



EASYCHLORGEN 4250, 8500

Electrolysis system for on-site hypochlorite generation



Installation, Operation & Maintenance Instructions

EN

Read these operation and maintenance instructions before start-up!

To be held for further reference.

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1. Notes for the Reader

1.1 Introduction

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

The operating manual for the EASYCHLORGEN electrolysis systems 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

1.2 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. |

1.3 Explanation of the warning signs

| Signal Word | Meaning |
|---|--|
|  | General danger zone |
|  | Danger of electric shock |
|  | Danger of explosion |
|  | Danger of damage to machine or functional influences |

1.4 Identification of warnings

Warnings are intended to help you recognize 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.

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.

1.7 Details for the operator

The operating manual is a significant component of the EASYCHLORGEN 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 EASYCHLORGEN system may not make any changes, attach fittings or make alterations to the construction of the EASYCHLORGEN system that may impair security, without the written consent of Lutz-Jesco. 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. 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.

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

Confirmation of the training instruction

Topic of the training instruction:

Date:

Training instructor:

Training instructor's signature:


| No. | Surname | First Name | Signature |
|-----|---------|------------|-----------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

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! |
| <p>Mortal danger from electric shock!</p> <p>Live parts can inflict fatal injuries.</p> <p>⇒ Ensure that the mains voltage is switched off before opening the control cabinet door.</p> | |

| | |
|--|----------------|
|  | DANGER! |
| <p>Danger to life through explosions!</p> <p>When using dosing devices without ATEX certification in a potentially explosive area, explosions can occur that result in fatal injuries.</p> <p>⇒ Never use the device in potentially explosive areas</p> | |

| | |
|---|----------------|
|  | DANGER! |
| <p>Increased risk of accidents due to insufficient qualification of personnel!</p> <p>The equipment and accessories may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.</p> <p>⇒ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.</p> <p>⇒ Prevent access to the system for unauthorised persons.</p> | |

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.

- 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 these operating instructions, 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. Although the dosing media produced by the EASYCHLORGEN system is classified non-hazardous, the following protective equipment is recommended when carrying out certain tasks:

- Commissioning
- Working on pressurised dosing devices
- Shutdown
- Maintenance
- Disposal



Protective clothing



Protective Gloves



Goggles

2.5 Personnel qualification

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

These operating instructions differentiate 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!

| Specialist staff | <ul style="list-style-type: none"> • Installation • Hydraulic installations • Commissioning • Taking out of operation • Fault rectification • Maintenance • Repairs • Disposal |
|----------------------|--|
| Trained electricians | <ul style="list-style-type: none"> • Electrical installation • Rectifying electrical faults • Electrical repairs |
| Trained persons | <ul style="list-style-type: none"> • Control • Storage • Transportation |

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 "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 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 EASYCHLORGEN 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%) Cl₂ by weight.

3.3 Device Revision

This operating instruction manual applies to the following devices:

| Device | Month /year of manufacture |
|------------------------|----------------------------|
| EASYCHLORGEN 4250/8500 | 10/2017 onwards |

3.4 Sodium chloride chemical specification

The EASYCHLORGEN 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, or compressed PVD salt chips is not recommended.

Note: Within the European Union the supply of salt for use as a precursor for in-situ generated active chlorine falls under the Biocidal Products Regulation (BPR). Please consult your salt supplier to check for compliance with this regulation!

| 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 | <10 |
| 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 |



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.

3.5 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 5-20°C.

3.6 Standard warranty conditions

| Equipment | Warranty Period |
|--------------------|---------------------------|
| Electronic devices | 2 years |
| Electrolyser | 5 years limited, pro-rata |
| Wearable items | 12 months |

4. Product description

4.1 Scope of delivery

Please compare the delivery note with the scope of delivery:

- EASYCHLORGEN electrolyser cabinet
- EASYCHLORGEN DC power supply cabinet
- Insulated DC power busbars (2m), clamps, self-amalgamating tape.
- Brine break tank with float valve assy
- Duplex softening system
- Operating Instructions
- **Selectable Options:** Brine saturator tank, external product tank, dosing pump/s & accessories.

4.2 Design and function

4.2.1 Function description

EASYCHLORGEN 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. Sodium hypochlorite solution (the product) is prepared by a simple, once through batch process, initiated by the level switch within the Product Tank. Refer to the diagram 4.2.3 in conjunction with the description below.

When the product level in the degassing tank (14), or optionally the external product tank, falls below the start/stop fill level switch (11) the water solenoid valve (4) and brine solenoid valve (3) are energised simultaneously, allowing softened water to flow through the pressure reducing valve (7) and through the volumetric flow meter (6). The water stream flows through the brine inductor (2) to create a vacuum which draws in a set amount of brine from the external brine saturator tank. Once the predetermined quantity of brine is drawn, the water and brine solenoid valves (4 & 3) are closed, whilst the water dilution valve (5) is opened to allow a predetermined quantity of dilution water to be delivered directly to the electrolyser vessel/s, before closing. The resultant diluted brine solution passes through the electrolyser/s (13). At the same time, d.c. voltage is applied across the electrolyser cells where the diluted brine solution completes the electrical path and allows an electric current to flow between the cell plates. The generated product is delivered to the degassing tank (14) before transfer to an external product tank through the product outlet connection (16). When the product reaches the start/stop fill level (11) in the product/degassing tank, or, the start/stop level switch in the external product tank, the generating process is stopped. The process is restarted after a predetermined time delay period has elapsed, initiated when the liquid level in the product/degassing tank falls below the start/stop fill level (11). The process can also be re-started and stopped manually by pressing and holding the 'scroll up' arrow key on the control panel keypad (1) for 3 seconds.

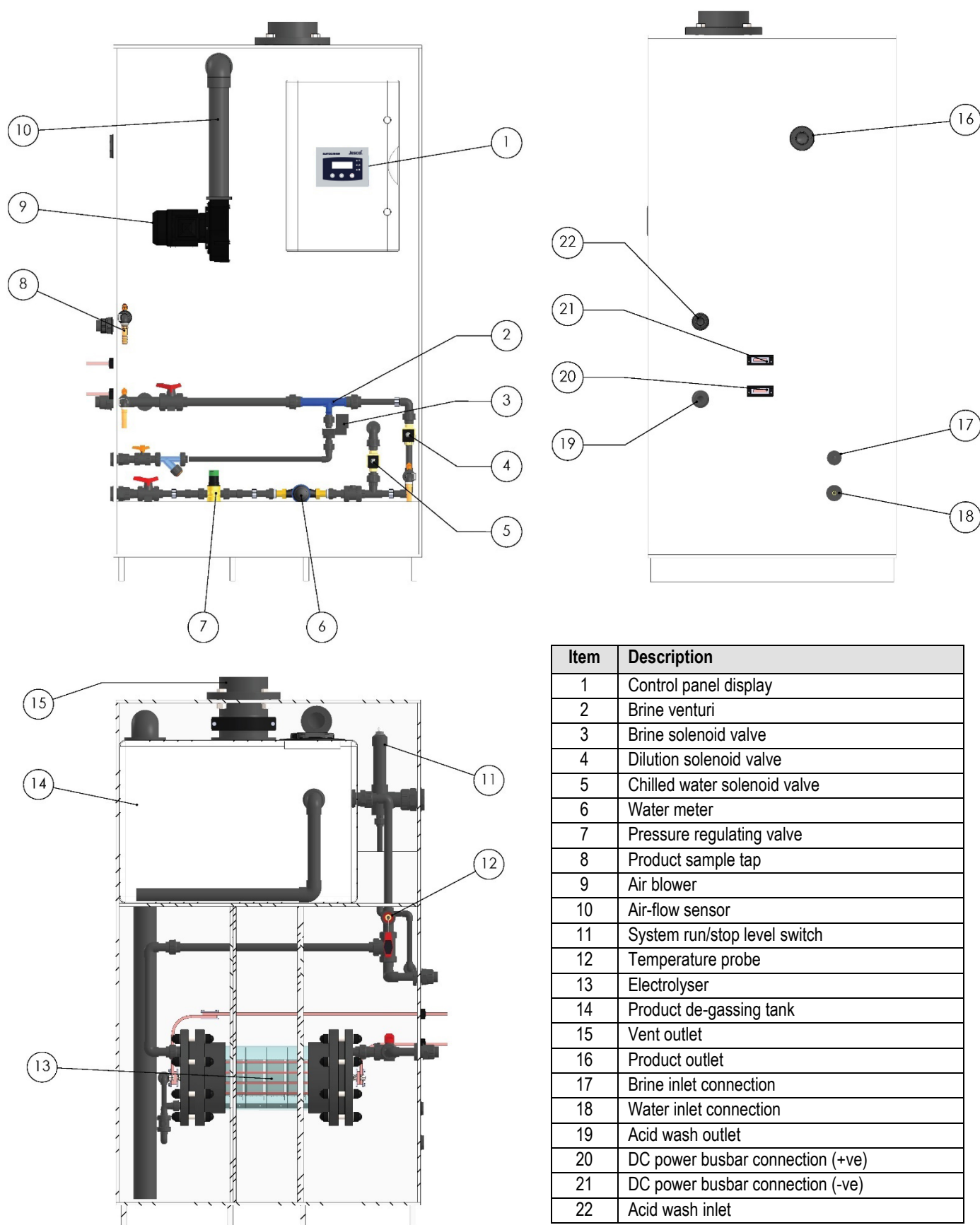
Hot climates: *In hot climates where water supply temperatures may exceed 20°C, an external water chiller (supplied by others) should be installed on the incoming water supply. The water chiller must be correctly sized according to the liquid output capacity of the model (refer to 5.1.1), the ambient air temperature and the desired water temperature differential.*

On 4250 & 8500 models the temperature of the generated product is monitored by a PT100 sensor located close to the degassing tank inlet (12); the reading can be viewed on the EASYCHLORGEN control panel by using the 'scroll' keys. A high temperature alarm set-point (adjusted in the control panel Engineering menu) is provided to shut down production in the event of abnormal temperature conditions.

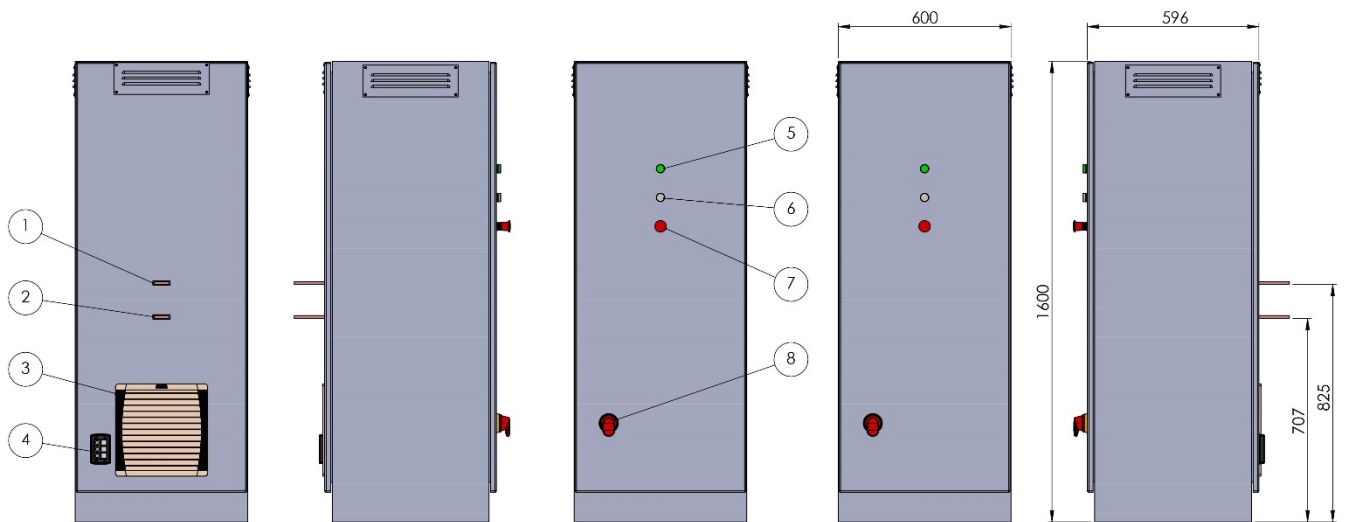
Whilst the unit is generating sodium hypochlorite product, hydrogen gas is produced as a by-product. Hydrogen gas is diluted as it enters the degassing tank with a continuous flow of fresh air from a centrifugal ventilation fan (9) and is vented safely to atmosphere via ducting connected to the ventilation outlet (15) to an external exhaust point (atmosphere). The system is designed so that there are no external areas where hydrogen levels can reach the LEL (lower explosive limit). An air-flow sensor (10) is provided to shut down production in the event the air flow fails to remain within normal operating parameters.

A text display on the control panel (1) will advise of the reason for the fault and initiate a volt-free contact which can be used for connection of a remote alarm device.

4.2.2 EASYCHLORGEN description



4.2.3 Power supply description



A dedicated, stand-alone power supply unit (PSU) is provided. The PSU cabinet provides power for the whole of the electrolyser system; AC power to the EASYCHLORGEN control panel and DC power to the electrolyser. The cabinet requires a 3Ø+N+E supply rated according to the model capacity (refer to 5.1.3 Electrical Specifications).

The PSU cabinet should be located according to the installation examples in section 7.4, in close proximity to the electrolyser cabinet. DC connections between the PSU and the electrolyser cabinet are facilitated by the flexible DC busbar (2m) and clamp system provided.

Key:

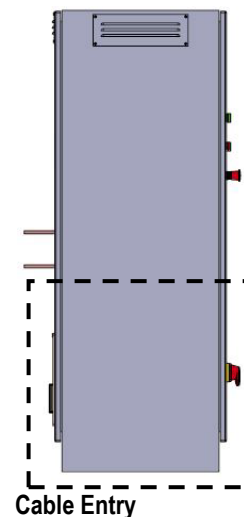
1. + DC busbar clamp
2. – DC busbar clamp
3. Ventilation fan
4. Control cable ports
5. Generating indicator lamp, green.
6. Power indicator lamp, white.
7. Emergency Stop button, red
8. Main electrical isolator

The white power indicator (6) is lit when a 3 phase AC power source is available. The green generating indicator (5) is lit when the electrolyser D.C. output power is available. A ventilation fan (3) operates continuously to draw in air at the base of the cabinet and discharge warm air through the vent louvres at the top of the cabinet. The DC power supply operation can be disabled by pressing the Emergency Stop button.

NOTE: When the Emergency Stop button is engaged, AC power remains available to the EASYCHLORGEN control panel for the purpose of communicating fault conditions and allowing remote monitoring (option) via RS485/Modbus to continue.

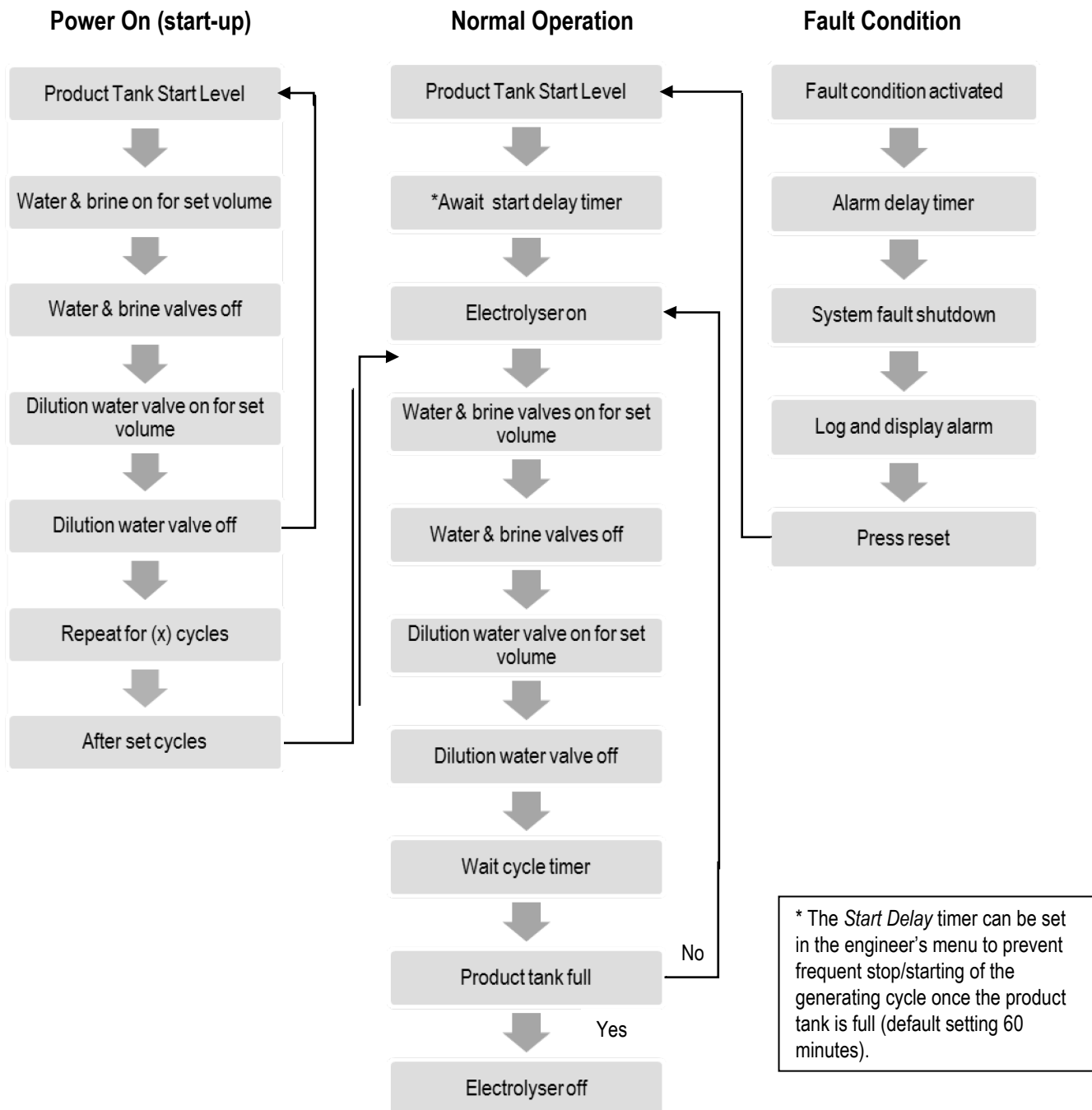
The operation of the main isolator (4) will disconnect power to all circuits within the PSU cabinet.

For ease of maintenance the PSU contains modular DC power-packs with self-regulating current output, short circuit and high temperature protection. Each power-pack is equipped with variable speed cooling fans which automatically regulate according to internal temperatures. It is normal for changes in the fan speed to occur during operation.



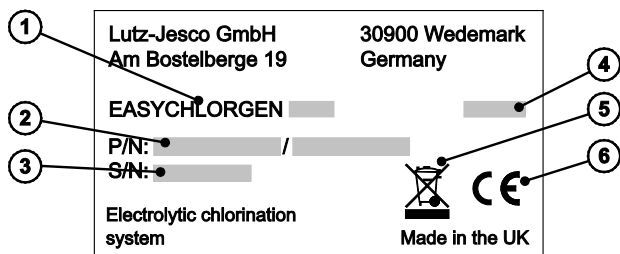
The incoming 3Ø+N+E cable may enter the lower section of the PSU cabinet only. For convenience of installation the entry location of the cable may be at the discretion of the electrical installation engineer and must be completed according to local electrical codes.

