Selcoperm SES 125-2000 Electrochlorinator

Valid for SES-125, -250, -500, -1000 built before week 37-2015
Valid for SES-2000 built before week 20-2014

Installation and operating instructions

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Original installation and operating instructions.

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Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. General safety instructions

1.1 Purpose of this document

The Selcoperm disinfection system from Grundfos reflects the best available technology and complies with recognised safety regulations. Compliance with applicable standards, guidelines and laws has been confirmed. Nevertheless, risks which are beyond the manufacturer's control may arise from the use of the system.

Purpose of this manual:

- Provide guidance on safe and correct installation, commissioning, operating, fault finding, maintenance, storage and on spare parts.
- Warn against potential residual risks associated with the correct usage of the system and identify means of avoiding damage.

1.2 Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Caution ***If these safety instructions are not observed, it may result in malfunction or damage to the equipment.***

Note ***Notes or instructions that make the job easier and ensure safe operation.***

1.3 Users/target groups

This manual is aimed at specialist personnel responsible for installation, operation, commissioning, maintenance, servicing and (temporary) storage of the Selcoperm system.

Only authorised personnel trained by Grundfos are permitted to undertake any work at the system. Appropriate technical expertise and familiarity with the principles of measurement and control technology are assumed.

1.3.1 Obligations of the users

- Read this manual thoroughly before installation, operation, commissioning, maintenance, service or (temporary) storage of the Selcoperm system.
- Obtain instruction from specialist personnel of Grundfos on all service work relating to the system.
- Observe the recognised health and safety and accident prevention regulations.
- Wear appropriate protective clothing in accordance with national regulations for the prevention of accidents when working at the system and handling chemicals.
- Keep secret the service menu code for the operating software.

1.3.2 User workstation

The Selcoperm disinfection system is electronically controlled. Users and service personnel operate the system via a display with control and display elements.

1.3.3 Protective clothing

The users are obliged to wear personal protective equipment in accordance with national safety regulations when working with the system and with the chemicals. The personal protective equipment must be supplied by the operator and must be stored in a dry place in the installation room.

1.4 Obligations of the operator

The owner of the building or the operator of the Selcoperm disinfection system is responsible for the following:

- Consider this manual to be part of the product and ensure that it is kept clearly accessible in the immediate vicinity of the system for the entire service life of the system.
- Meet the installation requirements specified by the manufacturer for connections and fittings, environmental conditions, electrical connection, protective tube for dosing line (if necessary), audible or optical warning device for alarm messages (if necessary), chemicals and vent lines.
  See section *4. Installation*.
- Make sure that water lines and fixings are regularly checked, serviced and maintained.
- Obtain official approval for storing chemicals, if necessary.
- Instruct users in the operation of the system.
- Make sure that the labels supplied by the manufacturer with the system are clearly displayed in the installation location.
- Provide the user code for the operating software only to users who have received appropriate technical training.
- Make sure that the regulations for the prevention of accidents are observed in the installation location.
- Provide all users and service personnel with protective clothing, gloves, goggles, protective apron.

If the system has been ordered without a dosing pump, the operator must provide an external dosing pump prior to installation. The pump may only be connected to the Selcoperm disinfection system by authorised and qualified personnel from Grundfos.

1.5 Applications

The Selcoperm disinfection system is used to generate sodium hypochlorite solution non-continuously from sodium chloride, water and electricity. The system doses the produced hypochlorite solution into:

- the (drinking) water line of a building
- a swimming pool
- process water
- wastewater
- other industrial water cycles.

1.6 Inappropriate usage

Applications other than those described in section *1.5 Applications* are not in accordance with the intended use and are not permitted. The manufacturer, Grundfos, accepts no liability for any damage resulting from incorrect use.

The system comprises state-of-the-art components and has undergone safety-related testing.

Warning

Unauthorised structural modifications to the system may result in serious personal injury and damage to equipment.

It is forbidden to dismantle, modify, change the structure of, bridge, remove, bypass or disable components, including safety equipment.

1.7 Warranty

The Selcoperm range is fully guaranteed for a period of two calendar years from installation and commissioning, provided optimum operating conditions are as detailed in this manual. The electrodes are guaranteed time-dependent a further three years. Grundfos will replace or refurbish the electrodes during this period at cost of parts, less a percentage that is equal to the expected life not obtained from the electrodes. If this option is taken, warranty conditions current at the time of replacement will apply. See fig. 1.

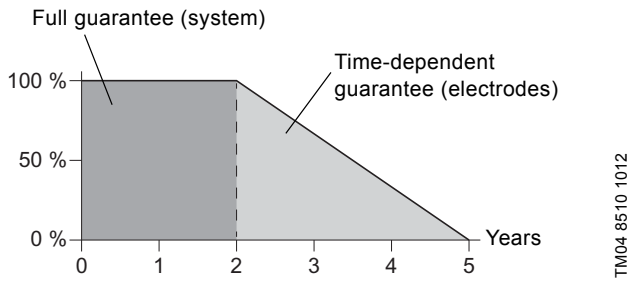

Fig. 1 Warranty

A guarantee claim in accordance with our general terms of sale and delivery is only valid if the following requirements are fulfilled:

- The system is used in accordance with the information within this manual.
- The system is not dismantled or incorrectly handled.
- The maintenance is carried out by authorised and qualified personnel.
- Original spare parts are used for repairs during maintenance.
- The operator's log as shown in section *10.2 Operator's log - master copy* is maintained in accordance with the time periods specified.

1.8 Safety and monitoring equipment

The Selcoperm disinfection system is fitted with the following safety and monitoring equipment:

- clear cover on hydraulic and electrolysis chamber
- flow and temperature sensors in hydraulics
- ventilation system with flow sensor for safe hydrogen removal.

1.9 Health and safety

Safety warning - sodium hypochlorite solution

The sodium hypochlorite solution falls below the 1 % concentration level, therefore a safety data sheet is not required. However we would always recommend best practice when handling the product. Where there is any possibility of damage by leakage from product line always fit secondary containment.

Warning

Sodium hypochlorite is alkaline and will cause oxidisation and bleaching. It is corrosive and could cause damage to skin or clothing.

Always wear chemical protective clothing and goggles when handling chemicals!

If splashed onto skin it should be washed off with fresh water. All affected clothing has to be removed. If the eye is affected, rinse immediately using an approved eye shower or fresh running water for at least 15 minutes, keeping the eyelid open and rotating the eye. Seek medical treatment immediately.
If swallowed, do not induce vomiting. Keep patient warm and quiet and seek immediate medical help. If breathing stops, apply rescue breaths and cardiopulmonary resuscitation as necessary until medical help arrives.

Warning notices advising operators of the possible dangers should be prominently displayed wherever hypochlorite is stored, generated or handled.

Warning

Treat sodium hypochlorite as an alkali and keep away from any acids, otherwise chlorine gas will be liberated!

A warning notice detailing this must be displayed locally!

Safety warning - electrical hazards

Before carrying out any form of inspection, maintenance or repair work on the system, operators must carry out tests to ensure that the plant has been satisfactorily isolated.

Safety warning - hydrogen gas

The electrolytic process of converting brine into sodium hypochlorite generates hydrogen gas which is vented to a safe external location through the degassing assembly via dual-contained pipework. The equipment should be regularly checked to ensure that no gas leakages occur.

Warning

Danger of explosion!

When checking the equipment for leakages only use hydrogen detectors!

Never use a match or any type of flame!

There should be natural ventilation at a high and a low level in the room where the electrochlorinator is installed. A sign prohibiting smoking and naked flames should be displayed within the room and at the point of discharge to the exterior.

If required, a hydrogen detector can be fitted within the plant room to stop the Selcoperm system in the unlikely event of a build-up of hydrogen gas. This will also prevent the situation of an operator working in a potentially explosive environment.

Safety warning - hydrochloric acid

Hydrochloric acid will only be used to clean the electrodes if the water softener has failed, or after several years of operation.

Warning

Always wear chemical protective clothing and goggles when handling chemicals!

If splashed onto skin it should be washed off with fresh water. All affected clothing has to be removed. If the eye is affected, rinse immediately using an approved eye shower or fresh running water for at least 15 minutes, keeping the eyelid open and rotating the eye. Seek medical treatment immediately.
If swallowed, do not induce vomiting. Keep patient warm and quiet and seek immediate medical help. If breathing stops, apply rescue breaths and cardiopulmonary resuscitation as necessary until medical help arrives. Treat as acid.

Warning

Keep the acid away from the product (sodium hypochlorite) and the product tank!

If acid is mixed with sodium hypochlorite, highly hazardous chlorine gas will be liberated!

Rinse out all residual sodium hypochlorite from the system before filling with acid. Make sure the system is flushed well with water before restarting it.

Safety warning - brine

Salt is safe to handle, but eyes should be rinsed with fresh running water if subjected to brine splashes.

Personal protective equipment

Due to the range of hazardous chemicals any information provided in this section is only general. It is the duty of the operator to ensure that he has obtained information on all safety precautions relevant to the type of task he is undertaking, and to ensure that they are adhered to. Grundfos recommends to follow good practice when handling chemicals, and to use personal protective equipment such as ventilated, enclosed goggles, face shields, chemical aprons, boots and gloves. An eye shower may also be advisable.

2. Product description

2.1 Components

2.1.1 Selcoperm electrochlorinator

The electrochlorinater includes:

- A water softener to facilitate a water supply of the correct specification to the brine tank for providing the brine solution, and also to the electrolyser cell for dilution of the brine solution to the correct specific gravity (SG). The softener is water powered.
- A brine pump to dose the brine solution into the softened water line to the electrolyser cell.
- An electrolyser cell to convert the brine solution and softened water into a sodium hypochlorite solution of up to 0.8 %.
- A control panel to facilitate the low voltage/high current DC supply used in electrolysis.
- Operating elements monitoring and controlling the generation of sodium hypochlorite.
- An electrical fan system to dilute the hydrogen gas generated, and to force the ventilation of the gas to a safe external discharge point.

2.1.2 External components

The external components include:

- A brine tank providing a saturated brine solution.
  The saturated brine is mixed with soft water for electrolysis, and used for regeneration of the water softener.
- A product tank designed to store the sodium hypochlorite solution. This tank provides the buffer storage facility from which dosing can take place.

