MINICHLORGEN

Operating instructions

Read the operating manual!

The user is responsible for installation and operation related mistakes!

Original operating manual

BA-65010-02-V02

Dosing Conveying Control | Liquids Gases Systems

List of Contents

1 Notes for the Reader

This operating manual provides significant assistance in the successful and smooth running of the MINICHLORGEN electrolysis systems, also referred to, in short, as “system” in the following instructional text.

The operating manual for the MINICHLORGEN electrolysis system must always be available where the system is located and it has to be read and used by every person who is assigned to working on the system. This includes amongst other things:

- the installation
- the servicing and repair work
- the maintenance (maintenance, care, repair)
- the transport

1.1 General non-discrimination

In this operating manual, only the male gender is used where grammar allows gender allocation. The purpose of this is to make the text clearly legible. Men and women are always referred to equally. We would like to ask female readers for understanding of this text simplification.

1.2 Explanation of the signal words

Different signal words in combination with warning signs are used in this operating manual. Signal words illustrate the gravity of possible injuries if the risk is ignored:

Signal word	Meaning
DANGER!	Refers to imminent danger. Ignoring this sign may lead to death or the most serious injuries.
WARNING	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to death or severe injuries.
CAUTION	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to minor injury or damage to property.
Note	Refers to a danger which, if ignored, may lead to risk to the machine and its function.

Table 1: Explanation of the signal words

1.3 Explanation of the warning signs

Warning signs represent the type and source of a danger:

Warning sign	Type of danger
	General danger zone
	Danger of electric shock
	Danger of explosion
	Danger of damage to machine or functional influences

Table 2: Explanation of the warning signs

1.4 Identification of warnings

Warnings are intended to help you recognise risks and avoid negative consequences.

This is how warnings are identified:

Warning sign	**SIGNAL WORD**
Description of danger. Consequences if ignored. ⇨ The arrow signals a safety precaution to be taken to eliminate the danger.	

1.5 Instruction for action identification

This is how pre-conditions for action are identified:

✓ Pre-condition for action which must be met before taking action.

This is how instructions for action are identified:

➔ Separate step with no follow-up action.

1. First step in a series of steps.
2. Second step in a series of steps.

▸ Result of the above action.

✓ **Action completed, aim achieved.**

1.6 References to intellectual property rights

This operating manual must be treated confidentially. Only authorised persons should have access to it. It may only be given to third parties with the written consent of Lutz-Jesco GmbH.

All documents are protected in the sense of the copyright law. It is forbidden to forward on and copy the documents, even in part, as well as to use and communicate their contents, insofar as this is not expressly conceded in writing. Violations are punishable and incur an obligatory payment of damages. Lutz-Jesco GmbH reserves all the rights for the practice of industrial property rights.

1.7 Details for the operator

The operating manual is a significant component of the MINICHLORGEN electrolysis system. The operator must ensure that the service personnel learn these guidelines.

The operating manual is to be supplemented by the operator regarding the operating instructions; national regulations for Health and Safety at Work and Environmental Protection, including information on the responsibilities of supervision and the observance of operational specifics, e.g. concerning labour organisations, operational sequences and appointed personnel.

Besides the operating manual and the obligatory regulations for Health and Safety at Work applicable in the country of use, as well as in the place of use, the recognised specialist technical regulations for safe and professional work must also be observed.

The operator of the MINICHLORGEN system may not make any changes, attach fittings or make alterations to the construction of the MINICHLORGEN system that may impair security, without the written consent of Lutz-Jesco GmbH. This also applies to the installation and setup of safety devices.

Any replacement parts to be used have to correspond to the technical requirements specified by Lutz-Jesco GmbH. This is always guaranteed in the case of original spare parts. Only appoint trained or instructed personnel. Clearly specify the responsibilities of the personnel for operating, servicing and repairing the system.

1.8 Instruction & training course assistance

As a contractor/operator you are obligated to inform and/or instruct the operating personnel about existing provisions of law and accident prevention regulations, as well as existing safety regulations at the plant. In doing so, the different technical qualifications have to be taken into account. The operating personnel must have understood the training and it must be ensured that the training is adhered to.

Only in this way can you ensure that your personnel work in a safety conscious and risk aware manner. This should be controlled on a regular basis. As the contractor/operator you should therefore obtain confirmation of each of the employee's attendance in writing.

On the following pages you will find examples of the training course topics, as well as a main form to copy for the confirmation of attendance.

If the operating personnel still require further training after the system has been delivered to the operator, please contact Lutz-Jesco GmbH.

1.9 Example of training course topics

For safety:

- Accident prevention regulations
- General safety precautions
- Action to be taken in an emergency
- Safety precautions for operating
- Safety devices
- Definition of symbols and signs

To operate

- How to operate the controls
- Elimination of operational disturbances
- Interpretation of fault indications

For maintenance and service instructions:

- Inspection/testing of the system
- Cleaning the system and exchange of replacement parts

2 Safety

2.1 General warnings

The following warnings are intended to help you to eliminate the dangers that can arise while handling the device. Risk prevention measures always apply regardless of any specific action.

Safety instructions warning against risks arising from specific activities or situations can be found in the respective sub-chapters.

DANGER!

Mortal danger from electric shock!

Live parts can inflict fatal injuries.

⇨ Ensure that the mains voltage is switched off before opening the control cabinet door.

DANGER!

Danger to life through explosions!

When using dosing devices without ATEX certification in a potentially explosive area, explosions can occur that result in fatal injuries.

⇨ Never use the device in potentially explosive areas.

DANGER!

Increased risk of accidents due to insufficient qualification of personnel!

The equipment and accessories may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.

⇨ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.

⇨ Prevent access to the system for unauthorised persons.

2.2 Hazards due to non-compliance with the safety instructions

Failure to follow the safety instructions may endanger not only persons, but also the environment and the device.

The specific consequences can be:

- failure of important functions of the device and of the corresponding system,
- failure of required maintenance and repair methods,
- danger to persons,
- danger to the environment caused by substances leaking from the system.

2.3 Working in a safety-conscious manner

Besides the safety instructions specified in this operating manual, further safety rules apply and must be followed:

- accident prevention regulations
- safety and operating provisions
- environmental protection provisions
- applicable standards and legislation

2.4 Personal protective equipment

Based on the degree of risk posed by the dosing medium and the type of work you are carrying out, you must use corresponding protective equipment. Read the Accident Prevention Regulations and the Safety Data Sheets to the dosing media find out what protective equipment you need.

You will require the minimum of the following personal protective equipment:

Personal protective equipment required	
	Protective goggles
	Protective clothing
	Protective gloves

Table 3: Personal protective equipment required

Wear the following personal protective equipment when performing the following tasks:

- Commissioning
- All work on gas-bearing sections of the plant
- Shutdown
- Maintenance work
- Disposal

2.5 Personnel qualification

Any personnel who work on the device must have appropriate special knowledge and skills.

Anybody who works on the device must meet the conditions below:

- attendance at all the training courses offered by the owner
- personal suitability for the respective activity
- sufficient qualification for the respective activity
- training in how to handle the device
- knowledge of safety equipment and the way this equipment functions
- knowledge of these operating instructions, particularly of safety instructions and sections relevant for the activity
- knowledge of fundamental regulations regarding health and safety and accident prevention.

All persons must generally have the following minimum qualification:

- training as specialists to carry out work on the device unsupervised,
- sufficient training that they can work on the device under the supervision and guidance of a trained specialist.

This operating manual differentiates between these user groups:

2.5.1 Specialist staff

Specialist staff are able, thanks to their professional training, knowledge and experience as well as knowledge of the respective provisions, to do the job allocated to them and recognise and/or eliminate any possible dangers by themselves.

2.5.2 Trained electricians

Due to their professional training, knowledge and experience as well as knowledge of specific standards and provisions, trained electricians are able to do the electrical work assigned to them and to recognise and avoid any potential dangers by themselves.

They are specially trained for their specific working environment and are familiar with relevant standards and provisions.

They must comply with the legally binding regulations on accident prevention.

2.5.3 Trained persons

Trained persons have received training from the operator about the tasks they are to perform and about the dangers stemming from improper behaviour.

Trained persons have attended all trainings offered by the operator.

2.5.4 Personnel tasks

In the table below, you can check what personnel qualifications are the pre-condition for the respective tasks. Only people with appropriate qualifications are allowed to perform these tasks!

Qualification	Activities
Specialist staff	■ Installtion ■ Hydraulic installations ■ Commissioning ■ Taking out of operation ■ Fault rectification ■ Maintenance ■ Repairs ■ Disposal
Trained electricians	■ Electrical installation ■ Rectifying electrical faults ■ Electrical repairs
Trained persons	■ Storage ■ Transportation ■ Control

Table 4: Personnel qualification

3 Intended Use

3.1 Notes on product warranty

Any non-designated use of the device can impair its function and the protection provided. This leads to invalidation of any warranty claims!

Please note that liability is on the side of the user in the following cases:

- The device is operated in a manner which is not consistent with these operating instructions, particularly safety instructions, handling instructions and the section 3 “Intended Use”.
- Information on usage and environment (see section 5 “Technical data“) is not adhered to.
- If people operate the device who are not adequately qualified to carry out their respective activities.
- No original spare parts or accessories of Lutz-Jesco GmbH are used.
- Unauthorised changes are made to the device.
- The user uses different salt quality than that indicated in this instruction manual.
- Maintenance and inspection intervals are not adhered to as required or not adhered to at all.
- The device is commissioned before it or the corresponding system has been correctly and completely installed.
- Safety equipment has been bridged, removed or made inoperative in any other way.

3.2 Intended purpose

The MINICHLORGEN on-site electrolytic chlorination system is intended for the following purpose: Generation of a <1% sodium hypochlorite solution using salt, water and electrical energy, with the resulting media to be used as a disinfection agent for the chlorination of drinking water, swimming pool and industrial waters.

The concentration of the sodium hypochlorite solution produced is 0.6% (±0.1%) Cl_2 by weight.

3.3 Sodium Chloride Chemical Specification

The MINICHLORGEN system is designed to be used with dry crystalline/ granular salt. Salt can be purchased in bulk/ pallet quantities to obtain best economy. When ordering salt from your supplier always specify the brand or specific quality you require, so that, in the unlikely event of any shortage of stock, you will still receive an equivalent grade of salt. The use of pure vacuum dried (PVD) salt is not recommended without first installing a pea gravel bed (cleaned) into the saturator tank.

Property	Unit	Specification
Arsenic (As)	mg/kg	<13
Cadmium (Cd)	mg/kg	<1.3
Chromium (Cr)	mg/kg	<13
Iron (Fe)	mg/kg	<10
Mercury (Hg)	mg/kg	<0.26
Nickel (Ni)	mg/kg	<13
Manganese (Mn)	mg/kg	<0.5
Lead (Pb)	mg/kg	<13
Antimony (Sb)	mg/kg	<2.6
Selenium (Se)	mg/kg	<2.6
Bromide	% of NaCl	<0.01
Calcium	% of NaCl	<0.01
Magnesium	% of NaCl	<0.01

Table 5: Sodium chloride chemical specification

MINICHLORGEN is a system for the “in situ” production of the biocidal active agent “chlorine dioxide” (with electrolysis systems: “active chlorine generated from sodium chloride by electrolysis”). In accordance with the biocide ordinance, as of 01.09.2015, the member states of the European Union may only use precursors for biocidal active agents produced “in situ” and which are used as disinfectants. These precursors must satisfy the quality requirements made of these substances by DIN EN and be sourced from a manufacturer or supplier listed in accordance with article 95 of the biocide ordinance. Please ask your supplier to confirm conformity with the biocide ordinance (certificate).

Biocidal active agent:
Active chlorine generated from sodium chloride by electrolysis

EC-Nr. mix;
CAS-Nr. not applicable;

Precursors:
Sodium chloride

EC-Nr. 231-598-3;
CAS-Nr. 7647-14-5;
Special salt for electrolytic cells DIN EN 16401 and 14805

Note

Damage to the system due to incorrect salt

Using the incorrect grade of salt may cause damage to the electrolyser cell and invalidate your warranty!

⇨ Please check with your supplier that the salt product supplied meets the minimum specification above.

3.4 Water Quality

Drinking water or water of a similar quality should be used. It should be free of solids and suspended matter. The temperature of the water entering the system must be in the range of 8 – 25°C.

3.5 Standard warranty conditions

Equipment	Warranty Period
Electronic devices	2 years
Electrolyser	2 years
Wearable items	12 months

Table 6: Standard warranty conditions

4 Product description

4.1 Scope of delivery

Prior to starting any installation operation you are kindly required to check the delivery against the packing list to ensure it is complete and has not been in any way subject to transport damages.

Do not operate any defective devices.

MINICHLORGEN is assembled onto a panel together with the following assembly components:

- Control panel with display
- Electrolyser
- Electrolyser power supply
- Water & brine flow monitoring and control devices
- Front protective plastic cover

The standard delivery comprises:

- MINICHLORGEN system
- Gas detector
- Operating instructions
- 8mmOD flexible softened water inlet tubing MDPE (blue) 2.5m
- 8mmOD flexible product outlet tubing PTFE (violet) 5m
- R½" saturator float valve and D50mm brine well assembly with 8mm OD brine suction line MDPE (black) 2.5m
- R½" product tank level switch assembly, 5m cable
- Product injection point fitting 20mm x 8mmOD
- R½"Product tank inlet connection
- 15mmOD softened water sample point fitting
- Optional – saturator tank, product tank, air blower ventilation kit, dosing pump/s, accessories.