4.2.4 Function sequence in automatic operation



4.2.5 Rating Plate

The rating plate contains information on the safety and functional method of the product. The rating plate must be kept legible for the duration of the service life of the product.



| No. | Description |
|-----|---|
| 1 | Product name |
| 2 | Nominal size |
| 3 | Month/ year of manufacture |
| 4 | Serial number |
| 5 | Label showing conformity with European directives |
| 6 | WEEE label |
| 7 | Power and voltage rating |
| 8 | Part number |

5. Technical data

5.1 EASYCHLORGEN skid unit

5.1.1 Output data

| Model: | | 4250 | 8500 |
|-------------------------|------|------|------|
| Chlorine capacity | Kg/h | 4.25 | 8.5 |
| Chlorine concentration | g/l | ≈7 | |
| Liquid product output | l/h | 650 | 1300 |
| Degassing tank capacity | l | 210 | 210 |

5.1.2 Operating conditions and limits

| Model: | | 4250 | 8500 |
|----------------------------|------|-----------|------|
| Softened water consumption | l/h | 650 | 1300 |
| Nominal salt consumption | kg/h | 3.5 | |
| Operating pressure | Bar | 1.5 – 8.5 | |
| Ambient temperature | °C | +5 to +40 | |
| Water supply temperature | °C | +8 to +20 | |

5.1.3 Control Panel electrical specification

| Model: | | 4250 | 8500 |
|----------------------|------|-------|------|
| Nominal power supply | V ac | 115v | |
| Frequency | Hz | 50-60 | |
| Phase | Ø | 1 | |
| Power consumption | W | 90 | 160 |
| Protection class | IP | 65 | |

5.1.4 Air blower electrical specification

| Model: | | 4250 | 8500 |
|----------------------|------|---------|------|
| Nominal power supply | V ac | 380-480 | |
| Phase | Ø | 3 | |
| Power consumption | W | 660 | |
| Protection class | IP | 55 | |

5.1.5 Connection dimensions

| Model: | | 4250 | 8500 |
|-----------------------------------|--|------------------------|------|
| Cold water feed | | 25mm | |
| Product outlet | | 50mm | |
| Saturated brine inlet | | 20mm | |
| Hydrogen vent line | | 160mm | |
| Electrical connection point | | M20 | |
| Control panel cable terminations | | 2.5 – 4mm ² | |
| Acid wash inlet/outlet connection | | 32mm | |

5.1.6 Components in contact with the media

| Description [all models] | Material |
|------------------------------------|--------------------------|
| Electrolytic cell | PVC, titanium, PTFE, FPM |
| Product transfer pipe | PVC |
| Product tank | MDPE |
| Product tank level switch assembly | PVDF/PVC, FPM/PPS |

| Model: | | 4250 | 8500 |
|------------|--|------|------|
| Net weight | | 260 | 325 |

5.1.7 Other data

5.1.8 External product tank storage facility option

| Model: | | 4250 | 8500 |
|---------------------------|--|--|------|
| Product tank capacity (L) | | Recommended minimum size of 1000L (Refer to product output in table 5.1.1 for suitable size) | |

5.1.9 Intermediate brine tank option

| Model: | | 4250 | 8500 |
|-----------------------------------|--|----------|------|
| Softened water feed connection | | G½" BSPm | |
| Saturated brine outlet connection | | G½" BSPf | |
| Net weight | | 3 | |

5.2 Power supply unit

5.2.1 Operating conditions and limits

| Model: | | 4250 | 8500 |
|--------------|----|-----------|------|
| Ambient temp | °C | +5 to +40 | |
| Humidity | % | <90 | |

5.2.2 Electrical specifications

| Model: | | 4250 | 8500 |
|----------------------|-----|---|---------------------|
| Nominal power supply | VAC | 4 wire Y 340-530 *3 wire Δ 196-305 *special order | |
| Phase | Ø | 3 | |
| Cable | | 5x16mm ² | 5x25mm ² |
| Power consumption | kWh | 24 | 47 |
| Protection class | IP | 21 | |

5.2.3 Other data

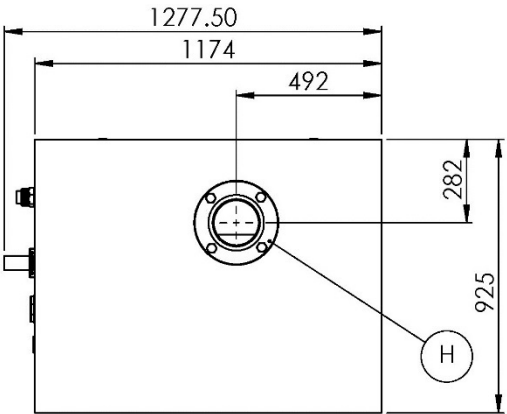
| Model: | | 4250 | 8500 |
|------------|----|------|------|
| Net weight | kg | 210 | 270 |

6. Dimensions

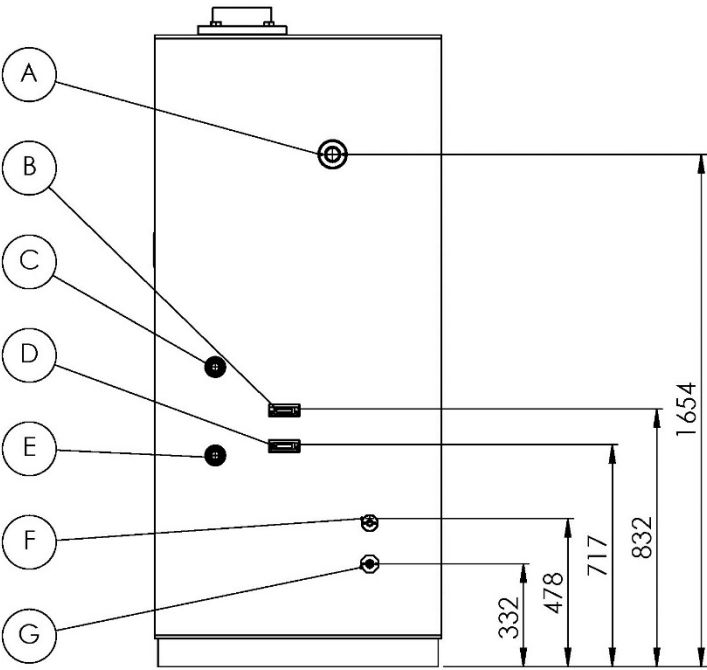
All dimensions in mm.

6.1 EASYCHLORGEN 4250/8500

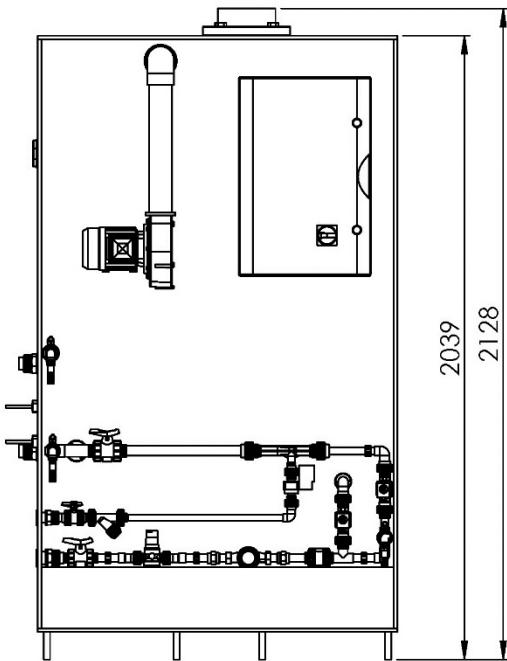
| Key | Description |
|-----|----------------------------------|
| A | Product outlet connection |
| B | DC power busbar connection (-ve) |
| C | Acid wash inlet connection |
| D | DC power busbar connection (+ve) |
| E | Acid wash outlet connection |
| F | Brine inlet connection |
| G | Water inlet connection |



Plan elevation

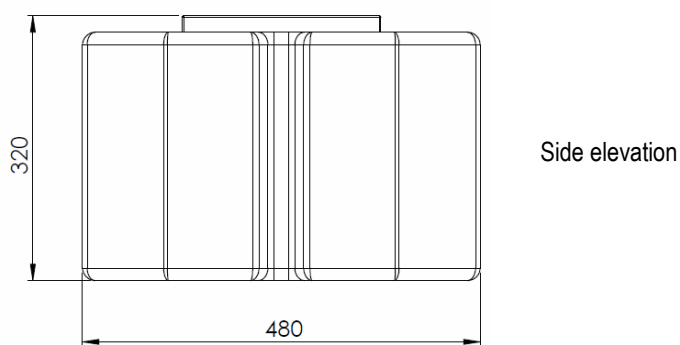
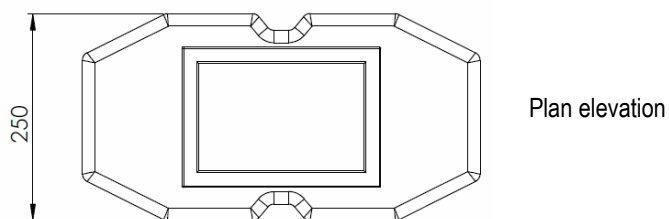


Side elevation

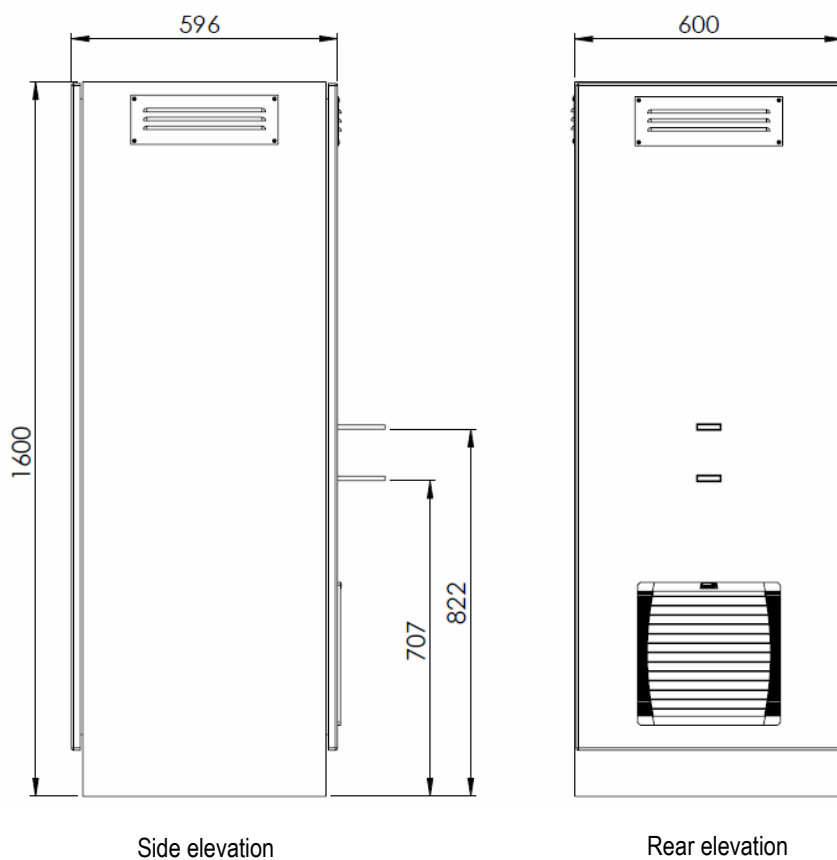


Front elevation


6.2 Intermediate brine tank





6.3 Power Supply Unit (PSU) cabinet



7. Installation

| | |
|---|----------------|
|  | WARNING |
| <p>Increased risk of accidents due to insufficient qualification of personnel!</p> <p>The equipment and accessories may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.</p> <p>⇒ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.</p> <p>⇒ Prevent access to the system for unauthorised persons.</p> | |

| | |
|---|----------------|
|  | WARNING |
| <p>Danger of personal injury and damage to property!</p> <p>The devices are 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.</p> <p>⇒ Transport the device using a floor conveyor that is suitable for the load such as a pallet truck or forklift truck.</p> <p>⇒ Wear safety shoes while transporting the device</p> | |

| | |
|--|-------------|
|  | Note |
| <p>Damage to the system due to incorrect installation.</p> <p>The failure to observe installation instructions (e.g. use of unsuitable tools, incorrect torque) can damage the system parts.</p> <p>⇒ Use suitable tools.</p> <p>⇒ Take care not to over-tighten fittings</p> | |

7.1 Installation location

7.1.1 EASYCHLORGEN electrolysis skid unit

Precondition for action:-

- ✓ A firm and level floor are required for the skid mounted unit. Refer to dimensions in section 6.
- ✓ The plant room has high level natural ventilation.

✓ The system must be accessible for operation and maintenance.

✓ Refer to installation schematics, section 7.4.

Perform the following steps:-

1. Locate the skid unit into its intended permanent position allowing sufficient space to connect services to the connection ports to the side and top of the system.
2. Install the hydrogen gas detector above the location of the EASYCHLORGEN 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. Avoid locating the gas detector immediately above an external salt saturator/brine tank.

✓ **Location of skid unit complete**

7.1.2 EASYCHLORGEN power supply unit (PSU)

The PSU range in size from 20kW to 40kW 3 phase power supplies according to model capacity. Ideally, the PSU is located in an electrical room immediately adjacent to the electrolysis skid unit plant room area. In warm and humid climates, electrical rooms often offer environmentally/airconditioned controlled conditions ideal for the PSU long term performance, where exposure to unnecessary heat and corrosion can be avoided.

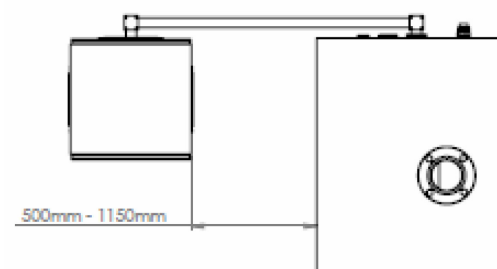
Precondition for action:-

✓ A firm and level floor is required for the PSU. Refer to dimensions in section 6.

✓ Refer to installation arrangements, section 7.4.

Perform the following steps:-

1. The PSU should be installed ideally at the same floor height as the main electrolysis unit.
2. The PSU electrical DC busbar connections should ideally be directly in-line with the corresponding connections of the main electrolysis unit and both units ideally within 1150mm adjacent of each other essentially to minimise electrical resistance and maintain good efficient electrolytic system performance.



EASYCHLORGEN / PSU BUSBAR ALIGNMENT PLAN VIEW EXAMPLE

1. The PSU fan ventilator lower inlet grille and upper exhaust grilles must not be obstructed. Allow a minimum of 400mm (3ft) clearance from any nearby wall/surface.
2. The PSU must be bolted firmly at its base to the floor or plinth on which it is positioned.

✓ **Location of PSU complete**

7.1.3 Intermediate brine tank

Precondition for action:-

- ✓ A firm and level floor is required for the intermediate brine tank facility. Refer to dimensions section 6.
- ✓ The system must be accessible for regular/routine maintenance procedures.
- ✓ Refer to installation schematic, section 7.4. The intermediate brine tank must be on the same floor level as the EASYCHLORGEN.

Perform the following steps:-

1. Locate the intermediate brine tank into position $\leq 1\text{m}$ adjacent to the EASYCHLORGEN brine inlet connection.

✓ **Location of intermediate brine tank complete**

7.1.4 Salt saturator (for electrolysis)

The EASYCHLORGEN 4250 and 8500 high capacity systems may consume large quantities of salt as part of the chlorine generation process. It is recommended that the site installs a bulk saturator for vehicle delivery direct to the saturator. Alternatively, a large open tank saturator (typically $>2000\text{kg}$ salt capacity) with the facility for overhead dispensing of one tonne bulk bags is installed.

Precondition for action:-

- ✓ A firm and level floor are required for the external saturator tank facility. Refer to dimensions section 6.
- ✓ The system must be accessible for operation, day-to-day filling with salt and for regular/routine maintenance procedures.
- ✓ Refer to installation schematic, section 7.4.

Perform the following steps:-

1. Locate the tank into position preferably near/adjacent to the EASYCHLORGEN.
2. Align the tank so that inlet & outlet pipe connections are conveniently situated for connection to appropriate services.

✓ **Location of salt saturator complete**

7.2 Hydraulic installation

7.2.1 Cold feed 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 4.0 Bar is required for the softening system and EASYCHLORGEN. A drop in pressure across any softening and pre-filter equipment must be considered to ensure a minimum operating run pressure of >3.0 bar can be sustained at the EASYCHLORGEN skid softened water inlet.
- ✓ The temperature of the incoming water supply must be maintained $\leq 20^\circ\text{C}$ upstream of the EASYCHLORGEN. A water chiller may be required in warm climates, or where the water supply temperature may be affected by other heat sources in the installation area.
- ✓ The equipment must be supplied with a clean potable water quality supply. Waters which are high in magnesium content may reduce the life of the water softener resin.
- ✓ A verifiable double check valve or pipe disconnect in the drinking water supply is fitted upstream of the entire EASYCHLORGEN system and any ancillary 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 8.5 bar upstream of the softening equipment.

Perform the following steps:-

1. Connect a 25mm (3/4") uPVC solvent cement softened cold water pipe supply to the EASYCHLORGEN connection point as indicated in the schematic in section 6.1. Ensure an isolation valve is fitted upstream to enable safe isolation during future system maintenance.

✓ **EASYCHLORGEN softened water supply**

7.2.2 Duplex Softener System (Clack 1665 type if supplied with EASYCHLORGEN refer to Appendix IV for further information)

Precondition for action:-

- ✓ A local waste water drain is available at floor level and within 10m of the softener system.

Perform the following steps:-

1. Install 25mm (1") pipework to the 1" BSPm threaded softener raw water inlet of the duplex softener valve head. Fit a suitable isolation valve upstream of the softener system to provide a means of isolating the water supply for future service requirements.
2. Install and fit a 19mmID (3/4") flexible drain pipe to the backwash hose connector and allow to discharge to gravity to a waste water open drain trap.
3. Install 25mm (1") interconnecting pipework to the saturator and to the EASYCHLORGEN softened water inlet connection.

✓ **Softener plumbing complete**

7.2.3 Salt saturator

The external salt saturator requires a softened water supply.



Note

Damage to the system due to water scaling.

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

⇒ Make sure that the saturator is always supplied with softened water.

Precondition for action:-

- ✓ EASYCHLORGEN and external salt saturator located correctly.

Perform the following action:-

1. The saturator will require a softened cold water supply with pipework feed of minimum diameter 15mm (1/2"). The softened water can be provided by the softening system used for the EASYCHLORGEN electrolysis system.
2. At the inlet of the saturator, fit a suitable isolation valve.
3. Connect the saturator's brine outlet to the EASYCHLORGEN intermediate brine tank inlet connection using minimum 25mm (3/4") rigid plastic pipe work. Install a plastic isolating ball valve inline to provide safe isolation during future maintenance.

✓ **Saturator plumbing complete**

7.2.4 Intermediate brine tank

The intermediate brine tank is vitally important to maintain a steady supply of brine to the EASYCHLORGEN skid system. The level of brine inside the brine tank is controlled by a ball float valve assembly.

Precondition for action:-

- ✓ Refer to installation layout schematic, section 7.4

1. The brine tank is fed from the main electrolysis salt saturator via 25mm (3/4") rigid plastic pipe work.
2. Install minimum 20mm (1/2") rigid plastic pipe at the brine tank outlet and connect up to the EASYCHLORGEN brine inlet connection.

✓ **Intermediate brine tank plumbing complete**

7.2.5 Product tank and liquid level measuring column

The product tank facility must be installed strictly in accordance to: ventilation instructions section 7.2 and the use of the external tank liquid level column intended for the insertion of level sensor switches for the correct signalling/switching of the EASYCHLORGEN. Refer to installation schematics section 7.4

The product tank should be installed so that the product inlet pipework from the EASYCHLORGEN is independent of the product outlet pipework used for the flooded suction to dosing pump and/or transfer pump equipment.

Precondition for action:-


- ✓ Refer to installation layout schematic, section 7.4
- ✓ Any pipe unions, valves or other pipe fittings must be supplied with either EPDM or FPM elastomer seals and gaskets.

Perform the following steps:-

1. Interconnect the liquid level measuring column to the outlet of the EASYCHLORGEN and the inlet of the product tank using a minimum 50mm (1 1/2") rigid PVC pipework. Fit an isolating ball valve at both the inlet and outlet of the measuring column.
2. Fit a suitable isolation ball valve at the product tank outlet in preparation for the installation of a suitable dosing pump manifold assembly.

✓ **product tank plumbing complete**

7.2.6 Ventilation



DANGER!

Danger to life through explosions!

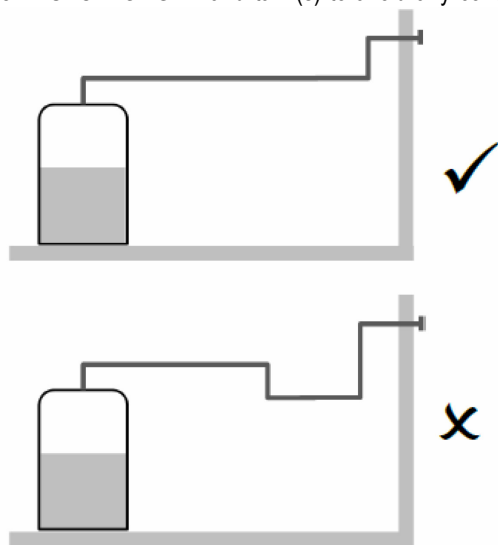
Incorrect installation of the ventilation exhaust piping may cause irreversible damage to the system components and may even create an explosive atmosphere!

⇒ Make sure to install ventilation pipe works correctly.

The EASYCHLORGEN and product tank(s) each require the installation of a ventilation pipe duct circuit to a suitable exterior outside termination vent point (normally at high level >3m/10ft), in order to safely vent any hydrogen gas liberated from the electrolytic process.

The exterior vent pipe termination points must be installed so as to create a Zone 2 area around the opening of the vent. Refer to section 7.2.7 “External Zone 2 requirement” for guidance.

Plan each pipe route as direct and straight as possible and always on an incline from the vent connection located at the top of the EASYCHLORGEN and tank(s) to avoid any condensation



trap.

