Operating Instructions

Reverse-Osmosis-System

UO-D 600/ 900/ 1200/ 1500/ 2000 CD

UO-D 600-2000 xxx CD

Translation of the original instructions

Overview of Contents

Appendix

Imprint

The edition date on the cover sheet is definitive.
Subject to technical change.

Contents of Chapter A

1 Notes on using the Operating Instructions

Purpose:

The Operating Instructions are intended for users of the system and contain information on how to operate and maintain the system safely and reliably.

Availability:

The Operating Instructions must always be available at the place where the system is in use.

Subdivision:

The Operating Instructions consist of a number of chapters named by letters of the alphabet.
An outline of all the chapters appears on Page 1.
The header and page numbering, along with the letter identifying each chapter, make it easier for you to orient yourself.
For information on the content of a specific chapter, please refer to the contents on the first page of that chapter.

Conventions/abbreviations:

OI	Operating Instructions
TD	Technical Documentation
RO	Reverse Osmosis
CY	Conductivity
-	Enumerated items
☞	Steps to be performed

2 General safety information

2.1 Explanation of symbols and references

This symbol refers to an immediate danger that threatens the safety and life of persons. Failure to observe these notices will have severe consequences on health and safety, including life-threatening injuries.

This symbol refers to a possible danger that threatens the safety and life of persons. Failure to observe these notices may have severe consequences on health and safety, including life-threatening injuries.

This symbol refers to a possibly hazardous situation.
Failure to observe these references may result in minor injuries and/or damage to property.

This symbol points out important information for working with the system in a proper manner. Failure to observe these references may result in malfunctions in the system or disturbances in the environment.

2.2 Additional safety requirements

Country-specific requirements, standards and regulations must be observed.

2.3 Usage in accordance with intended purpose

The RO-system is used to desalinate softened or hardness stabilized water. The system must only be operated with water supplied in accordance with the quality described in Chapter C and the operating parameters specified there.
The system must not be operated unless it is in proper working order. Any malfunctions must be rectified immediately.

2.4 Improper use

The reverse osmosis unit is not intended for the production of water for human consumption. The permeate produced must not be fed into the drinking water supply. Operational safety of this installation can only be guaranteed if the installation is used in accordance with the purpose defined in the technical manual. Any purpose or operation beyond the mentioned limits is considered as incorrect. The manufacturer/ supplier assumes no liability for damages resulting from incorrect use; this risk is carried solely by the plant operator.

2.5 Operating staff

Only persons who have read and understood these Operating Instructions are permitted to operate the system. When operating the system, it is particularly important to observe the safety information strictly.

2.6 Residual dangers

Water damage

To avoid accumulation of spills caused by leaks, the area in which the system is set up must be equipped with a floor drain and/or a leak monitoring system and corresponding alarm.

Electrical shock

Do not touch electrical components with wet hands.
Before performing tasks on parts of electrical system, disconnect the system from electrical power supply.

Mechanical force

Parts of the system are under excess pressure of up to 25 bar (g). Release the pressure from the system before repairs and maintenance tasks.

Hygiene-critical applications

Danger of contamination of system components due to non sufficient execution of cleaning / disinfection of the unit.
Adhere to the information provided regarding cleaning and disinfection.

2.7 Bringing the system to a stop in the event of an emergency

- ☞ Turn off the main switch
- ☞ Shut off the water supply

After remedying the damage:

- ☞ Open the water supply
- ☞ Turn on the main switch

2.8 Safety information for maintenance task

The operator must take pains to ensure that all maintenance, inspection and assembly tasks are performed by authorized and qualified professionals who have been sufficiently informed for the task at hand by thoroughly studying the Operating Instructions. These tasks must be properly performed by professionally trained staff member.

The system must be shut down and protected from being placed in operation again unintentionally before all repair and maintenance tasks. It is absolutely essential to observe the procedure described in these Operating Instructions for shutting down the system.

Before beginning tasks on the electrical equipment of the system, a check must confirm that power has been disconnected from the corresponding section of the system. In addition, the system must be secured to prevent it from being turned on again unintentionally.

Protective clothing suitable for the hazard at hand must be worn while performing the task. Immediately after the maintenance tasks are completed, all safety and protective equipment must be set back in place and functionality restored

2.9 Disposing of system parts and operating materials

When they need to be discarded, system parts must be disposed of according to local requirements including separately, if so required.

2.10 Unauthorized conversion and manufacturing replacement parts

Conversion or modification of the system is only permitted with the approval of the manufacturer. The same applies to making changes in the programming for the control system. Original replacement parts and accessories authorized by the manufacturer enhance safety. Use of other parts will void the warrantee.

2.11 Warrantee claims and liability

This product corresponds to the state of the art and was designed and manufactured in accordance with applicable rules of the technology, after which it was subjected to a quality control process.
If there should nevertheless be any grounds for complaint, please direct requests for replacement to the manufacturer of this product in accordance with the general terms and conditions of sale and delivery.

3 Basic principles of reverse osmosis systems

3.1 The principle of reverse osmosis

Osmosis is a process on which nearly all natural metabolic processes are based. If two solutions of varying concentrations are separated in a system by a semipermeable membrane, the solution with the higher concentration will always have a tendency to become more diluted. This process (osmosis) will continue until osmotic equilibrium is achieved.

In the process of reverse osmosis, the direction of the osmotic flow is reversed. To achieve this, pressure must be exerted on the concentrated solution. This pressure must be considerably greater than the osmotic pressure that arises due to the natural balancing of differing concentrations.

Synthetic membranes are used in water treatment systems that work on the principle of reverse osmosis. These membranes are permeable for water molecules. The content materials dissolved in the water are held back by the membranes. High pressure causes the concentrated solution (for example drinking water or process water) to flow through these membranes. The result is a separation of this solution into a partial flow with water in which the content materials that are held back are located (concentrate).

3.2 Calculation equations

Yield [%] = $\frac{\text{permeate output [l/h]} \bullet 100\%}{\text{feed water input [l/h]}}$

feed water input = Permeate output + concentrate output

Concentrate output [l/h] = $\frac{\text{permeate output [l/h]} \bullet 100\%}{\text{yield [\%]}}$ - permeate output [l/h]

Desalinization rate [%] = [1- $\frac{Cy_{\text{permeate}}}{Cy_{\text{raw water}}}$**]** $\bullet 100\%$

3.3 Dependencies of permeate output

The permeate output of the system depends on the particular feed water parameters like temperature, feed water pressure and salinity and thus may be lower.
The nominal output specified in the technical data (chapter C) refers to the corresponding design parameters.

Generally, when adjusting the unit, do not exceed max. permeate output and do not underrun min. amount of concentrate.

In addition the following applies to units with permeate output ≥ 600 l/h; do not underrun min. amount of concentrate recirculation.

In addition the following applies to units with permeate output of 120 - 500 l/h; do not exceed max. pump pressure.

Danger

If the system is operated at a higher feed water temperature than the design temperature; do not to exceed the maximum permeate output that is specified in the technical data (chapter C)!

3.4 Conductivity of first permeate

After switching on the RO system, permeate with high conductivity is produced for a short time. Therefore, assure that during the system design of the peripheral systems engineering a minimum running time of the RO system of at least 30 min per shifting process is guaranteed.

Transport and Storage

Units have to be transported in upright position and in its original packaging.

All units must be secured against slipping and falling over during transport!

The transport weight corresponds to the empty weight. For transport weights, please refer to the Technical Data in Chapter C.

Prior delivery, units are filled with preserving- and antifreeze mixture. Antifreeze agent is effective down to -10° Celsius. The unit can be damaged by frost. Because of this, the unit must be protected against frost and freezing during transport and storage.

The min. /max. storage temperature is 0 - 40°C.

The maximum storage duration for the units in their original packing is 12 months at 20 °C. After that, the preservative fluid must be rinsed out and replaced if necessary.

Contents of Chapter C

1 Rating plate

The rating plate is located on the front side of the system. It contains information on the current system and the particular installed options.
To ensure fast and problem-free processing of warrantee claims, technical information or customer service, be sure to indicate the system type, item number and manufacturing number.

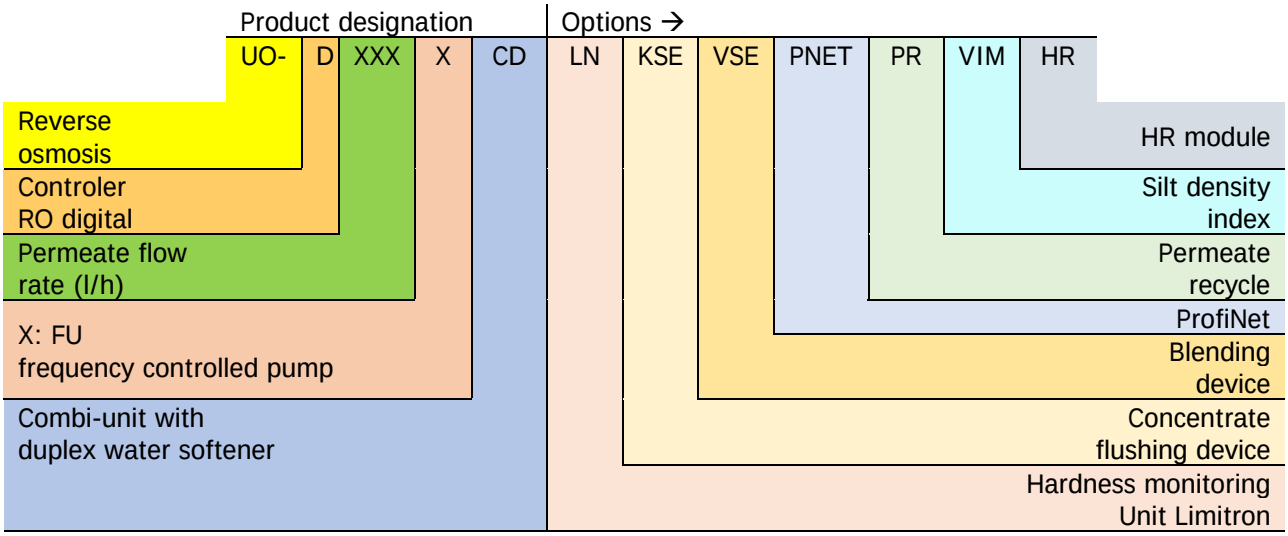
1.1 Rating plate specifications

Specifications and pictograms on the rating plate of the system:

	Pictogram and/ or Specification
☞ CE-marking	CE
☞ Type designation	UO-D ...
☞ Item no.:	420 xxx
☞ Serial number	AF YY-xxxxxx (AF year-consecutive number)
☞ Year of manufacture	(year)
☞ Electrical connection	(V/Hz)
☞ Power input	(kW)
☞ Pre-Fuse	(A)
☞ Protection type	(IP)
☞ Application class	
☞ Consult operating manual!	
☞ Indoor installation	

1.2 Identification of the system

The type designation on the rating plate consists of the product designation and the installed options. Use the following matrix to get an explanation for the type designation of the particular existing unit.



2 Available Options

The available options for this system are shown in the PID and the spare parts list; both are located in the appendix of this manual. The following table shows the available options including their item-numbers for the particular system type.

option	LN	KSE	VSE	PNET	PR	VIM	HR
Item – no.:	1)	383774	383776	541842	383775	382284	383777
UO-D xxx CD	●	x	x	x	x	x	x
UO-D xxx FU-CD	●	x	x	x	x	x	x

● Standard
x Available option

1) 370038 UO-D 600 – 1500 (FU) CD
370069 UO-D 2000 (FU) CD

2.1 Description of the Options

Hardness monitoring unit LN

Device for continuously monitoring the feed water hardness. The hardness monitoring unit has a floating contact for the signal exchange. In case of a detected hardness breakthrough, the RO-unit will be shut-down.

Concentrate flushing unit KSE

Time controlled draining of the concentrate during shut-down by an automatic bypass valve with the pressure of the RO feed water.

Blending device VSE

Automatic bypass of the RO System to blend permate with feedwater in the outlet tank, to adjust the specific conductivity after the RO system. The maximum output corresponds to the permeate flow rate of the unit.

Profinet connection PNET

Standardized possibility to transfer all measured and logged data to customer-side PLC e.g. central control system.

Permeate recycle PR

The first permeate at unit's start-up is recirculated to pump 1P01 until the adjusted permeate minimum quality is reached. The permeate valve 1V02 will be switched to "recirculation"" or "production" depending on the conductivity measured at 1Q02.

Connection for Silt density index monitoring VIM

Measurement of the Silt Density Index SDI. The SDI is a cumulative parameter. It estimates the fouling intensity of a RO module.

HR-Module

Membrane-modules with higher retention rate (typically >98.5%) for higher permeate quality.

Depending on the particular feed water parameters like temperature, feed water pressure and salinity, there will a decrease in permeate output accordingly, when using HR modules.

3 Technical data

System		UO-D 600 CD	UO-D 900 CD	UO-D 1200 CD	UO-D 1500 CD	UO-D 2000 CD
Item-no.:		420231	420232	420233	420234	420235
Control		RO digital				
Softener – item-no.:		Ecotrol 200 TWIN - 360542		Ecotrol 400 TWIN - 360544		
Feed water specification						
Feed water pressure min. /max.	bar	4/6				
max. hardness of feed water	°dH	28				
Pressure fluctuations (limit)	bar	±0,5				
Temperature min./max.	°C	5/35				
Connections						
Feed water	DN	25				32
Permeate	DN	20				20
Concentrate	HT	100				100
Power consumption	kW	1.5		2.2		3.0
Power connection	V/Hz	3x400/50				
Protection type		IP44				
Output data						
Permeate outlet max. *	l/h	600	900	1200	1500	2000
Concentrate at 75% yield	l/h	200	300	400	500	700
Concentrate recirculation min.	l/h	1000	800	600	500	1000
yield, depending on feed water quality	%	75-80				
Salt rejection rate min.	%	97				
Salt rejection rate min. with option HR	%	>98.5				
Dimensions and weights						
Dimensions (HxWxD)	mm	1210x810x1860 Ø550x1050		1210x810x2000 Ø730x1090		
Weight approx.	kg	300	320	470	500	520
Environmental data						
Ambient temperature min./max.	°C	5/40				
Relative humidity	%	<95, non condensing				
Sound level max.	dB(A)	75				

*****(see sec. A 3.3)

Systems are designed for softened drinking water without chlorine in accordance with the German Drinking Water Regulation with a salt content of 1000 mg/l and at a feed water temperature of 15 °C. Max. permeate counter pressure 0.3 bar!

System		UO-D 600 FU-CD	UO-D 900 FU-CD	UO-D 1200 FU-CD	UO-D 1500 FU-CD	UO-D 2000 FU-CD
Item-no.:		420241	420242	420243	420244	420245
Control		RO digital				
Softener – Item-no.:		Ecotrol 200 TWIN - 360542		Ecotrol 400 TWIN - 360544		
Feed water specification						
Feed water pressure min./max.	bar	4/6				
max. hardness of feed water	°dH	28				
Pressure fluctuations (limit)	bar	±0,5				
Temperature min./max	°C	5/35				
Connections						
Feed water	DN	25				32
Permeat	DN	20				20
Concentrate	HT	100				100
Power consumption	kW	2.2				4.0
Power connection	V/Hz	3x400/50-60				
Protection type		IP44				
Output data						
Permeate outlet max*	l/h	600	900	1200	1500	2000
Concentrate at 75% yield	l/h	200	300	400	500	700
Concentrate recirculation min.	l/h	1000	800	600	500	1000
yield, depending on feed water quality	%	75-80				
Salt rejection rate min.	%	97				
Salt rejection rate min with option HR	%	>98.5				
Dimensions and weights						
Dimensions (HxWxD)	mm	1210x810x1860 Ø550x1050		1210x810x2000 Ø730x1090		
Weight approx.	kg	300	320	470	500	520
Environmental data						
Ambient temperature min./max.	°C	5/40				
Relative humidity	%	<95, non-condensing				
Sound level max.	dB(A)	75				

*****(see sec. A 3.3)

Systems are designed for softened drinking water without chlorine in accordance with the German Drinking Water Regulation with a salt content of 1000 mg/l and at a feed water temperature of 15 °C. Max. permeate counter pressure 0,3 bar!

4 Usage limits

In order to attain the life span of 3 years calculated for the membranes, reverse osmosis installations must be supplied, in accordance with the installation type, with softened water (types ND, KR, e.g.) or tap water with stabilised hardness level (type AS, e.g.) They also must be operated in compliance with the German Drinking Water Regulation and the specifications below. Membranes are wearing parts. The degree of wear depends on the feed water quality and the operating conditions.

Parameter	Unit	Limit
Free chlorine *	mg/l	not detectable*
Iron **	mg/l	0.2
Manganese **	mg/l	0.05
Silicate ***	mg/l	25
SDI [4]	-	3
pH level during operation [5]		3.6-9.5
pH level during cleaning		2-12

The feed water must be free from substances that damage the membrane.
These are in particular:

- oxidants (e.g. free chlorine, ozone, hydrogen peroxide)
- surfactants (especially if cationic)
- biocides and inhibitors
- natural organic matter (NOM)

If the UP feed water is softened, the soft water quality is to be observed. If antiscalant is added for hardness stabilisation (i.e. when iron, manganese and silicate are stabilised at the same time), the manufacturer's specifications must be complied with. If necessary, the pH or the permeate output must be adjusted.

*****Free chlorine (oxidants) corrodes the plastic membrane, especially if metal ions are present. This attack is irreversible and will cause a decrease of the salt retention rate while increasing the permeate conductance. This is why the feed water of the UP installation should not contain any free chlorine.

******Iron/manganese can be present in a dissolved or undissolved state. Undissolved iron or manganese should be removed by filtration. Dissolved iron/manganese can be oxidised and then removed by filtration or stabilised, for example, by means of an antiscalant. Iron/manganese deposits on the membranes can generally be removed by chemical cleaning.

******* Silicate may form solid deposits on the membranes which are hard to remove. The maximum silicate concentration in the RO concentrate should not exceed 100 mg/l if soft water is used. In RO installations, type KR, the maximum silicate concentration in the RO feed water is 10 mg/l for this reason.

[4]The SDI is a sum parameter. It indicates the degree to which suspended matter will likely form deposits on the membrane. If the SDI > 3, prefiltration must be improved accordingly.

[5] The pH level considerably influences the solubility of many water compounds.
It may be necessary to modify the pH level in order to obtain the desired permeate yield or quality.

5 Product description

5.1 Working principle diagram

See the PID in the appendix.

5.2 Functional description

Feed water is fed in through a fine filter 0F01 passing the system disconnector 0X01 and the softener 0X02. The softener reduces the hardness of the feed water to a value of < 0.1 °dH.
The softened water then passes through the hardness monitoring device 1X02 and the fine filter 1F01 to enter the RO unit.
The pump unit 1P01 pumps the water through the semipermeable membranes 1X01.x.at high pressure. As a result of the high pressure, some of the water diffuses through the membranes.
The result is purified water that is almost completely free of salts, colloids, germs and pyrogens. This water, which is led off, is referred to as **permeate**.
The salts that are held back are continually rejected into the wastewater channel with the **RO concentrate**. The control unit of the system monitors and controls all important functions during permeate production and downtime.

Contents of Chapter D

1 Set-up

1.1 Requirements for the set-up location

- The space required for the system may be derived from the measurements specified in Chapter C. In addition, there should be 1.0 m in front of the system and 0.8 m of space on each side available for operating and maintaining the system.
- The room in which the system is set up must meet the environmental conditions specified in Chapter C.
- The set-up surface must be even and run horizontally.
- The room must be well ventilated and not exposed to freezing temperatures.
- To avoid accumulation of spills caused by leaks, the area in which the system is set up must be equipped with a floor drain and /or a leak monitoring system and corresponding alarm.
- The necessary electrical connections must be available on the construction side (see Chapter C) and must be located no more than 2 m away from the system.
- The feed water connection must be provided with a shut-off valve.
- Depending on unit size, there must be control air connection.

1.2 Setting up the system

☞ Unpack the system.

☞ Check over the delivery for completeness and transport damage.
Any deviations or damage must be reported to the manufacturer immediately.

☞ Move the system carefully to the place provided for it with a suitable lifting device.

☞ The system must be set up on a proper surface in accordance with the requirements of Chapter C

2 Water-side connections

2.1 Necessary qualifications of the assembly staff

The water-side connection must only be made by trained professional staff members. Observe general regulations (in German-speaking countries, DIN, DVGW, SVGW and ÖKGW) as well as local installation requirements while installing the system.

2.2 Making the hydraulic connections

Feedwater

☞ Remove the sealing disks from the screw connection in the inlet.
(sealing disks are not present in systems with flange connections)

☞ Connect the inlet

Permeate

☞ Remove the sealing disks from the screw connection in the permeate outlet.
(sealing disks are not present in systems with flange connections)

☞ Connect the permeate outlet with the consumer line

Concentrate

☞ Remove the sealing disk from the concentrate outlet.
(sealing disks are not present in systems with flange connections)

☞ lay the concentrate outlet to the wastewater drain

Wastewater connection (if applicable)

☞ lay the wastewater outlet (HT-pipe) to the wastewater drain

Prevent recontamination!
Do not connect the concentrate outlet piping with the wastewater drain directly.

Caution

During standstill times of the system the maximum back pressure of 0.3 bar must not be exceeded. The cross section of permeate piping by customer may only be one nominal width greater than the permeate output piping of the system. At a back pressure > 0.3 bar and the risk of permeate backflow, a check valve has to be installed into permeate piping. It is only allowed to install a shut-off valve into permeate piping, if also a relief valve is installed.

3 Electrical connection

3.1 Necessary qualifications of the assembly staff

Danger

Electrical connection tasks may only be performed by an electrician in accordance with the applicable country-specific regulations.

3.2 Circuit diagram of the system

The circuit diagram of the system is located in the appendix of this operating manual.

3.3 Connecting the power supply

Danger

Before connecting the power supply, make certain that the corresponding main switch is turned off. Make the power supply connection in the control cabinet with a fixed connection according to the circuit diagram.

☞ When using three-phase alternating current, ensure that the direction of the rotating field and the direction of rotation of the pump are of right-hand rotation.

3.4 Connecting the accessories / signal exchange

Connections for the

– Product container level

– Forced stop

– Combined malfunction

should be made according to the circuit diagram.

Active analogue output at the unit´s controller; do not connect power (24 V DC) on the 4-20 mA analogue outputs.

Contents of Chapter E

1 Placing the system in service

1.1 Qualifications of the commissioning staff

Caution

The system must be placed in service by qualified professionals.

Before the system is placed in service, all screw connections must be retightened.

1.2 Placing the softener in service

For the start-up of the water-softening unit see the operating instructions in the appendix of this manual!

1.3 Rinsing out the preservative fluid

Caution

The preservative solution contains 1.5% sodium bisulfite, 20% glycerine and 2.5% sodium bicarbonate. The preservation fluid should be drained out into the run-off channel in accordance with applicable regulations governing pouring and draining.

- ☞ Connect the product permeate outlet with run-off channel
- ☞ Open valves 1V04 (if existing), 1V05 and 1V06 completely
- ☞ Open feed water
- ☞ Switch main-switch On
- ☞ Set the system into operation (see Chapter F) **and rinse for minimum 45 minutes**

The higher permeate conductivity during the rinsing of the system can cause a shutdown of the system.
In this case quit the malfunction (see Chapter F) and continue rinsing.

1.4 Adjusting the operating parameters

1.4.1 Installations without pump regulating valve 1V04

☞ Adjust concentrate flow (see chapter C) on 1Fl01 with valve 1V06

☞ Adjust permeate flow (see Chapter C) on 1Fl02 with valve 1V05

☞ If necessary adjust concentrate recirculation (see Chapter C) with valve 1V06

1.4.2 Installations with pump regulating valve 1V04

☞ Adjust valve 1V04 to middle position (50% open)

☞ Adjust concentrate flow on 1Fl01 (see chapter C) with valve 1V06

☞ Adjust concentrate recirculation on 1Fl03 (if existing - see Chapter C) with valve 1V05

☞ Adjust permeate flow on 1Fl02 (see Chapter C) with valve 1V04

☞ If necessary readjust concentrate recirculation (if existing) with 1V05 and concentrate flow with 1V06

☞ Record the operating data of the system on a log sheet (see Chapter H)

☞ Turn off the system

☞ Reconnect the permeate with the tank or consumer

Caution

Generally, when adjusting the unit, do not exceed max. permeate output and do not underrun min. amount of concentrate. In addition the following applies to units with permeate output ≥ 600 l/h; do not underrun min. amount of concentrate recirculation. In addition the following applies to units with permeate output of 120 - 500 l/h; do not exceed max. pump pressure.

The permeate output of the system depends on the particular feed water parameters like temperature, feed water pressure and salinity. For further information, see Chapter A/3.3.

1.5 Adjustments on blending device VSE

Adjustment of the amount of blending water for option VSE:

☞ with the start of pump 1P01 solenoid valve 1V14 opens

☞ adjust the amount of blending water on 1Fl14 with valve 1V15

The amount of soft water intended for blending must not exceed the max. permeate output of the unit.

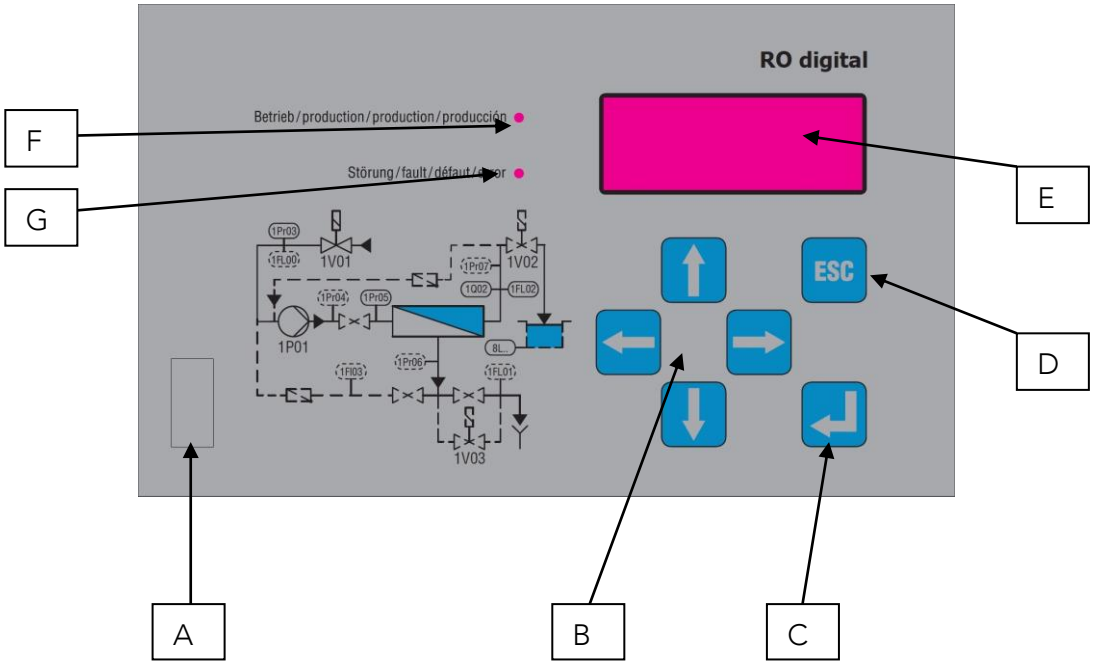
2 Taking the system out of service

Taking the system out of service refers to a down time of >30 days for the system. When the system is taken out of service, it must be preserved. For information on preserving the system, please see chapter I.

Contents of Chapter F

1 Operating and display components

1.1 Operating and display components RO digital



	Name	Function
A	Power switch	- Turns the system on and off ➔ only with casing for top mounting
B	← ↑ → ↓	- Password entry - Menu selection - Selection
C	↵	- Confirmation of entries - Brings up a menu
D	ESC	- Quit menu - Quit malfunctions
E	Display	Displays: - current operating state - permeate conductivity / temperature - operating hours - flow rates - pressures - output states - current malfunctions
F	Operation LED (green)	System in operation
G	Malfunction LED (red)	Active malfunction

For additional information on the function and operation of the RO digital control unit, please refer to the RO digital control unit manual in the appendix of these Operating Instructions. For special machines the test report in the control cabinet should be noted.

2 Operating states

2.1 Off

- System off (all outputs inactive).
- Malfunction recording off.

2.2 Operating

2.2.1 Start

- 1V01 input valve opened
- 1P01 pump in operation
- 1V02 permeate valve (when existing) closed

Permeate is being rejected.

2.2.2 Production

- 1V01 input valve opened
- 1P01 pump in operation
  For frequency converter pumps with Option PKR:
  RO-pump 1P01 controlled to constant permeate flow.
- 1V02 permeate valve (when existing) opened

System is producing permeate.

2.2.3 Concentrate rinsing

- 1V01 input valve opened
- For P030= Displacement: 1P01 pump not in operation
  For P030= Flushing: 1P01 pump in operation
- For P280= with overflow: 1V02 permeate valve (when existing) opened
  For P280= without overflow: 1V02 permeate valve (when existing) closed
- 1V03 concentrate valve (when existing) opened

After time P031 elapses, switch over to Standby.

2.2.4 Standby

Upper level input (terminal 22, 23) opened

System in standby until request about level active again

2.2.5 Discontinous rinsing

Time-controlled forced production if the operating state STANDBY has been active for the set time (P042).

2.3 Disinfection

System is in operation, **without any safety devices**.

- 1V01 input valve opened
- 1P01 pump in operation
  For frequency converter pumps with Option PKR:
  RO-pump 1P01 controlled to constant permeate flow.
- 1V02 permeate valve (when existing) opened

System is in operation, **without any safety devices**.

2.4 Rinsing

System is in rinsing, **without any safety devices**.

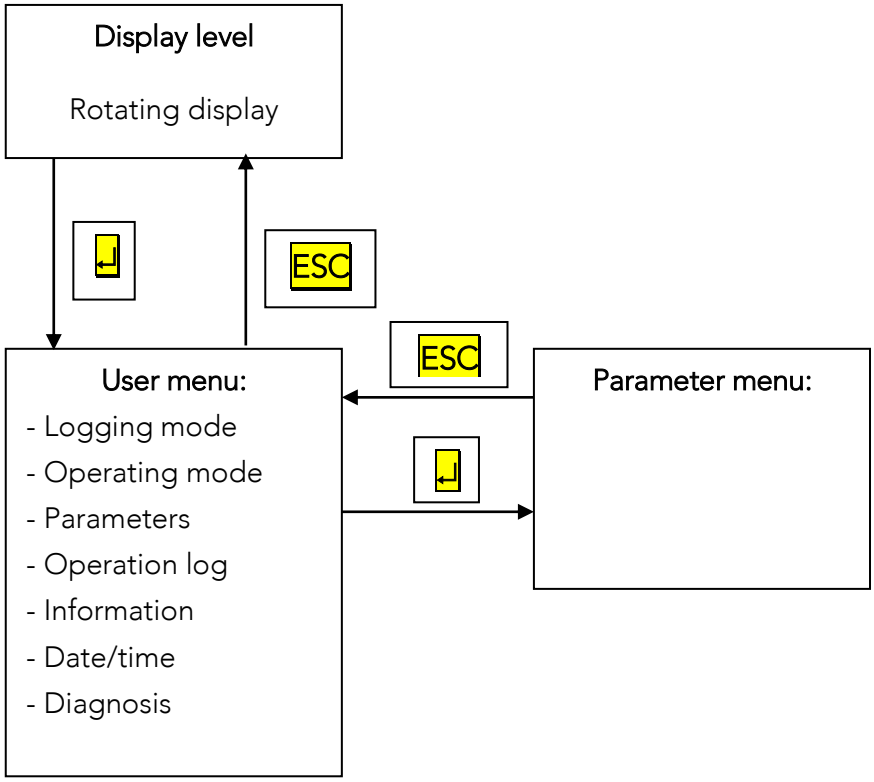
- 1V01 input valve opened
- 1P01 pump not in operation
- 1V03 concentrate valve (when existing) opened

System is in operation, **without any safety devices**.

3 Brief description of the RO digital control system

In the single chapters images of the visualization of the control system are used to illustrate the operation of the unit. The settings and values shown there are examples and are **not** applicable to an actual unit and its controller and visualization.

3.1 Menu structure



3.2 Access Authorisation

The menu items Parameters and Diagnostics, resp. the functions and settings therein are secured by a 4-digit, numeric password.
Accordingly, a distinction is made between the following two hierarchical access levels (password levels).

Access level	Name of level	Pre-set password	Password necessary for...
B	operator	„1234“	refer to chapter 9.2 in RO digital control unit manual
T	technician	„3456“	

If a password is asked for, it must be entered and confirmed with the ↵-key.

If a wrong password is entered, the menu level will not be displayed.

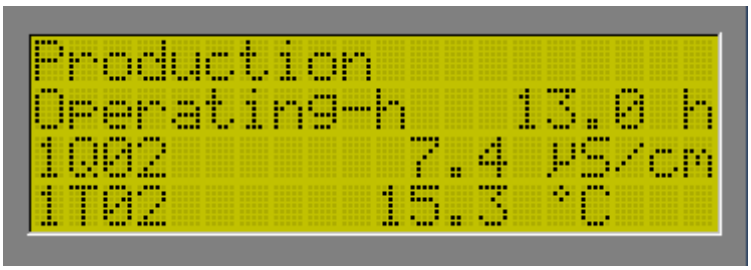
Press the ESC key to quit.

3.3 Display level (rotating display)

The integrated process visualisation allows the activated units (pump 1P01; valves 1V01, 1V02, 1V03; pressure switches 1PR03, 1Pr04, 1Pr05, 1Pr06; flow rates 1Fl00, 1Fl01, 1Fl02, 1Fl03) to be displayed on the screen. Inactive units bear a dash (–) or are not shown at all.

Note!

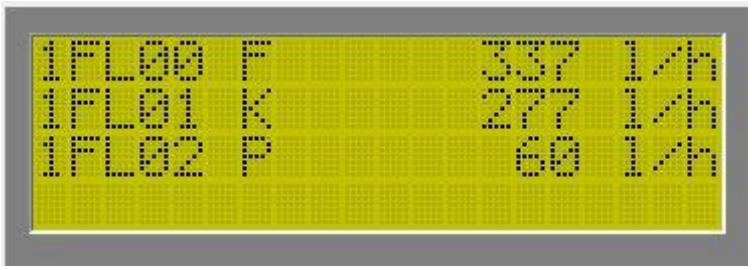
The display can be switched from rotating to fixed by using the buttons ↑ and ↓.



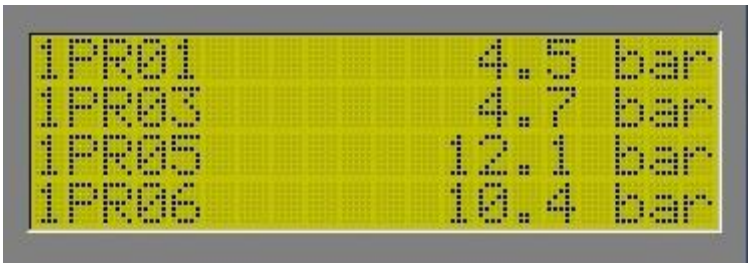
current operating state

operating hours

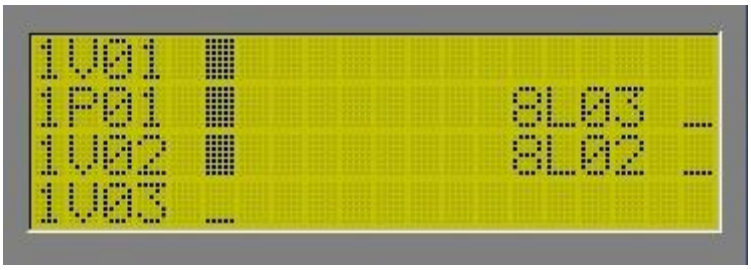
permeate conductivity and temperature r



currently measured flow rates.



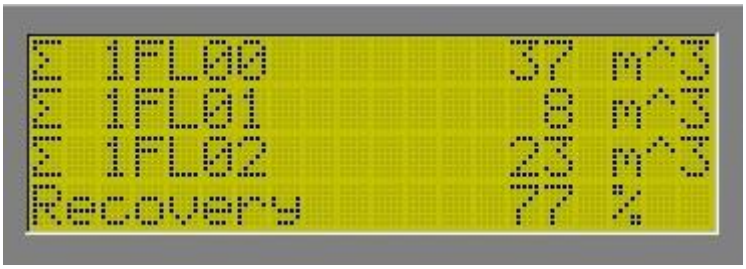
currently measured pressures.



Switching status:

_ Unit not active,

▮ Unit active.



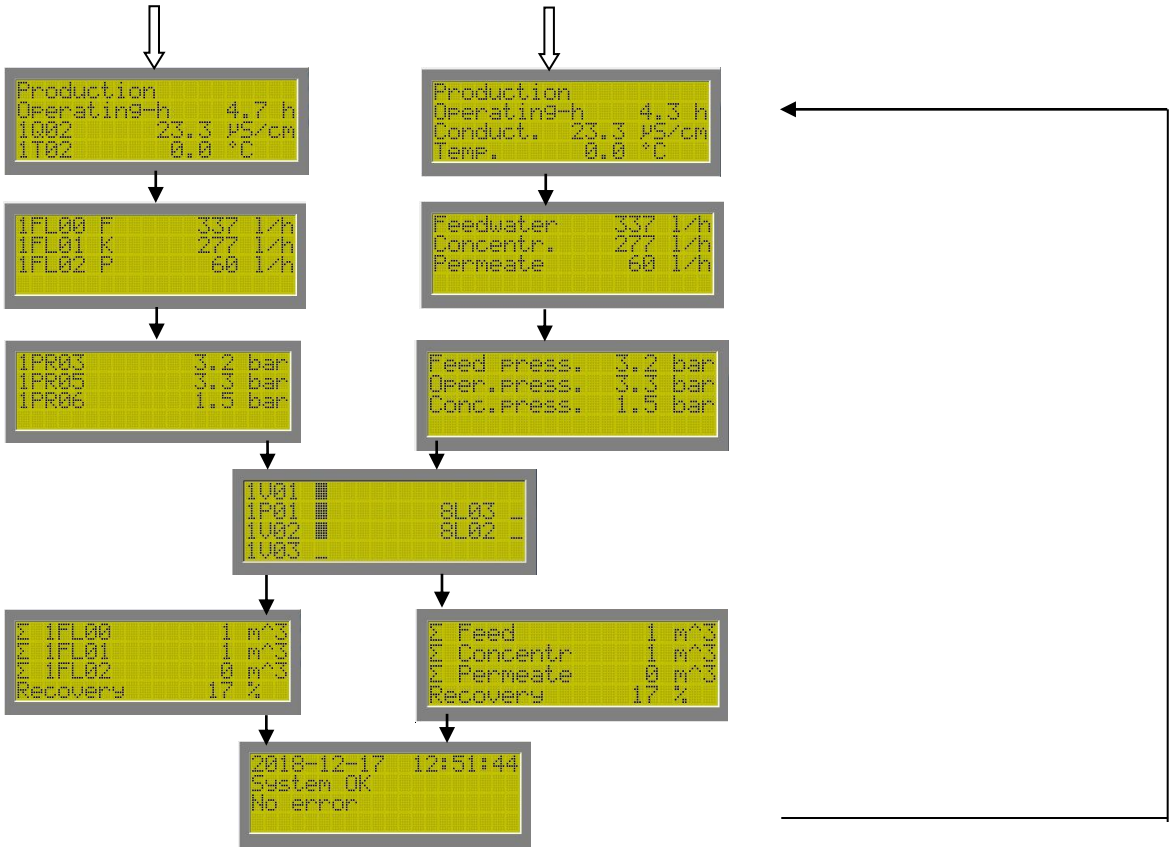
Flow volumes and recovery rate.

current date/ time, actual malfunctions.

3.3.1 Display level in plain text depiction

Below you will find explanations on the differences of the set display languages:

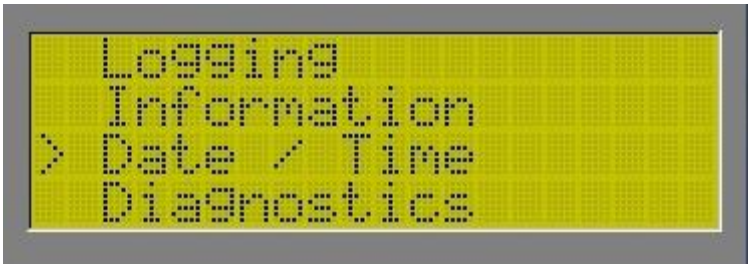
Display language: English Display language: GB-text



3.4 User-Level

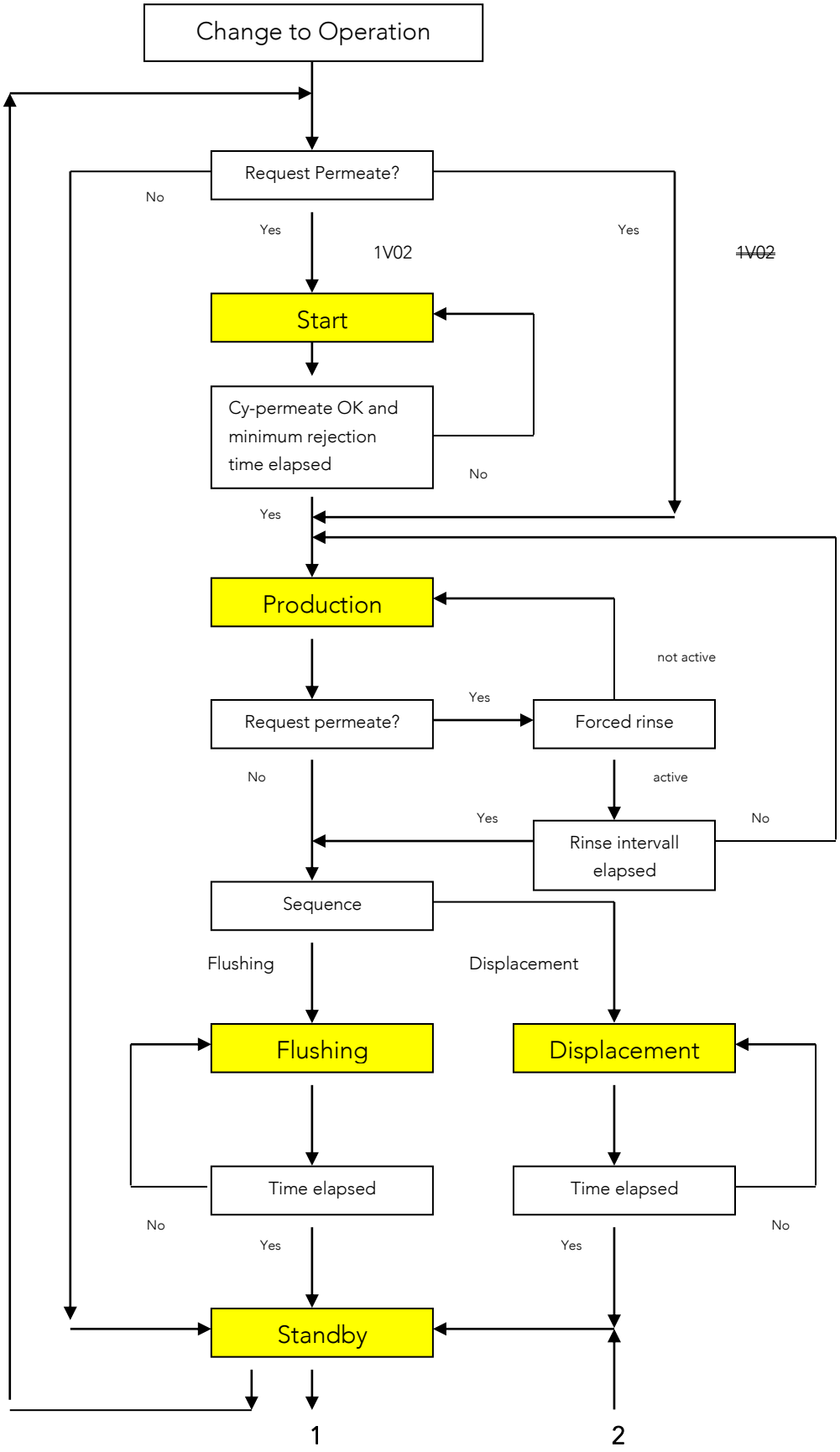
To get into user-level press the ↵-key.

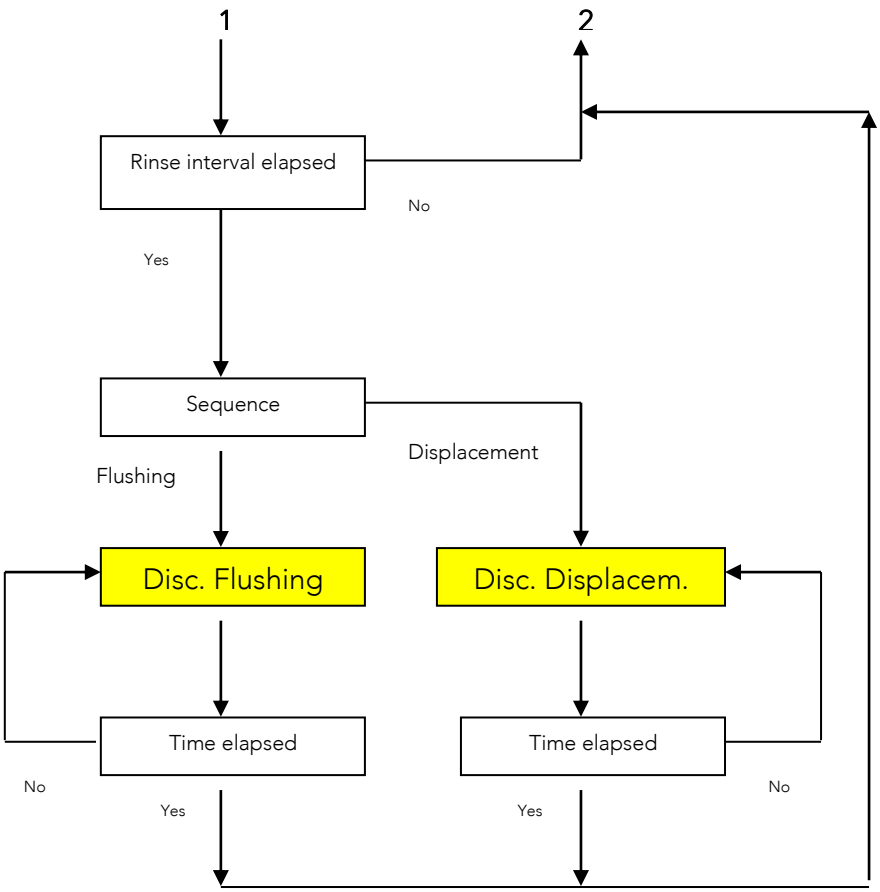
- Logging mode
- Change of operation states
- Selection of parameter level
- Selection of logging



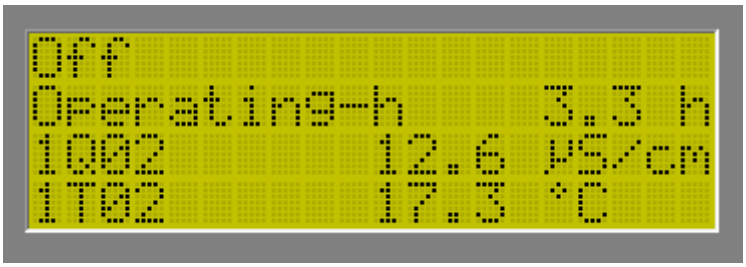
- Selection of information menu
- Setting date and time
- Selection of diagnostics menu

3.5 Functional diagram



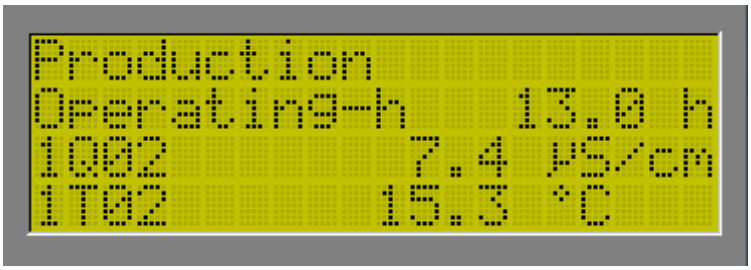

1
2
Rinse interval elapsed
No
Yes
Sequence
Displacement
Flushing
Disc. Flushing
Disc. Displacem.
Time elapsed
Time elapsed
No
Yes
Yes
No

3.6 Turning on



➔ System is running

3.7 Turning off



➔ System is shut-off

Contents Chapter G

1 General information

The use of high-quality individual components and installing safety and monitoring equipment in our systems allows us to reach a very high level of operational availability.
If an operating malfunction should nevertheless arise, the error can easily be detected using the following malfunction table and the cause eliminated.
If serious malfunctions occur, please contact the manufacturer (see rating plate).

Only qualified professional personnel with the appropriate training should eliminate malfunctions, taking into consideration the safety requirement in Chapter A of these Operating Instructions!
Power must be disconnected from the system before beginning these tasks, and the system must be protected to ensure it is not turned on again unintentionally!
Pressure must be released from all lines.

1.1 Malfunction message to the manufacturer

To ensure effective help in resolving malfunctions, please have the following information on hand:

- Manufacturing number
- Item number
- System type
- Log sheets and maintenance records of the last 4 months

1.2 Malfunction display

- - Red malfunction LED on the control system
- - Malfunction message appears on the display

1.3 Malfunction reset

☞ ESC

Malfunction pump with frequency converter (if existing)

☞ Switch off and restart main switch

1.4 Malfunction table

Note!
According to language setting the fault message is displayed in plain text as shown in brackets hereafter.

Malfunction	Cause	Remedy
Control display dark	Power supply interrupted	Make power supply connection
	Fuse F100 (2A) defective	Replace the fuse in question
	Fuse F101 (0,5A) defective	
	Flat band cable between the motherboard and the display unplugged	Unscrew the front plate and plug the cable back in
	Control system defective	Replace the control system
Motor protection/ Hard water display:	Hard water sensor triggered (if present)	- Check the soft water quality - Check the sensor and replace if necessary
	Wire jumper defective	Restore the wire jumper
	Motor protection switch triggered (if present)	- Check the adjustment of the motor protection switch - Check the motor
	Fault pump with FC (if present)	- Check the Motor - Switch off main switch
1Pr03 (Feed pressure low) ▼▼▼; Pressure 1Pr03<P073.1 display: **	Feed water pressure too low	- Check the pressure difference on the softener - Increase the feed water pressure
	Filter blocked	Replace the filter cartridge
	Pressure switch defective	Replace the pressure switch
	1V01 input valve defective	Replace the valve
1Q02 (High conductivity) ▲▲▲; 1Q02>P174 display:	Conductivity of feed water too high	Calculate desalinization rate Target: > 97%
	Desalinization rate too low	After consultation with the manufacturer: - Clean RO modules - Replace RO modules
UBATT ▼▼▼ display:	Battery flat	Replace battery
RTC failure display:	Real-time clock defective	- Reboot controller - Replace controller
Watchdog failure display:	Microcontroller defective	- Reboot controller - Replace controller
Keybord failure display:	Keyboard defective	- Reboot controller - Replace controller

**1V01 input valve opened, 1P01 pump not in operation, 1V02 permeate valve (when existing) opened. If pressure returns, system restarts automatically after 1 min. With every returning malfunction, restart time will be doubled to max. 32 min. Time delay will be reset by pressing ESC-key.

Malfunction	Cause	Remedy
System is not producing permeate	System in STANDBY even though the permeate tank is empty	Level switch defective
	System in PRODUCTION	- Pump defective - Fuse F300 defective
	Display EXTERN STOP	Connected softener is in regeneration
1Pr03 (Feed pressure high) ▲▲▲; Pressure 1Pr03>P077	Feed water pressure too high	- Check the feed booster unit - Reduce feed water pressure, if necessary, install pressure regulator into the supply water line
	Pressure switch defective	Replace pressure switch
1Fl02 (Fault permeate low) ▼▼▼; 1Fl02<P144 display:	Feed water temperature too low	Calculate permeate output according to Chapter A3.3
	Permeate counterpressure too high	Check permeate line
	Modules blocked	After consultation with the manufacturer: - Clean RO modules - Replace RO modules
	Pump defective	Replace pump
	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
Red LED at FC-pump	Malfunction of frequency-controlled pump	- check motor - switch off main switch and switch on again
1Fl02 (Fault permeate high) ▲▲▲; 1Fl02>P145 display:	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
1Fl01 (Fault concentr. Low) ▼▼▼; 1Fl01<P134 display:	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
1Fl01 (Fault concentr. High) ▲▲▲; 1Fl01>P135 display:	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
1Fl03 (Fault recirc. Low) ▼▼▼; 1Fl03<P154 display:	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
1Fl03 (Fault recirc. High) ▲▲▲; 1Fl03>P155 display:	Valve position changed	Re-adjust unit
	Flow sensor defective	Replace flow sensor
1Pr01 (Supply pressure high) ▲▲▲; 1Pr01>P063 display:	Feed water pressure too high	- Check the feed booster unit - Reduce feed water pressure, if necessary, install pressure regulator into the supply water line
	Pressure sensor defective	Replace pressure sensor

Malfunction	Cause	Remedy
1Pr04 (Pump pressure high) ▲▲▲; 1Pr04>P083 display:	Pump regulating valve closed	- Check the feed booster unit - Reduce feed water pressure, if necessary, install pressure regulator into the supply water line
	Pressure sensor defective	Replace pressure sensor
	Modules blocked	After consultation with the manufacturer: - Clean RO modules - Replace RO modules
1Pr05 (Oper. pressure high) ▲▲▲; 1Pr05>P093 display:	Valve position changed	Re-adjust unit
	Pressure sensor defective	Replace pressure sensor
	Modules blocked	After consultation with the manufacturer: - Clean RO modules - Replace RO modules
1Pr07 (Perm. pressure high) ▲▲▲; 1Pr07>P113 display:	Permeate counterpressure too high	Check permeate line
	Pressure sensor defective	Replace pressure sensor

Contents of Chapter H

1 Maintenance and monitoring tasks

1.1 Safety information


Caution

The operator must ensure that all maintenance, monitoring and assembly tasks are performed by authorized and qualified trained personnel.
The system must be shut down and protected from being placed in operation again unintentionally before all repair and maintenance tasks.