2.2 Product overview

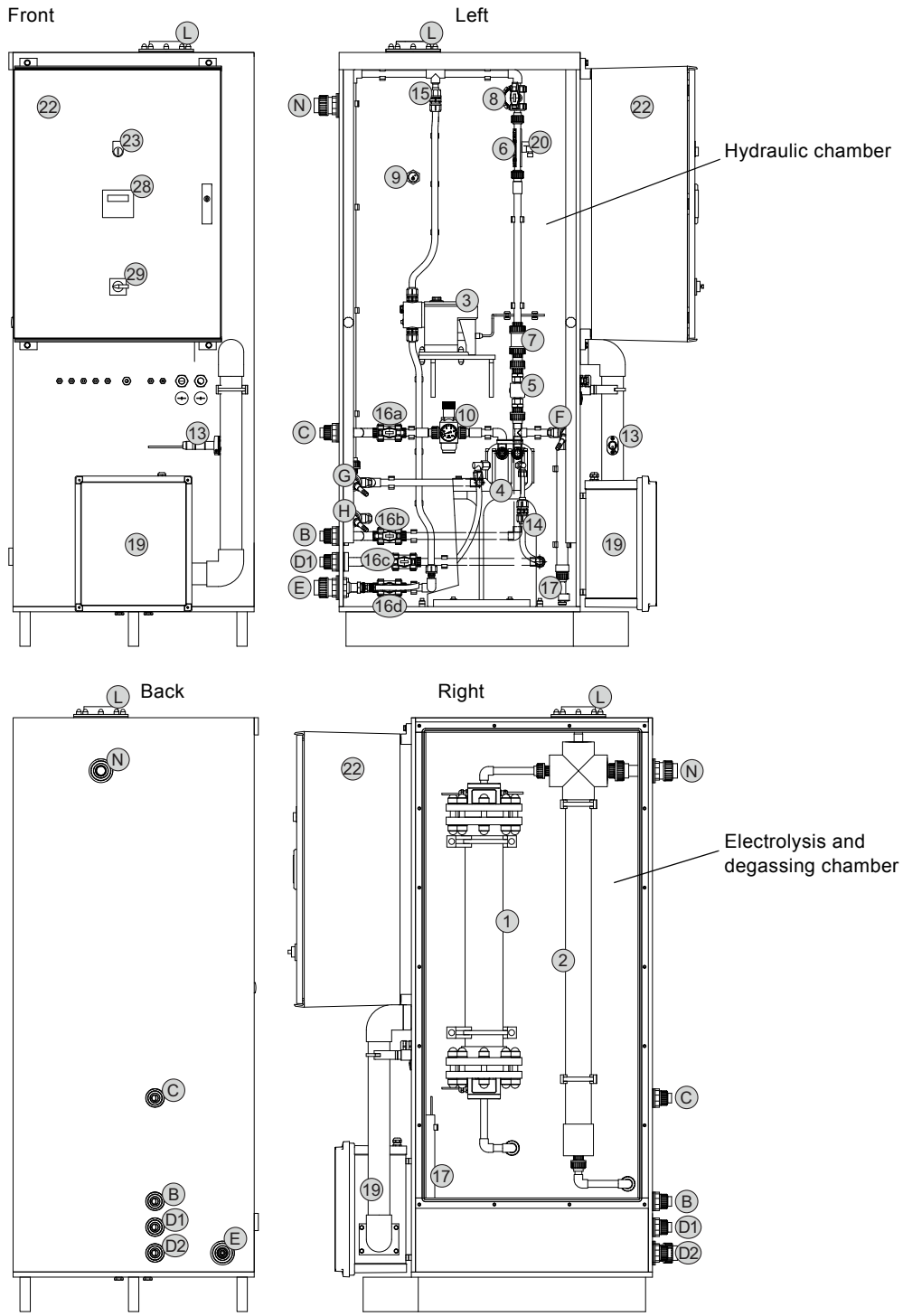

Fig. 2 Overview

1	Electrolyser cell	15	Brine injection valve	B	Soft water outlet to brine tank
2	Transparent degassing column	16a	Isolating valve	C	Mains water inlet
3	Brine pump	16b	Isolating valve	D1	Brine inlet water softener
4	Water softener	16c	Isolating valve	D2	Brine inlet dosing pump
5	Water solenoid valve	16d	Isolating valve	E	Waste outlet
6	Flowmeter	17	Internal tray flood switch	F	Soft water sample valve
7	Non-return valve	19	Air dilution fan	G	Electrolyte sample valve
8	Water flow adjustment valve	20	Flowmeter switch	H	Product sample valve
9	Degassing column level sensor	22	Control panel	L	Hydrogen gas outlet
10	Pressure reducing valve	23	Control lamp of mains supply	N	Product outlet to tank
13	Air flow sensor	28	Display and control		
14	Brine valve water softener	29	Mains switch		

2.3 Schematic

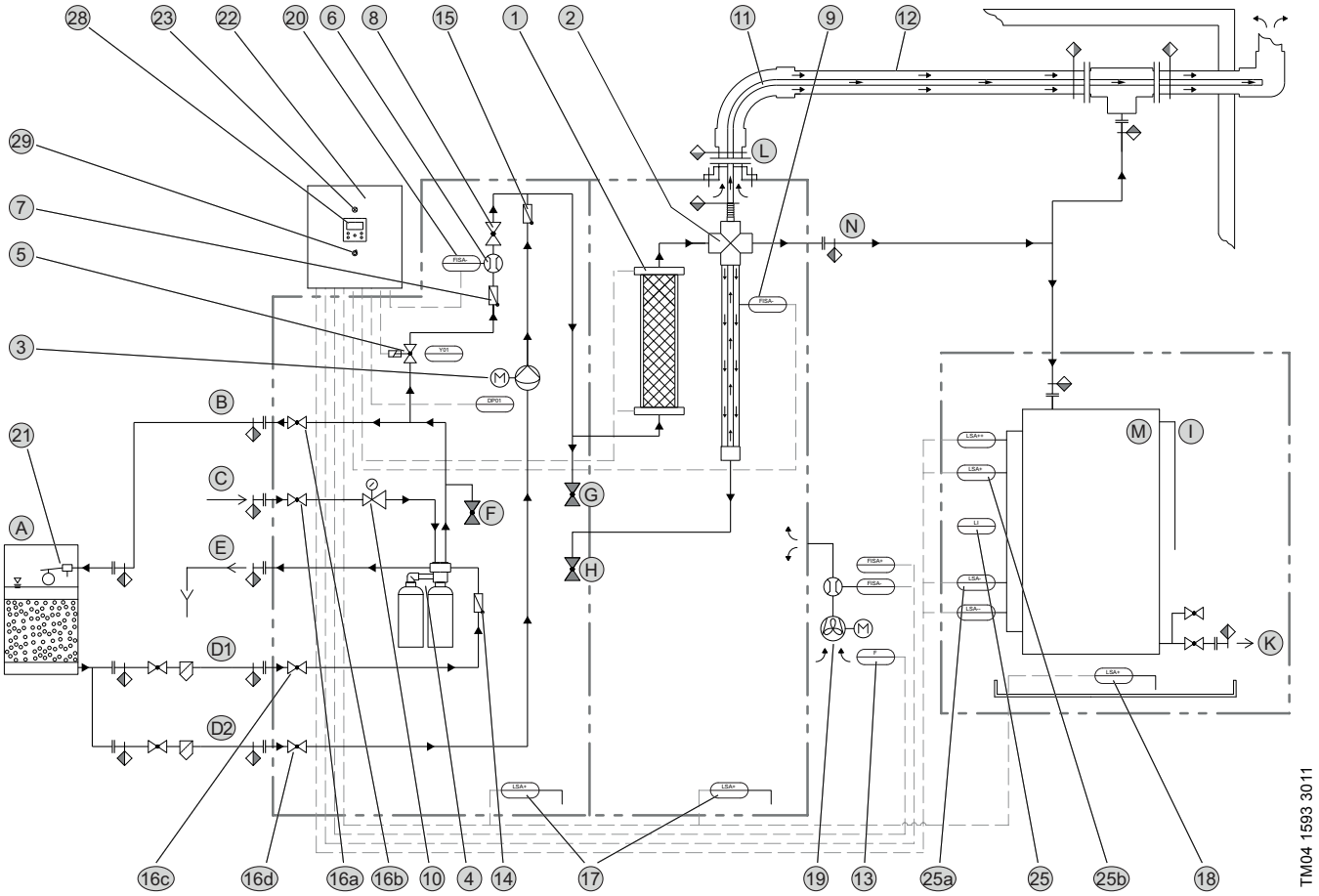

Fig. 3 Schematic

1	Electrolyser cell	16b	Isolating valve	A	Brine tank
2	Transparent degassing column	16c	Isolating valve	B	Soft water outlet
3	Brine pump	16d	Isolating valve	C	Mains water inlet
4	Water softener	17	Internal tray flood switch	D1	Brine inlet water softener
5	Water solenoid valve	18	Tray flood switch of product tank	D2	Brine inlet dosing pump
6	Flowmeter	19	Air dilution fan	E	Waste outlet
7	Non-return valve	20	Flowmeter switch	F	Soft water sample valve
8	Water flow adjustment valve	21	Floater valve	G	Electrolyte sample valve
9	Degassing column level sensor	22	Control panel	H	Product sample valve
10	Pressure reducing valve	23	Control lamp of mains supply	I	Product overflow
11	Hydrogen pipe	25	Product tank level sensor	K	Product outlet to point of application
12	Ventilation line	25a	Start-fill level	L	Hydrogen gas outlet
13	Air flow sensor	25b	Stop-fill level	M	Product tank
14	Brine valve water softener	28	Display and control	N	Product outlet to tank
15	Brine injection valve	29	Mains switch		
16a	Isolating valve				

2.4 Process description

For locating the components, see figures 2 and 3.

2.4.1 Selcoperm

Sodium hypochlorite solution (the product) is prepared in a simple batch process, initiated by the level within the product tank (M).

The water for the electrochlorinator should be supplied to mains water supply (C) via a double non-return valve. Water enters the system via an isolating valve (16a). The water passes through a pressure reducing valve (10) to ensure a regulated pressure throughout the system. All water then passes through a water softener (4). Softened water passes into the brine tank (A), via isolating valve (16b) to produce a brine solution. This is regulated by the floater valve (21) within the brine tank (A). Saturated brine is then available for regeneration of the softener (4) via isolating valve (16c), and for the brine pump (3) via isolating valve (16d).

The process is initiated by the level sensor (25) in the product tank (M). When the product level falls below the start-fill level (25a), the water solenoid valve (5) opens, and allows softened water to flow through the flowmeter (6). When this water flow raises the magnetic float within the flowmeter (6) the flowmeter switch (20) is triggered and starts the brine pump (3). The pump doses saturated brine into this water flow via the injection valve (15). The resulting diluted brine solution of 20-30 g/l NaCl passes through the electrolyser cell (1). If no fail safe is triggered, a voltage is applied across the electrolyser cell (1). When the electrolyser cell (1) is completely filled with liquid, and the degassing column level sensor (9) is activated by the liquid, a current flows. The resulting product (sodium hypochlorite solution) leaves the electrolyser cell (1) and enters the transparent degassing column (2). Then it flows into the product tank (M).

When the product reaches the stop-fill level (25b) in the product tank (M), the process is stopped. The process is restarted when the product level in the tank (M) falls below the start-fill level. The process can also be started manually via control (28).

While the unit is generating the product, hydrogen gas produced in the process is removed in the degassing column (2) and is passed through a dual-contained seamless pipe (11) to a safe ventilation discharge point. An air dilution fan (19) is fitted to dilute the hydrogen gas to a maximum dilution of 25 % of the LEL (Lower Explosive Limit). The air is blown continually through the electrolysis and degassing chamber and through the dual-contained pipework to prevent localised accumulation of hydrogen. An air flow sensor (13) is fitted to shut down the electrochlorinator in case of a blockage or restriction in the ventilation line (12), or if the sealing cover of the electrolysis and degassing chamber is removed.

The electrochlorinator is fail safe. In case of faults the display on the control (28) shows reasons and initiates a potential-free contact for an output alarm.

2.4.2 Water softener

Hard water contains calcium and magnesium. The water softener (4) contains resin beads, which hold sodium ions. When hard water passes through the resin beads inside the water softener, the beads attract and hold the calcium and magnesium ions in exchange for sodium. After this ion exchange process, the water is soft.

Once the resin beads are loaded with calcium and magnesium ions, they must be regenerated so that they can continue to soften water. The salt in the brine tank (A) mixes with soft water to wash the resin beads. Only clean, soft water must be used to make the brine. The brine loosens the hardness minerals that have accumulated on the resin beads, then the system backwashes and flushes the hardness minerals away trough waste outlet (E).

Note ***Leaky taps and pipes should be repaired to ensure proper performance of the water softener.***

3. Technical data

3.1 Nameplate

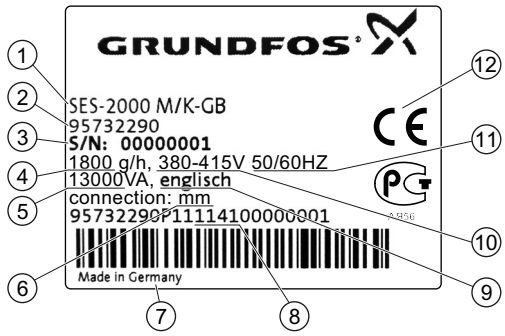

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Fig. 4 Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Serial number
4	Max. capacity
5	Power consumption
6	Connection (imperial/metric)
7	Country of origin
8	Year and week of production
9	Software language
10	Voltage
11	Frequency
12	Marks of approval

3.2 Type key

Example	SES	-250	-M	/G	-GB

Capacity

Max.	Nominal [g/h]
125	110
250	220
500	450
1000	900
2000	1800

Connection

I	imperial
M	metric

Supply voltage, frequency

H	100-120 V, 50/60 Hz
G	220-240 V, 50/60 Hz
K	380-415 V, 50/60 Hz

Software language

GB	English
DE	German
FR	French
ES	Spanish
RU	Russian

3.3 Typical unit set points

The following table shows typical values expected upon commissioning. Please note that these values may need to be adjusted due to salt, water and power quality/availability at site.