TANK VENT PIPE INSTALLATION EXAMPLE

Use wide radius bends instead of elbows to reduce air friction where possible. DO NOT install any unions or any disconnection points at any point along the vent pipe work. Where the EASYCHLORGEN vent pipe circuit is >30m in length, the pipe diameter must be increased to maintain required minimum airflow.

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 0.8m 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 signs in the plant room and exterior vent point:

- Warning Sign
- No Smoking
- No Naked Flames

Precondition for action:


- ✓ suitable outside vent points provided
- ✓ adequate natural air room ventilation

Perform the following steps:

1. Install a 160mm (6") diameter rigid PVC ventilation pipework system from the socket connection located on top of the EASYCHLORGEN cabinet to the exterior vent point provided.
2. Install at least ≥90mm (4") diameter rigid ventilation pipework system from the top of the product tank(s) to an exterior vent point.
3. Provide and fix appropriate signage to vent pipework and at each vent exhaust point in accordance with local rules.

✓ **Ventilation installation complete.**

7.2.7 External Zone 2 Ventilation requirement



DANGER!

Danger to life through explosions!

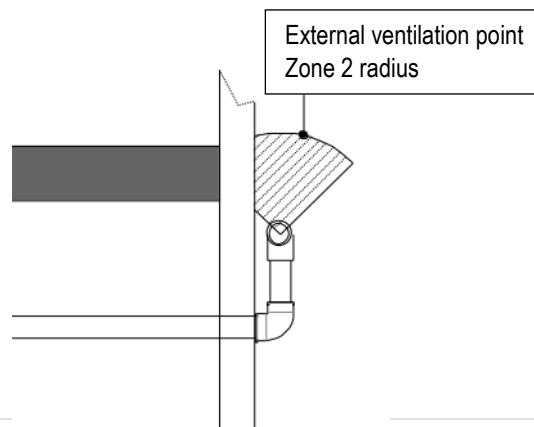
An external Zone 2 area clearance is required at the external vent opening to avoid potential explosive environment!

⇒ 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 7.4 “Installation schematics”:-


| System type | External vent Zone 2 radius |
|-------------------|-----------------------------|
| EASYCHLORGEN 4250 | 3.5 m |
| EASYCHLORGEN 8500 | 5.0 m |

If in doubt, contact your supplier for further advice.



7.3 Electrical Installation

| | |
|--|----------------|
|  | DANGER! |
| <p>Mortal danger from electric shock! Live parts can inflict fatal injuries.</p> <p>⇒ Disconnect from the electricity supply before working on any equipment and secure all devices to prevent it from being switched on again.</p> | |

| | |
|--|----------------|
|  | WARNING |
| <p>Risk from electric shock! Electrostatic charges can inflict fatal injuries.</p> <p>Customised installations: The use of external product tanks equipped with supplementary mechanical ventilation and/or liquid transfer pumps may create risk of electrostatic shock.</p> <p>⇒ The design of storage and transfer systems should be risk assessed by a competent person.</p> <p>⇒ Additional earth bonding arrangements may be required in accordance with local electrical codes.</p> | |

All electrical work must be carried out by a trained electrician.

7.3.1. Wiring the PSU cabinet and EASYCHLORGEN control panel

Precondition for action:

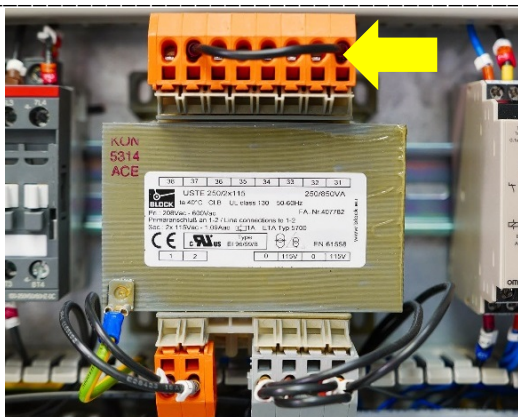
- ✓ PSU cabinet and EASYCHLORGEN located correctly
- ✓ Identify system model/type

Perform the following working steps:

1. Wire in accordance with the wiring diagrams detailed later in this section for the corresponding model ensuring that the electrical installation is suitable for the voltage and kW rating of the unit, as indicated on the machine identification plate. Refer to Technical Data section 5.1 and 5.2.
2. Connect a mains 3-phase AC + Neutral power supply to the PSU cabinet isolator connection block. A cable, conduit or electrical trunking connection will need to be carried out by an electrician for suitable entry of the electrical supply through the lower section of the PSU cabinet panel as detailed in 4.2.3.
3. Earth the device in accordance with local regulations.
4. Interconnect the 115VAC power supply cable from the PSU cabinet to the EASYCHLORGEN control panel mains power isolator connection. A 2C+E cable is factory fitted at the PSU cabinet for this purpose and may be replaced to comply with local regulatory requirements.
5. Interconnect the 3-phase AC power supply from the PSU cabinet to the EASYCHLORGEN air blower rotary isolator.

A 3C+E cable is factory fitted for this purpose and may be replaced to comply with local regulatory requirements.

6. Interconnect the multi-core signal cable from the PSU cabinet to the EASYCHLORGEN control panel. A multi-core cable is factory fitted for this purpose and may be replaced to comply with local regulatory requirements.
7. Interconnect the 2-wire screened signal cable pre-wired at the EASYCHLORGEN control panel to the corresponding terminals at the PSU cabinet. A screened cable is factory fitted for this purpose and may be replaced to comply with local regulatory requirements. **IMPORTANT!** Only earth the signal cable screen at the EASYCHLORGEN control panel and NOT at the PSU cabinet.
8. Interconnect the M12 yellow cable assembly to the EASYCHLORGEN control panel and the hydrogen gas detector. An M20 connection point on the underside of the control panel is provided for this cable route.
9. Connect the external product tank stop level switch cable assembly to the EASYCHLORGEN control panel. An M20 connection point on the underside of the control panel is provided for this cable route.
10. Interconnect any auxiliary wiring (for devices supplied outside the scope of the standard system) using the spare cable glands provided.
11. **IMPORTANT!** Inside the PSU cabinet, locate the isolating power transformer, ref. XF-1. This transformer allows a wide range of 3 phase supplies to be accommodated and provide a fixed 115VAC single phase supply to the EASYCHLORGEN Control Panel. **Connect the voltage setting LINK WIRE/S according to the local 3Ø supply voltage as detailed in the table below. Failure to select the correct linkage may result in permanent damage to the EASYCHLORGEN control panel PCB!**



BUSBAR SQUARE FLAT CONNECTOR PLATE ASSEMBLY

- Using a torque wrench and 13mm socket, tighten the four bolts evenly to 4Nm. If the equipment is situated in a location where background vibration may be present, apply a thread-lock sealant (e.g. Loctite 290) to the bolt threads during the final tightening turns.
- All exposed copper busbar surfaces must be covered and finished with a suitable self-amalgamating tape to protect against short-circuit and corrosion.
- Ensure busbars are adequately supported along their length to eliminate stress at the terminal connections.

✓ DC electrolyser wiring complete

| 3Ø Supply Voltage, 50-60Hz | Link Terminals |
|-------------------------------|----------------|
| *208v | 1-37/2-31 |
| *230v | 1-36/2-32 |
| 380v | 31-38 |
| 400v | 32-38 |
| 415v | 31-37 |
| 440v | 32-37 |
| 460v | 32-36 |
| 480v | 33-36 |
| 500v | 34-36 |
| 525v | 31-35 |

* 3Ø special voltage option available for Δ3 wire supplies

✓ PSU cabinet and EASYCHLORGEN control panel wiring complete

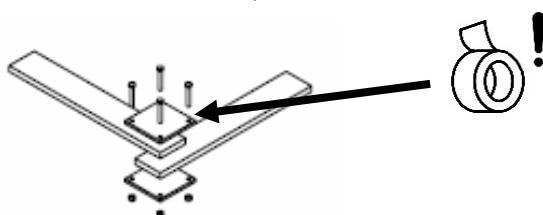
7.3.2 Electrolyser DC wiring

Precondition for action:

✓ PSU cabinet and EASYCHLORGEN located correctly

Perform the following working steps:

- The DC electrical interconnection between the PSU and EASYCHLORGEN must be completed using the 50mm x 10mm sectional flexible busbar supplied with the PSU unit. The mating of each busbar connection must be carried out using only the square flat connector plates supplied with the PSU. Due to the high DC current output of the PSU it is vital that all DC connections are made with care. Ensure all bare copper busbar surfaces are clean and free of dust, chemical residue and grease prior to connection.
- Ensure the corresponding busbars maintain correct polarity from the PSU connector plate terminals to the EASYCHLORGEN connector plate terminals.

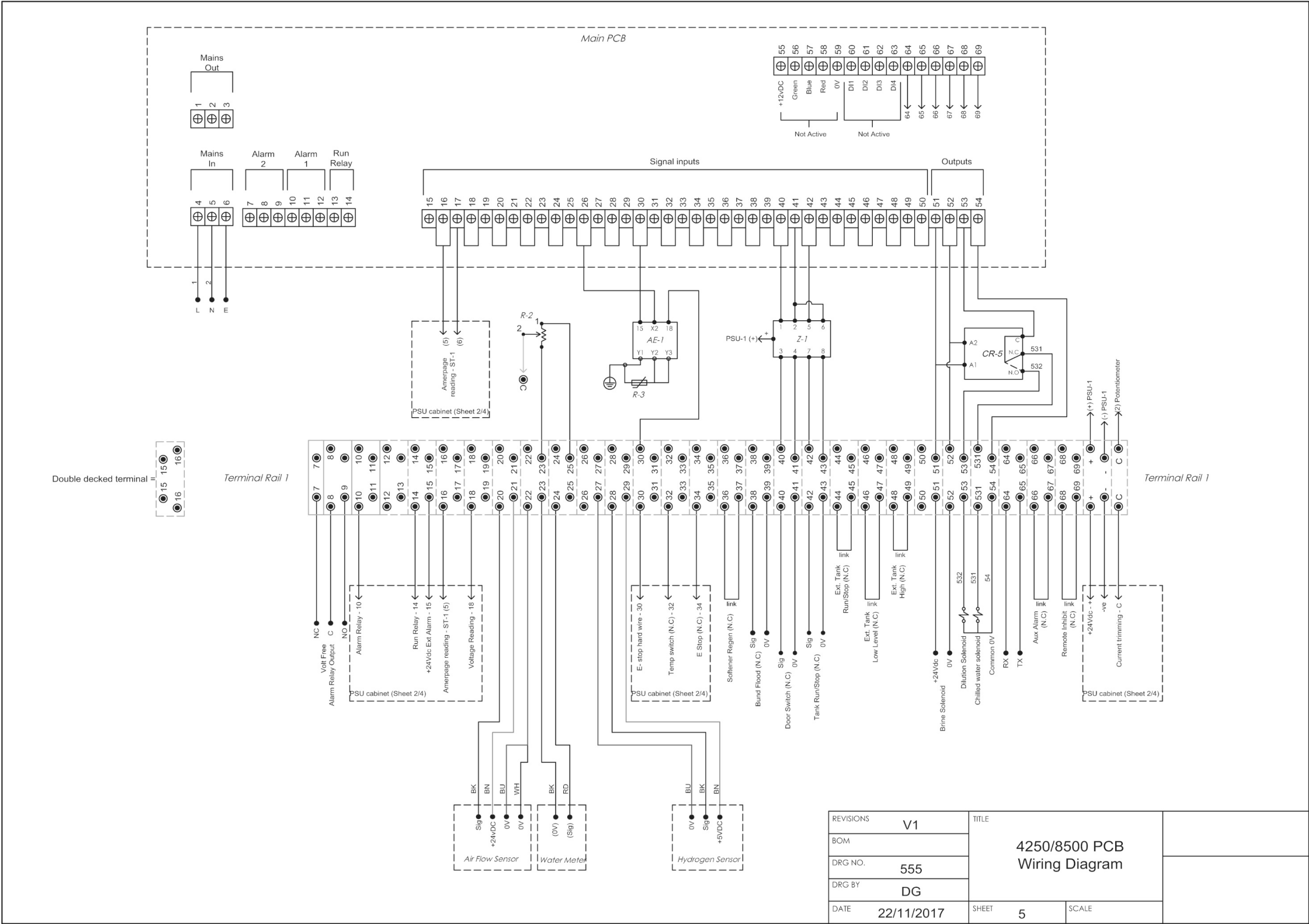


7.3.3 EASYCHLORGEN Control Panel PCB Terminal List

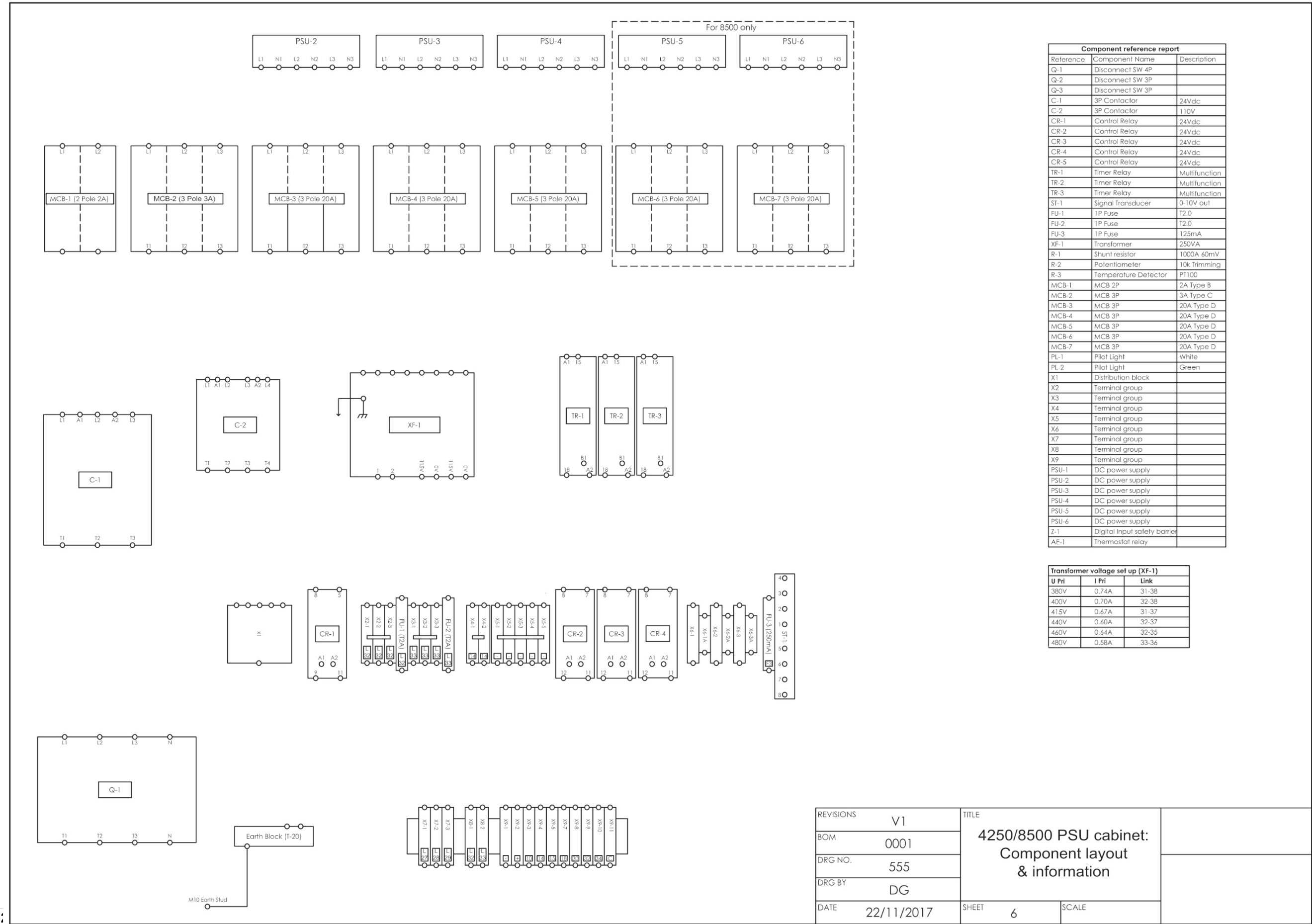
| Terminal I.D. | PCB Description | Function | |
|---------------|-----------------|--|-----------------------------------|
| 1 | L | Mains Out (auxiliary mains output) | 110Vac |
| 2 | N | | |
| 3 | E | | |
| 4 | L | Mains In 110Vac 50/60Hz input voltage. | 110Vac |
| 5 | N | | |
| 6 | E | | |
| 7 | N.C | normally closed contact | voltage free general alarm output |
| 8 | C | common | |
| 9 | N.O | normally open contact | |
| 10 | N.O | Alarm 1 Internal alarm relay control function | internal alarm |
| 11 | C | | |
| 12 | N.C | | |
| 13 | C | Run Relay Electrolyser run signal | |
| 14 | N.O | | |
| 15 | + | | |
| 16 | + | +24VDC Output Common circuit/signal voltage | signals |
| 17 | + | Sig Amps electrolyser current signal input (optional) | |
| 18 | - | 0V common 0V | |
| 19 | + | Sig Volts electrolyser voltage signal input | |
| 20 | - | 0V Common 0V | |
| 21 | + | Sig Air Flow airflow signal input | |
| 22 | + | +24VDC Output Output voltage for air flow meter | |
| 23 | - | 0V Common 0V | |
| 24 | - | 0V Common 0V | |
| 25 | + | Sig Flow Meter Pulses water meter pulse signal input | |
| 26 | + | +5VDC Output not active | |
| 27 | + | Sig Product Temp electrolyser solution temperature signal input | |
| 28 | - | 0V Common 0V, hydrogen sensor | |
| 29 | + | Sig Hydrogen hydrogen sensor signal input | |
| 30 | + | +5VDC Output Voltage supply for hydrogen sensor | |
| 31 | N.C | Ext Alarm N/C External N.C Emergency alarm, linked to terminal 15 when not in use | |
| 32 | - | 0V Common 0V | |
| 33 | + | Sig Panel Temp panel temperature signal input | |
| 34 | - | 0V Common 0V | |
| 35 | + | Sig Emergency Stop Signal for emergency stop switch | |
| 36 | - | 0V Common 0V | |
| 37 | + | Sig Softener Regen Signal for softener regeneration input | |
| 38 | - | 0V Common 0V | |
| 39 | + | Sig Flood Signal for external bund flood / Linked to common 0V not in use | |
| 40 | - | 0V Common 0V | |
| 41 | + | Sig Door electrolyser cabinet door | |

| | | | | |
|----|----|-----------------------|---|------------------|
| 41 | - | 0V | signal input Common 0V | |
| 42 | + | Sig Tank Start/Stop | degassing tank signal input | |
| 43 | - | 0V | Common 0V | |
| 44 | + | Sig Ext Tank Run/Stop | Signal for product tank run/stop switch | |
| 45 | - | 0V | Common 0V | |
| 46 | + | Sig Ext Tank Low Lv | Signal for low level switch in external product tank (optional) | |
| 47 | - | 0V | Common 0V | |
| 48 | + | Sig Ext Tank H-H | Signal for high level switch in external product tank | |
| 49 | - | 0V | Common 0V | |
| 50 | * | Spare | not active | |
| 51 | + | +24VDC | 24VDC Supply for brine solenoid | control outputs |
| 52 | - | 0V | Common 0V | |
| 53 | + | +24VDC | 24VDC Supply for water solenoid | |
| 54 | - | 0V | Common 0V | |
| 55 | + | +12VDC | not active | |
| 56 | + | Green | not active | |
| 57 | + | Blue | not active | |
| 58 | + | Red | not active | |
| 59 | - | 0V | not active | |
| 60 | + | Digital Inputs | not active | |
| 61 | + | | | |
| 62 | + | | | |
| 63 | + | | | |
| 64 | RX | Receive | Data receive (option) | Telemetry option |
| 65 | TX | Transmit | Data transmit (option) | |
| 66 | + | Aux Alarm (stop) | external alarm signal input | external inputs |
| 67 | - | 0V | Common 0V | |
| 68 | + | Remote Inhibit (stop) | external/remote inhibit signal input | |
| 69 | - | 0V | Common 0V | |