Warning

Before beginning tasks on the electrical systems and equipment, a check must confirm that power has been disconnected from the system. In addition, the system must be secured to prevent it from being turned on again unintentionally.
Protective clothing suitable for the hazard at hand must be worn while performing the maintenance tasks.
Immediately after the maintenance tasks are completed, all safety and protective equipment must be set back in place and functionality restored.

1.2 General information

To ensure long-term problem free operation of the system, maintenance tasks must be performed at regular intervals and a record must be kept of operating parameters! The record of operating parameters and maintenance tasks should be kept by the operator of the system himself.

Signing a maintenance contract with the supplier makes it possible for the supplier to take over the responsibility of performing regular maintenance tasks on the system. A record book should be kept to record operating parameters. It is located in the appendix of these operating instructions. The purpose of this record keeping is to have continuous documentation of the operating parameters. This makes it easier to detect a drop in output or incorrect functionality of the system and then to eliminate the problem.
The documentation of maintenance tasks should be kept on the maintenance log that is provided for this purpose.

2 Logging operating parameters

The following parameters must be checked and recorded **weekly**:

Parameter	Measurement point/remarks
Hardness feed water	Check with the hardness kit on the 0V01 tap, resp. 0V02
Conductivity of feed water	Measurement with conductivity measuring instrument
pH value/ Temperature of feed water	Measurement with pH value indicator
Residual hardness in soft water	Measurement with the hardness kit on the 1V07 tap
Stock of salt in the brine tank	Check stock of salt and refill. Refill-interval depends on flow quantity.
Filter/fine filter outlet pressure	0Pr02 / 1Pr02 pressure gauge
Operating hours	Control display
Conductivity of soft water	Verification with conductivity measurement device
Temperature of soft water	Verification with conductivity measurement device
Fine filter inlet pressure	1Pr01 control display
Fine filter outlet pressure	1Pr02 control display
Operating pressure	1Pr05 control display
Concentrate pressure (if existing)	1Pr06 control display
Permeate output	1FI02 control display
Concentrate output	1FI01 control display
Concentrate recirculation (if existing)	1FI03 control display
Conductivity of permeate	Control display
Temperature of permeate	Control display
Desalinization rate	For calculation see Chapter A 3.3
Absence of leaks in the system	

Minor fluctuations in the (conductivity of permeate and permeate output) are normal. The effect of the temperature or a fluctuating conductivity in supply water may be reasons for this.

When the desalinization rate drops below 95% or there is a drop in permeate output of about 10%, a concentrate rinse should be performed (see 3.2).

3 Maintenance

Maintenance tasks should be performed when needed, but no less often than at the maintenance specified intervals!

3.1 Maintenance tasks

The following maintenance task should be performed:

System part	Task to be performed	Maintenance interval
Filter (0F01/1F01)	☞ shutdown the system ☞ remove the filter housing ☞ replace the filter cartridge ☞ screw the housing firmly	-3 months -if the pressure drops by 0.8 bar
Pressure switch	Functional test by blocking the feed water inlet → RO has to switch off	-6 months
system disconnector	☞ check for leakages visually ☞ Functional test by blocking the feed water inlet →the middle part of the system disconnector body has to discharge	-6 months
Sensor hardness monitoring device	Replace sensor	- 12 months - after triggering of sensor
- Conductivity cell(s) - pH-sensor (if existing)	Check of parameters with reference device, if necessary new calibration	- on start-up - 1 year - if quality of feed water changes
Filter mat for control cabinet fan (if existing)	Check fouling factor and clean as required	- 1 month
	Replace filter mat	- 6 month
- Rotary vane pump, 230V/ 0,25 and 0,55kW (if existing)	Exchange of pump	- 8000 working hours
Softening unit	see Operating Instructions in the appendix	
Accessories	see Operating Instructions in the appendix	

3.2 Performing a concentrate rinse (water brushing)

During a concentrate rinse, the increase in the flow of concentrate flows more strongly through the membrane(s). Because of this, soluble accretions are more readily removed and rinsed out.

The duration of a "water brushing" should be at least 60 minutes, and it should be performed as follows:

- ☞ Log record of actual values
- ☞ Open the 1V06 concentrate valve
- ☞ Open the 1V05 pressure control valve
- ☞ Allow to rinse for at least 60 minutes
- ☞ Adjust the operating parameters to the target values
- ☞ Wait for 10 minutes
- ☞ Log record of actual values

Note:

If the conductivity of permeate does not improve permanently after a concentrate rinsing, a chemical cleaning of the membranes must be performed.

In this case, it is essential to contact the supplier to agree upon the further procedure!

Log sheet Softening unit

Customer: _____System Type: _____
Item No: _____Placed in service on: _____

Parameter	Value PID/ Measuring point	Value	Values when placed in service	Date	Date	Date	Date
Hardness feed water	0V01, resp. 0V02	°dH					
Conductivity feed water	0V01, resp. 0V02	°µS/cm					
pH value	0V01, resp. 0V02						
Temperature of feed water	0V01, resp. 0V02	°C					
Residual hardness in soft water	0V07	°dH					
Stock of salt in the brine tank	0X02	-					
Filter/fine filter outlet pressure	0Pr02/ 1Pr02	bar					

Log sheet RO- unit

Customer: _____System Type: _____
Item No: _____Placed in service on: _____

Parameter	Value PID/ Measuring point	Value	Values when placed in service	Date	Date	Date	Date
Operating hours	Display Control	h					
Residual hardness of soft water	1V07	°dH					
Conductivity of soft water	1V07	µS/cm					
Temperature of soft water	1V07	°C					
Fine filter inlet pressure	1Pr01	bar					
Fine filter outlet pressure	1Pr02	bar					
Operating pressure	1Pr05	bar					
Concentrate pressure	1Pr06	bar					
Permeate output	1FI02	l/h					
Concentrate output	1FI01	l/h					
Concentrate recirculation (if existing)	1FI03	l/h					
Conductivity of permeate	Display Control	µS/cm					
Temperature of permeate	Display Control	°C					
Desalinization rate	-	%					
Hose connections	-	-					
Absence of leaks in the system	-	-					

Note:
Values of commissioning have to be logged, in order of further performance evaluation of the unit. Log the values weekly in **copies** of this log sheet. If there are **deviations** of more than **15%** to the commissioning values (e.g. operation pressure, differential pressure, permeate performance, desalination rate), the **supplier** has to be **contacted.**

Maintenance log

Customer: _____ **System type:** _____

_____ **Item No.:** _____

_____ **Placed in service on:** _____ **CW** _____

1. Quarter / year: _____

System part	CW 1	CW 2	CW 3	CW 4	CW 5	CW 6	CW 7	CW 8	CW 9	CW 10	CW 11	CW 12	CW 13
Fine filter													
Pressure switch													
System disconnector													
hardness monitoring device													
Conductivity cell pH-sensor (if existing)													
Filter mat for control cabinet fan (if existing)													
Rotary vane pump, 230V/ 0,25 and 0,55kW													
Softening unit													
Accessories (if existing)													

Note: Each maintenance task must be documented with a date and the initials of the person performing the task.

Maintenance log

Customer: _____ **System type:** _____

_____ **Item No.:** _____

_____ **Placed in service on:** _____ **CW** _____

2. Quarter / year: _____

System part	CW 14	CW 15	CW 16	CW 17	CW 18	CW 19	CW 20	CW 21	CW 22	CW 23	CW 24	CW 25	CW 26
Fine filter													
Pressure switch													
System disconnector													
hardness monitoring device													
Conductivity cell pH-sensor (if existing)													
Filter mat for control cabinet fan (if existing)													
Rotary vane pump, 230V/ 0,25 and 0,55kW													
Softening unit													
Accessories (if existing)													

Note: Each maintenance task must be documented with a date and the initials of the person performing the task.

Maintenance log

Customer: _____ **System type:** _____

_____ **Item No.:** _____

_____ **Placed in service on:** _____ **CW** _____

3. Quarter / year: _____

System part	CW 27	CW 28	CW 29	CW 30	CW 31	CW 32	CW 33	CW 34	CW 35	CW 36	CW 37	CW 38	CW 39
Fine filter													
Pressure switch													
System disconnector													
hardness monitoring device													
Conductivity cell pH-sensor (if existing)													
Filter mat for control cabinet fan (if existing)													
Rotary vane pump, 230V/ 0,25 and 0,55kW													
Softening unit													
Accessories (if existing)													

Note: Each maintenance task must be documented with a date and the initials of the person performing the task.

Maintenance log

Customer: _____ **System type:** _____

_____ **Item No.:** _____

_____ **Placed in service on:** _____ **CW** _____

4. Quarter / year: _____

System part	CW 40	CW 41	CW 42	CW 43	CW 44	CW 45	CW 46	CW 47	CW 48	CW 49	CW 50	CW 51	CW 52
Fine filter													
Pressure switch													
System disconnector													
hardness monitoring device													
Conductivity cell pH-sensor (if existing)													
Filter mat for control cabinet fan (if existing)													
Rotary vane pump, 230V/ 0,25 and 0,55kW													
Softening unit													
Accessories (if existing)													

Note: Each maintenance task must be documented with a date and the initials of the person performing the task.

Content of Chapter I

1 Preserving the system

1.1 General points

After 12 months at most the preserving agent should be flushed out and replaced if necessary.

When the system is shut down for more than 30 days, it must be preserved.

When it is put into operation again, please follow the procedure described in chapter E of this operating manual.

Preservation / Cleaning is carried out by shut down of the system.

With 2 pass RO-systems, every stage will be preserved and cleaned separately.

With 2 pass RO-systems the components of the 2nd stage are designated wit "2" after the aggregate designation. For example the pressure regulating valve of stage 1 is 1V05, the pressure regulating valve of stage 2 is 1V25.

With systems of type combi (C=single water-softening unit) or (CD= duplex water-softening unit) only the RO-part is preserved. The softener will not be preserved.

Warning

The preservative solution contains 1.5% sodium bisulfite, 20% glycerine and 2.5% sodium bicarbonate. The preserving solution should be fed into the drain in accordance with the directives that apply in the given case.

1.2 Preserving options

- Sodium bisulphite: preserving without antifreeze
- Sodium bisulphite + glycerine: preserving with antifreeze to a temperature of 10°C
- ready-to-use preserving agent incl. antifreeze (item. no. 530055)

1.3 Materials required

- Preserving tank with locking valve
- Connecting tubes
- Preserving/neutralization chemicals: sodium bisulphite (item no. 530058), glycerine (item no. 530024) and sodium bicarbonate (item no. 530197)
- Protective clothing (goggles, gloves, apron)

1.4 Connecting the preservation tank

- ☞ Switch off system
- ☞ Close the feed water inlet
- ☞ Set up the preservation tank (9B01) at a height to ensure that the preserving solution will flow into the RO system by gravity
- ☞ Close valves (9V01) at the preservation tank
- ☞ Detach the cut-off pipes at the feed water inlet, the permeate pipe and the concentrate pipe of the RO system
- ☞ The connecting tubes should be connected as follows:
    - Connect the outlet from the preservation tank with the feed water cut-off point of the RO system
    - Set up a tube connection between the preservation tank and the concentrate cut-off point of the RO system
    - Set up a tube connection between the preservation tank and the permeate cut-off point of the RO

1.5 Preparing the preserving solution

Danger of fumes!

In handling cleaning chemicals, please have regard to the general instructions for avoidance of accidents and to what is stated in the relevant safety data sheet.

When pouring the chemicals into the preservation tank, protective clothing should be worn – protective goggles, rubber gloves and rubber apron.

- ☞ Charge the preservation tank with a quantity of soft water as specified in the table (see 1.7, depending on the size of the system).
- ☞ Check that the connections are adequately sealed.
- ☞ Prepare the preserving solution by adding the chemical sodiumbicarbonate ($NaHCO_3$), according to table 1.7, to the already filled in water in the preservation tank. Dissolve by stirring constantly.
- ☞ add the chemical sodiumbisulfite ($NaHSO_3$), according to table 1.7, in portions, stir constantly in order to prevent foaming
- ☞ add glycerine, according to table 1.7, stir constantly to homogenize the batch
- ☞ resp. fill the preservation tank with the ready-to-use preserving agent incl. antifreeze (item. no. 530055)

Important:

Chemicals should be added with caution – stir constantly.

1.6 Executing the preservation procedure

- ☞ Open the 1V06 concentrate-regulation valve and the 1V05 pressure-regulation valve completely
- ☞ Open the locking valve (9V01) on the preservation tank
- ☞ Switch the RO system to "Disinfection" operating mode (see control manual)

Warning

Attention:

System running without any safety devices.

- ☞ Let the preserving solution circulate for ten minutes
- ☞ Switch off the RO system (see control manual)
- ☞ Close the locking valve (9V01) on the preservation tank
- ☞ Detach the tube connections
- ☞ Close off feed water input and permeate and concentrate outlets with sealing disks
- ☞ Dispose of preserving solution (see 1.1 "General points")

1.7 Composition of the preserving solution

	Permeate output of the system (l/h)	**Soft water supply** (l)	**Sodium bisulphite powder** (kg)	**Glycerine** (l)	**Sodium-bicarbonate** (kg)
item no.			530 058	530 024	530 197
conc. of chemicals			97%	86,5%	
conc. in preserving solution			1,5% w/w	20% v/v	2,5% w/w
	- 500	20	0,39	5,8	0,63
	550 - 1500	50	0,97	14,5	1,6
	1550 - 3500	100	1,93	29,0	3,1
	3550 - 9500	200	3,87	58,0	6,25
	9550 -12.000	250	4,84	72,5	7,8
	12.050 - 17.000	300	5,80	87	9,4
	17.050 – 20.000	400	7,74	116	12,5
	20.050 - 30.000	500	9,67	145	15,6

The pH value of the preserving solution is about 7.

2 Cleaning the system

2.1 General points

If the conductivity of the permeate rises by as much as 15%, or if the permeate output falls by as much as 10%, it is recommended that the membrane modules should be cleaned.

There is a distinction to be made between two types of cleaning:

1.) Acid cleaning to remove carbonate and iron deposits

2.) Alkali cleaning to remove organic impurities and silica scaling

Generally cleaning should be carried out in the following sequence: alkali → acid
Please discuss the type of cleaning with the manufacturer before carrying it out.

Warning

Cleaning solution shall be disposed with in adherence to the local or country-specific requirements.

2.2 Materials required

- ☞ Cleaning tank with locking valve
- ☞ Three connecting tubes
- ☞ Universal indicator paper, pH 0-14 (art. no. 630074)
- ☞ Preserving/ neutralising chemicals (see 2.6 "Cleaning solutions")
- ☞ Conductivity measurement device for comparative measurement
- ☞ Protective clothing (goggles, gloves, apron)

2.3 Connecting the cleaning tank

☞ see section 1.4

2.4 Preparing the cleaning solution

Danger of fumes!

In handling cleaning chemicals, please have regard to the general instructions for avoidance of accidents and to what is stated in the relevant safety data sheet.

When pouring the chemicals into the cleaning tank, protective clothing shall be worn – protective goggles, rubber gloves and rubber apron.

- ☞ Charge the cleaning tank with the quantity of soft water specified in the table.
- ☞ Check that the connections are adequately sealed
- ☞ Prepare the cleaning solution by adding the chemicals (as shown on table 2.6) to the cleaning tank.

Important

Chemicals should be added with caution – stir constantly.

2.5 Executing the cleaning procedure

- ☞ Switch off the system
- ☞ Close the feed water inlet

Charging the system with the cleaning solution

- ☞ Open the 1V06 concentrate-regulation valve and the 1V05 pressure-regulation valve completely
- ☞ Open the locking valve (9V01) on the cleaning tank 9B01
- ☞ Switch the RO system to "Disinfection" operating mode (see control manual)

Attention:

System running without any safety devices.

Application time for cleaning solution to be effective

- ☞ Let cleaning solution circulate for between 30 and 60 minutes
- ☞ Switch off RO system (see control manual)
- ☞ Close locking valve (9V01) on the cleaning tank
- ☞ Take notice of the sufficient contact time of 12h for the alkaline cleansing agent A12
- ☞ Dispose of cleaning solution (see 1.1, "General points")

Flushing out the system

- ☞ Open feed water inlet
- ☞ Switch RO system to "Disinfection" operating mode (see control manual)
- ☞ Flush out the system for at least 45 minutes. The flushing fluid that accumulates, may be discarded batch wise (see 1.1, "General points")
- ☞ Switch off RO system (see control manual)
- ☞ Detach the connecting tubes
- ☞ Reconnect the feed water inlet and permeate- and concentrate-outlets

Warning

Do not terminate the cleaning procedure until the pH value of the concentrate is the same as the pH value of the feed water. The typical pH-value after neutralisation is about 6.5-9.

The temperature of the cleaning solution must not exceed 35° C.
If the pH value shows no further change between the input and outflow of the cleaning solution, the cleaning procedure may be terminated.

If cleaning of the RO-unit is carried out via a manual cleaning unit (MRA) , each component of the MRA (incl. pump) shows resistance against the cleansing detergents mentioned here.

Warning

Nevertheless, the MRA has to be rinsed clear after each cleaning. Use water to flush out any detergent residues. Finish rinsing when the rinsing water shows pH-neutrality.

2.6 Cleaning solutions

2.6.1 Acid cleaning

			optimal
	Permeate output of the system (l/h)	**Soft water supply** (l)	**Cleansing agent S2** (kg) alternatively citric acid
item no.			**530 183**
conc. of chemicals			100%
	- 500	50	1,0
	550 - 1500	100	2,0
	1550 - 3500	200	4,0
	3550 - 9500	300	6,0
	9550 -12.000	400	8,0
	12.050 - 17.000	500	10,0
	17.050 – 20.000	700	14,0
	20.050 - 30.000	1000	20,0

The pH value of the cleansing agent solution is about 2.
It should not be allowed to fall below this level.
Note the safety data sheet of the cleansing agent.

2.6.2 Alkali cleaning

			optimal		alternatively	
			normal fouling	**heavy fouling**		
	Permeate output of the system (l/h)	**Soft water supply** (l)	**Cleansing agent A12 1%** (kg)	**Cleansing agent A12 2%** (kg)	**Sodium-dodecylsulfate** (g)	**NaOH flakes** (g)
item no.			530 177	530177	530 021	530027
conc. of chemicals			100%	100%	90%	100%
	- 500	50	0,5	1,0	15	50
	550 - 1500	100	1,0	2,0	30	100
	1550 - 3500	200	2,0	4,0	60	200
	3550 - 9500	300	3,0	6,0	90	300
	9550 -12.000	400	4,0	8,0	120	400
	12.050 - 17.000	500	5,0	10,0	150	500
	17.050 – 20.000	700	7,0	14,0	210	700
	20.050 - 30.000	1000	10,0	20,0	300	1000

Warning

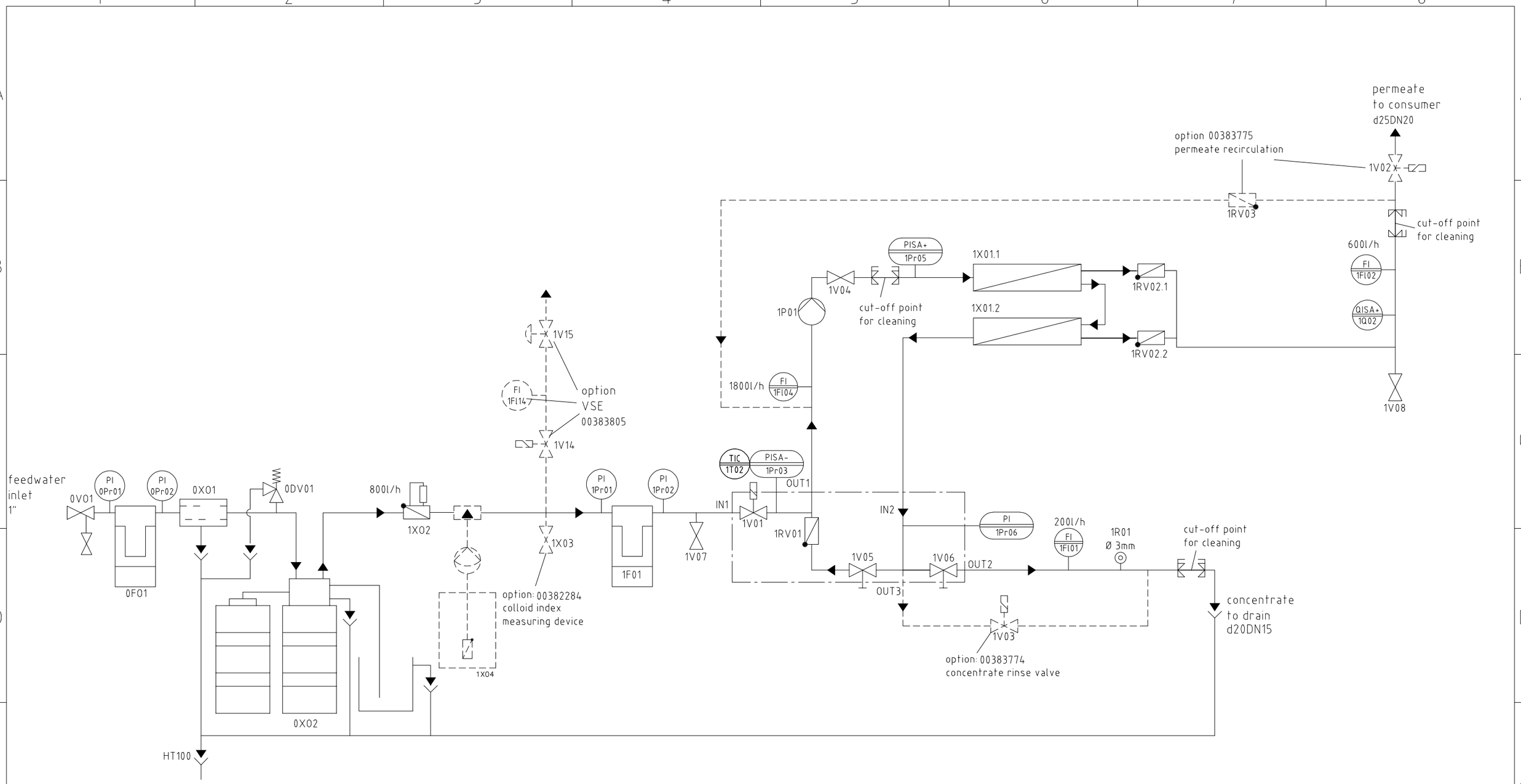
The pH value of the cleansing agent solution is about 12.
It should not be allowed to fall below this level.
Note the safety data sheet of the cleansing agent.

Note the following advices for the application of cleansing agent A12.
The sufficient contact time for the alkaline cleansing agent A12 is 12h.
After cleaning procedure use either cleansing agent S2 or citric acid for neutralization. The typical pH value after neutralization is about 6.5-9.

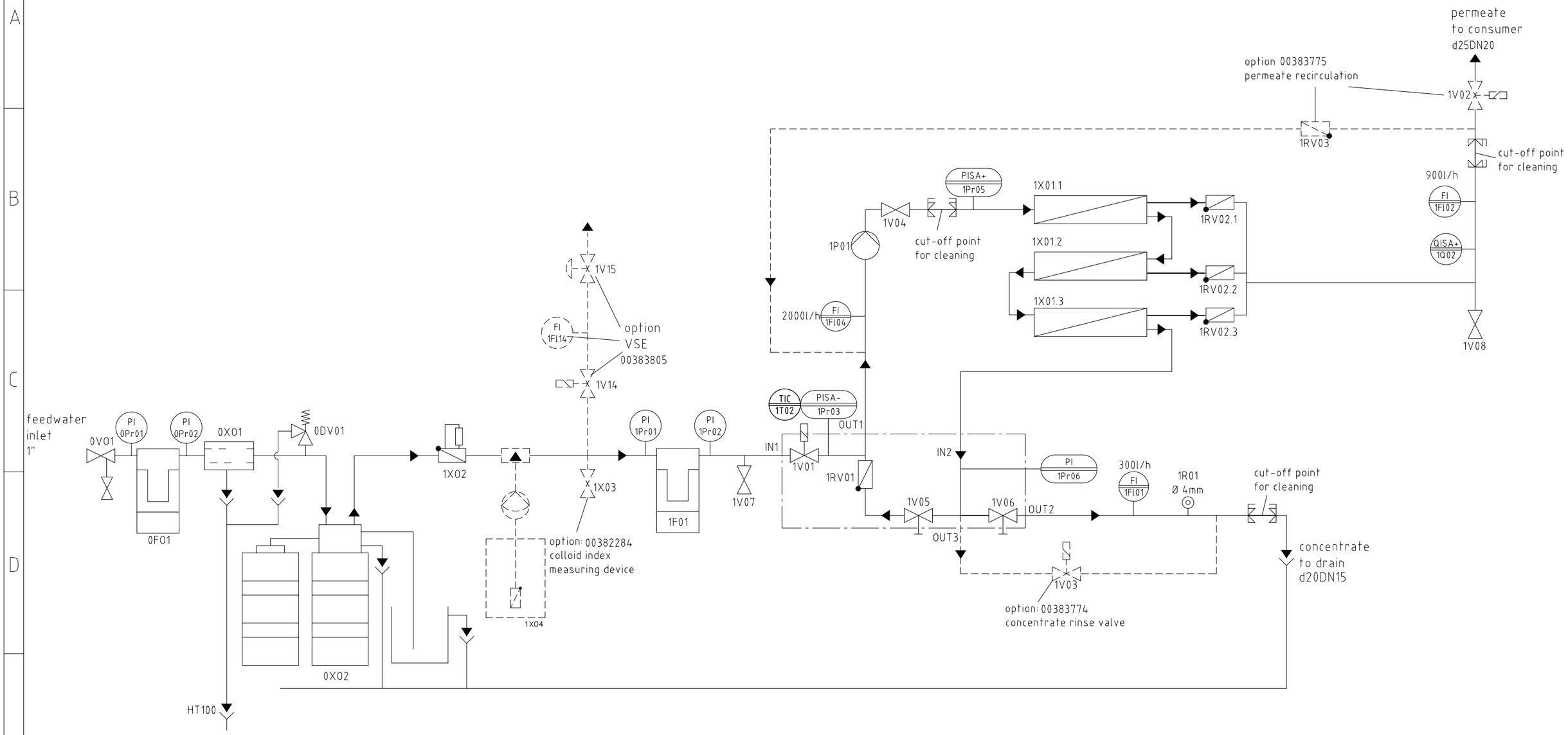
In case of extensive formation of foam during application of cleansing agent A12, use defoam fluid. (item no. 530185)

Caution

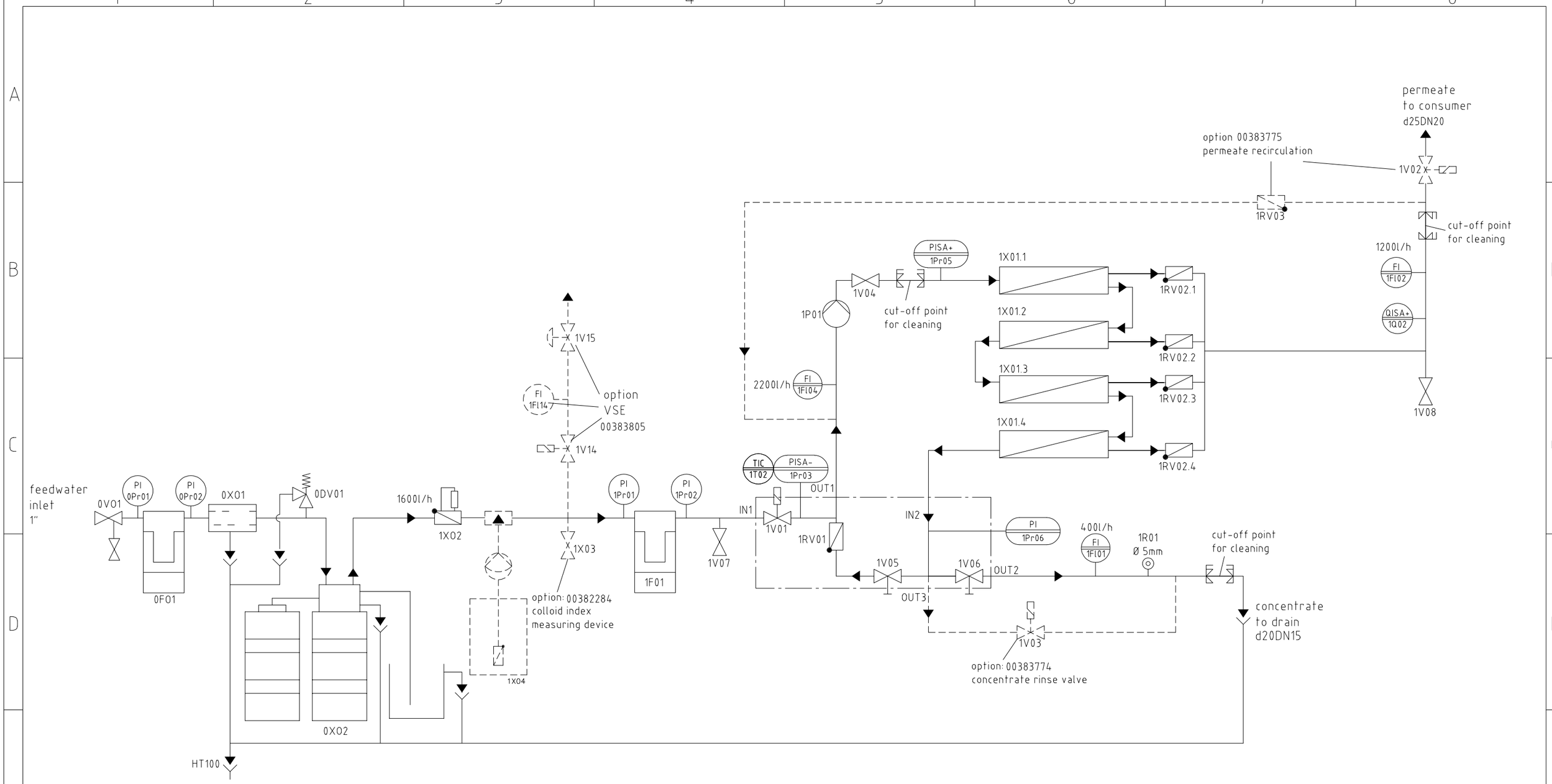
Use only this mentioned defoam liquid. Other defoam liquids may destroy the RO-unit´s membranes.



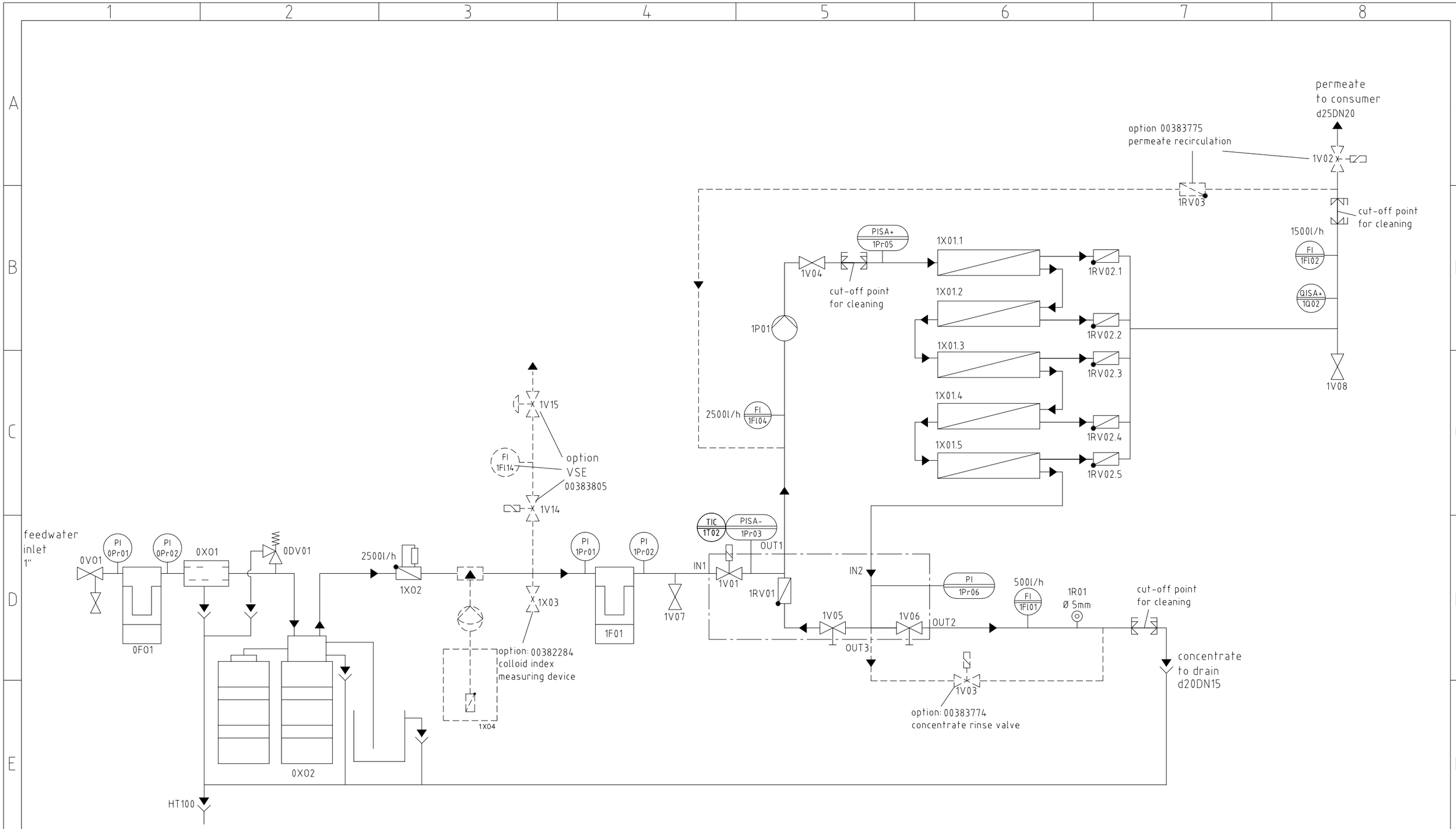
				Allgemein-Toleranzen DIN ISO 2768 - mK	Oberfläche	Maßstab 1:1.4	Position – Menge –
						– –	–
					Datum	Name	UO-D 600 CD
				Bearb.	22.04.2016	eng	
				Gepr.	22.04.2016	eng	----
				Norm			
E	1X04	03.05.2022	rei				
D	DR geä. zu FirstLine	12.11.2020	eng				00420231-30000
C	1T02 zu 1Pr03	02.08.2019	rei				Blatt
B	1Fl01/02/04	30.04.2019	eng				Bl
Rev.	Änderung	Datum	Name	EDV Nr. 00420231-30000.dwg			



				Allgemein-Toleranzen DIN ISO 2768 - mK		Oberfläche	Maßstab 1:1.4 / Position – / Menge –
					Datum	Name	– – –
				Bearb.	22.04.2016	eng	UO-D 900 CD
				Gepr.	22.04.2016	eng	----
				Norm			
E	1X04	03.05.2022	rei				
D	DR geä. zu FirstLine	12.11.2020	eng				00420232-30000
C	1TP02 zu 1PR03	01.10.2019	rei				Blatt
B	1FI01/02/04	30.04.2019	eng				Bl
Rev.	Änderung	Datum	Name	EDV Nr. 00420232-30000.dwg			



				Allgemein-Toleranzen DIN ISO 2768 - mK	Oberfläche	Maßstab 1:1.4 / Position – / Menge –
						– / – / –
					Datum / Name	UO-D 1200 CD
				Bearb.	22.04.2016 / eng	
				Gepr.	22.04.2016 / eng	----
				Norm		
E	1X04	03.05.2022	rei			
D	DR geä. zu FirstLine	12.11.2020	eng			00420233-30000
C	1TP02 zu 1PR03	01.10.2019	rei			Blatt
B	1Fl01/02/04	30.04.2019	eng			Bl
Rev.	Änderung	Datum	Name	EDV Nr. 00420233-30000.dwg		



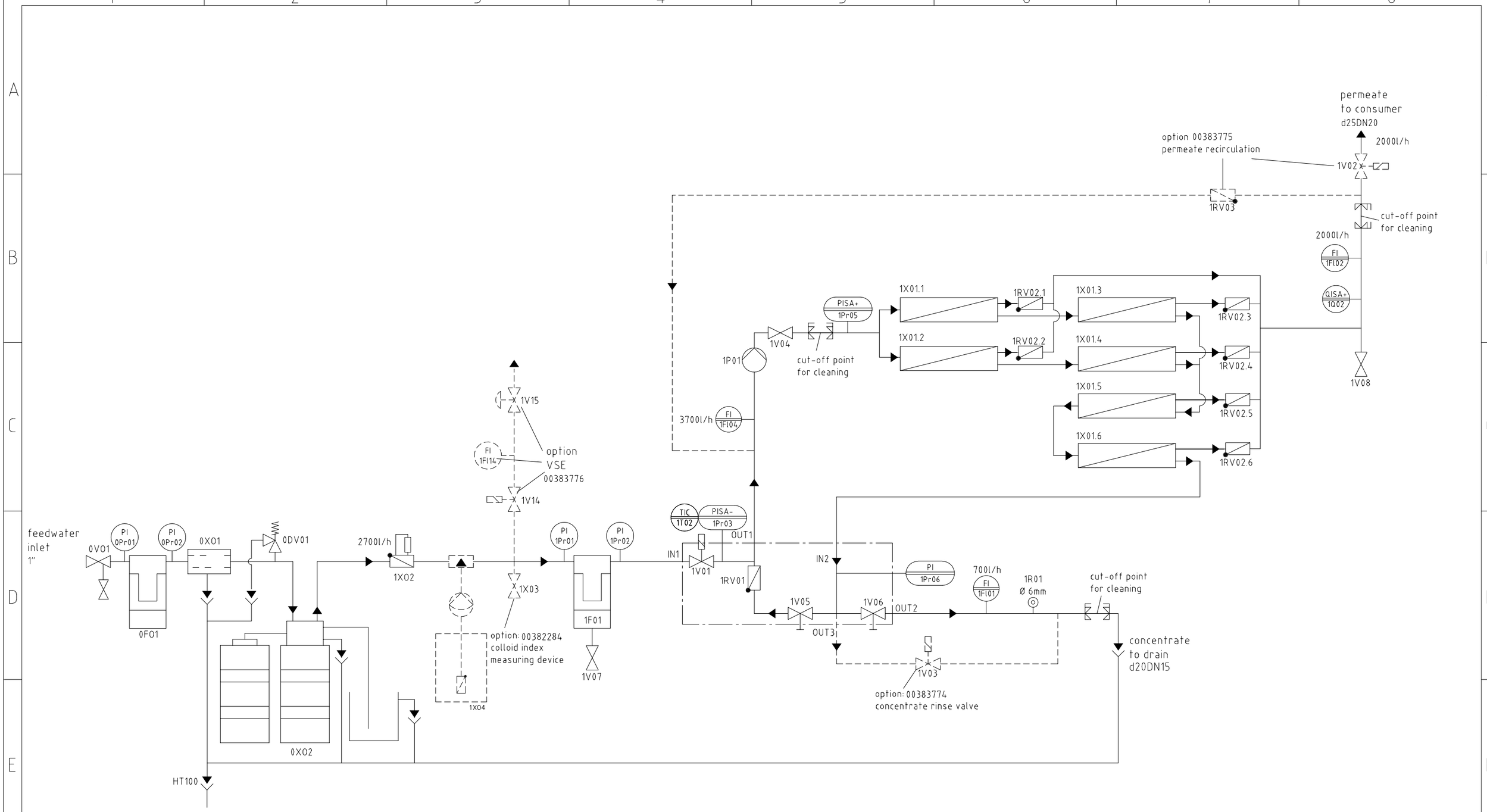
				Allgemein-Toleranzen DIN ISO 2768 - mK	Oberfläche	Maßstab 1:1.4
						Position – Menge –
						–
						– –
					Datum	Name
				Bearb.	22.04.2016	eng
				Gepr.	22.04.2016	eng
				Norm		
E	1X04	03.05.2022	rei			
D	DR geä. zu FirstLine	12.11.2020	eng			
C	1TP02 zu 1PR03	01.10.2019	rei			
B	1FI01/02/04	30.04.2019	eng			
Rev.	Änderung	Datum	Name	EDV Nr. 00420234-30000.dwg		

UO-D 1500 CD

00420234-30000

Blatt

Bl



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						Position – Menge –
						–
						– –
					Datum	Name
				Bearb.	22.04.2016	eng
				Gepr.	22.04.2016	eng
				Norm		
D	1X04	03.05.2022	rei			UO-D 2000 CD
C	DR geä. zu FirstLine	12.11.2020	eng			----
B	1TP02 zu 1PR03	01.10.2019	rei			00420235-30000
A	1FI01/02/04	30.04.2019	eng			Blatt
Rev.	Änderung	Datum	Name	EDV Nr. 00420235-30000.dwg		Bl

spare part list

item: **UO-D 600 CD**
item-no: **00 420 231**

item-no.	position (P+ID)	quantity	unity	w/s*	description	additional details
00 335 113	0F01	1	pcs	W	Filter Cartridge FST	1-2", 95-140 µm
00 630 004	0Pr01 0Pr02	2	pcs	s	pressure gauge	0-10 bar
00 366 074	0X02	1	pcs	S	1" TWIN valve for Ecotrol TWIN 2(	incl. DLFC 027/ injector yellow
00 366 077	0X02	1	pcs	S	electronic for Ecotrol TWIN	
00 365 839	0X02	1	pcs	S	WS1 Injector	ASY yellow
00 365 988	0X02	1	pcs	S	WS1 drive	
00 365 997	0X02	1	pcs	W	WS1 piston- and spacer stack asy	
00 366 078	0X02	1	pcs	S	WS1 TWIN counter unit	
00 365 213	0X02	1	pcs	S	brine tank	200L
00 365 582	0X02	1	pcs	S	brine valve Schurz type	900mm, 1/4"
00 430 172	0X02	2	pcs	S	pressure vessel Q 10x54 (2,5")	60,7 L blue
00 140 051	0X02	100	l	W	cation exchange resin	strong acid
00 530 059	0X02	8	kg	W	quartz gravel size 3,15-5,6 mm	
00 335 014	1F01	1	pcs	w	filter cartridge	10", 5 µm
00 630 565	1FL01	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN08
00 630 566	1FL02	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN10
00 630 587	1FL04	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN20
00 390 227	1P01	1	pcs	s	pump CR3-19	1,5 kW, 3x400V/50Hz
00 390 242	1P01	1	pcs	s	slide ring seal	for CR, CRN, CRI (E) 1,3, 5
00 630 563	1Pr01 1Pr02	2	pcs	s	pressure gauge	0-10 bar
00 630 412	1PR03	1	pcs	s	pressure sensor	0-10 bar
00 630 551	1Pr05	1	pcs	s	pressure sensor	0-25 bar
00 630 420	1Pr06	1	pcs	s	pressure sensor	0-25 bar
00 100 066	1Q02	1	pcs	s	measuring cell	114OR, ¼" µS/cm
00 410 242	1V01	1	pcs	s	solenoid valve	24V/DC
00 650 355	1X01	2	pcs	w	O-ring-set for pressure vessel	4", GFK 4040-1
00 395 146	1X01	2	pcs	w	membrane modul 4040 ND	originally packed max. storage time: 6 months
00 545 466		1	pcs	s	control	RO digital
00 383 163		1	pcs	s	foil for control	RO digital
00 540 706		10	pcs	s	micro-fuse	6,3 A T
00 541 150		1	pcs	s	micro-fuse	0,5 A T
00 541 791		10	pcs	s	micro-fuse	3,15 A T
00 541 792		10	pcs	s	micro-fuse	2,0 A T
spare parts for options						
00 405 125	1V02	1	pcs	s	solenoid valve	1", PA, 24V/DC
00 410 127	1V03	1	pcs	s	solenoid valve	½", brass, 24V/DC
00 410 107	1V14	1	pcs	s	solenoid valve	½", Ms, 230V/50Hz
00 395 147	1X01	2	pcs	w	membrane modul 4040 HR	originally packed max. storage time: 6 months
00 370 031	1X02	1	pcs	w	sensor for Limitron and Limitent	originally packed max. storage time: 6 months
00 370 034		1	pcs	s	head part for Limitron	
00 370 035		1	pcs	s	foot part for Limitron	
00 300 007	1X03	1	pcs	s	filter for measuring device for blocking index VIM	
00 335 054		100	pcs	w	filter membranes for VIM	0,45 µm

revision	date	name	
1Fl01/02/04	30.04.19	Eng	
1X01	12.08.21	Rei	*w = wear part
			s = spare part

spare part list

item: **UO-D 900 CD**
item-no: **00 420 232**

item-no.	position (P+ID)	quantity	unity	w/s*	description	additional details
00 335 113	0F01	1	pcs	W	Filter Cartridge FST	1-2", 95-140 µm
00 630 004	Pr010Pr02	2	pcs	s	pressure gauge	0-10 bar
00 366 074	0X02	1	pcs	S	1" TWIN valve for Ecotrol TWIN 20	incl. DLFC 027/ injector yellow
00 366 077	0X02	1	pcs	S	electronic for Ecotrol TWIN	
00 365 839	0X02	1	pcs	S	WS1 Injector	ASY yellow
00 365 988	0X02	1	pcs	S	WS1 drive	
00 365 997	0X02	1	pcs	W	WS1 piston- and spacer stack asy	
00 366 078	0X02	1	pcs	S	WS1 TWIN counter unit	
00 365 213	0X02	1	pcs	S	brine tank	200L
00 365 582	0X02	1	pcs	S	brine valve Schurz type	900mm, 1/4"
00 430 172	0X02	2	pcs	S	pressure vessel Q 10x54 (2,5")	60,7 L blue
00 140 051	0X02	100	l	W	cation exchange resin	strong acid
00 530 059	0X02	8	kg	W	quartz gravel size 3,15-5,6 mm	
00 335 014	1F01	1	pcs	w	filter cartridge	10", 5 µm
00 630 565	1FL01	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN08
00 630 566	1FL02	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN10
00 630 587	1FL04	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN20
00 390 227	1P01	1	pcs	s	pump CR3-19	1,5 kW, 3x400V/50Hz
00 390 242	1P01	1	pcs	s	slide ring seal	for CR, CRN, CRI (E) 1,3, 5
00 630 563	1Pr01 1Pr02	2	pcs	s	pressure gauge	0-10 bar
00 630 412	1PR03	1	pcs	s	pressure sensor	0-10 bar
00 630 551	1Pr05	1	pcs	s	pressure sensor	0-25 bar
00 630 420	1Pr06	1	pcs	s	pressure sensor	0-25 bar
00 100 066	1Q02	1	pcs	s	measuring cell	114OR, ¼" µS/cm
00 410 242	1V01	1	pcs	s	solenoid valve	24V/DC
00 650 355	1X01	3	pcs	w	O-ring-set for pressure vessel	4", GFK 4040-1
00 395 146	1X01	3	pcs	w	membrane modul 4040 ND	originally packed max. storage time: 6 months
00 545 466		1	pcs	s	control	RO digital
00 383 163		1	pcs	s	foil for control	RO digital
00 540 706		10	pcs	s	micro-fuse	6,3 A T
00 541 150		1	pcs	s	micro-fuse	0,5 A T
00 541 791		10	pcs	s	micro-fuse	3,15 A T
00 541 792		10	pcs	s	micro-fuse	2,0 A T
spare parts for options						
00 405 125	1V02	1	pcs	s	solenoid valve	1", PA, 24V/DC
00 410 127	1V03	1	pcs	s	solenoid valve	½", brass, 24V/DC
00 410 107	1V14	1	pcs	s	solenoid valve	½", Ms, 230V/50Hz
00 395 147	1X01	3	pcs	w	membrane modul 4040 HR	originally packed max. storage time: 6 months
00 370 031	1X02	1	pcs	w	sensor for Limitron and Limitent	originally packed max. storage time: 6 months
00 370 034		1	pcs	s	head part for Limitron	
00 370 035		1	pcs	s	foot part for Limitron	
00 300 007	1X03	1	pcs	s	filter for measuring device for blocking index VIM	
00 335 054		100	pcs	w	filter membranes for VIM	0,45 µm

revision	date	name	
1Fl01/02/04	30.04.19	Eng	
1X01	12.08.21	Rei	*w = wear part
			s = spare part

spare part list

item: UO-D 1200 CD
item-no: 00 420 233

item-no.	position (P+ID)	quantity	unity	w/s*	description	additional details
00 335 113	0F01	1	pcs	W	Filter Cartridge FST	1-2", 95-140 µm
00 630 004	Pr010Pr02	2	pcs	s	pressure gauge	0-10 bar
00 366 076	0X02	1	pcs	S	1" TWIN valve for Ecotrol TWIN 40	incl. DLFC 053/ injector lightgreen
00 366 077	0X02	1	pcs	S	electronic for Ecotrol TWIN	
00 365 841	0X02	1	pcs	S	WS1 Injector	ASY lightgreen
00 365 988	0X02	1	pcs	S	WS1 drive	
00 365 997	0X02	1	pcs	W	WS1 piston- and spacer stack asy	
00 366 078	0X02	1	pcs	S	WS1 TWIN counter unit	
00 365 215	0X02	1	pcs	S	brine tank	300L PE-white
00 365 582	0X02	1	pcs	S	brine valve Schurz type	900mm, 1/4"
00 430 163	0X02	2	pcs	S	pressure vessel C 14x65 (4")	blue
00 140 051	0X02	200	l	W	cation exchange resin	strong acid
00 530 059	0X02	22	kg	W	quartz gravel size 3,15-5,6 mm	
00 335 014	1F01	1	pcs	w	filter cartridge	10", 5 µm
00 630 566	1FL01	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN10
00 630 630	1FL02	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN15
00 630 587	1FL04	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN20
00 390 231	1P01	1	pcs	s	pump CR 3-21	2,2 kW, 3x400V/50Hz
00 390 242	1P01	1	pcs	s	slide ring seal	for CR, CRN, CRI (E) 1,3, 5
00 630 563	1Pr01 1Pr02	2	pcs	s	pressure gauge	0-10 bar
00 630 412	1PR03	1	pcs	s	pressure sensor	0-10 bar
00 630 551	1Pr05	1	pcs	s	pressure sensor	0-25 bar
00 630 420	1Pr06	1	pcs	s	pressure sensor	0-25 bar
00 100 066	1Q02	1	pcs	s	measuring cell	114OR, ¼" µS/cm
00 410 242	1V01	1	pcs	s	solenoid valve	24V/DC
00 650 355	1X01	4	pcs	w	O-ring-set for pressure vessel	4", GFK 4040-1
00 395 146	1X01	4	pcs	w	membrane modul 4040 ND	originally packed max. storage time: 6 months
00 545 466		1	pcs	s	control	RO digital
00 383 163		1	pcs	s	foil for control	RO digital
00 540 706		10	pcs	s	micro-fuse	6,3 A T
00 541 150		1	pcs	s	micro-fuse	0,5 A T
00 541 791		10	pcs	s	micro-fuse	3,15 A T
00 541 792		10	pcs	s	micro-fuse	2,0 A T
spare parts for options						
00 405 125	1V02	1	pcs	s	solenoid valve	1", PA, 24V/DC
00 410 127	1V03	1	pcs	s	solenoid valve	½", brass, 24V/DC
00 410 107	1V14	1	pcs	s	solenoid valve	½", Ms, 230V/50Hz
00 395 147	1X01	4	pcs	w	membrane modul 4040 HR	originally packed max. storage time: 6 months
00 370 031	1X02	1	pcs	w	sensor for Limitron and Limitent	originally packed max. storage time: 6 months
00 370 034		1	pcs	s	head part for Limitron	
00 370 035		1	pcs	s	foot part for Limitron	
00 300 007	1X03	1	pcs	s	filter for measuring device for	
00 335 054		100	pcs	w	filter membranes for VIM	0,45 µm

revision	date	name	
1X01	12.08.21	Rei	
			*w = wear part
			s = spare part

spare part list

item: **UO-D 1500 CD**
item-no: **00 420 234**

item-no.	position (P+ID)	quantity	unity	w/s*	description	additional details
00 335 113	0F01	1	pcs	W	Filter Cartridge FST	1-2", 95-140 µm
00 630 004	0Pr01 0Pr02	2	pcs	s	pressure gauge	0-10 bar
00 366 076	0X02	1	pcs	S	1" TWIN valve for Ecotrol TWIN 40	incl. DLFC 053/ injector lightgreen
00 366 077	0X02	1	pcs	S	electronic for Ecotrol TWIN	
00 365 841	0X02	1	pcs	S	WS1 Injector	ASY lightgreen
00 365 988	0X02	1	pcs	S	WS1 drive	
00 365 997	0X02	1	pcs	W	WS1 piston- and spacer stack asy	
00 366 078	0X02	1	pcs	S	WS1 TWIN counter unit	
00 365 215	0X02	1	pcs	S	brine tank	300L PE-white
00 365 582	0X02	1	pcs	S	brine valve Schurz type	900mm, 1/4"
00 430 163	0X02	2	pcs	S	pressure vessel C 14x65 (4")	blue
00 140 051	0X02	200	l	W	cation exchange resin	strong acid
00 530 059	0X02	22	kg	W	quartz gravel size 3,15-5,6 mm	
00 335 014	1F01	1	pcs	w	filter cartridge	10", 5 µm
00 630 566	1FL01	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN10
00 630 630	1FL02	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN15
00 630 587	1FL04	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN20
00 390 228	1P01	1	pcs	s	pump CR3-25	2,2 kW, 3x400V/50Hz
00 390 242	1P01	1	pcs	s	slide ring seal	for CR, CRN, CRI (E) 1,3, 5
00 630 563	1Pr01 1Pr02	2	pcs	s	pressure gauge	0-10 bar
00 630 412	1PR03	1	pcs	s	pressure sensor	0-10 bar
00 630 551	1Pr05	1	pcs	s	pressure sensor	0-25 bar
00 630 420	1Pr06	1	pcs	s	pressure sensor	0-25 bar
00 100 066	1Q02	1	pcs	s	measuring cell	114OR, ¼" µS/cm
00 410 242	1V01	1	pcs	s	solenoid valve	24V/DC
00 650 355	1X01	5	pcs	w	O-ring-set for pressure vessel	4", GFK 4040-1
00 395 146	1X01	5	pcs	w	membrane modul 4040 ND	originally packed max. storage time: 6 months
00 545 466		1	pcs	s	control	RO digital
00 383 163		1	pcs	s	foil for control	RO digital
00 540 706		10	pcs	s	micro-fuse	6,3 A T
00 541 150		1	pcs	s	micro-fuse	0,5 A T
00 541 791		10	pcs	s	micro-fuse	3,15 A T
00 541 792		10	pcs	s	micro-fuse	2,0 A T
spare parts for options						
00 405 125	1V02	1	pcs	s	solenoid valve	1", PA, 24V/DC
00 410 127	1V03	1	pcs	s	solenoid valve	½", brass, 24V/DC
00 410 107	1V14	1	pcs	s	solenoid valve	½", Ms, 230V/50Hz
00 395 147	1X01	5	pcs	w	membrane modul 4040 HR	originally packed max. storage time: 6 months
00 370 031	1X02	1	pcs	w	sensor for Limitron and Limitent	originally packed max. storage time: 6 months
00 370 034		1	pcs	s	head part for Limitron	
00 370 035		1	pcs	s	foot part for Limitron	
00 300 007	1X03	1	pcs	s	filter for measuring device for blocking index VIM	
00 335 054		100	pcs	w	filter membranes for VIM	0,45 µm

revision	date	name	
1Fl01/02/04	30.04.19	Eng	
1X01	12.08.21	Rei	*w = wear part
			s = spare part

spare part list

item: **UO-D 2000 CD**
item-no: **00 420 235**

item-no.	position (P+ID)	quantity	unity	w/s*	description	additional details
00 335 113	0F01	1	pcs	W	Filter Cartridge FST	1-2", 95-140 µm
00 630 004	0Pr01 0Pr02	2	pcs	s	pressure gauge	0-10 bar
00 366 076	0X02	1	pcs	S	1" TWIN valve for Ecotrol TWIN 40	incl. DLFC 053/ injector lightgreen
00 366 077	0X02	1	pcs	S	electronic for Ecotrol TWIN	
00 365 841	0X02	1	pcs	S	WS1 Injector	ASY lightgreen
00 365 988	0X02	1	pcs	S	WS1 drive	
00 365 997	0X02	1	pcs	W	WS1 piston- and spacer stack asy	
00 366 078	0X02	1	pcs	S	WS1 TWIN counter unit	
00 365 215	0X02	1	pcs	S	brine tank	300L PE-white
00 365 582	0X02	1	pcs	S	brine valve Schurz type	900mm, 1/4"
00 430 163	0X02	2	pcs	S	pressure vessel C 14x65 (4")	blue
00 140 051	0X02	200	l	W	cation exchange resin	strong acid
00 530 059	0X02	22	kg	W	quartz gravel size 3,15-5,6 mm	
00 335 101	1F01	1	pcs	w	filter cartridge	10", 5 µm, BB
00 630 566	1FL01	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN10
00 630 630	1FL02	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN15
00 630 587	1FL04	1	pcs	s	flow rate sensor HUBA 4-20 mA	DN20
00 390 215	1P01	1	pcs	s	pump CR3-36	3 kW, 3x400V/50Hz
00 390 242	1P01	1	pcs	s	slide ring seal	for CR, CRN, CRI (E) 1,3, 5
00 630 563	1Pr01 1Pr02	2	pcs	s	pressure gauge	0-10 bar
00 630 412	1PR03	1	pcs	s	pressure sensor	0-10 bar
00 630 551	1Pr05	1	pcs	s	pressure sensor	0-25 bar
00 630 420	1Pr06	1	pcs	s	pressure sensor	0-25 bar
00 100 066	1Q02	1	pcs	s	measuring cell	114OR, ¼" µS/cm
00 410 242	1V01	1	pcs	s	solenoid valve	24V/DC
00 650 355	1X01	6	pcs	w	O-ring-set for pressure vessel	4", GFK 4040-1
00 395 146	1X01	6	pcs	w	membrane modul 4040 ND	originally packed max. storage time: 6 months
00 545 466		1	pcs	s	control	RO digital
00 383 163		1	pcs	s	foil for control	RO digital
00 540 706		10	pcs	s	micro-fuse	6,3 A T
00 541 150		1	pcs	s	micro-fuse	0,5 A T
00 541 791		10	pcs	s	micro-fuse	3,15 A T
00 541 792		10	pcs	s	micro-fuse	2,0 A T
spare parts for options						
00 405 125	1V02	1	pcs	s	solenoid valve	1", PA, 24V/DC
00 410 127	1V03	1	pcs	s	solenoid valve	½", brass, 24V/DC
00 410 098	1V14	1	pcs	s	solenoid valve	1", Ms, 230V/50Hz
00 395 147	1X01	6	pcs	w	membrane modul 4040 HR	originally packed max. storage time: 6 months
00 370 031	1X02	1	pcs	w	sensor for Limitron and Limitent	originally packed max. storage time: 6 months
00 370 034		1	pcs	s	head part for Limitron	
00 370 035		1	pcs	s	foot part for Limitron	
00 300 007	1X03	1	pcs	s	filter for measuring device for blocking index VIM	
00 335 054		100	pcs	w	filter membranes for VIM	0,45 µm

revision	date	name	
1Fl01/02/04	30.04.19	Eng	
1X01	12.08.21	Rei	*w = wear part
			s = spare part

Beschreibung description	U0-D 600-2000 (CD)
Projekt project	

Versorgungsspannung supply voltage	3x 400V/50Hz, PE
Vorsicherung fuse protection	20 A
Steuerspannung 1 control voltage 1	230 VAC
Steuerspannung 2 control voltage 2	24 VDC
Mind. Zuleitung min. power cable	5x2,5 mm²
max. Strom max. current	siehe Seite &ET1/1 see page &ET1/1

&EIH/1

	Revision	Datum	Name		Datum	Name
a				Gez.	13.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Deckblatt
cover sheet

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1 & EDK
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 1
25 Bl.