4.2 Design and function

4.2.1 Structure of the device

Fig. 1: Front cover fitted

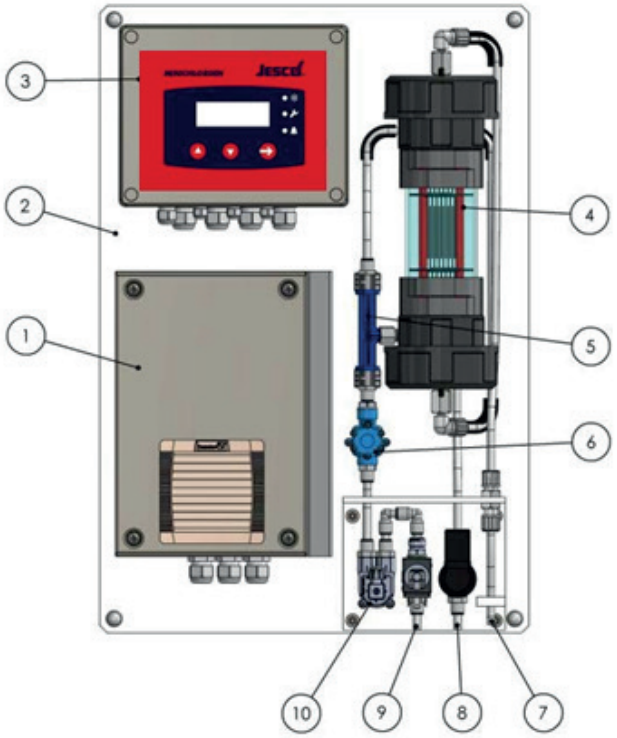


Fig. 2: Front cover removed

Position	Description
1	Electrolyser DC power management unit
2	Rigid backboard
3	Control panel
4	Electrolyser
5	Brine injector
6	Water pressure regulator
7	Chlorine product outlet
8	Brine control valve
9	Softened water control valve
10	Volumetric water flow sensor

Table 7: Description of components

4.2.2 Function description

MINICHLORGEN is a fully automatic system for the preparation of dilute sodium hypochlorite solution containing 0.6%(±0.1) Cl_2, from the raw materials of salt, softened water and electrical energy.

In normal operation, a batch process sequence commences: the water solenoid (9) opens and a set volume of water passes under pressure through the flow sensor (10), pressure regulator (6) and venturi (5). Simultaneous to the water solenoid opening, the brine solenoid (8) opens for a pre-set time to allow the correct volume of brine to be drawn into the side suction point of the venturi. The homogenised mixture of water and brine exiting the top of the venturi continues to flow on through into the electrolyser (6) until the end of the set batch volume of solution is delivered as determined by the flow sensor (10). During this batch process a DC current regulated by the DC power supply (1) is passed through the electrolyser generating a sodium hypochlorite solution within the electrolyser. As a result of the batching process, generated product is displaced from the electrolyser (4) and is transferred to the product tank or directly to the process, depending on application. This batch process cycle is indicated on the control panel (3) where “GENERATING” is displayed on screen and continues to do so until the external product tank level switch operates indicating tank full, or an external process signal input switches off (depending on the installation/application) at which point “STOPPED” is displayed.

As a result of the MINICHLORGEN chlorine generation batch process, a small quantity of Hydrogen gas is produced as a by-product of electrolysis. The gas is safely vented to an outdoor location as detailed in the installation guidance notes within this manual.

5 Technical data

5.1 Output data

MINICHLORGEN				
Model:		**30**	**60**	**90**
Chlorine capacity	g/h	30	60	90
Chlorine concentration	g/l	6		
Liquid product output	l/h	5	10	20

Table 8: Output data

5.2 Operating conditions and limits

MINICHLORGEN				
Model:		**30**	**60**	**90**
Nominal water consumption	l/h	5	10	15
Nominal salt consumption	kg/h	0.1	0.2	0.3
Operating pressure	bar	2 to 8		
Ambient temp	°C	+5 to +45		
Water supply temp	°C	+8 to +25*		

Table 9: Operating conditions and limits

* water chiller required above 25 °C

5.3 Electrical specifications

MINICHLORGEN				
Model:		**30**	**60**	**90**
Power supply	Ø	1 Ø, 230 V AC		
Power consumption	kWh	0.15	0.3	0.45
Protection class	IP	54		

Table 10: Electrical specifications

5.4 Connection dimensions

Description	Size
Water connection (MUST be softened water!)	8 mmOD push-fit tube
Brine feed/suction connection	8 mmOD push-fit tube
Product/chlorine outlet connection	8 mmOD push-on tube compression
Product/chlorine injection connection	8 mmOD push-on tube compression
Product tank & vent Tee manifold	20 mm uPVC solvent socket
Level switch cable assembly	M12, 4-pin
Mains electric power supply	Euro angled plug (CEE 7/4), 2 m 3-core 1.5 mm^2 PVC cable
Control panel cable terminations	M20, max.12 mmOD 3 core cable, 1.0 mm^2

Table 11: Connection dimensions

5.5 Components coming into contact with the media

Description	Material
Electrolytic cell	PVC, titanium, PTFE, FPM
Water transfer tube	MDPE
Product transfer tube	PTFE
Brine transfer tube	MDPE
Water/brine tube fittings	PVDF
Product tank / vent Tee and tank top fittings	uPVC
Product tank level switch assembly	PVDF / PVC, FPM
Saturator float valve assembly	PP / Brass / NBR

Table 12: Connection dimensions

5.6 Other data

MINICHLORGEN				
Model:		**30**	**60**	**90**
Net weight	kg	16		
without cover	kg	<15		

Table 13: Other data

6 Dimensions

6.1 Overall dimensions

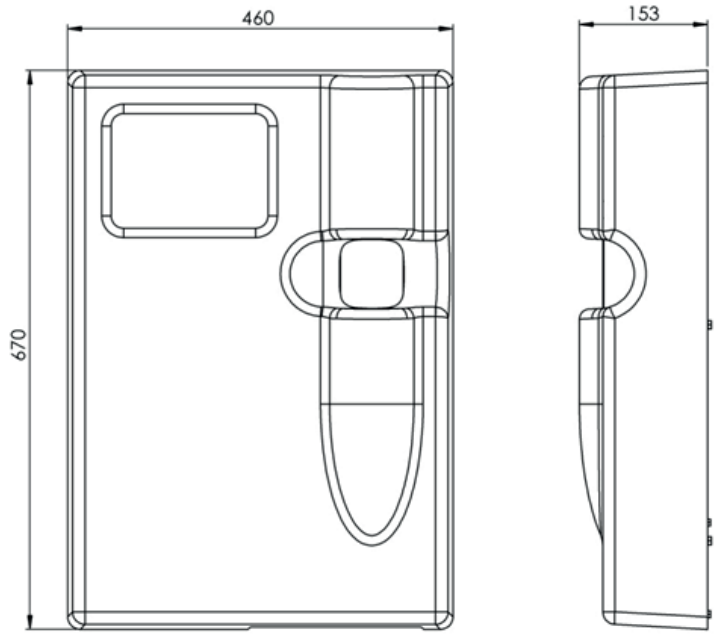


Fig. 3: Dimensions MINICHLORGEN

6.2 Backboard mounting dimensions

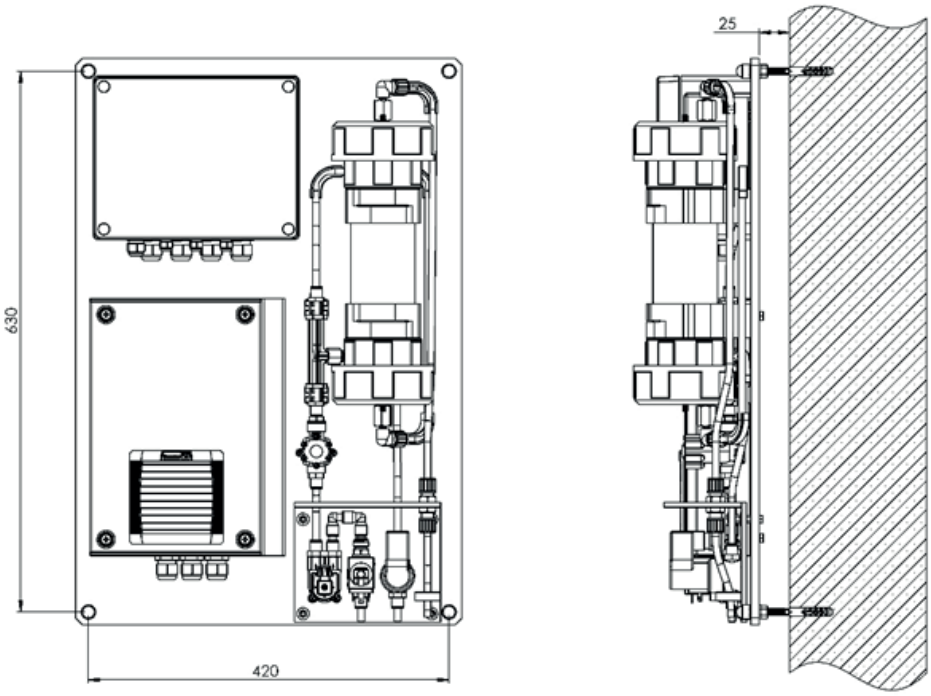


Fig. 4: Dimensions MINICHLORGEN without cover

6.3 Standard accessories

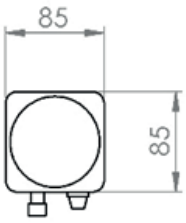


Fig. 5: Gas detector

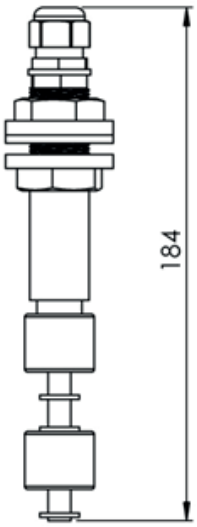


Fig. 7: Product tank dual level switch assembly

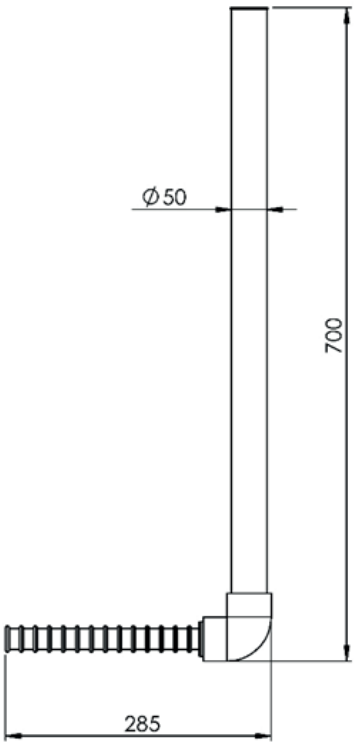


Fig. 6: Saturator tank brine well assembly

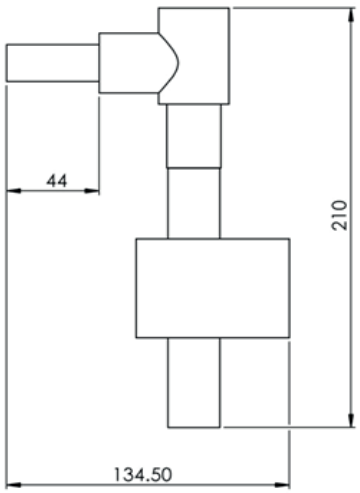


Fig. 8: Saturatur tank float valve assembly

7 Installation

WARNING

Increased risk of accidents due to insufficient qualification of personnel!

This device and its accessories may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.

⇨ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.

⇨ Prevent access to the system for unauthorised persons.

WARNING

Danger of personal injury and damage to property!

The device is extremely heavy. The failure to take adequate safety precautions during transportation and to act with caution can lead to accidents involving personal injuries and damage to property. Limbs can be crushed when the device is set up.

⇨ Transport the device using a floor conveyor that is suitable for the load such as a pallet truck, forklift truck or crane.

⇨ Wear safety shoes while transporting the device.

Note

Damage to the system due to incorrect installation

The failure to observe installation instructions (e.g. use of unsuitable tools, incorrect torque) can damage the system parts.

⇨ Use suitable tools.

⇨ Take care not to over-tighten fittings.

7.1 Installation location

7.1.1 MINICHLORGEN system

Precondition for action:

✓ A solid wall or suitable rigid frame must be available for the MINICHLORGEN.

✓ A firm and level floor is available for any external product tank and salt saturator facility where applicable.

✓ The system must be accessible for operation and maintenance and with sufficient room lighting.

✓ Adequate natural room ventilation.

✓ Refer to installation schematics on page 24.

Perform the following working steps:

1. Locate the MINICHLORGEN unit into position (wall/frame). The top of the backboard should be positioned at a height suitable for use by operation and maintenance personnel, typically no higher than 1650 mm. Refer to Dimensions section for MINICHLORGEN backboard hole centre dimensions. A wall fixing kit containing wall plugs and studs is supplied. Ensure the minimum surface clearance is established when wall/surface mounting, as detailed in section 6 “Dimensions”.
2. Install the hydrogen gas detector above the location of the MINICHLORGEN system, preferably up against the underside of the room ceiling or at the highest point in the immediate room. The sensor head unit is supplied with a fixing bracket that must be used in order to facilitate quick and easy replacement of the sensor head at the time of future maintenance/replacement. A yellow M12 signal cable plug assembly is pre-wired to the MINICHLORGEN ready to connect to the hydrogen gas detector as part of the wiring installation.
3. If the MINICHLORGEN is intended to supply a chlorine product tank, the dual level switch kit (supplied) should be fitted to the top of the product tank by preparing a 22 mm diameter hole in a flat horizontal level position on top of the tank. Always remember to remove any swarf/debris from with inside the product tank!

✓ **Location of MINICHLORGEN unit and standard ancillary items complete**

7.2 Hydraulic installation

7.2.1 Water supply

Note

Damage to the system due to sediment in water.

Water containing sediment may damage or adversely impact on the performance of the system.

⇨ Make sure that the water is always free of sediment.

Precondition for action:

✓ A minimum cold water supply pressure of 2 bar is required.

✓ The equipment must be supplied with clean softened water of a quality similar to drinking water. Waters which are also high in magnesium content may reduce the life of the water softener resin. (A softener device may have been supplied within the scope of the system and will require installing correctly.)

✓ A verifiable double check valve or pipe disconnector in the drinking water supply is fitted upstream of the entire MINICHLORGEN system and any anciliary softener equipment if the local conditions require it.

✓ A pressure reducing valve should be fitted to the water supply if the supply pressure is greater than 8 bar.

7.2.2 Softened water supply

If softened water is freely available on-site, please proceed to the next section 7.2.3.

If no softened water is freely available on-site, the following information and instructions will need to be followed.

7.2.2.1 Filter cartridge softener option

If a filter softener kit has been supplied within the scope of the system, please adhere to the follow instructions.

Precondition for action:

✓ Suitable water supply available.