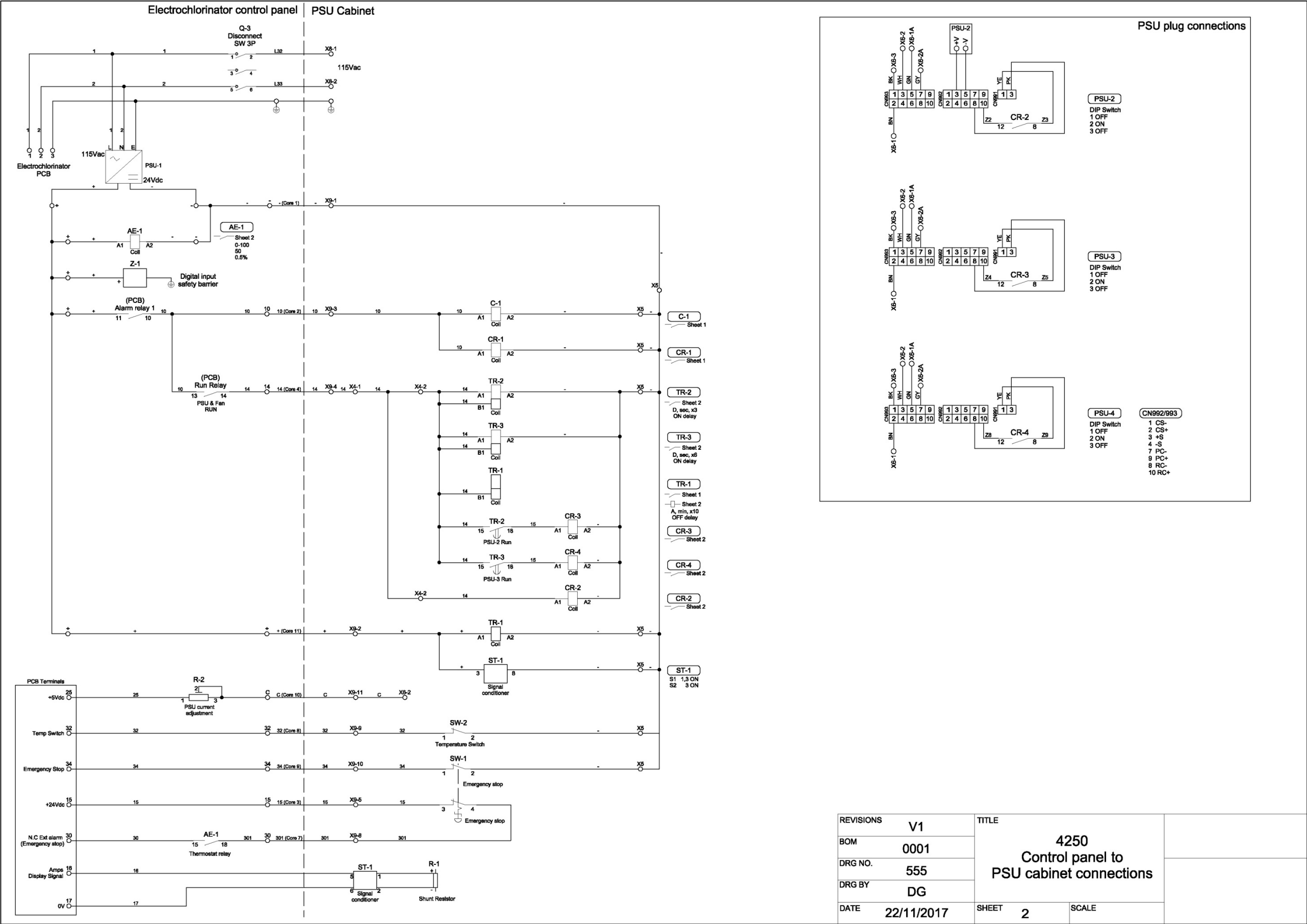
7.3.4 Control Panel PCB Terminal Diagram



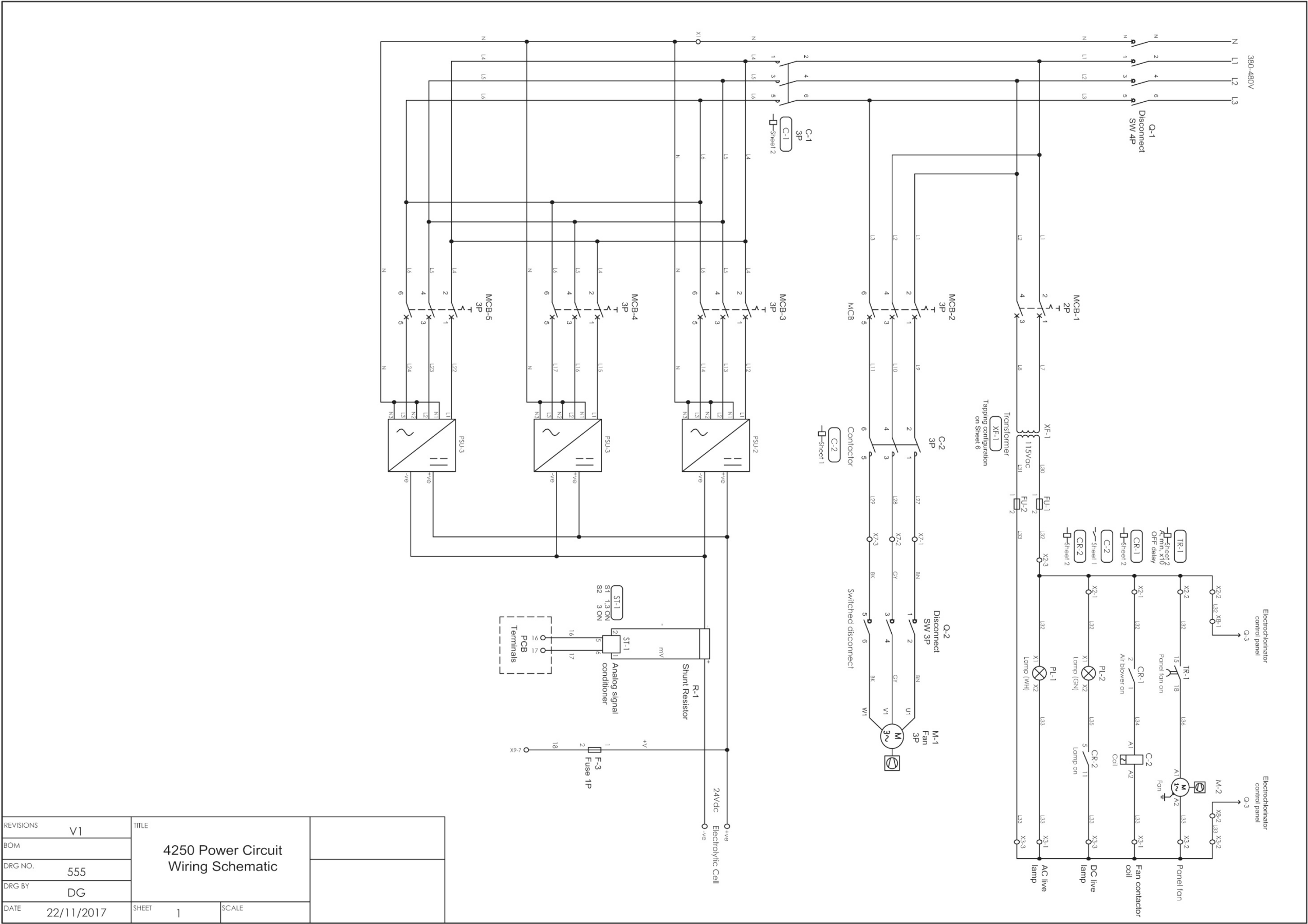
7.3.5 4250/8500 Power Supply Cabinet: Component Layout & Information



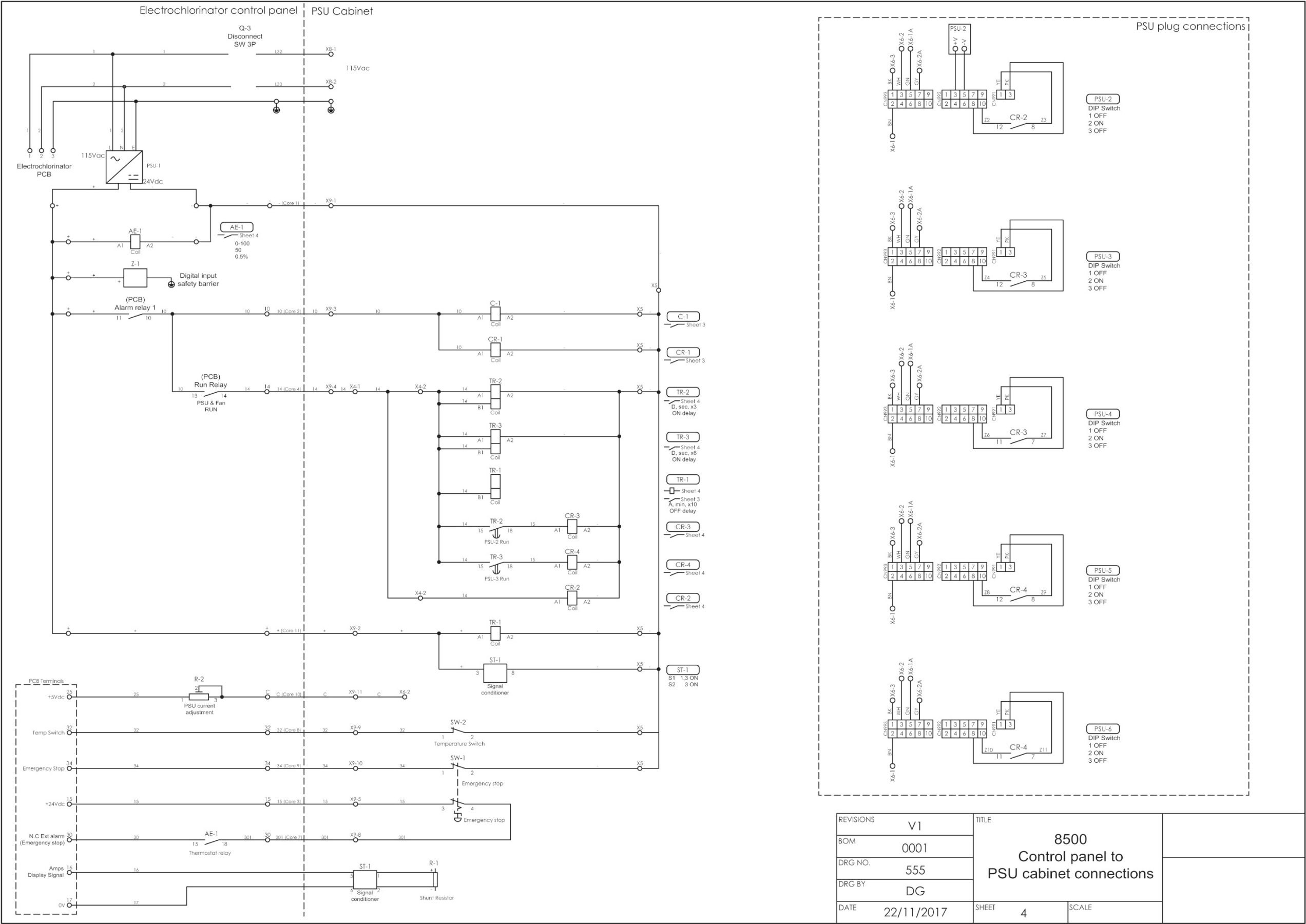
7.3.6 4250 Control Panel to Power Supply Cabinet Connections



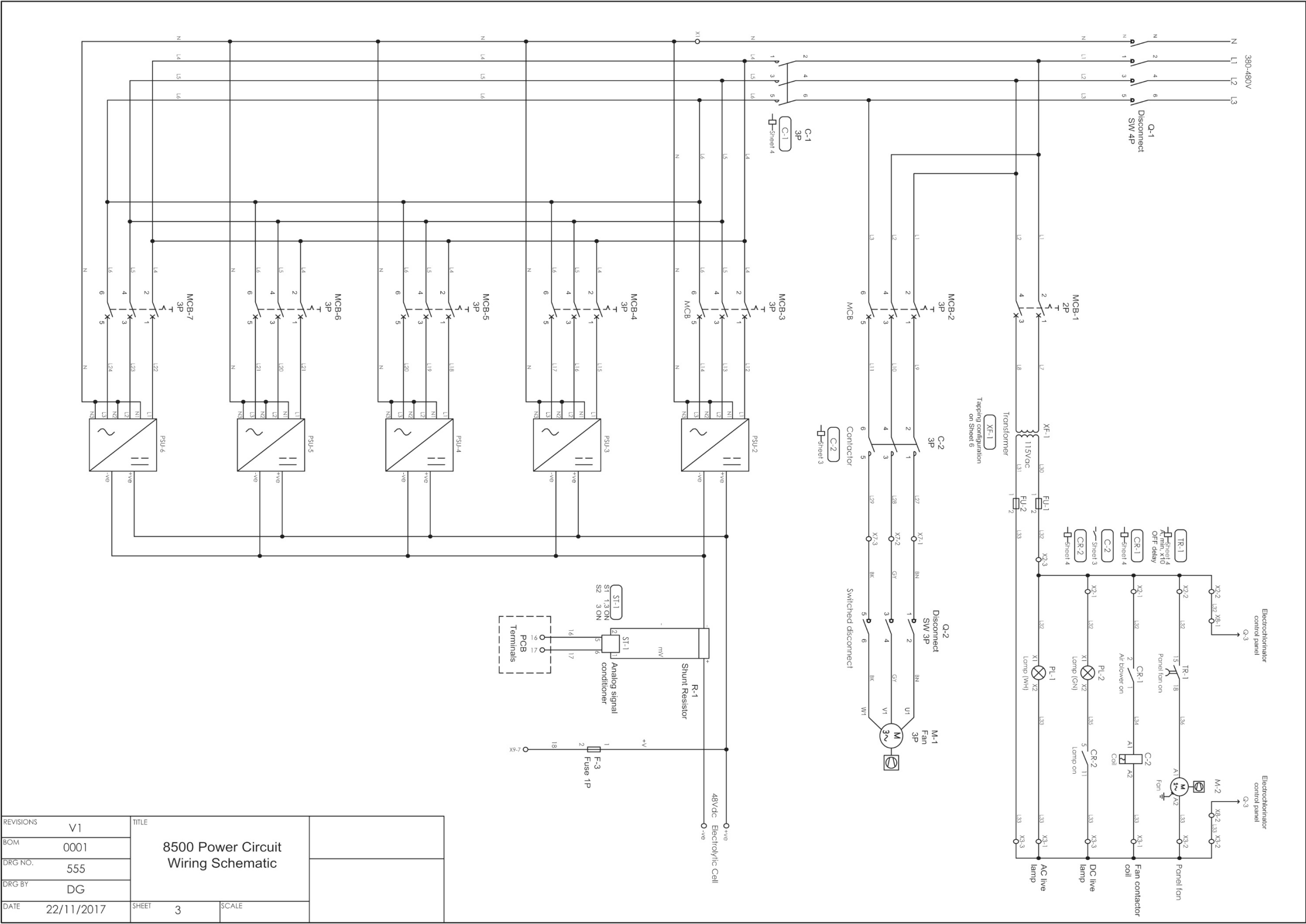
7.3.7 4250 Power Circuit Wiring Schematic



7.3.8 8500 Control Panel to Power Supply Cabinet Connections



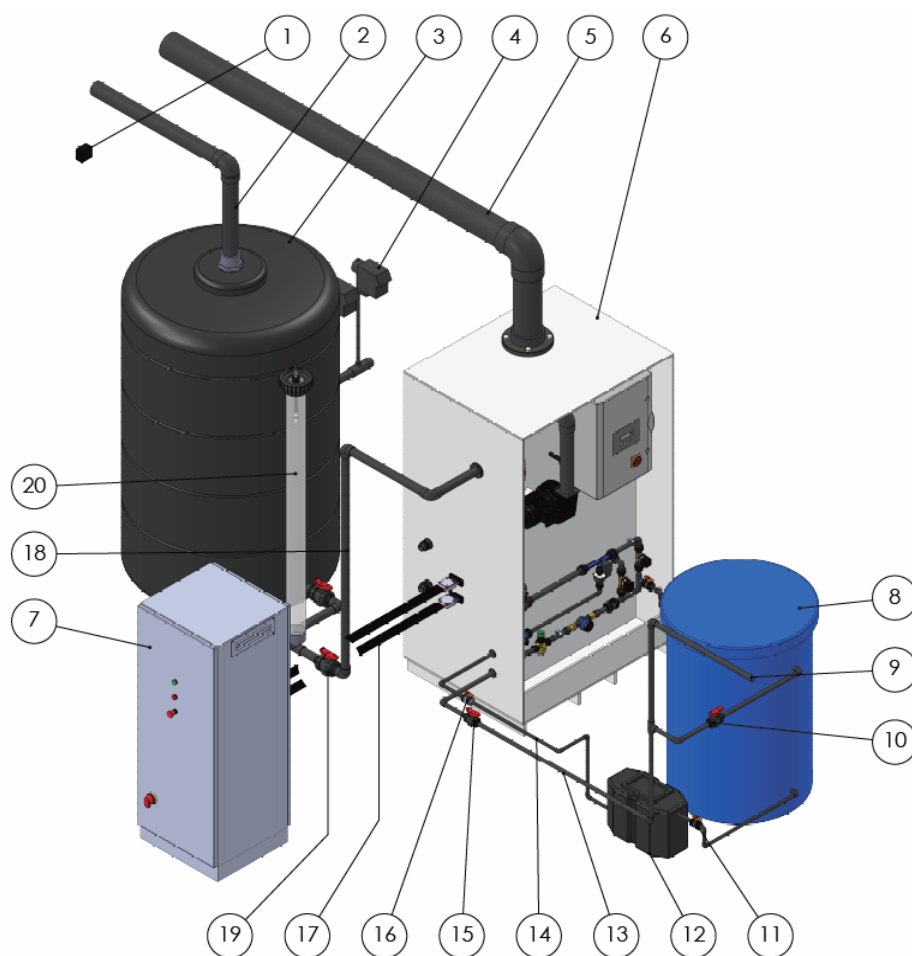
7.3.9 8500 Power Circuit Wiring Schematic



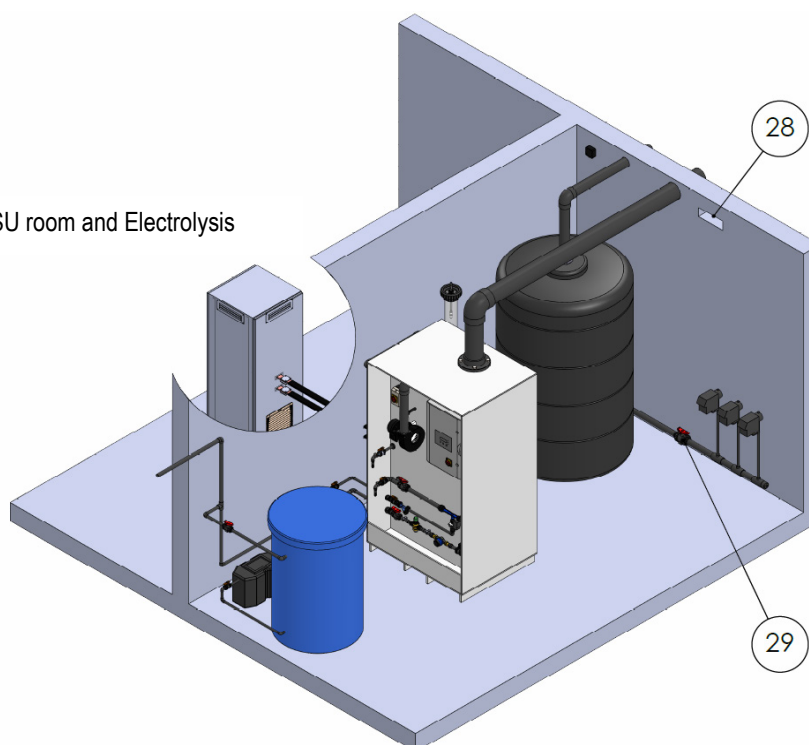
7.4 General installation layouts

7.4.1 Electrolytic plant

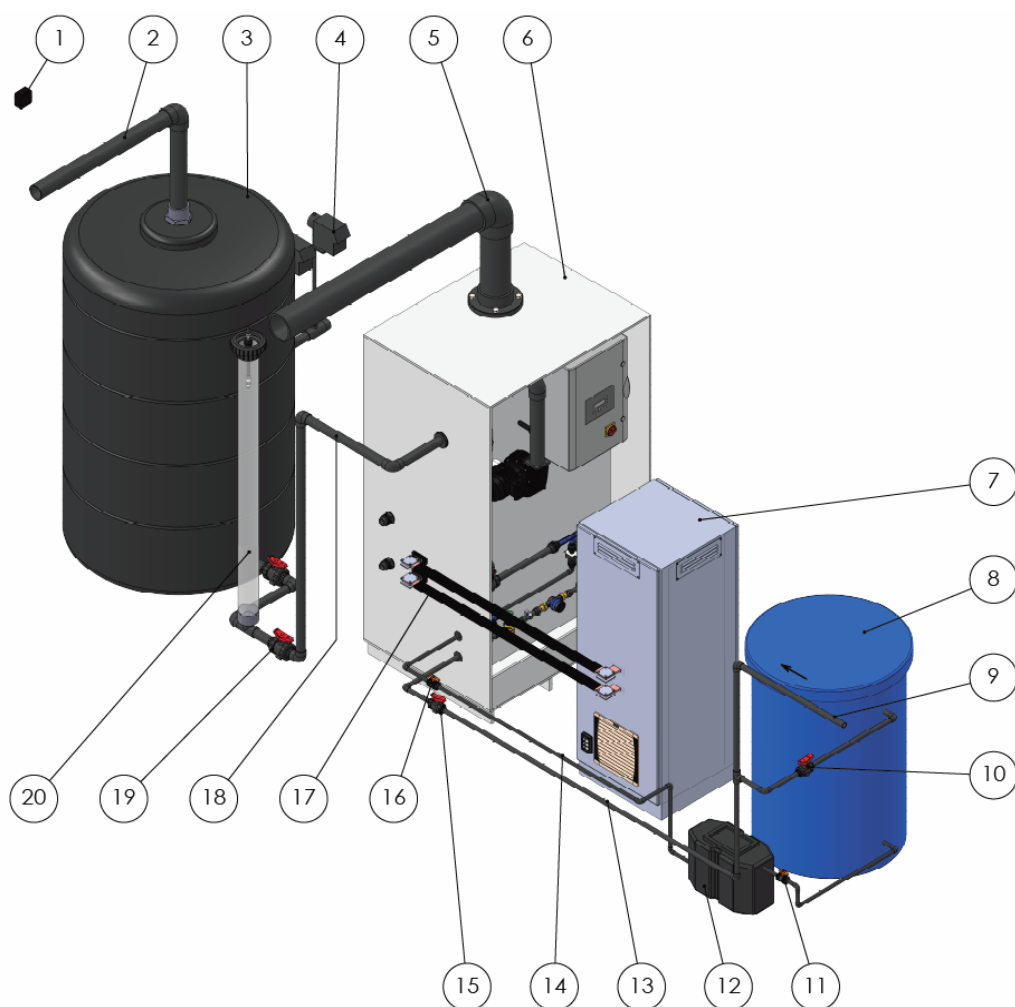
Installation layout example 1:



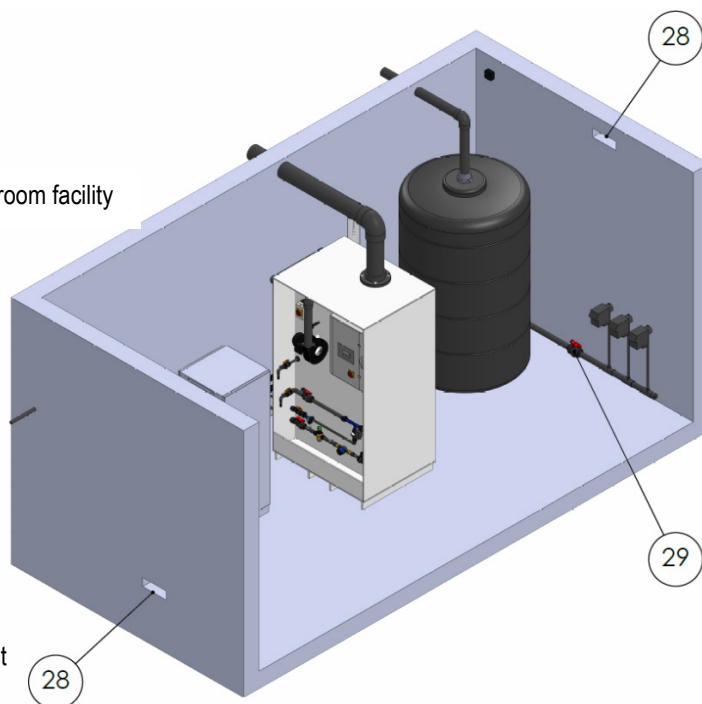
Electrical PSU room and Electrolysis



Installation example 2:



Single plant room facility



7.4.2 Softening equipment layout

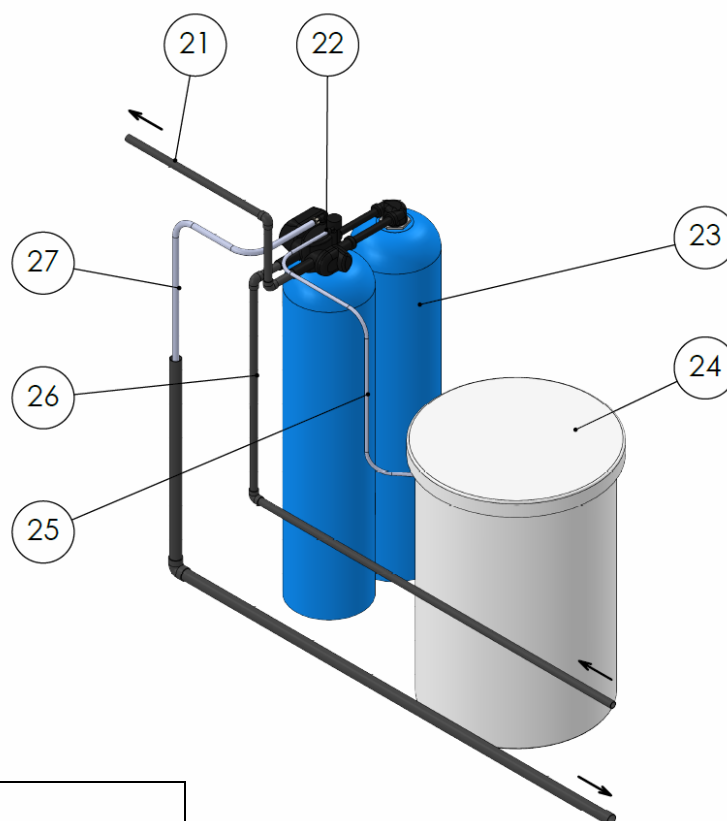
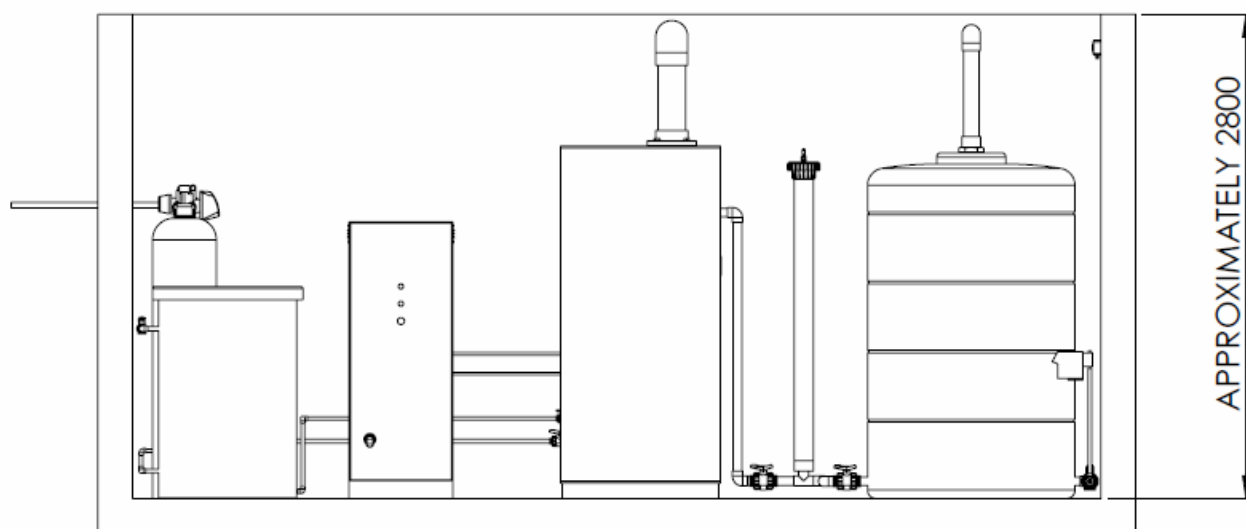
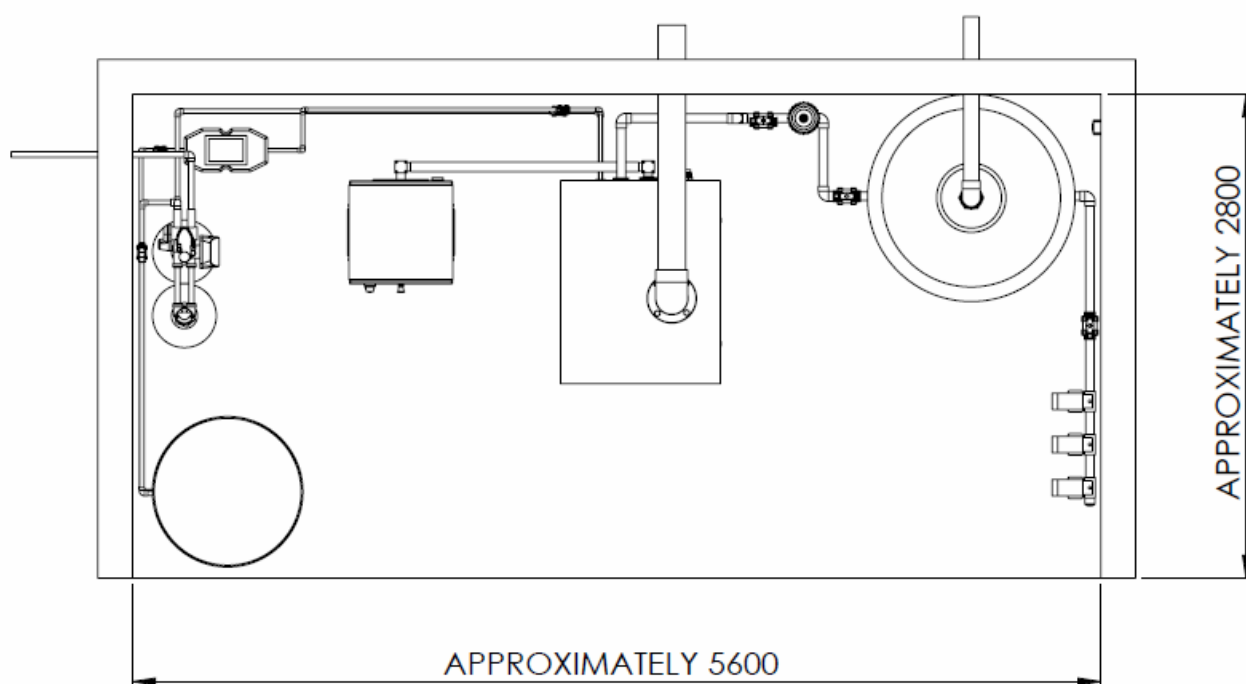


Table of key descriptions

| Key | Description |
|-----|--|
| 1 | Hydrogen gas detector |
| 2 | Product tank natural ventilation pipe work |
| 3 | Product tank |
| 4 | Chlorine dosing equipment example |
| 5 | Electrolyser forced ventilation pipe work |
| 6 | EASYCHLORGEN unit |
| 7 | PSU cabinet |
| 8 | Saturator for electrolysis |
| 9 | Potable softened water supply |
| 10 | Saturator isolation valve |
| 11 | Intermediate brine tank isolation valve |
| 12 | Intermediate brine tank |
| 13 | EASYCHLORGEN potable softened water supply |
| 14 | EASYCHLORGEN saturated brine feed |
| 15 | Brine isolation valve |
| 16 | Softened water feed isolation valve |
| 17 | DC electrolyser busbars |
| 18 | Product outlet pipe work |
| 19 | Product outlet isolation valve |
| 20 | Product tank level switch column |
| 21 | Softened water outlet |
| 22 | Softener valve head unit |
| 23 | Duplex softener vessel system |
| 24 | Saturator for softener system |
| 25 | Brine draw and refill pipe |
| 26 | Potable cold (hard) water inlet |
| 27 | Softener backwash drain pipe |
| 28 | Natural room ventilation |
| 29 | Product tank outlet isolation valve |

7.4.3 General installation arrangement

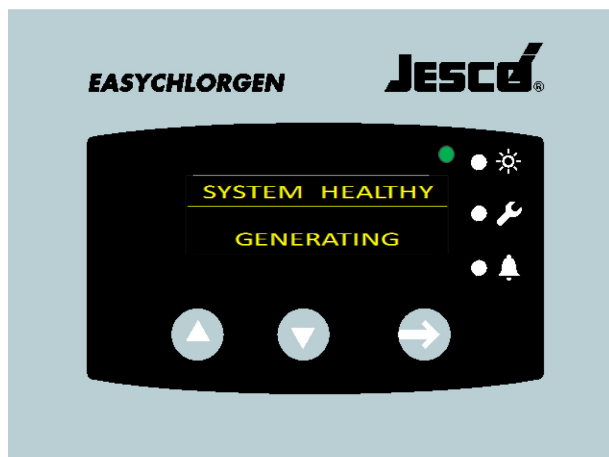
Example floor plan:



8. Control

8.1 Control display

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



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:



Scroll UP selection button



Scroll DOWN selection button



ENTER selection confirmation button

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

- Green LED = system healthy
- Amber LED = maintenance action
- Red flashing LED = system fault

Symbol representation:



System healthy (GRN)

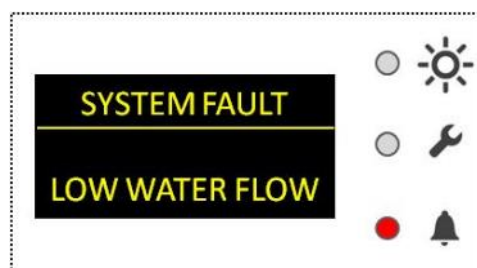


System warning /Maintenance action (AMB)



System fault (flashing RED)


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



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.

| | |
|--|----------------|
|  | WARNING |
| Risk of equipment failure and injury to personnel and property! | |
| <p>⇒ 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 EASYCHLORGEN system to avoid any immediate or ensuing risk.</p> | |

9. Start Up

| Check No. | SAFETY CHECK | Checked (Yes / No) |
|-----------|--|--------------------|
| 1 | Hydrogen gas detector fitted correctly at high level in the EASYCHLORGEN room. | |
| 2 | EASYCHLORGEN and Product Tank ventilation is correctly installed to external Zone 2 exhaust points | |
| 3 | The EASYCHLORGEN mechanical room has natural ventilation. | |

| | |
|--|-------------|
|  | Note |
| Damage to the system due to incorrect installation/commissioning. | |
| <p>⇒ Ensure essential commissioning checks are completed correctly to avoid potential mechanical failure when system placed into operation</p> | |

| Check No. | PRE-START UP CHECK | Checked (Yes / No) |
|-----------|--|--------------------|
| 4 | PSU isolating transformer AC LINK wire correctly configured to local voltage conditions. | |
| 5 | Suitable softened (minimum 3 bar pressure) water supply available and connected to EASYCHLORGEN. | |
| 6 | Exposed DC copper busbar connections are adequately protected with self-amalgamating tape. | |
| 7 | Saturator tank is supplied with softened water supply. | |
| 8 | Intermediate brine tank fitted where necessary. | |

9.1 Commissioning and Initial Start-Up

Precondition for action:

- ✓ The system is configured according to the factory setup.
- ✓ The system has been installed in accordance with section 7, Installation.
- ✓ 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. Saturation allowed for at least one hour.
- ✓ The hydrogen gas sensor detection kit is correctly installed and electrically connected via the 4-pin plug/M12 cable assembly as per installation instruction.

The PSU cabinet will require powering up to provide the electrical supply to the whole system.

9.1.1 PSU Power Up

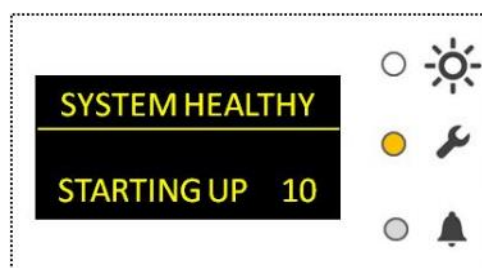
Perform the following working steps:-

1. Switch on the PSU at the cabinet door main isolator.
2. Disengage the Emergency Stop button by twisting and pulling outward.
3. The Power On (white) lamp will illuminate indicating that there is power available to the system.

9.1.2 EASYCHLORGEN Control Panel Power Up

Perform the following working steps:

1. Switch on the power supply to the EASYCHLORGEN at the door main isolator. Next, the Start-up screen appears:-



The EASYCHLORGEN system will perform a set countdown number of water and brine batch cycles from 10 through to 0 (4250 model) or 15 through to 0 (8500 model) to initially charge the electrolyser with a minimum

volume of brine solution prior to automatically starting normal generation/batch cycles.

Note that the PSU GEEN lamp will be illuminated indicating the EASYCHLORGEN system is in normal operation.

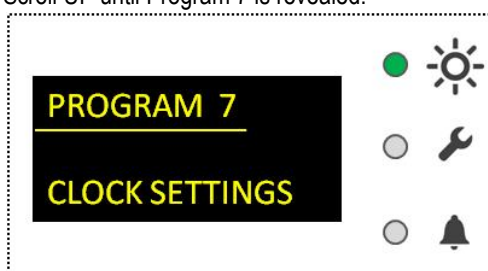
- During the above start up cycles, immediately place the EASYCHLORGEN into MANUAL INHIBIT mode by pressing and holding the scroll UP key for 5 seconds. The following MANUAL INHIBIT screen will appear and stop the system:-



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



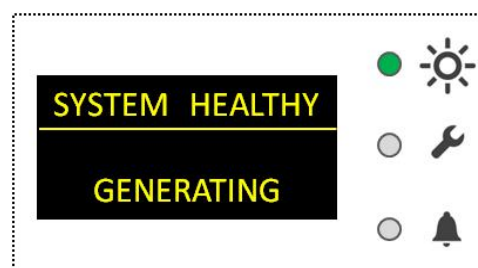
- Using the UP/DOWN scroll keys enter the service code 2236 – each digit needs to be individually selected and entered.
- Scroll UP until Program 7 is revealed:-



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

9.1.3 Exiting Program

- 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.
- To restart the system press and hold the scroll UP key for 5 seconds.
- EASYCHLORGEN system will now resume its countdown start-up sequence and then proceed to normal automatic operation indicated by SYSTEM HEALTHY, GENERATING.



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

The normal DC Volt reading should be in the range of between 24 and 26 volts (4250 model) or 48 to 52 volts (8500 model).

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


- 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 – Commissioning Log.**

9.1.4 Changing display language

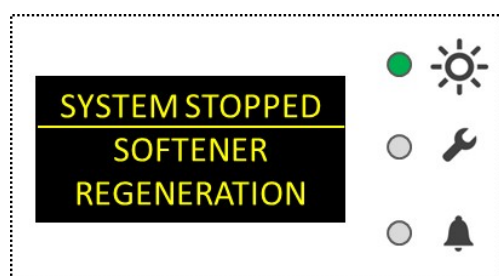
10. The control panel display language can be selected when the EASYCHLORGEN is in normal operation simply by scrolling down to Program 9 and repeatedly depress the ENTER key until the language of choice is displayed, from which then leave this screen by scrolling UP/DOWN back to normal operating screen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

9.1.5 Adjustment of regenerative softener (if fitted)

11. If a digital flow metered auto regenerative duplex softener is fitted to the system, the hardness setting of the softener control should be set to at least 50mg/l CaCO₃ above the hardness value of the source water.
12. 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 EASYCHLORGEN. Refer to section 5.1 "Output data" for maximum daily water consumption values.

| | |
|---|-------------|
|  | Note |
| <p>Damage to the system due to incorrect installation/commissioning.</p> <p>⇒ Ensure EASYCHLORGEN does not operate without a reliable softened water supply!</p> | |

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



If the above screen is not displayed then this may be a result that the softener regeneration signal is not properly connected to the EASYCHLORGEN. Contact your supplier for further advice.

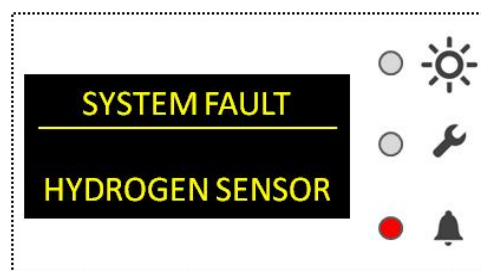
13. Complete the Commissioning record log sheet in Appendix I.
14. After 12 to 24 hours operation it is recommended to perform further checks:-

- 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 in place;-

NO SALT = NO CHLORINE!

9.1.6 Hydrogen gas detector check

15. Whilst the EASYCHLORGEN 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 EASYCHLORGEN will go into alarm and display:-



16. 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 EASYCHLORGEN system

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

9.2 Normal Start-Up

Precondition for action:

- ✓ The EASYCHLORGEN 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 EASYCHLORGEN 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.
- ✓ Ensure all hydraulic isolation valves are open upstream of the EASYCHLORGEN as appropriate.

9.2.1 PSU Power Up

Perform the following working steps:-

4. Switch on the PSU at the cabinet door main isolator.
5. Disengage the Emergency Stop button by twisting and pulling outward.
6. The Power On (white) lamp will illuminate indicating that there is power available to the system.