Inhaltsverzeichnis
table of contents

Spalte X: eine automatisch erzeugte Seite wurde manuell nachbearbeitet
Column X: An automatically generated page was manually reworked

HE_F06_002

Inhaltsverzeichnis
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Projektbez.: U0-D 600-2000 (CD)
= 001 + S1 & EIH
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 1 25 Bl.

Inhaltsverzeichnis
table of contents

Spalte X: eine automatisch erzeugte Seite wurde manuell nachbearbeitet
Column X: An automatically generated page was manually reworked

HE_F06_002

Seite / Pfad Page / path	Seitenbeschreibung Page description	Seitenzusatzfeld Supplementary page field	Datum Date	Bearbeiter editor	X
=001+S1&ETA/2	Flanschplatte cable gland plate		07.11.2022	lei	
=001+S1&ETA/3	Montageplatte mounting plate		07.11.2022	lei	
=001+S1&ETB/1	Kabelübersicht cable overview		07.11.2022	lei	
=001+S1&ETS/1	Stückliste bill off materials		07.11.2022	lei	
=001+S1&ETS/2	Stückliste bill off materials		07.11.2022	lei	
=001+S1&EAI/1	Änderungsinformationen revisional informations		07.11.2022	lei	

	Revision	Datum	Name		Datum	Name
a				Gez.	07.11.2022	Lei
b				Gepr.	07.11.2022	mo
c						

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Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & EIH

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 2
25 Bl.

Projekt Information
project information

Schaltschrankausführung
control cabinet assembly

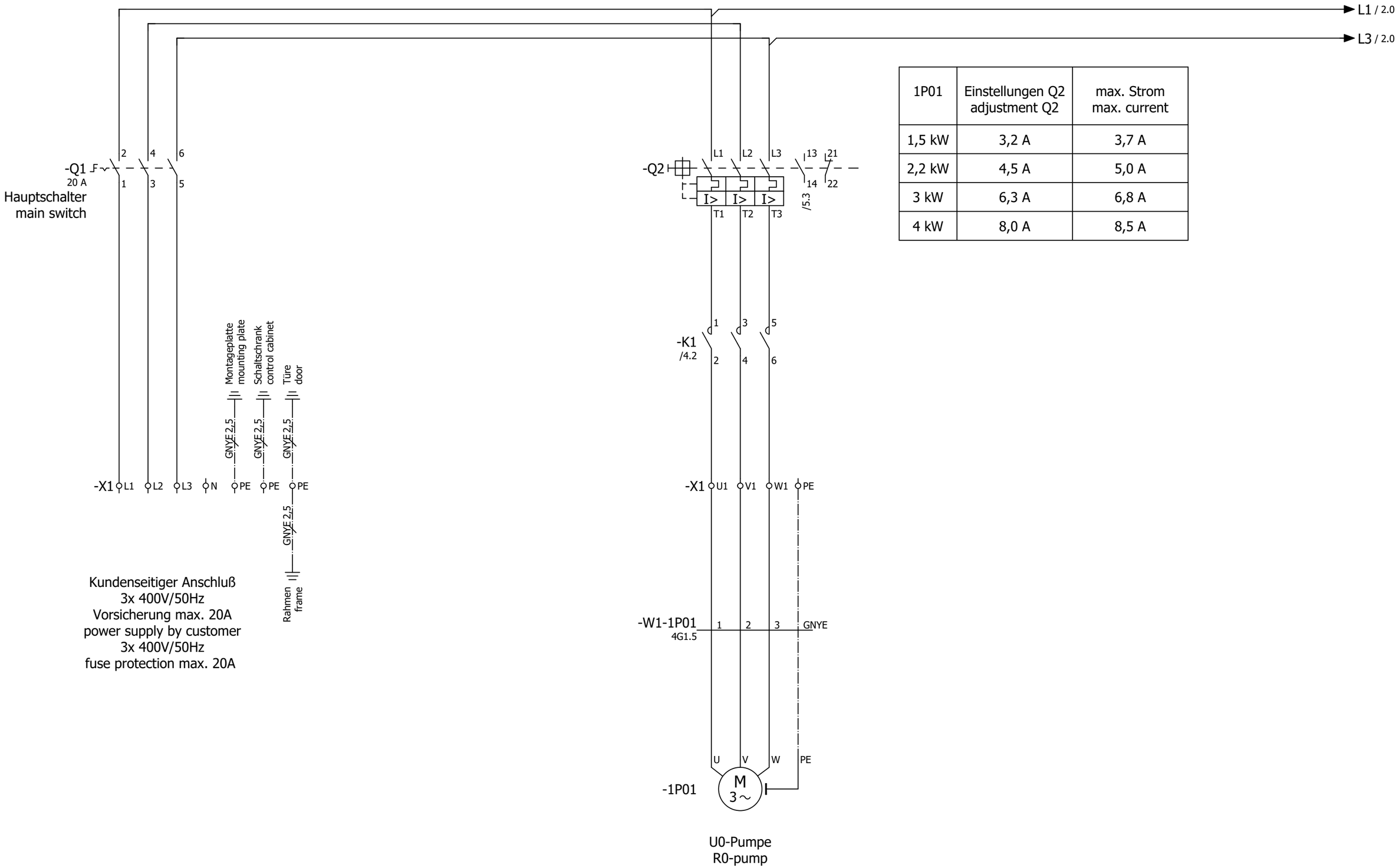
Hersteller manufacturer	Schneider Electric GmbH
Maße dimensions	400x400x200 mm
Schutzart protection type	IP 54

Vorsicherung :
fuse protection :

Sicherung fuse	Aderdimensionierung wire dimensions	Wago Klemmen Wago clamp
16A	1,5 mm²	2002
20A	2,5 mm²	2002
25A	4 mm²	2002
32A	6 mm²	2004
40A	10 mm²	2006
50A	10 mm²	2006
63A	16 mm²	2016
80A	25 mm²	2016
100A	35 mm²	Power35

Verdrahtungsfarben
wiring colors

Hauptstromkreis main circuit	schwarz black	1,5-35 mm²
N-Leiter N-conductor	hellblau light blue	1,5-35 mm²
Schutzleiter protective conductor	grün / gelb green / yellow	1,5-35 mm²
Steuerspannung 230VAC control voltage 230VAC	rot red	0,75 mm²
Steuerspannung 0VAC control voltage 0VAC	rot / weiß red / white	0,75 mm²
Steuerspannung 24VDC control voltage 24VDC	dunkelblau dark blue	0,75 mm²
Steuerspannung 0VDC control voltage 0VDC	grau grey	0,75 mm²
Dig. Eing. Microcontroller dig. input microcontroller	violett purple	0,75 mm²
Dig. Ausg. Microcontroller dig. output microcontroller	dunkelblau dark blue	0,75 mm²
Analoge Messleitung + analog measuring circuit +	weiß white	0,75 mm²
Analoge Messleitung - analog measuring circuit -	weiß / blau white / blue	0,75 mm²
Analog Leitung Microcontroller analog cable microcontroller	weiß white	0,75 mm²
Fremdspannung external voltage	orange orange	0,75 mm²



1P01	Einstellungen Q2 adjustment Q2	max. Strom max. current
1,5 kW	3,2 A	3,7 A
2,2 kW	4,5 A	5,0 A
3 kW	6,3 A	6,8 A
4 kW	8,0 A	8,5 A

U0-Pumpe
R0-pump

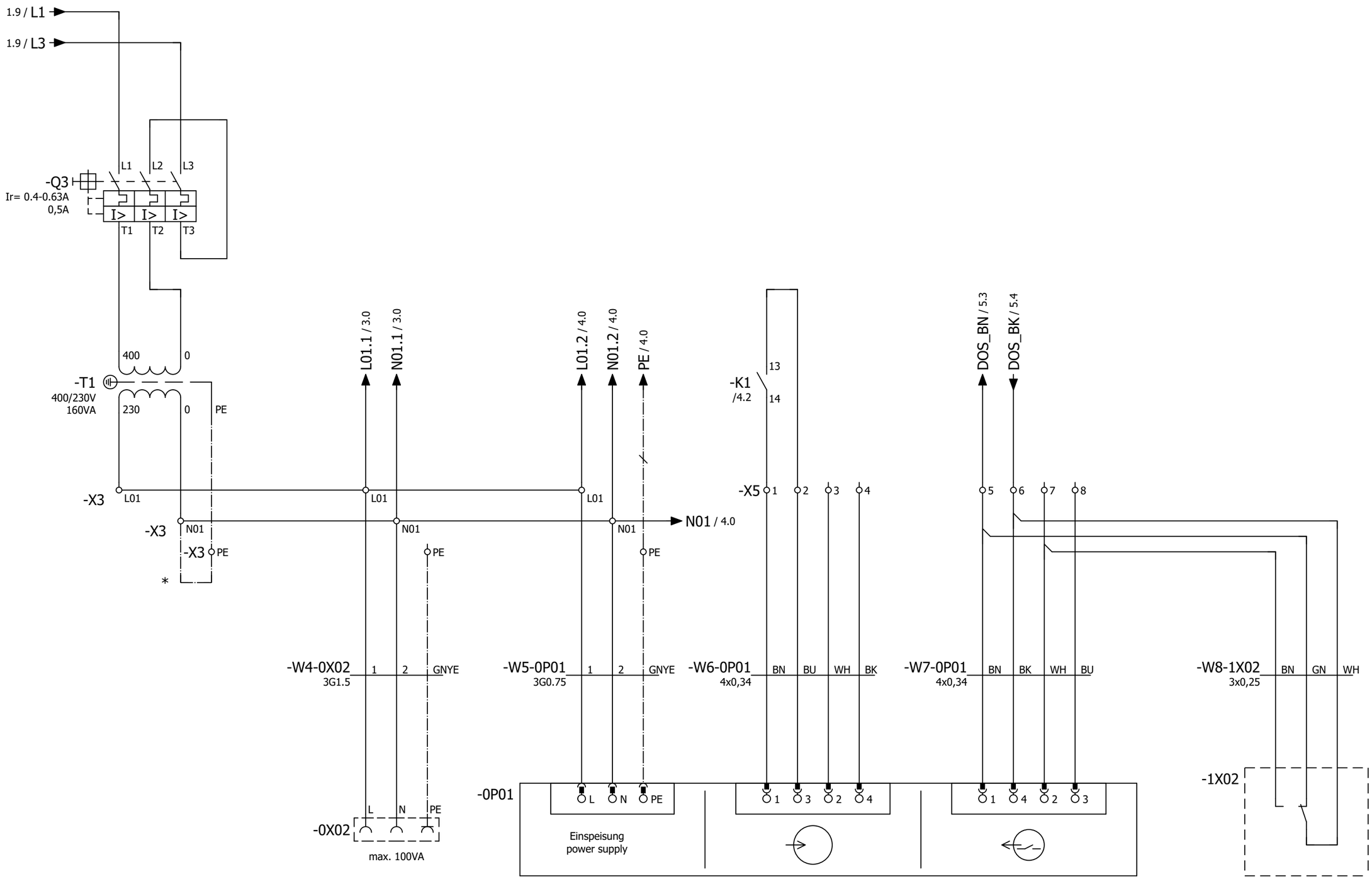
&EPI/1

2

	Revision	Datum	Name		Datum	Name
a				Gez.	14.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Hauptstromkreis
main circuit

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1
& ET1
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 1
25 Bl.



	Revision	Datum	Name		Datum	Name
a				Gez.	17.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Hauptstromkreis
main circuit

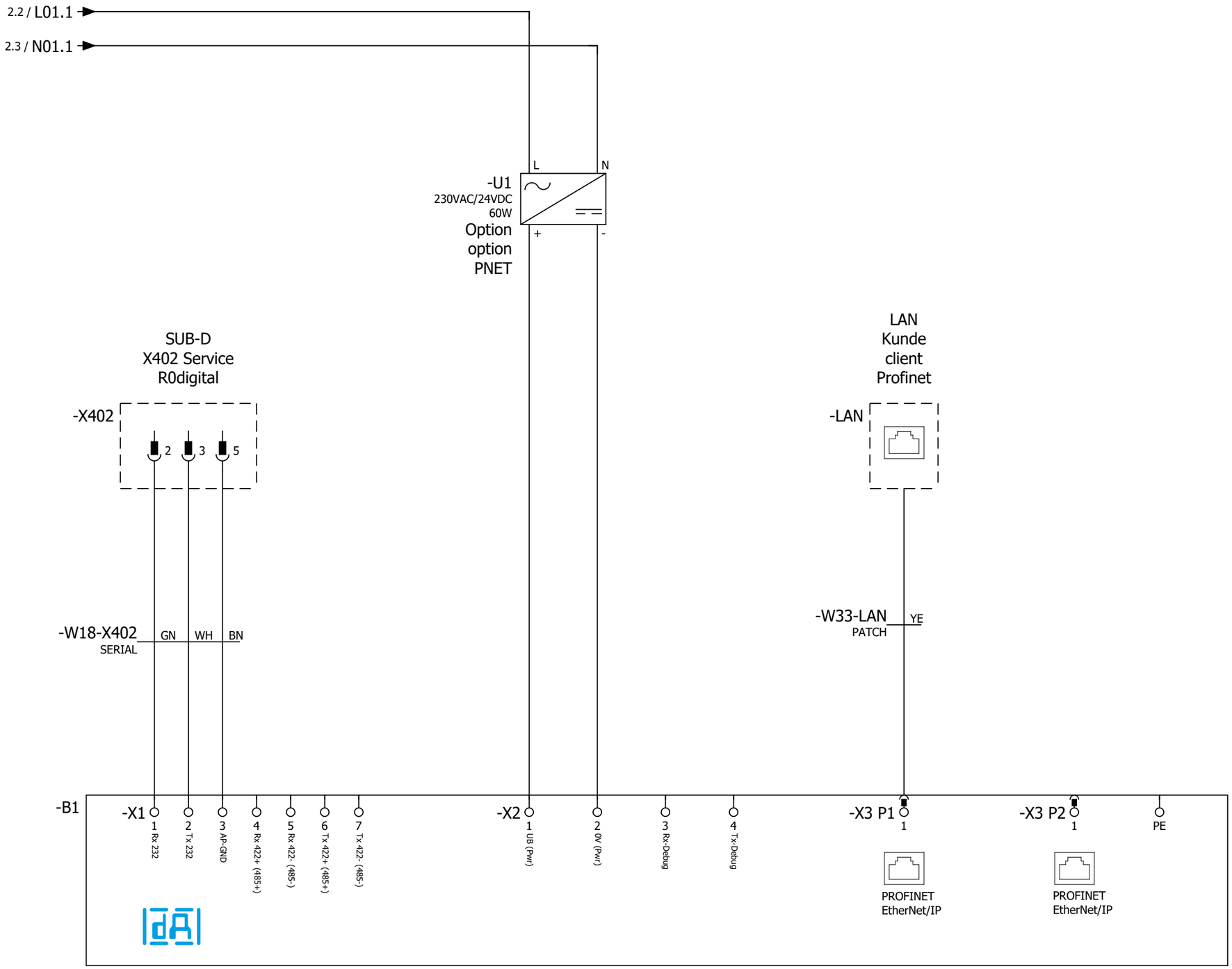
Projektbez.: U0-D 600-2000 (CD)

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

= 001
+ S1 & ET1

Blatt 2
25 Bl.



Profinet
Option
option
PNET

2

4

	Revision	Datum	Name		Datum	Name
a				Gez.	03.03.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Profinet
profinet

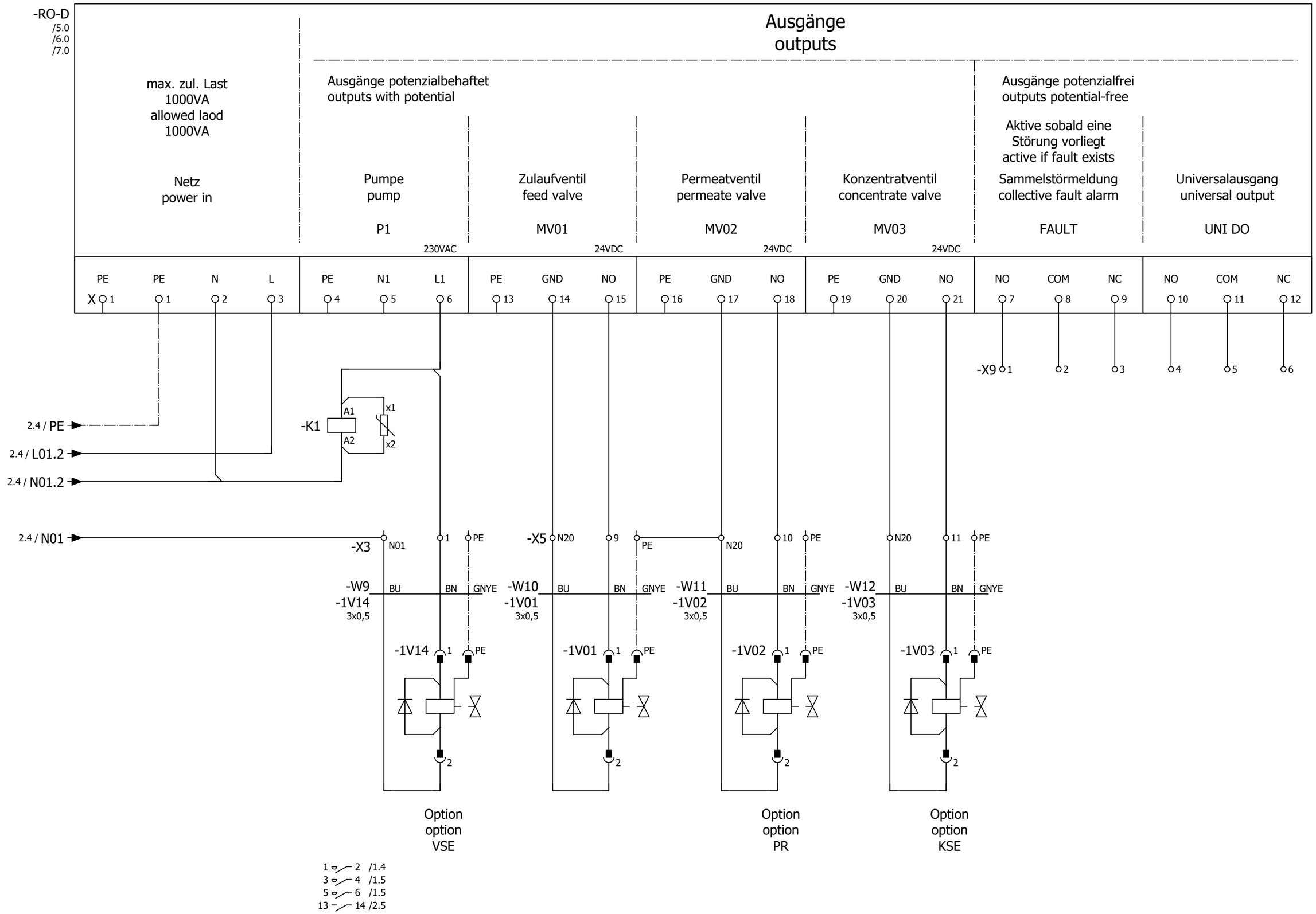
Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ET1

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 3
25 Bl.

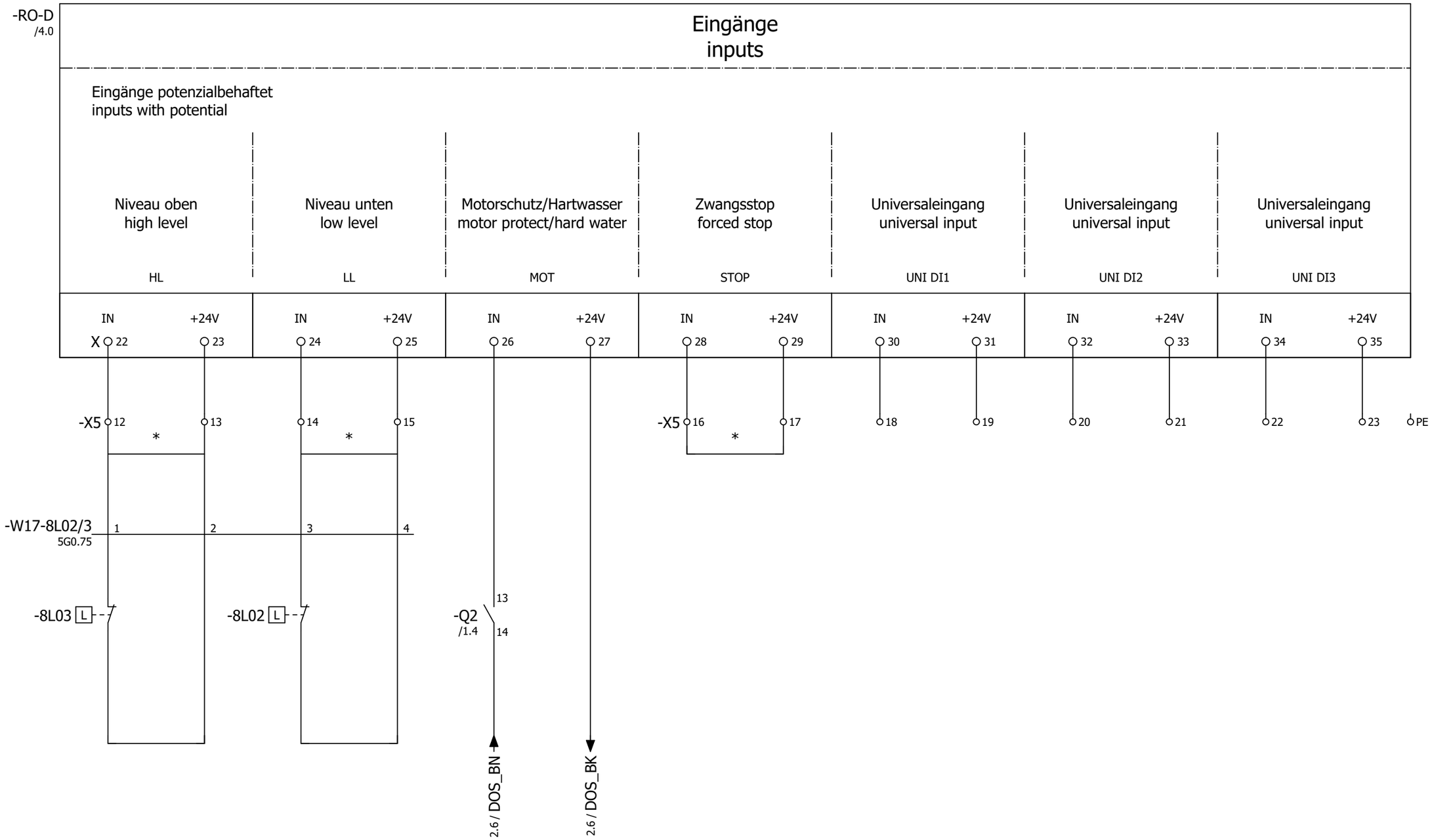


3 5

	Revision	Datum	Name		Datum	Name
a				Gez.	18.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Anschlußbelegung R0 digital
terminals R0 digital

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1 & ET1
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 4
25 Bl.

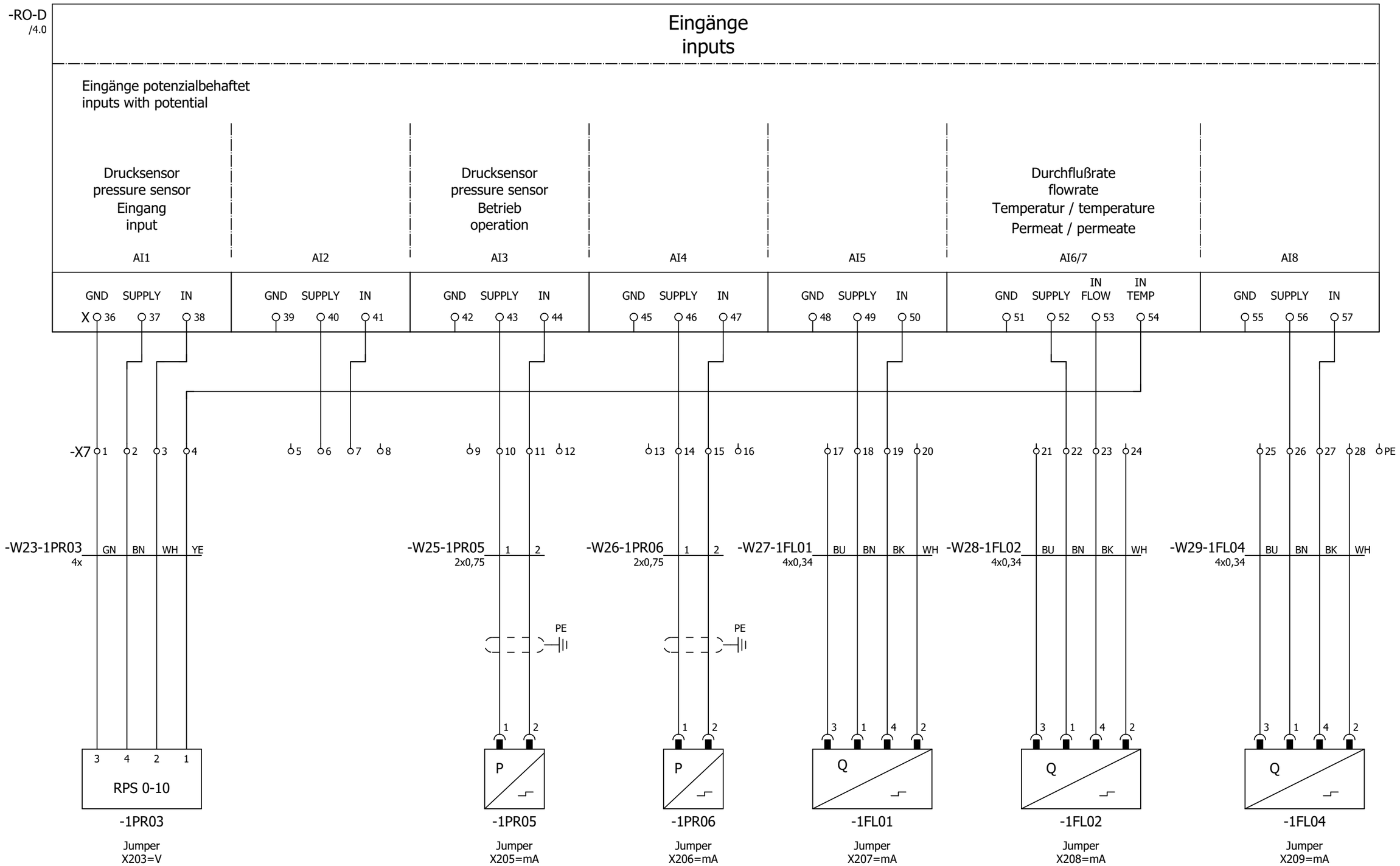


* bei ext. Beschaltung Brücke entfernen
* remove bridge in case of external connection

	Revision	Datum	Name		Datum	Name
a				Gez.	18.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Anschlußbelegung R0 digital
terminals R0 digital

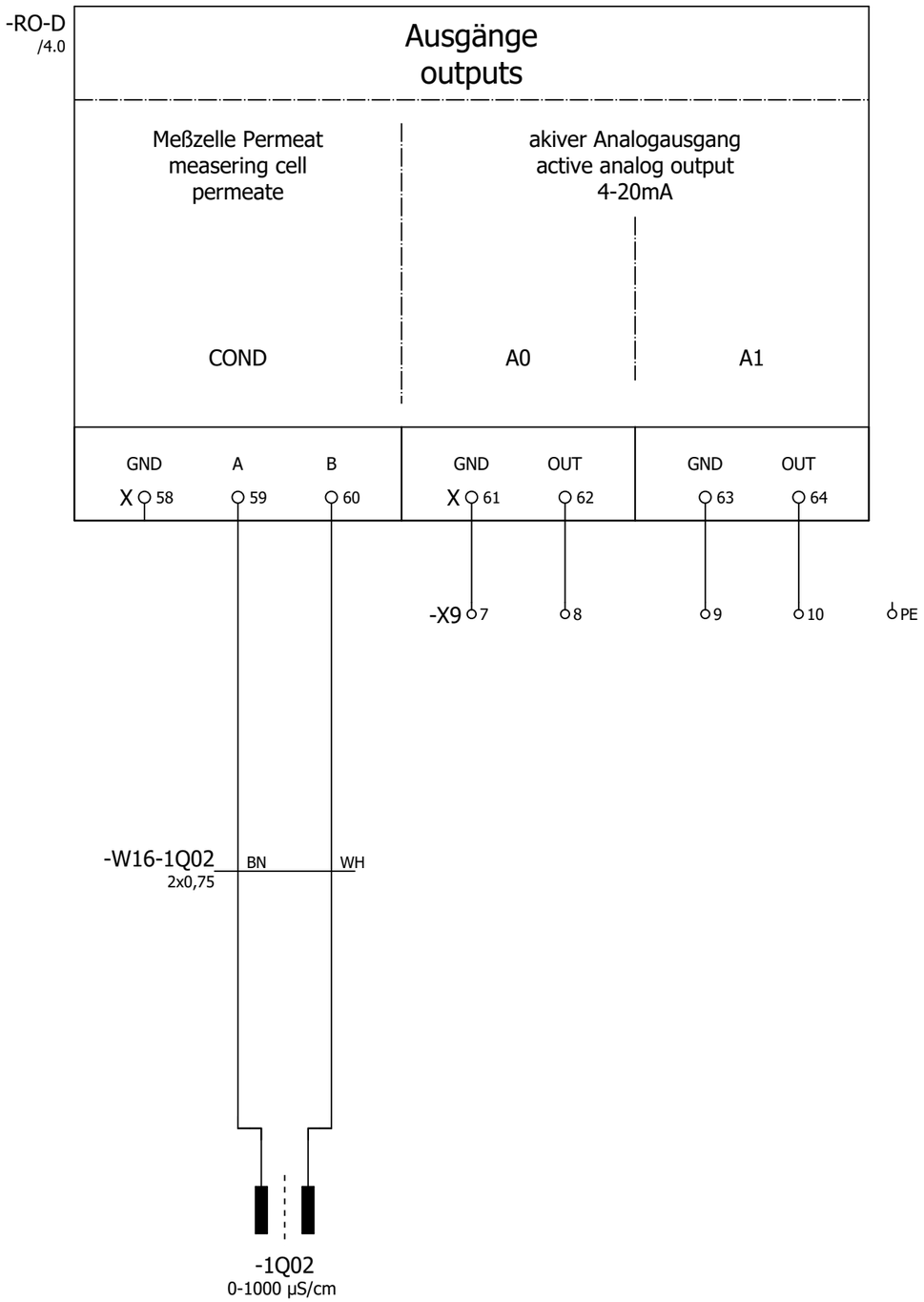
Projektbez.: U0-D 600-2000 (CD)
= 001 + S1 & ET1
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 5
25 Bl.



	Revision	Datum	Name		Datum	Name
a				Gez.	11.03.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Anschlußbelegung R0 digital
terminals R0 digital

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1 & ET1
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 6
25 Bl.



&ETK/1

	Revision	Datum	Name		Datum	Name
a				Gez.	11.03.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Anschlußbelegung R0 digital
terminals R0 digital

Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ET1

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 7
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

Leiste Strip
=001+S1-X1
X1, Klemmleiste Einspeisung, Leistungsabgänge

Funktionstext / Bemerkung Function text / remark	-W1-1P01 Kabelname Cable name	ÖLFLEX® CLASSIC 110 Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabeltyp Cable type	Kabelname Cable name	Seite / Spalte Page / column
					-X1							
Einspeisung Power supply			-Q1	1	L1		WAGO 2002-1201					&ET1/1.0
=			-Q1	3	L2		WAGO 2002-1201					&ET1/1.1
=			-Q1	5	L3		WAGO 2002-1201					&ET1/1.1
=					N		WAGO 2002-1204					&ET1/1.1
=					PE		WAGO 2002-1207					&ET1/1.1
					PE		WAGO 2002-1207					&ET1/1.1
					PE		WAGO 2002-1207					&ET1/1.2
U0-Pumpe R0-pump	1		-1P01	U	U1		WAGO 2002-1201	-K1	2			&ET1/1.4
=	2		-1P01	V	V1		WAGO 2002-1201	-K1	4			&ET1/1.5
=	3		-1P01	W	W1		WAGO 2002-1201	-K1	6			&ET1/1.5
=	GNYE		-1P01	PE	PE		WAGO 2002-1207					&ET1/1.5

	Revision	Datum	Name		Datum	Name
a				Gez.	09.06.2021	Lei
b				Gepr.	07.11.2022	mo
c						

Klemmleiste =001+S1-X1
terminal strip =001+S1-X1

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1
& ETK
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 1
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

Leiste Strip
=001+S1-X3
X3, Klemmleiste Abgänge Steuerspannung 230VAC

Funktionstext / Bemerkung Function text / remark		-W9-1V14 PVC	-W5-0P01 ÖLFLEX® CLASSIC 110	-W4-0X02 ÖLFLEX® CLASSIC 110	Kabelname Cable name	Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabeltyp Cable type	Kabelname Cable name	Seite / Spalte Page / column
									-X3							
Option option	PNET								L01		WAGO 2002-1201	-T1	230			&ET1/2.1
=	PNET								N01		WAGO 2002-1204	-T1	0			&ET1/2.1
=	PNET								PE		WAGO 2002-1207	-T1	PE			&ET1/2.1
Enthärter softener	(CD)			1			-0X02	L	L01		WAGO 2002-1201	-U1	L			&ET1/2.2
=	(CD)			2			-0X02	N	N01		WAGO 2002-1204	-U1	N			&ET1/2.3
=	(CD)			GNYE			-0X02	PE	PE		WAGO 2002-1207					&ET1/2.3
Dosierpumpe dosing pump	Option option		1				-0P01	L	L01		WAGO 2002-1201	-RO-D-X	3			&ET1/2.4
=	Option option		2				-0P01	N	N01		WAGO 2002-1204	-K1	A2			&ET1/2.4
=	Option option		GNYE				-0P01	PE	PE		WAGO 2002-1207	-RO-D-X	1			&ET1/2.4
Verschneidung (VSE) blending	Option option	BN					-1V14	1	1		WAGO 2002-1201	-K1	A1			&ET1/4.3
=	Option option	BU					-1V14	2	N01		WAGO 2002-1204					&ET1/4.3
=	Option option	GNYE					-1V14	PE	PE		WAGO 2002-1207					&ET1/4.3

Klemmleiste =001+S1-X3
terminal strip =001+S1-X3

Projektbez.: U0-D 600-2000 (CD)
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000

= 001
+ S1 & ETK
Blatt 2
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

Funktionstext / Bemerkung Function text / remark			-W17-8L02/3	-W12-1V03	-W11-1V02	-W10-1V01	-W8-1X02	-W7-0P01	-W6-0P01	Kabelname Cable name	Leiste Strip =001+S1-X5 X5, Klemmleiste Digitale Ein- / Ausgänge 24VDC						Kabelname Cable name					Seite / Spalte Page / column
			ÖLFLEX® CLASSIC 110	PVC	PVC	PVC	UNITRONIC® LiYY	PUR	PUR	Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Brücke Jumper Klemme Terminal -X5		Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabeltyp Cable type					
Freigabe release	Option option								BN		-0P01-X2	1	1		WAGO 2000-1201	-K1	14					&ET1/2.5
=	Option option								BU		-0P01-X2	3	2		WAGO 2000-1201	-K1	13					&ET1/2.5
=	Option option								WH		-0P01-X2	2	3		WAGO 2000-1201							&ET1/2.5
=	Option option								BK		-0P01-X2	4	4		WAGO 2000-1201							&ET1/2.5
Störung / Limitron fault / LN	Option option							BN			-0P01-X3	1	5		WAGO 2000-1201	-Q2	14					&ET1/2.6
							GN				-1X02	12										
Störung / Limitron fault / LN	Option option							BK			-0P01-X3	4	6		WAGO 2000-1201	-RO-D-X	27					&ET1/2.6
							WH				-1X02	11										
Störung / Limitron fault / LN	Option option							WH			-0P01-X3	2	7		WAGO 2000-1201							&ET1/2.7
							BN				-1X02	14										
Störung fault	Option option							BU			-0P01-X3	3	8		WAGO 2000-1201							&ET1/2.7
Zulaufventil feed valve						BN					-1V01	1	9		WAGO 2000-1201	-RO-D-X	15					&ET1/4.4
=						BU					-1V01	2	N20		WAGO 2000-1204	-RO-D-X	14					&ET1/4.4
=						GNYE					-1V01	PE	PE		WAGO 2000-1207							&ET1/4.4
Permeatventil (PR) permeate valve	Option option				BN						-1V02	1	10		WAGO 2000-1201	-RO-D-X	18					&ET1/4.5
=	Option option				BU						-1V02	2	N20		WAGO 2000-1204	-RO-D-X	17					&ET1/4.5
=	Option option				GNYE						-1V02	PE	PE		WAGO 2000-1207							&ET1/4.5
Konzentratventil (KSE) concentrate valve	Option option			BN							-1V03	1	11		WAGO 2000-1201	-RO-D-X	21					&ET1/4.6
=	Option option			BU							-1V03	2	N20		WAGO 2000-1204	-RO-D-X	20					&ET1/4.6
=	Option option			GNYE							-1V03	PE	PE		WAGO 2000-1207							&ET1/4.7
Niveau oben high level			1								-8L03		12		WAGO 2000-1201	-RO-D-X	22					&ET1/5.1
=			2								-8L03		13		WAGO 2000-1201	-RO-D-X	23					&ET1/5.1
Niveau unten low level			3								-8L02		14		WAGO 2000-1201	-RO-D-X	24					&ET1/5.2
=			4								-8L02		15		WAGO 2000-1201	-RO-D-X	25					&ET1/5.2
Zwangsstop forced stop													16		WAGO 2000-1201	-RO-D-X	28					&ET1/5.4

Klemmleiste =001+S1-X5
terminal strip =001+S1-X5

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1
& ETK
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 3
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

Leiste Strip
=001+S1-X5
X5, Klemmleiste Digitale Ein- / Ausgänge 24VDC

Funktionstext / Bemerkung Function text / remark	Kabelname Cable name	Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal -X5	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabelname Cable name	Kabeltyp Cable type	Seite / Spalte Page / column
Zwangsstop forced stop					17		WAGO 2000-1201	-RO-D-X	29			&ET1/5.5
Universaleingang 1 universal input					18		WAGO 2000-1201	-RO-D-X	30			&ET1/5.5
=					19		WAGO 2000-1201	-RO-D-X	31			&ET1/5.6
Universaleingang 2 universal input					20		WAGO 2000-1201	-RO-D-X	32			&ET1/5.6
=					21		WAGO 2000-1201	-RO-D-X	33			&ET1/5.7
Universaleingang 3 universal input					22		WAGO 2000-1201	-RO-D-X	34			&ET1/5.8
=					23		WAGO 2000-1201	-RO-D-X	35			&ET1/5.8
					PE		WAGO 2000-1207					&ET1/5.8

	Revision	Datum	Name		Datum	Name
a				Gez.	09.06.2021	Lei
b				Gepr.	07.11.2022	mo
c						

Klemmleiste =001+S1-X5
terminal strip =001+S1-X5

Projektbez.: U0-D 600-2000 (CD)
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
= 001
+ S1
& ETK
Blatt 4
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

Funktionstext / Bemerkung Function text / remark			-W29-1FL04	-W28-1FL02	-W27-1FL01	-W26-1PR06	-W25-1PR05	-W23-1PR03	Kabelname Cable name	Leiste Strip =001+S1-X7 X7, Klemmleiste Analog Signale Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal -X7	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabelname Cable name					Seite / Spalte Page / column
			PUR	PUR	PUR			Systemkabel VFS/RPS	Kabeltyp Cable type								Kabeltyp Cable type					
1PR03								GN		-1PR03	3	1		WAGO 2000-1201	-RO-D-X	36						&ET1/6.1
=								BN		-1PR03	4	2		WAGO 2000-1201	-RO-D-X	37						&ET1/6.1
=								WH		-1PR03	2	3		WAGO 2000-1201	-RO-D-X	38						&ET1/6.1
=								YE		-1PR03	1	4		WAGO 2000-1201	-RO-D-X	54						&ET1/6.1
												5		WAGO 2000-1201								&ET1/6.2
												6		WAGO 2000-1201	-RO-D-X	40						&ET1/6.2
												7		WAGO 2000-1201	-RO-D-X	41						&ET1/6.2
												8		WAGO 2000-1201								&ET1/6.3
1PR05												9		WAGO 2000-1201								&ET1/6.3
=							1			-1PR05	1	10		WAGO 2000-1201	-RO-D-X	43						&ET1/6.3
=							2			-1PR05	2	11		WAGO 2000-1201	-RO-D-X	44						&ET1/6.4
=												12		WAGO 2000-1201								&ET1/6.4
1PR06												13		WAGO 2000-1201								&ET1/6.4
=						1				-1PR06	1	14		WAGO 2000-1201	-RO-D-X	46						&ET1/6.4
=						2				-1PR06	2	15		WAGO 2000-1201	-RO-D-X	47						&ET1/6.5
=												16		WAGO 2000-1201								&ET1/6.5
1FL01					BU					-1FL01	3	17		WAGO 2000-1201								&ET1/6.5
=					BN					-1FL01	1	18		WAGO 2000-1201	-RO-D-X	49						&ET1/6.6
=					BK					-1FL01	4	19		WAGO 2000-1201	-RO-D-X	50						&ET1/6.6
=					WH					-1FL01	2	20		WAGO 2000-1201								&ET1/6.6
1FL02				BU						-1FL02	3	21		WAGO 2000-1201								&ET1/6.7
=				BN						-1FL02	1	22		WAGO 2000-1201	-RO-D-X	52						&ET1/6.7
=				BK						-1FL02	4	23		WAGO 2000-1201	-RO-D-X	53						&ET1/6.7
=				WH						-1FL02	2	24		WAGO 2000-1201								&ET1/6.7
1FL04			BU							-1FL04	3	25		WAGO 2000-1201								&ET1/6.8

Klemmenplan
Terminal diagramm

HE_F13_002

Leiste Strip
=001+S1-X7
X7, Klemmleiste Analog Signale

Funktionstext / Bemerkung Function text / remark	-W29-1FL04 PUR	Kabelname Cable name Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal -X7	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabelname Cable name Kabeltyp Cable type	Seite / Spalte Page / column
1FL04	BN		-1FL04	1	26	•	WAGO 2000-1201	-RO-D-X	56		&ET1/6.8
=	BK		-1FL04	4	27	•	WAGO 2000-1201	-RO-D-X	57		&ET1/6.9
=	WH		-1FL04	2	28	•	WAGO 2000-1201				&ET1/6.9
					PE	•	WAGO 2000-1207				&ET1/6.9

5 7

	Revision	Datum	Name		Datum	Name
a				Gez.	09.06.2021	Lei
b				Gepr.	07.11.2022	mo
c						

Klemmleiste =001+S1-X7
terminal strip =001+S1-X7

Projektbez.: U0-D 600-2000 (CD)
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
= 001
+ S1
& ETK
Blatt 6
25 Bl.

Klemmenplan
Terminal diagramm

HE_F13_002

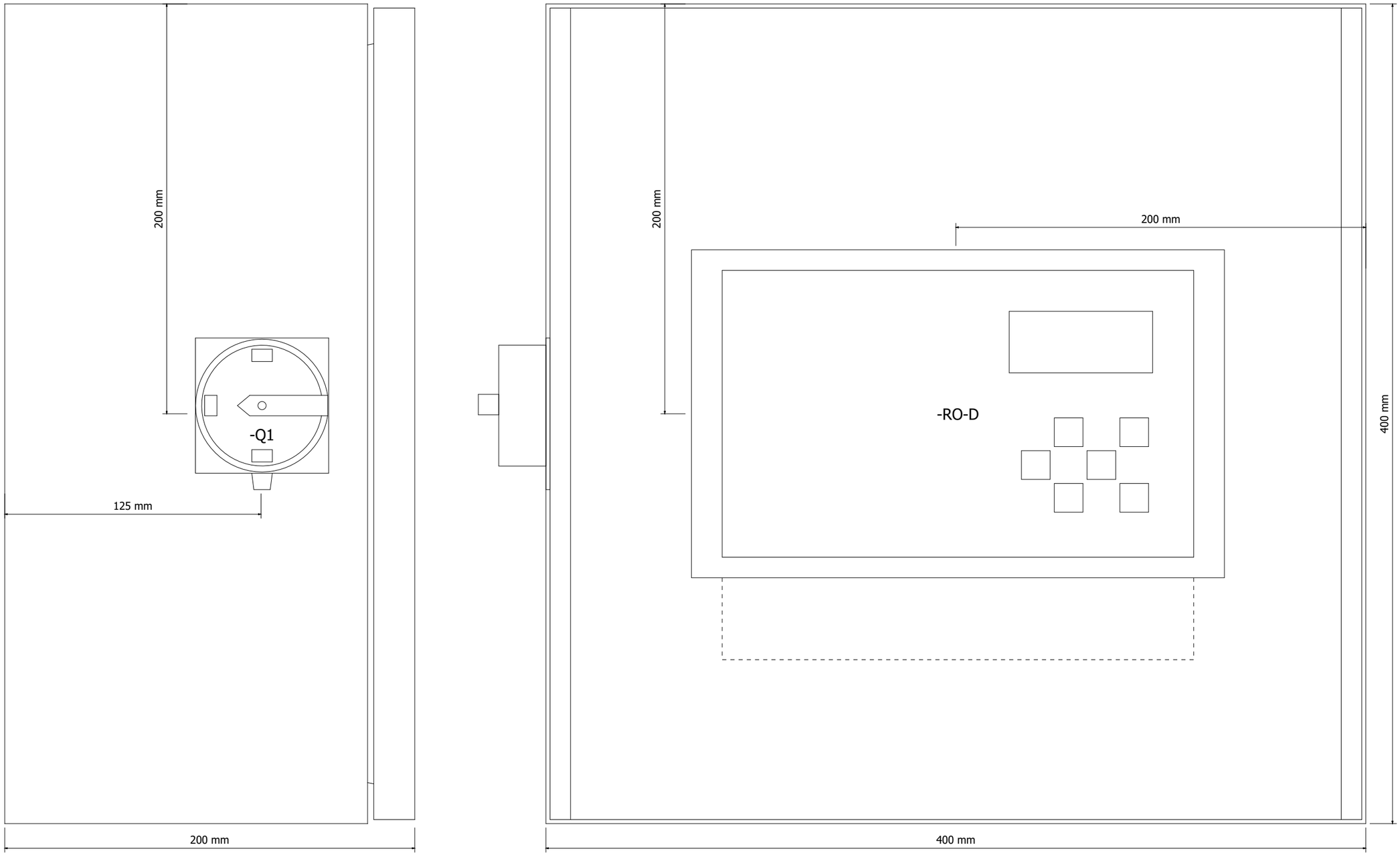
Leiste Strip
=001+S1-X9
X9, Klemmleiste Meldungen für GLT/ZLT

Funktionstext / Bemerkung Function text / remark	Kabelname Cable name	Kabeltyp Cable type	Zielbezeichnung Target designation	Anschluss Connection	Klemme Terminal	Brücke Jumper	Klemmentyp Terminal type	Zielbezeichnung Target designation	Anschluss Connection	Kabelname Cable name	Kabeltyp Cable type	Seite / Spalte Page / column
					-X9							
Sammelstörmeldung collective fault alarm					1		WAGO 2000-1201	-RO-D-X	7			&ET1/4.7
=					2		WAGO 2000-1201	-RO-D-X	8			&ET1/4.7
=					3		WAGO 2000-1201	-RO-D-X	9			&ET1/4.8
Universalausgang universal output					4		WAGO 2000-1201	-RO-D-X	10			&ET1/4.8
=					5		WAGO 2000-1201	-RO-D-X	11			&ET1/4.8
=					6		WAGO 2000-1201	-RO-D-X	12			&ET1/4.9
Analogausgang 1 analog output					7		WAGO 2000-1201	-RO-D-X	61			&ET1/7.2
=					8		WAGO 2000-1201	-RO-D-X	62			&ET1/7.2
Analogausgang 2 analog output					9		WAGO 2000-1201	-RO-D-X	63			&ET1/7.3
=					10		WAGO 2000-1201	-RO-D-X	64			&ET1/7.3
					PE		WAGO 2000-1207					&ET1/7.4

	Revision	Datum	Name		Datum	Name
a				Gez.	09.06.2021	Lei
b				Gepr.	07.11.2022	mo
c						

Klemmleiste =001+S1-X9
terminal strip =001+S1-X9

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1
& ETK
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 7
25 Bl.