Perform the following working steps:

1. Install the filter kit immediately upstream of the MINICHLORGEN unit and also upstream of the salt saturator within the cold water supply pipe work.
2. Fit inlet and outlet isolation valves pre and post filter in order to provide isolation function during filter maintenance.
3. A softened water sample tap should be fitted to enable testing of the water supply post softener filter and pre MINICHLORGEN. A suitable 15 mmOD push-fit sample tap T' assembly is included in the standard scope of supply.
4. Connect softened water finally to the MINICHLORGEN using the 15 mm x 8 mmOD tube adaptor supplied with the system. Use the blue coloured flexible 8 mmOD tubing (2.5 m supplied) to connect to the 8 mmOD water inlet fitting of the MINICHLORGEN unit.

✓ **Filter softener equipment installed**

7.2.2.2 Auto regenerative softener option

If an automatic regenerative softener unit has been supplied within the scope of the system, please adhere to the follow instructions.

Precondition for action:

✓ Suitable water supply available

Perform the following working steps:

1. Install the softener unit on a firm level base within easy reach of the MINICHLORGEN system and near to a local waste water drain point.
2. Follow the general installation instructions. Ensure the softener is fitted with isolation valves on the inlet and outlet connections in order to carry out future maintenance of the unit.
3. A softened water sample tap should be fitted to enable testing of the water supply post-softened water and pre MINICHLORGEN. A suitable 15 mmOD push-fit sample tap T' assembly is included in the standard scope of supply.
4. Connect the softener' water outlet to the MINICHLORGEN using the 15 mm x 8 mmOD tube adaptor supplied with the system. Use the blue coloured flexible 8 mmOD tubing (2.5 m supplied) to connect to the 8 mmOD water inlet fitting of the MINICHLORGEN unit.

✓ **Softener equipment connected**

7.2.3 Chlorine product storage tank

Refer to section 7.5.3 "Product tank configuration detail".

The MINICHLORGEN can be installed and used to fill and maintain a product storage tank with a regulated volume of chlorine.

Precondition for action:

✓ Product tank in position

Perform the following steps:

1. Fit the 20 mm uPVC product tank inlet connector (supplied) to the top of the product tank.
2. Fit a vertical length of 20 mm uPVC pipe at least 1 m in length into the tank inlet connector.
3. Fit the product injection 20 mm T-assembly (supplied) to the top of the 20 mm vertical tank inlet pipe (above). The top of the injection T-assembly will be connected to the appropriate ventilation conduit. Refer to section 7.2 "Hydraulic installation" below for hydrogen ventilation details.
4. Use the violet coloured flexible 8 mmOD PTFE tubing (5 m supplied) to connect the MINICHLORGEN product outlet to the product injection T-assembly (supplied).
5. The product tank must additionally be naturally vented at the top side of the tank by using a 20 mm plastic vent pipe/elbow fitting (not supplied).

✓ **Chlorine product tank piping installation complete**

7.2.4 Salt Saturator standard arrangement

The MINICHLORGEN is supplied with a standard set of accessories to enable the use of a standard open top tank with (or without) tank top lid to create a salt saturator in order to establish the MINICHLORGEN with a supply of saturated brine at all times.

Refer to section 7.5.4 "Saturator configuration detail".

Precondition for action:

✓ Suitable plastic saturator tank/lid

✓ MINICHLORGEN saturator accessory kit: float valve and brine well assemblies/kits

Perform the following steps:

1. Drill a 22 mm hole near to the top side of the tank side wall and fit the float valve assembly.
2. Place the brine well assembly into the tank, align vertically and at a 45 degree angle with the float valve. Permanently fix the brine well pipe using the plastic pipe bracket and fixing nut and bolt supplied. The location of the pipe bracket should be above the float valve (water line) to avoid any seepage of brine solution through the bracket fixing bolt when the saturator is in operation.
3. If the saturator is intended to be used with a lid/cover, then the lid will require a cut-out to accommodate either the 50 mm grey PVC pipe or the 8 mmOD black MDPE brine tubing.

✓ **Saturator installation / configuration complete**

7.2.5 Hydrogen ventilation

DANGER!

Danger to life through explosions!

Incorrect installation of the hydrogen vent may cause irreversible damage to the system components and may even create an explosive atmosphere!

⇨ Make sure to install the hydrogen vent correctly.

The MINICHLORGEN requires the installation of a ventilation pipe duct circuit between the unit and to a suitable exterior outside termination vent point (normally at high level >3 m), in order to safely vent any hydrogen gas liberated from the electrolytic process.

The exterior vent pipe termination point must be installed so as to create an external safe Zone-2 around the opening of the vent. Refer to section 7.2.5.1 “External Zone 2 requirement” for guidance.

Plan the pipe route as direct and straight as possible and always on an incline from the vent discharge connection injection T-assembly to a discharge point within 15 metres.

If the MINICHLORGEN is installed in a room with poor natural ventilation, or where a vent pipe route of greater than 15 m is unavoidable, an Air Blower Ventilation Kit option must be fitted!

If the external vent position is less than 3 m high, or access to the Zone 2 exhaust position cannot be prevented, an Air Blower kit option must be fitted!

For pipe runs longer than 15 m, an Air Blower Kit P/No. 202-401 should be fitted and a 2”/63 mm diameter duct pipe should be used so that the airflow volume can be maintained >40 m^3 per hour.

Use wide radius bends instead of elbows to reduce air friction. DO NOT install any unions or any disconnection points at any point along the vent pipe work.

To comply with Health & Safety requirements the vent termination point on the external wall should not be located directly beneath any air intake and must be located at least 0.8 m from any window or possible source of ignition. If the external vent pipe work is located in a public area, or there is a possibility of vandalism, it should be protected with a suitable steel cage/pipe capping.

It is advisable to provide the following warning sign at the external vent exhaust position:

7.2.5.1 External Zone 2 requirement

DANGER!

Danger to life through explosions!

An external Zone 2 area clearance is required at the external vent opening to avoid potential explosive enviroment!

⇨ Make sure to apply the correct Zone 2 external clearance.

The following Zone 2 requirements are necessary at the point of the external vent as indicated in section 7.5 “Installation schematics” on page 24.

System type	External vent Zone 2 radius
MINICHLORGEN 30	120 mm
MINICHLORGEN 60	240 mm
MINICHLORGEN 90	360 mm

Table 14: Connection dimensions

If in doubt, contact your supplier for further advice.

7.2.5.2 Standard hydrogen ventilation (<15 m)

Precondition for action:

✓ Suitable outside vent point provided

✓ Adequate natural air room ventilation

Perform the following steps:

1. Install a length of 1/2” / 20 mm ventilation piping from the top of the vertical product injection T-assembly and the exterior vent point. Ensure the entire vent pipework is always at an incline toward the external vent point.
2. Provide and fix appropriate signage at the vent point in accordance with local rules.

✓ **Standard ventilation installation complete**

7.2.5.3 Air blower ventilation (ducting >15 m length)

An air blower ventilation kit, part number 202-401 may have been supplied within the scope of the system. This equipment is intended to assist with the safe extraction of hydrogen from the MINICHLORGEN unit. For example, in small rooms with poor ventilation or pipe runs greater than 15 m in length. Refer to section 7.2.5 “Hydrogen ventilation” for further understanding of the requirement to install an air blower kit.

Precondition for action:

✓ Suitable outside vent termination point provided

✓ Suitable local wall/frame mounting of the air blower equipment adjacent to the MINICHLORGEN unit.

✓ Refer to air blower schematics section 7.5.2.

Perform the following steps:

1. Mount the air blower enclosure box on to the wall/frame as close to the MINICHLORGEN unit as possible and a minimum of 200 mm above floor level.
2. Ensure the enclosure is not obstructed and retains full clearance of its air intake.
3. The 2"/63 mm manifold should be braced with a pipe bracket where necessary.
4. Connect the MINICHLORGEN product injection/tank vent 20 mm uPVC Tee assembly with suitable piping up into the air blower ventilation 63 mm uPVC Tee assembly.
5. Interconnect the 63 mm Tee vent assembly outlet to the external vent pipe termination point with suitable piping.
6. The entire vent pipe circuit from tank to external termination point should always be on a slight incline without exception to avoid any condensates accumulating and obstructing/restricting ventilation. The vent pipe work must be a permanent fixed solvent cement pipe installation without any unions or quick release couplings so that the ventilation circuit cannot be inadvertently disconnected. In this way, any condensates safely drain back to the product tank.

✓ **Location of air blower equipment and ventilation pipe work complete**

7.3 Electrical installation

DANGER

Mortal danger from electric shock!

Live parts can inflict fatal injuries.

⇨ Disconnect from the electricity supply before working on any equipment.

⇨ Secure all devices to prevent it from being switched on again.

7.3.1 MINICHLORGEN – standard product tank arrangement

Precondition for action:

✓ Unit located correctly

✓ Suitable electrical power supply which meets with the electrical requirement designated on the MINICHLORGEN machine identification plate.

✓ Trained electrical personnel to carry out electrical tasks

Perform the following working steps:

1. The MINICHLORGEN is supplied with an angled Euro plug lead ready for connection to a suitable Euro socket. Cut away the plug and fit to a fixed electrical fused switched socket where appropriate.
2. Earth the device in accordance with local regulations.
3. Interconnect the yellow M12 plug cable assembly from the MINICHLORGEN control panel onto the M12 socket of the hydrogen gas detector.
4. Interconnect the product tank level switch 5 m cable (product tank switch kit supplied) using the M12 level switch plug and connect to the M12 bulkhead socket on the underside of the MINICHLORGEN control panel.
5. Interconnect any auxiliary wiring (for devices supplied outside the scope of the standard system) to the control panel using the spare cable glands provided. Take care not to obstruct the final locating of the MINICHLORGEN external plastic cover.

✓ **MINICHLORGEN wiring complete**

7.3.2 Auto regenerative softener option

If a SIMPLEX automatic regenerative water softener is to be installed then an interrupt signal switch circuit to the MINICHLORGEN is necessary in order to stop the MINICHLORGEN operating whilst the softener is in regeneration. The softener may also require an electrical power supply for its operation – refer to the softener manual.

Precondition for action:

✓ The SIMPLEX water softener must be fitted with a regeneration cycle signal switch.

Perform the following steps:

1. Where applicable connect a suitable power supply to the softener.

2. Connect the regeneration/backwash remote inhibit signal cable from the softener valve head to the MINICHLORGEN control panel in accordance with the wiring connections, section 7.4.

✓ **SIMPLEX softener wiring complete**

A DUPLEX softener will not require any regeneration wiring signal interconnection with the MINICHLORGEN as the duplex softener provides an uninterrupted softened water supply. The duplex softener may require an electrical power supply for its operation – refer to the softener manual.

✓ **DUPLEX softener install complete**

7.3.3 Air blower ventilation kit option

Pre condition for action:

✓ The device and vent pipe correctly located and installed.

✓ A suitable switched fused power supply is available within 2 m of installed device.

Perform the following tasks:

1. Connect the air blower power lead to the switch fused power supply in accordance to local rules.
2. Connect the air flow sensor to the MINICHLORGEN control panel, in accordance with the wiring diagram in section 7.4. A spare available M20 cable gland entry is provided on the control panel.

✓ **Air blower kit wiring complete**

7.4 Electrical connections

7.4.1 Control Panel PCB Terminal Connections

Refer also to drawing schematics in section 7.4.2 “Main PCB Connection Diagram-1” on page 22.

Terminal I.D.		PCB Description	Function	
1	L	Mains Out	230 V AC output voltage for electrolyser power supply	230 V AC
2	N			
3	E			
4	L	Mains In	230 V AC input voltage	
5	N			
6	E			
7	N.C.	Alarm 2	Alarm relay	Volt free alarm contacts
8	C			
9	N.O.			
10	N.O.	Alarm 1	Alarm relay	
11	C			
12	N.C.			
13	C	Run Relay	Electrolyser run signal	signals
14	N.O.			
15	+	+24 V DC Output	Common supply voltage	
16	+	Sig Amps	Signal for Amperage reading	
17	-	0 V	Common 0 V	
18	+	Sig Volts	Signal for Voltage reading	
19	-	0 V	Common 0 V	
20	+	Sig Air Flow	Signal for air flow reading (If Air Blower Ventilation kit is installed)	
21	+	+24 V DC Output	Output voltage for air flow meter (If installed)	
22	-	0 V	Common 0 V	
23	-	0 V	Common 0 V	
24	+	Sig Flow Meter Pulses	Signal for incoming water flow sensor pulses	
25	+	+ 5 V DC Output	Voltage supply for water flow sensor	
26	+	Sig Product Temp	Not in use on	
27	-	0 V	Common 0 V	
28	+	Sig Hydrogen	Signal for hydrogen sensor reading	
29	+	+5 V DC Output	Voltage supply for hydrogen sensor	

Table 15: Control Panel PCB Terminal Connections

Terminal I.D.		PCB Description	Function	
30	N.C.	Ext Alarm N/C	External N.C. Emergency alarm, linked to terminal 15 when not in use	signals
31	-	0 V	Common 0 V	
32	+	Sig Panel Temp	Signal for temperature of panel	
33	-	0 V	Common 0 V	
34	+	Sig Emergency Stop	Signal for emergency stop switch	
35	-	0 V	Common 0 V	
36	+	Sig Softener Regen	Signal for softener regeneration input	
37	-	0 V	Common 0 V	
38	+	Sig Flood	Signal for external bund flood / Linked to common 0 V nit in use	
39	-	0 V	Commen 0 V	
40	+	Sig Door	No function - Linked to common 0 V	
41	-	0 V	Common 0 V	
42	+	Sig Tank Start/Stop	No function - Linked to common 0 V	
43	-	0 V	Common 0 V	
44	+	Sig Ext Tank Run/stop	Signal for product tank run/stop switch //external chlorine signal run input	
45	-	0 V	Common 0 V	
46	+	Sig Ext Tank Low Lv	Signal for low level switch in external product tank	
47	-	0 V	Common 0 V	
48	+	Sig Ext Tank H-H	Signal for high level switch in external product tank	
49	-	0 V	Common 0 V	
50	*	Spare	Spare terminal	
51	+	+24 V DC	24 V DC Supply for brine solenoid	control outputs
52	-	0 V	Common 0 V	
53	+	+ 24 V DC	24 V DC Supply for water solenoid	
54	-	0 V	Common 0 V	