Type	125	250	500	1000	2000
Nominal capacity [g/h]	110	220	450	900	1800
Water meter flow [l/h]	19	38	75	140	285
Water pressure regulated [bar]	3-4	3-4	3-4	3-4	3-4
Water temp. [°C]	10-20	10-20	10-20	10-20	10-20
Brine flow [l/h]	1.7 - 2.1	3.4 - 4.2	6.8 - 8.2	12 - 15.5	24-30
Specific gravity of electrolyte	1.019 - 1.022	1.019 - 1.022	1.019 - 1.022	1.019 - 1.022	1.019 - 1.022
Total product flow [l/h]	20.7 - 21.1	41.4 - 42.2	81.8 - 83.2	152 - 155.5	309-315
Amperage [A]	22-25	44-46	85-95	170-190	300-330
Voltage [V]	27-30	27-30	27-30	27-30	27-30
Low-volt alarm [V]	26	26	26	26	26
High-volt alarm [V]	31	31	31	31	31
Product strength [g/l]	5-6	5-6	5-6	5.5 - 6.5	5.5 - 6.5
Air flow [m^3/h]	90-140	90-140	90-140	90-220	90-220

3.4 Dimensions and weights

3.4.1 Weights

Type	125	250	500	1000	2000
Gross weight [kg]	299	309	319	334	349
Net weight [kg]	160	170	180	195	210

3.4.2 Dimensional drawing

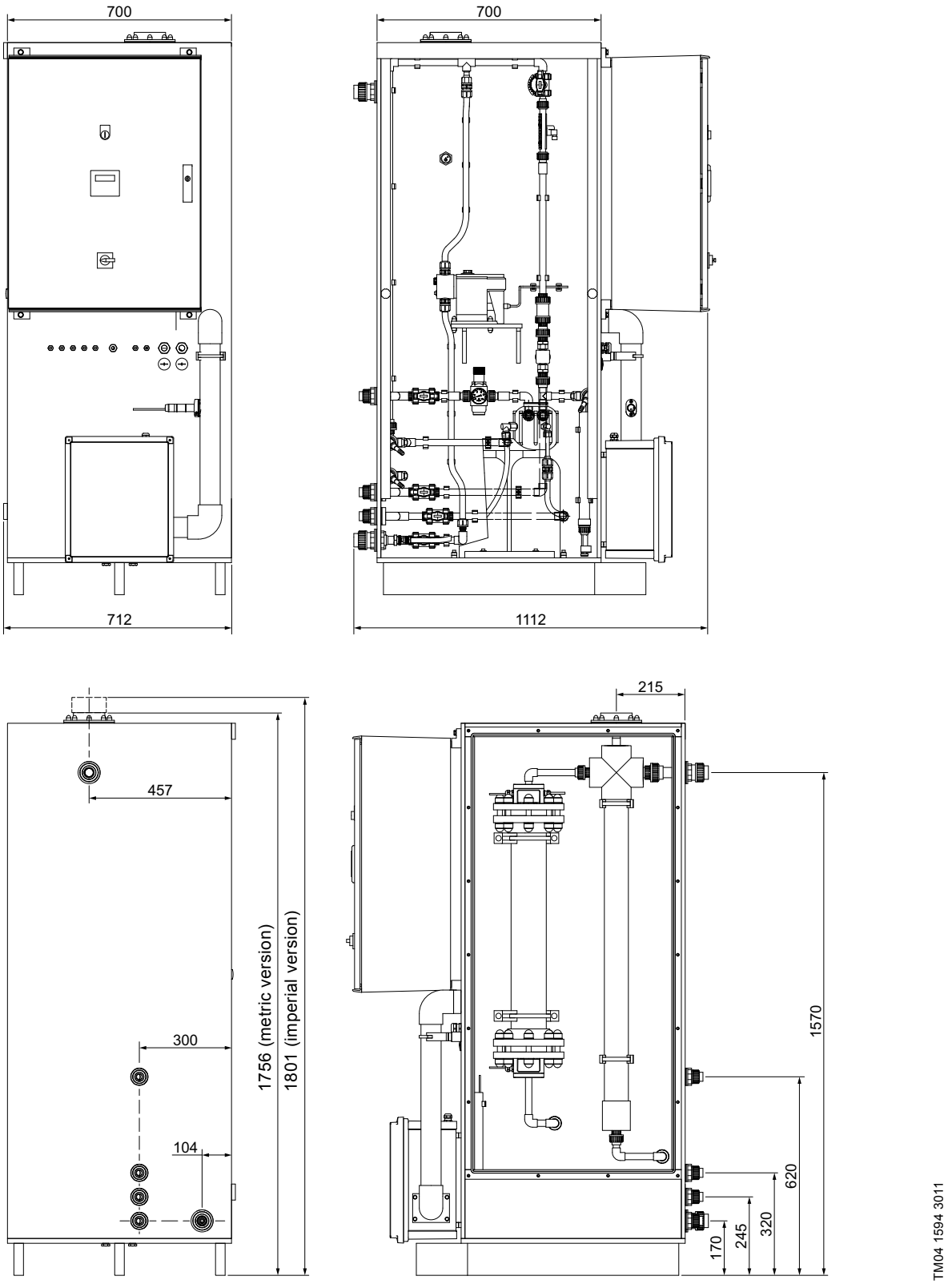


Fig. 5 Dimensional drawing

3.5 Brine tank capacities

Brine tank	Salt capacity [kg]	Gravel requirement [kg]
95714317	150	25
95714318	300	50
95714319	500	75
95714320	1000	175

3.6 Temperatures and humidity

Max. relative humidity, non-condensing	[%]	80
Permissible ambient temperature	[°C]	+5 to +40
Permissible mains water operating temperature	[°C]	+10 to +20
Transport and storage temperature, drained and not connected*	[°C]	-5 to +50
Max. altitude above sea level	[m]	2000

* For storage temperatures below +5 °C, the whole system including water softener, lines and external components must not contain any water.

3.7 Materials

System frame	PP
Chamber covers	PVC clear
Electrolyser cell tube	PVC-U clear
Internal pipes	PVC-U grey
Seals	EPDM
Pump dosing heads	PVC-U grey

3.8 Salt specifications

Caution

The manganese level in the electrolyte entering the electrolyser cell must not exceed 20 mg/m^3 at any time.

The electrolyte must contain less than 2 mg/l fluoride (F).

Use food-grade granular/pellet salt (99.9 %) according to EN 14805 type 1 or EN 973 type A with following minimum requirements:

3.8.1 Chemical parameters

Max. limits in mg/kg of dry NaCl

Parameter		Max. mass fraction [mg/kg]
Chromium	(Cr)	13.0
Arsenic	(As)	13.0
Cadmium	(Cd)	1.30
Iron	(Fe)	10.0
Mercury	(Hg)	0.26
Manganese	(Mn)	10.0
Nickel	(Ni)	13.0
Lead	(Pb)	13.0
Antimony	(Sb)	2.60
Selenium	(Se)	2.60

3.8.2 Impurity limit

Max. limit in mass fraction in % of NaCl content

Parameter	Max. mass fraction [% by weight]
Bromide	0.01
Calcium	0.01
Magnesium	0.01

3.9 Water softener

3.9.1 General data

Water flow rate		
Operation flow rate	[l/min]	20
Max. backwash flow rate	[l/min]	2.7
Peak flow rate	[l/min]	27
Min. flow rate	[l/min]	0.56
Regeneration		
Salt used	[kg]	0.45
Regeneration time	[min]	11
Water used per cycle	[l]	18.9
Operating data		
Max. temperature	[°C]	45
Max. operating pressure	[bar/psi]	8.5 / 125
Min. operating pressure	[bar/psi]	2.5 / 36
Differential pressure for regeneration	[bar/psi]	2.5 / 36
General data (filled with resin beads)		
Shipping weight	[kg]	18
Inlet/Outlet connections	[inch]	1/4 BSP (male)

3.9.2 Hardness ranges and meter discs

Meter disc number	Hardness range		Litres between regeneration cycles
	ppm $CaCO_3$ (US)	°dH (Germany)	
2	92-181	4-8	1103
3	182-269	8-11	736
4*	270-356	11-15	552
5	357-442	15-19	441
6	443-524	19-23	368
7	525-607	23-27	315

* built in at factory

3.10 Electrical requirements

Warning

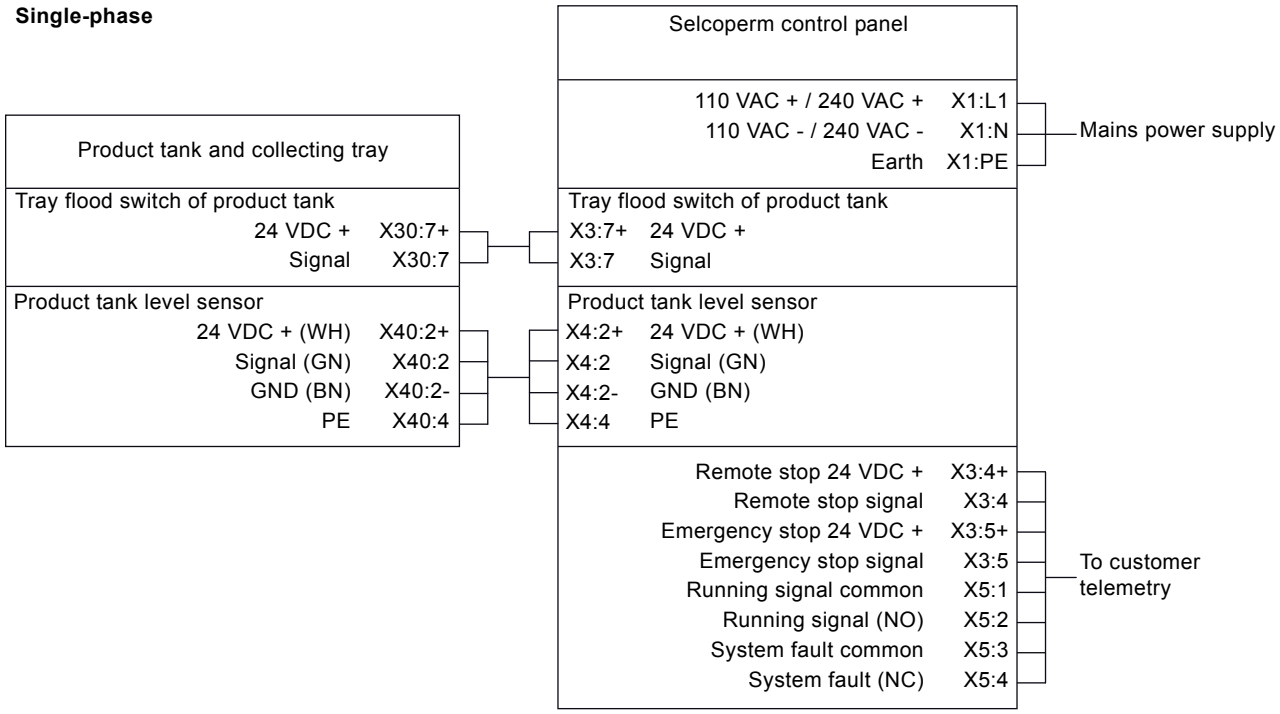
Before making any electrical connections, switch off the power supply and make sure that it cannot be accidentally switched on.

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

All electrical connections must be carried out in accordance with the separate wiring diagram delivered with the system.