&ETK/7

2

	Revision	Datum	Name		Datum	Name
a				Gez.	14.02.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Schaltschrank
control cabinet

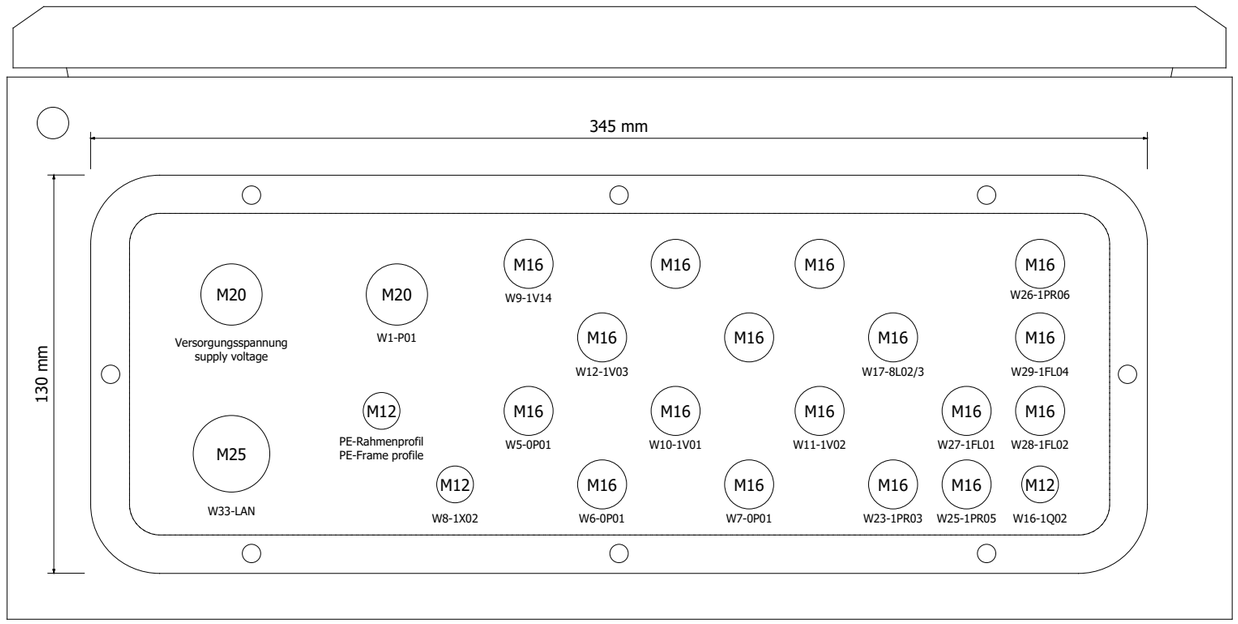
Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ETA

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

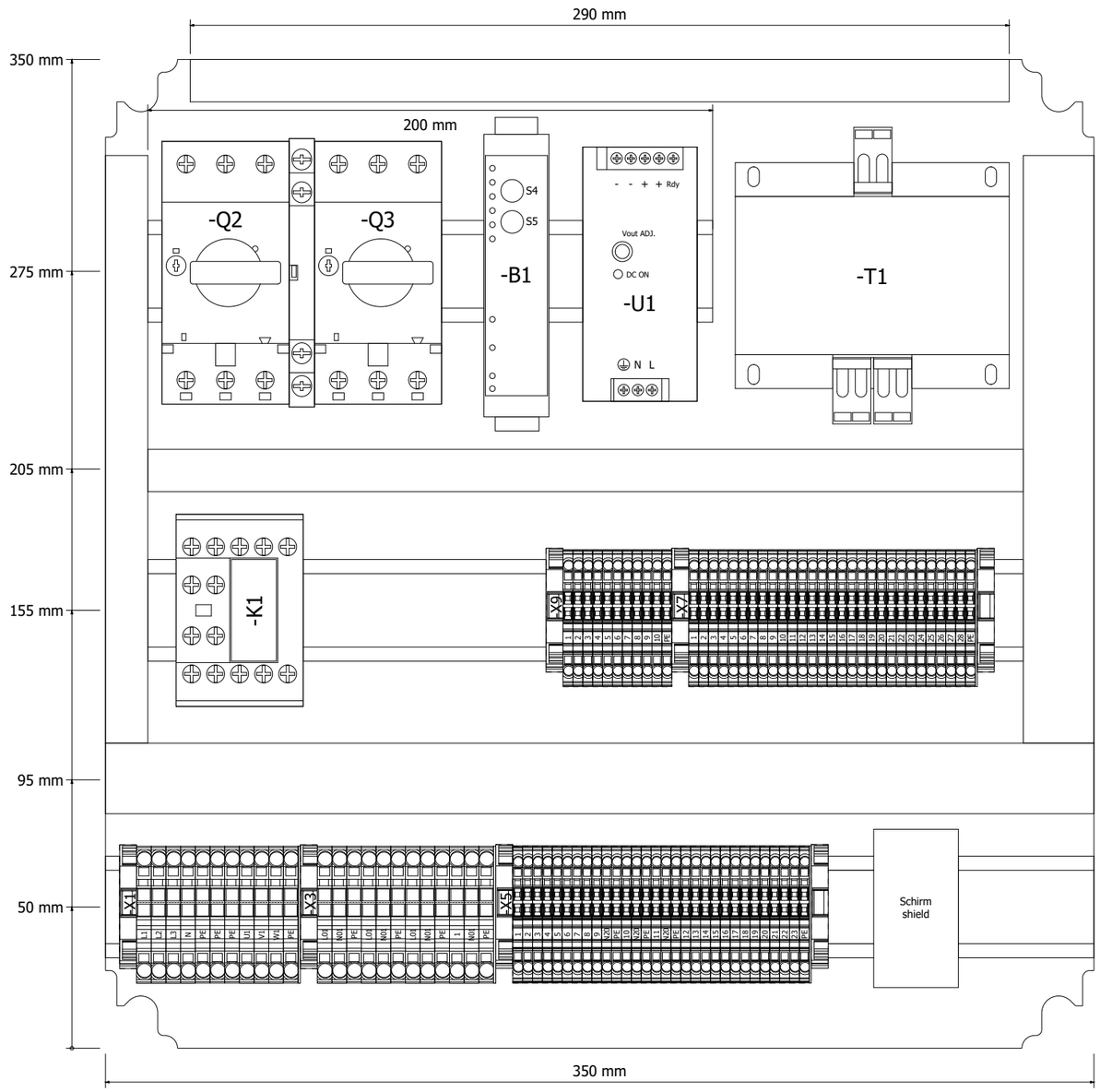
Blatt 1
25 Bl.



	Revision	Datum	Name		Datum	Name
a				Gez.	12.03.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Flanschplatte
cable gland plate

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1 & ETA
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 2
25 Bl.



2

&ETB/1

	Revision	Datum	Name		Datum	Name
a				Gez.	12.03.2020	Lei
b				Gepr.	07.11.2022	mo
c						

Montageplatte
mounting plate

Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ETA

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 3
25 Bl.

Kabelübersicht
cable overview

HE_F10_001

Kabelname Cable name	Quelle (von) Source	Ziel (bis) Target	Kabeltyp cable type	alle Adern all cores	verwendete Adern Conductors used	Querschnitt [mm] cross-section[mm]	Länge [m] Length (m)	Funktionstext Function text
-W1-1P01	-X1	-1P01	ÖLFLEX® CLASSIC 110	4G	4	1.5		U0-Pumpe R0-pump
-W4-0X02	-X3	-0X02	ÖLFLEX® CLASSIC 110	3G	3	1.5		Enthärter softener
-W5-0P01	-X3	-0P01	ÖLFLEX® CLASSIC 110	3G	3	0.75		Dosierpumpe dosing pump
-W6-0P01	-X5	-0P01-X2	PUR	4	4	0,34	2	Freigabe release
-W7-0P01	-X5	-0P01-X3	PUR	4	4	0,34	2	Störung fault
-W8-1X02	-X5	-1X02	UNITRONIC® LiYY	3	3	0,25		Limitron LN
-W9-1V14	-X3	-1V14	PVC	3	3	0,5	10	Verschneidung (VSE) blending
-W10-1V01	-X5	-1V01	PVC	3	3	0,5	10	Zulaufventil feed valve
-W11-1V02	-X5	-1V02	PVC	3	3	0,5	10	Permeatventil (PR) permeate valve
-W12-1V03	-X5	-1V03	PVC	3	3	0,5	10	Konzentratventil (KSE) concentrate valve
-W16-1Q02	-1Q02	-RO-D-X	UNITRONIC® LiYY	2	2	0,75		1Q02
-W17-8L02/3	-X5	-8L03	ÖLFLEX® CLASSIC 110	5G	4	0.75		Niveau oben/unten high/low level
		-8L02						
-W23-1PR03	-X7	-1PR03	Systemkabel VFS/RPS	4	4			1PR03
-W25-1PR05	-X7	-1PR05		2	2	0,75	3	1PR05
-W26-1PR06	-X7	-1PR06		2	2	0,75	3	1PR06
-W27-1FL01	-X7	-1FL01	PUR	4	4	0,34	2	1FL01
-W28-1FL02	-X7	-1FL02	PUR	4	4	0,34	2	1FL02
-W29-1FL04	-X7	-1FL04	PUR	4	4	0,34	2	1FL04

&ETA/3

&ETS/1

	Revision	Datum	Name		Datum	Name
a				Gez.	01.04.2022	Lei
b				Gepr.	07.11.2022	mo
c						

Kabelübersicht
cable overview

Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ETB

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 1
25 Bl.

Artikelstückliste
parts list

HE_F01_001

BMK	Menge Quantity	ERP-Nummer ERP number	Bezeichnung description	Typnummer type number	Hersteller manufacturer	Bestellnummer Order number	Seite / Pfad Page / path
-B1	1	00541923	Universelles Feldbusgateway Unigate CL-PN	UNIGATE CL - PROFINET 2Port	DA	DA.UG-CL-PN	&ET1/3.0
-K1	1	00540710	Leistungsschütz, 3-polig + 1 Schließer, 5,5 kW/400 V/AC3	DILM12-10(230V50HZ,240V60HZ)	ETN	ETN.DILM12-10(230V50HZ,2	&ET1/4.2
-K1	1	00540104	Varistor-Beschaltung, 130 - 240 VAC, für DILA, M7-12	DILM12-XSPV240	ETN	ETN.DILM12-XSPV240	&ET1/4.2
-Q1	1	00540141	Hauptschalter, 3-polig, 20 A, NOT-AUS-Funktion, 90 °, abschließbar in	T0-2-1/EA/SVB	ETN	ETN.T0-2-1/EA/SVB	&ET1/1.0
-Q2	1	00540091	Motorschutzschalter, 3-polig, Ir = 2,5 - 4 A, Schraubanschluss	PKZM0-4	ETN	ETN.PKZM0-4	&ET1/1.4
-Q2	1	00540092	Motorschutzschalter, 3-polig, Ir = 4 - 6,3 A, Schraubanschluss	PKZM0-6,3	ETN	ETN.PKZM0-6,3	&ET1/1.4
-Q2	1	00540093	Motorschutzschalter, 3-polig, Ir = 6,3 - 10 A, Schraubanschluss	PKZM0-10	ETN	ETN.PKZM0-10	&ET1/1.4
-Q2	1	00540083	Normal-Hilfsschalter, 1 Schließer + 1 Öffner, Schraubanschluss	NHI11-PKZ0	ETN	ETN.NHI11-PKZ0	&ET1/1.4
-Q3	1	00541692	Transformatorschutzschalter, 3-polig, Ir = 0,4 - 0,63 A, Schraubanschluss	PKZM0-0,63-T	ETN	ETN.PKZM0-0,63-T	&ET1/2.1
-RO-D	1	00545466	R0 digital	U0-Steuerung R0 digital Einbau	HER	HER.00545466	&ET1/4.0
-T1	1	00541089	Transformator 400/230V, 50/60Hz, 160VA		BUS	BUS.112238221001	&ET1/2.1
-U1	1	00541240	Netzgerät geregelt, 1-phasig, 60W	DRA60-24A	LUE	LUE.722754	&ET1/3.3
-W1-1P01	1	00540384	ÖLFLEX CLASSIC 110 4G1,5	ÖLFLEX® CLASSIC 110	LAPP	LAPP.1119304	&ET1/1.4
-W4-0X02	1	00540383	ÖLFLEX CLASSIC 110 3G1,5	ÖLFLEX® CLASSIC 110	LAPP	LAPP.1119303	&ET1/2.2
-W5-0P01	1	00540239	ÖLFLEX CLASSIC 110 3G0,75	ÖLFLEX® CLASSIC 110	LAPP	LAPP.1119103	&ET1/2.4
-W6-0P01	1	00453029	Systemkabel M12-A, 4x0,34, 2m		LUE	LUE.499807.0200	&ET1/2.5
-W7-0P01	1	00453031	Systemkabel M12-B, 4x0,34, 2m		LUE	LUE.499808.0200	&ET1/2.6
-W8-1X02	1	00540503	UNITRONIC LiYY 3X0,25	UNITRONIC® LiYY	LAPP	LAPP.0028303	&ET1/2.8
-W9-1V14	1	00541238	Ventilstecker Bauform A, 10m, PVC, 230V	LV-A-9675 10m PVC 230V	LUE	LUE.709675	&ET1/4.2
-W10-1V01	1	00541237	Ventilstecker Bauform A, 10m, PVC, 24V	LS-A-9607 10m PVC 24V	LUE	LUE.709607	&ET1/4.4
-W11-1V02	1	00541237	Ventilstecker Bauform A, 10m, PVC, 24V	LS-A-9607 10m PVC 24V	LUE	LUE.709607	&ET1/4.5
-W12-1V03	1	00541237	Ventilstecker Bauform A, 10m, PVC, 24V	LS-A-9607 10m PVC 24V	LUE	LUE.709607	&ET1/4.6
-W16-1Q02	1	00540461	UNITRONIC LiYY 2X0,75	UNITRONIC® LiYY	LAPP	LAPP.0028602	&ET1/7.1
-W17-8L02/3	1	00540493	ÖLFLEX CLASSIC 110 5G0,75	ÖLFLEX® CLASSIC 110	LAPP	LAPP.1119105	&ET1/5.1
-W23-1PR03	1	00630522	Systemkabel VFS/RPS	KABEL-VFS-RPS	GRF	GRF.97905217	&ET1/6.1
-W25-1PR05	1	00542125	Ventilstecker Bauform A , 3m, 4-20mA		LUE	LUE.196959.0300	&ET1/6.3
-W26-1PR06	1	00542125	Ventilstecker Bauform A , 3m, 4-20mA		LUE	LUE.196959.0300	&ET1/6.4
-W27-1FL01	1	00453029	Systemkabel M12-A, 4x0,34, 2m		LUE	LUE.499807.0200	&ET1/6.5
-W28-1FL02	1	00453029	Systemkabel M12-A, 4x0,34, 2m		LUE	LUE.499807.0200	&ET1/6.7
-W29-1FL04	1	00453029	Systemkabel M12-A, 4x0,34, 2m		LUE	LUE.499807.0200	&ET1/6.8
-X1	6	00541879	2-Leiter-Durchgangsklemme	2002-1201	WAGO	WAGO.2002-1201	&ET1/1.0;&ET1/1.1
-X1	1	00541912	Schraubenlose Endklammer	249-116	WAGO	WAGO.249-116	&ET1/1.0
-X1	1	00541880	2-Leiter-Durchgangsklemme	2002-1204	WAGO	WAGO.2002-1204	&ET1/1.1
-X1	4	00541881	2-Leiter-Schutzleiterklemme	2002-1207	WAGO	WAGO.2002-1207	&ET1/1.1;&ET1/1.2
-X1	1		Abschluss- und Zwischenplatte	2002-1291	WAGO	WAGO.2002-1291	&ET1/1.5
-X3	4	00541879	2-Leiter-Durchgangsklemme	2002-1201	WAGO	WAGO.2002-1201	&ET1/2.1;&ET1/2.2
-X3	1	00541912	Schraubenlose Endklammer	249-116	WAGO	WAGO.249-116	&ET1/2.1

Stückliste
bill off materials

Projektbez.: U0-D 600-2000 (CD)
= 001
+ S1
& ETS
Auftrags-Nr.:
Zeichnungs-Nr.: 545802-02000
Blatt 1
25 Bl.

Artikelstückliste
parts list

HE_F01_001

BMK	Menge Quantity	ERP-Nummer ERP number	Bezeichnung description	Typnummer type number	Hersteller manufacturer	Bestellnummer Order number	Seite / Pfad Page / path
-X3	4	00541880	2-Leiter-Durchgangsklemme	2002-1204	WAGO	WAGO.2002-1204	&ET1/2.1;&ET1/2.3
-X3	4	00541881	2-Leiter-Schutzleiterklemme	2002-1207	WAGO	WAGO.2002-1207	&ET1/2.1;&ET1/2.3
-X3	1		Abschluss- und Zwischenplatte	2002-1291	WAGO	WAGO.2002-1291	&ET1/4.3
-X5	23	00541873	2-Leiter-Durchgangsklemme	2000-1201	WAGO	WAGO.2000-1201	&ET1/2.5...&ET1/2.7
-X5	2	00541912	Schraubenlose Endklammer	249-116	WAGO	WAGO.249-116	&ET1/2.5;&ET1/5.8
-X5	3	00541874	2-Leiter-Durchgangsklemme	2000-1204	WAGO	WAGO.2000-1204	&ET1/4.4...&ET1/4.6
-X5	4	00541875	2-Leiter-Schutzleiterklemme	2000-1207	WAGO	WAGO.2000-1207	&ET1/4.4;&ET1/4.5
-X5	1		Abschluss- und Zwischenplatte	2000-1291	WAGO	WAGO.2000-1291	&ET1/5.8
-X7	28	00541873	2-Leiter-Durchgangsklemme	2000-1201	WAGO	WAGO.2000-1201	&ET1/6.1...&ET1/6.9
-X7	2	00541912	Schraubenlose Endklammer	249-116	WAGO	WAGO.249-116	&ET1/6.1;&ET1/6.9
-X7	1	00541875	2-Leiter-Schutzleiterklemme	2000-1207	WAGO	WAGO.2000-1207	&ET1/6.9
-X7	1		Abschluss- und Zwischenplatte	2000-1291	WAGO	WAGO.2000-1291	&ET1/6.9
-X9	10	00541873	2-Leiter-Durchgangsklemme	2000-1201	WAGO	WAGO.2000-1201	&ET1/4.7...&ET1/4.9
-X9	1	00541912	Schraubenlose Endklammer	249-116	WAGO	WAGO.249-116	&ET1/4.7
-X9	1	00541875	2-Leiter-Schutzleiterklemme	2000-1207	WAGO	WAGO.2000-1207	&ET1/7.4
-X9	1		Abschluss- und Zwischenplatte	2000-1291	WAGO	WAGO.2000-1291	&ET1/7.4

	Revision	Datum	Name		Datum	Name
a				Gez.	04.02.2022	Lei
b				Gepr.	07.11.2022	mo
c						

Stückliste
bill off materials

Projektbez.: U0-D 600-2000 (CD)

= 001
+ S1 & ETS

Auftrags-Nr.:

Zeichnungs-Nr.: 545802-02000

Blatt 2
25 Bl.

Änderungsinformationen
revisional informations

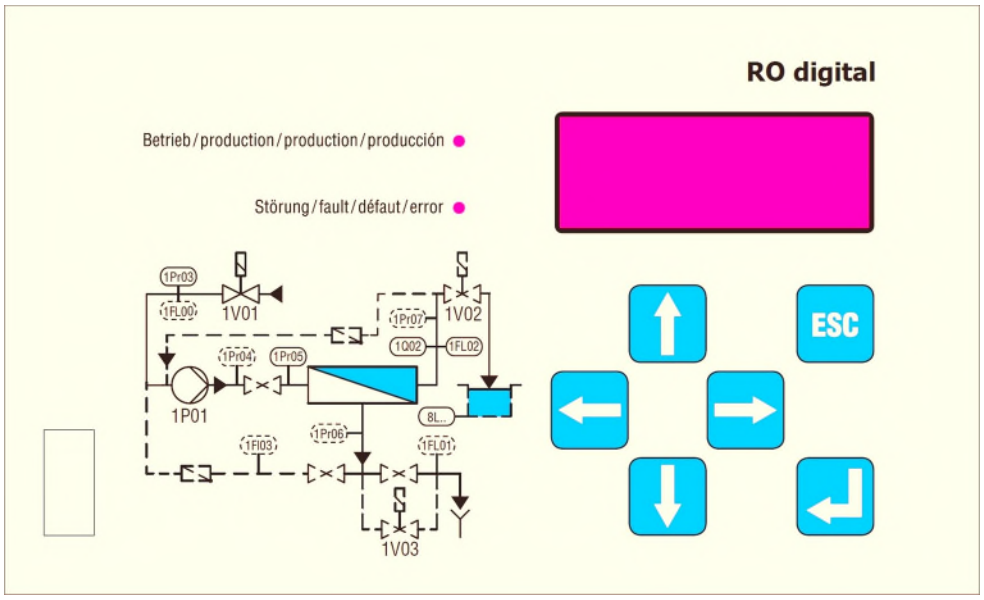
HE_F28_001

Nr.	Datum	Anlage	Ort	Änderungen	Firma	Bearbeiter

Operating Instructions

RO digital controller

Software V1.8.x



Translation of the original instructions

Contents

Revision	Date	Author	Comments / Software versions
1	15.08.11	Jm	First version
2	03.09.13	Bvt	amendment of profinet equipment
3	21.10.13	Bvt	update delay fault relay, extension AI
4	31.01.14	Bvt	5. amendment Note AO
5	23.09.14	Bvt	p.13 update AI1-8
6	09.09.15	Bvt	Update pt. 2.3, 9.2, 11
7	03.05.16	Bvt	Update pt. 8.13
8	14.12.18	Bvt	SW version 1.7.0; Impr., 7., 7.1, 7.4, 10.2, 11.
9	23.07.19	Bvt	Insertion pt. 8.6.1
10	07.01.20	Bvt	SW version 1.8.0; pt. 2.1, 2.3, 8.8, 9.2 parameter P30
11	17.05.22	Rei	Update 6.2.2
12	13.02.23	Rei	10.3 operating mode OFF

Imprint

1 Introduction

1.1 Description

The RO digital controller is used for the fully automatic control of reverse osmosis installations.

1.2 Notational conventions

The following abbreviations are used throughout this manual:

Lim Limit

Cd Conductivity

T Temperature

t Time/Duration

high Output or input actuated

low Output or input not actuated

The following notations are used throughout this manual:

Type:	**Font:**	**Example:**
Keys:	capitals + bold	**LEFT, UP, DOWN**
LEDs:	capitals + bold	**PRODUCTION, FAULT**
Inputs/outputs, inlets/outlets:	capitals + bold	**INLET VALVE**
Operating parameters:	italics	*Cond permeate, flow rate*
Operating status:	capitals + underlined	OFF, OPERATION
Operating modes:	capitals + underlined	REJECT, PERMEATE RECIRCULATION
Faults:	capitals + underlined	LACK OF PRESSURE

1.3 Intended use

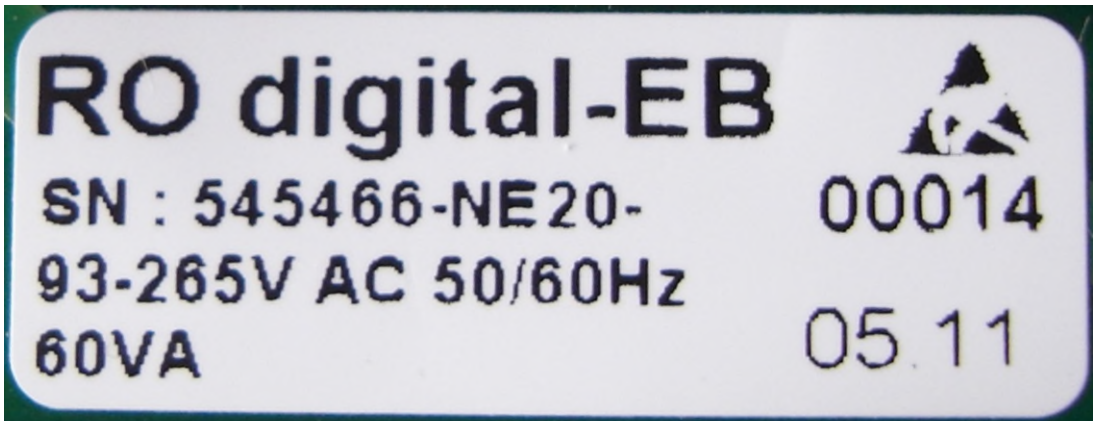
This controller is intended to control reverse osmosis installations in non-explosion-prone areas.

- The device can be mounted on top of an installation (top-mount casing) or fitted into an installation (fitted casing). Another mounting type is not permitted.
- The manufacturer is not liable for damages resulting from improper or unintended use. Improper or unintended use may turn the controller into a hazardous device.

2 Identification

2.1 Nameplate

The nameplate is located on the I/O board near the power input.



EB: RO digital with fitted casing

AB: RO digital with top-mount casing

2.2 Scope of supply

- Unit with terminal block
- Terminal diagram (printed onto the board)
- Bill of materials

2.3 Accessories

We offer the following optional accessories for the controller:

- Item no. 100066: Measurement cell 1/4 inch; 1-1000 µS/cm; cable length 1.5 m
- Item no. 100067: Measurement cell 1/4 inch; 1-1000 µS/cm; cable length 6 m
- Item no. 383423: Standard front foil in 4 languages, coloured, for top-mount casing with PID
- Item no. 383731: Standard front foil in 4 languages, coloured, for fitted casing with PID
- Item no. 383732: Standard front foil in 4 languages, coloured, for fitted casing without PID
- Item no. 541842: Profinet-module for RO digital for fitted casing
- Item no. 542070: Profinet-module for RO digital for top-mount casing
- Item no. 542181: Profibus-module for RO digital for fitted casing

3 Mounting

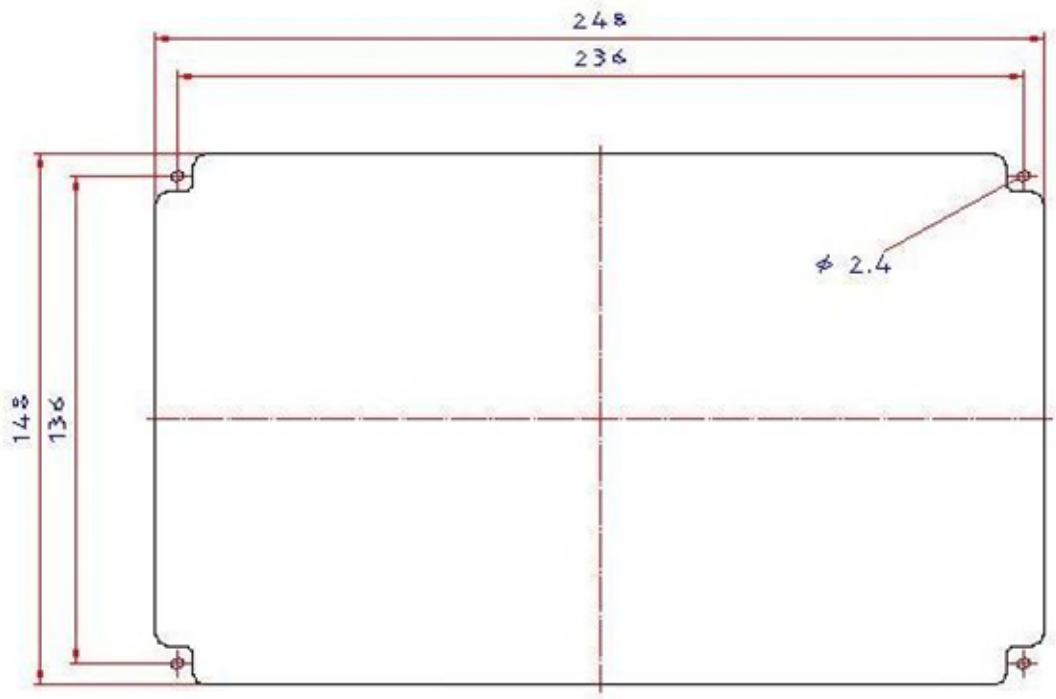
3.1 Mounting conditions

Working temperature range: 0 to 45°C (32 to 113°F), relative humidity 10 to 90%, non-condensing.

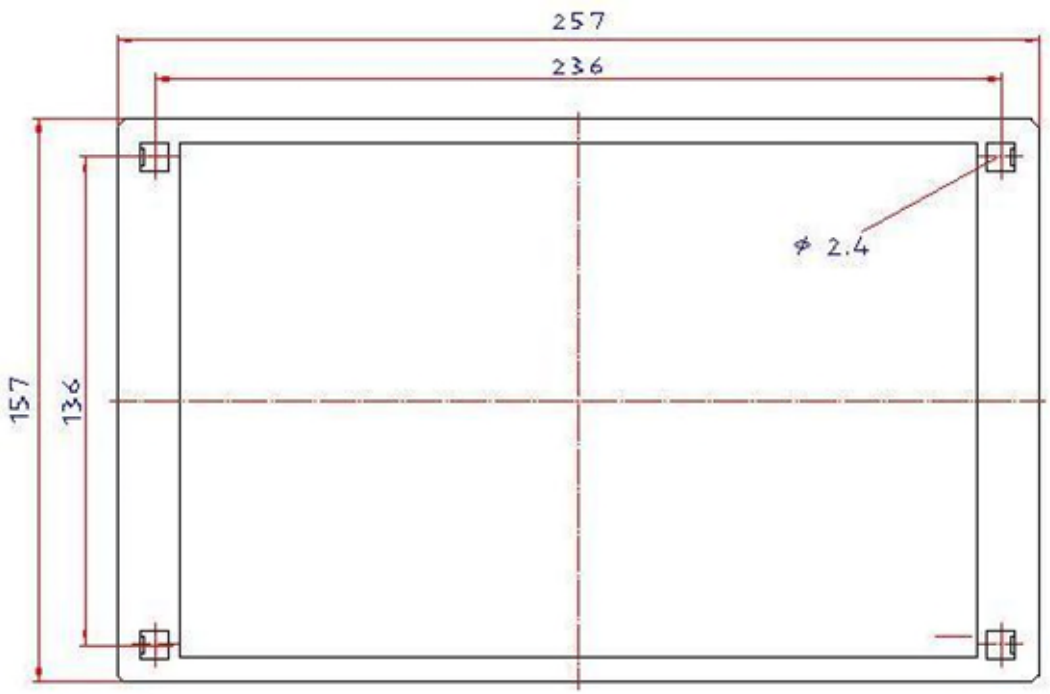
Note:

- Please provide sufficient cooling of the installation in order to avoid heat accumulation.
- Make sure there is sufficient distance to strong magnetic fields.

3.2 Fitting the device into the control cabinet



- Make an opening as shown in the drawing.
- Cut mounting holes for M3 screws.
- Slide on gaskets included in the delivery.
- Insert the control into the opening from the front side.

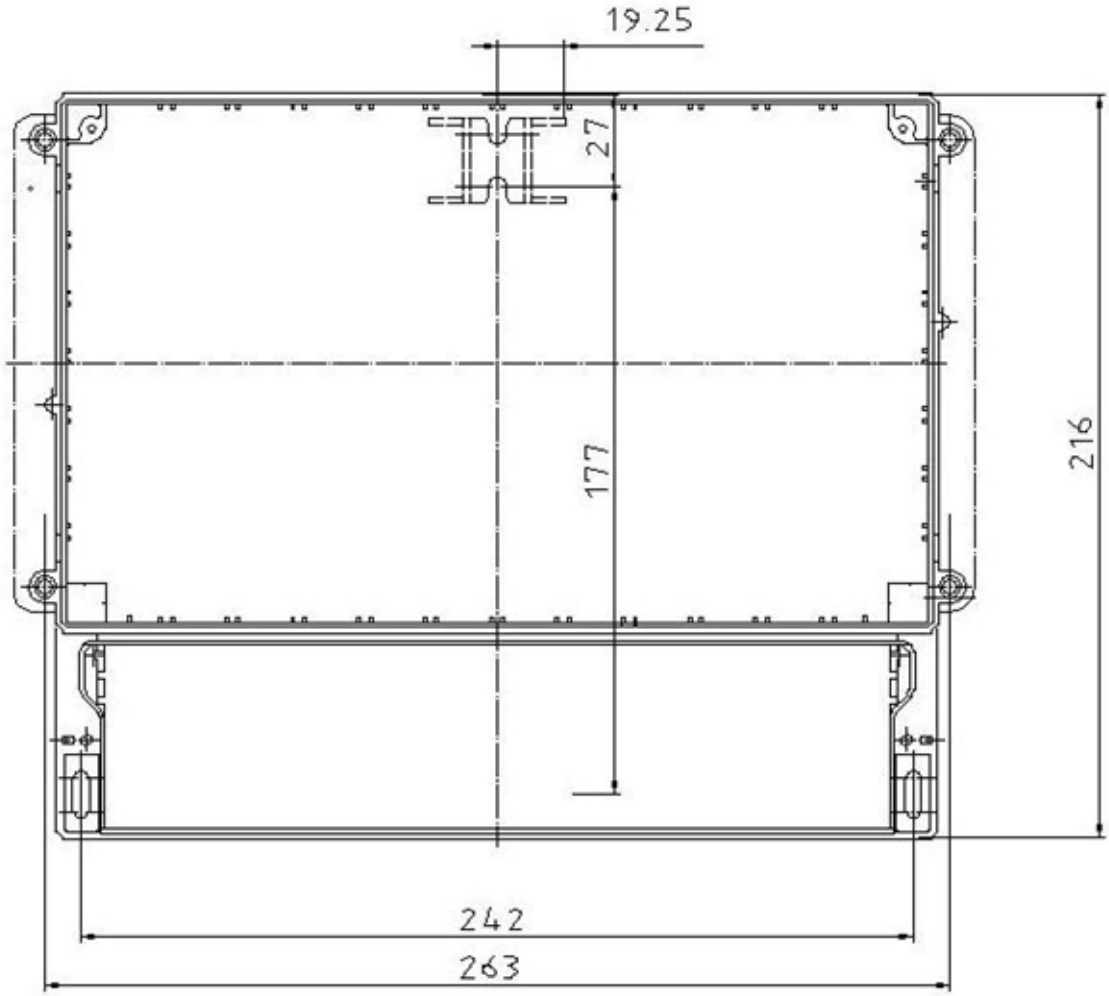


- Secure the control with 4 M3 x 20mm screws.

Note:

IP65 protection is only guaranteed if the device is mounted into a control cabinet.

3.3 Mounting the device to the wall



- Drill 3 holes (diameter and dowel type depend on wall structure) as shown in the drawing.
- Unscrew the device's terminal block cover.
- Insert the top screw in the middle.
- Position the device onto that screw.
- Attach the device with both screws.
- Screw the terminal block cover back on.

4 Electrical connection

4.1 Wiring at a glance

Warning!

Note that the entire electric connection may only be carried out while the device is disconnected from the mains.

Note:

- The protective earth connection must be carried out before any other connection. Danger may occur if the PE wire is interrupted.
- Before performing the start-up, make sure that the supply voltage corresponds to the value indicated on the nameplate (right side or back side of casing).
- Combining low safety voltage and voltage presenting a risk of electrocution at the relays is not permitted.
- For the mains line, an overcurrent protection device (nominal current ≤ 16 A) is required.

Note:

Observe the terminal diagram printed on the board.

4.2 Terminal layout

Terminal	Function	Type	Printing	Comment
	Rack earthing lug	PE		
1	Supply voltage	PE	POWER IN	Internal fuse: 6.3 A
2		230V neutral		
3		230V phase		
4	Pump 1P01	PE	P1	Actual voltage corresponds to supply voltage
5		230V neutral, NO contact		
6		230V phase, NO contact		
7	Centralised alarm	NO	FAULT	Voltage-free contact Max. 250 VAC/4A; 24 VDC/1A
8		COM		
9		NC		
10	Universal output	NO	UNI DO	Voltage-free contact Max. 250 VAC/4A; 24 VDC/1A
11		COM		
12		NC		
13	Feed valve 1V01	PE	MV01	24VDC; max. 0.5 A
14		GND		
15		24VDC NO contact		
16	Permeate valve 1V02	PE	MV02	24VDC; max. 0.5 A
17		GND		
18		24VDC NO contact		
19	Concentrate valve 1V03	PE	MV03	24VDC; max. 0.5 A
20		GND		
21		24VDC NO contact		
22	Upper level 8L03	+ input	HL	For voltage-free, external switch
23		+ 24 VDC		
24	Lower level 8L02	+ input	LL	For voltage-free, external switch
25		+ 24 VDC		

Terminal	Function	Type		Comment
26	Motor protection/hard water	+ input	MOT	For voltage-free, external switch
27		+ 24 VDC		
28	Forced stop	+ input	Stop	For voltage-free, external switch
29		+ 24 VDC		
30	Universal input 1	+ input	UNI DE 1	For voltage-free, external switch
31		+ 24 VDC		
32	Universal input 2	+ input	UNI DE 2	For voltage-free, external switch
33		+ 24 VDC		
34	Universal input 3	+ input	UNI DE 3	For voltage-free, external switch
35		+ 24 VDC		
36	Pressure probe supply pressure 1Pr03	GND	AI 1	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 203
37		Sensor supply		
38		Signal input		
39	Analogue input2	GND	AI 2	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 204
40		Sensor supply		
41		Signal input		
42	Analogue input3	GND	AI 3	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 205
43		Sensor supply		
44		Signal input		
45	Analogue input4	GND	AI 4	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 206
46		Sensor supply		
47		Signal input		
48	Analogue input5	GND	AI 5	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 207
49		Sensor supply		
50		Signal input		
51	Permeate flow / temperature sensor 1FI02 / 1T02	GND	AI 6/7	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 208
52		Sensor supply		
53		Flow signal input		
54		Temperature signal input		Input 0,.5-3.5V
55	Analogue input 8	GND	AI 8	Sensor supply/ Signal input: choice of either 5 VDC/ 0.5–3.5 V or 24 VDC/ 4–20mA via jumper x 209
56		Sensor supply		
57		Signal input		
58	Permeate conductivity sensor / 1Q02	Shield (ground)	COND	
59		Cond. Sensor A		
60		Cond. Sensor B		
61	Analogue Output1 4-20mA	-	A0	Max. load: 500 Ohm
62		+		
63	Analogue Output2 4-20mA	-	A1	Max. load: 500 Ohm
64		+		

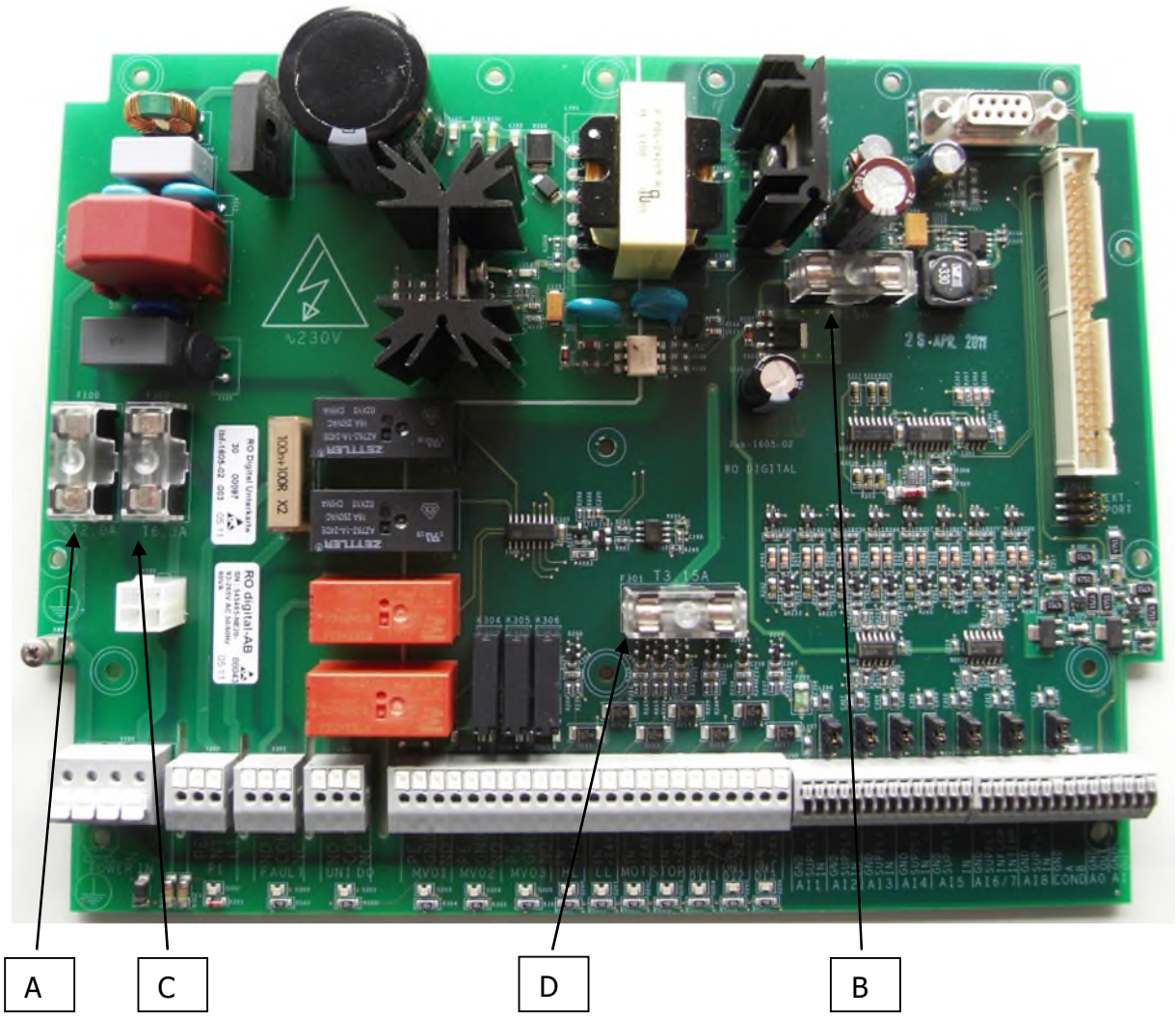
4.3 Terminal overview

Terminal	Max. cross-section	Max. current	Remarks
1 to 3	2.5 mm²	16A	Supply voltage
4 to 35	1.5 mm²	10A	Pump, digital outputs, digital inputs
36 to 62	0.5 mm²	2A	Sensor supply, analogue inputs, conductivity sensor, analogue output

4.4 Cable specifications

Terminals	Cable min.	Cable max.	Cable type
Supply voltage	3 x 1.5 mm²	3 x 2.5 mm²	NYM-J/ÖLFLEX® 110

4.5 Fuses



	Designation	Value	Function
A	F100	2 AT	Fuse mains input
B	F101	0.5 AT	Fuse electronics
C	F300	6.3 AT	Fuse pump output
D	F301	3.15 AT	Fuse digital outputs

5 Commissioning

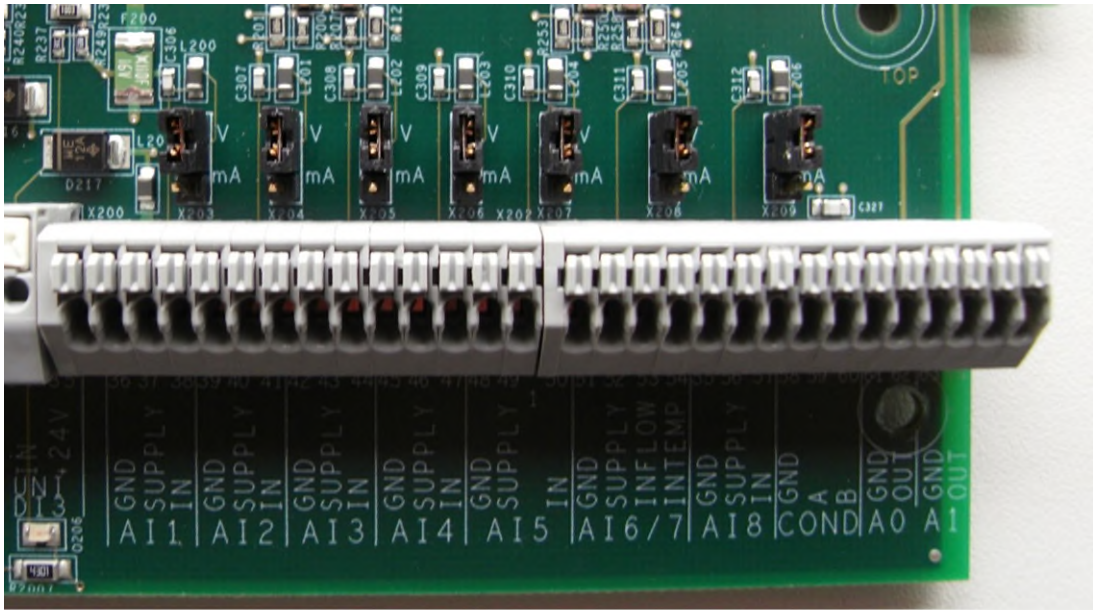
Note:

Before first start-up make sure that jumpers are set correctly. Wrongly set jumpers can damage analogue outputs and connected sensors.

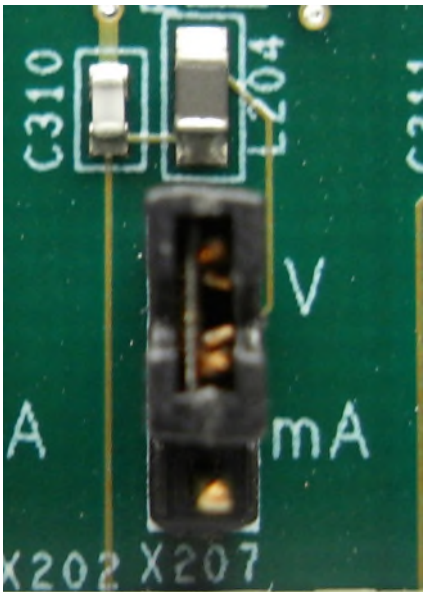
Note:

Active analogue output; do not connect power (24V DC) on the 4-20 mA analogue outputs.

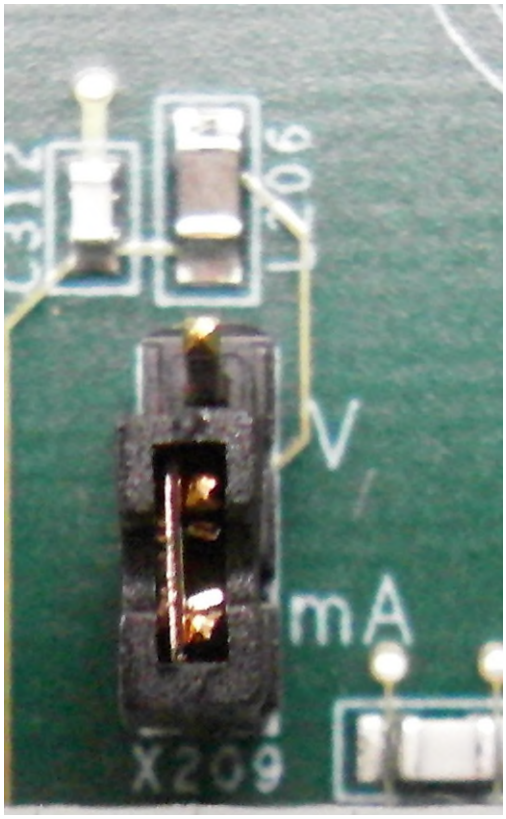
5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA



Set by a jumper above the input terminals.



Analogue sensor 0.5–3.5 V/ sensor supply 5 VDC



Analogue sensor 4 20 mA/ sensor supply 24 VDC

5.2 Programming the machine signature

See chapter 9.1 P01 Machine identification code

5.3 Parametrising the sensors

See chapter 8.12 Measuring and calibrating

5.4 Setting the operating parameters

See chapters: 8.7 Setting the limit values, 8.8 Setting the times, and 8.9 Selecting the parameters.

5.5 Calibrating the conductivity measurement

See chapter 8.12 Measuring and calibrating

6 Functional description

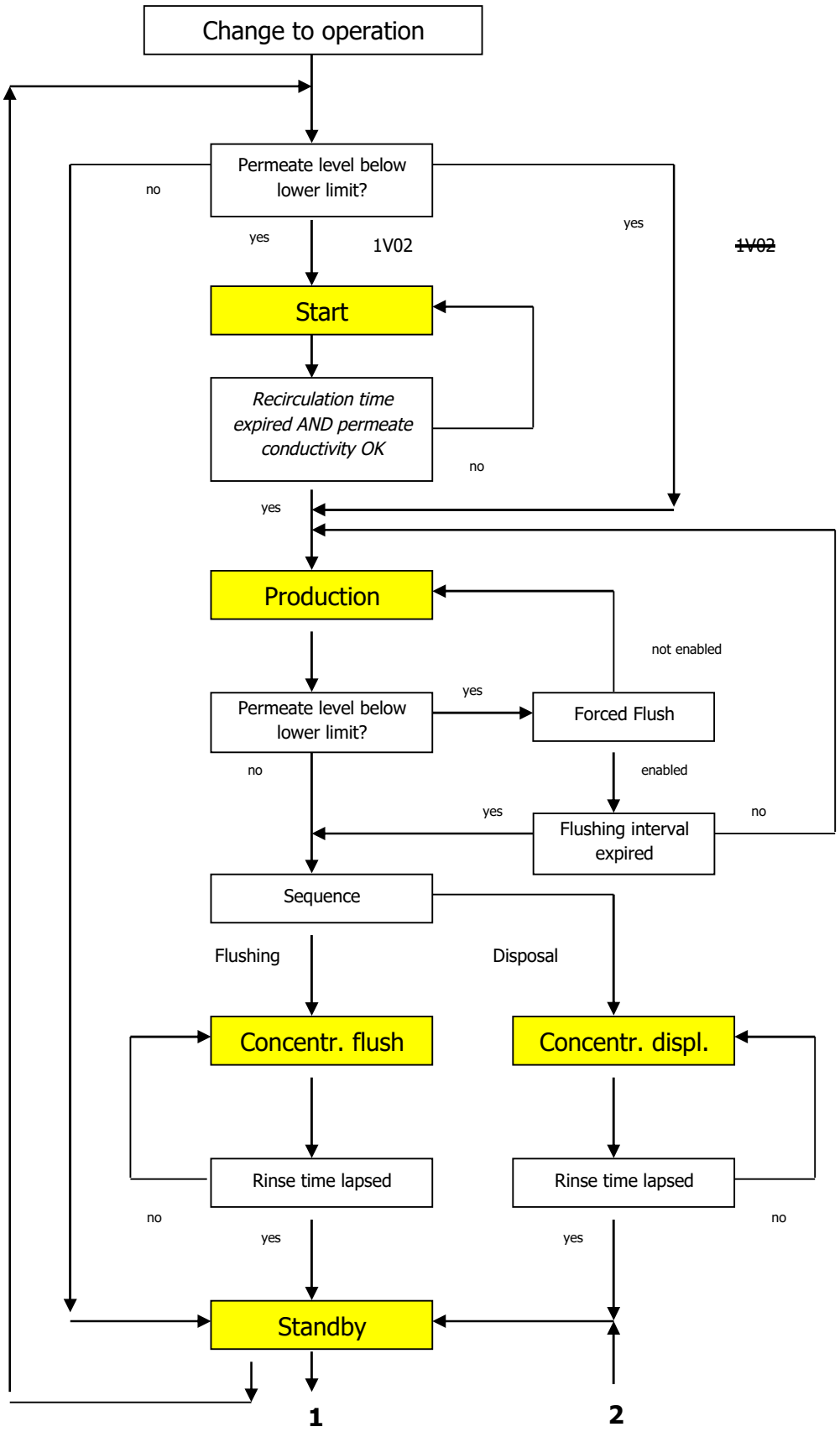
6.1 Operating modes

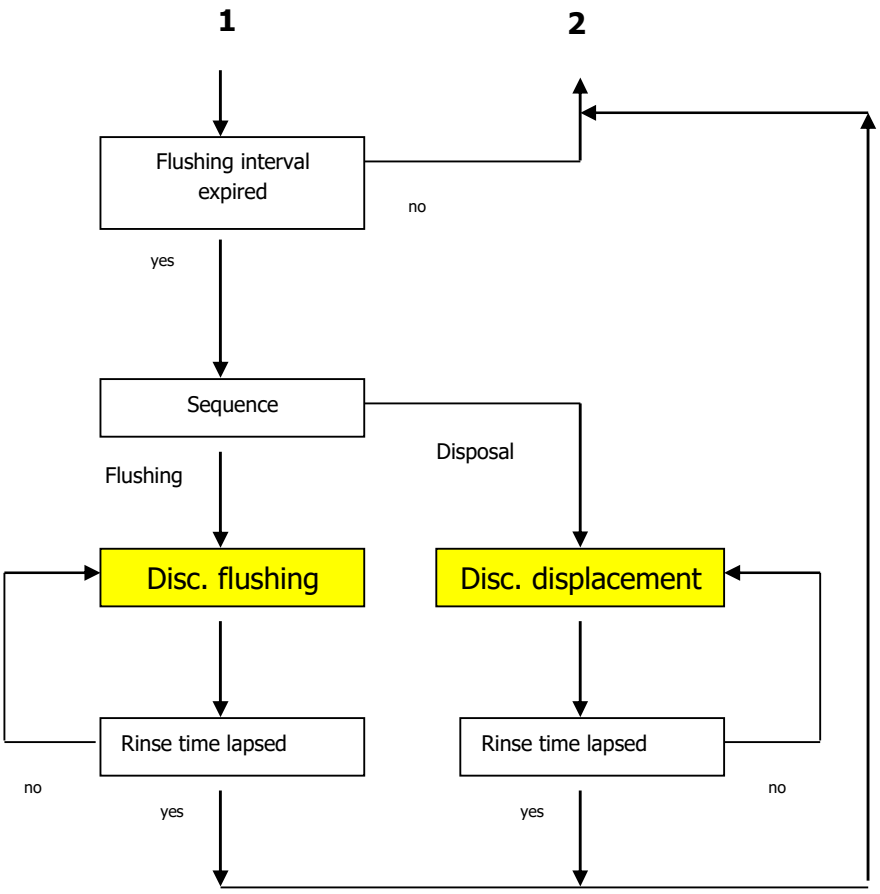
The RO digital can be set to the following operating states:

- OFF
- OPERATION
- DISINFECTION
- RINSING
- DIAGNOSIS

6.2 Operation

6.2.1 Operation flow chart





6.2.2 Rejection

During the START phase, permeate is recycled or sent to the drain, depending on the installation configuration. Permeate is recycled until its conductivity has fallen below the limit (parameter 174). For the START phase, a minimum duration (parameter 050) as well as a maximum duration (parameter 051) have been defined.