Table 15: Control Panel PCB Terminal Connections

Terminal I.D.		PCB Description	Function	
55	+	+ 12 V DC	12 V DC Supply for electrolyser LEDs	Electrolyser LED outputs
56	+	Green	Connection for green LED	
57	+	Blue	Connection for blue LED	
58	+	Red	Connection for red LED	
59	-	0 V	Common 0 V	
60	+	Digital Inputs	No function	
61	+			
62	+			
63	+			
64	RX	Receive	Data receive	Telemetry option
65	TX	Transmit	Data transmit	
66	+	Aux Alarm	Auxiliary alarm	Not in use
67	-	0 V	Common 0 V	
68	+	Remote Inh	Remote Inhibit	
69	-	0 V	Common 0 V	

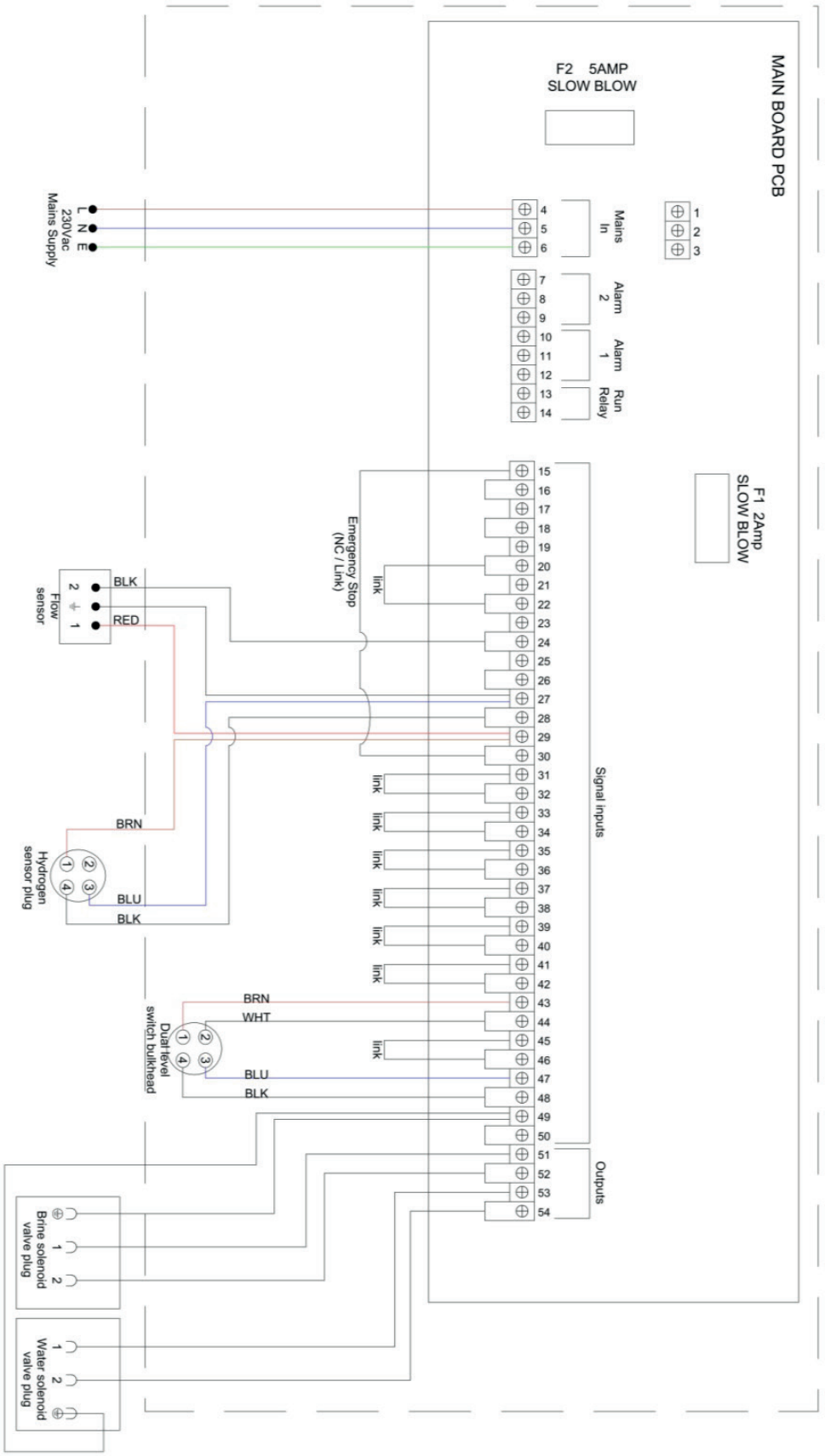
Table 15: Control Panel PCB Terminal Connections

Product Tank - dual level switch assembly P/No. 211-033 A		
Cable ID	**Function**	**Terminals**
Grn/Yel (Pin 1 + 2)	Start/Stop Level	43 / 44
Brn/Wht (Pin 3 + 4)	High Level	47 / 48

Table 16: Level switch PCB connections

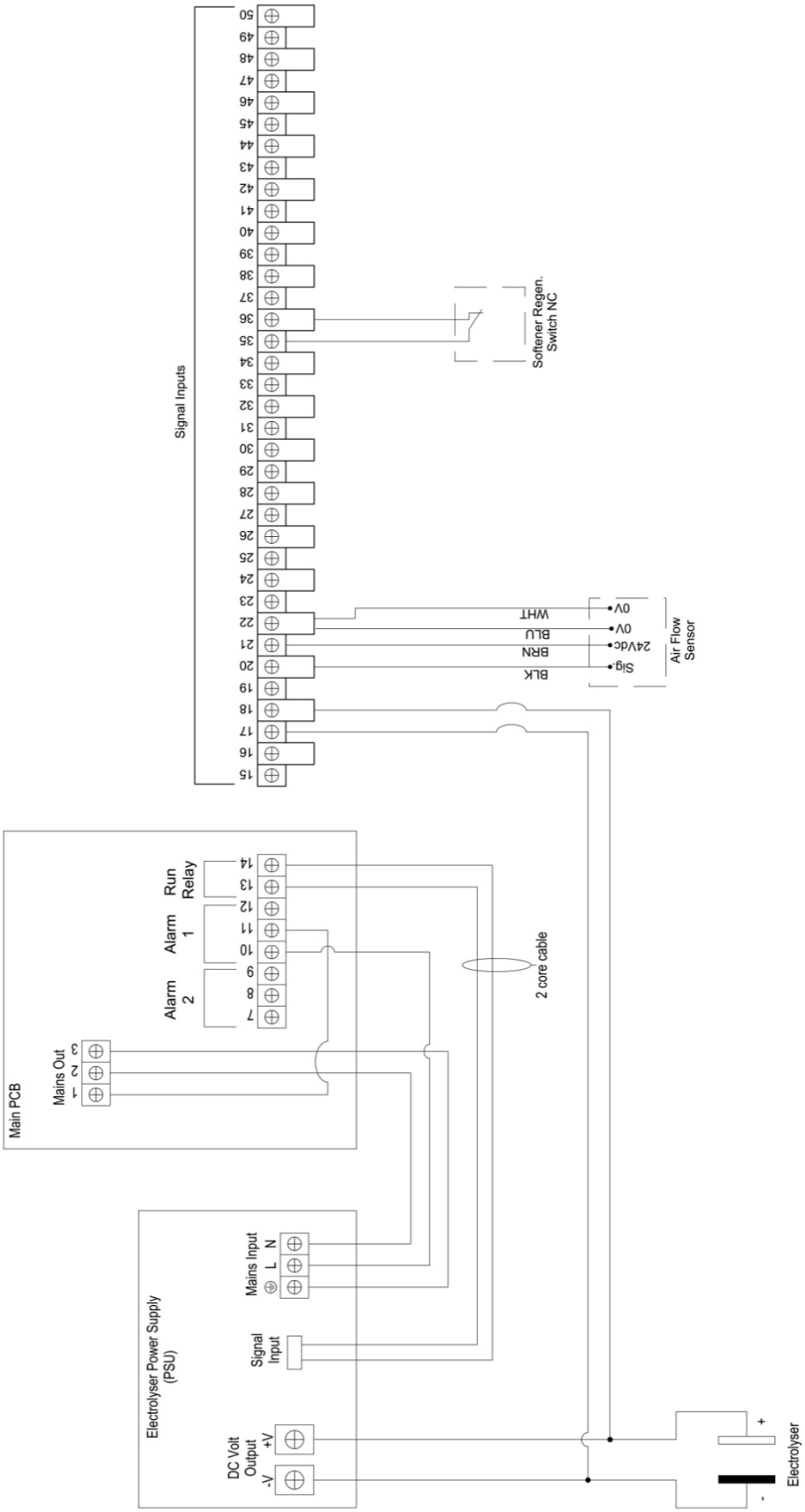
7.4.2 Main PCB Connection Diagram-1

Main PCB showing detail of mains power connection, signal inputs and signal outputs as standard specification.



7.4.3 Main PCB Wiring Diagram-2

Main PCB showing detail only of electrolyser power supply circuit and optional equipment signal inputs.



7.5 Installation schematics

7.5.1 MINICHLORGEN - standard product tank and atmospheric hydrogen vent

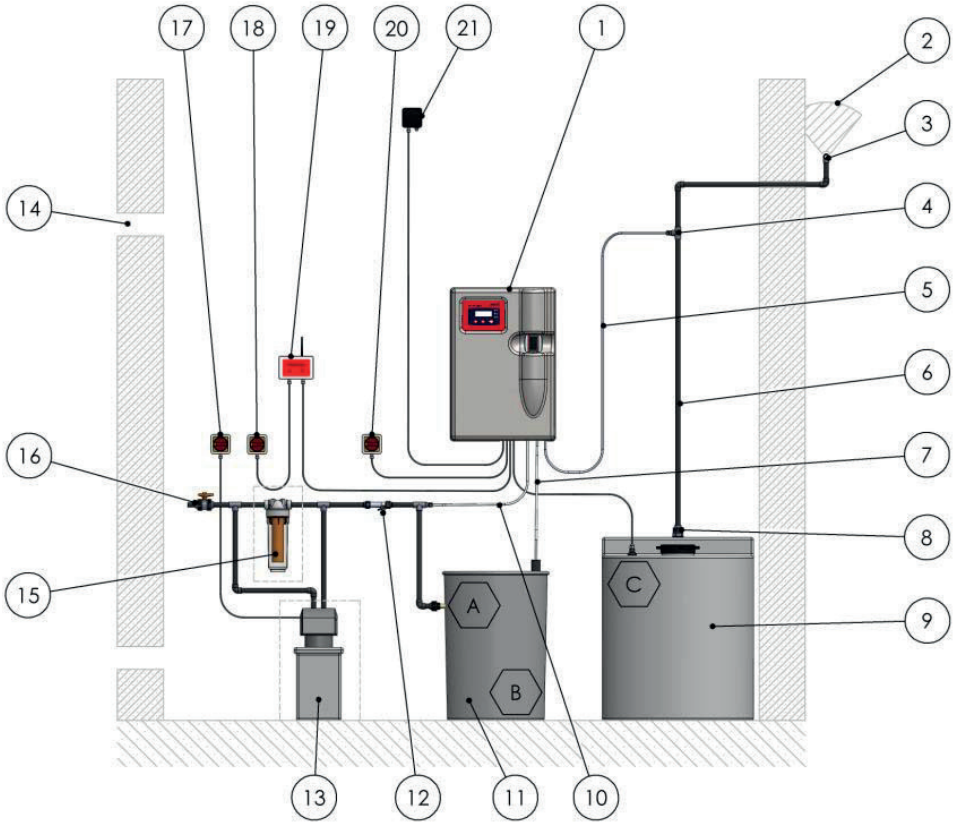


Fig. 9: Standard product tank and atmospheric hydrogen vent

Pos.	Description
1	MINICHLORGEN
2	External unobstructed ventilation
3	External ventilation point
4	Chlorine product injection
5	Chlorine product feed tube
6	Chlorine tank fill line
7	Brine suction
8	Product tank connection
9	Product tank
10	Softened water feed tube
11	Salt saturator
12	Softened water sample point

Pos.	Description
13	Optional Auto regenerative softener*
14	Natural room ventilation
15	Optional Softener cartridge*
16	Cold water feed supply
17	Softener electrical power supply
18	Telemetry electrical power supply
19	MINICHLORGEN telemetry unit
20	MINICHLORGEN electrical power supply
21	Gas detector
A	Saturator float valve assembly
B	Brine well & suction line assembly
C	Product tank level switch assembly

Table 17: Standard product tank and atmospheric hydrogen vent

* MINICHLORGEN must have softened water feed

7.5.2 MINICHLORGEN - standard product tank and air blower hydrogen ventilation option

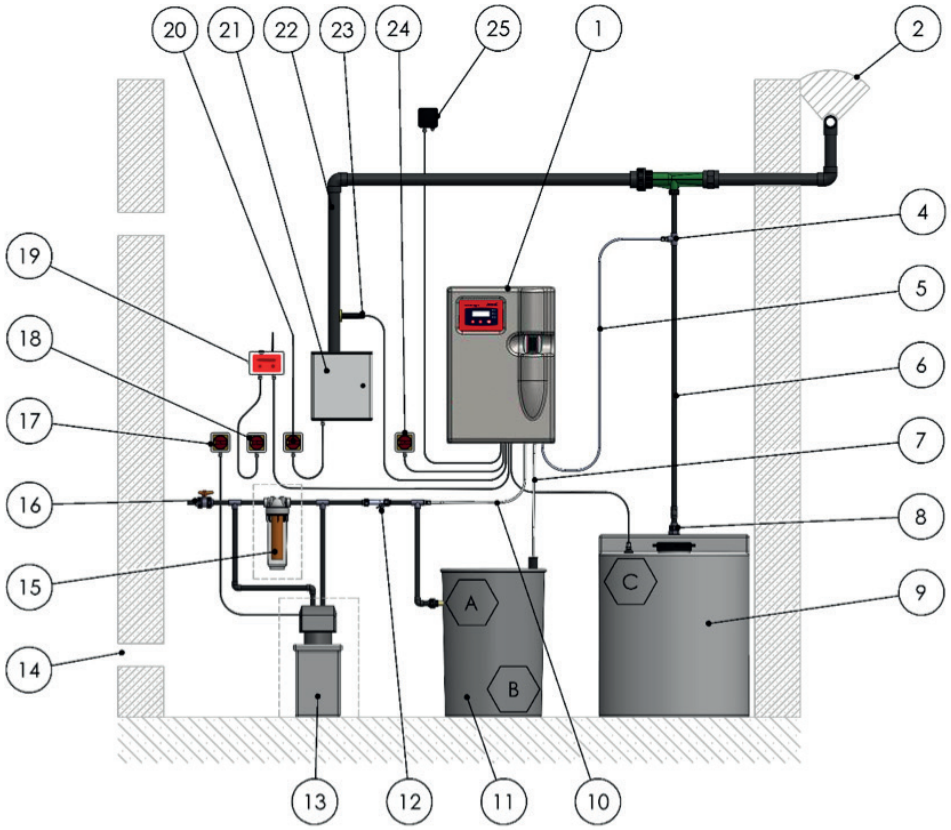


Fig. 10: Standard product tank and air blower hydrogen ventilation option

Pos.	Description
1	MINICHLORGEN
2	External unobstructed ventilation
3	External ventilation point
4	Chlorine product injection
5	Chlorine product feed tube
6	Chlorine tank fill line
7	Brine suction
8	Product tank connection
9	Product tank
10	Softened water feed tube
11	Salt saturator
12	Softened water sample point
13	Optional Auto regenerative softener*
14	Natural room ventilation