Perform the following working steps:-

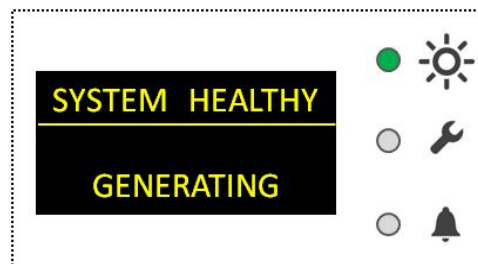
1. Switch on the power supply to the EASYCHLORGEN. The Start-up screen appears:-



The EASYCHLORGEN system will perform a set countdown number of water and brine batch cycles from 10 through to 0 (4250 model) or 20 through to 0 (8500 model) to initially charge the electrolyser with a minimum volume of brine solution prior to automatically starting normal generation/batch cycles.

Note that the PSU GREEN lamp will be illuminated indicating the EASYCHLORGEN system is in normal operation.

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



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

The normal DC Volt reading should be in the range of between 24 and 26 volts for 4250 models and 48 to 52 volts for the 8500 model.

- N.B.** 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 with this system will most likely result in failure of the system and affect the warranty conditions.

⇒ Use the correct salt.

10.1 Automatic Operation

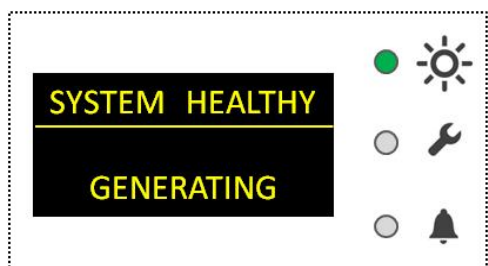
The EASYCHLORGEN system is automated. However, the salt saturator should be refilled with salt before allowing it to become empty. Try not to allow the salt level to drop <25% full. The saturator should have markers fitted to indicate “maximum” and “minimum” salt level!

On electrical power the EASYCHLORGEN 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:-



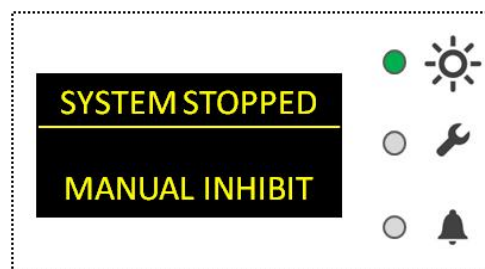
When the system is generating and the tank is filling the display will show:-



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, the scroll UP key may be pressed for 5 seconds to place the system into MANUAL INHIBIT mode which halts the automatic operation:-



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

10.3 Remote Inhibit

The EASYCHLORGEN 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 EASYCHLORGEN into STOP mode to prevent the EASYCHLORGEN from operating with softened water (signal switching between softener and EASYCHLORGEN):-



The system will resume automatic operation once the regenerative process is complete.

10.5 Emergency Shutdown


In the event of an emergency, you must immediately disconnect the device from the mains supply.

An Emergency Stop device is fitted at the PSU cabinet front door. This device can be operated to stop the system. At the control panel, the screen will display SHUTDOWN - EMERGENCY STOP and will activate the alarm condition, indicated by the panel flashing RED lamp and any connected alarm device will activate.

The EASYCHLORGEN system will need to be reset on the panel by pressing the ENTER button once the Emergency Stop device has been released.

10.6 Record Log of Operation

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 |
| <p>Long term damage due to incorrect maintenance.</p> <p>Without good operational record keeping, operational efficiency cannot be monitored and may lead to unnecessary maintenance in the future.</p> <ul style="list-style-type: none">⇒ 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. During normal operation, isolate the power supply to the EASYCHLORGEN via the rotary isolator switch on the control panel.
2. Switch off on the main Power Supply Unit (PSU).
3. Switch off any electronic softener system associated with the EASYCHLORGEN.
4. Isolate the upstream feed water supply.
5. Isolate where necessary any inlet/outlet valves associated with product storage tank(s).

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

11.2 Long-term shutdown

Perform the following working steps:-

1. During normal operation, switch the control panel off via the rotary isolator.
2. Close the brine valve immediately upstream of the brine in-line strainer screen.
3. Switch the control panel back on again and immediately on completion of the Start-Up cycle, repeat switching the control panel off and back on again to complete one further Start-Up cycle. On completion of final Start-Up cycle, switch the control panel off at the rotary isolator and secure with a padlock as necessary.
4. Switch off the main Power Supply Unit (PSU) at its rotary isolator and secure with a padlock as necessary.
5. Switch off any electronic softener system associated with the EASYCHLORGEN.
6. Isolate the upstream feed water supply.
7. Isolate where necessary any inlet/outlet valves associated with product storage tank(s).

✓ **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 water, brine and product 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" section 16 and "Warranty claim" section 17.

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 section 16).

12. Maintenance

Products by Lutz-Jesco are manufactured to the highest quality standards and have a long 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 supply 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.

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 |
|------------------------------------|------------------|---|
| As required | Trained persons | <ul style="list-style-type: none"> ▪ Clean or replace in-line brine strainer screen ▪ Clean/replace in-line PRV strainer screen |
| Annual | Specialist staff | <ul style="list-style-type: none"> ▪ In addition to above:- ▪ Check/Test hydrogen gas sensor function ▪ PSU housekeeping |
| 2 yrs (or >10,000 operating hours) | Specialist staff | <ul style="list-style-type: none"> ▪ In addition to above:- ▪ Replace product pipe seals/gaskets |

12.1.1 Clean/replace brine strainer screen

Depending on quality of the softened cold water supply and salt specification, the in-line strainer screen protecting the brine control solenoid valve may periodically require cleaning or replacing.

One of the reasons the EASYCHLORGEN may alarm "VOLTAGE HIGH" is due to a restriction in brine flow, resulting in a low salinity brine solution entering the electrolytic cell. The system is designed to shut down in the event of high voltage conditions.

Precondition for action:-

- ✓ Place the system in to short term shutdown. See section 11.1
- ✓ Biennial service kit available, see section 14 "Spare Parts"
- Refer to the diagram in 12.4.3 for component location detail

Perform the following working steps:-

1. Ensure the ball valve is closed immediately upstream of the brine strainer assembly.
2. Unscrew the strainer screen plastic securing bonnet to remove the entire screen assembly.
3. By unclipping the end of the strainer cage, the screen can be removed for cleaning in warm soapy water or replaced with a new replacement screen.
4. After cleaning/replacement of the screen, apply a small amount of silicone grease to the bonnet thread and O-ring before refitting the screen assembly hand tight only.
5. Re-open the ball valve and start-up the system as per section 9.2.

✓ **The brine strainer has been successfully cleaned/replaced.**

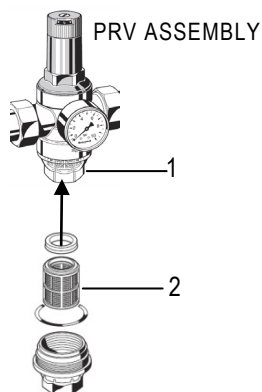
12.1.2 Clean/replace water PRV strainer screen

Precondition for action:-

- ✓ Place the system in to short term shutdown. See section 11.1
- ✓ Biennial service kit available, see section 14 "Spare Parts"
- Refer to the system diagram in 12.4.3 for component location detail and component diagram below,

Perform the following working steps:-

1. Ensure the ball valve immediately upstream of the cold water feed Pressure Regulation Valve (PRV) is closed.
2. Unscrew the strainer screen brass securing bonnet "1" located at the base of the PRV to remove the entire screen assembly.



3. Clean/replace the screen “2” and ensure screen is assembled correctly back into the bonnet and tightly secured back into the base of the PRV housing.
4. Re-open the ball valve and start-up the system as per section 9.2.

✓ **The PRV strainer has been successfully cleaned/replaced.**

12.1.3 PSU housekeeping

It is important that each annual inspection and service of the EASYCHLORGEN system includes cleaning the inside of the PSU cabinet from dust and small particles drawn in through the air cooling fan intake.

Precondition for action:-

- ✓ EASYCHLORGEN system in short-term shutdown

Perform the following working steps:-

1. With the PSU electrically isolated, unlock and open the cabinet door.
2. Use a nozzle vacuum cleaner to remove dust settled on the internal base of the cabinet and air intake grille. Carefully vacuum dust with soft bristle attachment from any accessible component surfaces. DO NOT vacuum the main electrical isolation connection block.
3. Ensure the cabinet door is locked closed after housekeeping.

✓ **PSU housekeeping complete**

12.1.4 Replace product pipe seals/gaskets

Elastomers (rubber seals) exposed to the electrolytic process are subject to chemical wear and require routine replacement every two years regardless of operating hours as a preventative maintenance action.

Prior to commencing this maintenance action, the electrolytic hydraulic circuit requires purging of residual chlorine solution.



WARNING

Increased risk of accidents due to chemical exposure!

A residual of brine/chlorine solution may drip from the pipe work and fittings.

- ⇒ Wear correct personal protective equipment.
- ⇒ Wipe away any spillage immediately.

Precondition for action:-

- ✓ Perform the long term shut down procedure; see section 11.2.
- ✓ Biennial service kit available, see section 14 “Spare Parts”

- Refer to the diagram in 12.4 for detail of seal replacement location.

Perform the following working steps:-


1. Drain down the product/degassing tank and associated pipe work by closing the external product tank inlet valve (or product isolation valve located immediately downstream of the EASYCHLORGEN unit) and opening the product sample point valve. Allow the solution to drain into a clean plastic container. Empty contents carefully into the external product tank or carefully wash away to a waste sewer drain with copious water until the product solution is fully drained. Close the product sample valve when drip free.
2. Repeat step 1 only this time draining the electrolyser cell(s) and pipe work by opening the brine sample point valve. Close the brine sample valve when drip free.
3. Remove the electrolyser cell enclosure window by removing the vertical window bead retainers and then the horizontal window bead retainers.
4. Commence replacing spare elastomers as detailed in section 12.4.
5. Carefully loosen each fitting, in-turn replacing gaskets/O-rings with correct replacements. Apply a small amount of silicone grease to threaded union connections to reduce friction prior to reconnecting and securing fittings, hand tight only.
6. Ensure the electrolyser chamber window is refitted correctly back into position.
7. Perform start-up as per section 9.2.

✓ **Replacement of seals and gaskets complete**

12.1.5 Hydrogen gas detector inspection

The hydrogen gas (H₂) detection system is very important to ensure a safe environment. The H₂ detector should be routinely tested at least annually, to verify a safe system of work.

N.B. When the sensor is functioning correctly and the display reads 100%, this is equivalent to a H₂ detection level in the

| | |
|---|----------------|
|  | WARNING |
| Increased risk of accidents due to chemical exposure! | |
| <p>A residual of brine/chlorine solution may drip from the pipe work and fittings.</p> <p>⇒ Wear correct personal protective equipment. ⇒ Wipe away any spillage immediately.</p> | |

atmosphere of less than 2.5% of the LEL threshold which is still extremely safe. However, this level is higher than normal and action should be taken to identify and rectify the situation.

Precondition for action:-

- ✓ EASYCHLORGEN system in normal automatic operation.

Perform the following working steps:-

1. 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 EASYCHLORGEN panel to reveal Program 4.
2. Compare the displayed hydrogen level with the commissioned value as recorded in Appendix I at time of initial commissioning/start-up. If the present reading displayed is >25% higher than commissioning reading it is recommended to carry out the following checks:-
 - a. The ventilation system is working at the correct commissioned airflow rate.
 - b. The electrolyser cabinet window air seal integrity is good and not leaking air pressure outward.
 - c. The plant room natural air ventilation has not been compromised.
 - d. Carry out H₂ sensor performance check procedure as per section 9.2.1.
3. Replace the hydrogen sensor if:-
 - a. reading is above normal range >70%
 - b. sensor is known to have been damaged by exposure to water emersion or fire damage
 - c. sensor has been in operation >2 years

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

12.1.6 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 specialist staff.

A major overhaul of the EASYCHLORGEN system is required every 5 years, regardless of operating hours. An approved EASYCHLORGEN service specialist 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 electrolytic cell may require acid cleaning.

The following items will need to be replaced/checked:

- Water and brine control solenoid valves.
- Electrolyser casing flange gaskets.
- Electrolyser terminal O-rings.
- All standard pipe connection elastomers.
- The hydrogen gas sensor head.
- Water softener - full service of its valve head assembly and replacement of the softener resin.
- All safety switches and safety devices to be fully tested.

Action to be taken:-

- ⇒ **Contact your EASYCHLORGEN service provider to arrange a major overhaul service.**

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

12.2 Electrolyser cleaning

The electrolyser (electrolytic cell assembly) may require acid cleaning periodically to remove the presence of water hardness scaling and any heavy metal deposition e.g. iron and manganese deposits. Cleaning of the electrolyser can be automated or carried out manually, depending on client specification.

Calcium scaling of the electrolyser, normally a white coloured deposit on the electrolyser cell plate structure, is usually the result of softener failure allowing hard water to enter the electrolyser and/or poor quality salt being used for the electrolytic process.

Iron and/or manganese fouling is usually a dark brown/black coloured deposit on the surface of the cell plates and a result of poor feed water quality and/or poor quality salt used for the electrolytic process.

Repeated acidic chemical cleaning will likely damage the electrolyser cell plates resulting in poor generation efficiency e.g. low chlorine strength, high salt consumption, high voltage conditions.

Always try to prevent the damage in the first place through good operation principles as detailed in section 3, "Intended Use".



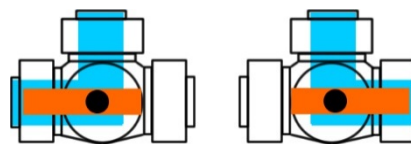
One of the reasons the EASYCHLORGEN may alarm in "VOLTAGE HIGH" is due to the electrolyser becoming scaled with hardness salts and/or fouled with heavy metals.

In this section, a recommended method for manual cleaning only is detailed. Consult your supplier for information relating to any automatic cleaning apparatus fitted where applicable. Precondition for action:-

- ✓ Perform Long-term shut down procedure, see section 11.2.
- ✓ Electrolyser chemical cleaning apparatus ready

Perform the following working steps:-

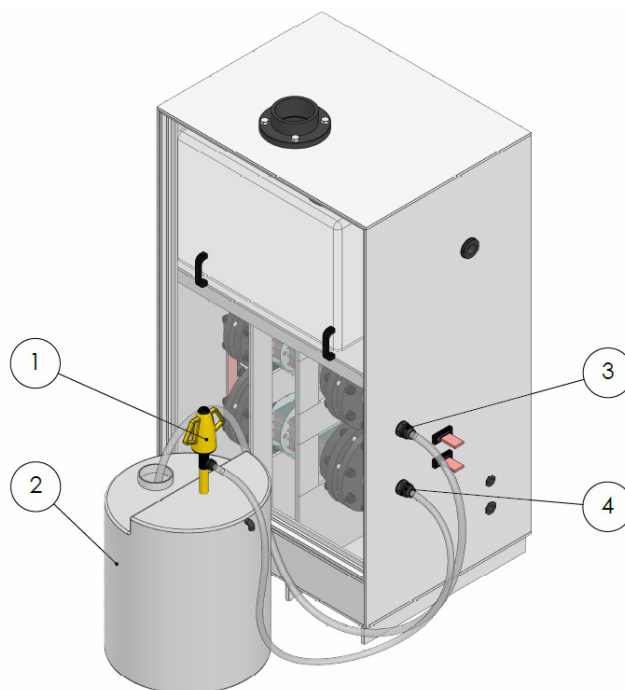
1. Drain the brine/product solution pipe work and electrolyser(s) by opening the brine salinity sample point valve. Allow the contents to empty into a clean plastic container until the sample point is drip free. Close the brine salinity sample valve.
2. Securely connect (hand tight) the flow and return hose sets of the electrolyser chemical cleaning kit to the side connection cell cleaning ports of the EASYCHLORGEN. The cleaning kit tank should only be filled with clean cold water at this stage.
3. Remove the electrolyser compartment window by removing the vertical window bead retainers and then the horizontal window bead retainers.
4. Locate each of the two 3-way L-Port isolating ball valves at the inlet and outlet of the electrolyser cell(s) and turn the valve handles by rotating 90 degrees so that the "L-Port"



3 WAY L-PORT VALVE ADJUSTMENT EXAMPLE

indicators show flow and return through the electrolyser and chemical cleaning kit circuit.

5. Purge the electrolyser(s) of any remaining saline water and chlorine solution residue with clean water using the cleaning kit pump system and safely pump away this initial purge/rinse water volume to a waste/foul service drain – not a surface drain!
 6. Fill the cleaning tank with chemical cleaning solution typically a 10% HCl (muriatic acid) solution and circulate this through the electrolyser(s) for at least 10 minutes observing removal of precipitates. Heavy scaling/fouling will require several cleaning volumes and increased contact time to be removed completely.
 7. Dispose of the chemical residue carefully and responsibly in accordance to local site rules.
 8. Rinse the electrolyser(s) with a clean tank of water prior to removing the cleaning kit.
 9. Ensure the electrolyser compartment window is refitted correctly back into position.
 10. Prepare the system for Start-Up as detailed in section 9.1.
- ✓ **Electrolyser chemical wash carried out successfully.**



Example of electrolyser chemical cleaning using manual operated system.

12.3 Finishing maintenance

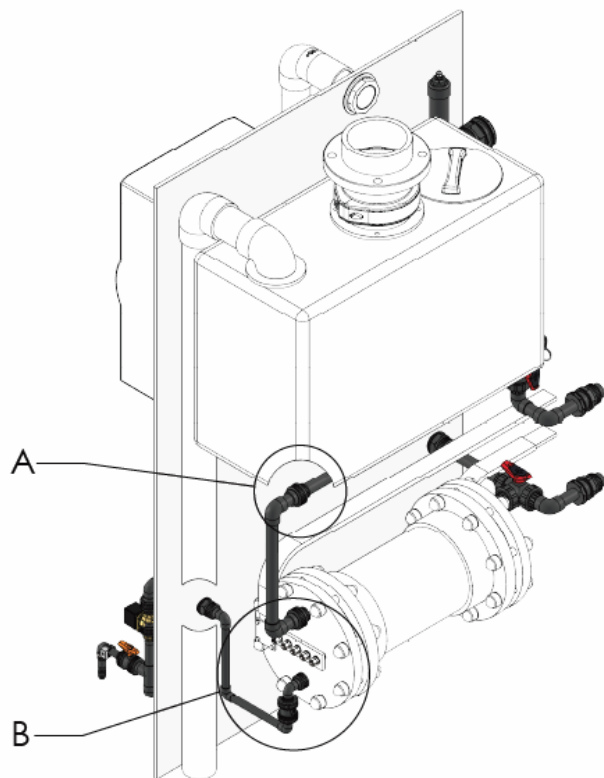
Perform the following working steps:-

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 EASYCHLORGEN system and as per any associated documents which are contained within this manual.
3. Affix a sticker displaying the maintenance date next to the EASYCHLORGEN rating plate.
4. To assure correct start up procedures refer to section 9 "Start-up".