During the START phase, the **VALVE** 1V01 is open and the **PUMP** 1P01 is running. The **PERMEATE VALVE** (Option) 1V02 remains closed.

The installation does not produce permeate.

6.2.3 Production

During the PRODUCTION phase, permeate is produced until the tank is full (**LEVEL** 8L03).

The display indicates the following messages alternately:

- Production: Operating hours; Conductivity 1Q02; Temperature 1T02
- Flow rates
- Pressure values
- States of the digital outputs
- Totalised flow rate and yield

During this operating phase, the **PUMP** 1P01 is running and the **VALVES** 1V01 and 1V02 are open.

The installation produces permeate.

6.2.4 Standby

During PRODUCTION the permeate tank is filled until the Tank Full message is triggered. If the full level is reached, the installation changes to STANDBY. If additional filling is required by the **LEVEL** switch, the installation returns to PRODUCTION.

During this state, **PUMP** 1P01 is not running and the **VALVES** 1V01 and 1V02 are closed.

No permeate is produced.

6.2.5 Discontinuous rinse

If the installation remains in STANDBY for a certain, settable time (parameter 042), DISC. FLUSHING is carried out for a settable time (parameter 041). If the parameter 042 is set to zero, the DISC. FLUSHING is switched off.

During this state, the **PUMP** 1P01 is running, the **VALVE** 1V01 is open and the **VALVE** 1V02 is either closed ("*Tank without overflow*") or open ("*Tank with overflow*"), depending on parameter 280.

6.2.6 Concentrate displacement / rinse

If, during PRODUCTION the upper **LEVEL** input is activated, the installation switches to CONCENTRATE DISPOSAL/-FLUSHING for a settable time (parameter 041).

During this operating phase, the **PUMP** 1P01 is running (only during rinse), the **VALVE** 1V01 is open and the **VALVE** 1V02 is closed; if "*Tank with overflow*" is set, the **VALVE** remains open.

6.3 Disinfection

The installation runs **without any safety devices** in order to allow continuous DISINFECTION.

The **VALVES** 1V01 and 1V02 are open; the **PUMP** 1P01 is running.

After DISINFECTION, it must be ensured that the installation is free from any disinfectant.

Note!

When in this operating status, the installation runs without any safety devices.

6.4 Rinsing

The installation runs **without any safety devices** in order to allow flushing of preservatives.

The **VALVES** 1V01 and 1V03 are open.

After FLUSHING, it must be ensured that the installation is free from preservatives.

Note:

When in this operating status, the installation runs without any safety devices.

6.5 Diagnosis

DIAGNOSIS is accessed via the menu. In this operating status, all outputs of the controller can be manipulated via the membrane keyboard and the status of the controller inputs can be shown.

Note:

The units connected to the controller outputs are triggered without any safety devices if the respective output is actuated in diagnosis mode!

7 Operation

In the following chapters images of the visualization of the control system are used to illustrate the operation of the unit. The settings and values shown there are examples and are **not** applicable to an actual unit and its controller and visualization.

Do not use the display languages D-Text und GB-text for the following unit series:

- HP xxx D/E
- HP xxx D/E/B

Adhere to the relevant PID's.

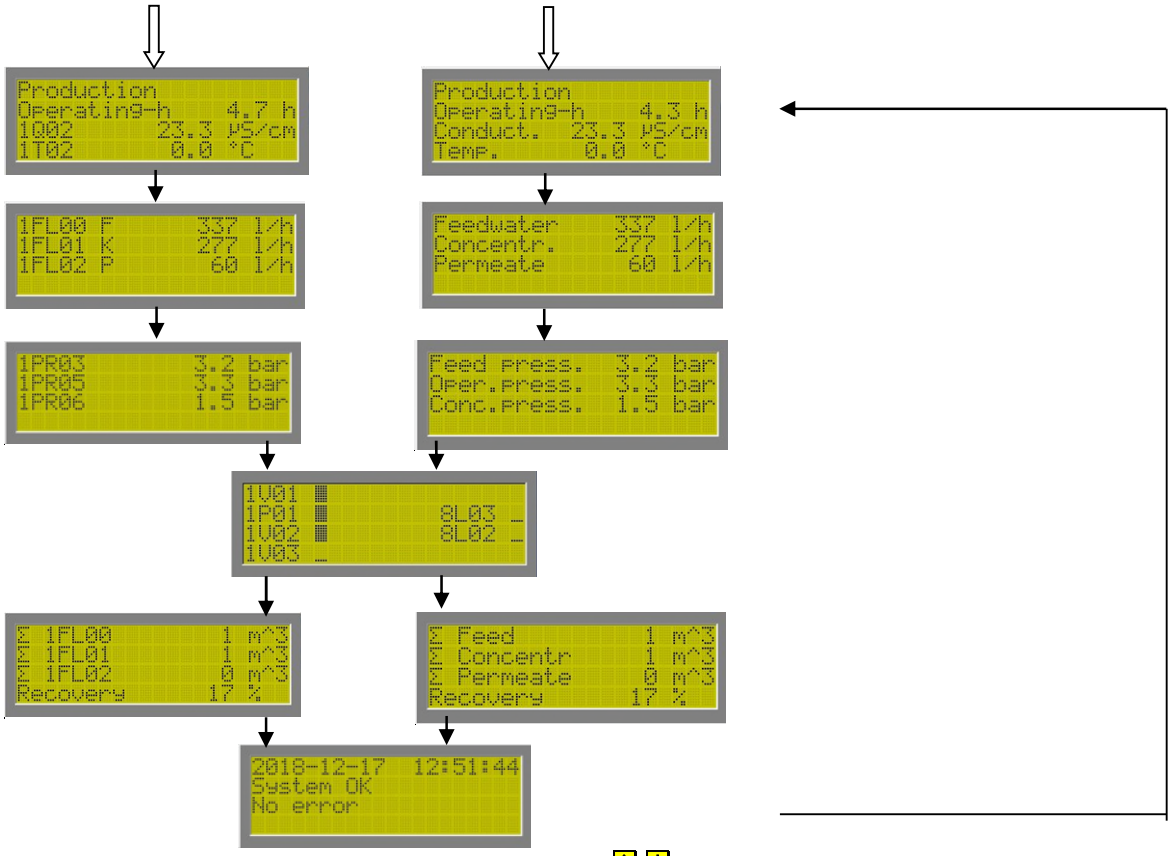
7.1 Operation at a glance

The controller is easy to understand so that commissioning is facilitated.

The integrated process visualisation allows the activated units (pump 1P01; valves 1V01, 1V02, 1V03; pressure switches 1PR03, 1Pr04, 1Pr05, 1Pr06; flow rates 1Fl00, 1Fl01, 1Fl02, 1Fl03) to be displayed on the screen. Inactive units bear a dash (–) or are not shown at all.

Below you will find explanations on the differences of the display languages:

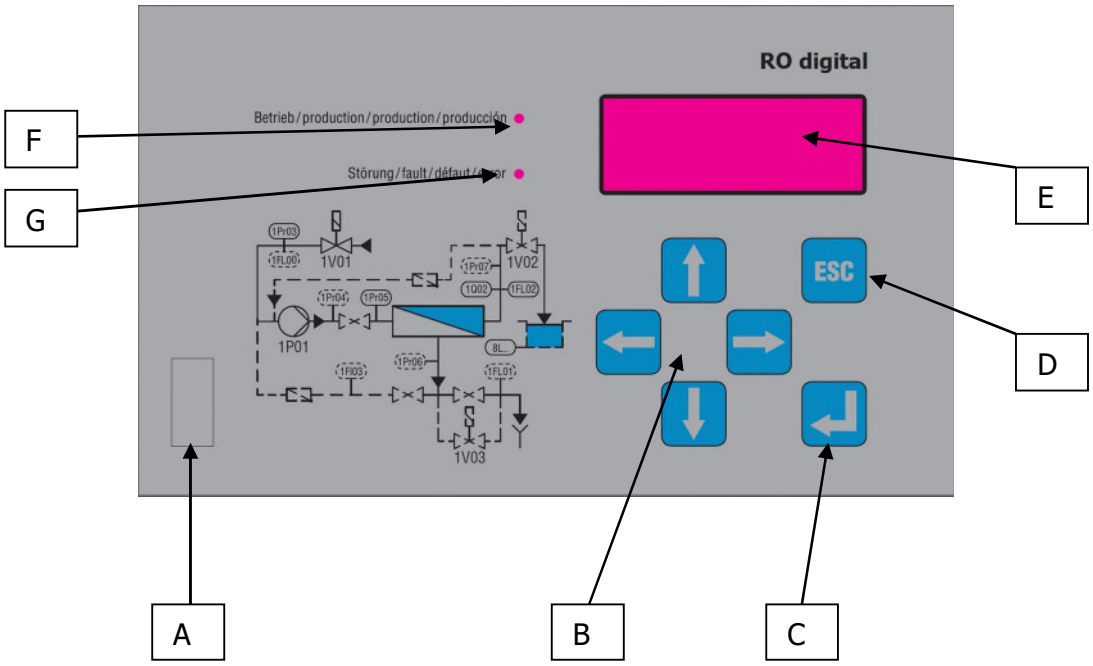
Display language: English Display language: GB-text



Activate and deactivate scrolling with the keys ⇧ ⇩.

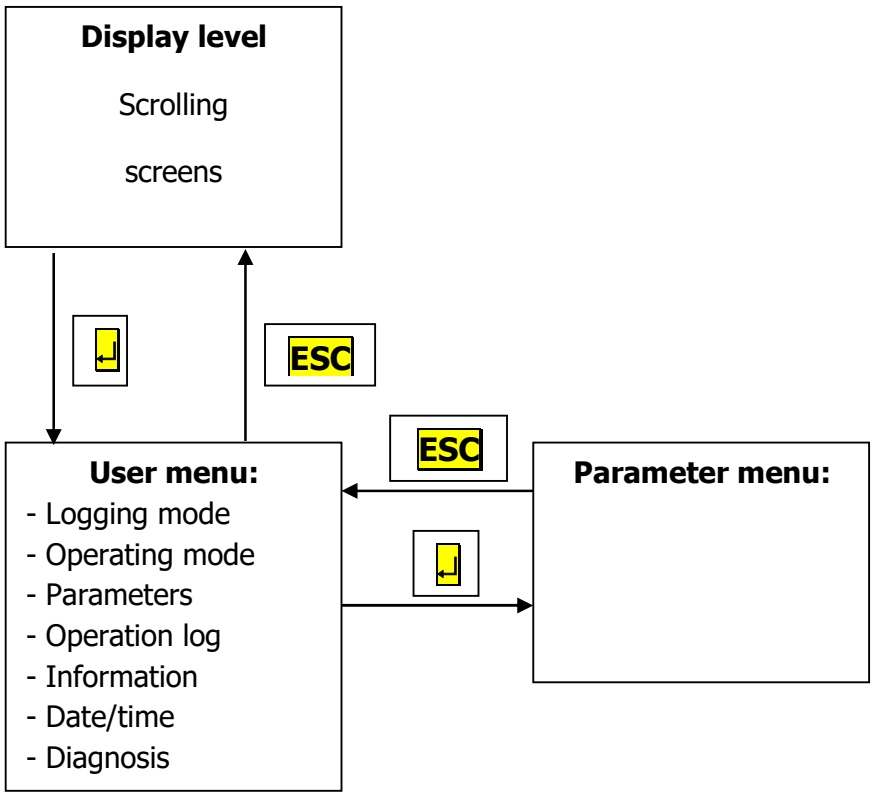
7.2 Display and control elements

The user interface consists of a text display (4x20 characters), 6 keys and an **OPERATION** and a **FAULT** LED. It also has an acoustic alarm.



	Designation	Function
A	Mains switch	- Turn the installation on and off ➔ top-mount housing only
B	← ↑ → ↓	- Password entry - Menu selection - Options
C	↵	- Confirm data entered - Enter the menu
D	ESC	- Exit menu - Fault acknowledgement
E	Display	Display of: - current operating mode - permeate conductivity and temperature - operating hours - flow rates - pressure values - switching state of the outputs - current faults
F	LED **PRODUCTION** (green)	Unit is operating
G	LED **FAULT** (red)	Fault active

7.3 Menu structure



7.3.1 Menu items

The menu consists of several items in a list (arranged one below the other) that can be longer than the number of items displayed on the screen.

A menu item is selected with the arrow ▸ on the left side of the screen. The arrow is moved with the ↑ ↓ keys to the menu item of your choice. The marked menu item is then selected with the ↵ key. If the list of menu items is longer than can be displayed on the screen, the controller scrolls automatically.

Note:

- Most of the menus have a hierarchical structure, i.e., upon selection of a menu item, an additional submenu opens.
- You can usually leave a menu by pressing the **ESC** key (return to standard level).

7.3.2 Data editing

Editing is generally carried out via a special screen in which the parameters are displayed.

Any editing process may be aborted without saving the changed value by pressing **ESC**.
When editing parameters, the following data types are to be differentiated:

7.3.2.1 Numerical data

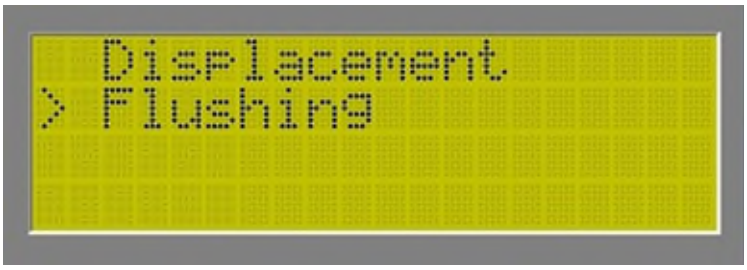
Numerical editing is carried out to adjust the operating parameters and to set the reference parameters. Numerical editing is done in the same way a decade switch is used.

The digit to be changed is selected with the cursor (a block in the display) and set to the desired value by pressing the ↑ ↓ keys as often as necessary. By means of the ← → keys, the cursor can be moved to the other digits so that these can be modified as well.

The value indicated is stored using the ↵ key.

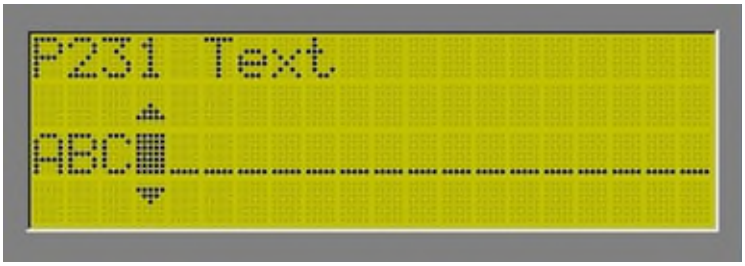
7.3.2.2 Selection data

In some cases an option can be selected (operating statuses, operating modes). Upon access, the operator can scroll through all additional options with the ↑ ↓ keys. The displayed option is confirmed with the ↵ key.



7.3.2.3 Alphanumerical data

The message texts can be edited alphanumerically. The procedure is identical to that of numerical editing, but it is possible to select numbers and characters with the ↑ ↓ keys.



7.3.2.4 Confirmations

For safety reasons and to avoid erroneous settings, some functions require confirmation.

By confirming with the ↵ key the selected function is carried out. By pressing the **ESC** key the function is aborted.

7.4 Access Authorisation

The menu items Parameters and Diagnostics, resp. the functions and settings therein are secured by a 4-digit, numeric password.
Accordingly, a distinction is made between the following two hierarchical access levels (password levels).

Access level	Name of level	Pre-set password	Password necessary for…
B	operator	„1234“	refer to chapter 9.2
T	technician	„3456“	

If a password is asked for, it must be entered and confirmed with the ↵ key.

If a wrong password is entered, the menu level will not be displayed.

Press the **ESC** key to quit.

8 Operation of the installation by personnel

8.1 Changing the operating mode

During normal OPERATION, the *operating mode* can be changed by pressing the ↵ key (access to user menu). In the user menu, item *2 Operation mode* has to be selected and confirmed with ↵.

The operating modes screen is displayed, in which the desired *operating mode* can be selected with the ⇑ ⇓ keys.

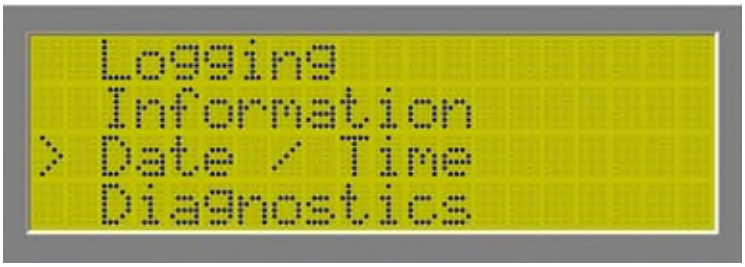
Note:

- From the OPERATION mode it is only possible to change to OFF. A direct change to DISINFECTION or RINSING is not possible.
- From the DISINFECTION and RINSING mode it is only possible to change to OFF. A direct change to OPERATION is not possible.

8.2 Entering day and time

Attention the entry of date and time must be set in operating mode: OFF!

Day and time are entered by pressing the ↵ key (access to user menu). In the user menu, item 6 *Date / Time* has to be selected and confirmed with ↵.



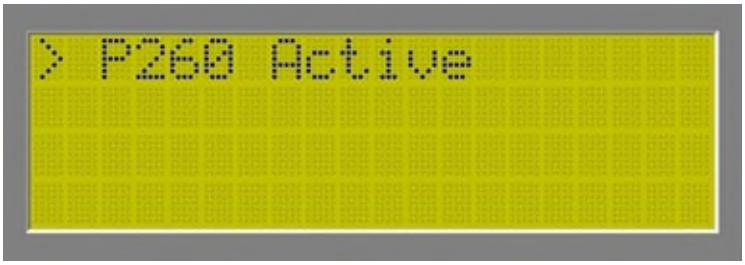
The input screen is displayed first. Once date and time have been set, the user is returned to the user menu.

8.3 Parametrising the digital output

The *universal output* is parametrised by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select P26 *Univ. Output*.

The selection screen is displayed. Select P260 *Active*.



In the screen that follows, the system status for the selected universal output has to be selected.

The system status can be selected from:

- *1V01*
- *1V02*
- *1V03*
- *1P01*
- *Uni-DI1*
- *Uni-DI2*
- *Uni.-DI3*
- *Standby (Tank full)*
- *Rejection*
- *Production*
- *Concentrate…*
- *Disc. flushing*
- *Disinfection*
- *External stop*
- *Warning*
- *8L01*
- *8L04*
- *Always on*

As all selectable parametrisations have equal priority, the user must ensure that the contact is already providing voltage (closed) when one parameter has been met (connection using the logical OR operation) when making the adjustments.

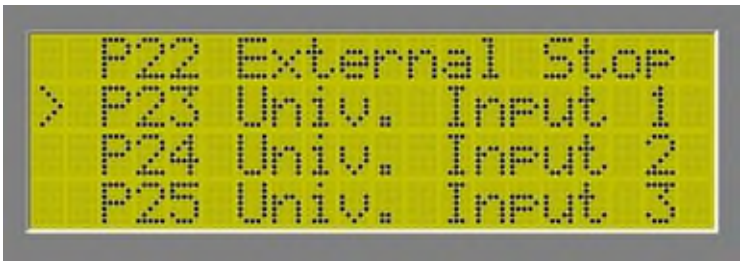
Note:

The unit connected to the universal output must have a sufficiently protective circuit with an RC-varistor in order to prevent a fault in the controller.

8.4 Parametrisation of digital inputs

The *universal inputs* are set by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select P23 *Univ. Input 1* or P24 *Univ. Input 2* or P25 *Univ. Input 3*.



Now set the *universal input* on the following screen.

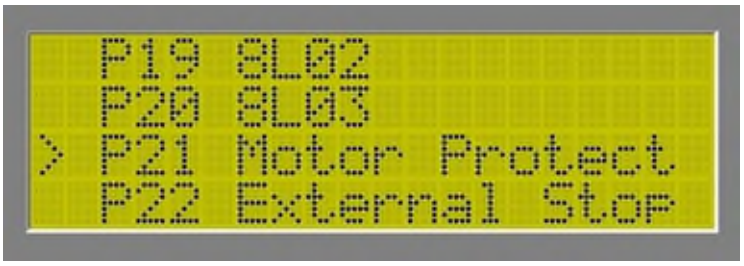
The universal inputs must be set as follows:

- P230 *Contact Type*: Selection of the connected contact (NO or NC).
- P231 *Text*: Message text for active inputs can be defined.
- P232 *Reaction*: Selection of the installation reaction to be triggered:
    - *No Reaction*
    - *Message*
    - *Switch Off*
    - *Emergency Off*
    - *Request*
- P233 *Active*: Selection of the installation conditions that will initiate an analysis of the universal input:
    - *Standby*
    - *Rejection*
    - *Production on*
    - *Concentrate…*
    - *Disc. Flushing*
    - *Disinfection*
    - *External Stop*
    - *Always on*
- P234 *Delay*: Adjustment of the delay for the activation of the input.

8.5 Parametrisation of standard inputs

The *standard inputs* (external stop, level switch, pressure switch, motor protection switch) are set by pressing the ↵ key (access to user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select P19 *8L02* or P20 *8L03* or P21 *Motor Protect* or P22 *External Stop*.



Now set the *input* on the following screen.

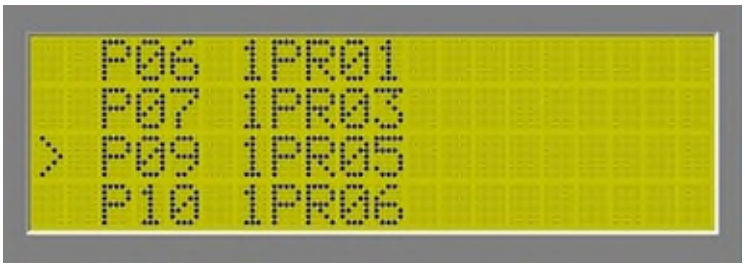
The *inputs* must be set as follows:

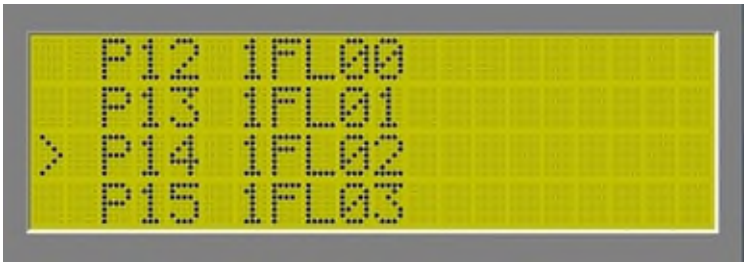
- *Contact Type*: Selection of the connected contact, *NO* or *NC*.
- *Delay*: Programming of the delay after input activation possible (not available for 8L02 or 8L03!)

8.6 Standard parametrisation of the analogue inputs

The *standard analogue inputs* are set (flow rates, pressure values) by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the *Analogue input* that is to be set.





Now set the *input* on the following screen.

The *analogue inputs* must be set as follows:

- *Min. Range* – set the lower measuring range limit.
- *Max. Range* – set the upper measuring range limit.
- *Offset* – deviation of the measured value.

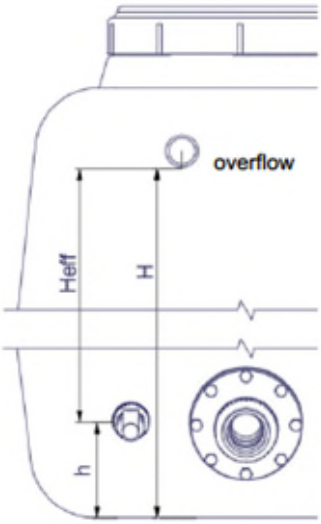
8.6.1 Connection of 8L00-mA sensor and sensor adjustment

Caution

It is the plant operator's duty to have any maintenance, control, and assembly work done by authorised and qualified technical staff. Before carrying out any work on electrical installations or units, make sure that the installation is free of electrical current. Ensure that the installation cannot be switched on unintentionally.

Instructions:

- ☞ The jumper of the analogue input to which the mA sensor is connected to must be set to **mA** and the system identification must be set to **8L00_mA** (number 7).
- ☞ See also following page



Two height values are required for sensor adjustment:

1.) The installation height from the centre of the sensor to the bottom of the tank.
2.) The height from the lower edge of the overflow to the bottom of the tank.

The resulting effective usable height H_{eff} must be adjusted then.
e.g.: Installation height of centre of sensor h = 150 [mm]
Height of lower edge of overflow H = 1200 [mm]
H_{eff} = H-h = 1200-150 [mm] = 1.05 [m]

Also required is the top sensor reading of the built-in measurement device,
e.g.: 0-0.2 [bar] correspond to 0-2 [m] water column.

The effective usable height H_{eff} must never be higher than the top sensor reading. E.g.: H_{eff} = 3 [m] and the top sensor reading is 0.2 [bar]. This means that the sensor cannot detect anything above 2 [m], because the signal is already at 20 [mA] at this height. In this example, 1 [m] of the tank would remain unused.

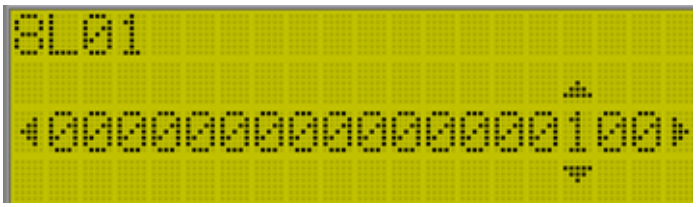
Then the calculation of parameter P181 is performed as follows:

$$\mathrm{P181} = \frac{Top\ pressure\ sensor\ reading}{H_{eff}} = \frac{2[\mathrm{m}]}{1.05[\mathrm{m}]} \times 100 = 190[\%]$$

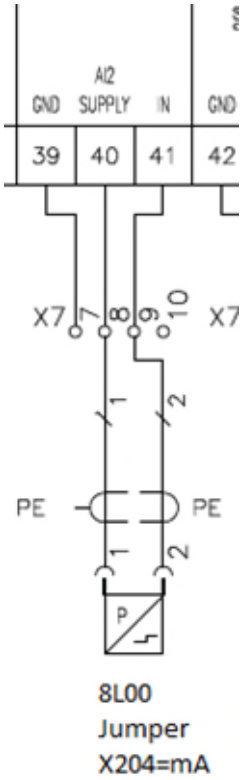
The other parameters P183 (10 [%]), P184 (60 [%]), P185 (80 [%]) and P186 (90 [%]) do not need to be calculated in this way, but refer to parameter P181, which now corresponds to 100 [%] resulting from the adjustment.

The dry run protection for the downstream pressure booster system, which is fed from the permeat tank containing the sensor, can be implemented by parameterising of the universal output 8L01.

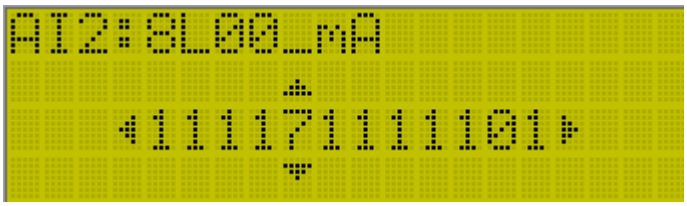
Picture 1 and 2: example of parameterising 8L01 dry run protection pressure booster system



Picture 3: example of an electrical connection 4-20mA sensor



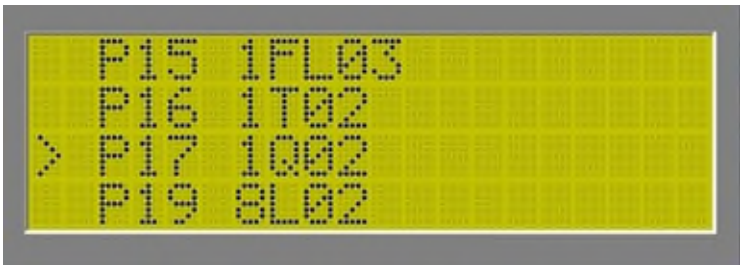
Picture 4: Example programming RO digital



8.7 Setting the limit values

The *limits* are entered by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the *Analogue input* for which the limits will be set.



Set the limits in the screen that is now displayed.

- *Max. Limit:* – set the limit value.

- *Limit Delay:* – set a time delay.
- *Limit React.:* – select the kind of reaction in case of limit exceedance.
    - *No Reaction*
    - *Warning*
    - *Emergency Off*

8.8 Setting the times

The *times* (rinse, rejection, lack of pressure, etc.) are set by pressing the ↵ key (access to user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the parameter for which the time will be set.

The *times* must be set as follows:

- P031 *Rinse Time:* setting of the duration of concentrate displacement/rinse.
- P033 *Interval:* setting of the duration of the automatic concentrate displacement/rinse.
- P041 *Rinse Durat.:* setting the duration of the discontinuous rinse.
- P042 *Rinse Interv.:* setting of the interval of the discontinuous rinse.
- P050 *Min. Time:* setting of the minimum duration of rejection after start-up.
- P051 *Max. Time:* setting of the maximum duration of rejection after start-up.
- P074 *Fault Delay:* setting of the priming delay for the **PUMP** 1P01 if there is pressure available.
- P074.1 *Fault Delay:* setting of the delay for initiation of the lack of pressure fault during priming, 1P01 not yet in operation mode.
- P075 *Fault Delay:* setting of the delay for initiation of the lack of pressure fault during priming.
- P076 *Start Delay:* setting of the delay for initiation of the lack of pressure fault during operation.
- P165 *Limit Delay:* setting of the delay before the temperature alarm is triggered.
- P173 *Warn Delay:* setting of the delay before the conductivity pre-alarm is triggered.
- P175 *Fault Delay:* setting of the delay before the conductivity alarm is triggered.

8.9 Selecting the parameters

The *parameters* (error display, tank type, etc.) are set by pressing the ↵ key (access to user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the parameter for which the selection will be made.

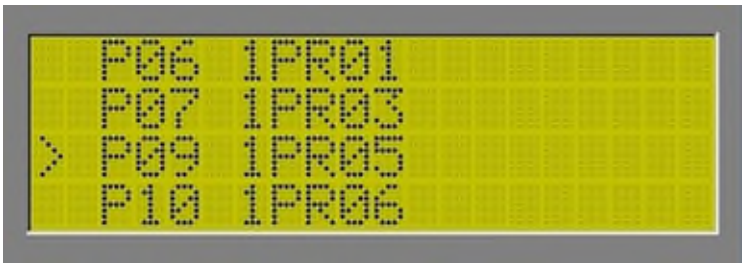
The *selection parameters* must be set as follows:

- P030 *Sequence*: select the rinsing type:
  - *Displacement* (without pump)
  - *Flushing* (with pump)
- P032 *Forced Rinse*: select whether there should be forced rinse during operation:
  - *Not Active*
  - *Active*
- P040 *Type of Rinse*: select the discontinuous rinsing type:
  - *Displacement* (without pump)
  - *Flushing* (with pump)
- P280 *Sel. T- Type*: select the tank type:
  - *With overflow* (permeate valve opened during disc. rinse/ concentrate displacement/ concentrate rinse)
  - *Without overflow* (permeate valve closed during disc. rinse/ concentrate displacement/ concentrate rinse)

8.10 Selecting the alarm options

The *alarm options* are set by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the analogue parameters for which the *Alarm options* will be selected.



For the *Alarm options* the following parameters may be chosen:

- *NO Reaction*: no effect on installation operation.
- *Warn*: the installation remains in operation if an alarm is active.
- *Emergency Off*: the installation is stopped if an alarm is active.

Note:

If the *cond perm* or *T permeate* alarm is active, the installation reacts immediately after detection of the fault; the alarm message, however, is displayed with the delay that has previously been set.

8.11 Carrying out a reset

A RESET (*summation, system, calibration*) is carried out pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select P29 *Reset*.

The settings screen is displayed from which a *Reset* (P290 to P292) is to be selected.

P290 Summation (-Reset)

This menu option allows the flow and operating hours sums to be RESET.

P291 Settings (-Reset)

This menu option allows the controller to be RESET to factory settings from any installation mode.

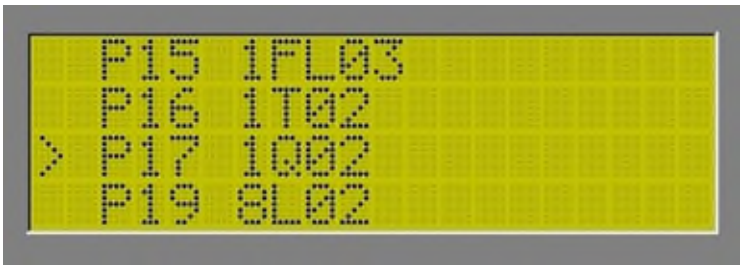
P292 Calibration (-Reset):

The sensors of the controller have been calibrated to standard values at delivery. These standard values must be adapted manually to local requirements. If these calibration data have been modified and should then be reset to standard settings, a calibration RESET must be carried out.

8.12 Measuring and calibrating

Measuring and calibrating of the sensors is carried out by pressing the ↵ key (access to the user menu). In the user menu, item 3 *Parameters* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

The settings screen is displayed. Select the *analogue parameters* that will be calibrated.



For calibration the following parameters may be chosen:

- *Min. Range* – set the lower measuring range limit.
- *Max. Range* – set the upper measuring range limit.
- Offset – deviation of the measured value.

Calibration of the conductivity measurement is carried out by means of a comparative measurement.

- Calibration: input of the currently measured reference conductivity as the upper reference point for the conductivity measurement.

Note:

The sensors have to be recalibrated once a year!

8.13 Diagnostics

The *Diagnostics* of the installations sensors is carried out by pressing the ↵ key (access to the user menu). In the user menu, item 7 *Diagnostics* has to be selected and confirmed with ↵. The relevant *password* must be entered when the request for password input is displayed.

After entering the correct password the *diagnostics* screen will be opened in the editing mode and the control changes to operating mode **OFF**, i.e. all outputs are switched off. After entering the wrong password the *diagnostics* screen will not be opened.

In the displayed *diagnostics* screen select which input should be monitored or which output should be manipulated.

These submenus make it possible to test all the inputs and outputs of the controller and therefore also to control the unit manually.

Digital Inputs:

The operating modes of the digital inputs *external stop, motor protection, level 8L02, level 8L03 and universal input 1-3*.

Digital Outputs:

The outputs of the controller are displayed and controlled. Chose an output with the cursor key in order to control it. (The output designation is shown in plain text.) It can be controlled with the ↑ ↓ keys.

Note:

The units connected to the controller outputs are triggered without any safety devices if the respective output is actuated in diagnosis mode!

Analogue Inputs:

The measuring values of the analogue inputs are displayed.

Analogue Outputs:

The analogue outputs of the controller are displayed.

Closing the "Diagnostics" option:
After testing any inputs and outputs, the operator can return to the main menu, by pressing the **ESC** key.

When quitting the *diagnostics* screen out of the display mode the control will then be in the same state as it was when the *diagnostics* screen was entered, even if the various screens had been left with changed settings, entered during diagnosis.

Attention!

When quitting the *diagnostics* screen out of the editing mode, the control stays in operating mode **OFF!**

8.14 Operating log

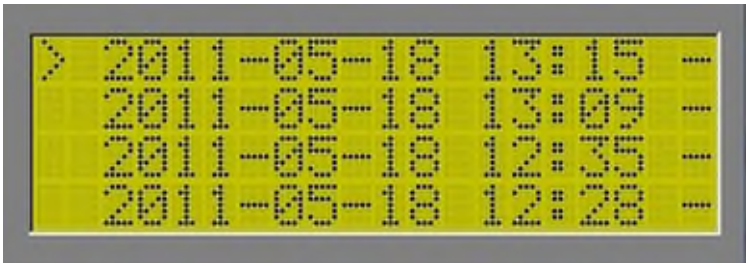
After the controller has been switched on, the data are logged constantly in an operating log. This mainly aids finding the cause for a fault more quickly.

Press the ↵ key to display the operating log (access to user menu). In the user menu, item 4 *Logging* has to be selected and confirmed with ↵.

The following options are shown:

Chose from:

- *All Records*: list of all records in the memory.
- *Error Records:* list of all errors in the memory.



Press the ↵ key to view the details of the selected entry. Within the details screen, use the ← → keys to scroll through the entries in chronological order. Use the ↑ ↓ keys to scroll within the entry shown.

9 Basic settings / parametrisation

9.1 P01 Machine Identification Code

The machine identification code is a 12-digit code defining the unit's input and output assignation. Each digit refers to a different input or output. The figure defines the type and/or function of the respective input or output, makes sure the right parameters are shown or hidden, and controls screens configuration.

Note:

Changing the machine identification code will reset the operating log.

Use the ← → keys to navigate from one digit to another and use the ↑ ↓ keys to set one digit to a defined value.

Terminal <Text>	Selection <Text>	Remarks
13-15 <MV1>	0 <disabled> **1** <enabled>	
16-18 <MV2>	0 <disabled> **1** <enabled>	
19-21 <MV3>	0 <disabled> **1** <enabled>	
36-38 <AI1>	**1** <1PR03_V> 2 <1PR03_mA>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
39-41 <AI2>	**0** <disabled> 1 <1PR04_V> 2 <1PR04_mA> 3 <1PR01_V> 4 <1PR01_mA> 5 <1PR07_V> 6 <1PR07_mA> 7 <8L00_mA> 8 <8L00_V>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
42-44 <AI3>	0 <disabled> **1** <1PR05_V> 2 <1PR05_mA>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
45-47 <AI4>	0 <disabled> **1** <1PR06_V> 2 <1PR06_mA> 3 <1PR01_V> 4 <1PR01_mA> 5 <1PR07_V> 6 <1PR07_mA> 7 <8L00_mA> 8 <8L00_V>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
48-50 <AI5>	0 <disabled> 1 <1FL01_V> 2 <1FL01_mA> **3** <1FL00_V> 4 <1FL00_mA>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!

Terminal <Text>	Selection <Text>	Remarks
51-53 <AI6>	0 <disabled> **1** <1FL02_V> 2 <1FL02_mA>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
54 <AI7>	0 <disabled> **1** <enabled>	0 ==> temperature compensation 1Q02 disabled, conductivity measurement 1Q02 without temperature compensation
55-57 <AI8>	**0** <disabled> 1 <1FL03_V> 2 <1FL03_mA> 3 <1PR01_V> 4 <1PR01_mA> 5 <1PR07_V> 6 <1PR07_mA> 7 <8L00_mA> 8 <8L00_V> 9 <1FL04_V> : <1FL04_mA>	The selected value must correspond to the jumper setting (see chapter 5.1 Setting the analogue inputs 0.5–3.5 V/ 4-20mA)!
58-60 <COND>	0 <disabled> **1** <enabled>	0 ==> conductivity measurement 1Q02 disabled

Default settings are **bold**

9.2 List of parameters

Note:

Parameters may be non-visible, depending on the machine signature/ identification code that has been programmed.

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P01 Machine Sign.						**T**
P010	Refer to chapter 9.1 P01 Machine identification code	12 digits number code defining IO-settings of each unit				**T**
P02 Language						**B**
P020	Sel. Language	Change of language settings		- Deutsch - English - Français - Español		**B**
P03 Shutdown						**T**
P030	Sequence	Selection of rinsing method		-Displace ment -Flushing		**T**
P031	Rinse Time	Duration of displacement / flushing	xx h xx min xx s			**T**
P032	Forced Rinse	Selection of forced rinse during operation		- active - not active		**T**
P033	Interval	Duration of forced rinse	xx h xx min xx s			**T**
P034	Delay	Delay of automatic concentrate displacement / flushing	xx h xx min xx s			**T**
P04 Standby						**T**
P040	Type of Rinse	Selection of discontinuous rinsing method		-Displace ment -Flushing		**T**
P041	Rinse Durat.	Setting of duration discontinuous rinsing	xx h xx min xx s			**T**
P042	Rinse Interv.	Setting of duration discontinuous rinse interval	xx h xx min xx s			**T**
P05 1V02						**T**
P050	Min. Time	Setting of min. duration of rejection after start	xx h xx min xx s			**T**
P051	Max. Time	Setting of max. duration of rejection after start	xx h xx min xx s			**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P06 1PR01						**T**
P060	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P061	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P062	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P063	Max. Limit	limit	bar	0.0 - 99.9		**T**
P064	Limit Delay	Delay time	xx h xx min xx s			**T**
P065	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P07 1PR03						**T**
P070	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P071	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P072	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P073.1	Limit Stop	Stop at low-pressure	bar	0.0 - 99.9		**T**
P073.2	Limit Start	Start after low-pressure	bar	0.0 - 99.9		**T**
P074	Fault Delay	Setting of start-up delay pump, when pressure is available	xx h xx min xx s			**T**
P074.1	Delay fault relay	Setting of delay of forwarding to fault signal relay	xx h xx min xx s			**T**
P075	Fault Delay	Setting of delayed triggering at low-pressure fault during start	xx h xx min xx s			**T**
P076	Start Delay	Setting of delayed triggering at low-pressure fault during operation	xx h xx min xx s			**T**
P077	Max. Limit	limit	bar	0.0 - 99.9		**T**
P078	Limit Delay	Delay time	xx h xx min xx s			**T**
P079	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P08 1PR04						**T**
P080	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P081	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P082	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P083	Max. Limit	limit	bar	0.0 - 99.9		**T**
P084	Limit Delay	Delay time	xx h xx min xx s			**T**
P085	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P09 1PR05						**T**
P090	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P091	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P092	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P093	Max. Limit	limit	bar	0.0 - 99.9		**T**
P094	Limit Delay	Delay time	xx h xx min xx s			**T**
P095	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P10 1PR06						**T**
P100	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P101	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P102	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P11 1PR07						**T**
P110	Min. Range	Low limit measuring range	bar	0.0 - 99.9		**T**
P111	Max. Range	High limit measuring range	bar	0.0 - 99.9		**T**
P112	Offset	Offset for measured value display	bar	-9.9...+9.9		**T**
P113	Max. Limit	limit	bar	0.0 - 99.9		**T**
P114	Limit Delay	Delay time	xx h xx min xx s			**T**
P115	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P12 1FL00						**T**
P120	Unit	Selection of unit		- l/h - m³/h		**T**
P121	Min. Range	Low limit measuring range		0.0 - 9999.9		**T**
P122	Max. Range	High limit measuring range		0.0 - 9999.9		**T**
P123	Offset	Offset for measured value display		-99.9...+99.9		**T**
P124	Min. Limit	Lower limit		0.0 - 9999.9		**T**
P125	Max. Limit	Upper limit		0.0 - 9999.9		**T**
P126	Warn Delay	Delay time	xx h xx min xx s			**T**
P127	Fault Delay	Delay time	xx h xx min xx s			**T**
P128	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P13 1FL01						**T**
P130	Unit	Selection of unit		- l/h - m^3/h		**T**
P131	Min. Range	Low limit measuring range		0.0 - 9999.9		**T**
P132	Max. Range	High limit measuring range		0.0 - 9999.9		**T**
P133	Offset	Offset for measured value display		-99.9...+99.9		**T**
P134	Min. Limit	Lower limit		0.0 - 9999.9		**T**
P135	Max. Limit	Upper limit		0.0 - 9999.9		**T**
P136	Warn Delay	Delay time	xx h xx min xx s			**T**
P137	Fault Delay	Delay time	xx h xx min xx s			**T**
P138	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P14 1FL02						**T**
P140	Unit	Selection of unit		- l/h - m³/h		**T**
P141	Min. Range	Low limit measuring range		0.0 - 9999.9		**T**
P142	Max. Range	High limit measuring range		0.0 - 9999.9		**T**
P143	Offset	Offset for measured value display		-99.9...+99.9		**T**
P144	Min. Limit	Lower limit		0.0 - 9999.9		**T**
P145	Max. Limit	Upper limit		0.0 - 9999.9		**T**
P146	Warn Delay	Delay time	xx h xx min xx s			**T**
P147	Fault Delay	Delay time	xx h xx min xx s			**T**
P148	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P15 1FL03						**T**
P150	Unit	Selection of unit		- l/h - m³/h		**T**
P151	Min. Range	Low limit measuring range		0.0 - 9999.9		**T**
P152	Max. Range	High limit measuring range		0.0 - 9999.9		**T**
P153	Offset	Offset for measured value display		-99.9...+99.9		**T**
P154	Min. Limit	Lower limit		0.0 - 9999.9		**T**
P155	Max. Limit	Upper limit		0.0 - 9999.9		**T**
P156	Warn Delay	Delay time	xx h xx min xx s			**T**
P157	Fault Delay	Delay time	xx h xx min xx s			**T**
P158	Limit React.	Selection of reaction at limit exceedance		- No Reaction - Warn - Emergency Off		**T**
P50 1FL04						**T**
P500	Unit	Selection of unit		- l/h - m³/h		**T**
P501	Min. Range	Low limit measuring range		0.0 - 9999.9		**T**
P502	Max. Range	High limit measuring range		0.0 - 9999.9		**T**
P503	Offset	Offset for measured value display		-99.9...+99.9		**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P16 1T02						**B**
P160	Min. Range	Low limit measuring range	°C	0 - 100		**T**
P161	Max. Range	High limit measuring range	°C	0 - 100		**T**
P162	Offset	Offset for measured value display	°C	-9.9...+9.9		**T**
P163	Min. Limit	Lower limit	xx.x °C	0.0 - 99.9		**B**
P164	Max. Limit	Upper limit	xx.x °C	0.0 - 99.9		**B**
P165	Fault Delay	Setting of delayed triggering at temperature fault	xx h xx min xx s			**B**
P166	Limit React.	Selection of reaction at limit exceedance		- not active - active		**B**
P17 1Q02						**B**
P171	Calibration	Reference value for maximum	xxx µS/cm	0 - 999		**T**
P172	Limit Warn	Conductivity exceeded	xxx µS/cm	0 - 999		**B**
P173	Warn Delay	Setting of delayed triggering for conductivity pre-warning	xx h xx min xx s			**B**
P174	Limit Fault	Release permeate max. alarm permeate too high	xxx µS/cm	0 - 999		**B**
P175	Fault Delay	Setting of delayed triggering for conductivity fault	xx h xx min xx s			**B**
P176	Limit React.	Selection of reaction at limit exceedance		- not active - active		**B**
P18 8L00						**T**
P180	>< min	Reference value for minimum	%	0 - 999		**T**
P181	>< max	Reference value for maximum	%	0 - 999		**T**
P182	Offset	Offset for measured value display	%	-9.9...+9.9		**T**
P183	Limit Dry	Dry-run protection	%	0 - 100		**T**
P184	RO Start	Start the unit	%	0 - 100		**T**
P185	RO Stop	Stop the unit	%	0 - 100		**T**
P186	Full Alarm	Tank overfull	%	0 - 100		**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P19 8L02						**T**
P190	Contact Type	Selection of connected contact		- NO - NC		**T**
P20 8L03						**T**
P200	Contact Type	Selection of connected contact		- NO - NC		**T**
P21 Motor Protect						**T**
P210	Contact Type	Selection of connected contact		- NO - NC		**T**
P211	Delay	Setting of delay after activation of the input	xx h xx min xx s			**T**
P22 External Stop						**T**
P220	Contact Type	Selection of connected contact		- NO - NC		**T**
P221	Delay	Setting of delay after activation of the input	xx h xx min xx s			**T**
P23 Univ. Input 1						**T**
P230	Contact Type	Selection of connected contact		- NO - NC		**T**
P231	Text	Text display at active input	Feel free for own wording			**T**
P232	Reaction	Selection of following reaction	- No Reaction - Message - Warning - Switch Off (Tank full) - Emergency Off - Level Request			**T**
P233	Active	Selection of operation modes where universal input has to be evaluated	Standby Rejection Production on Displacement Disc. Flushing Disinfection External Stop Always on			**T**
P234	Delay	Setting of delay after activation of the input	xx h xx min xx s			**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P24 Universal input 2						**T**
P240	Contact Type	Selection of connected contact		- NO - NC		**T**
P241	Text	Text display at active input	Feel free for own wording			**T**
P242	Reaction	Selection of following reaction	- No Reaction - Message - Warning - Switch Off (Tank full) - Emergency Off - Level Request			**T**
P243	Active	Selection of operation modes where universal input has to be evaluated	Standby Rejection Production on Displacement Disc. Flushing Disinfection External Stop Always On			**T**
P244	Delay	Setting of delay after activation of the input	xx h xx min xx s			**T**

Parameter	Function	Short desription	Format/ Unit	Options/ Range	Individual setting	Password level
P25 Universal input 3						**T**
P250	Contact Type	Selection of connected contact		- NO - NC		**T**
P251	Text	Text display at active input	Feel free for own wording			**T**
P252	Reaction	Selection of following reaction	- No Reaction - Message - Warning - Switch Off (Tank full) - Emergency Off - Level Request			**T**
P253	Active	Selection of operation modes where universal input has to be evaluated	Standby Rejection Production on Displacement Disc. Flushing Disinfection External Stop Always On			**T**
P254	Delay	Setting of delay after activation of the input	xx h xx min xx s			**T**
P26 Univ. Output						**T**
P260	Active	Digital output controlled, if…	- 1V01 - 1V02 - 1V03 - 1P01 - Uni-DI1 - Uni-DI2 - Uni-DI3 - Standby - Rejection - Production on - Displacement - Disc. Flushing - Disinfection - External Stop - Warning - 8L01 - 8L04 - Always On			**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P27 Analogue Outputs:						**T**
P270	AO1 >< 4mA	Lower calibration value				**T**
P271	AO1 >< 20mA	Upper calibration value				**T**
P272	AO1 20mA=	Full scale value				**T**
P273	AO1 Value	Output analogue value…		- 1Q02 - 1T02 - 1FL00 - 1FL01 - 1FL02 - 1PR01 - 1PR03 - 1PR05 - 1PR06 - 1PR07 - 8L00		**T**
P274	AO2 >< 4mA	Lower calibration value				**T**
P275	AO2 >< 20mA	Upper calibration value				**T**
P276	AO2 20mA=	Full scale value				**T**
P277	AO2 Value	Output analogue value…		- 1Q02 - 1T02 - 1FL00 - 1FL01 - 1FL02 - 1PR01 - 1PR03 - 1PR05 - 1PR06 - 1PR07 - 8L00		**T**
P28 Tank Type						**T**
P280	Sel T-Type	Selection of tank type		- with overflow - without overflow		**T**
P29 Reset						**T**
P290	Summation	Reset of quantification of flow measurements and operating hours				**T**
P291	Settings	Reset the control into ex-factory condition, out of any arbitrary operating mode.				**T**
P292	Calibration	Reset to recall standard settings, after calibration data has been changed				**T**

Parameter	Function	Short description	Format/ Unit	Options/ Range	Individual setting	Password level
P30 RS232 interface						**T**
P300	baud-rate service	setting baud-rate	baud	9600 19200 38400 57600 115200	115200	**T**
P301	Baud-rate external	setting baud-rate	baud	9600 19200 38400 57600 115200	115200	**T**

10 Faults and their elimination

10.1 Indication and acknowledgement

The current, non-acknowledged error messages are displayed in the error screen of the corresponding operating mode.