3.10.1 Field wiring diagram

Single-phase



Three-phase

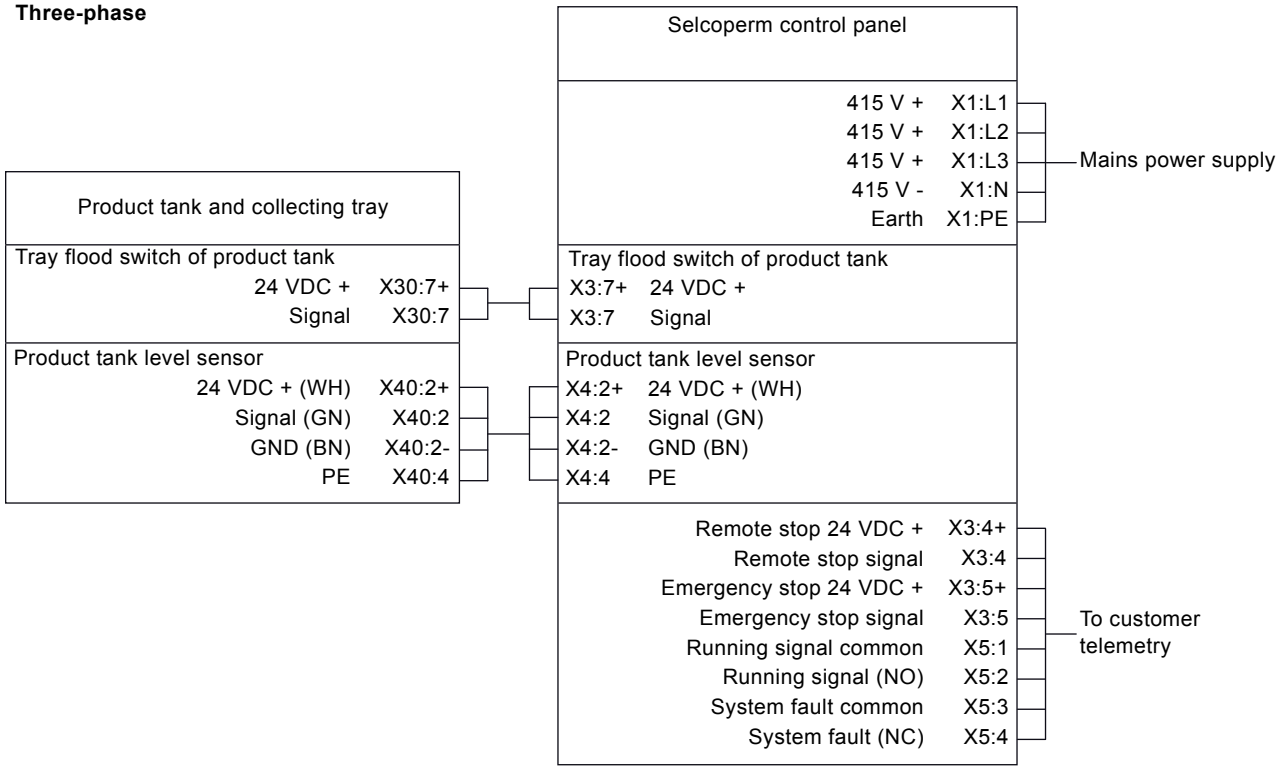


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Fig. 6 Field wiring diagram

3.10.2 Switching status of relay outputs

Signal	Relay open	Relay closed
Running signal	System stopped	System running
System fault	Fault	No fault
Collecting tray signal	Liquid in collecting tray	No liquid in collecting tray
Remote stop signal	System stopped	System running
Emergency stop signal	System stopped	System running

3.10.3 Electrical data

Data		125	250	500	500	1000	2000
		single-phase			three-phase + N		
Voltage	[V]	1 x 100-240, - 10 %/+ 10 %			380-415, - 10 %/+ 10 %		
Frequency	[Hz]	50/60			50/60		
Max. power consumption	[VA]	1100	2000	3500	3500	7200	13000
Enclosure class		IP54			IP54		
Electrical safety class		I			I		
Pollution degree		2			2		

4. Installation

4.1 Installation drawings

4.1.1 Installation overview

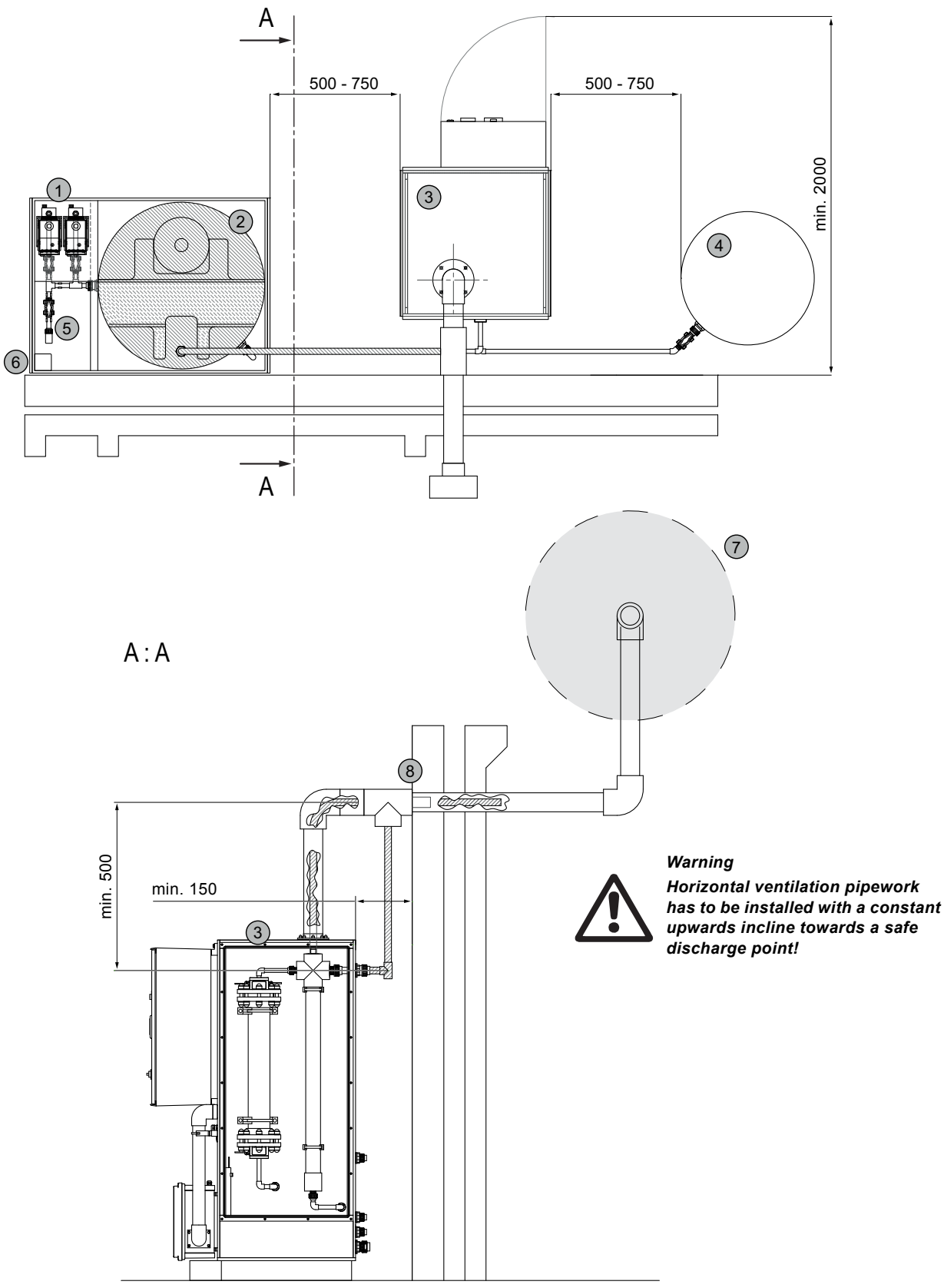

Fig. 7 Selcoperm installation

1	Duty/standby dosing pumps	5	Pressure level sensor
2	Product tank and collecting tray	6	Tray flood switch of product tank
3	Selcoperm electrochlorinator	7	Safe ventilation area
4	Brine tank	8	Drill hole 3" for ventilation pipework

4.1.2 Brine tank

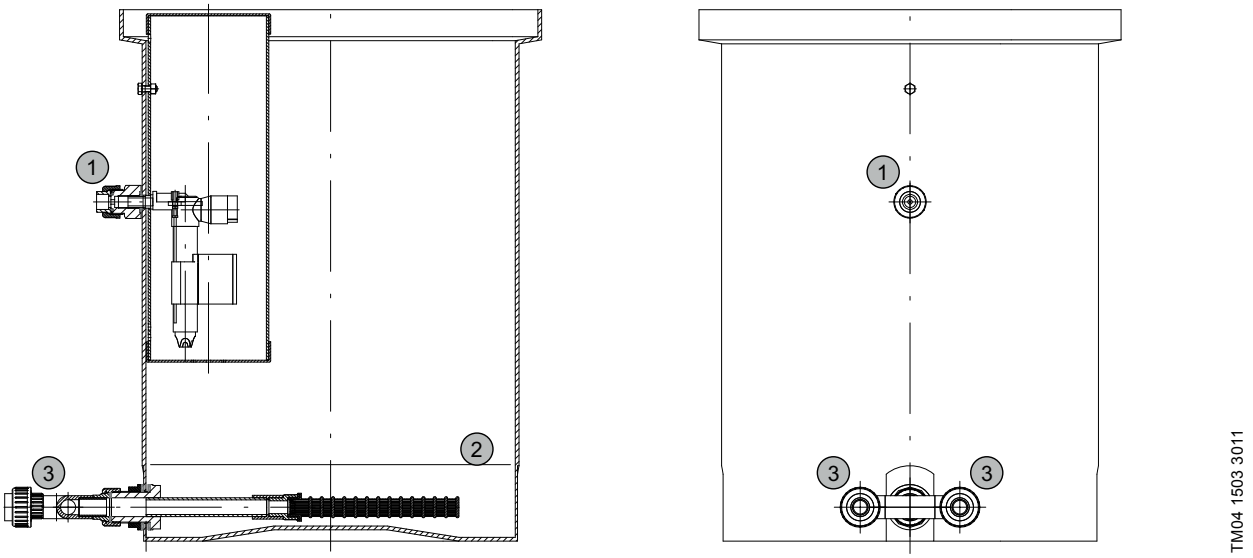

Fig. 8 Brine tank

1	Soft water inlet (20 mm)
2	Minimum gravel level
3	Brine outlets (20 mm)

Note ***Requirements and capacities of brine tank see section 3.5 Brine tank capacities.***

4.1.3 Venturi tee

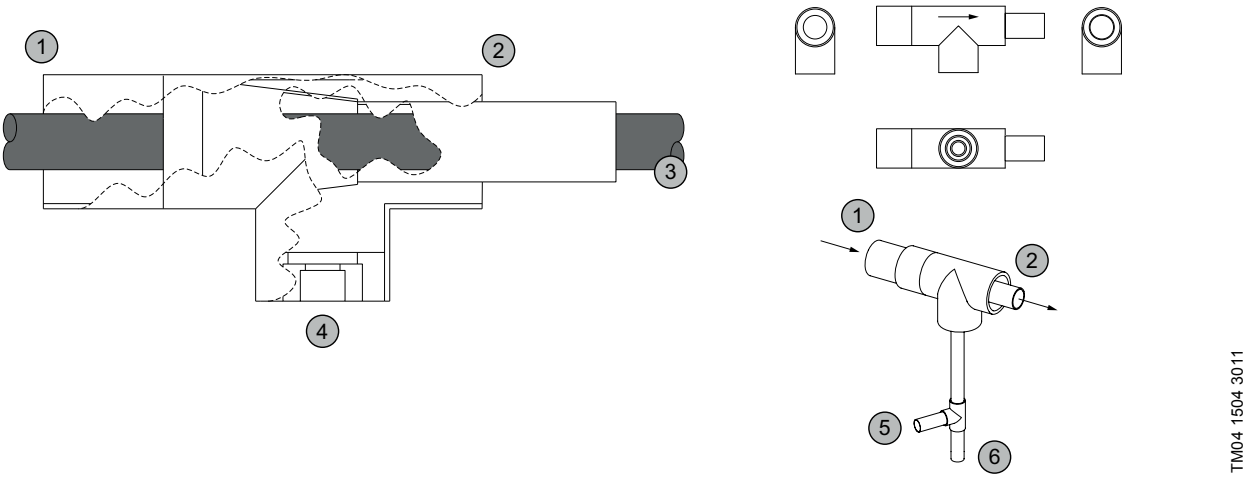

Fig. 9 Venturi tee

1	Ventilation line from electrochlorinator, ∅90 (OD)	4	Product line connection, ∅32 (OD)
2	Ventilation line to safe ventilation point, ∅90 (OD)	5	Product line from electrochlorinator, ∅32 (OD)
3	Flexible vent hose	6	Product line to product tank, ∅32 (OD)

4.2 Installation notes

4.2.1 Location

The Selcoperm system should be installed in a frost-free room with good natural ventilation. Make sure that the electrochlorinator is positioned with a 750 mm clearance on both the hydraulic and cell sides to ensure easy access for maintenance and servicing. Also ensure that sufficient clearance is given for access to the control panel and for control panel door to open, as shown in fig. 7.