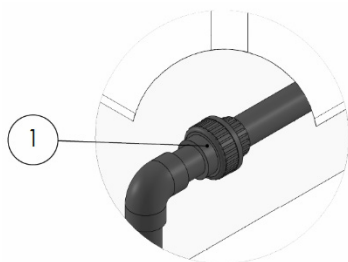
✓ **Maintenance completed.**

12.4 Location of maintenance parts

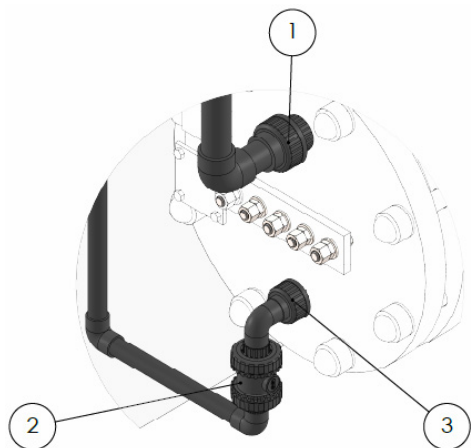
12.4.1 Left side electrolyser compartment



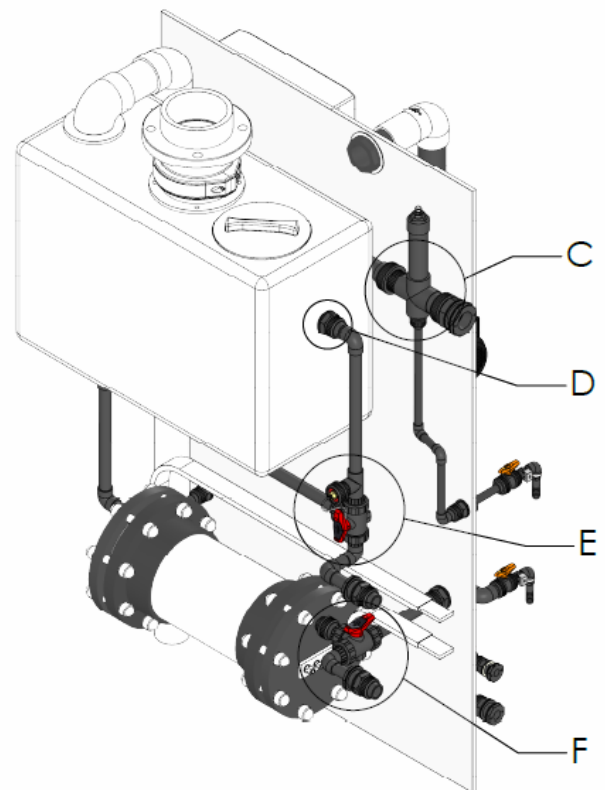
Detail A:



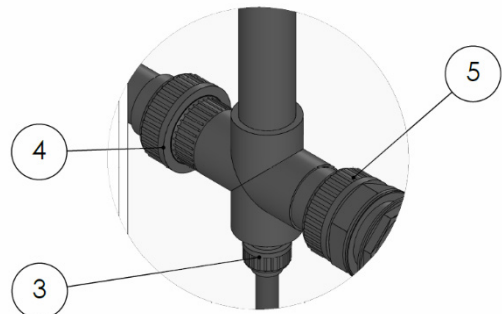
Detail B:



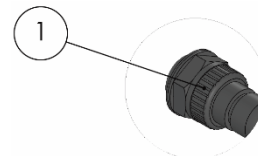
12.4.2 Right side electrolyser compartment



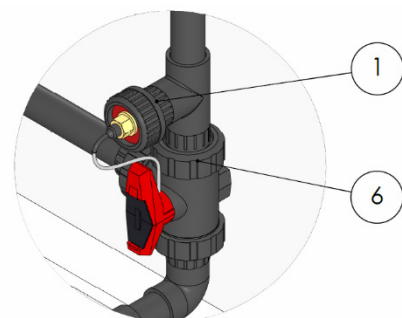
Detail C:



Detail D:



Detail E:



Detail F:

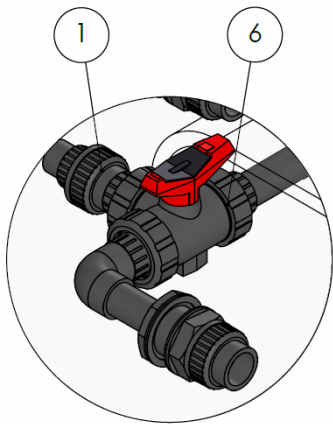
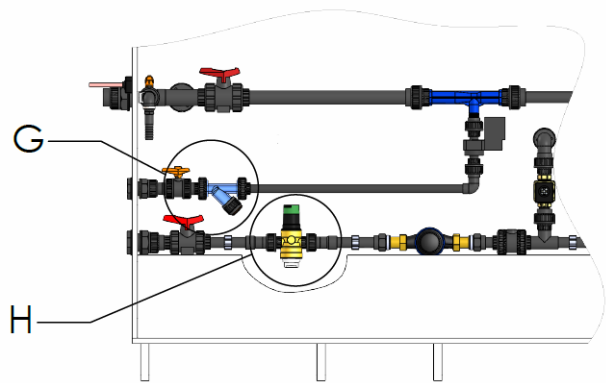


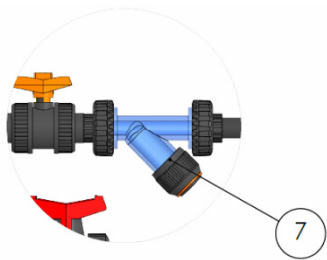
Table: Maintenance Parts List

| Key | Item description (detail A – H) |
|-----|---------------------------------|
| 1 | DN25 Union O-ring |
| 2 | DN15 NRV O-ring |
| 3 | DN15 Union O-ring |
| 4 | DN40 Union O-ring |
| 5 | DN40 Adaptor Gasket |
| 6 | DN25 Valve O-ring |
| 7 | DN20 Strainer Screen |
| 8 | DN20 PRV strainer screen |

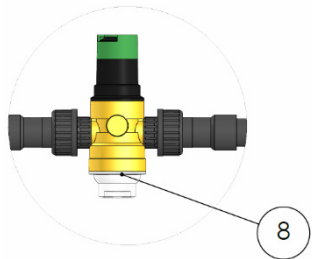
12.4.3 Hydraulic control apparatus



Detail G:



Detail H:



13. Trouble-shooting

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 EASYCHLORGEN service provider on further measures or return the device/system component for repair.

| Display | Fault | Possible causes | Remedy |
|--|--|--|---|
| System Fault / Emergency Stop | The Emergency Stop button has been depressed | Manually Activated | Reset Emergency stop switch and then Reset |
| | | Accidentally Activated | Reset Emergency stop switch and then Reset |
| | | Wire Breakage/Loose connection | Check wiring and ensure switch is NC when Healthy |
| System Fault / Panel Temperature | A temperature of 50°C has been exceeded within the control panel | Blocked inlet/outlet filters | Clean or replace filters then Reset |
| | | Panel cooling fan Fault | Check and replace then reset |
| | | Panel Temperature switch fault | Check and replace then reset |
| | | Wire Breakage/Loose connection | Check wiring and ensure switch is NC when Healthy |
| System Fault / Ext Tank High | The High Level point within the external product tank has been exceeded. | Failure of the Start/Stop Switch | Check and replace then reset |
| | | Solenoid valve passing | Check for debris, worn valve seat or diaphragm |
| | | Back filling through dosing system | Check dosing system non return valves clean |
| | | Wire Breakage/Loose connection | Check wiring and ensure switch is NC when Healthy |
| System Fault / Ext Tank Low | The Low Level point within the external product tank has been reached. | Failure of the Start/Stop Switch | Check and replace then reset |
| | | System in Manual Inhibit | Remove system from Manual Inhibit |
| | | System in Remote Inhibit | Remove system from Remote Inhibit |
| | | System in Fault Condition | Check system fault and reset |
| | | Take of demand too high | Reduce product dose rate |
| | | Failure of the low Level switch | Check wiring and ensure switch is NC when Healthy |
| System Fault / Auxiliary Alarm | An Auxiliary Alarm input has been activated. | Auxiliary Alarm has been Activated | Check and Reset |
| | | Wire Breakage/Loose connection | Check wiring and ensure switch is NC when Healthy |
| System Fault / Hydrogen Sensor | Hydrogen Level has exceeded 100% of the alarm value (<2.5% LEL) | Broken or damaged pipe work | Check and replace |
| | | Ventilation Blockage | Check and clean |
| | | Sensor not connected | Connect sensor |
| | | Wire Breakage/Loose connection | Wire breakage/loose connection |
| System Fault / Voltage High | Electrolyser High Volt Set Point has been exceeded. | Lack of Salinity within the Electrolyser | Check for blockages then check S.G. |
| | | Scale on Electrodes | Check softener operating correctly, Check salt quality then reset |
| | | Alarm point set too low. | Check and adjust |
| | | Wire Breakage/Loose connection | Replace wire/tighten connection/clean connection |
| System Fault / Voltage Low | Electrolyser Low Volt Set point has been reached. | High salinity within the electrolyser | Check salt setting/ adjust and reset. |
| | | Power Supply Failure | Check and replace |
| | | Faulty Run Relay | Check and replace |
| System Fault / No Water Flow | Insufficient Water Flow within the batch process cycle time period. | Low Water Pressure | Check service pressure |
| | | Blockage within water pipe work | Check and clean |
| | | Blockage within Softener | Check, service or replace |
| | | Faulty Flow Meter | Check and replace |
| | | Wire Breakage/Loose connection | Wire breakage/loose connection |
| System Fault / Low Air Flow | Low Air flow from Blower | Blockage in ventilation pipe work | Check and remove blockage |
| | | Air Blower Failure | Check and replace |
| | | Air Flow Sensor Failure | Check, clean or replace |
| | | Wire Breakage/Loose connection | Wire breakage/loose connection |
| System Fault / High Air Flow | Air flow detected by the air low sensor has exceeded the high air flow set point | Ventilation pipe is broken/disconnected | Check integrity of the ventilation pipe |
| | | Electrolyser compartment door seal faulty or the door securing bars are missing/not fitted correctly | Check the condition of the door seals and that the securing bars are inserted fully into position |
| System Fault / Product Temp | The temperature of the generated product has exceed the high temperature set point | Incoming water supply temperature is too high | Consider installing a water chiller if the incoming water supply is higher than 20°C, or check the chiller if already installed |
| | | Faulty water flow meter | Check/replace the flow meter |
| | | Faulty Run Relay (closed contacts) | Check/replace the Run Relay 'R1' |

14. Spare Parts

14.1 Maintenance sets

Biennial maintenance kit includes the following parts:-

- Elastomer seals kit, pipe fittings
- Elastomer seals kit, 3-way valves
- Strainer screen, brine feed
- Strainer screen, softened cold water feed
- 50g tube O-ring/thread lubricant

| System Model | Code | Description |
|--------------|---------|--------------------------|
| 4250-8500 | 200-206 | Biennial maintenance kit |

14.2 Critical site spares

| Code | Description |
|----------|--|
| 210-006 | Ventilation air flow sensor |
| 8-GP0219 | Ventilation air blower 3 phase |
| 210-018 | Hydrogen gas sensor** |
| 211-006 | Water control solenoid valve assembly, 3/4in, 24vdc. |
| 213-021 | Brine control solenoid valve assembly |
| 8-GP0106 | Temperature sensor (PT100) |
| G0069/5 | Degassing tank level switch assembly |
| 8-GP0039 | Control circuit power supply (PS1) |
| 210-203 | Control circuit board (PCB) |
| 8-GP0221 | PSU cabinet cooling fan |
| 210-031 | DC electrolytic power pack module, 4250 |
| 210-032 | DC electrolytic power pack module, 8500 |

NOTE (**EASYCHLORGEN system will not operate with a defective hydrogen sensor)

15. 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.:

Reason for repair:

.....

.....

.....

| Dosing medium | | | |
|---------------|--|-------------|--|
| Description: | | Irritating: | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Properties | | Corrosive: | <input type="checkbox"/> Yes <input type="checkbox"/> 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:

16. Warranty claim

Warranty Application

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 application filled out.

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 and conditions of the device

Point of use / system designation:

.....

Accessories / Ancillaries used:

.....

Commissioning (date):

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

Please describe the specific installation and enclose a simple drawing or picture of the system installation, showing materials of construction, diameters, lengths and heights of interconnecting pipe work, ducting, devices, etc.

Appendix I – Commissioning Log

Commissioning / Service Sheet

To be completed and kept on Site

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

| | | | | | |
|---|--|--|--|--|--|
| DATE OF VISIT | | | | | |
| VOLTMETER READING (V) | | | | | |
| AMP READING (A) | | | | | |
| TEMP READING (°C) | | | | | |
| HOURS RUN | | | | | |
| AIRFLOW RATE (m ³ /hr) | | | | | |
| HARDNESS TEST (Green / Red) | | | | | |
| PRODUCT TEST (% Av. Cl ₂) | | | | | |
| PRODUCT TEST (S.G.) | | | | | |
| HYDROGEN SENSOR TEST | | | | | |
| QUANTITY OF SALT ADDED | | | | | |
| WATER SOFTENER Settings | | | | | |
| VISUAL ELECTROLYSER INSPECTION | | | | | |
| VISUAL VENTILATION PIPEWORK INSPECTION INCLUDING DISCHARGE POINT | | | | | |
| VISUAL INSPECTION FOR LEAKS | | | | | |
| OTHER SITE INFORMATION / ADJUSTMENTS | | | | | |
| WHO COMPLETED THE CHECKS (Sign) | | | | | |
| Comments / Observations / Adjustments made | | | | | |

Appendix II – Operators Log

Operators Log

To be completed and kept on Site

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

[illegible]

Appendix III – Service Log

Service Check Sheet

| | | | |
|---|----------------------|-----------------------------|------------|
| Date: | | System type / model: | |
| Serial number: | | Hour meter: | |
| Service Item | OK | Comments | |
| Electrochlorinator | | | |
| Check Product tank | | | |
| 1) For Leaks | | | |
| Check Electrodes for | | | |
| 1) Scale | | | |
| 2) Leaks | | | |
| 3) Correct operation | | | |
| Check Softener | | | |
| See Operator Manual | | | |
| Solenoid Valves | | | |
| 1) Water Correct operation | | | |
| 2) Brine Correct operation | | | |
| 3) Dilution Correct operation | | | |
| Hydrogen Sensor | | | |
| 1) Correct operation | | | |
| Brine Tank | | | |
| 1) Check for leaks and clean tank | | | |
| Control Panel Check | | | |
| 1) Terminals for security and signs of over heating | | | |
| 2) Check all components are present, correctly installed, and operating correctly | | | |
| 3) All fuse rating are correct | | | |
| 4) Correct operation of panel | | | |
| Ventilation | | | |
| 1) Check pipe work | | | |
| 2) Check air flow sensor | | | |
| 3) Check room ventilation | | | |
| Complete Operators Log | | | |
| System Operation / Settings | | | |
| Hydrogen Sensor (%): | Product Temperature: | Volts: | Amps: |
| Cycle Time: | Air Flow: | Brine Timer: | Hours Run: |

Installation, Operation & Maintenance Guide

Clack WS TT

Duplex Regenerating Softener System



Manual 029

Contents

1. Unpacking Instructions

2. Installation

- Pre-installation checks
- Fitting the distribution systems Adding the media
- Fitting the valves
- Brine tank connections
- Duplex hydraulic connections DLFC (drain line flow control) Injectors
- Electrical Connections
- Quickstart
- Programming the valve

3. Settings

- Softener setting sheet

4. Commissioning

- Introduction Regeneration Service

5. Routine Maintenance

- Weekly Monthly Yearly

6. Troubleshooting

- Typical Installation Layout

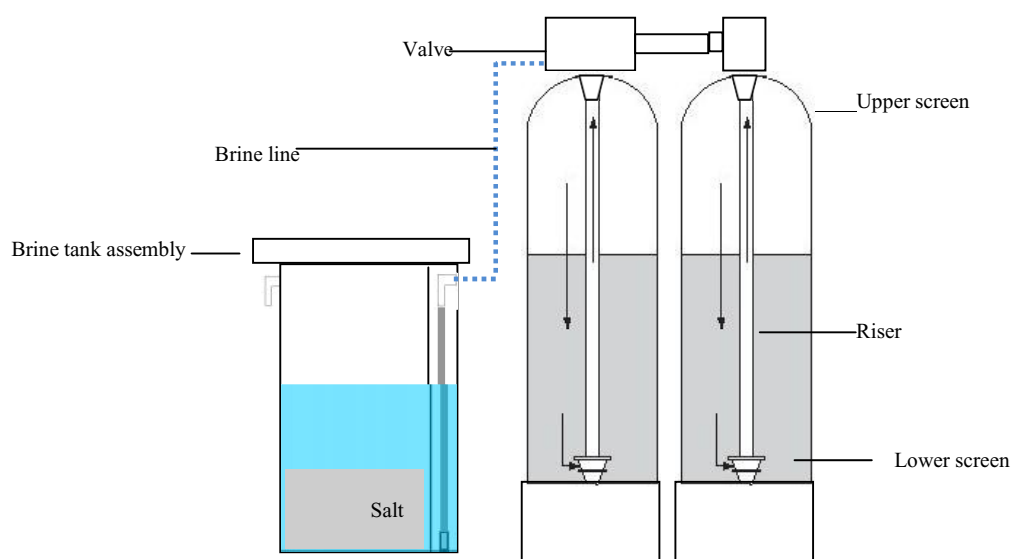
Accessories

5303028632 Service Wrench

1. Unpacking

PLEASE USE THE ACCOMPANYING PACKING DOCUMENTS TO CHECK THAT ALL ITEMS ARE PRESENT AND CORRECT.

The main parts of the system include:



2. Installation

Please observe the local regulations concerning the installation of your system. Check that you have allowed space for access to the unit for possible future maintenance. This installation may require plumbing work and will require an electrical outlet to be fitted near the system. Only attempt this if you have the necessary skills.

2.1 Pre-installation checks

The area needs to be level, frost free, have access to electricity and an open drain. Check the incoming water quality is within any parameters specified for that media (contact your supplier). In addition to this check the incoming water pressure is between 4 and 8 bar and the water temperature is between 3°C and 45°C.

2.2 Fitting the Distribution Systems

Fit the bottom distribution systems into the vessels – the bottom screens should be pre-glued to the riser tubes (fig A.1) (smaller systems). Alternatively, if the system uses bottom laterals these need to be assembled inside the vessels (fig A.2), Move the vessels to their final positions as they will be difficult to move once the media has been added.



Fig A.1



Fig A.2



Fig A.3

2.3 Adding the Media

Block the top of the riser tubes to stop media getting down the tubes (see fig A.3). Add about 1/3 by volume of water to the vessels so when the media is poured in it doesn't damage the bottom distribution system. Add the media supplied but make sure there is approximately 30% free space left above the media so when the system is backwashed the media can expand into the space and allow any sediment or contaminants to be backwashed away (there may be media left over). Unblock the riser tubes.

2.4 Fitting the Valves

Add a small amount of silicone grease to the valve outer and inner O-rings (fig A.4 & 5).



Fig A.4



Fig A.5

If top screens have been supplied these should be attached next

Slide the valves onto the riser tubes and gently push it down onto the vessel treads. Screw the valve on until you start to squeeze the main O ring and then finally give the valve a final tighten by tapping the rear side of the valve with the palm of your hand (fig A.6)



Fig A.6

2.5 Brine Tank Connections.

Attach the brine line tubing to the brine tank and valves using the connectors fitted to the brine tank (fig A.7), and valve (fig A.8).



Fig A.7



Fig A.8

Sizes may vary depending on the valves used, please note to use the poly insert if provided with your specific valves.

2.6 Duplex Hydraulic Connections

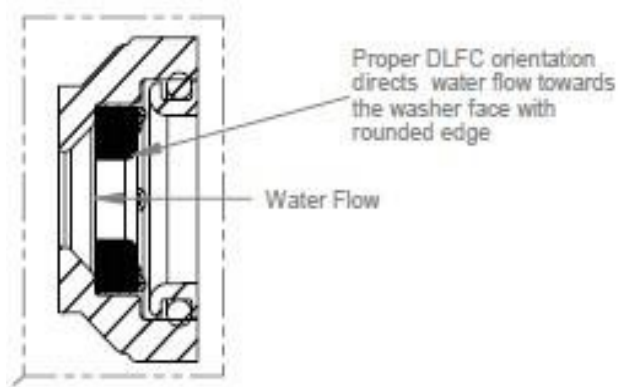
Semi ridged connections are supplied for use on vessels up to and including 14" and flexible hoses to make connections on larger vessels are supplied.

2.7 DLFC (drain line flow control)

This is possibly one of the most important components to check has been installed; this will control the backwash flow rate and ensure the system will continue to function correctly. The DLFC is fitted inside the drain line elbow. See below picture of the drain line housing.



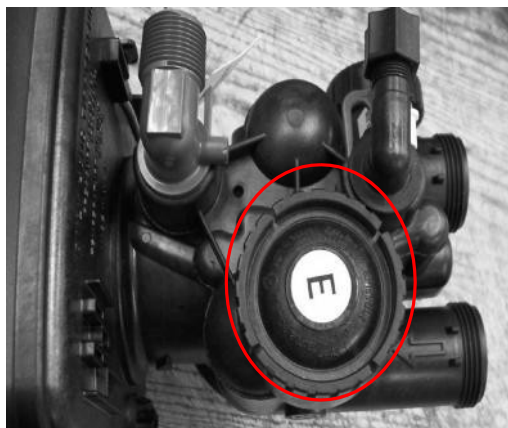
3/4" Elbow



Insert

2.8 Injector

The injector is another important item in the functioning of the system, please check that it is fitted in the DN position and that the UP position has been plugged. The injector colour code is orange.



2.9 Electrical connections



To connect the power cable you need to firstly remove the covers then remove the drive bracket assemblies by pressing up on the drive brackets release tabs and pulling towards you, the drive bracket including software can now be lifted away to reveal the back plate (fig A.9).

Fig A.9

The power cable should be threaded through the back plate And strain relief as shown in Fig A.9a



Fig A.9a

You can now re install the drive bracket into its original position. Please make sure that this has been replaced correctly as this can cause problems at a later date.

If fitting additional cables used for a micro switch remove the knock out on the back plate Fig A.10 then remove the tabs at the bottom of the strain relief on the back side of the back plate fig A.11 thread the cables and attach the cover.