Pos.	Description
15	Optional Softener cartridge*
16	Cold water feed supply
17	Softener electrical power supply
18	Telemetry electrical power supply
19	MINICHLORGEN telemetry unit
20	Air blower electrical power supply
21	Air blower unit
22	63 mm/2" uPVC ventilation pipe work
23	Air flow sensor
24	MINICHLORGEN electrical power supply
25	Gas detector
A	Saturator float valve assembly
B	Brine well & suction line assembly
C	Product tank level switch assembly

Table 18: Standard product tank and air blower hydrogen ventilation option

* MINICHLORGEN must have softened water feed

7.5.3 Product tank configuration detail

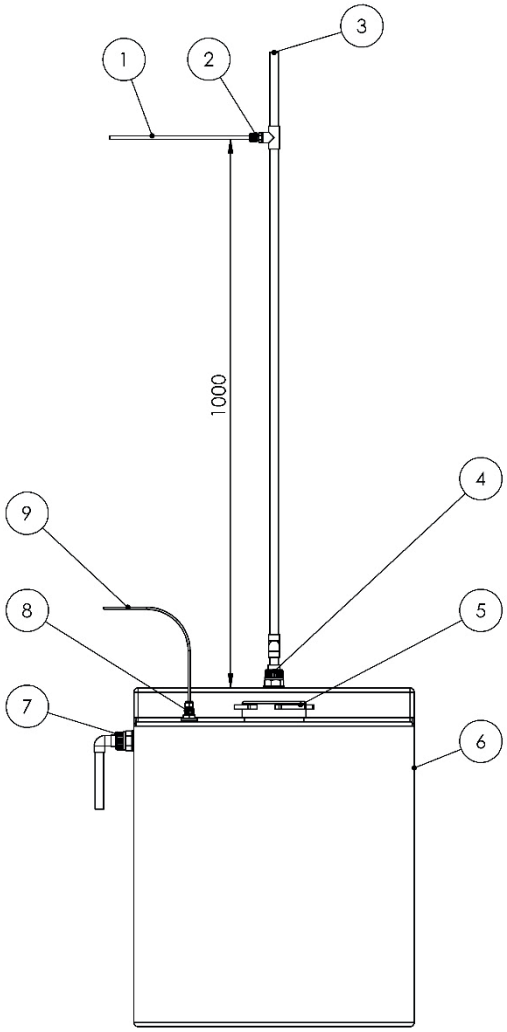


Fig. 11: Product tank

Pos.	Description
1	Chlorine product line, 8 mmOD violet PTFE tube
2	Chlorine injection T-assembly, 20 mm grey uPVC
3	20 mm grey uPVC ventilation piping
4	20 mm grey uPVC tank connector
5	Product tank lid
6	Product tank
7	Vent/overflow pipe, >20 mm diameter pipework
8	Dual level switch 25 mm tank connection uPVC/PVDF
9	5 m signal cable M12 connection to MINICHLORGEN

Table 19: Connection dimensions

7.5.4 Saturator configuration detail

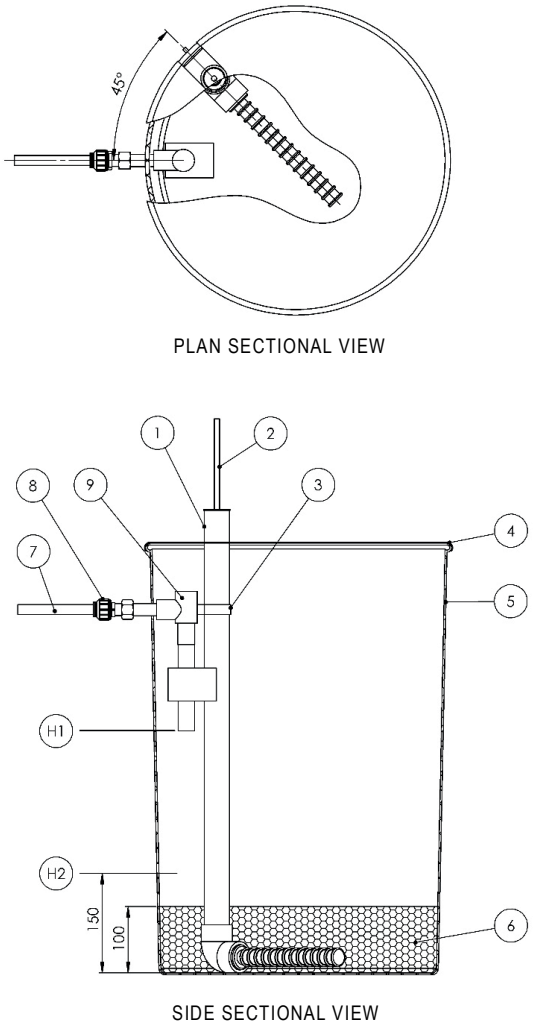


Fig. 12: Saturator

Pos.	Description
1	Brine well assembly, 50 mm grey uPVC pipe
2	Brine suction, 8 mmOD black MDPE tube
3	50 mm pipe clip & fixing bolt assembly
4	Lid, saturator tank
5	Saturator Tank
6	Gravel bed (optional)
7	15 mmOD softend water supply pipe
8	15 mmOD push-fix x ½" BSPf connector
9	float valve assembly
H1	Maximum salt level
H2	Minimum salt level

8 Control

8.1 Control display

The operation of the MINICHLORGEN Compact electrolytic chlorine generation and preparation system is performed via the universal MINICHLORGEN control panel.

Fig. 13: Control display

The system can be configured and operated via the control interface. An operating field with two direction keys and an enter confirmation key are available for this purpose.

Key representation:

Taste	Funktion
	Scroll UP selection button
	Scroll DOWN selection button
	ENTER selection confirmation button

Table 20: Key functions

The control interface also indicates current operational system status via three bright LEDs.

8.2 LEDs

Symbol representation:

	System healthy (GRN)
	System warning /Maintenance action (AMB)
	System fault (flashing RED)

The display screen will always describe the system status or fault condition in conjunction with the appropriate LED symbol representation:

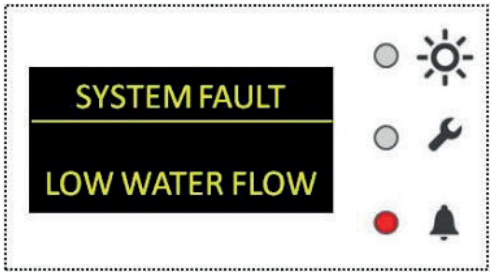


Fig. 14: System fault

System fault is the present condition in this example and the ENTER key has the following assignment:

By pressing the ENTER button the fault will be accepted and the system will reset and attempt to resume normal operation.

9 Start-up

WARNING

Risk of equipment failure and injury to personnel and property!

⇨ Ensure the Pre-Start Up Check List is complete and all instructions and installation criteria adhered to prior to commissioning and start-up of the MINICHLORGEN system to avoid any immediate or ensuing risk.

Check No.	Safety check
1	Hydrogen gas detector fitted correctly at high level in the MINICHLORGEN room.
2	Product tank is ventilated with additional ventilation hole using at least a 20 mm vent pipe elbow fitting/ piping, see section 7.5.3.
3	The MINICHLORGEN mechanical room has natural ventilation.

Table 21: Safety check

Note

Damage to the system due incorrect installation/commissioning.

⇨ Ensure essential commissioning checks are completed correctly to avoid potential mechanical failure when system placed into operation.

Check No.	Pre-start up check
4	There is a minimum air gap clearance of 15mm between the rear of the MINICHLORGEN backboard and the mounting surface/wall in order to allow adequate ventilation at all times from the DC power supply fan exhaust at the rear of the MINICHLORGEN.
5	Suitable softened (minimum 2 bar pressure) water supply available and connected to MINICHLORGEN together with regeneration interruption signal where applicable.
6	Entire ventilation pipe circuit is a permanent fixed continuous conduit and on an incline at all time to the external termination point.
7	Saturator tank is supplied with softened water supply.
8	Softened water sample point is fitted.

Table 22: Pre-start up check

9.1 Commissioning and Initial Start-Up

Preconditions for actions:

- ✓ The system is configured according to the factory setup.
- ✓ The system has been installed in accordance with section 7 “Installation”.
- ✓ The MINICHLORGEN device is earthed.
- ✓ A softened water supply is connected and ready either via a regenerative softener or softener filter cartridge specifically supplied and installed with the MINICHLORGEN system or via an existing soft water supply already available on site.
- ✓ The softened water supply should be confirmed by performing a water hardness YES/NO test. The sample will be a GREEN result for soft water and RED result for hard water. The result MUST BE GREEN, i.e. soft water. DO NOT PROCEED further until a reliable softened water supply is available.
- ✓ The salt saturator is filled with a pre-charge of the correct specification of salt and the water level has reached its full level governed by the float valve.
- ✓ The hydrogen gas sensor detection kit is correctly installed and electrically connected via the 4-pin plug/M12 cable assembly as per installation instruction.

9.1.1 Clock setting

Perform the following working steps:

1. Switch on the power supply to the MINICHLORGEN. Next, the Start-up screen appears:

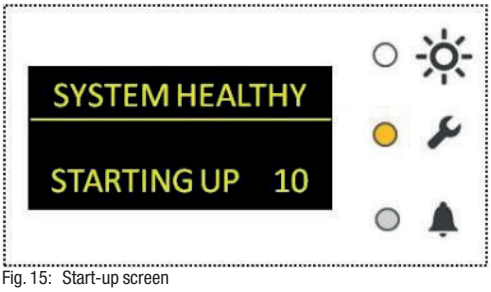


Fig. 15: Start-up screen

▶ The MINICHLORGEN system will perform a set countdown number of water and brine batch cycles from 10 through to 0 to initially charge the electrolytic cell with a minimum volume of brine solution prior to automatically starting normal generation/batch cycles.

2. During the above start up cycles, immediately place the MINICHLORGEN into MANUAL INHIBIT mode by pressing and holding the scroll UP key for 5 seconds. The following MANUAL INHIBIT screen will appear and stop the system:

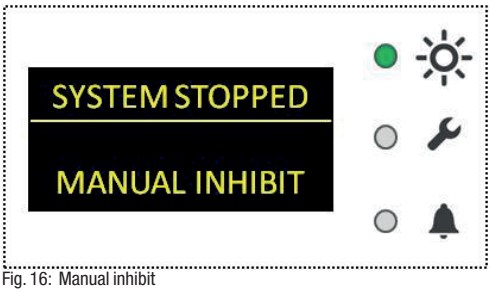


Fig. 16: Manual inhibit

3. Press the ENTER button for 5 seconds to access the Service Menu. The following screen will appear:

Fig. 17: Pin

4. Using the UP/DOWN scroll keys enter the service code 2236 - each digit needs to be individually selected and entered.
5. Scroll UP until Program 7 is revealed:

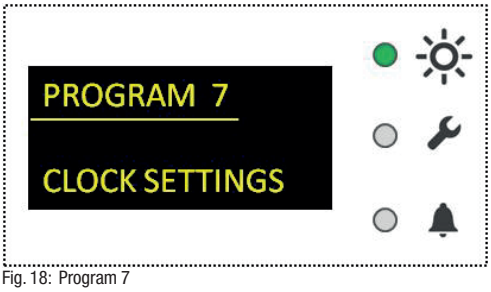


Fig. 18: Program 7

6. Press ENTER and then scroll DOWN to adjust date and time accordingly. Pressing ENTER at the EXIT screen will revert to Service Menu.

✓ **Clock set.**

9.1.2 Softener cartridge set-up (if fitted)

Skip to 9.1.4 if no softener cartridge is fitted.

1. Scroll UP until Program 9 is displayed and press ENTER.
2. Select type A, B or C softener cartridge size:

Cartridge ID	Calcium Hardness Capacity mg/l ($CaCO_3$)
A	48,000
B	97,000
C	292,000

Table 23: Softener cartridge sizes

3. Press ENTER on selection.
4. Scroll UP to Program 10 “Water Hardness” and press ENTER.
5. Scroll UP/DOWN to select the Total Hardness value of the mains water supply, in $CaCO_3$ mg/l. Note: Add a safety of +50 to the entered value to allow for water variances. Press ENTER to store the value.

✓ **Softener cartridge set-up.**

9.1.3 Exiting Program

1. Scroll UP until Program 1 / End Program Mode is reached. At this point press ENTER and the display will return to the MANUAL INHIBIT screen.
2. To restart the system press and hold the scroll UP key for 5 seconds.
3. MINICHLORGEN system will now resume its countdown start-up sequence and then proceed to normal automatic operation indicated by SYSTEM HEALTHY, GENERATING.