4.2.2 Vent piping - very important

Make sure that internal vent hose and external ventilation pipework is installed to a safe discharge point at the exterior of the building.

External zone requirements zone 2:

Selcoperm 125	0.6 metres
Selcoperm 250	0.9 metres
Selcoperm 500	1.3 metres
Selcoperm 1000	1.9 metres
Selcoperm 2000	2.8 metres

The pipework should be installed as direct and straight as possible with no dips and no more than 10 m in length. For longer distances please ask Grundfos for suitable solutions. The run should rise continuously in an uphill direction towards the safe discharge point. The end of ventilation pipework should be fitted with a tee to ensure the free flow of hydrogen while protecting the ventilation line from ingress of rain (fig. 21). Vent outlets can be fitted with low-restriction cowls to prevent against blockages such as nesting birds.

Inner ventilation tube should pass through the Venturi tee and end at the point where the ventilation pipe leaves the building (fig. 7).

Make sure that the ventilation pipe run is at least 500 mm higher than the highest point in the product line to product tank (fig. 7).

Make sure that the Venturi tee is positioned within the vent line in the correct orientation (arrow shows flow direction) and with the connection to the product line in a vertical, pointing down orientation (fig. 18).

Figure 9 shows a detailed diagram illustrating the Venturi tee and its correct installation.

4.2.3 Connective pipework

Make sure that all installation pipework and fittings are suitable for use with drinking water. All pipework should be PVC-U, as shown in fig. 20. All electrochlorinator connections are supplied as standard in PVC-U. For outdoor/external pipe we suggest ABS pipe and fittings for their greater resistance to low temperatures. For vent pipework we recommend to use PVC-U ventilation pipe.

We recommend a proprietary PVC glue is used after preparing the glued surfaces with a proprietary solvent cleaner. This will ensure the correct seal between both PVC and ABS pipework.

The table below shows the connection sizes for the standard Selcoperm product range. Position of connections, see fig. 2.

Connection	Pipe bore [inch]	Pipe diameter [mm]
Hydrogen gas outlet (L)	3	90
Product outlet (K)	1	32
Water inlet (C)	1/2	20
Soft water outlet (B)	1/2	20
Brine inlet (D1, D2)	1/2	20
Waste outlet (E)	1	32

Prior to installation, all pipework and fittings between components should be checked to ensure they conform to appropriate local and international legislation.

4.2.4 Water supply

Good quality filtered water is required according to specification in section *6.3.1 Water specification*. If there is insufficient pressure, a booster pump is required. Where the sodium hypochlorite produced is to be dosed into drinking water, it is preferable to use final treated mains water.

Flow rates see section *3. Technical data*. The tables do not include the water demand for water softener regeneration.

Water supply connections must be checked to ensure they conform to respective international standards e.g. double non-return valves on input.

4.2.5 Water softener

Make sure that the waste outlet (fig. 2, pos. E) has been piped to an open, unpressurised drain point. The drain point for the system should not be situated higher than 2 m above the height of the softener waste outlet. As standard the electrochlorinator is fitted with a 32 mm (1") waste connection to provide an unpressurised return back to the drain.

4.2.6 Brine tank

Figure 8 shows a typical brine tank assembly.

Note ***Temperature drop between brine tank and electrochlorinator may result in crystallization of salt.***

The table below shows the connection sizes for the standard brine tank range.

Connection	Pipe bore [inch]	Pipe diameter [mm]
Soft water inlet	1/2	20
Brine outlets	1/2	20

When a bulk salt saturator (with more than 2 m in height) is installed, a break tank should be installed before the softener and electrochlorinator.

4.2.7 Level sensor

Make sure that the product tank level sensor (fig. 3, pos. 25) is correctly installed at the base of the product tank and all wiring connections back to the Selcoperm have been made and checked.

4.2.8 Ventilation

Make sure that room vents or louvers are installed at high and low level of the installation room to encourage natural ventilation throughout the electrochlorination area.

4.3 Electrical connection

Warning

Before making any electrical connections, switch off the power supply and make sure that it cannot be accidentally switched on.

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

All electrical connections must be carried out in accordance with the separate wiring diagram delivered with the system.

See also section *3.10.1 Field wiring diagram*.

5. Operation

5.1 Display and control

Most functions can be controlled at the display and control elements (see fig. 2, pos. 28). During operation, the process can be manually stopped or remotely stopped through external contact.

The display shows the following information:

- System status
- System information.

Note ***The system reverts back to main display screen automatically when the tank is full or when a fault occurs.***

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Fig. 10 Control and display with main display screen

Key		Function
DEL		Key is not assigned
STAR		Key is not assigned
ALT		Service menu 1 Enter Service menu 1.
ESC		Escape Escape takes you back to main display screen.
OK		Restart Press OK to restart system after a fault has occurred.
Scroll keys	**UP**	Screen selection
	DOWN	
	LEFT	Manual stop in main display screen: Can be used to stop the electrochlorinator. Pressing once more will restart the electrochlorinator.
	RIGHT	Select and adjust values in service menu 1.

5.2 Main menu

The main menu can be accessed without entering a password. It contains four screens with following information:

1	Main display screen with system status and "TANK LEVEL" in percent
2	"AMPS" (amperage) and "VOLTS" (voltage)
3	"AIR FLOW" and "GENERATING TIME" (operating hours)
4	Contact details Grundfos

Scroll through the screens using the [UP] and [DOWN] keys.

Press [ESC] to return to main display screen.

5.3 Service menu 1

The service menu 1 allows the operator to adjust the electrochlorinator's running parameters.

To enter service menu 1, a password (code) is required.

5.3.1 Enter service menu 1

1. Press [ALT] in main menu screen 4.
2. Enter the password "01987" with the scroll keys.
3. Press [OK]. First screen of service menu 1 will be displayed.
   – Scroll through the screens using the [UP] and [DOWN] keys.
   – Press [OK] to edit a set point.
   – Use the scroll keys to set new values.
   – Press [ESC] to exit the edit mode.
   – Once all values are set, press [ESC] to exit service menu 1 and return to main display screen in main menu.

5.3.2 Map of main menu and service menu 1

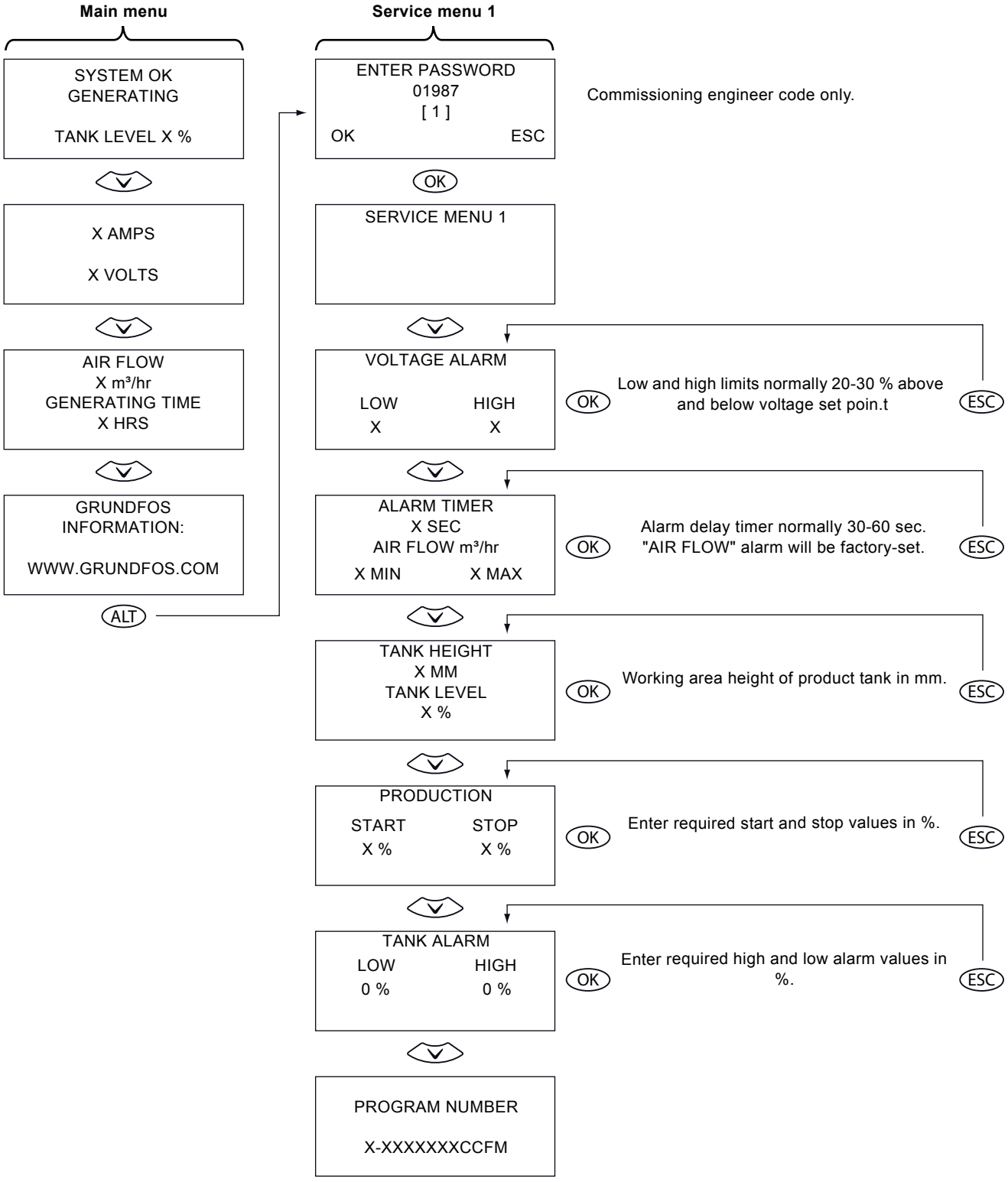

Fig. 11 Map of main menu and service menu 1

- "VOLTAGE ALARM", "ALARM TIMER" and "AIR FLOW" will be factory-set at final assembly test but may need to be altered upon commissioning.
- "TANK HEIGHT" will need to be set specifically to the application, and will need to be entered upon commissioning.
- "PRODUCTION START/STOP", and "TANK ALARM" will need to be set specifically to the customer's requirements.

6. Startup

For locating the components, see figures 2 and 3.

Warning

Prior to startup all system components and lines must be checked for tightness!

6.1 Brine tank

Warning

Wear goggles when filling the brine tank with salt.

Make sure that the brine tank (A) includes a filter bed of minimum 150 mm in height with 4-6 mm washed gravel, and that it is filled with the correct food grade quality salt (see section *3.8 Salt specifications*). The brine tank (A) must be kept full with salt at high level.