Functional sequence in case of a fault:

- The LED **FAULT** at the controller front panel flashes.
- The **ALARM RELAY** is activated.
- The **ESC** key is assigned the function "*acknowledge alarm relay*".

Once the **ESC** key is pressed:

- The **ALARM RELAY** is reset.
- The controller returns to the error screen of the corresponding operating mode.
- The automatic scroll mode stops.
- You can continue to scroll through the screens manually.
- The **ESC** key is assigned the function "*error acknowledgement*".
- The acknowledged error messages are erased from the error screen.

If all error messages have been acknowledged individually by pressing the **ESC** key,

- the system will return to normal display mode.

10.2 Description of and search for faults

Note!
According to language setting the fault message is displayed in plain text as shown in brackets hereafter.

10.2.1 1Pr03 (Feed pressure low) ▼▼▼; Pressure 1Pr03<P073.1

During operation, this alarm is triggered with a delay if there is a lack of pressure.

Cause	Remedy
Feed water pressure too low	- Check pressure difference at the water softener - Increase feed water pressure
Filter clogged	Replace filter cartridge
Pressure probe defective	Replace pressure sensor
Inlet valve 1V01 defective	Replace valve

The installation starts up again automatically after 1 minute. If the alarm occurs again, the delay is doubled until the 32 minute maximum is reached.

This time delay can be reset with **ESC**.

Adjust the delay of forwarding to fault relay by P074.1 (terminal 7, 8, 9).

10.2.2 1Pr03 (Feed pressure low) ▼▼▼; Pressure 1Pr03<P073.2

During start/reject, this alarm is triggered with a delay if there is a lack of pressure.

Cause	Remedy
Feed water pressure too low	- Check pressure difference at the water softener - Increase feed water pressure
Filter clogged	Replace filter cartridge
Pressure probe defective	Replace pressure sensor
Inlet valve 1V01 defective	Replace valve

The installation starts up again automatically after 1 minute. If the alarm occurs again, the delay is doubled until the 32 minute maximum is reached.

This time delay can be reset with **ESC**.

Adjust the delay of forwarding to fault relay by P074.1 (terminal 7, 8, 9).

10.2.3 1Pr03 (Feed pressure high) ▲▲▲; Pressure 1Pr03>P077

During operation, this alarm is triggered with a delay if there is an excess of pressure.

Cause	Remedy
Feed water pressure too high	- Check the pressure rise of the feed water - Decrease the feed water pressure
Pressure probe defective	Replace pressure sensor

10.2.4 Motor protection; Hard water

The signalling contact of the **MOTOR PROTECTION SWITCH** is evaluated in combination with the signalling contact of the **HARD WATER SENSOR**. If no signal is emitted, this alarm is triggered.

Cause	Remedy
Hard water sensor triggered (if any)	- Check soft water quality - Check sensor and replace if necessary
Jumper defective	Repair jumper
Motor protection switch triggered (if any)	- Check the motor protection switch settings - Check motor

10.2.5 1Q02 (Conduct. Warning) ▲; 1Q02>P172

The permeate conductivity is monitored against two limits. If the first limit is exceeded, a pre-warning is displayed.

Cause	Remedy
Feed water conductivity too high	Calculate demineralisation rate
Demineralisation rate too low	After having consulted the manufacturer - clean modules - replace modules

10.2.6 1Q02 (High conductivity) ▲▲▲; 1Q02>P174

The permeate conductivity is monitored against two limits. If the second limit is exceeded, an error message is displayed and the permeate valve 1V02 is closed.

Cause	Remedy
Feed water conductivity too high	Calculate demineralisation rate
Demineralisation rate too low	After having consulted the manufacturer - clean modules - replace modules

10.2.7 1T02 (Low temperature) ▼▼▼; 1T02<P163

The permeate temperature is monitored against a settable upper and lower limit. If the temperature falls below the lower limit, this error message is displayed.

10.2.8 1T02 (High temperature) ▲▲▲; 1T02>P164

The permeate temperature is monitored against a settable upper and lower limit. If the value exceeds the upper limit, this error message is displayed.

10.2.9 1Fl00 (Warn. feedwater low) ▼; 1Fl00<P124

The flow rate at the RO inlet is monitored against a settable upper and lower limit. If the value falls below the lower limit, this warning is displayed before an error message is shown.

10.2.10 1Fl00 (Fault feedwater low) ▼▼▼; 1Fl00<P124

The flow rate at the RO inlet is monitored against a settable upper and lower limit. If the flow rate remains below the lower limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Feed water pressure too low	- Check the pressure rise of the feed water - Increase feed water pressure
Flow sensor defective	Replace flow sensor

10.2.11 1Fl00 (Warn. feedwater high) ▲; 1Fl00>P125

The flow rate at the RO inlet is monitored against a settable upper and lower limit. If the upper limit is exceeded, this warning is displayed before an error message is shown.

10.2.12 1Fl00 (Fault feedwater high) ▲▲▲; 1Fl00>P125

The flow rate at the RO inlet is monitored against a settable upper and lower limit. If the flow rate remains above the upper limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Feed water pressure too high	- Check the pressure rise of the feed water - Decrease the feed water pressure
Flow sensor defective	Replace flow sensor

10.2.13 1Fl01 (Warn. concentr. Low) ▼; 1Fl01<P134

The concentrate flow rate towards the drain is monitored against a settable upper and lower limit. If the value falls below the lower limit, this warning is displayed before an error message is shown.

10.2.14 1Fl01 (Fault concentr. Low) ▼▼▼; 1Fl01<P134

The concentrate flow rate towards the drain is monitored against a settable upper and lower limit. If the flow rate remains below the lower limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.15 1Fl01 (Warn. concentr. High) ▲; 1Fl01>P135

The concentrate flow rate towards the drain is monitored against a settable upper and lower limit. If the upper limit is exceeded, this warning is displayed before an error message is shown.

10.2.16 1Fl01 (Fault concentr. High) ▲▲▲; 1Fl01>P135

The flow rate of the concentrate to the drain is monitored against a settable upper and lower limit. If the flow rate remains above the upper limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.17 1Fl02 (Warn. permeate low) ▼; 1Fl02<P144

The permeate flow rate is monitored against a settable upper and lower limit. If the value falls below the lower limit, this warning is displayed before an error message is shown.

10.2.18 1Fl02 (Fault permeate low) ▼▼▼; 1Fl02<P144

The permeate flow rate is monitored against a settable upper and lower limit. If the flow rate remains below the lower limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.19 1Fl02 (Warn. permeate high) ▲; 1Fl02>P145

The permeate flow rate is monitored against a settable upper and lower limit. If the upper limit is exceeded, this warning is displayed before an error message is shown.

10.2.20 1Fl02 (Fault permeate high) ▲▲▲; 1Fl02>P145

The permeate flow rate is monitored against a settable upper and lower limit. If the flow rate remains above the upper limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.21 1Fl03 (Warn. recirc. Low) ▼; 1Fl03<P154

The concentrate recirculation flow rate is monitored against a settable upper and lower limit. If the value falls below the lower limit, this warning is displayed before an error message is shown.

10.2.22 1Fl03 (Fault recirc. Low) ▼▼▼; 1Fl03<P154

The concentrate recirculation flow rate is monitored against a settable upper and lower limit. If the flow rate remains below the lower limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.23 1Fl03 (Warn. recirc. high) ▲; 1Fl03>P155

The concentrate recirculation flow rate is monitored against a settable upper and lower limit. If the upper limit is exceeded, this warning is displayed before an error message is shown.

10.2.24 1Fl03 (Fault recirc. High) ▲▲▲; 1Fl03>P155

The concentrate recirculation flow rate is monitored against a settable upper and lower limit. If the flow rate remains above the upper limit for a longer time, first a warning and then this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Flow sensor defective	Replace flow sensor

10.2.25 1Pr01 (Supply pressure high) ▲▲▲; 1Pr01>P063

The pressure at the RO inlet is monitored against a settable upper limit. If the value exceeds the upper limit, this error message is displayed.

Cause	Remedy
Feed water pressure too high	- Check the pressure rise of the feed water - Decrease the feed water pressure
Pressure probe defective	Replace pressure sensor

10.2.26 1Pr04 (Pump pressure high) ▲▲▲; 1Pr04>P083

The pump pressure is monitored against a settable upper limit. If the value exceeds the upper limit, this error message is displayed.

Cause	Remedy
Feed water pressure too high	- Check the pressure rise of the feed water - Decrease the feed water pressure
RO pump	Check RO pump
Pressure probe defective	Replace pressure sensor

10.2.27 1Pr05 (Oper. pressure high) ▲▲▲; 1Pr05>P093

The operating pressure is monitored against a settable upper limit. If the value exceeds the upper limit, this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Pressure probe defective	Replace pressure sensor

10.2.28 1Pr07 (Perm. pressure high) ▲▲▲; 1Pr07>P113

The permeate pressure is monitored against a settable upper limit. If the value exceeds the upper limit, this error message is displayed.

Cause	Remedy
Valve settings have been changed	- Check valve settings - Reconfigure the installation
Pressure probe defective	Replace pressure sensor

10.2.29 8L01 (Low level alarm) ▼▼▼; 8L01<P183

The permeate tank level is monitored against a settable lower limit. If the level falls below the lower limit, this error message is displayed.

10.2.30 8L04 (High level alarm) ▲▲▲; 8L04>P186

The permeate tank level is monitored against a settable upper limit. If the level exceeds the upper limit, this error message is displayed.

10.2.31 UNI-Dix; <Text>

If one of the digital **UNIVERSAL INPUTS** is set to *"emergency switch-off", "switch-off"* or *"warning"* and if the **UNIVERSAL INPUT** is active for a longer period than has been set for the delay, this message is displayed.

10.2.32 UBatt ▼▼▼

The controller's buffer battery is empty and must be replaced (see chapter 10.3 Replacing the buffer battery).

10.2.33 Real-time clock error

The real-time clock module of the controller is defective; the controller must be replaced.

10.2.34 Watchdog error

The microcontroller of the controller is defective; the controller must be replaced.

10.2.35 KeyPad Error

One or several keys of the controller are defective; the controller must be replaced.

10.3 Replacing the buffer battery

The buffer battery is located on the board behind the display. It must be replaced if the controller displays UBatt ▼▼▼

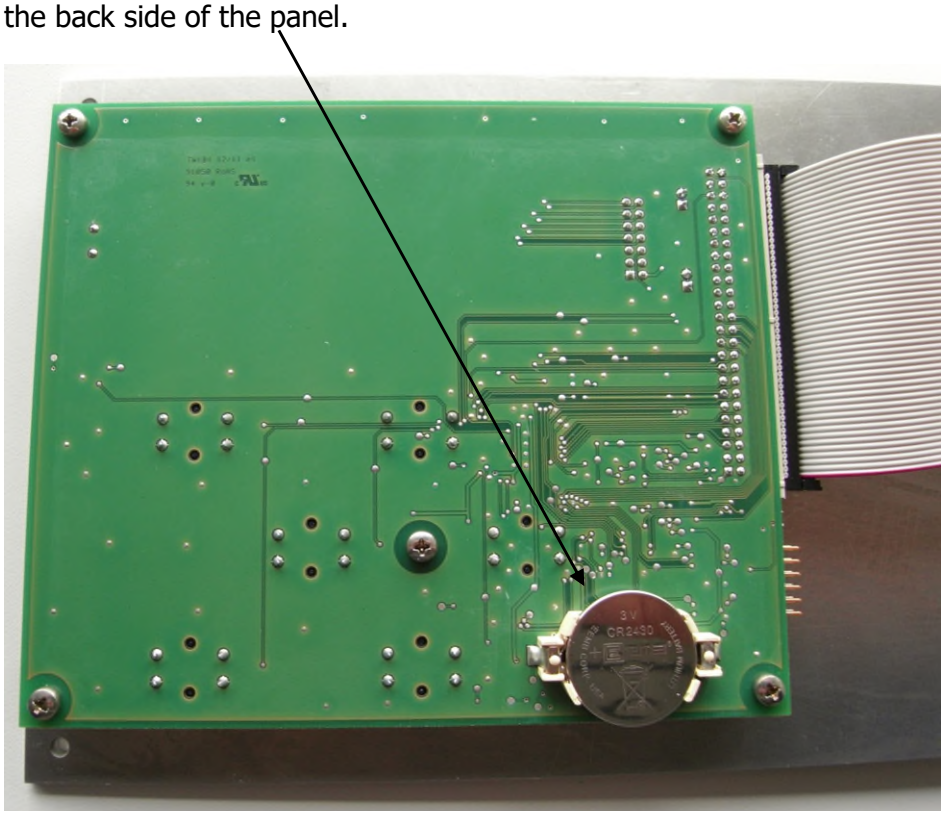
Note:

Before replacing the battery, the system must be set to operating mode OFF and the control unit must be disconnected from the power supply:

- Select operating mode OFF.
- Top mount controller: switch off the controller at the power switch.
- Built-in controller: switch off the installation at the power switch.

10.3.1 Top mount controller

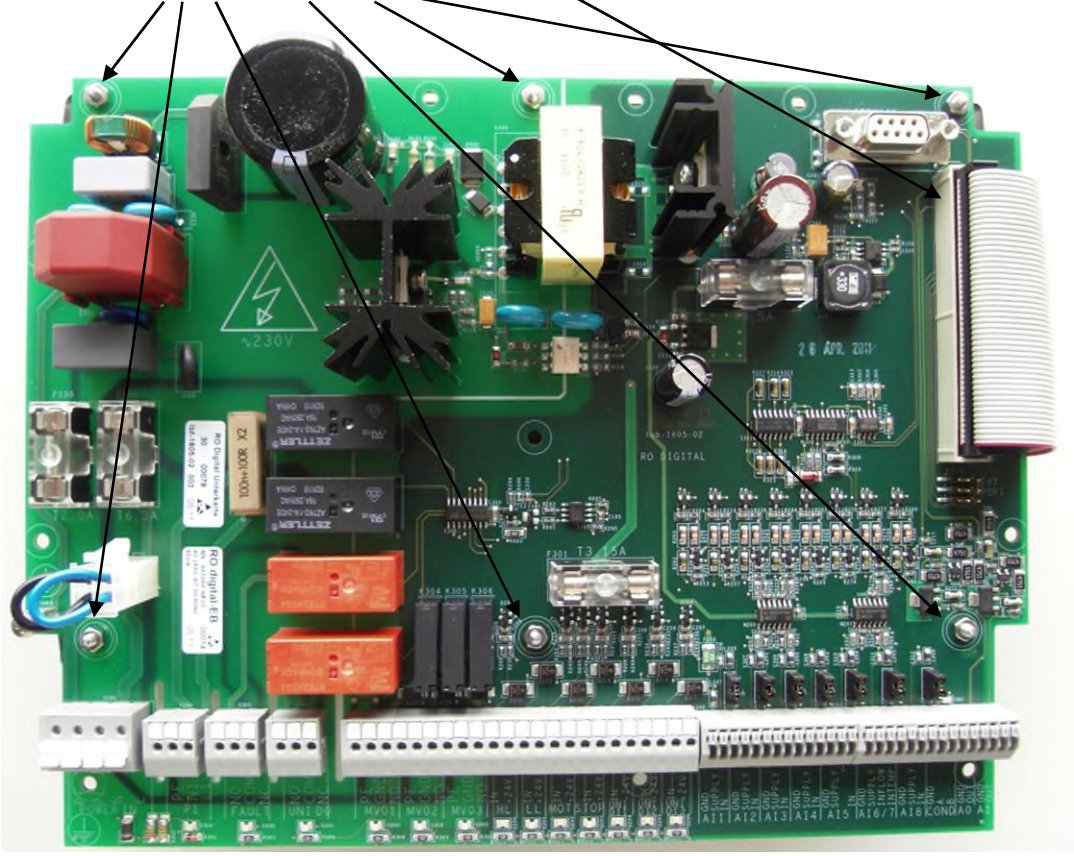
Unscrew the front panel in order to replace the battery (type CR 2430) which is located at the back side of the panel.



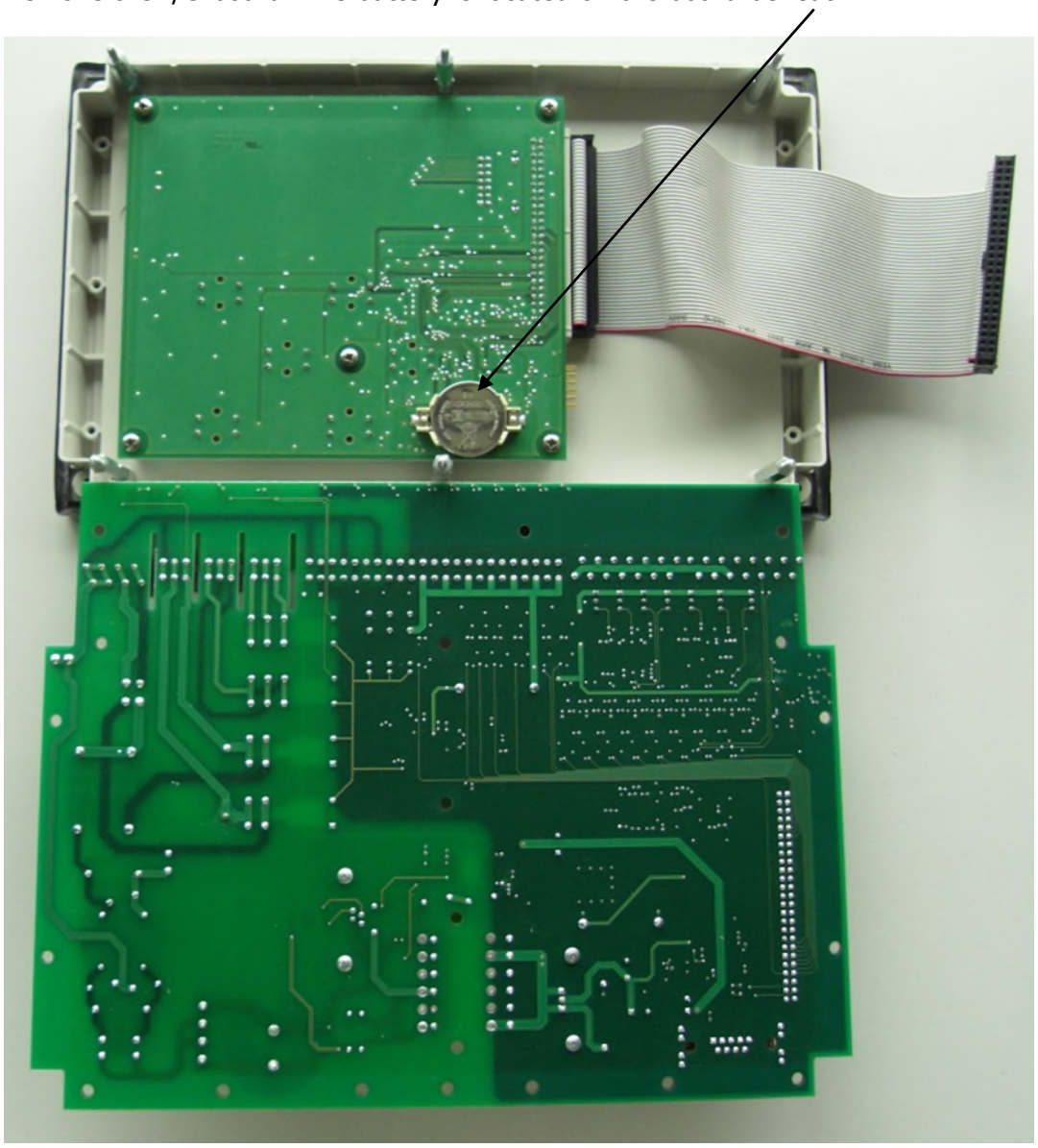
10.3.2 Built-in controller

Unscrew the I/O board in order to replace the battery

- Unplug the flat ribbon cable.
- Unscrew the 6 M3 nuts.



Remove the I/O board. The battery is located on the board beneath.



Having replaced the battery, screw the I/O board back in place and re-plug the flat ribbon cable.

Re-commissioning:

-Switch on with the mains/main switch

-Attention!

Date and time must be reset in operating mode OFF!

-Select the operating mode "Operation" to restart the system.

11 Technical data

Housing	Built-in housing, top mount housing
Supply voltage	Wide range input 93 - 265 V; 50/60Hz
Fuses	- Electronics fuse (F101) 0.5 AT - Pump output fuse (F300) 6.3 AT - Digital outputs fuse (F301) 3.15 AT - PSU input fuse (F100) 2 AT
Protection	IP 65
Ambient temperature	0 – 45 °C (32 – 113°F)
Display	Text display 4 x 20 digits, backlit
Keypad	6 keys
LEDs	- Operation (green) - Fault (red)
Display languages	- 6 standard languages (D, D-Text, GB, GB-text, F, ESP) integrated
Terminals	Spring-loaded terminals: - 2.5 mm² for supply, outputs - 1.5 mm² for inputs - 0.5 mm² for analogous inputs
Interfaces	- RS232 interface as a 9 pin Sub-D terminal on the I/O board, galvanically isolated for diagnosis and servicing purposes - Port for another optional interface module for connection of a visualisation device, profinet, etc.
Voltage-free outputs	Change-over contact, max. 250V/ 4 A
Mains outputs	Pump, 230 V/ 5A inductive load NO contact to N NO contact to L
24VDC outputs	Permissible permanent load 0.5A, temporarily 150%
Analogue inputs	0.5 - 3.5 VDC or 0/4-20 mA Supply voltage 5 VDC ± 2.5% Separate change of the analogue inputs voltage supply from 5V to 24V for each I/O via jumper
Analogue outputs	4-20 mA, max. load 500 Ohm
Conductivity measuring range	1 to 1000 µS/cm
Operating temperature	0 to 45°C (32 – 113°F)

Operating Instructions

Duplex water softening unit
ECOTROL TWIN

60/ 120/ 200/ 320/ 400

Translation of the original instructions

Contents

Technical Appendix

Imprint

Contents

1 Notes on using the Operating Instructions

Purpose:

The Operating Instructions are intended for users of the system and contain information on how to operate and maintain the system safely and reliably.

Availability:

The Operating Instructions must always be available at the place where the system is in use.

Subdivision:

The Operating Instructions consist of several chapters named by letters of the alphabet. An outline of all the chapters appears on Page 1.
The header and page numbering, along with the letter identifying each chapter, make it easier for you to orient yourself.
For information on the content of a specific chapter, please refer to the contents on the first page of that chapter.

Conventions/abbreviations:

OI Operating Instructions

TD Technical Documentation

- Enumerated items

☞ Steps to be performed

2 General safety information

The information contained in this operating manual, and especially in the "safety instructions" section, is vital to the safe operation of the installation.
Therefore, any person working with this installation must read these safety instructions and always observe them. This applies to the company carrying out the assembly and installation work as well as to the plant operator.
In addition, special on-site rules and regulations regarding accident prevention are to be observed.

2.1 Explanation of symbols and references

Procedures which, if not carried out properly, may lead to personal injury or to faulty operation of the installation are indicated by the following symbols:

This symbol indicates an imminent danger to human life and health. Disregarding this information will lead to serious personal injury up to life-threatening injury.

This symbol indicates a potential danger to human life and health. Disregarding this information will lead to serious personal injury up to life-threatening injury.

This symbol indicates a potentially dangerous situation. Disregarding this information could result in minor injury or damage to the equipment.

This symbol indicates important information for the correct usage of the installation. Disregarding this information may lead to faulty operation of the installation or other equipment**.**

2.2 Safety information

Country-specific requirements standards and regulations must always be adhered to.

2.3 Intended use

The installation is designed for the softening of particle and metal ion free well- and surface water. The pressure, temperature and flow limits given in the technical data section must be observed.
Intended use also implies that:

- the information contained in this manual is observed,
- the installation is inspected and serviced at the prescribed intervals.

2.4 Unintended use

The water softening unit is not intended for the production of water for human consumption. The filtrate produced must not be fed into the drinking water supply. Operational safety of this installation can only be guaranteed if the installation is used in accordance with the purpose defined in the technical manual. Any purpose or operation beyond the mentioned limits is considered as incorrect. The manufacturer/ supplier assumes no liability for damages resulting from incorrect use; this risk is carried solely by the plant operator.

2.5 Foreseeable misuse

Foreseeable misuse is also the use as a
- filter (mechanical filtration without regeneration by means of brine),
- storage container (after removal of the ion exchange resin), or
- hydraulic accumulator.

Do not feed the installation with hot water.
The limits indicated in Chapter C "Technical data" must be adhered to as well.

2.6 Operating staff

Only persons who have read and understood these operating instructions are permitted to operate the installation. When operating the installation, the safety instructions must be observed strictly.

2.7 Residual risks

The installation is state-of-the-art and has been designed and constructed to meet current safety requirements. Its use could, however, endanger the life or health of operating personnel or of third persons or cause damage to the installation itself or to other objects.
Only use the installation
- for its intended purpose,
- and when it is in a completely safe condition.

Malfunctions that may possibly affect safe operation must be eliminated immediately. This must be ensured by the plant operator himself or by the company that has been entrusted to carry this out.


Danger

Damage by water
In order to avoid inundation caused by leaks, the installation room must be equipped with a floor runoff and/or a leakage detection system with alarm function.


Danger

Electrical Shock
Do not touch electrical components with wet hands. Before starting work at electric components, separate the installation from the mains.


Danger

Mechanical energy
Some installation parts are pressurized at up to 25 bar. Depressurize them before starting repair and maintenance work.


Danger

Hygiene-critical applications
For hygiene-critical applications, the water softening unit should be disinfected on site.

2.8 Bringing the system to a stop in the event of an emergency

- ☞ Turn off the main switch
- ☞ Shut off the water supply

After remedying the damage:
- ☞ Open the water supply
- ☞ Turn on the main switch

2.9 Safety information for maintenance task

The operator must take pains to ensure that all maintenance, inspection and assembly tasks are performed by authorized and qualified professionals who have been sufficiently informed for the task at hand by thoroughly studying the Operating Instructions. These tasks must be properly performed by professionally trained staff member.
The system must be shut down and protected from being placed in operation again unintentionally before all repair and maintenance tasks. It is absolutely essential to observe the procedure described in these Operating Instructions for shutting down the system.
Before beginning tasks on the electrical equipment of the system, a check must confirm that power has been disconnected from the corresponding section of the system. In addition, the system must be secured to prevent it from being turned on again unintentionally.
Protective clothing suitable for the hazard at hand must be worn while performing the task. After the maintenance tasks are completed, all safety and protective equipment must be set back in place immediately and functionality restored.

2.10 Disposing of system parts and operating materials

When they need to be discarded, system parts must be disposed of according to local requirements including separately, if so required.

2.11 Unauthorized conversion and manufacturing replacement parts

Conversion or modification of the system is only permitted with the approval of the manufacturer. The same applies to making changes in the programming for the control system. Original replacement parts and accessories authorized by the manufacturer enhance safety. Use of other parts will void the warrantee.

2.12 Warrantee claims and liability

This product corresponds to the state of the art and was designed and manufactured in accordance with applicable rules of the technology, after which it was subjected to a quality control process.
If there should nevertheless be any grounds for complaint, please direct requests for replacement to the manufacturer of this product in accordance with the general terms and conditions of sale and delivery.

Contents of Chapter B

1 Shipment and Storage

1.1 Shipment from distributor to customer

During shipment all installations and packages must be secured against shifting and toppling.

The shipment weight equals the empty weight and is indicated in Chapter C/2, Technical Data.

Frost may damage the installation. Protect the installation from frost during shipment. The environmental requirements are indicated in Chapter C/2, Technical Data.

1.2 Storage

Frost may damage the installation. Protect the installation from frost during storage. The environmental requirements are indicated in Chapter C/2, Technical Data.

Filled installations (in general up to installation size 320) may be stored for six months as a maximum.
Skid-mounted installations have been wet tested. In order to prevent microbiological contamination, the installation should be commissioned within four weeks after delivery.

1.3 Shipment to the installation site

Use a suitable lift truck to convey the installation carefully to the dedicated installation area.
Observe indications as to the centre of gravity, if any.

1.4 Scope of supply

The installation consists of:

- ion-exchange tank (one for simplex units, two for duplex units)
- ion-exchange resin with supporting gravel
- main control valve
- piping
- brine tank

Content of Chapter C

1 Function

In water softening installations, hardness components such as calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions found in natural water are replaced by sodium ions (Na^{+}). For this purpose ion-exchange resins are used. Ion-exchange resins are spherical plastic granules on a polystyrene basis. They are also referred to as ion exchangers.

The ion-exchange unit has a limited capacity for absorbing hardness components from the untreated water. As soon as a certain amount of water has passed, the ion exchange resin becomes depleted and must be regenerated.

The harder the water to be treated, the more often regeneration is necessary. Regeneration is carried out using dissolved salt (sodium chloride, NaCl).

1.1 Outline of the process

The complete cycle of the tank ("filter") in a water-softening unit consists of the steps shown in 1.2:

Operation
Backwash
Brine draw/ Slow rinse
Fast rinse

During "operation", water is fed by the upper nozzle and passes the resin bed from the top to the bottom until the resin is no longer able to replace the hardness components with sodium ions. The resin is depleted now. During the charging process, a "hardness front" passes the resin bed from the top to the bottom as the amount of water that has passed the tank increases. The depletion of the resin is calculated via the pulses coming from a water meter detecting the amount of soft water produced.

During the backwash stage, the resin bed is loosened by water flowing through the tank from the bottom to the top. At the same time, resin abrasion and suspended matter are washed out via the upper nozzle. This process ends after 5 to 10 minutes.

Then the "brine draw" step is initiated: Brine runs downwards through the resin bed. The supporting gravel around the lower nozzle permits an even brine flow throughout the whole tank diameter. Almost all the hardness components on the resin are replaced with sodium ions. A solution of unused NaCl as well as of $CaCl_2$ and $MgCl_2$ that has been formed during the ion exchange process is now carried out of the tank to the sewers. The next step is the slow rinse.

The drive water of the water jet injector continues passing the resin bed after the brine has been extracted. During this step, the salt solution remaining in the resin bed is driven out of the tank. Since the brine draw and the slow rinse steps are carried out without the position of the central distribution valve being changed, we call these two steps the "brine draw/slow rinse" phase. This phase takes 45 to 55 min.

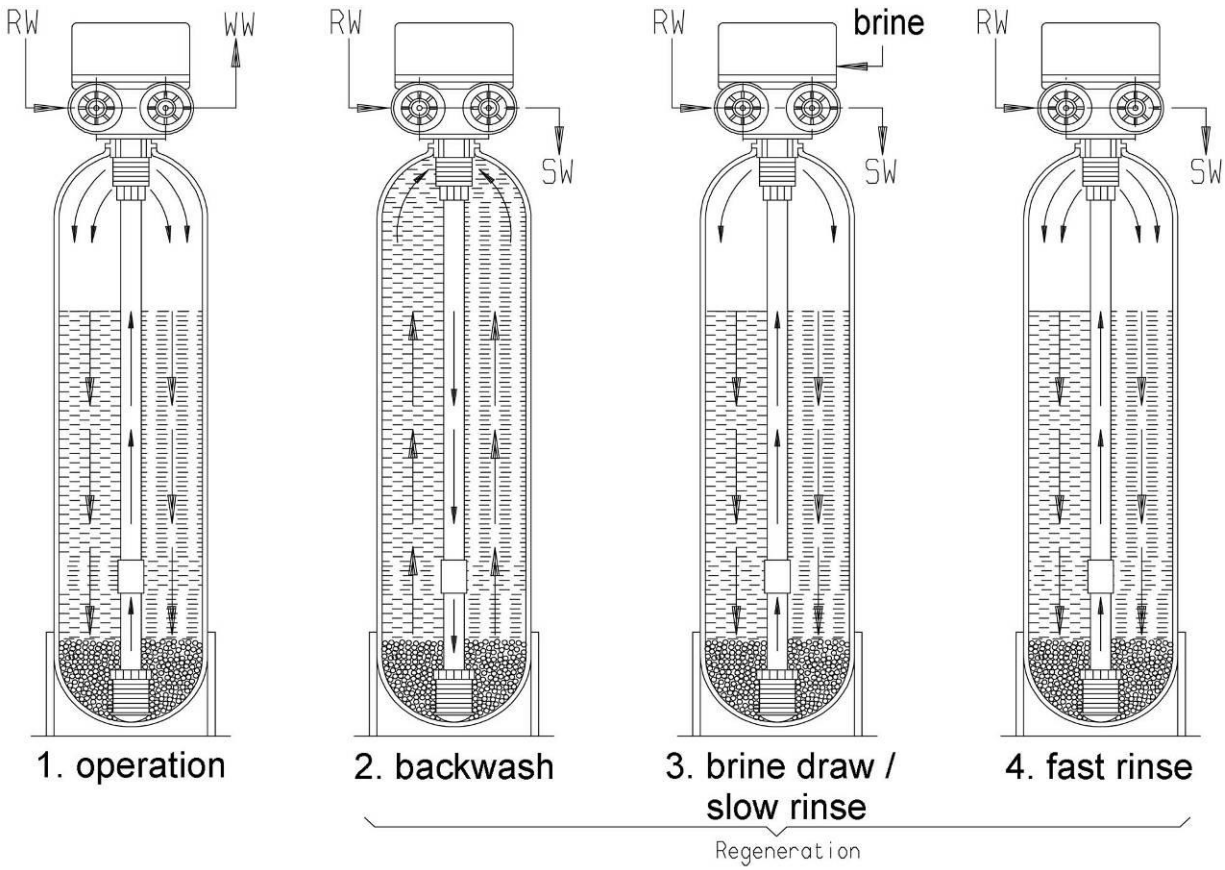
During the last step of the regeneration process ("fast rinse"), water runs downwards over the resin bed. The original packing density that has been reduced during backwash is now re-established and the residual solution in the resin granule is washed out. The installation is now ready for operation again. This takes 15 to 25 min. The tank then is in stand-by mode.

The indication for maximum resin capacity is a theoretical value and is above the actual usable resin capacity. The actual value is subject to the influence of local conditions at the place of installation.

1.2 Operating status

The cycles of a water softening plant

RW – raw water
SW – rinse water
WW – soft water



2 Technical Data

Water softening unit Ecotrol TWIN		**60**	**120**	**200**	**320**	**400**
max. resin capacity	m³x°dH	60	120	200	320	400
min. flow	m³/h	0.1	0.15	0.25	0.4	0.5
max. flow	m³/h	1.0	1.5	2.0	3.5	4.0
pressure drop	bar	1.0	1.0	1.2	1.3	1.5
operating pressure min./max.	bar	3/8				
flow pressure variation, max.	bar	+/- 0.5				
operating temperature min./max.	°C	5/35				
raw water		1" male thread				
soft water		1" male thread				
effluent	hose	13x3.5				
effluent amount, max.	m³/h	0.28	0.58	0.58	0.99	1.15
ion exchange resin per tank	l	15	30	50	80	100
supporting gravel per tank	kg	1.2	4	4	8	11
brine tank	l	100	100	200	300	300
salt stock – no. of regenerations	units	30	13	16	18	13
salt consumption per regeneration approx.	kg	3.0	6.0	10.0	16.0	20.0
brine consumption per regeneration approx.	l	10.0	20.0	33.5	53.5	66.9
backwash approx.	min.	5	5	8	8	8
brine draw approx.	min.	63	49	76	61	62
fast rinse approx.	min.	10	10	16	16	15
brine tank filling approx.	min.	6	12	15	26	31
regeneration in total approx.	min.	84	77	115	111	116
connected load approx.	W	2 x 8				
Voltage / frequency	V/Hz	230/50 - 60				
Weight approx.	kg					
Sound level	dB (A)	63				

Experience has shown that operational parameters may vary during plant operation due to changes in composition and concentration of the consumables or the water used, due to changes in the environmental conditions, the legally valid regulations, and the operating conditions.

Contents of Chapter D

1 Installation and Assembly

1.1 Assembly preparation

NOTE **Please consider the drawings in the technical appendix when installing and assembling the unit.**

Installation of overpressure relief device.
Take approiate measures to secure the water softening unit from overpressure.
During plant stoppage, i.e. no consumption of soft water, in correlation with increase in temperature >10°C pressure can rise in the pressure vessel and the feed water supply line strongly.
Installation of diaphragm pressure tank or overflow valve as overpressure relief devices is mandatory.

1.2 Location / Installation surfaces

Install the equipment in a frost-resistant, sufficiently ventilated and clean location. The installation surface must be finished and level.

1.3 Drain

NOTE **The wastewater must be able to fall freely (without backpressure) into the discharge canal on the site (as specified in EN 1717).**

The wastewater tubing must have the right diameter and must be usable. Observe the amount of wastewater given in Chapter C.

1.4 Raw and soft water pipe

The raw water and the soft water pipes on site must have the right diameter and be in the correct position when laid to the installation.

If drinking water is used as raw water, the following must be observed:

NOTE **EN 1717 stipulates that water softening units may be used for drinking water applications if they are equipped with one of the following safety devices: outlet with free fall or backflow preventer. The DIN (German Institute for Standardisation) regulation no. 19636 "Softeners for drinking water installation" states on page 2, pt./section/item 4.7 Prevention of microbiological contamination: Since water softening units, especially when in intermittent operation, tend to be polluted by germs, they must be prevented from contamination by suitable constructive or chemical-physical measures.**

If automatic disinfection is desired, resin containing silver can be added or a resin disinfection system (working with chlorine) can be installed in the brine suction line (additional charge).

1.5 Washing the gravel

Rinse the quartz gravel in a bucket under running water, stirring constantly, in order to remove impurities.

2 Installation assembly

2.1 Ion-exchange tanks and brine tank

Bring the softener tank(s) and the brine tank in their correct position, i.e. facing the direction indicated on the assembly drawing.

If the softening installation is not commissioned directly after installation and if there may be frost before installation start-up, the installation has to be filled without adding water.

NOTE **The formation of low pressure or vacuum must be prevented in the softener tank and the unit. If applicable use additional devices on site, like aeration valves, to stop formation of low pressure or vacuum.**

2.2 Filling

The installations of the sizes 60 to 320 are already filled with ion-exchange resin and supporting gravel at delivery. Fill installation of size 400 as follows:

☞ Unscrew the main control valve from the tank.

☞ Remove the central pipe from the main control valve / the adapter and place it back into the tank so that the lower nozzle is positioned in the bottom centre of the tank.

☞ Cover the opening of the central pipe so that no impurities may fall into it.

☞ Fill the tank up to the first quarter with clean water.

☞ Fill the tank first with quartz gravel, then with ion-exchange resin (consult technical data in Chapter C for the amount required). Distribute the gravel and the resin you received evenly between the two tanks!

☞ Rinse the tank thread with clean water until impurities have been removed.

☞ Remove cover from central pipe opening. Check that the o-ring in the upper nozzle (main control valve) is undamaged.

☞ Mount main control valve onto the central pipe again and screw into the tank thread.

☞ Mount the piping included with the delivery.

2.3 Establishing the hydraulic connections

All pipe connections must be free from mechanical tension. Do not crush or bend the hoses. Screw the hoses tightly.

In the case of wastewater and drainage pipes, the pipe length should slope towards the wastewater connection. The wastewater must be able to flow out without any back pressure.

Brine pipe:

Connect the injector and the brine valve with a brine pipe (PE hose).

Raw water connection:

Connect the raw water pipe to the raw water port via an isolating valve.

Soft water connection:

Connect the soft water pipe to the consumers.

Wastewater connection:

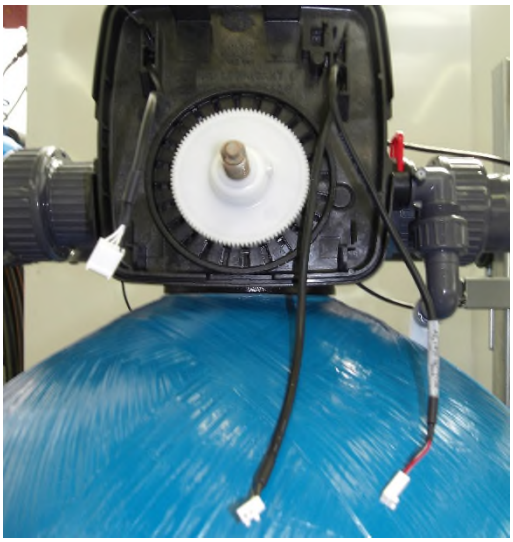
Connect the rinsing outlet of the control valve with the free drainage inlet by means of a woven hose.

2.4 Establishing the electric connections and mounting the connection cables

☞ Mains connection: plug the PSU of the control valve in fused type F earthing contact socket outlets on site.

☞ Connection cable, water meter cable and three-way valve cable:

Note: The TWIN valve is mounted on the topside of softener tank A. The softener tank B does not have a control valve mounted on its topside.



Similar illustration

Contents of Chapter E

1 Start-up

1.1 Check before start-up

1.1.1 Hydraulic connections

Are the raw water, soft water, wastewater and brine pipes connected correctly and leak-proof? Is there sufficient flow pressure available at maximum capacity? (See technical data in Chapter C)

1.1.2 Power supply

Is there one type F earthing contact socket outlet available within reach of the PSU cable and is there continuous operating voltage? Has the water meter sensor been plugged-in?

1.2 Start-up

Check water-softening unit for leaks at start-up procedure. Shipping and transport may cause leakages; these must be remedied on site.

1.2.1 Preparations:

- ☞ Close the on-site isolation valves upstream and downstream of the water softening installation.
- ☞ Plug the PSU into the type F earthing contact socket outlet.

1.2.2 Controller-Setting:

Before start-up read the operating instructions especially chapter F (Operation and Monitoring), chapter programming of the control valve and the Control Valve Manual in the appendix thoroughly.
The control has not been factory set. Set the parameters according to the tables in the technical appendix and adjust the parameters as described in the Control Valve Manual.

Setting of degree of raw water-hardness on-site according to controllers manual p.18:

- ☞ STEP 1I - Press NEXT and ▲ simultaneously for 3 seconds
- ☞ STEP 2I – Hardness: Set the amount of influent hardness using ▲ or ▼. (…) Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

Units available: ppm, fH, dH

1.2.3 Rinsing the softener tank

Each ion-exchange tank must be backwashed before start-up!

- ☞ Open the isolating valve in the raw water pipe.
- ☞ Press the "REGEN" button for three seconds, The first step (BACKWASH) is started and the backwash time is counted down.
- ☞ Wait until the backwash step is terminated and the controller is in the brine draw/slow rinse (BRINE) phase.
- ☞ Press the "REGEN" button to abort the brine draw/slow rinse (BRINE) phase. The controller moves on to fast rinse (RINSE).
- ☞ Press the "REGEN" button to abort the fast rinse (RINSE) phase. The controller passes to brine tank filling (FILL).
- ☞ Wait for this phase to end.
- ☞ Upon termination of the brine tank filling step (FILL), check if the water level in the brine tank is at least approx. 20 mm above the salt tray.
- ☞ Rinse the second ion-exchange tank analogously – but skip the last step (FILL) since the brine tank has already been filled when rinsing the first ion-exchange tank.

1.3 Setting the installation to operating mode

NOTE:

Only refined salt in accordance with DIN EN 973 is suitable for regeneration. We recommend operating our water-softening installations only with higher-grade salt tablets in accordance with DIN EN 973, type A.

NOTE:

If fine-grained boiled salt is used, a cheesecloth that is cut to fit (mesh size 200 µm) must be put onto the salt tray. The cheesecloth must cover the salt tray completely.

- ☞ Fill the regeneration salt into the brine tank and spread it evenly on the salt tray.
- ☞ Open the isolation valves in the raw water and in the soft water pipe so that water is drawn.
- ☞ Throttle the soft water amount at the soft water isolation valve so that the maximum flow rate is not exceeded. If maximum throughput is exceeded this will lead to an increase in residual hardness. If no flow meter is installed, the throughput must be gauged by litres.

NOTE:

Do not limit the flow rate in the raw water supply, doing so may result in water shortage during regeneration.

2 Shut-down

2.1 Short-term decommissioning (<2 weeks)

- ☞ Always wait for the regeneration to end if a regeneration has been triggered. If the plant is disconnected during regeneration, it may supply hard water or even brine to the user after re-commissioning!
- ☞ Unplug the mains plug.
- ☞ Close the isolation valves in the raw and in the soft water lines.
- ☞ If the connected systems are to be supplied with untreated water rather than not at all, the by-pass – if available – is to be left open.

2.2 Long-term decommissioning (>2 weeks)

Before the softener is taken out of service for a fairly long period, it must be regenerated completely.

- ☞ As soon as saturated brine has formed in the brine tank and one of both exchangers is in standby mode (ready for operation) a regeneration of the active exchanger must be triggered manually by pressing the regeneration button. In case of regeneration in progress, wait until regeneration has ended. Otherwise the risk exists that possible residual hardness or brine may be fed into the system erroneously during start-up of the softening unit.
- ☞ At the end of the regeneration, unplug the mains connection.
- ☞ If the softening plant may be affected by frost before it is commissioned again, the water has to be drained out of the softener tanks. The residual humidity in the softener vessel is sufficient to prevent the resin from drying completely.

2.3 Restart

2.3.1 Re-comissioning after short-term decommissioning

- ☞ Make sure that the softening installation and all hydraulic connections are in proper operation condition and that the brine tank has been filled completely with salt.
- ☞ Plug in the mains plug.
- ☞ Slowly open the isolating valves in the raw and soft water pipes.

2.3.2 Re-commissioning after long shut-down period

- ☞ Make sure that the softening installation and all hydraulic connections are in proper operation condition and that the brine tank has been filled completely with salt.
- ☞ Slowly open the isolating valves in the raw and soft water pipes.
- ☞ Fill water into the brine tank until the level is above the salt tray (water reaches the salt, brine formation is enabled).
- ☞ Before triggering a regeneration, allow time (min. 3 h at 15°C) for brine to form. The time is calculated from the time of the last regeneration or from the last filling of the tank with regeneration salt.
- ☞ Plug in the mains plug.
- ☞ Slowly open the isolating valves in the raw water pipe of the water-softening installation.

- ☞ Initiate manual regeneration of the ion-exchange tank 1 by pressing the regeneration key and wait for it to end.
- ☞ Upon termination of the regeneration wait for brine to form (min. 3 h).
- ☞ Initiate manual regeneration of ion-exchange tank 2.
- ☞ Slowly open the isolating valves in the soft water pipe.

Contents of Chapter F

1 Programming the controller

Set the controller according to chapter "Programming control valve " in the appendix of this manual.

2 Operation

2.1 Locking the control panel

Lock the control panel as follows:

☞ Press the "REGEN" button.

☞ Press the ▽ button.

☞ Press the "NEXT" button.

☞ Press the △ button.

☞ Press the "SET CLOCK" button – "loc" is displayed.

Unlock the display analogously.

2.2 Displaying the residual capacity and the current flow

☞ Press the "NEXT" button – the current flow is displayed (only for ion-exchange tanks that are in operation).

☞ Press the "NEXT" button – the residual capacity is displayed.

2.3 Triggering immediate regeneration

☞ Press the "REGEN" button for three seconds

The controller sets the currently running valve, according to the current display, to the various backwash cycles. The installation can be set to the next cycle by pressing the "REGEN" button. If all cycles have been passed through, the valve returns to operating mode (time).

Contents of chapter G

1 Troubleshooting

1.1 General Notes

Due to high-grade components and integrated safety and monitoring devices the unit is very reliable.

If nevertheless malfunctions occur, they can be identified and remedied easily by means of the table below.
If severe malfunctions occur, please contact the manufacturer (see nameplate).

Malfunctions may only be remedied by qualified and trained technical staff in accordance with safety instructions in chapter A of this manual!
Before starting repair work, separate the unit from the mains and make sure that it cannot be switched on erroneously!

☞ All lines must be pressureless.

1.2 Contacting the manufacturer in case of malfunctions

In order to facilitate effective help in case of malfunctions, make sure you have the following information at hand when contacting the manufacturer:

- Serial number
- Part number
- Type of installation

1.3 Troubleshooting table

Fault	Cause	Remedy
Controller display dark	Mains supply interrupted	Provide mains supply
	Controller defective	Replace controller
No soft water throughput	Isolating valve(s) in the raw water and/or in the soft water pipe closed	Open isolating valves
Residual hardness of the soft water too high	Check salt stock; the salt level must at least equal the water level	Top up salt and initiate regeneration when the salt has dissolved (approx. 5 h)
	Salt stock sufficient	Initiate regeneration and check if brine is drawn
	Brine is drawn	Contact supplier
	No brine is drawn	Remove brine valve and clean it
Brine tank overflowing	Filling time of the brine tank too long and brine valve defective – float does not close the valve anymore	Measure filling time of the brine tank and compare with technical specifications
		Replace brine valve

1.4 Fault codes on control unit

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 REGEN button is depressed and held.	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 REGEN button is depressed and held.	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
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.
	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

Problem	Possible Cause	Solution
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.
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 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. 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.

Problem	Possible Cause	Solution
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.

Content of chapter H

1 Data recording/ maintenance/ servicing

1.1 Recording

In order to warranty smooth operation, the installation must be checked regularly for damage, leakage, etc.

The following operating parameters have to be checked within at least the defined intervals / as required and documented:

Check, measure, () = log	Daily	Weekly
Total hardness (raw water)	(X)	
Residual soft water hardness	(X)	
Operating pressure (raw water)		X
Raw water temperature		X
Salt stock in the brine tank	(X)	

1.2 Maintenance / servicing

The maintenance tasks can be carried out by our service staff within the framework of a service contract. The use of original spare parts is a warranty condition.

Component	Measures	Interval
Brine valve	Remove and clean the brine valve from the main control valve, check it for water tightness and replace if necessary	As required
Brine tank	Check the tank for impurities and clean it if necessary (empty tank, rinse it with water, aspirate water or tip tank, remount parts)	3 months
Ion exchangers	Top up if necessary, if residual resin in good condition. Replace every 3 to 5 years, depending on load.	12 months As required

1.3 Operation log

Use this template of the operation log for copying and duplication. List the values according to the given time intervals.

