal block UK2.5 blue						
16	4	-X2	W2T507204	isolating terminal MTK						
17	8	-X1	W2T507238	terminal block UK2.5						
18	19	-X2	W2T825276	Terminal block UTI 2,5-L/L						
19	20	-X2	W2T825277	Terminal block UTI 2,5-PE/L/L						
20	10	-12K1 -12K2 -12K3 -12K4 -13K1 -6K2 -6K3 -7K2 -7K3 -9K6	W2T504096	Switching relays DC24V, 2NONC						
21	2	-12K1 -6K2	W2T505796	relay bridge 2NO/NC						
22	2	-3Q4 -3Q5	W2T825469	Auxiliary contact						
23	1	-3Q4	W2T825481	circuit breaker 0.9...1.25A						
24	1	-3Q5	W2T825482	circuit breaker 0.7 ..1.0A						
25	2	-3F7 -4F3	W2T504074	circuit breaker B6A, 1-p						

bill of materials									
Original		Reg. I		Reg. II		Reg. III		Reg. IV	
 EVOQUA <small>WÄRMETECHNOLOGIEN</small> Water Technologies GmbH		Project OSEC-B2 order number		Drawing number WAE9011		Sheet 19 21		Page 8	

bill of materials: W3T348822																													
No.	Qty.	Equipment identifier	Part-no.	Description	Manufacturer	Order no.																							
26	2	-4F4 -4F5	W2T504082	circuit breaker C4A, 1-p																									
27	2	-13U2 -13U3	W3T258165	isolator 20-255VUC, 0-30V																									
28	2	-7K7 -8K3	W2T825669	Contacto DC24V, 4KW																									
29	1	-16ZB1	W2T503907	gland plate 530x159mm																									
30	1	-A3	W3T165713	control cabinet 600x760x210mm																									
31	1	-163	W2T506830	Grounding strip 4mm ² , 170mm																									
32	1	-16ZB4.3	W2T506831	Grounding strip 4mm ² , 300mm																									
33	3	-16ZB4.2	W2T507113	Clamp																									
34	1	-3ZB2.2	W2T504903	sticker Rotating-field clockwise																									
35	1	-3ZB2.1	W2T505826	label "attention"																									
36	1	-3ZB2	W2T507237	label "attention"																									
37	13	-16ZB7	W2T505940	Fastening blank 6mm																									
38	2	-16ZB4.1	W2T506100	Screw M3x6mm																									
39	16	-16ZB1.3	W2T506112	Screw M5x10mm																									
40	4	-X2	W2T506342	Fuse T 0.1A, 5x20mm																									
41	1	-14A6	W2T816358	Operator Panel KTP700 Basic color DP 2nd Gen.																									
42	1	-14W1	W2T504304	Memory module 128kB																									
43	1	-14W1	W2T504372	S7-300 CPU313C																									
44	1	-14W1	W2T504921	Plug 40 pin																									
45	1	-14W1	W2T504928	Plug 40 pin																									
46	1	-14W1	W2T506123	Sectional bar																									
47	1	-14G1	W2T506697	Power supply																									
48	1	-14W1	W3T162698	Connecting cable S7 AG - HMI 1.6m																									
49	1	-9N2	W2T505943	Isolating amplifier																									
50	11	-16ZB1.2	W2T504178	cabl gland M16																									
51	13	-161 -16ZB4	W2T504179	cabl gland M20																									
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Project		OSEC-B2		Drawing number		WAE9011		Sheet 20																					
Order number								Z1 Pg.																					

9. Declaration of conformity



EG-Konformitätserklärung EC Declaration of Conformity Déclaration CE de conformité

No. MAE 1712

Ausgabe/issue/édition 01

Hersteller/Manufacturer/Constructeur: Evoqua Water Technologies GmbH
 Anschrift/Address/Adresse: Auf der Weide 10, D-89312 Günzburg
 Produktbezeichnung: Chlor-Elektrolyse-Anlage OSEC-B2
Product description: OSEC-B2 Hypochlorite Generation System
 Description du produit: Electrolyseur de chlore OSEC-B2

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender europäischer Richtlinien überein:

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

Le produit désigné est conforme, dans la version que nous avons mise en circulation, avec les prescriptions des directives européennes suivantes :

- | | |
|------------|---|
| 2006/42/EG | <p>Richtlinie des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung).
 <i>Directive of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/ED (recast).</i>
 Directive du Parlement européen et du Conseil du 17 mai 2006 relative aux machines et modifiant la directive 95/16/CE (refonte).</p> |
| 2014/30/EU | <p>Richtlinie des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit.
 <i>Directive of the European Parliament and of the Council of 26 February 2014 on the approximation of the laws of the Member States relating to electromagnetic compatibility.</i>
 Directive du Parlement européen et du Conseil du 26 février 2014 relative au rapprochement des législations des Etats membres concernant la compatibilité électromagnétique.</p> |
| 2014/35/EU | <p>Richtlinie des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.
 <i>Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.</i>
 Directive du Parlement européen et du Conseil du 26 février 2014 concernant le rapprochement des législations des Etats membres relatives au matériel électrique destiné à être employé dans certaines limites de tension.
 CE-Kennzeichnung / CE marking / Marquage CE: 2016</p> |

Ersteller : SR
 Ausgabe : 24.02.2014
 Dokument: VD130-1_CE_Konformitätserklärung.doc

Evoqua Water Technologies GmbH
 Auf der Weide 10
 89312 Günzburg
 Deutschland

Tel.: +49 (8221) 904-0
 Fax: +49 (8221) 904-203
www.evoqua.com

Seite 1 von 2



Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung der in der Nachweisdokumentation aufgelisteten Normen.
Evidence of conformity to the Directives is assured through the application of the standards listed in the relevant documentation.
 La conformité avec les directives est assurée par le respect des normes listés dans la documentation technique correspondante.

Benannte Person für technische Unterlagen:

Authorized person for the technical file:

Personne désignée pour la documentation technique:

Name / name / nom: Evoqua Water Technologies GmbH

Adresse / address / adresse: Auf der Weide 10, D-89312 Günzburg

Günzburg, den / the 2016-02-10

Evoqua Water Technologies GmbH

Klaus Andre
Technischer Leiter/Director Engineering

Unterschrift
signature / signature

Helmut Fischer
Leiter QM / Quality Manager

Unterschrift
signature / signature

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration certifies the conformity to the specified directives but does not imply any warranty for properties. The safety documentation accompanying the product shall be considered in detail.

La présente déclaration atteste de la concordance avec les directives citées, elle n'offre cependant pas de garantie quant à la nature ou la durabilité selon l'article 443 du code civil allemand. Les consignes de sécurité de la documentation du produit fournie sont à respecter.

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Wallace & Tiernan[®] Products worldwide

Australia

+61 3 8720 6597
info.au@evoqua.com

Canada

+1 905 944 2800
canadainfo@evoqua.com

China

+86 10 57076305
sales.cn@evoqua.com

France

+33 1 41 15 92 20
wtfra@evoqua.com

Germany

+49 8221 9040
wtger@evoqua.com

Singapore

+65 6830 7165
sales.sg@evoqua.com

UK

+44 300 124 0500
info.uk@evoqua.com

USA

+1 856 507 9000
wt.us@evoqua.com



Wallace & Tiernan®
an EVOQUA brand



Auf der Weide 10, 89312 Günzburg, Germany

+49 (8221) 904-0 www.evoqua.com

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