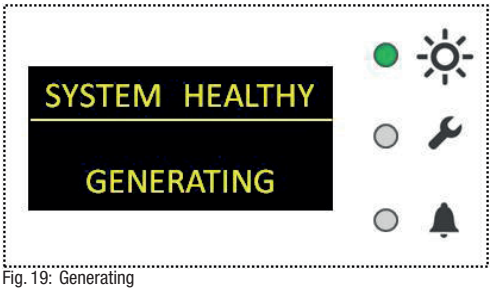


Fig. 19: Generating

4. When the SYSTEM HEALTHY screen is visible, scroll DOWN to observe engineer display 1:

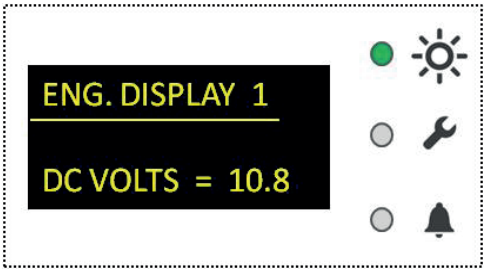


Fig. 20: Engineer display

The normal DC Volt reading should be in the range of between 10 and 13 volts.

N.B. the DC volt reading may take several hours to stabilize on initial commissioning owing to the water/brine solution strength stabilizing.

5. Continue to scroll DOWN to observe Eng. Display 4 which provides a visual indication of the hydrogen threshold as a percentage. An acceptable level of <70 % should always be the case. The hydrogen gas detect system is factory set and requires only an annual service inspection/test. IMPORTANT! As soon as the hydrogen reading is stable from initial power up, enter this reading into the commissioning record in Appendix I.

✓ **Program exited.**

9.1.4 Changing display language

1. The control panel display language can be selected when the MINICHLORGEN is in normal operation simply by scrolling down to Program 9 and repeatedly depress the ENTER key until the language of choice is displayed, from which then leave this screen by scrolling UP/DOWN back to normal operating screen display.

9.1.5 Adjustment of regenerative softener (if fitted)

1. If a digital flow metered auto regenerative softener is fitted to the system, the hardness setting of the softener control should be set to at least 50 mg/l $CaCO_3$ above the hardness value of the source water.
2. If a time clock auto regenerative softener is fitted to the system, ensure that the regeneration cycle is frequent enough to accommodate the total litres capacity per day water flow through the MINICHLORGEN. Refer to section 5.1 “Output data” for maximum daily water consumption values.

	Note
Damage to the system due incorrect installation/commissioning. ⇨ Ensure MINICHLORGEN does not operate without a reliable softened water supply!	

In the case of a single SIMPLEX regenerative softener vessel unit, the MINICHLORGEN must not operate during the regeneration cycle. When the softener is in regeneration, the MINICHLORGEN should stop and the screen will display:

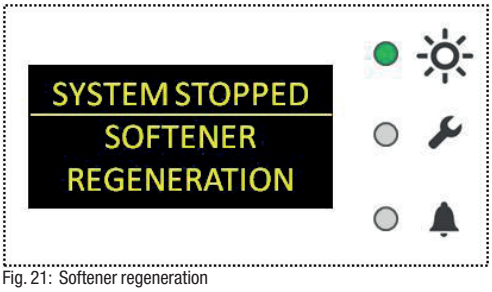


Fig. 21: Softener regeneration

If the above screen is not displayed then this may be a result that the softener regeneration signal is not properly connected to the MINICHLORGEN. Refer to section 7.3.2 for further guidance.

3. Complete the Commissioning record log sheet in Appendix I.
4. After 12 to 24 hours operation it is recommended to perform further checks:

➔ Carry out a chlorine product strength test. The result should ideally be 0.6 % ± 0.1 %.

➔ Carry out a YES/NO hardness test of the softened water supply. The result should be YES i.e. a green colour test sample result.

➔ Adequate salt stock is available for the operator to maintain uninterrupted operation and that site management have a salt stock ordering process is in place.

✓ **Regenerative softener adjusted.**

9.1.6 Hydrogen gas detector check

1. Whilst the MINICHLORGEN is in normal operation, remove the signal cable attached to the hydrogen sensor by unscrewing the M12 connector plug directly attached to the black detector housing. Within a few seconds the MINICHLORGEN will go into alarm and display:

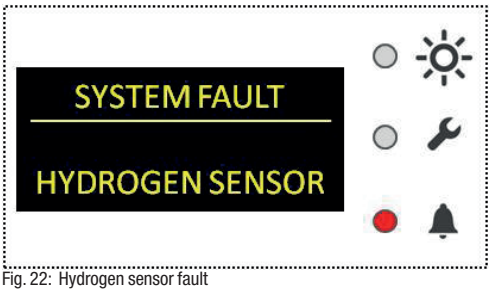


Fig. 22: Hydrogen sensor fault

2. Reconnect the M12 cable plug to the gas detector and press the ENTER button on the control panel to accept the alarm and resume normal operation.

Consult your technical supplier should there be any concerns whatsoever with the commissioning and operation of the MINICHLORGEN system.

✓ **System commissioning and start up completed.**

9.2 Normal Start-Up

Precondition for action:

✓ The MINICHLORGEN has only been in short term shutdown and that all commissioning and initial start up procedures have previously been completed and no alterations to the MINICHLORGEN equipment and configuration has not subsequently been altered.

✓ The softened water supply should be confirmed by performing a water hardness YES/NO test. The sample will be a GREEN result for soft water and RED result for hard water. The result MUST BE GREEN, i.e. soft water. DO NOT PROCEED further until a reliable softened water supply is available.

✓ The salt saturator is filled with a pre-charge of the correct specification of salt and the water level has reached its full level governed by the float valve.

Perform the following working steps:

1. Switch on the power supply to the MINICHLORGEN. The Start-up screen appears:

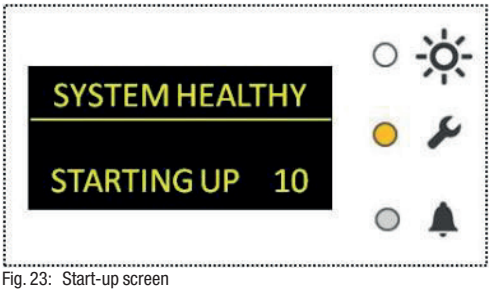


Fig. 23: Start-up screen

▶ The MINICHLORGEN system will perform a set countdown number of water and brine batch cycles from 10 through to 0 to initially charge the electrolytic cell with a minimum volume of brine solution prior to automatically starting normal generation/batch cycles.

2. When the countdown is complete the MINICHLORGEN will resume normal operation and display SYSTEM HEALTHY, GENERATING:

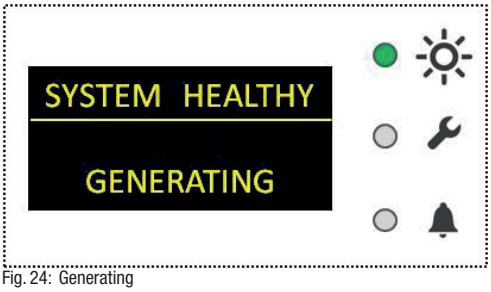


Fig. 24: Generating

3. When the SYSTEM HEALTHY screen is visible, scroll DOWN to observe engineer display 1:

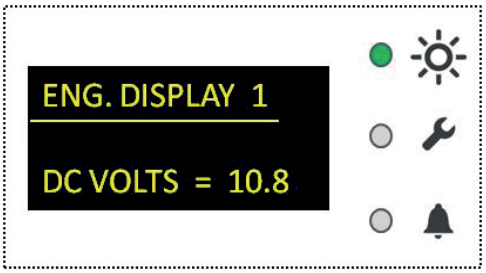


Fig. 25: Engineer display

The normal DC Volt reading should be in the range of between 10 and 13 volts.

- The DC volt reading may take several hours to stabilize on initial commissioning owing to the water/brine solution strength stabilizing.

✓ **Start up complete.**

10 Operation

Note

Damage to the system due to incorrect salt supply!

Failure to observe the correct specification of salt used by this system will most likely result in failure of the system and affect the warranty conditions.

⇨ Use the correct salt.

10.1 Automatic Operation

The MINICHLORGEN system is automated. However, the salt saturator should be refilled with salt manually before allowing it to become empty. Try not to allow the salt level to drop <25 % full. The saturator should have markers fitted to indicate “maximum” and “minimum” salt level!

On electrical power the MINICHLORGEN always performs an initial purge of water and brine prior to normal operation. In normal operation, the electrolytic chlorine process will START and STOP automatically according to the level of the product storage tank facility.

When the tank is full the display will show:

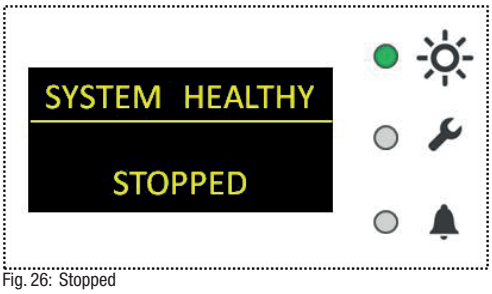


Fig. 26: Stopped

When the system is generating and the tank is filling the display will show:

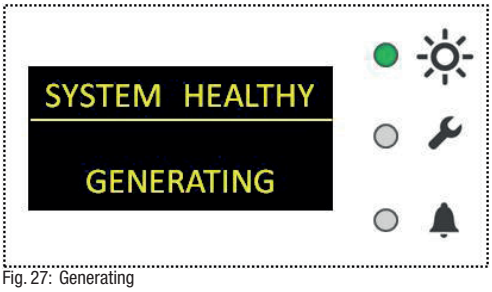


Fig. 27: Generating

10.2 Manual Inhibit

The automatic process may be interrupted by placing the control cycle in to MANUAL INHIBIT mode. This will STOP the automatic electrolytic process.

Whilst the system is displaying SYSTEM STOPPED or SYSTEM HEALTHY, the scroll UP key may be pressed for 5 seconds to place the system into MANUAL INHIBIT mode which halts the automatic operation:

Fig. 28: Manual inhibit

Press the scroll UP key again for 5 seconds to resume automatic operation.

10.3 Remote Inhibit

The MINICHLORGEN may be connected to an external switch intended to stop the system remotely. If the system is stopped remotely the screen will display REMOTE INHIBIT. The system will not resume automatic operation until the remote inhibit function is released.

10.4 Softener Regeneration

Note

Damage to the system due to hard water supply!

Hard water may damage or adversely impact on the performance of the system.

⇨ Regularly check and verify the softened water supply.

⇨ If a regenerative softener device is fitted, make sure that the correct salt level is regularly checked and maintained in the softener brine tank where applicable.

Failure to provide a softened feed water supply for the normal operation of the system will most likely result in failure of the system and affect the warranty conditions.

If a SIMPLEX automatic regenerative softener has been fitted, the softener will automatically regenerate and whilst doing so should place the MINICHLORGEN into STOP mode to prevent the MINICHLORGEN from operating with softened water (signal switching between softener and MINICHLORGEN):

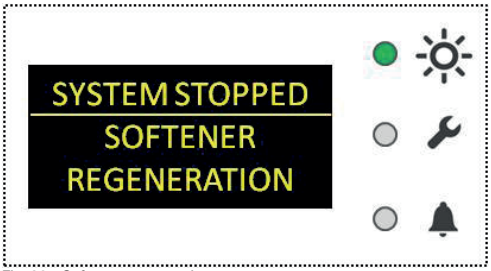


Fig. 29: Softener regeneration

The system will resume automatic operation once the regenerative process, approximately 60 minutes, is complete.

10.5 Replace Water Softener Cartridge

If a softener cartridge filter has been fitted to the system, the softener cartridge will eventually become exhausted and requires replacement.

The MINICHLORGEN control panel monitors the volume of water consumed in the generating process and will indicate on the display screen when the cartridge requires replacement. In addition, the amber warning lamp will illuminate while the cartridge is becoming exhausted in order to alert the operator that attention is required:

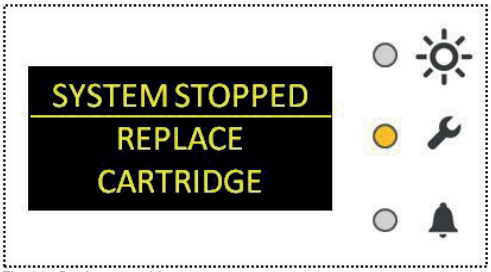


Fig. 30: Replace cartridge

Failure to replace the cartridge when indicated may quickly lead to reduced system performance and unnecessary failure of the system.

Preconditions for actions:

✓ Place the system into MANUAL INHIBIT mode.

✓ The system water supply at the inlet and outlet of the filter cartridge has been isolated.

Perform the following working steps:

1. Relieve water pressure within the filter bowl by depressing the pressure release button on top of the filter housing or by briefly opening the filter outlet valve and then the softened water sample tap.
2. Remove the filter cartridge bowl using the filter spanner (supplied with the filter kit) taking care not to drop the filter bowl.
3. Dispose of the water contained in the filter bowl to a waste drain.
4. Dispose of the exhausted softener cartridge as commercial waste.
5. Fit the correct new replacement softener cartridge.
6. Open the filter inlet/outlet isolating valves.
7. Take the system out of MANUAL INHIBIT to resume automatic operation.
8. Reset the cartridge filter volume counter on the MINICHLORGEN control panel by repeatedly depressing the scroll DOWN key until the Eng. Display 7 is displayed:

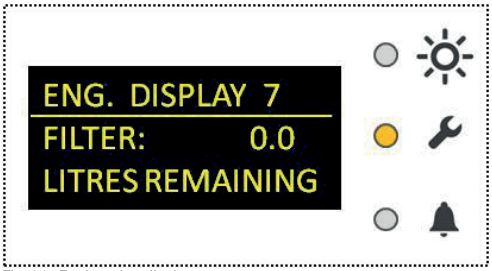


Fig. 31: Engineering display 7

9. Press the ENTER key for 5 seconds and the “litres remaining” value will reset to the correct value.
10. Press the scroll DOWN key twice to return to the normal operating display.

✓ **The cartridge filter is now successfully replaced.**

10.6 Emergency Shutdown

In the event of an emergency, you must immediately disconnect the device from the mains supply. This can be achieved by switching the rotary isolator to the off position.