Location:
Period of time:

Date	Raw water hardness °dH	Residual hardness soft water°dH		Check Salt stock	Counter Water meter m³
		Exchange vessel 1	Exchange vessel 2		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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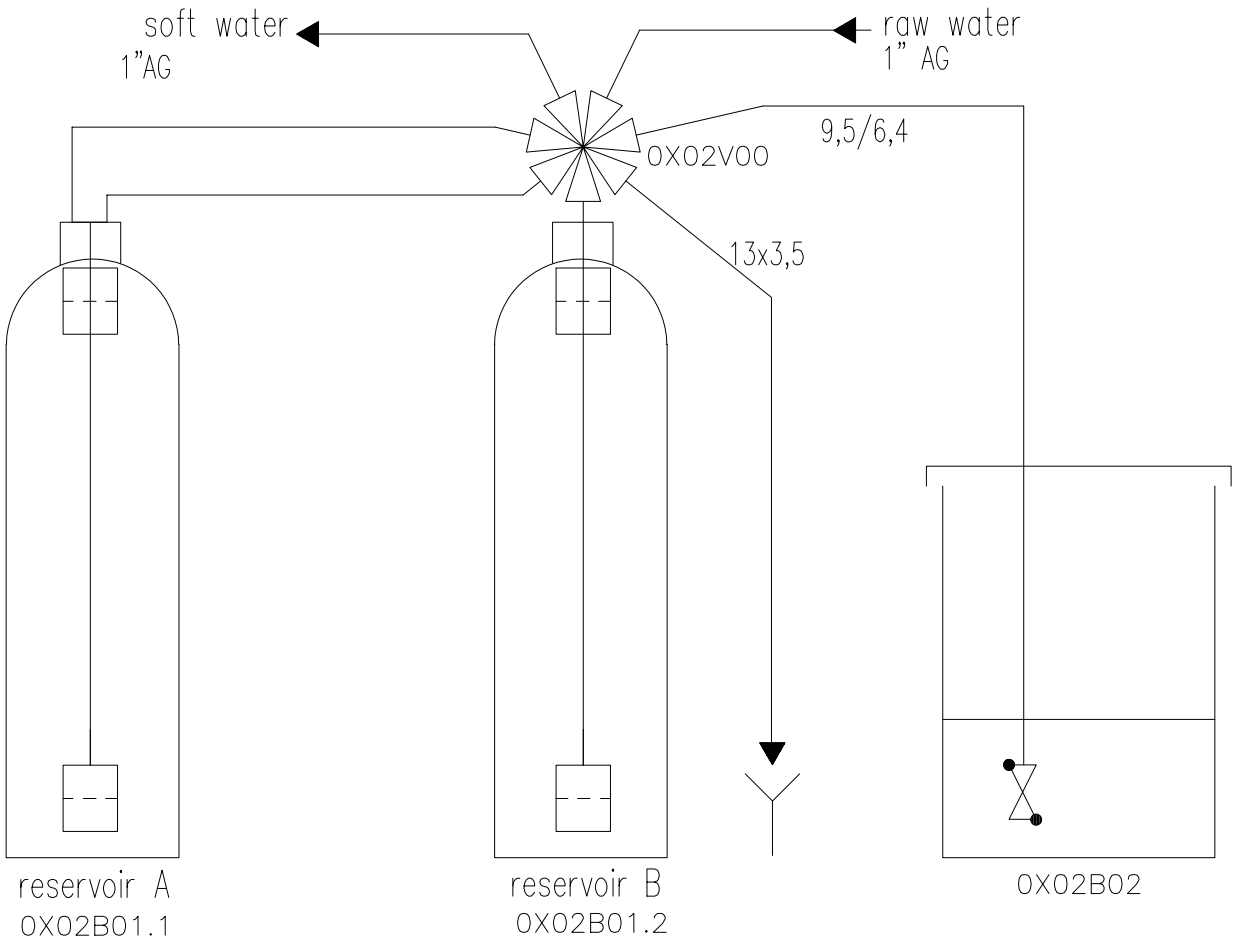


				Allgemein-Toleranzen DIN ISO 2768 - mK	Oberfläche	Maßstab 2:1	Position – Menge –
						– –	
				Datum	Name	ECOTROL TWIN 60 - 400 Doppelenthärter	
				Bearb. 15.01.2015	eng		
				Gepr. 16.01.2015	eng		
				Norm			
B	Überlauf	22.04.2022	rei			00360544-30000	Blatt Bl
A	R+I bez. geänd.	28.03.2017	eng				
Rev.	Änderung	Datum	Name	EDV Nr. 00360544-30000.dwg			

spare parts list

item: **water softening unit ECOTROL TWIN 60**

item no **360 540**

item no:	position (PID)	quantity	unit	w/s*	designation	additional information
00 366 072		1	pcs	s	1" TWIN Valve for Ecotrol TWIN 60	incl. DLFC 013/ injector brown
00 366 077		1	pcs	s	electronic for Ecotrol TWIN	
00 365 838		1	pcs	s	WS1 Injector	ASY brown
00 365 988		1	pcs	s	WS1 drive	
00 365 997		1	pcs	w	WS1 piston- and spacer stack asy	
00 366 078		1	pcs	s	WS1 TWIN counter unit	
00 365 211		1	pcs	s	brine tank	100L Euraqua
00 365 582		1	pcs	s	brine valve Schurz type	900mm, 1/4"
00 430 170		2	pcs	s	pressure vessel Q 07x35 (2,5")	20,4L blue
00 140 051		30	l	w	cation exchange resin	strong acid
00 530 059		2,4	kg	w	quartz gravel size	size 3,15-5,6 mm

revision	date	name	*w = wear part
			s = spare part

spare parts list

item: **water softening unit ECOTROL TWIN 120**

item no: **360 541**

item no	position (PID)	quantity	unit	w/s*	designation	additional information
00 366 073		1	pcs	s	1" TWIN valve for Ecotrol TWIN 120	incl. DLFC 027/ injector white
00 366 077		1	pcs	s	electronic for Ecotrol TWIN	
00 366 014		1	pcs	s	WS1 Injector	ASY E white
00 365 988		1	pcs	s	WS1 drive	
00 365 997		1	pcs	w	WS1 piston- and spacer stack asy	
00 366 078		1	pcs	s	WS1 TWIN counter unit	
00 365 212		1	pcs	s	brine tank	100L
00 365 582		2	pcs	s	brine valve Schurz type	900mm, 1/4"
00 430 171		2	pcs	s	pressure vessel Q 10x35 (2,5")	39,2 L blue
00 140 051		60	l	w	cation exchange resin	strong acid
00 530 059		8	kg	w	quartz gravel size	size 3,15-5,6 mm

Revision	Date	Name	*w = wear part
			s = spare part

spare parts list

item. **Water softening unit ECOTROL TWIN 200**

item no: **360 542**

item no	position (PID)	quantity	unit	w/s*	designation	additional information
00 366 074		1	pcs	s	1" TWIN valve for Ecotrol TWIN 200	incl. DLFC 027/ injector yellow
00 366 077		1	pcs	s	electronic for Ecotrol TWIN	
00 365 839		1	pcs	s	WS1 Injector	ASY yellow
00 365 988		1	pcs	s	WS1 drive	
00 365 997		1	pcs	w	WS1 piston- and spacer stack asy	
00 366 078		1	pcs	s	WS1 TWIN counter unit	
00 365 213		1	pcs	s	brine tank	200L
00 365 582		1	pcs	s	brine valve Schurz type	900mm, 1/4"
00 430 172		2	pcs	s	pressure vessel Q 10x54 (2,5")	60,7 L blue
00 140 051		100	l	w	cation exchange resin	strong acid
00 530 059		8	kg	w	quartz gravel size	3,15-5,6 mm

revision	date	name	*w = wear part
			s = spare part

spare parts list

item **water softening unit ECOTROL TWIN 320**
item no: **360 543**

item no:	position (PID)	quantity	unit	w/s*	designation	additional information
00 366 075		1	pcs	s	1" TWIN valve for Ecotrol TWIN 320	incl. DLFC 042/ injector lightblue
00 366 077		1	pcs	s	electronic for Ecotrol TWIN	
00 365 840		1	pcs	s	WS1 Injector	ASY lightblue
00 365 988		1	pcs	s	WS1 drive	
00 365 997		1	pcs	w	WS1 piston- and spacer stack asy	
00 366 078		1	pcs	s	WS1 TWIN counter unit	
00 365 215		1	pcs	s	brine tank	300L PE-white
00 365 582		2	pcs	s	brine valve Schurz type	900mm, 1/4"
00 430 173		1	pcs	s	pressure vessel Q 13x54 (2,5")	103 L blue
00 140 051		160	l	w	cation exchange resin	strong acid
00 530 059		16	kg	w	quartz gravel size	3,15-5,6 mm

revision	date	name	*w = wear part
			s = spare part

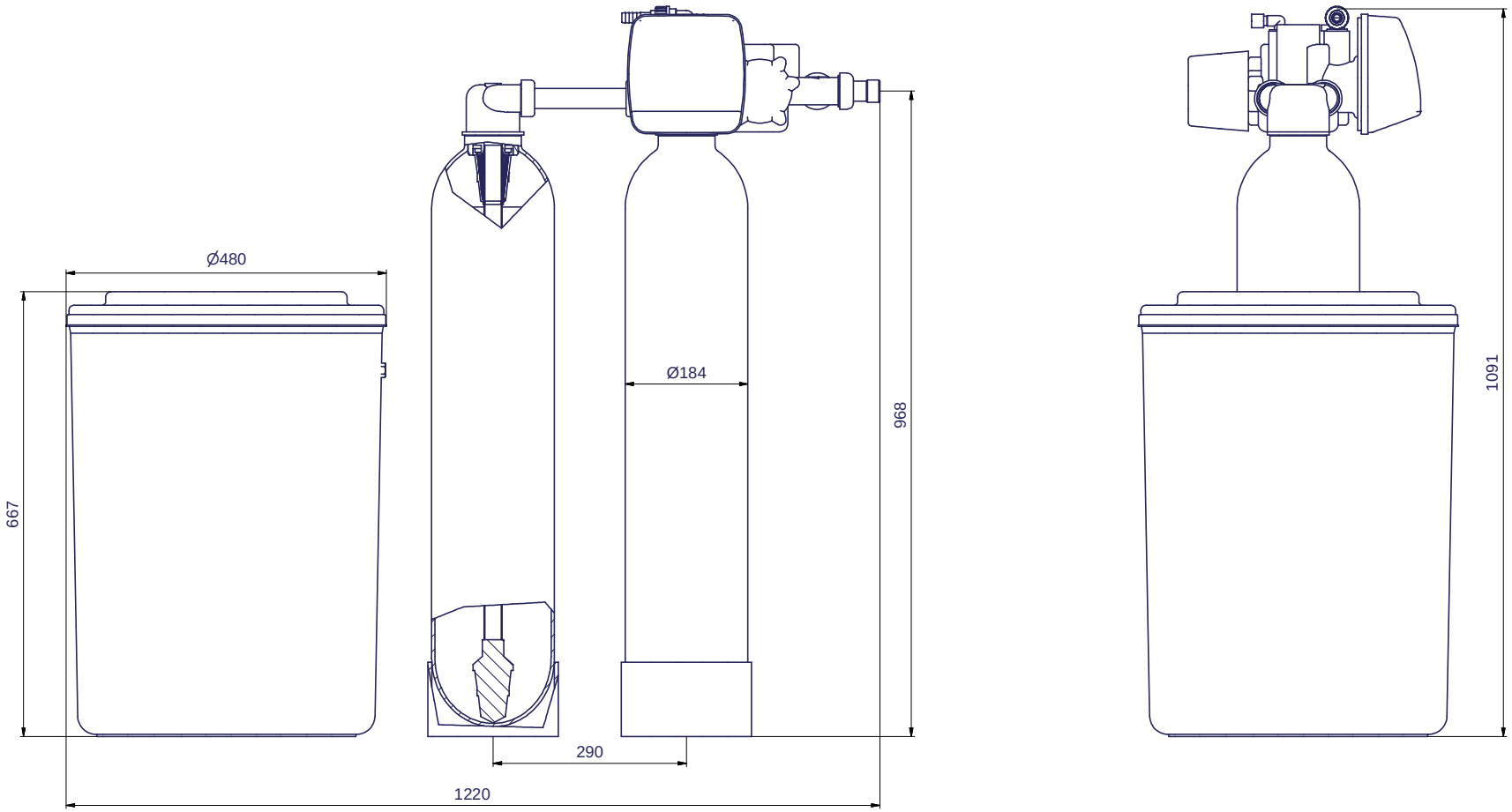
spare parts list

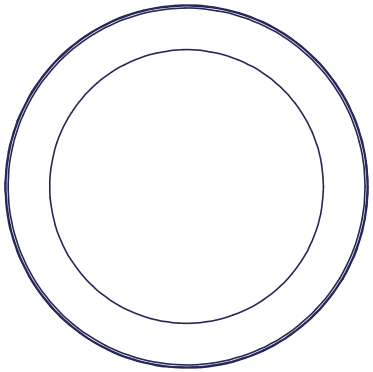
item **water softening unit ECOTROL TWIN 400**

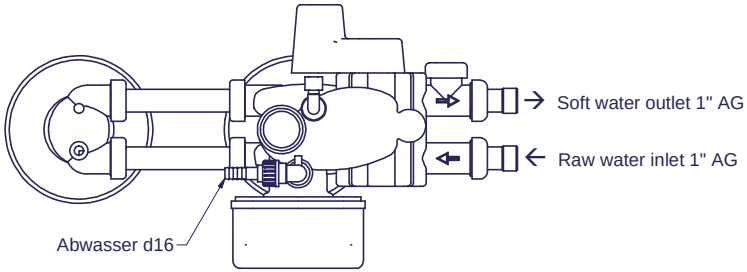
item no: **360 544**

item no	position (PID)	quantity	unit	w/s*	designation	additional information
00 366 076		1	pcs	s	1" TWIN valve for Ecotrol TWIN 400	incl. DLFC 053/ injector lightgreen
00 366 077		1	pcs	s	electronic for Ecotrol TWIN	
00 365 841		1	pcs	s	WS1 Injector	ASY lightgreen
00 365 988		1	pcs	s	WS1 drive	
00 365 997		1	pcs	w	WS1 piston- and spacer stack asy	
00 366 078		1	pcs	s	WS1 TWIN counter unit	
00 365 215		1	pcs	s	brine tank	300L PE-white
00 365 582		1	pcs	s	brine valve Schurz type	900mm, 1/4"
00 430 163		2	pcs	s	pressure vessel C 14x65 (4")	blue
00 140 051		200	l	w	cation exchange resin	strong acid
00 530 059		22	kg	w	quartz gravel size 3,15-5,6 mm	3,15-5,6 mm

revision	date	Name	*w = wear part
			s = spare part







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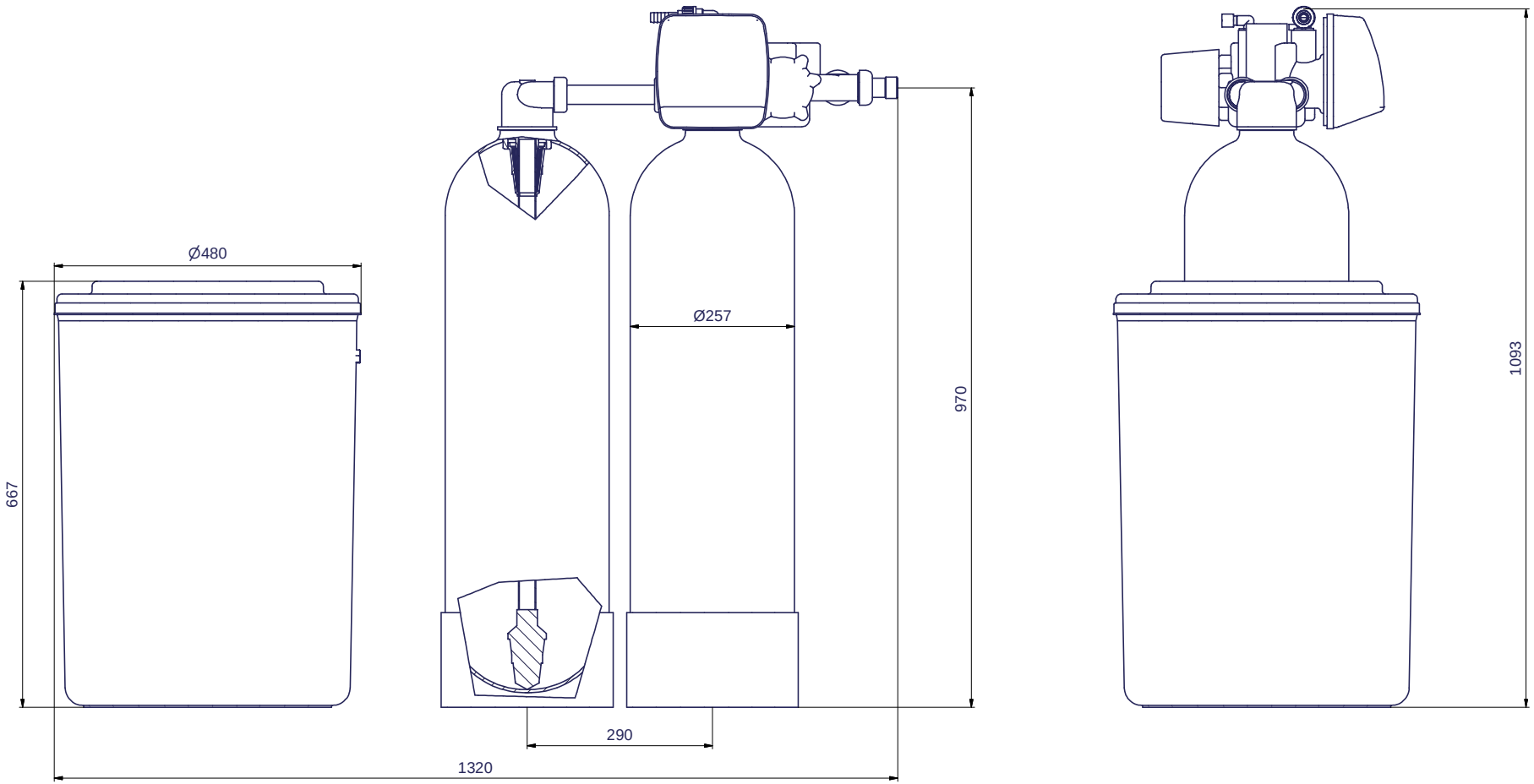
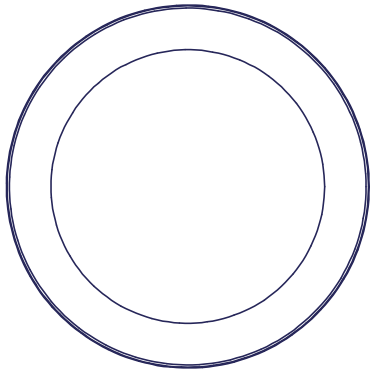
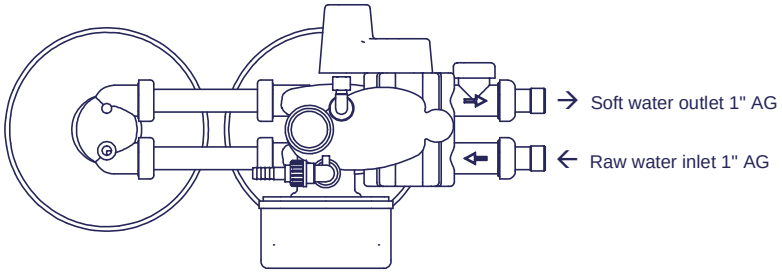
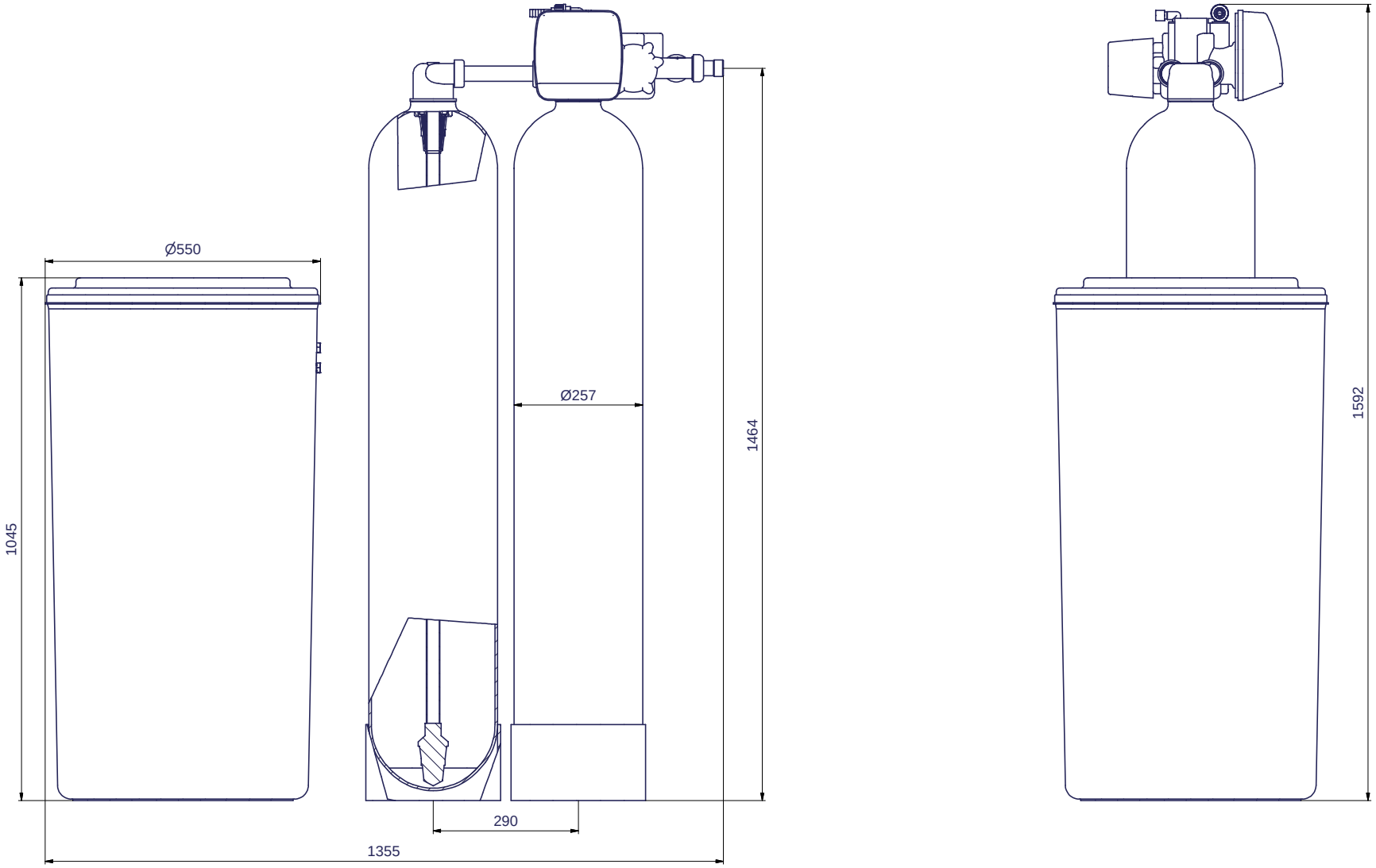
				Werkstoff, Halbzeug Rohteil-Nr. Modell-oder Gesenk-Nr.	
			Datum / Name Bearb. 15.01.2015 eng Gepr. 15.01.2015 eng Norm.	ECOTROL TWIN 60 Doppelenthärter	
A	überarbeitet	29.04.2015 eng		00360540-11000	Blatt 1
Rev.	Änderung	Datum Name	Ursprung 00360540-11000	Ersatz für	Ersetzt durch A2

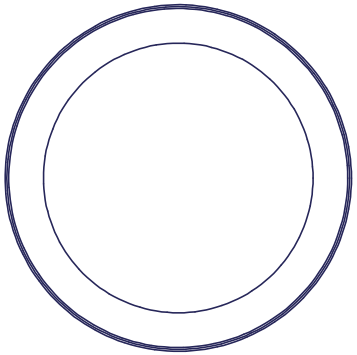


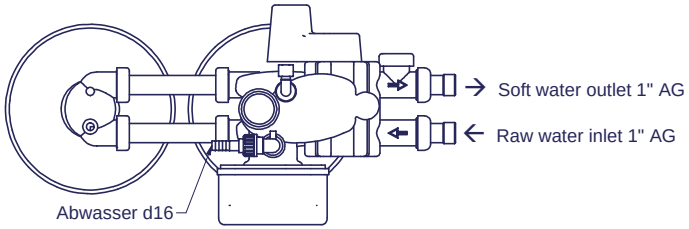




			Allgemein-Toleranzen DIN ISO 768 - mK	Maßstab 1 : 5	(Gewicht) 0,00 kg
				Werkstoff, Halbzeug Rohteil-Nr. Modell-oder Gesenk-Nr.	
			Datum / Name Bearb. 15.01.2015 eng Gepr. 15.01.2015 eng Norm.	ECOTROL TWIN 120 Doppelenthärter	
A	überarbeitet	29.04.2015 eng		00360541-11000	Blatt 1
Rev.	Änderung	Datum Name	Ursprung 00360541-11000	Ersatz für	Ersetzt durch A2







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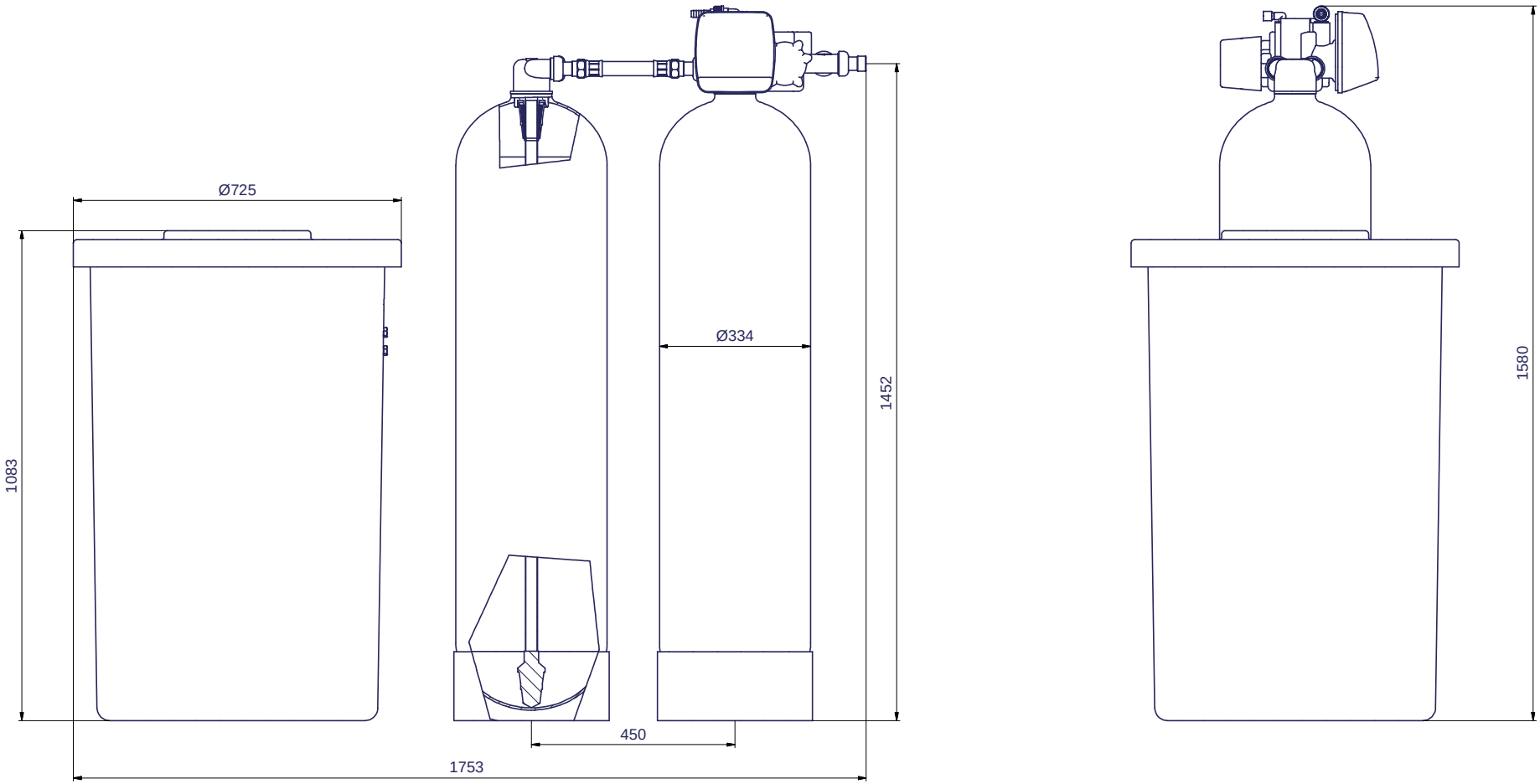
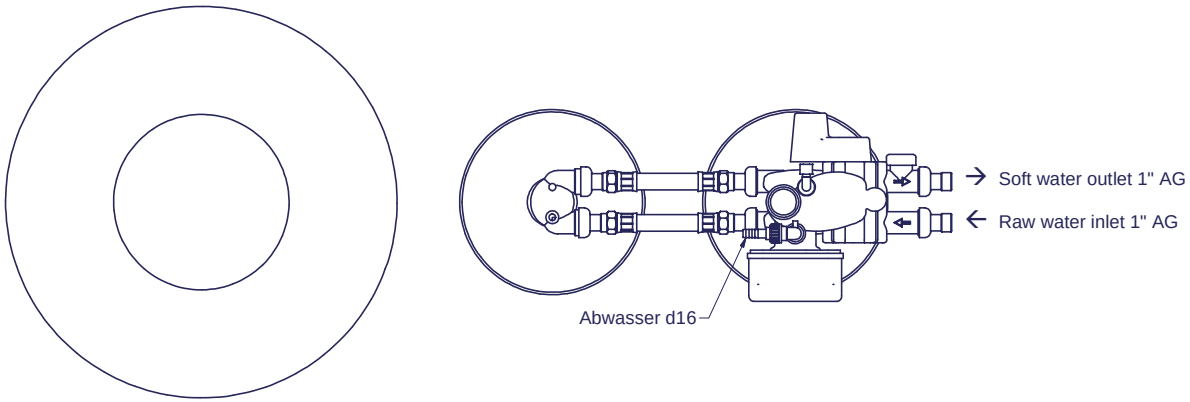
				Werkstoff, Halbzeug Rohteil-Nr. Modell-oder Gesenk-Nr.	
			Datum / Name Bearb. 15.01.2015 eng Gepr. 15.01.2015 eng Norm.	ECOTROL TWIN 200 Doppelenthärter	
A	überarbeitet	29.04.2015 eng		00360542-11000	Blatt 1
Rev.	Änderung	Datum Name	Ursprung 00360542-11000	Ersatz für	Ersetzt durch A2





			Allgemein-Toleranzen DIN ISO 768 - mK	Maßstab 1 : 7	(Gewicht) 0,00 kg
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			Datum / Name Bearb. 15.01.2015 eng Gepr. 15.01.2015 eng Norm.	ECOTROL TWIN 320 Doppelenthärter	
A	überarbeitet	29.04.2015 eng		00360543-11000	Blatt 1
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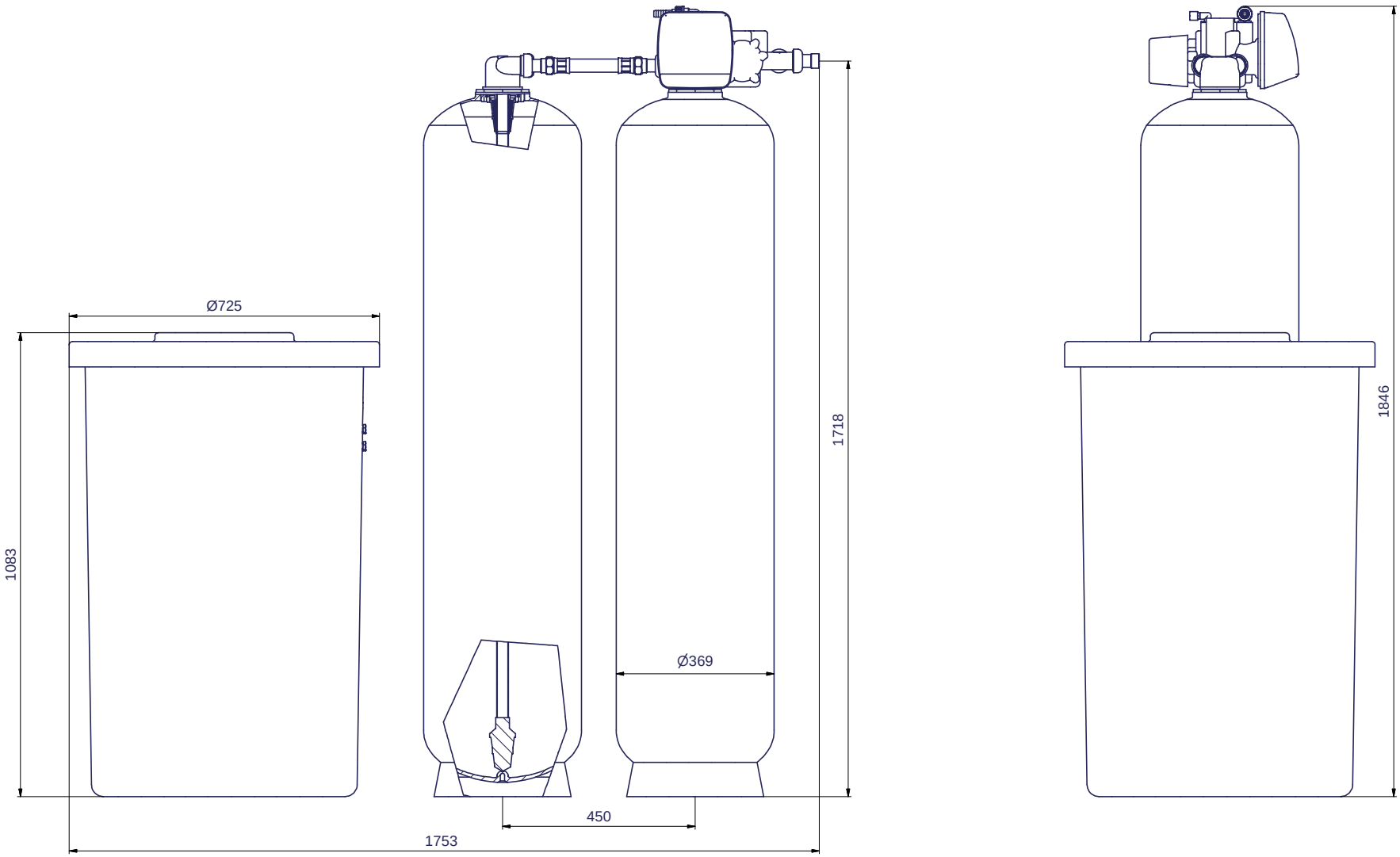
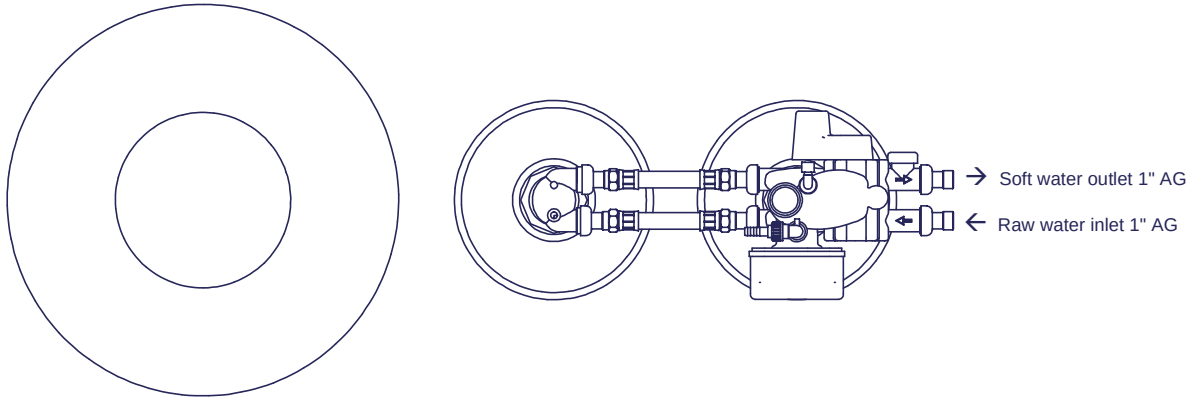
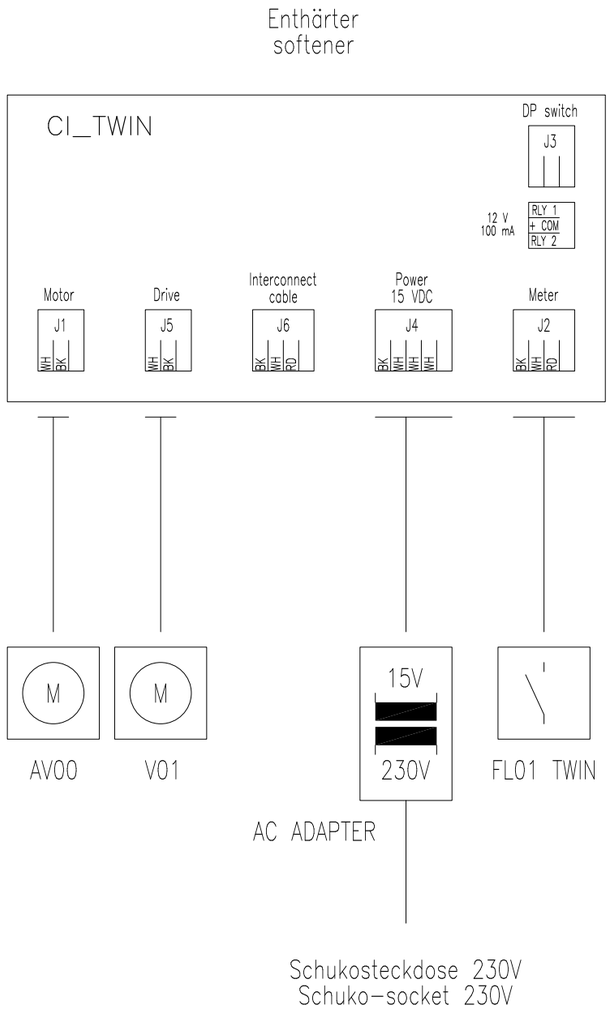




			Allgemein-Toleranzen DIN ISO 768 - mK		Maßstab 1 : 7 (Gewicht) 0,00 kg
					Werkstoff, Halbzeug Rohteil-Nr. Modell-oder Gesenk-Nr.
				Datum / Name	ECOTROL TWIN 400
			Bearb.	15.01.2015 rei	Doppelenthärter
			Gepr.	16.01.2015 eng	
			Norm.		
					00360544-11000 — Blatt 1 — A2
A	überarbeitet	29.04.2015	eng		
Rev.	Änderung	Datum	Name	Ursprung 00360544-11000	Ersatz für / Ersetzt durch



	Revision	Datum	Name		Datum	Name
a				gez.	28.01.20	Lei
b						
c				gepr.	28.01.20	Goe
d						

Projektbez.
Ecotrol TWIN 60 – 400

Auftragsnr.

Zeichnungsnr.
366049-01001

Blatt 1
1 Bl.

Programming Control Valve

1 Programming the controller

1.1 OEM Cycle Sequence

1.1.1 Step 1CS

☞ Press the "NEXT" and the ▽ button simultaneously for 3 seconds.

☞ Press the "NEXT" and the ▽ button simultaneously for 3 seconds again.

Press the "NEXT" button to go the following step. Press the "REGEN" buttons to return to the preceding step.

1.1.2 Step 2CS

☞ Choose the **valve type** using the △▽ buttons for TWIN-Valve 1.0 Γ

1.1.3 Step 3CS (not displayed)

☞ Choose the **water meter type** using the △▽ buttons.

1.1.4 Step 4CS

☞after selection of valve 1.0 Γ in step 2CS set pre-rinsing time (1-20 min) for pressure tank that is going into operation; recommended standard setting “offRINSE”

1.1.5 Step 5CS

This step is only available, if "OFF" has been chosen in step 3CS or step 3CS is not being displayed. It allows, for example, having a regeneration initiated by differential pressure (for filtration units); recommended standard setting “dPoff”

1.1.6 Step 6CS

☞ Set the hardness unit to "dH" using the △▽ buttons.

1.1.7 Step 7CS

☞ Choose 1 "BACKWASH" using the △▽ buttons.

1.1.8 Step 8CS

☞ Choose 2 "dn BRINE" using the △▽ buttons.

1.1.9 Step 9CS

☞ Choose 3 "RINSE" using the △▽ buttons.

1.1.10 Step 10CS

☞ Choose 4 "FILL" using the △▽ buttons.

1.1.11 Step 11CS

☞ Choose 5 "END" using the △▽ buttons.

1.1.12 Step 12CS

☞ Choose "off" using the △▽ buttons.

1.2 OEM Softener System Setup

1.2.1 Step 1S

☞ Press the "NEXT" and the ▽ buttons simultaneously for 3 seconds.

Press the "NEXT" button to go the following step. Press the "REGEN" button to return to the preceding step.

1.2.2 Step 2S

☞ Choose "SOFTENING" using the △▽ buttons.

1.2.3 Step 3S

☞ Set the backwash time using the △▽ buttons.

1.2.4 Step 4S

☞ Set the brine draw/slow rinse time using the △▽ buttons.

1.2.5 Step 5S

☞ Set the fast rinse time using the △▽ buttons.

1.2.6 Step 6S

☞ Set the salt amount in kg using the △▽ buttons. (Caution: The setting does not indicate the real salt consumption in kg. This depends on the flow control. Determine value experimentally!)

1.2.7 Step 7S

☞ Set the system capacity using the △▽ buttons.

It is recommended to set max. resin capacity including a correction factor, since max. resin capacity is a theoretical value and thus above the actually usable capacity. The correction factor is 0.8. The actually usable value is subject to the influence of local conditions at the place of installation.

example for systems capacity setting ECOTROL TWIN 200:

theoretical units capacity	x	factor 0,8
200	x	0,8

= **160**

See also tabular overview for further settings.

1.2.8 Step 8S

☞ Choose "AUTO" using the △▽ buttons.
The capacity will be calculated depending on the hardness unit set.

1.2.9 Step 9S

☞ Choose "on 0" using the △▽ buttons.

1.2.10 Step 10S

☞ Choose "oFF" using the △▽ buttons. Step 11S and 12S not eligible, if 10S=oFF

1.2.11 Step 13S

☞ Choose "oFF" using the △▽ buttons. Step 14S and 15S not eligible, if 13S=oFF

1.2.12 Step 16S

☞ Choose "oFF" using the △▽ buttons.

1.3 Installer Display Settings

1.3.1 Step 1I

☞ Press the "NEXT" and the △ button simultaneously for 3 seconds.

1.3.2 Step 2I:

☞ Set the feed-water hardness using the △▽ buttons.

1.3.3 Step 3I

☞ Set the blending water hardness using the △▽ buttons (if a blending valve is used).

1.3.4 Step 4I

☞ Set the forced regeneration interval (no. of days between two regenerations) using the △▽ buttons.

1.3.5 Step 5I

☞ Display shows “Regen on 0”, if “on 0” has been set in step 9S.

1.3.6 Step 6I

☞ Not displayed, if “on 0” has been set in step 9S.

1.4 User display setting

1.4.1 Step 1U

☞ Press "SET CLOCK" button.

1.4.2 Step 2U

☞ Set the current time (hours) using the △▽ buttons.

☞ Press the "SET CLOCK" button to complete this step.

1.4.3 Step 3U

☞ Set the current time (minutes) using the △▽ buttons.

☞ Press the "SET CLOCK" key to complete this step.

2 Tabular overview of the factory settings

Step	Designation	Factory settings	60	120	200	320	400
1CS	Access menu		Press "NEXT" and ▽ (Down) button simultaneously for 3 seconds **twice in a row**				
2CS	Select valve type	1.0	1.0 **r**	1.0 **r**	1.0 **r**	1.0 **r**	1.0 **r**
3CS	Select water meter type (only if 2.0 preselected)	-	-				
4CS	Tank A/B	ALT off	-				
	time pre-rinse	-	off RINSE				
5CS	External regeneration initiation	dPoff	dPoff				
6CS	Set hardness unit	ppm	dH				
7CS	Reg. step 1	BACKWASH	BACKWASH				
8CS	Reg. step 2	dn BRINE	dn BRINE				
9CS	Reg. step 3	BACKWASH	RINSE				
10CS	Reg. step 4	RINSE	FILL				
11CS	Reg. step 5	FILL	END				
12CS	Lodc	off	off				
1S	Access menu		Press "NEXT" and ▽ (Down) button simultaneously for 3 seconds				
2S	Select unit type	SOFTENING	SOFTENING				
3S	Backwash time (BACKWASH)	8 min	5 min	5 min	8 min	8 min	8 min
4S	Brine draw/slow rinse (dn BRINE)	60 min	63 min	49 min	76 min	61 min	62 min
5S	Fast rinse (RINSE)	8 min	10 min	11 min	16 min	16 min	15 min
6S	Fill time brine tank in kg of salt	kg 4.25	kg 4.0	kg 12	kg 15	kg 17.55	kg 21
7S	Unit capacity	d 80	d 48	d 96	d 160	d 256	d 320
8S	Capacity calculation	Regen AUTO	Regen AUTO				
9S	Initiation of regeneration	Regen Normal	Regen on 0				
10S	Relais 1 active	oFF	oFF				
11S	Relais 1 active time/liter (not eligible, if 10S=oFF)	-	-				
12S	Relais 1 inaktive Zeit (not eligible, if 10S=oFF)	-	-				
13S	Relais 2 active	oFF	oFF				
14S	Relais 2 active time/liter (not eligible, if 13S=off)	-	-				
15S	Relais 2 inaktive Zeit (not eligible, if 13S=off)	-	-				
16S	Salt alarm	oFF	oFF				

1I	Access menu		Press "NEXT" and △ (Up) button simultaneously for 3 seconds
2I	hardness setting 1	340 ppm / dH18	dH 20
3I	hardness setting 2 set blending water	dH 0	dH 0
4I	Forced regeneration (days)	14	7
5I	Forced regeneration (time hh)	**2**:00 / Regen on 0	Regen on 0
6I	Forced regeneration (time min)	2:**00**	Not displayed
1U	Access menu		Press "SET CLOCK" button
2U	Time hh		Set current time (hours)
3U	Time min		Set current time (minutes)

Reset of parameters to factory settings:

☞ Press buttons "NEXT" and ▽ (Down) simultaneously for 3 seconds and afterwards press buttons △ (Up) and ▽ (Down) simultaneously for 3 seconds

All parameters will be reset irreversibly.

For detailed information, please refer to the control manual in the appendix.

Water Specialist CI
Control Valve
Programming and Cover Drawing Manual

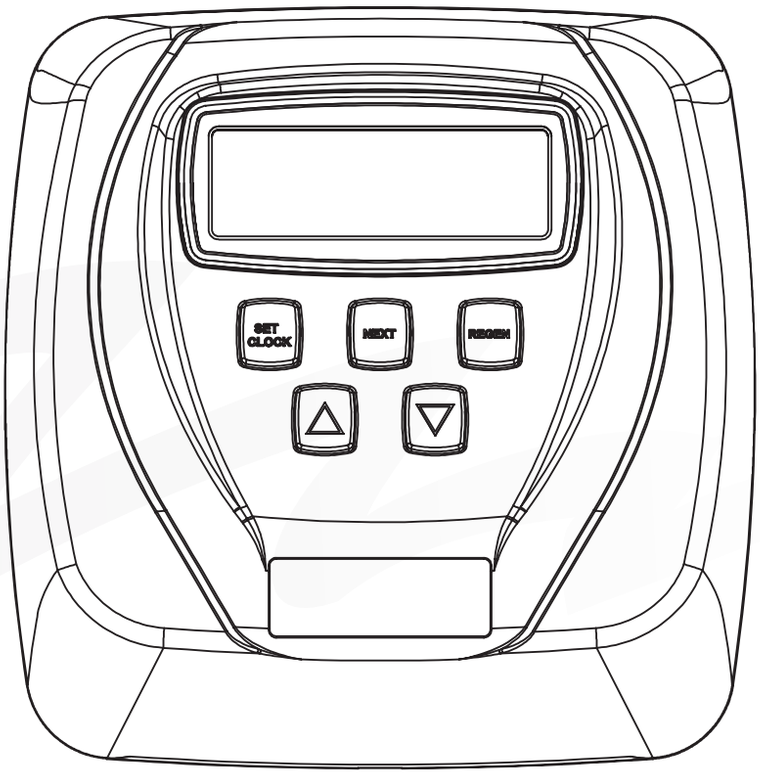


Table of Contents

CI Front Cover and Drive Assembly

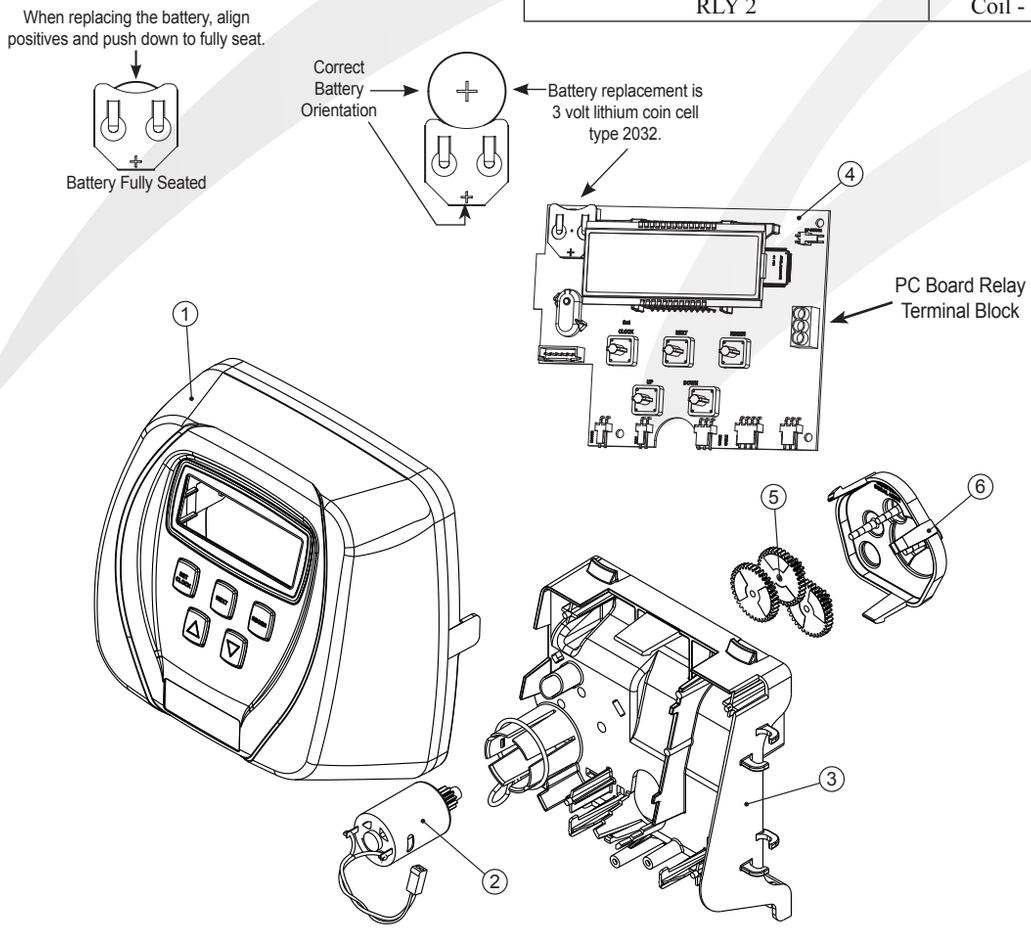
Drawing No.	Order No.	Description	Quantity
1	V3175CI-01	WS1CI FRONT COVER ASSEMBLY	1
2	V3107-01	WS1 MOTOR	1
3	V3106-01	WS1 DRIVE BRACKET & SPRING CLIP	1
4	V3108CI-06BOARD	WS1 THRU 2 CI PCB XMEGA REPL	1
5	V3110	WS1 DRIVE REDUCING GEAR 12X36	3
6	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3186	WS1 AC ADAPTER 120V-12V	1
	V3186EU	WS1 AC ADAPTER 220-240V-12V EU	
	V3186UK	WS1 AC ADAPTER 220-240V-12V UK	
	V3186-01	WS1 AC ADAPTER CORD ONLY	
Not Shown	V3178	WS1 DRIVE BACKPLATE	1

AC Adapter	U.S.	International
Supply Voltage	120 V AC	230V AC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 V AC	12 V AC
Output Current	500 mA	500 mA

Relay Driver Output Type – Dual Solid-State 12VDC “wet” contacts - N.O.
Relay Driver Output Capacity - 12VDC @100mA per relay output (total current through both outputs not to exceed 200mA).

NOTE: Check for proper mounting dimensions on valve backplate prior to mounting an external relay under control cover

Wiring for Correct On/Off Operation	
PC Board Relay Terminal Block	Relay
RLY 1	Coil -
+ COM	Coil +
RLY 2	Coil -



OEM General Instructions

The control valve offers multiple procedures that allow the valve to be modified to suit the needs of the installation. These procedures are:

- OEM Cycle Sequence
- OEM Softener System Setup
- OEM Filter System Setup
- Installer Display Settings
- User Display Settings
- Diagnostics
- Valve History

Once the OEM Cycle Sequence has been set, the other procedures can be accessed in any order. Details on each of the procedures are provided on the following pages.

To "lock out" access to diagnostic and valve history displays and modifications to settings except hardness, day override, time of regeneration and time of day by anyone but the manufacturer, press ▼, NEXT, ▲, and SET CLOCK in sequence after settings are made. To "unlock", so other displays can be viewed and changes can be made, press ▼, NEXT, ▲, and SET CLOCK in sequence.

When in operation normal user displays such as time of day, volume remaining before regeneration, present flow rate or days remaining before regeneration are shown. When stepping through a procedure, if no buttons are pressed within five minutes, the display returns to a normal user display. Any changes made prior to the five minute time out are incorporated.

To quickly exit OEM Softener Setup, OEM Filter Setup, Installer Display Settings, Diagnostics or Valve History press SET CLOCK. Any changes made prior to the exit are incorporated.

When desired, all programming and all information in Diagnostics may be reset to defaults when the valve is installed in a new location. To reset to defaults, press NEXT and ▼ simultaneously to go to the Softening/Filtering screen. Press ▲ and ▼ simultaneously to reset diagnostic values and all programming to defaults. Screen will return to User Display.

Sometimes it is desirable to have the valve initiate and complete two regenerations within 24 hours and then return to the preset regeneration procedure. It is possible to do a double regeneration if the control valve is set to "NORMAL" or "NORMAL + on 0" in OEM Softener System Setup or OEM Filter System Setup. To do a double regeneration:

1. Press the REGEN button once. REGEN TODAY will flash on the display.
2. Press and hold the REGEN button for three seconds until the valve regeneration initiates.

Once the valve has completed the immediate regeneration, the valve will regenerate one more time at the preset regeneration time.

For Valve Type 1.0Γ, press and hold SET CLOCK and ▲ for about 3 seconds to initiate an exchange of the tank in Service without cycling the regeneration valve. After tank switch, days remaining and capacity remaining status is retained for each tank until the next regeneration.

Prior to selecting the upflow regeneration cycle, verify that the correct body, main piston, regenerant piston and stack are being used, and that the injector plug(s) are in the correct location. Refer to the Service Manual for drawings and part numbers.

OEM Cycle Sequence

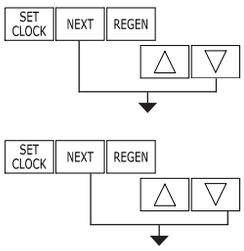
OEM Cycle Sequence instructions allows the OEM to set the order of the cycle. The OEM Softener System Setup or the OEM Filter System Setup allow the OEM to set how long cycles will last. The OEM may choose up to 9 cycles in any order.

Cycle Options			
BACKWASH	DN BRINE	FILL	**END**
RINSE	UP BRINE	SOFTENING OR FILTERING	

END must be used as the last cycle option. The SERVICE cycle should only be used in brine prefill applications.

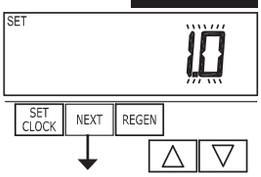
The following is an example of how to set a valve so that when regeneration is initiated BACKWASH occurs first, dn BRINE occurs second, RINSE occurs third, and FILL occurs fourth.