Warning

PVD (Pure Vacuum Dried) salt is not suitable for use in Grundfos brine tanks!

The water level in the brine tank (A) is maintained by floater valve (21).

6.2 Water softener

The water used to make the sodium hypochlorite should be softened to less than 20 mg/l $CaCO_3$. Hard water will scale the electrodes and reduce efficiency.

The water softener regenerates automatically. The amount of water that can be softened between two regeneration cycles is depending on the installed meter disc (fig. 13, pos. 3). The meter discs are numbered. Which meter disc number is needed depends on the water hardness of mains water supply at site. Hardness ranges of meter discs, see section *3.9.2 Hardness ranges and meter discs*.

6.2.1 Manual regeneration

See fig. 12.

1. Place a suitable screw driver at the screw on top of the softener head (right side of softener) to move pin (1).
2. Push down and turn the screw clockwise until pin (2) is positioned in regeneration start range (3) for regenerating the left side of the softener.
   – During regeneration pin (2) moves clockwise.
   – Wait until pin (2) has left the respective "BACKWASH" range and regeneration is finished.
3. Push down and turn the screw clockwise until pin (2) is positioned in regeneration start range (4) for regenerating the right side of the softener.
   – During regeneration pin (2) moves clockwise.
   – Wait until pin (2) has left the respective "BACKWASH" range and regeneration is finished.

The softener is regenerated.

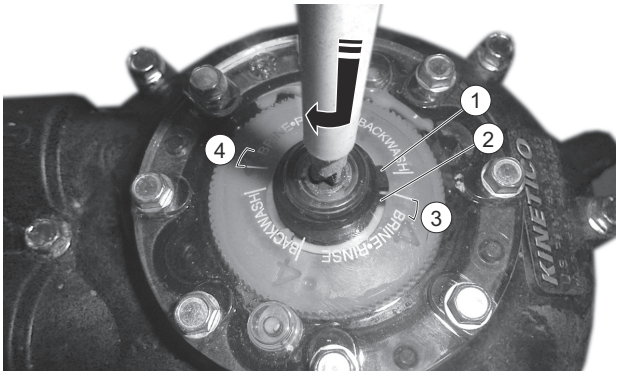

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Fig. 12 Manual regeneration

6.2.2 Exchanging the meter disc

See fig. 13.

1. Remove screws of transparent cover at top of softener head (detail A).
2. Remove transparent cover.
3. Remove balance piston (1) and spring (2).
4. Carefully remove meter disc (3) making sure all surrounding parts keep their functional position.
5. Use a small screw driver to slightly push the locking device (detail B) to the side, and insert required meter disc (3).
6. Refit spring (2) and balance piston (1).
7. Refit transparent cover and tighten screws.
   – Pin (4) of cover has to be placed in space (5) of softener head.

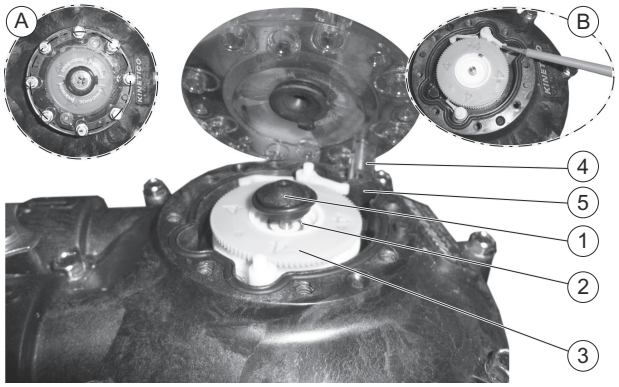

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Fig. 13 Exchange meter disc

6.3 Checking the mains water supply

6.3.1 Water specification

Make sure that the water supply conforms to the required standard of drinking water given in the specification below. Ask your local water supplier for the specific values.

Parameters	Value (maximum unless stated otherwise)	
Colour	[mg/l Pt/Co]	20
pH value		max. 10.0 min. 6.5
Iron Fe	[µg/l]	200
Manganese Mn	[µg/l]	20
Fluoride F	[mg/l]	2
Turbidity	[NTU]	4
Temperature	[°C]	10-20
Pressure	[bar]	3-15
Max. particle size	[µm]	100

6.3.2 Setting the water flow rate

The water flow rate is shown at flowmeter (6), and can be adjusted with water flow adjustment valve (8).

Type	Factory-set brine flow [l/h]*	Factory-set water meter flow [l/h]	Total product flow [l/h]
125	1.7 - 2.1	19	20.7 - 21.1
250	3.4 - 4.2	38	41.4 - 42.2
500	6.8 - 8.2	75	81.8 - 83.2
1000	12 - 15.5	140	152 - 155.5
2000	24-30	285	309-315

* Observe target value of specific gravity (SG). See section *3.3 Typical unit set points*.

Note

The values given above have to be kept and may require adjustment at site due to salt quality, water pressure, temperature and mains water flow rate.

6.4 Start-up and shutdown procedures

6.4.1 Start-up

1. Open water isolating valve (16a) and set pressure reducing valve (10) to show 3-4 bar on gauge.
2. Make sure that the brine tank (A) is prepared according to section *6.1 Brine tank*.
3. Open isolating valves (16b), (16c) and (16d).
4. At initial start-up or if the system was shut down for more than 4 weeks, regenerate the water softener manually. See section *6.2.1 Manual regeneration*.
5. Switch on power supply with mains switch (29). A start-up timer will be initiated at display (28).
6. Adjust the water flow adjustment valve (8) to set the water flow rate given in section *3.3 Typical unit set points* at the flowmeter (6).
7. Set the brine pump (3) to achieve a brine solution with a specific gravity (SG) of 1.02 using the Selcoperm test kit.
   – See section *6.5.2 Specific gravity (SG) of electrolyte*.
   – The brine pump (3) is regulated manually.

Note

Product dosing pumps should be set to give the desired chlorine at the point of injection.

6.4.2 Shutdown

Short term shutdown (up to 4 weeks)

Use the [LEFT] key on control (28) to shut down the Selcoperm system for a short term. See section *5. Operation*.

Shutdown up to six months

1. Switch off power supply at switch (29).
2. Isolate system from water supply with isolating valve (16a).

Shutdown for periods over six months

1. Switch off power supply at switch (29).
2. Fit hose from soft water sample valve (F) to electrolyte sample valve (G).
3. Fit hose to product sample valve (H) and direct it to a suitable discharge point.
4. Open product sample valve (H), electrolyte sample valve (G) and soft water sample valve (F).
5. Flush system thoroughly for a period of 5-10 minutes.
6. Close soft water sample valve (F). The degassing column (2) drains automatically through open product sample valve (H).
7. Close electrolyte sample valve (G).
8. Remove hose from soft water sample valve (F) and direct hose from electrolyte sample valve (G) to a suitable discharge point.
9. Open electrolyte sample valve (G) to drain electrolyser cell (1).
10. Close all sample valves and remove hoses.
11. Isolate system from water supply with isolating valve (16a).

For further advice please contact Grundfos.

6.5 Testing procedures during operation

Use the Grundfos test kit (No. 95702376) for SES-195.

Note

The frequency of the tests depends on the specific application, and must be determined individually by the customer.

After completion of all tests wash out containers thoroughly.

Enter all test results into the operator's log.

6.5.1 Checking the water hardness

A properly functioning water softener (4) is crucial for the efficiency and longevity of the Selcoperm system. High levels of calcium carbonate in the electrolyte will lead to a visible precipitation on the electrodes of electrolyser cell (1).

Water hardness test procedure

1. Take a sample of water from soft water sample valve (F).
2. Fill the plastic sample container to the 20-ml mark.
3. Add two "HARDNESS Yes/No" (No. 98144690) tablets to the sample, refit the lid and shake until the tablets are dissolved.

Result:

Sample turns green: Water is soft.

Sample turns red: Water softener (4) requires regeneration or resin bead replacement.

6.5.2 Specific gravity (SG) of electrolyte

The SG is the specific gravity of the electrolyte entering the electrolyser cell (1).

SG test procedure

1. Flush a clean and dry measuring vessel (capacity at least 500 ml) with electrolyte using electrolyte sample valve (G).
2. Fill the measuring vessel with a large sample of approximately 500 ml (to ensure an accurate reading) using electrolyte sample valve (G).
3. Fill the 100-ml measuring cylinder with the sample.
4. Place the hydrometer in the measuring cylinder and take the reading.
5. Required SG reading see section *3.3 Typical unit set points*.

Adjusting the SG

The SG of the electrolyte is controlled by the amount of brine injected into the softened water. The brine flow is controlled by a digital dosing pump (3). For the operation of the pump, see the manual of the pump. Increasing the flow of brine injected into the softened water will increase the SG, and restricting the flow will lower the SG.

6.5.3 Product test

A product test has to be carried out to determine the total production capacity of the Selcoperm system.

Product test procedure

1. Fill a 2-ml syringe with fresh product from product sample valve (H).
2. Take a clean 100-ml measuring cylinder and fill half with softened water from soft water sample valve (F).
3. Empty syringe into the measuring cylinder.
4. Fill measuring cylinder to the 100-ml mark with softened water from soft water sample valve (F).
5. Mix the solution to ensure an accurate dilution.
6. Fill both cells of the total Cl test kit to the 10-ml mark with the diluted sample.
7. Place one cell in the left compartment of the comparator as a blank.
8. Add one "CHLORINE HR" (No. 98144705) tablet to the other cell and crush the tablet.
9. Add one "ACIDIFYING GP" (No. 98144705) tablet to the same cell and crush the tablet.
10. Close the cell with a lid and swirl it until the tablets are dissolved.
11. Place this cell into the right compartment of the comparator.
12. Match the two colour fields against indirect daylight, and read off the result as mg/l Cl_2.

Product temperature test procedure

1. Take a product sample from the product sample valve (H).
2. Place the thermometer in the sample and take reading.
   – The reading should not exceed 40 °C.

6.6 Voltage, amperage and air flow readings

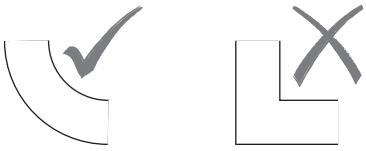
The readings for the electrochlorinator can be taken from display (28). Scroll down in main menu using [UP] and [DOWN] keys until the present values are displayed. See required values in section *3.3 Typical unit set points*.

6.7 Ventilation pipework

Ventilation pipework should be installed to the standards detailed in section *4. Installation*. The air flow through the electrochlorinator is key to the ATEX rating of the product, and effort must be made to ensure the air flow does not become turbulent. Key components in the ventilation line, such as the Venturi tee and ventilation hose must be installed correctly to ensure the correct functioning of the system.

6.7.1 Visual inspection of ventilation pipework

- The pipework should be installed as direct and straight as possible with no dips and no more than 10 m in length. The run should rise continuously in an uphill direction towards the safe discharge point.
- A minimum distance of 0.5 m should be allowed between the product line and ventilation line at all times.
- The Venturi-tee outlet to the product line should be installed downwards.
- Only smooth bends should be used for ventilation pipework. See following figure:



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- We suggest that a tee is fitted at the safe ventilation point to encourage discharge from the ventilation line.
- The flexible vent hose should end outside the electrochlorination room but not run to the safe ventilation point. See figs. 7 and 9.

6.8 Alarms

Before testing, enter service menu 1 (see section *5.3 Service menu 1*). Set the alarm timer to 10 seconds. This will significantly reduce the testing time. The alarm timer must be reset after completion of testing. After the triggering of each alarm the electrochlorinator will need to be reset at control (28).

6.8.1 Internal tray flood alarm

The internal tray flood switches (17) are situated at the base of each chamber of the electrochlorinator. To test the alarm, lift the float switches until the contact is broken. This will trigger the alarm and stop the electrochlorinator.

6.8.2 Low water flow alarm

Slowly restrict the water flow at water flow adjustment valve (8) until the floater falls below flowmeter switch (20). This will cause an alarm at display (28) and stop the electrochlorinator.

6.8.3 Air flow alarm

The air flow alarm utilises an air flow sensor (13) to shut down the electrochlorinator on low or high air flow.