If an auxiliary Emergency Stop device has been connected to the device then this can be activated to stop the system. If this is the case, the MINICHLORGEN system will need to be reset on the panel by pressing the ENTER button once the Emergency Stop device has been released.

10.7 Record Log of Operation

In order to maintain and monitor the performance of the system and ensure the system is operated within manufacturer warranty conditions, the operator has the responsibility to complete the Operator Log in Appendix II:

Note

Long term damage due to incorrect maintenance.

Without good operational record keeping, operational efficiency cannot be monitored and may lead to unnecessary maintenance in the future.

⇨ Record parameters as required on the log sheet each time salt is added.

⇨ Record parameters as required on the log sheet at regular intervals, approximately weekly.

✓ **Warranty compliance.**

11 Shutdown

11.1 Short-term shutdown (up to 6 months)

Perform the following working steps:

1. Isolate the power supply to the MINICHLORGEN via the rotary isolator switch.
2. Switch the mains on again to create a Start-up cycle. When the start-up cycle finishes immediately switch off again. Repeat this regime twice in total. The purpose of this regime is to rinse the electrolytic circuit of residual brine and sodium hypochlorite solution.
3. Isolate the feed water supply upstream of the saturator and softener as applicable.
4. Switch off the auto regenerative softener if applicable.

✓ **System shut down for the short term.**

11.2 Long-term shutdown

In addition to above “Short term shutdown”, perform the following working steps:

1. Place a sign on the system indicating that the unit will require pre-start up checks and commissioning checks prior to the next start-up.

✓ **System shut down for the long term.**

11.3 Storage

Required actions:

✓ The system has been shut down in accordance with the section 11.2 “Long-term shutdown”.

Storing the system correctly will extend its service life. You should avoid negative influences such as extreme temperatures, high humidity, dust, chemicals, etc.

Ensure ideal storage conditions where possible:

- The storage place must be cold, dry, dust-free and generously ventilated,
- Temperatures between +0 °C and +50 °C,
- Relative air humidity must not exceed 90 %.

11.4 Transportation

Required actions:

✓ The system has been shut down in accordance with the section 11.2 “Long-term shutdown”.

- The system may only be transported when empty of all salt and water/solution throughout the system.
- Use suitable lifting and transport equipment where necessary.
- The danger of cold embrittlement of the plastics which it contains means that the system may not be transported at temperatures under 0 °C. Cracks in welded seams, container walls and piping could result.

If the system is sent back to the supplier/manufacturer, please follow sections 16 “Declaration of no objection” on page 42 and section 17 “Warranty claim” on page 43.

11.5 Disposal of old equipment

- The system must be disposed of responsibly and in accordance with applicable local laws and regulations. It should not be disposed of as domestic waste.
- As the disposal regulations differ from country to country, please consult your supplier if necessary.
- In Germany, the manufacturer must provide free-of-charge disposal, provided the system has been safely returned along with a declaration of no objection (see page 42).

12 Maintenance

Products by Lutz-Jesco are manufactured to the highest quality standards and have along service life. However, some parts are subject to operational wear. This means that regular visual inspections are necessary to ensure a long service life. Regular maintenance will protect the system from operational interruptions.

DANGER

Mortal danger from electric shock!

Live parts can inflict fatal injuries.

⇨ Disconnect from the electricity before working on any equipment.

⇨ Secure all devices to prevent it from being switched on again.

WARNING

Increased risk of accidents due to insufficient qualification of personnel!

The system and its accessories may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.

⇨ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.

⇨ Maintenance is carried out using appropriate personal protective equipment.

12.1 Maintenance Intervals

The system requires regular maintenance to prevent errors, poor performance and even failure. This table gives an overview of maintenance work and the intervals at which you must carry it out. The next few sections contain instructions for carrying out this work.

Interval	Level	Maintenance
On demand	Operator	■ Replace softener cartridge if fitted
Annual	Technician	■ Check all hydraulic fittings and connections are leak free and tubing in good condition ■ Check/Test hydrogen gas sensor
2 yrs (or >10,000 operating hours)	Technician	■ Check/Test/Replace hydrogen gas sensor
5 yrs	Technician	■ Major overhaul

Table 24: Maintenance intervals

12.2 Hydrogen gas detector inspection

The hydrogen gas (H_2) detection system is very important to ensure a safely managed MINICHLORGEN system. The H_2 detector should be routinely tested frequently and at least annually in order to verify a safe system of work.

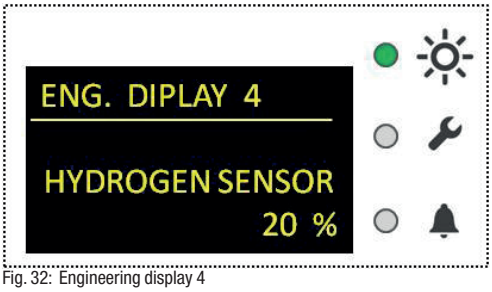


Fig. 32: Engineering display 4

Precondition for action:

✓ MINICHLORGEN system in normal automatic operation.

Perform the following working steps:

2. The Hydrogen level detected in the immediate atmosphere is displayed on the screen and should normally be below 70 %. This reading can be displayed by scrolling DOWN at the MINICHLORGEN panel to reveal Program 4.
3. Compare the displayed hydrogen level with the commissioned value as recorded in Appendix I at time of initial commissioning/start-up. If the current reading displayed is >25 % higher than commissioning reading it is recommended to replace the sensor.
4. Carry out check procedure in section 9.1.6 “Hydrogen gas detector check” on page 30.
5. Replace the hydrogen sensor if:

➔ reading is above normal range >70 %

➔ sensor is known to have been damaged by water emersion or fire damage

➔ sensor has been in operation >2 years

N.B. When the sensor is functioning correctly and the display reads 100 %, this is equivalent to a H_2 detection level in the atmosphere of less than 25 % of the LEL threshold which is still extremely safe, however, the level is higher than normal and action should be taken to rectify the problem.

✓ **The hydrogen gas detection system has been successfully checked/sensor replaced.**

12.3 Remedial Maintenance

Precondition for action:

✓ Perform Short-term shut down procedure, see section 11.1 “Short-term shutdown (up to 6 months)” on page 34

12.3.1 MINICHLORGEN unit

1. Remove the MINICHLORGEN plastic cover

2. Observe closely all the liquid tube fittings and if there is any slight leakage this may be due to an adapter fitting requiring further tightening or the tube requiring pushing into the tube fitting.
3. Wipe away any solution residues from fittings taking care to wear rubber gloves and protective glasses in case of any presence of chlorine and/or salt residue that may cause irritation of the skin and eyes.
4. Check the electrolyser DC cables are tight at the top and bottom brass connection terminals. DO NOT overtighten!
5. Brush away any dust that may have gathered at the front ventilation grille on the electrolyser power supply enclosure.
6. Check and tighten any loose cable glands or electrical connection plugs attached to the sensors and control valves where necessary.
7. Replace the MINICHLORGEN cover taking care to locate it properly.

12.3.2 Salt saturator

1. Clean out the salt saturator if the salt has left dirty residues depending on the salt quality.
2. Check the black brine suction line and the non-return foot valve assembly at the end of the black suction line tube (positioned in base of brine well assembly) is clean. Replace if damaged or missing!
3. Replace the saturator tank water float valve if it is damaged.
4. Check the softened water supply equipment requires any maintenance by referring to the appropriate manual supplied with the equipment.
5. Check inside the product tank is clean and carefully remove any debris that may be floating on the surface of the product solution as it might entangle with the float switch assembly and cause failure of the MINICHLORGEN system.
6. When all maintenance has been safely carried out place the MINICHLORGEN back into operation.

✓ **Remedial maintenance complete.**

12.4 Major service

Note

Damage to the system due to incorrect maintenance!

The system and its accessories may only be installed, operated and maintained by personnel with sufficient qualifications.

⇨ Make sure the maintenance is performed correctly by qualified personnel.

A major overhaul of the MINICHLORGEN system is required every 5 years, regardless of operating hours. An approved MINICHLORGEN service technician will be required to conduct this maintenance regime.

Control devices, the electrolytic cell, the salt saturator and all associated pipe work will require thorough inspection and cleaning and worn/ defective parts replaced as necessary.

The water and brine solenoid valves will require replacement.

The electrolytic cell will require an acid clean and its two cell casing end cap O-rings and the two terminal O-rings replacing.

All flexible plastic tubing will require replacement.

The hydrogen gas detect sensor head will require replacement.

If an auto regenerative softener is fitted, the softener will require a full service.

All safety switches and safety devices to be fully tested.

Action to be taken:

➔ Contact your MINICHLORGEN service provider to arrange a major overhaul service.

✓ **General overhaul will provide for future safe operation and continued reliable service.**

12.5 Electrolyser cleaning

The electrolyser (electrolytic cell) may require acid cleaning periodically to remove the presence of water hardness scaling and also any heavy metal deposition e.g. iron and manganese deposits.

One of the reasons the MINICHLORGEN may alarm in “VOLTAGE HIGH” is due to the electrolyser becoming scaled or fouled with heavy metals.

Precondition for actions:

✓ Perform Short-term shut down procedure, see section 11.1 “Short-term shutdown (up to 6 months)” on page 34.

Perform the following working steps:

WARNING

Increased risk of accidents due to brine spillage!

A residual of brine solution may drip from the saturator chamber above.

⇨ Wipe away any spillage immediately.

1. Dismount the MINICHLORGEN housing.
1. Connect the acid wash cleaning system to the electrolyser in accordance with the operating instructions provided with the MINICHLORGEN acid washing kit.
2. Completely rinse out and drain the electrolyser with water prior to refitting into the electrolyser chamber.
3. Refit the electrolyser cell to the union assemblies taking care not to over-tighten the union collars.
4. Ensure the water supply is turned on to the system
5. Perform start-up as per section 9.1.

✓ **Electrolyser acid wash carried out successfully.**

12.6 Finishing maintenance

Perform the following working steps:

1. Make a note of the date and scope of the maintenance performed.
2. Complete any operational, service or commissioning log sheets associated with the MINICHLORGEN system and as per any associated documents which are contained within this manual.
3. Attach a sticker displaying the maintenance date to the system.
4. To assure correct start up procedures, refer to section 9 “Start-up”.

✓ **Maintenance completed.**

13 Troubleshooting

See below for information about how to rectify faults on the control device or the system in general. If you cannot eliminate the fault, please consult with your approved MINICHLORGEN service provider on further measures or return the device/system component for repair.

Fault	Symptom/Cause	Remedy
High Volts Alarm	■ System run out of salt/weak brine solution causing. ■ Saturator tank is low in salt.	■ Check SG of the generated product from the product tank. The SG should be within the range of 1.014-1.018 kg/m$^{3.}$ ■ Make sure that the salt tank is topped up with the correct grade of salt. Allow sufficient time for a new loading of salt in the saturator to saturate. Carry out “Normal Start-Up” section 9.2.
	■ The water softener has failed causing scale build-up in the electrodes.	■ Carry out an acid clean of the electrolyser. In some cases due to wear and tear or >5 years operation, the electrolyser may require replacement.
	■ The water pressure is not sufficient to properly backwash and regenerate the water softener. ■ Water is slowly passing trough the MINICHLORGEN water solenoid valve. ■ The electrolyser DC terminals may have become loose and dirty/corroded.	■ Check water supply pressure at source and also check any water pressure boosting equipment is operational. ■ Replace the water solenoid valve assembly. ■ Clean and retighten the electrolyser DC terminal connections.
Low Volts Alarm	■ Water/brine solution to the MINICHLORGEN electrolyser is too strong in brine.	Check SG of the generated product from the product tank. The SG should be within the range of 1.014-1.018 kg/m^{3}. ■ A regenerative softener may be defective and allowing an excess residual of brine after regeneration cycle. Check softener. ■ Adjustment of the brine settings in the control panel may be necessary by a maintenance technician.
	■ MINICHLORGEN DC power supply is faulty. ■ MINICHLORGEN Main PCB Run relay faulty	■ DC Power supply overheated or failed. ■ PCB repair/replacement.
Ext Tank High Alarm	■ Product tank solution is at a higher level than normal.	■ Debris may have compromised the lower START/STOP switch causing it to be stuck in low level and requires careful cleaning. ■ Remove and inspect/clean/ replace the chlorine dosing pump suction valve, injection valve and pump head valves as liquid may be coming back from the water system and slowly filling the product tank.
	■ Faulty MINICHLORGEN water solenoid valve.	■ Switch MINICHLORGEN off and if water flowing through MINICHLORGEN into product tank, replace water solenoid valve assembly.
Ext Tank Low Alarm	■ Product tank reached low level ■ Low level switch faulty	■ Chlorine dosing pump(s) capacity too high or process demand higher than normal and attention to dosing output setting is required. ■ Clean or replace level switch
Low Water Flow	■ Water supply pressure is low or has been inadvertently isolated. ■ Flexible water tubing is damaged. ■ Softener is at fault.	■ Check water supply pressure at source and also check any water pressure boosting and softening equipment is operational. ■ Replace damaged tubing with correct type tube. ■ Softener requires service/repair.

Table 25: Troubleshooting

Fault	Symptom/Cause	Remedy
Low Airflow	■ External ventilation point is restricted. ■ Ventilation 63 mm venture T-assembly is dirty. ■ Air blower has been switched off or failed. ■ Air flow sensor is dirty or has failed.	■ Check all ventilation pipework for restriction/damage. ■ Venturi internal bore requires cleaning with a suitable bottle brush. ■ Check air blower switched on or if requires motor/ capacitor repair or replacement. ■ Carefully remove air sensor and clean sensor tip with dry soft cloth. Replace as necessary.
Hydrogen Sensor	■ Hydrogen sensor detected higher than normal level of hydrogen ■ Hydrogen sensor not connected ■ Hydrogen sensor faulty	■ Check external ventilation point has not been blocked and ventilation pipe work damaged. ■ Connect hydrogen sensor to MINICHLORGEN using cable/plug provided. ■ Fit new hydrogen sensor – do not repair!
Bund Flood	■ Bund tank level switch activated with liquid spillage/ leakage from product tank or leaking dosing pump ■ Level switch faulty	■ Repair/replace product tank or dosing pump equipment as necessary. ■ Replace level switch.