STEP 1CS



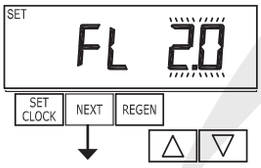
Step 1CS – Press NEXT and ▼ simultaneously for 3 seconds and release. Then press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2CS does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release. Then press NEXT and ▼ simultaneously for 3 seconds and release.

STEP 2CS



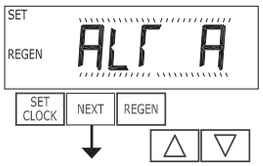
Step 2CS – Use ▲ or ▼ to select 1.0 for WS1 valve, 1.25 for WS1.25 valve, 1.5 for WS1.5 valve, 2.0 for WS2 or 1.0Γ for a twin valve.

STEP 3CS



Step 3CS – When 1.5 or 2.0 is selected, an additional screen will appear. It is used to select which size flow meter is to be used with the valve, 1.5", 2.0" or 3.0". Variable meter pulses of 0.1-150.0 PPL can also be selected. Press NEXT to go to Step 4CS. Press REGEN to return to previous step.

STEP 4CS



Step 4CS – Allows selection of one of the following using ▲ or ▼:
- the Control Valve to have no hard water bypass;
- the Control Valve to act as an alternator; or
- the Control Valve to have a separate source during the regeneration cycle; or
- the Control Valve to operate with the Clack System Controller.

Select OFF when none of these features are used.

This display will not appear if 1.0 Γ was selected in Step 2CS.

Only use Clack No Hard Water Bypass Valves or Clack Motorized Alternating Valves (MAV) with these selections. Clack No Hard Water Bypass Valves (1" or 1.25" V3070FF or V3070FM) are not designed to be used with the alternator or separate source functions.

Configuring the Control Valve for No Hard Water Bypass Operation:

Select nHbP for control operation. For no hard water bypass operation the three wire communication connector is not used.

Selection requires that a connection to MAV or a Clack No Hard Water Bypass Valve is made to the two pin connector labeled MAV located on the printed circuit board. If using a MAV, the A port of the MAV must be plugged and the valve outlet connected to the B port. When set to nHbP the MAV will be driven closed before the first regeneration cycle that is not FILL or SOFTENING or FILTERING, and be driven open after the last regeneration cycle that is not FILL.

NOTE: If the control valve enters into an error state during regeneration mode, the no hard water bypass valve will remain in its current state until the error is corrected and reset.

Configuring the Control Valve for Separate Source Operation:

Select SEPS for control operation. For separate source operation the three wire communication connector is not used.

Selection requires that a connection to a Clack Motorized Alternator Valve (MAV) is made to the two pin connector labeled MAV located on the printed circuit board. The C port of the MAV must be connected to the valve inlet and the A port connected to the separate source used during regeneration. The B port must be connected to the feed water supply.

When set to SEPS the MAV will be driven closed before the first regeneration cycle, and be driven open after the last regeneration cycle.

NOTE: If the control valve enters into an error state during regeneration mode, the MAV will remain in its current state until the error is corrected and reset.

Selecting the Control Valve to act as an alternator:
Software Rev Level 320.0 and higher = Use 3-wire Interconnect Cable for all communication between units.
Software Rev Level 319.5 and lower = Use 2-wire Interconnect Cables for twin alternators with independent flow meters.

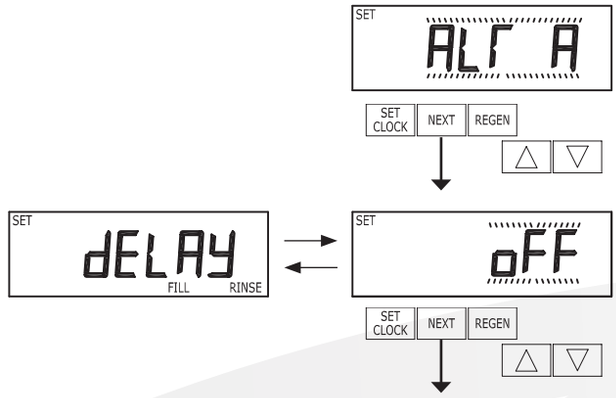
Prior to starting the programming steps, connect the interconnect cable to each control valve board's three pin connector labeled 'COMM CABLE'. Also connect the meter cord to either control valve to the three pin connector labeled 'METER'.			
		Softener Valve Programming Steps	
OEM Cycle Sequence	Step 4CS	Set to ALT A Connect ALT A valve to the MAV's A port and connect the MAV's two pin wire connector to the two pin connector labeled "DRIVE" on the ALT A valve	Set to ALT b Connect ALT b valve to the MAV's B port. No connections between the ALT b valve and the MAV are made.
Softener System Setup	Step 7S	Set Volume Capacity	Set Volume Capacity
Softener System Setup	Step 8S	Set to 'AUTO'	Set to 'AUTO'
Softener System Setup	Step 9S	Set regeneration time option to 'on 0'.	Set regeneration time option to 'on 0'.
Installer Display Setting	Step 4I	Set Day Over ride to "oFF"	Set Day Over ride to "oFF"

If set up for a filter, in Step 7F set Volume Capacity in M^3; in Step 8F select Regeneration Time Option “on 0”; and in Step 4I select Day Override “oFF”.

NOTE: If the control valve is in an error state during regeneration mode the MAV will close the B port and keep open the A port until the error is corrected and reset.

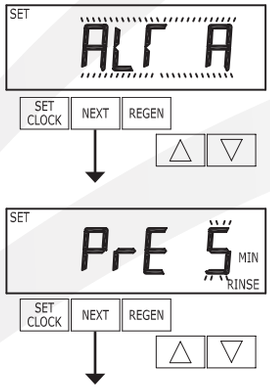
For Clack Corporation alternator systems using **WS1, WS1.25 and WS1.5** valves there will be an option to delay the last two cycles of regeneration (only “Rinse” and “Fill”). This feature splits the regeneration into two portions. The first portion of the regeneration will start immediately and all programmed cycles before the “Rinse” and “Fill” cycles will be performed. After all programmed cycles before “Rinse” and “Fill” are completed the control valve will drive to the service position (displaying “Delayed Rinse + Fill Pending”). When the volume of the on-line unit is depleted to 10% of its programmed capacity, the control valve will be triggered to finish the second portion of the regeneration. Once “Rinse” and “Fill” are completed, the valve will re-enter Standby mode until requested to come on-line for Service.

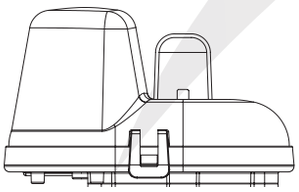
WS1, WS1.25 and WS1.5 Valves



For Clack Corporation alternator systems using the **WS2** valve, when NEXT is pressed after selecting ALT A or ALT b, a display will allow the user to set the amount of pre-service rinse time for the stand by tank just prior to returning to service. With 1.0Γ set, this same display appears and is set in a similar manner.

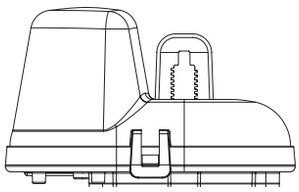
WS2 Valve





Retracted

Valve “A” in Service Position = MAV piston rod Retracted



Extended

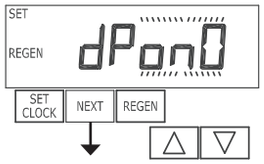
Valve “B” in Service Position = MAV piston rod Extended

Note: Clack Twin Alternator Operations

- Twin alternating systems can be programmed with a day override setting combined with the normal volume-based regeneration programming. A twin alternating system in this configuration will then regenerate based on the volume used or the day override if there is a period of low water usage.
- Twin alternating systems can be programmed as a time clock only based regenerating system. In this configuration, the days remaining are counted only on the unit that is in service. The unit in Stand-by Mode only notes days in diagnostics, which results in time clock only twin regeneration initiation.
- Twin alternating systems can be programmed for a delayed regeneration time. The system will allow an immediate transfer of the MAV to switch tanks and place a fully regenerated unit in service once a unit becomes exhausted. The exhausted unit will then be placed into Stand-by Mode and allowed to have a delayed regeneration at the pre-set time.

<u>Configuring the Control Valve to operate with Clack System Controller:</u>
Select SYS to link the Control Valve to the Clack System Controller. For communication between the Control Valve and the System Controller, a three-wire communication cable is required.
Press NEXT to go to Step 5CS. Press REGEN to return to previous step.

STEP 5CS



Step 5CS – Allows selection of one of the following using ▲ or ▼:
- an outside signal to initiate a regeneration;
- an outside signal to prevent or delay regeneration.

Selection only matters if a connection is made to the two pin connector labeled DP SWITCH located on the printed circuit board. Following is an explanation of the options:

OFF - Feature not used.

NOTE: In a twin alternating system each control must have a separate dP signal or dP switch. One dP signal or one dP switch cannot be used for both controls.

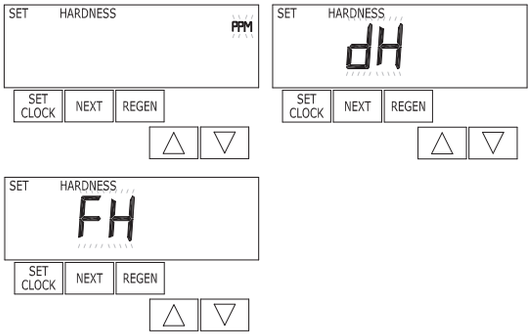
dPon0 – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will be signaled to the unit. In a twin alternating system the MAV will transition first to switch units so that the signaled unit can start regeneration. After the MAV has fully transitioned, the regeneration begins immediately. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “dPon0” is set, the Delayed Rinse and Fill feature is not available.

dPdEL – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will occur at the scheduled delayed regeneration time. In a twin alternating system, once the dP switch is triggered the PC board will display REGEN TODAY and switch tanks immediately. At the Delayed Regeneration Time, the triggered unit will then regenerate. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “dPdEL” is set, the Delayed Rinse and Fill feature is not available.

HoLd – If the dP switch is closed a regeneration will be prevented from occurring while there is switch closure. In a twin alternating system the regeneration of a unit can be prevented upon switch closure. If the unit depletes the capacity down to zero, it will not be allowed to switch tanks to regenerate until the switch is open. Note: For WS1 – WS1.5 control valves programmed for twin alternating the Delayed Rinse and Fill feature can be set in conjunction with the “HoLd” if desired.

Press NEXT to go to Step 6CS. Press REGEN to return to previous step.

STEP 6CS

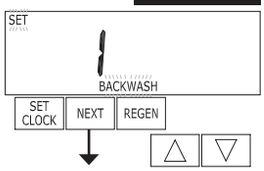


Step 6CS – Determine the measurement to calculate volumetric capacity. The choices are:

ppm parts per million
FH French degrees
dH German degrees

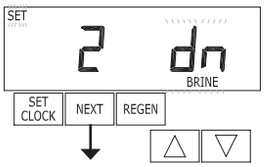
NOTE: If control is going to be used in a filter application none of these settings can be used.
Press NEXT to go to Step 7CS. Press REGEN to return to previous step.

STEP 7CS



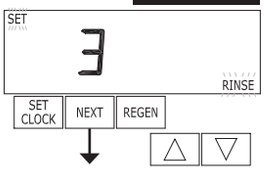
Step 7CS – Press ▲ or ▼ until BACKWASH appears. Press NEXT to go to Step 8CS. Press REGEN to return to previous step.

STEP 8CS



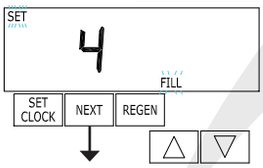
Step 8CS - Press ▲ or ▼ until BRINE appears. NOTE: Prior to selecting the upflow regeneration cycle, verify that the correct body, main piston, regenerant piston and stack are being used, and that the injector plug(s) are in the correct location. Refer to the Service Manual for drawings and part numbers. Press NEXT to go to Step 9CS. Press REGEN to return to previous step.

STEP 9CS



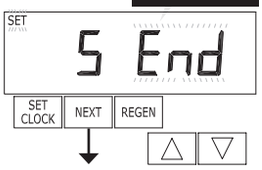
Step 9CS - Press ▲ or ▼ until RINSE appears. Press NEXT to go to Step 10CS. Press REGEN to return to previous step.

STEP 10CS



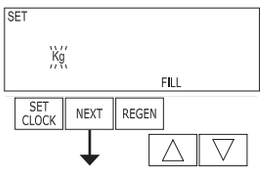
Step 10CS - Press ▲ or ▼ until FILL appears. Press NEXT to go to Step 11CS. Press REGEN to return to previous step.

STEP 11CS



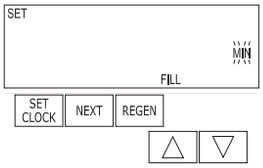
Step 11CS - Press ▲ or ▼ until END appears. Press NEXT to go to Step 12CS. Press REGEN to return to previous step.

STEP 12CS



RETURN TO NORMAL MODE

Step 12CS - Fill Units: If set as a softener, if Step 2CS is set to 1.5, and FILL is part of the Regeneration Cycle Sequence, FILL UNITS of MIN or kg can be selected. Press NEXT to exit OEM Cycle Sequence. Press REGEN to return to previous step.



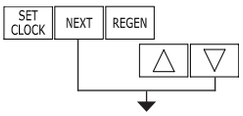
OEM Softener System Setup

In OEM Softener System Setup the OEM chooses the time for the cycles selected in OEM Cycle Sequence and specifies other operating parameters for the system. The upper and lower limits of the allowable values for the cycles are as follows:

Cycle Options	Units	Lower/Upper Limit
Backwash	Minutes	1 to 120
Rinse (fast)	Minutes	1 to 120
dn Brine (combination of brining and slow rinse)	Minutes	1 to 180
up Brine (combination of brining and slow rinse)	Minutes	1 to 180
Fill for 1”, 1.25”, 1.5”and 2.0L	kg	0.05 to 90.00
Fill for WS2 valves or WS1.5 set to MIN	Minutes	0.1 to 99.0
Service	Minutes	1 to 480

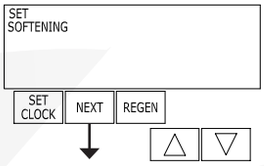
Since no time is associated with the END cycle, the END cycle will not appear in the OEM Softener System Setup sequence.

STEP 1S



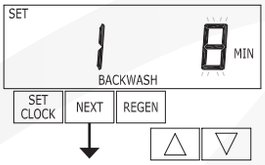
Step 1S – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2S does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

STEP 2S



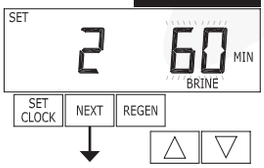
Step 2S – Choose SOFTENING using ▲ or ▼. Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

STEP 3S



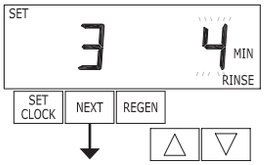
Step 3S – Select the time for the first cycle (which in this example is BACKWASH) using ▲ or ▼. Press NEXT to go to Step 4S. Press REGEN to return to previous step.

STEP 4S



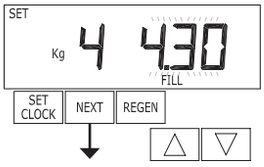
Step 4S – Select the time for the second cycle (which in this example is dn BRINE) using ▲ or ▼. Press NEXT to go to Step 5S. Press REGEN to return to previous step.
NOTE: The display will flash between cycle number and time, and brine direction (dn).

STEP 5S



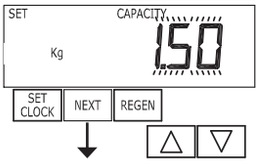
Step 5S – Select the time for the third cycle (which in this example is RINSE) using ▲ or ▼. Press NEXT to go to Step 6S. Press REGEN to return to previous step.

STEP 6S



Step 6S – Select the kg or MIN for the fourth cycle (which in this example is FILL) using ▲ or ▼. When both 2.0 and 2.0L are options in Step 2CS, and 2.0 is selected, or MIN is selected in Step 12CS, FILL is in minutes. WS2 valves are shipped from the factory with a refill flow contol of 2.2 gpm (8.3 lpm). Press NEXT to go to Step 7S. Press REGEN to return to previous step.

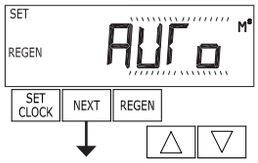
STEP 7S



Step 7S – Set System Capacity using ▲ or ▼. See chart. The System Capacity setting should be based on the volume of resin and Kg of salt fill set in Step 6S. When using ppm, dH, or FH the system capacity and hardness levels entered are used to determine the Volume Capacity. Press NEXT to go to Step 8S. Press REGEN to return to previous step.

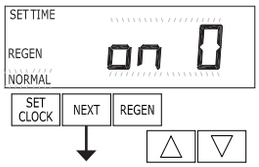
Setting	Units
PPM	Kg of $CaCO_3$
dH or FH	M^3

STEP 8S



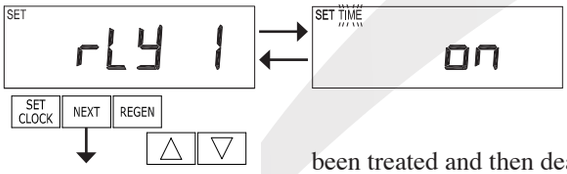
Step 8S – Set Volume Capacity using ▲ or ▼. If value is set to:
• AUTO capacity will be automatically calculated and reserve capacity will be automatically estimated;
• oFF regeneration will be based solely on the day override set (see Installer Display/Settings Step 4I);
• a number, regeneration initiation will be based on the value specified (in M^3); or
If oFF or a number is used, hardness display will not be allowed to be set in Installer Display Settings Step 2I & 3I. See Setting Options Table for more detail. Press NEXT to go to Step 9S. Press REGEN to return to previous step.

STEP 9S



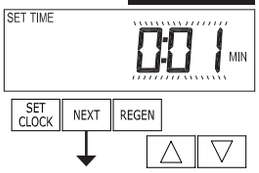
Step 9S – Set Regeneration Time Options using ▲ or ▼. If value is set to:
• NORMAL means regeneration will occur at the preset time;
• on 0 means regeneration will occur immediately when the volume capacity reaches 0 (zero); or
• NORMAL + on 0 means regeneration will occur at one of the following:
— the preset time when the volume capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first; or
— immediately after 10 minutes of no water usage when the volume capacity reaches 0 (zero).
NORMAL is the default if Step 4CS is set to ALT A or ALT b, and NORMAL + on 0 is not available. On 0 is the default if Step 2CS is set to 1.0 Γ, and NORMAL + on 0 is not available.
This step will not appear if Step 8S is set to off or Step 4CS is set to SYS.
See Setting Options Table for more detail. Press NEXT to go to Step 10S. Press REGEN to return to previous step.

STEP 10S



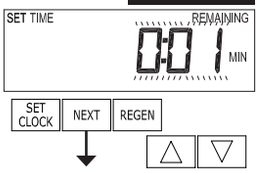
Step 10S – Set Relay 1 operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration cycle and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine/Up brine cycle, whichever comes first.
• Set L Softening on: Relay activates after a set number of liters has been treated and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set L Softening Regen on: Relay activates after a set number of liters have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set Off: If set to Off, Steps 11S and 12S will not be shown.
Press NEXT to go to Step 11S. Press REGEN to return to previous step.

STEP 11S



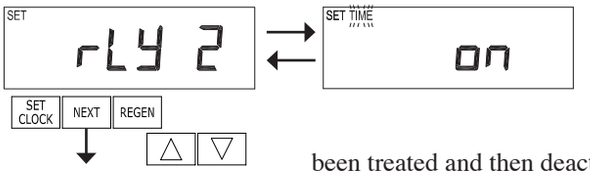
Step 11S – Set Relay 1 Actuation Time or Liters using ▲ or ▼. The choices are:
• Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first. Ranges from 1 second to 200 minutes.
• Relay Actuation Liters: Relay activates after a set number of Liters has passed through the meter when the valve is in the Service mode. Ranges from 1 to 200 Liters.
Press NEXT to go to Step 12S. Press REGEN to return to previous step.

STEP 12S



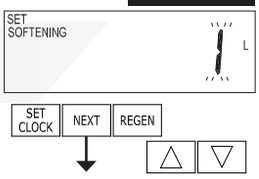
Step 12S – Set Relay 1 Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 10S the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set L on or Set L Softening Regen on is selected in Step 10S the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.
Press NEXT to go to Step 13S. Press REGEN to return to previous step.

STEP 13S



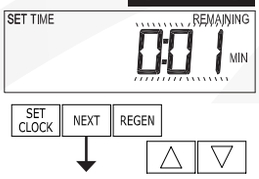
Step 13S – Set Relay 2 operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration cycle and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first.
• Set L Softening on: Relay activates after a set number of liters has been treated and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set L Softening Regen on: Relay activates after a set number of liters have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Error: Relay closes whenever the control enters the Error Mode, and immediately deactivates when the error mode is exited.
• Set Off: If set to Off, Steps 14S and 15S will not be shown.
Press NEXT to go to Step 14S. Press REGEN to return to previous step.

STEP 14S



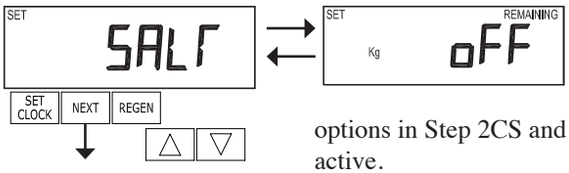
Step 14S – Set Relay 2 Actuation Time or Liters using ▲ or ▼. The choices are:
• Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle or Dn brine/Up brine cycle, whichever comes first. Ranges from 1 second to 200 minutes.
• Relay Actuation Liters: Relay activates after a set number of Liters has passed through the meter when the valve is in the Service mode. Ranges from 1 to 200 Liters.
Press NEXT to go to Step 15S. Press REGEN to return to previous step.

STEP 15S



Step 15S – Set Relay 2 Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 13S the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set L on or Set L Softening Regen on is selected in Step 13S the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.
Press NEXT to go to Step 16S. Press REGEN to return to previous step.

STEP 16S



RETURN TO NORMAL MODE

Step 16S – Set Low Salt Warning using ▲ or ▼. If value is set to:
• oFF, no low salt level warning will appear for the user; or
• a specific value, "FILL SALT" will flash on the display when the calculated remaining kg of salt falls below that level. Allowable values range from 5 to 400 Kg in 5 Kg increments. When both 2.0 and 2.0L are options in Step 2CS and 2.0 is selected, or MIN is selected in Step 12CS this step is skipped and not active.
Press NEXT to exit OEM Softener System Setup. Press REGEN to return to previous step.

Setting Options Table

Filters should only use shaded options

Volume Capacity	Regeneration Time Option	Day Override	Result[1]
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time.
AUTO	NORMAL	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached.
Any number	NORMAL	oFF	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0.
oFF	NORMAL	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached.
Any number	NORMAL	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0 or the specified number of days between regenerations is reached.
AUTO	on 0	oFF	Reserve capacity NOT automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur when volume capacity reaches 0.
Any number	on 0	oFF	Reserve capacity NOT automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur on 0.
AUTO	NORMAL on 0	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.
AUTO	NORMAL on 0	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.
Any number	NORMAL on 0	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.

[1] Reserve Capacity estimate is based on history of water usage. Reserve Capacity estimate is not available with alternator systems or Twin Tank Valve.

OEM Filter System Setup

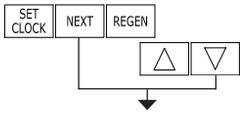
In OEM Filter System Setup the OEM chooses the time for the cycles selected in OEM Cycle Sequence and specifies other operating parameters for the system. The upper and lower limits of the allowable values for the cycles are as follows:

Cycle Options	Units	Lower/Upper Limit
Backwash	Minutes	1 to 120
Rinse (fast)	Minutes	1 to 120
dn Brine (combination of regenerant and slow rinse)	Minutes	1 to 180
Fill for all valves except WS2	Liters	0.2 to 76.00
Fill for WS2 Valves	Minutes	0.01 to 99.0
Service	Minutes	1 to 480

NOTE: Fill is in liters (except for WS2).

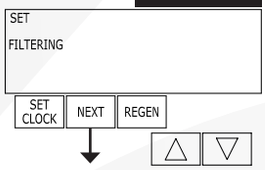
Since no time is associated with the END cycle, the END cycle will not appear in the OEM Filter System Setup sequence.

STEP 1F



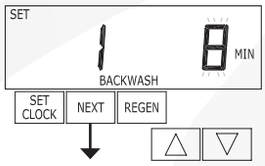
Step 1F – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2F does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

STEP 2F



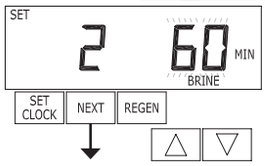
Step 2F – Choose FILTERING using ▲ or ▼. Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.

STEP 3F



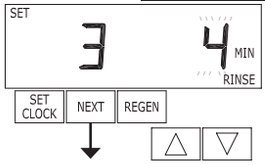
Step 3F – Select the time for the first cycle (which in this example is BACKWASH) using ▲ or ▼. Press NEXT to go to Step 4F. Press REGEN to return to previous step.

STEP 4F



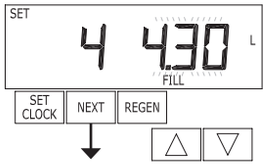
Step 4F – Select the time for the second cycle (which in this example is dn BRINE) using ▲ or ▼. Press NEXT to go to Step 5F. Press REGEN to return to previous step.
NOTE: The display will flash between cycle number and time, and brine direction (dn Brine).

STEP 5F



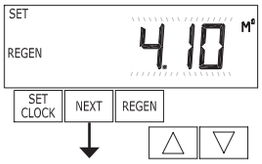
Step 5F – Select the time for the third cycle (which in this example is RINSE) using ▲ or ▼. Press NEXT to go to Step 6F. Press REGEN to return to previous step.

STEP 6F



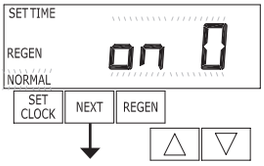
Step 6F – Select the volume in liters for the fourth cycle (which in this example is FILL) using ▲ or ▼. When both 2.0 and 2.0L are options in Step 2CS, and 2.0 is selected, FILL is in minutes. WS2 valves are shipped from the factory with a refill flow control of 2.2 gpm (8.3 lpm). Press NEXT to go to Step 7F. Press REGEN to return to previous step.

STEP 7F



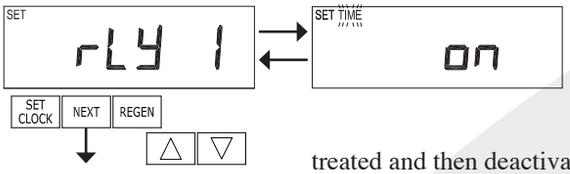
Step 7F – Set Volume Capacity using ▲ or ▼. If value is set to:
• oFF regeneration will be based solely on the day override set (see Installer Display/Settings Step 4I); or
• a number, regeneration initiation will be based off the value specified (in M^3).
See Setting Options Table for more detail. Press NEXT to go to Step 8F. Press REGEN to return to previous step.

STEP 8F



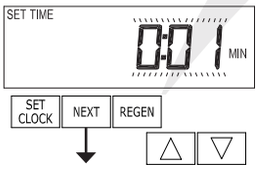
Step 8F – Set Regeneration Time Options using ▲ or ▼. If value is set to:
• NORMAL means regeneration will occur at the preset time;
• on 0 means regeneration will occur immediately when the volume capacity reaches 0 (zero); or
• NORMAL + on 0 means regeneration will occur at one of the following:
— the preset time when the volume capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first;
or
— immediately after 10 minutes of no water usage when the volume capacity reaches 0 (zero).
"NORMAL" is the default if Step 4CS is set to ALT A or ALT B, and "NORMAL + on 0" is not available.
On 0 is the default if Step 2CS is set to 1.0Γ, and NORMAL + on 0 is not available.
This step will not appear if Step 7F is set to "oFF".
See Setting Options Table for more detail. Press NEXT to go to Step 9F. Press REGEN to return to previous step.

STEP 9F



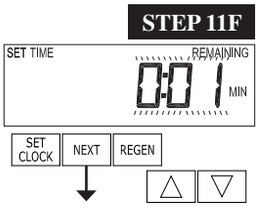
Step 9F – Set Relay 1 operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration cycle and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first.
• Set L Filtering on: Relay activates after a set number of liters has been treated and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set L Filtering Regen on: Relay activates after a set number of liters have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set Off: If set to Off, Steps 10F and 11F will not be shown.
Press NEXT to go to Step 10F. Press REGEN to return to previous step.

STEP 10F



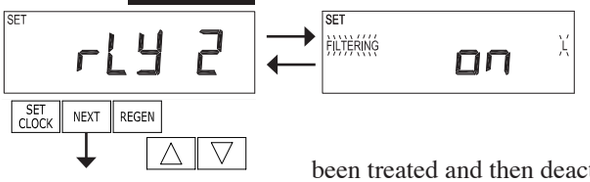
Step 10F – Set Relay 1 Actuation Time or Liters using ▲ or ▼. The choices are:
• Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first. Ranges from 1 second to 200 minutes.
• Relay Actuation Liters: Relay activates after a set number of Liters has passed through the meter when the valve is in the Service mode. Ranges from 1 to 200 Liters.
Press NEXT to go to Step 11F. Press REGEN to return to previous step.

STEP 11F



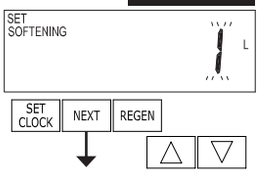
Step 11F – Set Relay 1 Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 10S the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set L on or Set L Filtering Regen on is selected in Step 9F the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.
Press NEXT to go to Step 12F. Press REGEN to return to previous step.

STEP 12F



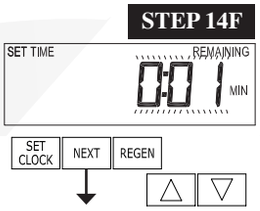
Step 12F – Set Relay 2 operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration cycle and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first.
• Set L Filtering on: Relay activates after a set number of liters has been treated and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Set L Filtering Regen on: Relay activates after a set number of liters have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.
• Error: Relay closes whenever the control enters the Error Mode, and immediately deactivates when the error mode is exited.
• Set Off: If set to Off, Steps 13F and 14F will not be shown.
Press NEXT to go to Step 13F. Press REGEN to return to previous step.

STEP 13F



Step 13F – Set Relay 2 Actuation Time or Liters using ▲ or ▼. The choices are:
• Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first. Ranges from 1 second to 200 minutes.
• Relay Actuation Liters: Relay activates after a set number of Liters has passed through the meter when the valve is in the Service mode. Ranges from 1 to 200 Liters.
Press NEXT to go to Step 14F. Press REGEN to return to previous step.

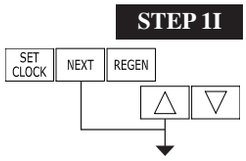
STEP 14F



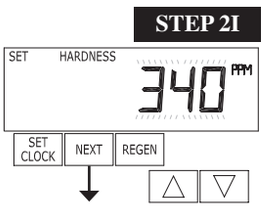
RETURN TO NORMAL MODE

Step 14F – Set Relay 2 Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 13S the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set L on or Set L Softening Regen on is selected in Step 13S the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.
Press NEXT to go to exit OEM Filter System Setup. Press REGEN to return to previous step.

Installer Display Settings

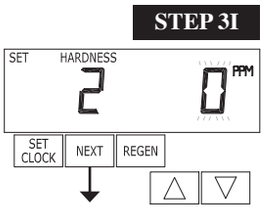


STEP 1I - Press NEXT and ▲ simultaneously for 3 seconds.

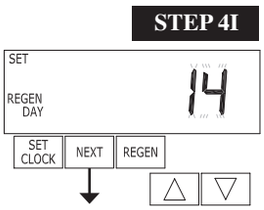


STEP 2I – Hardness: Set the amount of influent hardness using ▲ or ▼. This display will not be shown if FILTER is selected in Step 2F OR if oFF or a number was selected in Step 8S. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

Units Available
PPM
FH
dH



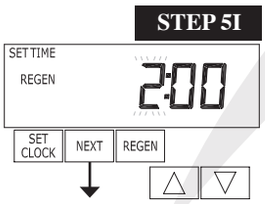
STEP 3I – Hardness 2: If using a mixing valve, set the amount of effluent hardness using ▲ or ▼. Range of available values may vary depending on system capacity selected and hardness selected in Step 2I. This display will not be shown if FILTER is selected in Step 2F OR oFF or a number was selected in Step 8S. Press NEXT to go to Step 4I. Press REGEN to return to previous step.



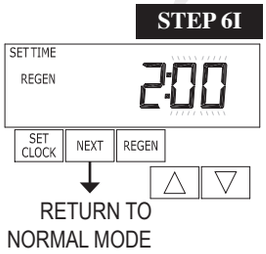
STEP 4I – Day Override: When volume capacity is set to oFF, sets the number of days between regenerations. When volume capacity is set to AUTO or to a number, sets the maximum number of days between regenerations. If value set to oFF, regeneration initiation is based solely on volume used. If value is set as a number (allowable range from 1 to 28) a regeneration initiation will be called for on that day even if sufficient volume of water were not used to call for a regeneration. Set Day Override using ▲ or ▼:

- number of days between regeneration (1 to 28); or
- oFF.

See Setting Options Table for more detail on setup. Press NEXT to go to step 5I. Press REGEN to return to previous step.



STEP 5I – Next Regeneration Time (hour): Set the hour of day for regeneration using ▲ or ▼ buttons. The default time is 2:00. This display will show "REGEN on 0 m^3" if "on 0" is selected in Set Regeneration Time Option in OEM Softener System Setup or OEM Filter System Setup. Press NEXT to go to step 6I. Press REGEN to return to previous step.



STEP 6I – Next Regeneration Time (minutes): Set the minutes of day for regeneration using ▲ or ▼. This display will not be shown if "on 0" is selected in Set Regeneration Time Option in OEM Softener System Setup or OEM Filter System Setup. Press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

To initiate a manual regeneration immediately, press and hold the REGEN button for three seconds. The system will begin to regenerate immediately. The control valve may be stepped through the various regeneration cycles by pressing the REGEN button.

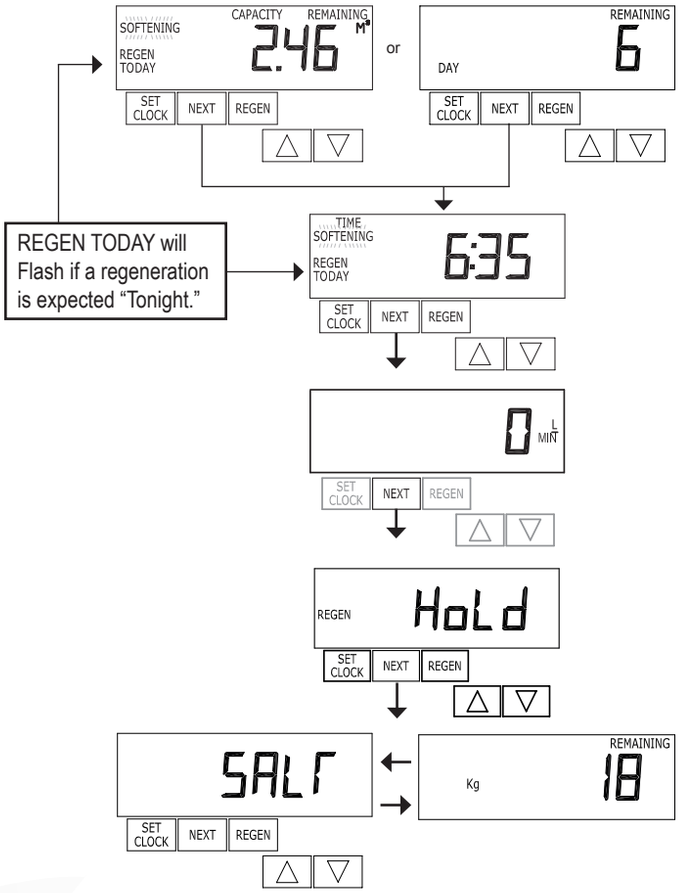
User Display Settings

General Operation

When the system is operating, one of five displays may be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day. The second display is one of the following: days remaining or volume remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the cubic meters that will be treated before the system goes through a regeneration cycle. The third display shows the current treated water flow rate through the system. If 1.0 Γ is selected in Step 2CS, an "A" in front of the flow rate indicates that the tank with the control valve on it is in service. If "b" is displayed, the tank with the in/out head is in service. The fourth display will show either dP or hold if the dP switch is closed. The fifth display shows the kg of salt remaining or flashes "SALT" fill when the calculated kg of salt falls below a safety level. The fifth display will not appear if the valve is a WS2, set up as a filter or if the Set Low Salt Warning is set to off (see last step in OEM Softener System Setup). The user can scroll between the displays as desired.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will appear on the display.

If a water meter is installed, the word "Softening" or "Filtering" flashes on the display when water is being treated (i.e. water is flowing through the system).



In Alternator Systems when a unit is waiting to initiate the first cycle step of regeneration, "REGEN Pndg" is displayed.

"STbY" is displayed in Alternator Systems when a valve is in Standby state.

"REGEN Pndg FILL RINSE" is displayed whenever a zero-capacity tank has transferred to an off-line state and is currently waiting to initiate the second portion of a regeneration cycle. Viewed only when Delayed Rinse and Fill is set to ON.

Regeneration Mode

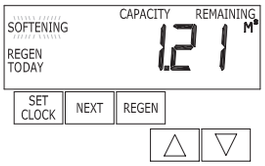
Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.

When the system begins to regenerate, the display will change to include information about the step of the regeneration process and the time remaining for that step to be completed. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.

Manual Regeneration

Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

REGEN TODAY will be displayed if a regeneration is expected "Tonight."



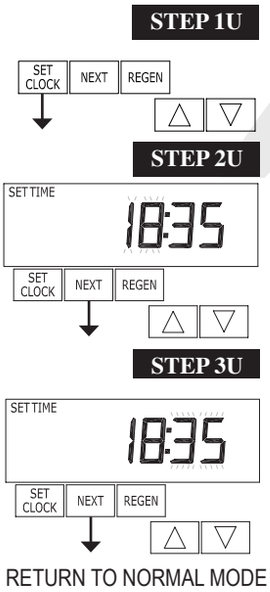
To initiate a manual regeneration at the preset delayed regeneration time, when the regeneration time option is set to "NORMAL" or "NORMAL + on 0", press and release "REGEN". The words "REGEN TODAY" will flash on the display to indicate that the system will regenerate at the preset delayed regeneration time. If you pressed the "REGEN" button in error, pressing the button again will cancel the request. Note: If the regeneration time option is set to "on 0" there is no set delayed regeneration time so "REGEN TODAY" will not activate if "REGEN" button is pressed.

To initiate a manual regeneration immediately, press and hold the "REGEN" button for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled.

Note: For softeners, if brine tank does not contain salt, fill with salt and wait at least two hours before regenerating.

Set Time of Day

The user can also set the time of day. Time of day should only need to be set after power outages lasting more than 24 hours, if the battery has been depleted and a power outage occurs or when daylight saving time begins or ends. If a power outage lasting more than 24 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. If a power outage lasts less then 24 hours and the time of day flashes on and off, the time of day should be reset and the non rechargeable battery replaced.



STEP 1U – Press SET CLOCK.

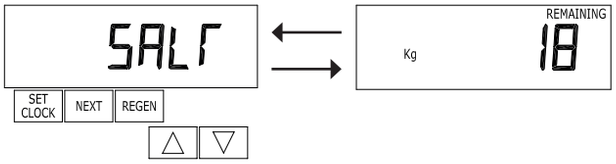
STEP 2U - Current Time (hour): Set the hour of the day using ▲ or ▼. Press NEXT to go to Step 3U.

STEP 3U - Current Time (minutes): Set the minutes of the day using ▲ or ▼. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

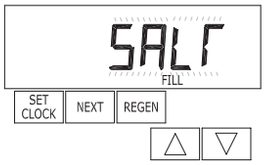
Salt Remaining or Adding Salt (not available for WS2 valves)

If the Low Salt Warning was activated in the last step of OEM Softener System Setup the following screens will be viewed in the User Display.

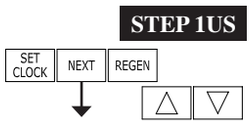
Note: The salt used per regeneration setting can be set in increments of 0.05 Kg, but the Kg REMAINING screen will round up or down to the closest whole number.



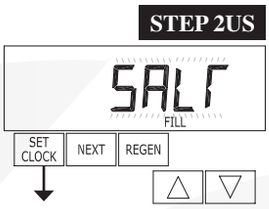
Once the salt remaining has gone below the set point the display will automatically flash Salt Fill.



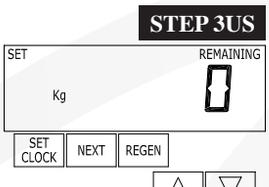
When adding salt to the brine tank (if the salt remaining feature is activated) the following steps must be completed:



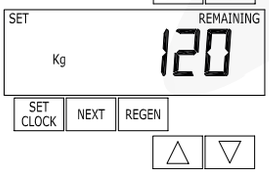
Step 1US – Press the NEXT button until SALT appears in the display. It does not matter if the SALT display alternates with the Kg REMAINING display.



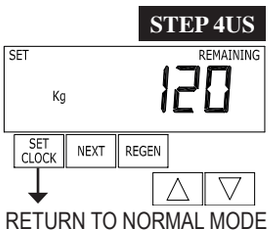
Step 2US – Press SET CLOCK.



Step 3US – Set Kg REMAINING: Use ▲ or ▼ to adjust the Kg remaining in the brine tank.



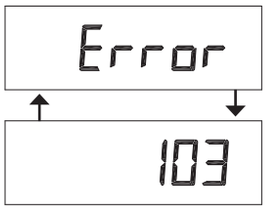
NOTE: Estimate the Kg of salt in the brine tank and add it to the amount of salt added to the brine tank. The example at the left would indicate 100 Kg of salt being added to a brine tank that has 20 Kg remaining.



Step 4US – Press SET CLOCK or NEXT to exit Adding Salt.

Power Loss

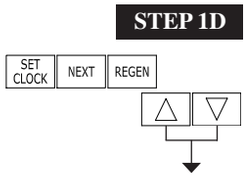
If the power goes out, the system will keep time for 24 hours or until the battery is depleted. If a power outage of more than 24 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. The system will remember the rest. If a power outage lasts less then 24 hours and the time of day flashes on and off, the time of day should be reset and the non rechargeable battery replaced.



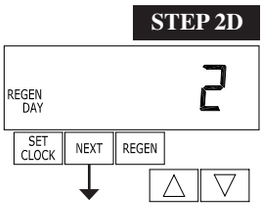
Error Message

If the word “ERROR” and a number are alternately flashing on the display contact the OEM for help. This indicates that the valve was not able to function properly.

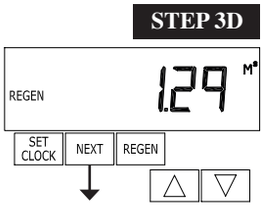
Diagnostics



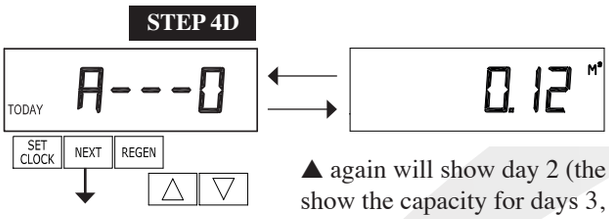
STEP 1D – Press ▲ and ▼ simultaneously for three seconds. If screen in step 2D does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds.



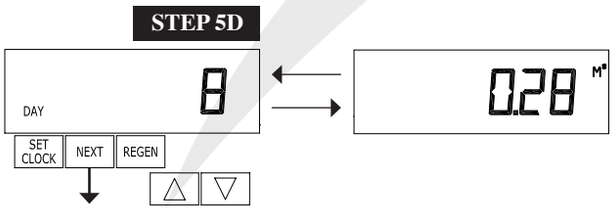
STEP 2D – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press NEXT to go to Step 3D. Press REGEN to exit Diagnostics.



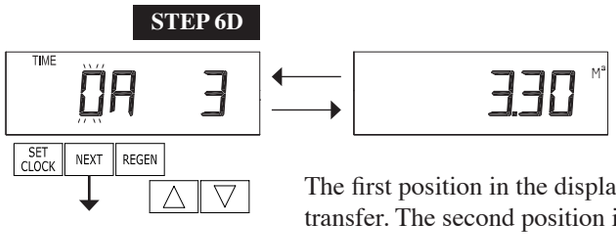
STEP 3D – Volume, since last regeneration: This display shows the volume of water that has been treated since the last regeneration. This display will equal zero if a water meter is not installed. Press NEXT to go to Step 4D. Press REGEN to return to previous step.



STEP 4D – Volume, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed and Set Volume Capacity is set to "Auto," this display shows 0 day (for today) and flashes the reserve capacity. Pressing ▲ will show day 1 (which would be yesterday) and flashes the reserve capacity used. Pressing ▲ again will show day 2 (the day before yesterday) and the reserve capacity. Keep pressing ▲ to show the capacity for days 3, 4, 5 and 6. ▼ can be pressed to move backwards in the day series. Display does not appear if 1.0Γ is selected in Step 2CS. Press NEXT at any time to go to Step 5D. Press REGEN to return to previous step.

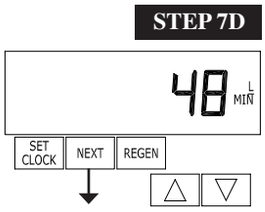


STEP 5D - Volume, 63-day usage history: This display shows day 1 (for yesterday) and flashes the volume of water treated yesterday. Pressing ▲ will show day 2 (which would be the day before yesterday) and flashes the volume of water treated on that day. Continue to press ▲ to show the maximum volume of water treated for the last 63 days. If a regeneration occured on the day the word "REGEN" will also be displayed. This display will show dashes if a water meter is not installed. Press NEXT at any time to go to Step 6D. Press REGEN to return to previous step.

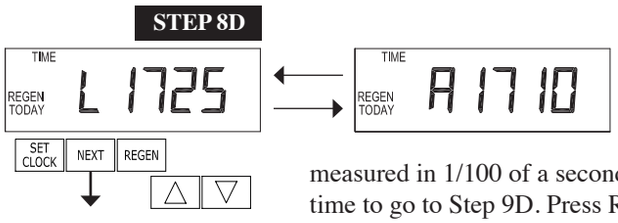


STEP 6D – Twin Tank Valve Transfer History only displays when 1.0Γ was selected in Step 2CS. Use ▲ or ▼ to scroll through the last 10 tank transfers.

The first position in the display ranges from 0 to 9 with the lowest number being the most recent transfer. The second position in the display will be either "A" or "b". If "A" then the tank with the valve on it was in service, if "b" the tank with the in/out head on it was in service. The next three digits represent the number of hours ago that the transfer occurred. The display alternates with the volume that was treated before the tank transferred. Press NEXT at any time to go to Step 7D. Press REGEN to return to previous step.

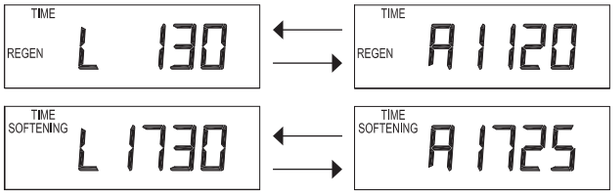


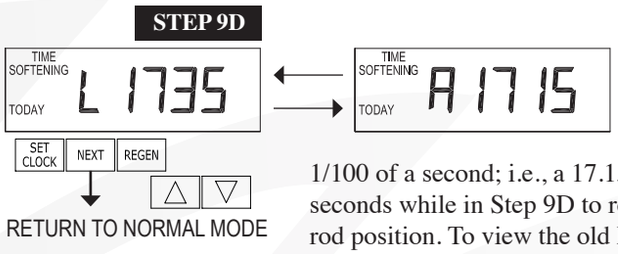
STEP 7D – Flow rate, maximum last seven days: The maximum flow rate in liters per minute that occurred in the last seven days will be displayed. This display will equal zero if a water meter is not installed. Press NEXT to go to Step 8D. Press REGEN to return to previous step.



STEP 8D – MAV Drive History in the direction of extended piston rod position. Display will not be shown if 1.0 Γ is not selected in Step 2CS and OFF is selected in Step 4CS. If the display does appear up to a four digit number will appear after the "L" which stands for latest and "A" which stands for average. Drive time is measured in 1/100 of a second; i.e., a 17.10 second move is displayed as 1710. Press NEXT at any time to go to Step 9D. Press REGEN to return to previous step.

Press and hold ▲ and ▼ buttons for 3 seconds while in Step 8D to reset the MAV drive history in both the retracted and extended piston rod position. To view the old MAV drive history data for retracted and extended rod position press and hold SET CLOCK and ▲ while in Step 8D. Press NEXT to advance display to the old MAV drive history.

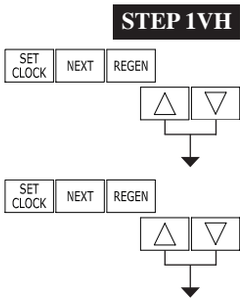




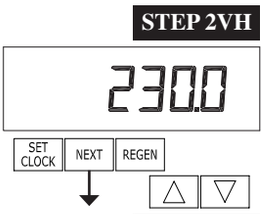
STEP 9D – MAV Drive History in the direction of retracted piston rod position. Display will not be shown if 1.0 Γ is not selected in Step 2CS and OFF is selected in Step 4CS. If the display does appear, up to a four digit number will appear after the "L" which stands for latest and "A" which stands for average. Drive time is measured in 1/100 of a second; i.e., a 17.15 second move is displayed as 1715. Press and hold ▲ and ▼ for 3 seconds while in Step 9D to reset the MAV drive history in both the extended and retracted piston rod position. To view the old MAV drive history data see Step 8D. Press the NEXT button at any time exit Diagnostics. Press REGEN to return to previous step.

When desired, all programming and all information in Diagnostics may be reset to defaults when the valve is installed in a new location. To reset to defaults, press NEXT and ▼ buttons simultaneously to go to the Softening/Filtering screen. Press ▲ and ▼ simultaneously to reset diagnostic values and all programming to defaults. Screen will return to User Display.

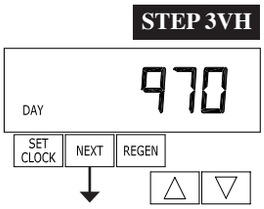
Valve History



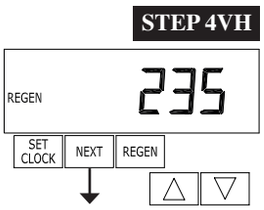
STEP 1VH – Press ▲ and ▼ simultaneously for three seconds and release. Then press ▲ and ▼ simultaneously and release. If screen in step 2VH does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds and release. Then press ▲ and ▼ simultaneously and release.



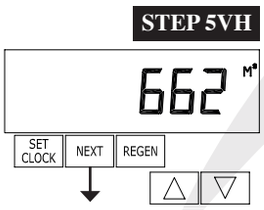
STEP 2VH[2] – Software version: This display shows the software version of the valve. Press the NEXT button to go to Step3VH. Press REGEN to exit the valve history.



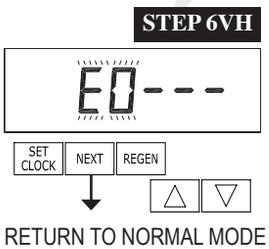
STEP 3VH – Days, total since start-up: This display shows the total days since startup. Press the NEXT button to go to Step 4VH. Press REGEN to return to previous step.



STEP 4VH – Regenerations, total number since start-up: This display shows the total number of regenerations that have occurred since startup. Press the NEXT button to go to Step 5VH. Press REGEN to return to previous step.



STEP 5VH – Volume, total used since start-up: This display shows the total volume of water treated since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 6VH. Press REGEN to return to previous step.



STEP 6VH – Error Log: This display shows a history of the last 10 errors generated by the control during operation. Press the ▲ or ▼ buttons to view each recorded error. Press the next button to exit Valve History. Press REGEN to return to previous step.

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[2] Values in steps 2VH through 6VH cannot be reset.

Revision History:

4/9/2013

PAGE 5:
For Valve Type 1.0Γ, press and hold SET and ▲ for about 3 seconds to initiate an exchange of the tank in Service without cycling the regeneration valve. After tank switch, days remaining and capacity remaining status is retained for each tank until the next regeneration.

11/7/2013

PAGE 4:
V3108CI-06BOARD WS1 THRU 2L/2 CI PCB XMEGA REPL

PAGE 5:
Prior to selecting the upflow regeneration cycle, verify that the correct body, main piston, regenerant piston and stack are being used, and that the injector plug(s) are in the correct location. Refer to the Service Manual for drawings and part numbers.

PAGE 6:
Step 3CS - New displays.
Variable meter pulses of 0.1-150.0 PPG can also be selected.

PAGE 12:
Added Steps 10S-15S Relay 1 and 2 operations.

PAGE 16:
Added Steps 9F-14F Relay 1 and 2 operations.

PAGE 19:
New displays for pending MAV operations.

11/20/2013

PAGE 6:
Step 3CS - changed PPG to PPL

1/20/2014

PAGE 4:
Add relay specifications

5/30/2014

PAGE 4:

4	V3108CI-06BOARD	WS1 THRU 2 CI PCB XMEGA REPL	1

PAGE 6:
Step 2CS - Remove references to WS2L
Step 3CS - add 1.5

PAGE 8:
Remove WS2L references

PAGE 9:
Remove WS2L references

U.S. Patents: 6,402,944 • 6,444,127 • 6,776,901

Translation supported by Pollet Water Group