High air flow alarm

Remove the cover from the electrolysis and degassing chamber. This will allow the air flow to rise, and will shut down the electrochlorinator on high air flow.

Low air flow alarm

Refit the cover and manually restrict the air flow at the safe ventilation point. This will reduce the air flow below the low air flow alarm point and shut down the electrochlorinator.

6.8.4 Volt alarms

There are many ways of triggering high and low volt alarms. The fault finding (see section *8. Fault finding*) details the cause and effect of these alarms. The best way to check the alarms is to increase and decrease the water flow.

High volt alarm

Increase the water flow with water flow adjustment valve (8). This will reduce the SG of the electrolyte. An alarm will be displayed and the electrochlorinator will be stopped.

Low volt alarm

1. Mark the position of the flowmeter switch (20) so it can be reset after the test.
2. To prevent a low water flow alarm, move the flowmeter switch (20) downwards.
3. Decrease the water flow at water flow adjustment valve (8). This will increase the SG of the electrolyte. An alarm will be displayed and the electrochlorinator will be stopped.
4. Move flowmeter switch (20) to its original position.

6.8.5 High and low tank alarms

These alarms must be triggered by filling the product tank (M) to its high alarm point and then emptying it to its low alarm point while the system is inhibited. Or by disconnecting the level sensor (25) and supplying a 0-10 V signal* (to contact X4:2) to simulate the pressure sensor output.

* Only for product tanks from spring 2009 and newer.

7. Maintenance

For locating the components, see figures 2 and 3.

7.1 Safety instructions

Warning

Cleaning and maintenance must only be carried out by authorised and qualified staff.

Shut down the whole system before any work at the system components and lines!

Separate the system from the power supply before any work at the system components and lines!

Wear the stipulated personal protective equipment (protective clothing, goggles, respirator etc.) when handling chemicals!

Observe the chemical manufacturer's safety data sheets (MSDS) and safety instructions of the used chemicals!

Safety installations, which have been disabled during maintenance, must be enabled again immediately after maintenance.

Warning

Danger of personal injury from chlorine gas!

Sodium hypochlorite solution tends to emit chlorine gas.

When working with open tanks or lines, wear appropriate personal protective equipment.

Warning

When the Selcoperm system is stopped via control panel or via external contact, the air dilution fan (19) continues running for some minutes. This ensures the removal of residual hydrogen gas from the system, lines and product tank.

Wait until the air dilution fan stops before starting any work at the system, lines and product tank!

If the power supply was switched off or in case of power failure, wait at least 20 minutes before starting any work at the system, lines and product tank!

Caution ***Rinse removed parts with clean water.***

Note ***Spare parts see section 9. Spare parts lists.***

7.2 Maintenance kits

The maintenance kit includes parts for maintenance after two years (maintenance kit for brine pump and for Selcoperm).

Description	Product No.
Maintenance kits for systems until 2010	
Selcoperm 125-500	95702281
Selcoperm 1000-2000	95702282
Maintenance kits for systems from 2011	
Selcoperm 125-500	98045877
Selcoperm 1000-2000	98045899
Maintenance kits for systems from 04-2012	
Selcoperm 125-500	98047506
Selcoperm 1000-2000	98047507

7.3 Weekly

- Check the level of brine tank (A). Re-fill with salt, if necessary.
- Check for water hardness by viewing the electrolyser cell (1) when not in operation. There should be no scale present. If required, a water hardness test on the softened water can be done. See section *6.5.1 Checking the water hardness*.
- Check for leakages, renew O-rings, gaskets etc. if required.
- Check all vent pipework and air dilution fan (19) for correct functioning.

Warning

Danger of explosion!

When checking the equipment for leakages only use hydrogen detectors!

Never use a match or any type of flame!

- Check that the degassing column (2) is always full of liquid.

7.4 Monthly

- Visually inspect electrodes in electrolyser cell (1). Only acid-clean, if significant scale has built up. See section *7.7 Acid cleaning*.
  - Unless there is a softening fault, or poor quality water/salt is being used, there should be no need to acid-clean more frequently than at the two-year maintenance.
- Check filter in pressure reducing valve (10) and clean, if required.
- Check electrical connections for signs of overheating and tighten, if required.
- Check that the protective insulation is installed properly.
- Fill in operator's log.

7.5 Every 2 years

- Overhaul solenoid valve (5). Replace any worn or damaged parts.
- When solenoid valve (5) is closed, check that no water passes.
- Clean flowmeter (6) if required.
- Overhaul brine pump (3).
  - Clean and replace worn valves/seats and diaphragms, if there is any sign of damage.
  - Fit new O-rings and gaskets before reassembling.
- Check brine valve (14). Replace if necessary.
- Wipe down and clean brine tank (A).
- Check operation of floater valve (21) in brine tank (A).
- Always complete operator's log after maintenance.

7.6 Cleaning

If necessary, clean all system surfaces with a moist and clean cloth.

7.7 Acid cleaning

Warning

Wear protective clothing and goggles and use the Grundfos acid cleaning kit!

Caution ***Hydrochloric acid used for acid cleaning must be of high grade, free from fluoride and in the concentration range of 5-7 % by weight!***

1. Switch off power supply at switch (29) and isolate system from the mains voltage.
2. Connect hose to product sample valve (H) and run to a suitable discharge point.
3. Open product sample valve (H) to drain the degassing column (2).

Caution ***Product sample valve (H) must remain open at all times during the acid cleaning procedure!***

4. Connect hose between soft water sample valve (F) and electrolyte sample valve (G).
5. Open electrolyte sample valve (G).
6. Open soft water sample valve (F) to flush electrolyser cell (1) for 5-10 minutes.
7. Shut off soft water sample valve (F).
8. Connect the acid cleaning pump output to electrolyte sample valve (G).
9. Attach hose to product sample valve (H) and back to acid cleaning kit.
10. Start pumping acid through system until electrodes are clean.
    – typically 5-10 minutes maximum
11. Once electrodes are clean, stop acid cleaning pump.
12. Remove the acid cleaning kit.
13. Move hose connected to product sample valve (H) to a suitable discharge point.
14. Reinstall hose from soft water sample valve (F) to electrolyte sample valve (G).
15. Open soft water sample valve (F) to flush electrolyser cell (1) for 5-10 minutes.
16. Close valves (F), (G), (H) and remove hoses.
17. Wipe up any drips.
18. Restart system according to *6.4.1 Start-up*.

8. Fault finding

For locating the components, see figures 2 and 3.

Fault	Display text	Possible cause	Possible remedy
High voltage	HIGH VOLTS	Lack of brine in electrolyser cell (1)	Check settings of brine pump (3). Check SG. See section *6.5.2 Specific gravity (SG) of electrolyte*.
		Scale on electrodes	Check softener operation. See section *6.5.1 Checking the water hardness*. Regenerate softener if necessary. See section *6.2.1 Manual regeneration*. Acid clean if necessary. See section *7.7 Acid cleaning*.
		Water flow too high	Adjust to correct value using water flow adjustment valve (8). See section *3.3 Typical unit set points*.
		Lack of salt in brine tank (A)	Check and refill if necessary.
		High resistance on DC cable connection	Clean and tighten connection. Use electrical contact grease.
		Input voltage low	Check incoming voltage/check fuses.
		Leakage in casing of electrolyser cell (1)	Replace gasket/O-ring if necessary.
		Electrolyte sample valve (G) open	Close valve.
Low voltage	LOW VOLTS	Too much brine in electrolyte.	Check settings of brine pump (3).
			Check SG. See section *6.5.2 Specific gravity (SG) of electrolyte*.
		Water flow too low	Check and adjust inlet water pressure.
			Adjust water flow.
Temperature failure control panel	PANEL TEMP	Low water flow or failure of water flow switch	Check water flow and flow switch settings.
		High ambient temperature	Ambient temperature must not exceed 40 °C.
		Cooling fan failure	Check and replace if necessary.
		Cover of electrolysis chamber not fitted/broken	Check and refit or replace.
		Faulty temperature sensor	Replace temperature sensor.
Temperature of electrolyser cell (1) to high	CELL TEMP	Mains water temperature to high	Check and rectify.
		High ambient temperature	Ambient temperature must not exceed 40 °C.
		Faulty temperature sensor	Replace temperature sensor.
Ventilation failure	AIR FLOW	Degassing column (2) not full of liquid	Check for ventilation blockage.
		Faulty degassing column level sensor (9)	Check and adjust. Replace if necessary.
		Vent pipe blocked	Check for blockage and remove blockage.
		Power failure at fan (19)	Check fuses.
		Motor failure at fan (19)	Replace fan.
		Failure of air flow sensor (13)	Check and replace if necessary.
Control lamp of mains supply (23) is off		Lamp failure	Check and replace.
		No incoming voltage	Check incoming voltage/check fuses.
Product tank filling level to high	TANK LEVEL HIGH	Failure of product tank level sensor (25)	Check and adjust if necessary.
		Solenoid valve (5) failure/passing liquid	Check and clean valve seat. Replace if fault persists.
Product tank filling level to low	TANK LEVEL LOW	Unit not switched on	Check and rectify.
		Product demand too high	Reduce demand.
		Failure of product tank level sensor (25)	Check and adjust or replace if necessary.
		Product tank (M) leaking	Check and repair.
		Remote stop enabled	Check and rectify.
Water flow failure	WATER FLOW	Low water inlet pressure	Contact local authorities.
		Failure of flowmeter switch (20)	Check and replace.
		Filter in pressure reducing valve (10) blocked	Check and clean.
		Water flow adjustment valve (8) closed	Check and adjust to correct value.
Collecting tray flood switches: Product tank, Electrolysis chamber, Hydraulic chamber	LEAKAGE	Solenoid valve (5) failure/passing liquid	Check and clean valve seat. Replace if fault persists.
		Leakage in pipe fitting	Check and repair.
		Leakage in product tank or from product dosing pumps	Check and repair.