Table 25: Troubleshooting

14 Spare Parts

14.1 Recommended spare parts

14.1.1 Replacement softener cartridges (if fitted)

Description
Low capacity softener filter cartridge, type-L* (A)
Standard capacity softener filter cartridge, type-S* (B)
High capacity softener filter cartridge, type-H* (C)

(* depending on type supplied with scope of system)

14.1.2 MINICHLORGEN 30/60/90 common spare parts

Description
Brine suction foot valve PP/EPDM non-return valve and filter screen assembly.
Product tank dual float level switch assembly PVDF/FPM with 5m PVC signal cable.
Hydrogen gas sensor & mounting bracket.
Electrolyser O-ring seal kit Set of EPDM internal O-rings and internal terminal O-rings.
Float valve assembly, saturator, PP/EPDM/Brass

14.2 Hydraulic/fluid control equipment

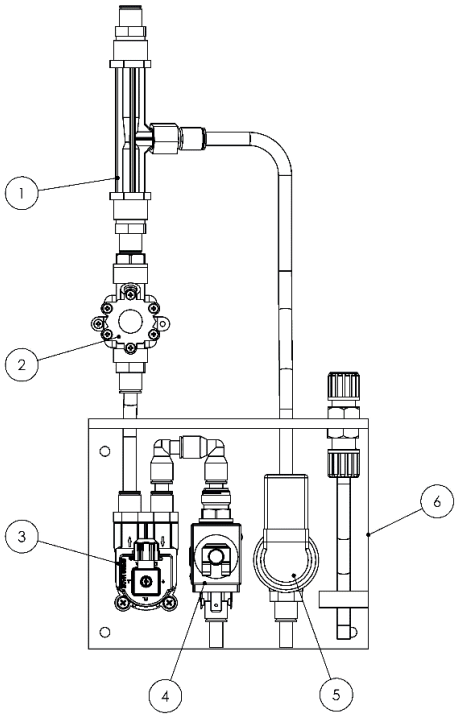


Fig. 33: Water/brine control devices

Key	Description
1	Brine suction venturi assembly PVDF/PP/EPDM, 8mmOD push-fit connections
2	Water pressure regulator assembly PP/SS/EPDM/PVDF/Ti, 8mmOD push-fit connections
3	Water flow sensor assembly PVDF/PP/EPDM
4	Water control solenoid valve assembly Brass/FPM/SS/PP/EPDM, 8mmOD push-fit connections
5	Brine control solenoid valve assembly PVC/FPM/PP/EPDM/PVDF/Ti, 8mmOD push-fit connections

15 EU declaration of conformity

(DE) EU-Konformitätserklärung
Hiermit erklären wir, dass das nachfolgend bezeichnete Gerät aufgrund seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der aufgeführten EG-Richtlinien entspricht. Bei einer nicht mit uns abgestimmten Änderung am Gerät verliert diese Erklärung ihre Gültigkeit.

(EN) EU Declaration of Conformity
We hereby certify that the device described in the following complies with the relevant fundamental safety and sanitary requirements and the listed EC regulations due to the concept and design of the version sold by us.
If the device is modified without our consent, this declaration loses its validity.

(FR) Déclaration de conformité UE
Nous déclarons sous notre propre responsabilité que le produit ci-dessous mentionné répond aux exigences essentielles de sécurité et de santé des directives CE énumérées aussi bien sur le plan de sa conception et de son type de construction que du modèle que nous avons mis en circulation.
Cette déclaration perdra sa validité en cas d'une modification effectuée sur le produit sans notre accord explicite.

(ES) Declaración de conformidad UE
Por la presente declaramos que, dados la concepción y los aspectos constructivos del modelo puesto por nosotros en circulación, el aparato mencionado a continuación cumple con los requisitos sanitarios y de seguridad vigentes de las directivas de la U.E. citadas a continuación.
Esta declaración será invalidad por cambios en el aparato realizados sin nuestro consentimiento.

Bezeichnung des Gerätes: **Description of the unit:** **Désignation du matériel:** **Descripción de la mercancía:**	Elektrolysechlorungsanlage zur Verwendung vor Ort On-site electrolytic chlorination system
Typ: **Type:**	MINICHLORGEN 30 / 60 / 90
EG-Richtlinien: **EC directives:**	Maschinenrichtlinie / Machinery (2006/42/EG) Niederspannungsrichtlinie / Electrical equipment designed for use within certain voltage limits (2014/35/EU) Elektromagnetische Verträglichkeit / Electromagnetic compatibility (2014/30/EU)
Dokumentationsbevollmächtigter: **Authorized person for documentation:**	Lutz-Jesco GmbH

Heinz Lutz
Geschäftsführer / Chief Executive Officer
Lutz-Jesco GmbH
Wedemark, 01.02.2017

Lutz-Jesco GmbH
Am Bostelberge 19
30900 Wedemark
Germany

16 Declaration of no objection

Please copy the declaration, stick it to the outside of the packaging and return it with the device.

Declaration of no objection

Please fill out a separate form for each appliance!

We forward the following device for repairs:

Device and device type: ..... Part-no.: .....

Order No.: ..... Date of delivery: .....

Reason for repair: .....

.....

.....

Dosing medium

Description: ..... Irritating: ☐ Yes ☐ No

Properties: ..... Corrosive: ☐ Yes ☐ No

We hereby certify, that the product has been cleaned thoroughly inside and outside before returning, that it is free from hazardous material (i.e. chemical, biological, toxic, flammable, and radioactive material) and that the lubricant has been drained.

If the manufacturer finds it necessary to carry out further cleaning work, we accept the charge will be made to us.

We assure that the aforementioned information is correct and complete and that the unit is dispatched according to the legal requirements.

Company / address: ..... Phone: .....

..... Fax: .....

..... Email: .....

Customer No.: ..... Contact person: .....

Date, Signature: .....

17 Warranty claim

Warranty claim

Please copy and send it back with the unit!

If the device breaks down within the period of warranty, please return it in a cleaned condition with the complete warranty claim.

Sender

Company: ..... Phone: ..... Date: .....

Address: .....

Contact person: .....

Manufacturer order no.: ..... Date of delivery: .....

Device type: ..... Serial number: .....

Nominal capacity / nominal pressure: .....

Description of fault: .....

.....

.....

.....

.....

.....

.....

.....

Service conditions of the device

Point of use / system designation: .....

.....

.....

Accessories used (suction line etc.): .....

.....

.....

.....

.....

Commissioning (date): .....

Duty period (approx. operating hours): .....

Please describe the specific installation and enclose a simple drawing or picture of the chemical feed system, showing materials of construction, diameters, lengths and heights of suction and discharge lines.

18 Appendix I - Extended settings

You can perform extended settings to the EASYCHLORGEN system in the Service menu. Only ever make alterations to these settings if you fully understand the consequences. Incorrect settings can result in hazardous situations and cause damage to the system. If you are unsure, please consult the manufacturer.

Change the settings

DANGER

Danger from faulty settings.

A number of the settings described here can result in considerable personal injury and damage to property if security-relevant limit values are not maintained or automatic deactivation following a limit value being exceeded. Only ever make alterations to these settings if you fully understand the consequences and this action does not produce a hazard.

⇨ Never change the safety-relevant factory settings: No. 4 (alarm delay), no. 5 (high voltage), no. 6 (low voltage), no. 14 (start-up cycles), no. 16 (ventilator alarm), no. 21 (air-flow sensor), no. 25 (air-flow calibration).

⇨ Consult the manufacturer if you are unsure whether one of your settings constitutes a danger.

Precondition for action:

✓ Section 7 “Installation” on page 16 and 9 “Commissioning” on page 29 were implemented completely and successfully.

✓ The system is switched on and has been activated.

Perform the following working steps:

1. Press and hold the ENTER button for 5 seconds to navigate to the Service menu.
   ▶ A PIN query appears.
2. Use the arrow button to enter the service code 2236 and confirm with ENTER.
3. Using the arrow button, navigate through the menu described below until you come to the second PIN query.
4. Using the arrow button, enter the service code 6322, confirm with ENTER and proceed with the settings.

Number	Function	Description
0	PIN query	PIN: 2236
1	End the settings	Press Enter to return to the “Manual stop” display.
2	Reboot delay	Factory setup This timer starts once the upper tank level has been reached, in order to prevent a premature restart. It can be reset by triggering the manual stop for a short time.
3	Shut-down delay	Factory setup The time from triggering deactivation to the actual safe deactivation of the system. For instance, the current cycle can be ended before shut-down.
4	Alarm delay	Factory setup A notification is displayed following a limit value infringement and the orange LED illuminates. The system continues to produce after the alarm delay and stops only after the end of the set time. A system error message appears, which is connected with the red LED. Should the limit value within the alarm delay return to the normal range, the yellow light will extinguish and the system will return to normal operation.
5	High voltage	Factory setup The maximum-permissible voltage depends on the electrolytic cell installed in the system.

Table 26: Extended settings in the Service menu

Number	Function	Description
6	Low voltage	Factory setup The minimum-permissible voltage depends on the electrolytic cell installed in the system.
7	Set the clock.	Setting the date and time for the correct display in the error logbook.
8	Brine timer	Factory setup This timer is only used with those models aspirating water through a water-jet pump and regulates the brine quantity which enters the electrolytic cell with every cycle. This setting has no function for the compact models.
9	Softening cartridge	If the water softening is performed using a water softening cartridge, the type selected can be indicated under this point. Using the type and (if given) water hardness, the system calculates the total capacity and provides the user with timely warning about the necessity of replacement. If an automatic water softener is connected to the system, the selection “none” must be made and the signal cable be connected to the control for regeneration.
10	Water hardness	Entry of the raw water hardness in ppm $CaCO_3$ plus 20% as a security reserve.
11	PIN query	PIN: 6322
12	Brine impulse	Factory setup The number of pulses of the flow measurement. The standard setting is 2 for compact systems and 1 for other types.
13	Ratio water/brine	Factory setup This is the setting of the ratio of water to brine with compact systems. For example, a value of 15 means 15 parts water to 1 part brine. With the other models, select 1 as setting.
14	Start-up cycles	Factory setup The number of filling cycles which need to be performed before commissioning or after maintenance work in order to ensure that the cell is filled with a sufficient quantity of thinned brine before the electrolysis flow is switched on.
15	Cycle duration	Factory setup The cycle duration described the time between two batches and thereby determined the system volume flow.
16	Alarm ventilator	Factory setup If the air volume flow falls under the pre-set value, an alarm is triggered, as thinning the hydrogen below 25% of the lower explosion limit (LEL) is no longer guaranteed.
17	External tank full	“Yes” if an external tank is used with a level switch (NC).
18	External tank empty	“Yes” if an external tank is used with a level switch (NO).
19	Additional alarm	“Yes” if an external alarm (NC) is connected to the system.
20	Current sensor	Factory setup “Yes” if a current sensor (0 - 10 V DC input) is connected to the system. The calculated range must also be entered in Menu 24.
21	Air flow sensor	Factory setup “Yes” if an air flow sensor (0 - 10 V DC input) is connected to the system. The calculated range must also be entered in Menu 25.
22	Leakage warning	“Yes” if a leakage switch (NC) is connected to the system.

Table 27: Extended settings in the Service menu

Number	Function	Description
23	Remote stoppage	“Yes”, if a remote stoppage is connected. In normal operation, if the contact is closed, the system will produce. If the contact is open, the system will stop without triggering an alarm.
24	Current calibration	Please contact the manufacturer to find out the entered values.
25	Air flow localisation	Please contact the manufacturer to find out the entered values.
26	Modbus address	Optional: Enter the address of the Modbus.
27	Modes/Modbus	Selection of the desired best communication methods.
28	Air flow high	Please contact the manufacturer to find out the entered values.
29	Product temperature	“Yes”, if a temperature sensor is installed in the product tank.
30	Temperature high	Please contact the manufacturer to find out the entered values.

Table 28: Extended settings in the Service menu

19 Appendix II - Commissioning / Service Log

Comments / observations / performed settings:

Commissioning / Service Sheet

To be completed and kept on site for:

(a) Commisioning (b) When attending a call-out for fault (c) After service visit

Date of visit					
VOLTMETER READING (V)					
HOURS RUN					
AIRFLOW RATE (m^3/hr)					
HARDNESS TEST (Grün / Rot)					
PRODUCT TEST (% Av. Cl_2)					
PRODUCT TEST (S.G.)					
H_2-SENSOR TEST					
QUANTITY OF SALT ADDED					
PRODUCT Dosing: Type:					
Setting:					
PRODUCT Dosing: Type:					
Seeting:					
WATER SOFTENER Setting:					
VISUAL ELECTROLYSER INSPECTION					
VISUAL VENTILATION PIPEWORK INSPECTION INCLUDING DISCHARGE POINT					
VISUAL INSPECTION FOR LEAKS					
OTHER SITE INFORMATIONS / ADJUSTMENTS					
WHO COMPLETED THE CHECKS (Sign)					

20 Appendix III - Operators Log

Operators Log

To be completed and kept on site for:

(a) When salt was added (b) When visiting site approximately weekly

Date of visit	VOLTMETER READING (V)	AIRFLOW RATE (m^3/hr)	H_2-SENSOR (%)	HOURS RUN	VISUAL CHECK FOR DAMAGE OR LEAKS	QUANTITY OF SALT ADDED	WHO COMPLETED THE CHECKS (Sign)	Comments / observations

21 Appendix IV - Service Check Sheet

Service Check Sheet

Date:		System type / model:
Serial number:		Hour meter:
Service Item	**OK**	**Comments**
Check product tank ■ For leaks		
Check electrolyser for ■ 1) Scale ■ 2) Leaks ■ 3) Correct operation		
Check softering equipment See operator manual		
Check solenoid valves ■ Correct water operation ■ Correct brine operation		
Check hydrogen sensor ■ Correct operation		
Check saturator / brine tank ■ Check for leaks and clean tank		
Check control panel ■ Terminals for security and signs of over heating ■ Check all components are present, correctly installed, and operating correctly ■ All fuse rating are correct ■ Correct operation / configuration of control panel		
Check ventilation ■ Check pipe work ■ Check air flow sensor ■ Check room ventilation		
Fill in operators log		
System operation / settings		
H_2-Sensor (%):	Volts:	
Cycle time:	Water : Brine ratio setting:	

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Instruction manual
MINICHLORGEN