Fig A.12 and fit the cover Fig A13



Fig A.11




Fig A.12

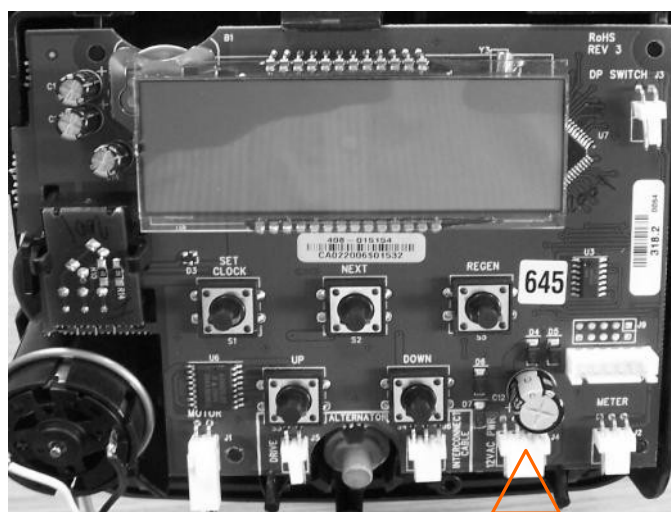


Fig A.13

fig A.10

You can now make connections to the PCB board. Connect power here  marked 12V DC

When all connections have been made the power can be turned on and programming can take place.



Quick Start

2.10 Programming the Valve.

The valve is pre programmed with the exception of the time of day and the Hardness, setting.

All adjustment should be made using the up and down arrows when the setting you wish to adjust is displayed on screen.

Set Time of Day.

Press **SET CLOCK**.

Adjust the hours and press **NEXT** to adjust the minutes, press **NEXT** to return to the normal **TIME** display.

Hardness setting.

Press **NEXT** and **UP** simultaneously for 3 seconds and release. **HARDNESS** with 340 should appear on screen. Adjust the hardness setting according to the local water hardness conditions.

Softener:

Press **NEXT** repeatedly until the display returns to the time of day.

2.11 Programming the Valves in case of memory loss

Should the programming have been lost in transit the following instructions in conjunction with the relevant setting sheet will allow you to re set them.

When the power has been connected the valve will display the software number and initialise itself and then display **TIME**; you can then start to program the valve.

Selections are made using the **UP** and **DOWN** buttons until the required setting is displayed: after each setting press **NEXT** to continue.



Set Time of Day:-

Press **SET CLOCK**.

Adjust the hours and press **NEXT** to adjust the minutes, press **NEXT** to return to the normal **TIME** display.

Step 1: Cycle Sequence

Press **NEXT** and **DOWN** simultaneously for 3 seconds and release.

The screen will display SOFTENING flashing!

Press **NEXT** and **DOWN** simultaneously for 3 seconds.

The screen should display 1.0 “, adjust if necessary.

Press **NEXT** after each setting and set each setting accordingly until the display returns to **TIME**

Step 2: System Setup

Press **NEXT** and **DOWN** simultaneously for 3 seconds and release.

The screen will display SOFTENING flashing. Press **NEXT**.

The screen should display CYCLE 1, adjust as necessary (see setting sheet that corresponds to your system!) Press **NEXT** and set each setting accordingly until the display returns to **TIME**.

Step 3: Display Settings

Press **NEXT** and **UP** simultaneously for 3 seconds and release.

HARDNESS with 340 should appear on screen. Adjust as necessary (see quick start section.

Press **NEXT** and set each setting accordingly.

3. Your System

3.1 Identifying your System

Your System will have an identification label fixed to the control valve, this will look similar to the picture shown here.

The information listed can be read as follows:

| | | |
|---------------|----------------|---|
| 4202035013 | Stock Number: | Manufacturers part number. |
| S/no 03100137 | Serial No: | Serial No. |
| Soft | Id Code: | System type identification code (= softener.) |
| | Configuration: | Vessel size, Valve type & Controller type. |

Identify the settings from the chart in the programming section – vessel size “**1665**”.

Each 16” diameter vessel requires a maximum of 150 litres of softener resin.

The duplex 1665 softener system is capable of treating a water volume of up to 18m³ at a hardness of 400 ppm CaCO₃. Lower water hardness value results in an increase of water volume that can be treated pro-rata, e.g.:

Each vessel regeneration will consume 24kg of salt.

The maximum peak flow of the softener system must not exceed 6.4m³/h

The valve is supplied pre-programmed!

(excluding settings that need to be done on site)

The settings are listed in case there is a need to re program the valve.

If you have any concerns or worries following the setting procedure please contact your supplier who will help you through the set up procedures.

Using the above information to identify your system you can then select the relevant setting sheet from the following pages.

3.2 Softener

* denotes factory setting (below)

Clack WSTT Valve Set up as a Softener

Software version 332.2

Please apply the settings in the following sequence

Selections are made using the UP & DOWN buttons until the required setting is displayed,

After each setting press NEXT to continue.

Capacities calculated at 50g CaCO₃ hardness removal per litre of resin.

| | | | | | | | | | | | | |
|-----------------------|-----|-----|------|------|------|------|------|------|------|-------|------|------|
| Vessel Size | 817 | 835 | 1035 | 1044 | 1054 | 1248 | 1354 | 1465 | 1465 | *1665 | 1865 | 2160 |
| Media Volume (litres) | 8 | 20 | 30 | 40 | 50 | 60 | 75 | 100 | 125 | *150 | 200 | 250 |

Step 1, Cycle Sequence,

Press NEXT and DOWN simultaneously for 3 seconds and release.

Screen will display SOFTENING flashing

Press NEXT and DOWN simultaneously for 3 seconds, the screen should display 1.0Γ, below, adjust to tubine setting

| | | |
|------------|-----|-----------------------------|
| Set Rinse | Off | or (see note 9) |
| DP Setting | Off | or (see note 2 for options) |
| Hardness | | PPM |
| Set 1 | | Backwash |
| Set 2 | | Brine Draw dn |
| Set 3 | | Rinse |
| Set 4 | | Fill (Salt required) |
| Set 5 | | End |

Step 2. System Setup,

Press NEXT and DOWN simultaneously for 3 seconds and release.

SET with SOFTENING flashing should appear on screen.

| | | | | | | | | | | | | |
|------------------|------|----|-----|----|-----|----|-----------------------------|----|------|------|----|------|
| Cycle 1 Backwash | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Cycle 2 Brine dn | | 54 | 68 | 60 | 70 | 62 | 64 | 86 | 86 | 71 | 84 | 61 |
| Cycle 3 Rinse | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Cycle 4 Fill Kg | 1.2 | 3 | 4.5 | 6 | 7.5 | 9 | 11.2 | 15 | 18.7 | 22.5 | 30 | 37.5 |
| Cycle 5 | | | | | | | | | | | | |
| Capacity Kg | 0.4 | 1 | 1.5 | 2 | 2.5 | 3 | 3.7 | 5 | 6.2 | 7.5 | 10 | 12.5 |
| Set Regen | Auto | | | | | | or (see not 3 for options) | | | | | |
| Set Time Regen | On 0 | | | | | | | | | | | |
| Set rLY 1 | Off | | | | | | or (see note 5 for options) | | | | | |
| Set rLY 2 | Off | | | | | | or (see note 6 for options) | | | | | |
| Set Salt | Off | | | | | | or (see note 7 for use) | | | | | |

Step 3, Display Settings.

Press NEXT & UP simultaneously for three seconds and release.

HARDNESS with 340 flashing should appear on screen,

| | | | | | | | | | | | | |
|--------------------|---------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Hardness | Set on site (if Regen is set to AUTO) | | | | | | | | | | | |
| Hardness 2 | 0 (not used) | | | | | | | | | | | |
| Regen Day | 14 | | | | | | | | | | | |
| Set Time Regen Hrs | Default 2: | | | | | | | | | | | |
| Set Time Regen Min | Default :00 | | | | | | | | | | | |

Step 4, Set time of day,

Press SET CLOCK

Set hours using the up and down buttons.

Set minutes using the up and down buttons,

29/07/2015

Notes:

| Notes for CI valves software version 332.2 | | |
|--|----------------------|---|
| Starting a manual Regeneration | | Press and hold the REGEN button until the motor starts. |
| Set a delayed regeneration | | Press the REGEN button (REGEN TODAY) will flash on screen) press the REGEN button again to clear. |
| Advancing through a regeneration | | Press the REGEN button to move to the next stage of regeneration. |
| Doing a soft reset | | Press & Hold REGEN & NEXT for 3 seconds. (resets valve in error). |
| Doing a total reset | | Press & Hold REGEN & NEXT for 3 seconds, then press & hold the UP & DOWN buttons together for 3 seconds. (resets valves history). |
| Changing the service display | | Press NEXT to toggle to the next available display. |
| Note | Options | |
| 1 | Off | Feature not used (standard setting) |
| | ALT A | Set on primary valve is using a standard duplex alternating system (Duplex only) |
| | ALT B | Secondary valve if using a standard duplex alternating system (Duplex only) |
| | SYS | If being used with a system controller. |
| | SEPS | Used if a separate source MAV is being fitted (requires 3 way Mav valve) |
| | nHbP | Used if a No Untreated Water valve is being fitted (no untreated water during regen) |
| 2 | Off | Feature not used (standard setting) If used the following options are available) |
| | dpon0 | If the contact is closed it will initiate an immediate regeneration. |
| | dPdEL | If the contact is closed it will initiate a delayed regeneration. |
| | Hold | If the contact is closed a regeneration will be prevented. |
| 3 | Auto | Capacity is automatically calculated and a reserve will be estimated. |
| | OFF | Regenerations will be controlled from the day override setting (user settings) |
| | M ³ | Regeneration will occur immediately when the set capacity has expired. |
| | | If off or M ³ is selected the hardness setting will not display in settings. |
| 4 | NORMAL | Regenerations will occur at the pre set time. (not available on alternating duplex) |
| | On 0 | Regenerations will occur immediately when capacity reaches zero. |
| | Normal on 0 | Regeneration will occur at the preset time when volume is below the reserve or if volume is below the reserve after 10 minutes of no water usage. |
| 5 | OFF | Feature not used. |
| | Time on | Activates after a set time from the start of a regeneration for a set period of time. |
| | L Softening on | Activates in service after a set number of litres for a set time and deactivates after a set period of flow stops. |
| | L Softening Regen on | As above but during regeneration. |
| 6 | OFF | Feature not used. |
| | Time on | Activates after a set time from the start of a regeneration for a set period of time. |
| | L Softening on | Activates in service after a set number of litres for a set time and deactivates after a set period of flow stops. |
| | L Softening Regen on | As above but during regeneration. |
| | Error | Activates whenever the valve enters an error mode. |
| 7 | | Add the KG of salt added to the brine bin each fill, does not show for 1.5 & 2" valves. |
| 8 | OFF | Standard setting. |
| | Delay | The last two cycles can be delayed (Rinse & Fill) this delays until the on line unit is depleted to 10%. |
| 8a | PrE | A pre rinse can be set to rinse the next cylinder before going into service (1" 2" & 1" TT) |
| 9 | PrE | A pre rinse can be set if required of up to 20 minute duration. |

4. Commissioning the System

4.1 Introduction

With the system fully plumbed and the valve programmed commissioning can start.

4.2 Regeneration

When the system is fully functional the regeneration will happen when capacity or period has expired. However, running a manual regeneration during commissioning is the best way of removing air from the system, bedding in the resin and flushing the system through.

Make sure the water inlet and outlet are closed. Press and hold the regeneration button for 3 seconds. The piston will move to the backwash position. Slowly half open the water inlet to the system, and then slowly open the outlet to allow the air to be purged from the first vessel. Skip through the rest of the regeneration cycles by pressing the Regeneration button to move through each stage then start the process again to purge the second vessel. Once the air has been purged you can fully open the inlet and outlet and allow the system to continue through the regeneration cycle, this will allow you to check for leaks and also purge any remaining air from the system. After a backwash the system will move through a brine draw routine, rinse and fill before stopping in the service position.

For new systems or after a media change it maybe necessary to run two regenerations to fully charge the media (check the water at the end of the backwash is running clear).

To initiate a delayed regeneration press the regeneration button once quickly this will start flashing Regen Today in the bottom left corner of the screen and the system will regenerate at the pre-set regeneration time. If you wish to cancel this just press the regeneration button again and the display will disappear.

To initiate an immediate regeneration press and hold the regeneration button until the valve motor starts to turn.

If during a regeneration cycle you need to skip through the cycle this can be done in the following way. To skip to the next stage quickly press the regeneration button and this will take it to the next stage of the regeneration, this can be repeated to get to the end of the regeneration cycle.

4.3 Service.

Water flows into the valve at the top, down through the media and then up through the 'riser' tube in the middle of the vessel. As the water travels through the media the ion exchange takes place. The controllers are set to automatically regenerate on capacity.

The display on the control can show either of the following; Time, current flow in litres per minute or remaining capacity, this can be changed by pressing the NEXT button.

5. Routine Maintenance

Your system is designed to run with the minimum of maintenance and does not normally require much adjustment.

Weekly

Check the salt level (this may need to be done more regularly dependant on consumption) **The salt level should always be above the water level.**

Check there is no sign of damage or leaks,
Check the quality of the treated water.

Monthly

Check the quality of the incoming water to see if it has changed significantly.

Annually

Check for leaks or damage.
Soda Ash Regeneration **CR100 & CR200 units only)**

6. Troubleshooting

On the following pages you will find a guide as to the most common problems that may arise; please consult this section before contacting your supplying dealer as most problems are easily cured using the troubleshooting information.

Troubleshooting

TC control valves do not have meters so shaded areas are not applicable for TC control valves

| Problem | Possible Cause | Solution |
|---|---|---|
| 1. No Display on PC Board | a. No power at electric outlet | a. Repair outlet or use working outlet |
| | b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection | b. Plug Power Adapter into outlet or connect power cord end to PC Board connection |
| | c. Improper power supply | c. Verify proper voltage is being delivered to PC Board |
| | d. Defective Power Adapter | d. Replace Power Adapter |
| | e. Defective PC Board | e. Replace PC Board |
| 2. PC Board does not display correct time of day | a. Power Adapter plugged into electric outlet controlled by light switch | a. Use uninterrupted outlet |
| | b. Tripped breaker switch and/or tripped GFI | b. Reset breaker switch and/ or GFI switch |
| | c. Power outage | c. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions. |
| | d. Defective PC Board | d. Replace PC Board |
| 3. Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing | a. Bypass valve in bypass position | a. Turn bypass handles to place bypass in service position |
| | b. Meter is not connected to meter connection on PC Board | b. Connect meter to three pin connection labeled METER on PC Board |
| | c. Restricted/ stalled meter turbine | c. Remove meter and check for rotation or foreign material |
| | d. Meter wire not installed securely into three pin connector | d. Verify meter cable wires are installed securely into three pin connector labeled METER |
| | e. Defective meter | e. Replace meter |
| | f. Defective PC Board | f. Replace PC Board |
| 4. Control valve regenerates at wrong time of day | a. Power outage | a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions. |
| | b. Time of day not set correctly | b. Reset to correct time of day |
| | c. Time of regeneration set incorrectly | c. Reset regeneration time |
| | d. Control valve set at "on 0" (immediate regeneration) | d. Check programming setting and reset to NORMAL (for a delayed regen time) |
| | e. Control valve set at "NORMAL + on 0" (delayed and/ or immediate) | e. Check programming setting and reset to NORMAL (for a delayed regen time) |
| 5. Time of day flashes on and off | a. Power outage | a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions. |
| 6. Control valve does not regenerate automatically when the correct button(s) is depressed and held. For TC valves the buttons are ▲&▼. For all other valves the button is REGEN | a. Broken drive gear or drive cap assembly | a. Replace drive gear or drive cap assembly |
| | b. Broken Piston Rod | b. Replace piston rod |
| | c. Defective PC Board | c. Defective PC Board |
| 7. Control valve does not regenerate automatically but does when the correct button(s) is depressed and held. For TC valves the buttons are ▲&▼. For all other valves the button is REGEN | a. Bypass valve in bypass position | a. Turn bypass handles to place bypass in service position |
| | b. Meter is not connected to meter connection on PC Board | b. Connect meter to three pin connection labeled METER on PC Board |
| | c. Restricted/ stalled meter turbine | c. Remove meter and check for rotation or foreign material |
| | d. Incorrect programming | d. Check for programming error |
| | e. Meter wire not installed securely into three pin connector | e. Verify meter cable wires are installed securely into three pin connector labeled METER |
| | f. Defective meter | f. Replace meter |
| | g. Defective PC Board | g. Replace PC Board |

| Problem | Possible Cause | Solution |
|--|--|---|
| 8. Hard or untreated water is being delivered | a. Bypass valve is open or faulty | a. Fully close bypass valve or replace |
| | b. Media is exhausted due to high water usage | b. Check program settings or diagnostics for abnormal water usage |
| | c. Meter not registering | c. Remove meter and check for rotation or foreign material |
| | d. Water quality fluctuation | d. Test water and adjust program values accordingly |
| | e. No regenerant or low level of regenerant in regenerant tank | e. Add proper regenerant to tank |
| | f. Control fails to draw in regenerant | f. Refer to Trouble Shooting Guide number 12 |
| | g. Insufficient regenerant level in regenerant tank | g. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace |
| | h. Damaged seal/stack assembly | h. Replace seal/stack assembly |
| | i. Control valve body type and piston type mix matched | i. Verify proper control valve body type and piston type match |
| | j. Fouled media bed | j. Replace media bed |
| 9. Control valve uses too much regenerant | a. Improper refill setting | a. Check refill setting |
| | b. Improper program settings | b. Check program setting to make sure they are specific to the water quality and application needs |
| | c. Control valve regenerates frequently | c. Check for leaking fixtures that may be exhausting capacity or system is undersized |
| 10. Residual regenerant being delivered to service | a. Low water pressure | a. Check incoming water pressure – water pressure must remain at minimum of 25 psi |
| | b. Incorrect injector size | b. Replace injector with correct size for the application |
| | c. Restricted drain line | c. Check drain line for restrictions or debris and clean |
| 11. Excessive water in regenerant tank | a. Improper program settings | a. Check refill setting |
| | b. Plugged injector | b. Remove injector and clean or replace |
| | c. Drive cap assembly not tightened in properly | c. Re-tighten the drive cap assembly |
| | d. Damaged seal/ stack assembly | d. Replace seal/ stack |
| | e. Restricted or kinked drain line | e. Check drain line for restrictions or debris and or un-kink drain line |
| | f. Plugged backwash flow controller | f. Remove backwash flow controller and clean or replace |
| | g. Missing refill flow controller | g. Replace refill flow controller |
| 12. Control valve fails to draw in regenerant | a. Injector is plugged | a. Remove injector and clean or replace |
| | b. Faulty regenerant piston | b. Replace regenerant piston |
| | c. Regenerant line connection leak | c. Inspect regenerant line for air leak |
| | d. Drain line restriction or debris cause excess back pressure | d. Inspect drain line and clean to correct restriction |
| | e. Drain line too long or too high | e. Shorten length and or height |
| | f. Low water pressure | f. Check incoming water pressure – water pressure must remain at minimum of 25 psi |

| Problem | Possible Cause | Solution |
|--|--|---|
| 16. E3, Err – 1003, Err – 103 = Control valve motor ran too long and was unable to find the next cycle position | a. Motor failure during a regeneration | a. Check motor connections then Press NEXT and REGEN buttons for 3 s seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor | b. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | c. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface | c. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| 17. E4, Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position | a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface | a. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| 18. Err -1006, Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV | a. Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function | a. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting |
| | b. MAV/ NHBP motor wire not connected to PC Board | b. Connect MAV/ NHBP motor to PC Board two pin connection labeled DRIVE. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | c. MAV/ NHBP motor not fully engaged with reduction gears | c. Properly insert motor into casing, do not force into casing Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor | d. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| 19. Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV | a. Foreign material is lodged in MAV/ NHBP valve | a. Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | b. Mechanical binding | b. Check piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV/ NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |

| Problem | Possible Cause | Solution |
|--|---|--|
| 13. Water running to drain | a. Power outage during regeneration | a. Upon power being restored control will finish the remaining regeneration time. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions. |
| | b. Damaged seal/ stack assembly | b. Replace seal/ stack assembly |
| | c. Piston assembly failure | c. Replace piston assembly |
| | d. Drive cap assembly not tightened in properly | d. Re-tighten the drive cap assembly |
| 14. E1, Err – 1001, Err – 101 = Control unable to sense motor movement | a. Motor not inserted full to engage pinion, motor wires broken or disconnected | a. Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled MOTOR. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | b. PC Board not properly snapped into drive bracket | b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | c. Missing reduction gears | c. Replace missing gears |
| 15. E2, Err – 1002, Err – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled | a. Foreign material is lodged in control valve | a. Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | b. Mechanical binding | b. Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | c. Main drive gear too tight | c. Loosen main drive gear. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |
| | d. Improper voltage being delivered to PC Board | d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. |

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