9. Spare parts lists

9.1 Selcoperm electrochlorinator

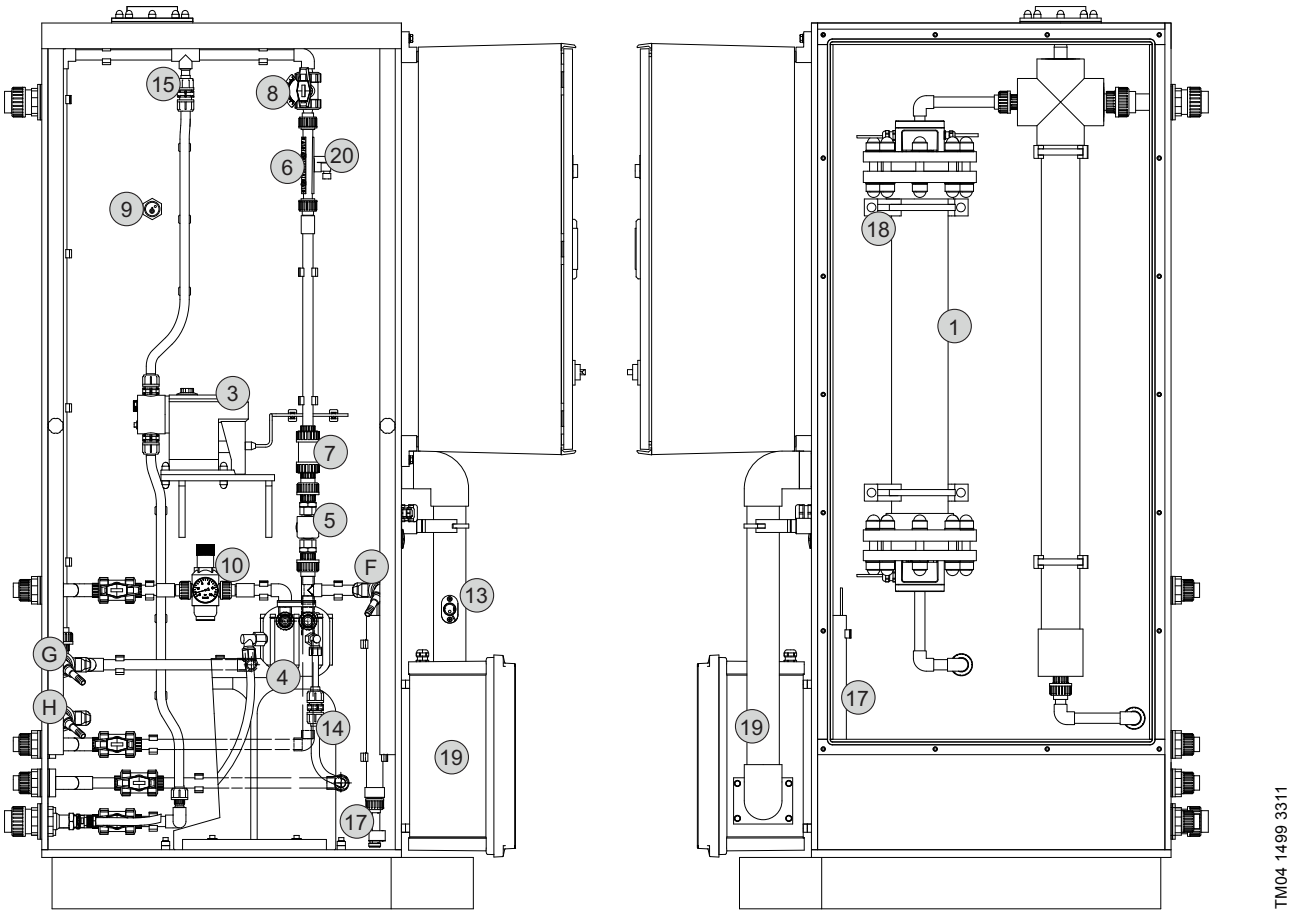


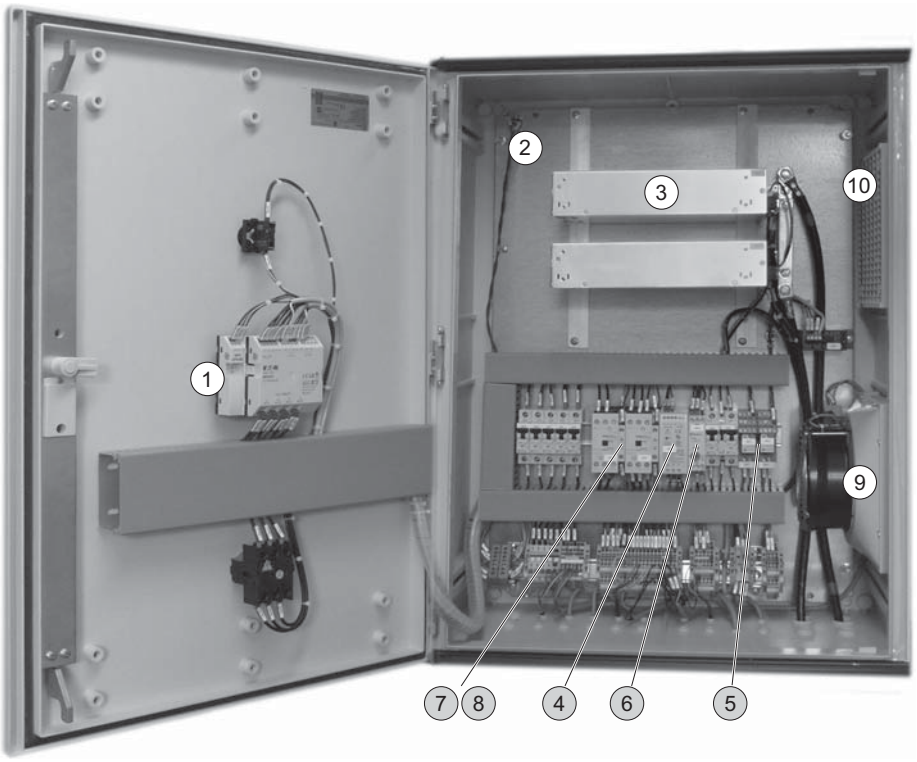
Fig. 14 Overview electrochlorinator spare parts

Pos.	Product No.	Description
1	98056656	Electrolyser cell (SES-125)
	98056729	Electrolyser cell (SES-250)
	98056755	Electrolyser cell (SES-500)
	98056757	Electrolyser cell (SES-1000)
	98056760	Electrolyser cell (SES-2000)
3	97721401	Brine pump (SES-125, -250, -500)
	97722252	Brine pump (SES-1000, -2000)
4	95724306	Water softener
5	95723503	1/2" water solenoid valve
6	95727171	Flowmeter (SES-125)
	95727172	Flowmeter (SES-250)
	95727173	Flowmeter (SES-500)
	95727174	Flowmeter (SES-1000)
	95727175	Flowmeter (SES-2000)
7	96728048	Non-return valve
8	98058475	Water flow adjustment valve

Pos.	Product No.	Description
9	95727178	Degassing column level sensor
10	96688535	Pressure reducing valve
13	95727176	Air flow monitor[1)]
	95727177	Air flow sensor
14	98058479	Brine valve water softener
15	98058478	Brine injection valve
17	98056894	Internal tray flood switch
18	95727185	Cell temp. sensor max. 70 °C
19	95727154	Air dilution fan (SES-125, -250, -500)
	95727155	Air dilution fan (SES-1000, -2000)
20	95727192	Bi-stable flowmeter switch
F	95712325	Soft water sample valve
G	95712325	Electrolyte sample valve
H	95712325	Product sample valve

1) for units before 06-2008 with air flow monitor

9.2 Power supply and control panel

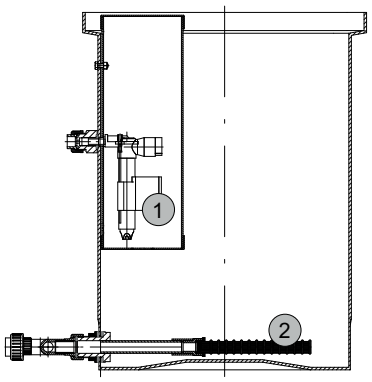


TM04 1500 3311

Fig. 15 Power supply and control panel

Pos.	Product No.	Description
1	95729981	Logic controller, language German
	95729982	Logic controller, language English
	95729983	Logic controller, language French
	95729984	Logic controller, language Spanish
	95729985	Logic controller, language Russian
2	95727184	Temperature sensor
3	95727165	Electrolyser power supply (SES-125)
	95727166	Electrolyser power supply (SES-250/500)
	98056500	Electrolyser power supply (SES-1000)
	98055689	Electrolyser power supply (SES-2000)
4	98059618	Power supply internal
5	98059659	Finder relay
6	98059686	Finder timer relay
7	98059653	Run relay / Alarm relay
8	98059655	Alarm Relay (SES-2000)
9	98059565	Fan for enclosure (SES-125, SES-250, SES-500)
	98059610	Fan for enclosure (SES-1000, SES-2000)
10	98059643	Fan filter

9.3 Brine tank

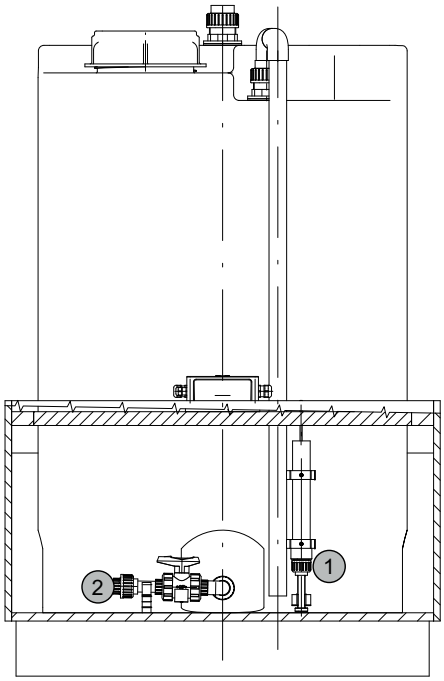


TM04 1506 3311

Fig. 16 Brine tank for salt saturation

Pos.	Product No.	Description
1	98056828	Side entry valve
2	95727187	3/4" lateral filter

9.4 Product tank



TM04 1595 3311

Fig. 17 Product tank

Pos.	Product No.	Description
1	98056894	Tray flood switch
2	95721859	Pressure level sensor 0-10 V
	95723414	Pressure level sensor 4-20 mA[1)]
	95727190	Replacement set for tank level sensor 4-20 mA[1)]

[1)] for product tanks delivered until spring 2009

10. Operator's log and service check list

10.1 Operator's log - commissioning settings

Note ***Complete after commissioning and keep on site.***

Date of visit	[yyyy/mm/dd]					
Ampere reading*	[A]					
Volt reading*	[V]					
Temp. of mains water supply	[°C]					
Generating time* (operating hours)	[h]					
Air flow rate*	[m^3/h]					
Pressure reducing valve setting	[bar]					
Water flowmeter reading	[l/h]					
Brine pump setting	[l/h]					
Hardness test result	green/red					
Product test result	[mg/l Cl_2]					
Specific gravity of electrolyte	[SG]					
Quantity of salt added	[kg]					
Product pump 1	[l/h]					
Product pump 2	[l/h]					
Number of water softener meter disc	No.					
Visual inspection of ventilation pipework						
Who completed the checks	sign					
Comments/observations/adjustments made						

* Readings can be taken from main menu. See section *5.2 Main menu*.

10.2 Operator's log - master copy

Note ***Complete and keep on site.***

Fill in when visiting site monthly. Fill in before calling service in case of failure.

Date of visit	[yyyy/mm/dd]					
Ampere reading*	[A]					
Volt reading*	[V]					
Temp. of mains water supply	[°C]					
Generating time* (operating hours)	[h]					
Air flow rate*	[m^3/h]					
Pressure reducing valve setting	[bar]					
Water flowmeter reading	[l/h]					
Brine pump setting	[l/h]					
Hardness test result	green/red					
Product test result	[mg/l Cl_2]					
Specific gravity of electrolyte	[SG]					
Quantity of salt added	[kg]					
Product pump 1	[l/h]					
Product pump 2	[l/h]					
Number of water softener meter disc	No.					
Visual inspection of ventilation pipework						
Who completed the checks	sign					
Comments/observations/adjustments made						

* Readings can be taken from main menu. See section *5.2 Main menu*.

10.3 Electrochlorinator service check sheet - master copy for service

Date	Unit type
Serial number	Hour meter

Service item	OK	Comments
Check product tank • Level sensor • For leakages • Collecting tray switch		
Check electrolyser cell for • Scale on electrodes • Leakages • Correct functioning		
Check water softener • Correct functioning (hardness test)		
Check solenoid valve • Correct functioning		
Check brine pump • Diaphragm • Valves • Foot valve/strainer		
Check pressure reducing valve • Clean strainer • Gauge working correctly		
Check brine tank • Check for leakages and clean tank • Check floater valve		
Check control panel • Check terminals for security and signs of overheating • Check all components are present, correctly installed, and operating correctly • Check all fuse ratings are correct • Check cooling fan for correct operation and clean • Check correct operation of panel		
Check ventilation • Check all components are present, correctly installed, and operating correctly		
Standby hypochlorite inductor • Check correct operation		
Fill in operator's log		

System operation/settings	
Amps	Volts
Water flow	Brine flow

11. Disposal

Warning

Before dismantling, the system must be completely flushed with water in order to remove the chemicals from the electrolyser cell, the hoses, the pipes and the pumps.

The system may only be dismantled by authorised and qualified personnel.

This product or parts of it must be disposed of in an environmentally sound way. Use appropriate waste collection services. If this is not possible, contact the nearest Grundfos company or service workshop.

12. Photos

TM04 1497 1210

Fig. 18 Correct installation of Venturi tee

TM04 1513 1210

Fig. 19 Typical installation

TM04 1514 1210

Fig. 20 Installation pipework

TM04 1515 1210

Fig. 21 Safe ventilation point

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