Operator´s Manual
Reverse Osmosis
TYPE: PHOENIX ONE

Date: 13.01.2021 | Version: 6

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CE 0297

For the reverse osmosis type Phoenix One, conformity according to EC directives is declared

Foreword

This Operator's Manual includes all information required for the installation and operation for the reverse osmosis model Phoenix One.
Please keep this Operator's Manual readily available and near the unit.

This Operator's Manual applies for the units with the serial number:

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Werner-von-Siemens-Str.2-6
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Rev#	Date / Name	Description
0	12.12.09 / N.Bürkle	First edition
1	28.02.14 / N.Bürkle	Nipro
2	20.12.19 / N.Bürkle	New Design / EMV
3	10.01.20 / N.Bürkle	Air pressure added
4	25.02.20 / N.Bürkle	gem. EN60601
5	01.12.20 / N.Bürkle	EMC information
6	13.01.21/ R.Tille	60Hz Version

1 General

1.1 Water quality

Microbiologic Quality

The microbiological quality of the dialysis water depends on a number of factors. Neglecting a factor could result in poor quality.

Examples of these factors:

- Quality of the inlet water (potable water)
- Reverse osmosis rinse intervals and the type and frequency of disinfection of the dialysis water system
- Disinfection method of the water inlet side of the dialysis machines
- General center hygiene (e.g. frequency of connecting or disconnecting dialysis machines to the dialysis water system)

Chemical quality

In order to receive an indication of the water quality, the conductivity of the water is measured. The conductivity is a measure of the amount of dissolved salts in the water and can be used as a performance parameter for osmosis.

Caution

Conductivity alone does not give 100% certainty that the water is suitable for dialysis. Therefore, regular checks of the chemical water quality must be carried out

1.2 Scope of supply

The scope of delivery includes the following parts:

- 1 reverse osmosis
- 1 connection set

1.3 Unit combinations

The unit model Phoenix DS may be combined with the following devices:

Hot cleaning system Phoenix One +
Hot cleaning system Phoenix One +FH

1.4 Accessories and Consumables

- 1 Prefilter 20“ 10µm

1.5 Notes for the Operator

The operator is responsible for:

- Competent and intended operation
- Compliance with work safety and accident prevention provisions
- Technical instruction of operating personnel

1.6 Laws and Standards

The following laws and standards are adhered to:

- Council Directive 93/42 EEC Medical Devices
- EN 60601
- DIN EN 1717 Protection of potable water against contamination

1.7 Symbols used in this Manual

Stands for a dangerous situation. Disregard can result in personal injury or material damage.

Stands for information and valuable tips.

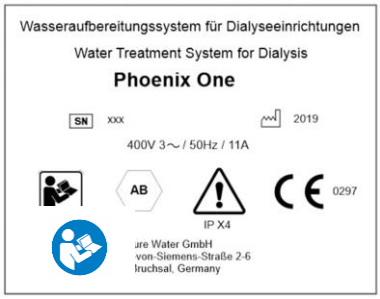
1.8 Transport and Storage

Protect unit against frost and moisture

Protect against strong jolting and collisions.

Only move unit upright and with an appropriate lift.

1.9 Model Plate



Attention, take note of accompanying documents

CE 0297 — CE mark with the number of the notified body. Here DQS

IPX 4 — Protection against the ingress of liquids. Here splash-water protection

AB — Protection Scheme according to EN 1717. Here free outlet

SN — Serial number

Year of construction

manufacturer

pay attention to manual

1.10 Warning on the Unit.

Caution! Hot surface. Attached to the tank.

Caution voltage. Turn mains switch off before opening housing. Fixed on control cabinet.

1.11 Shutdown

If a unit is shutdown for more than 5 days, conservation will be necessary.

Please contact Nipro Pure Water before performing conservation.

1.12 Disposal

Regarding the WEEE guidelines of the European Union, the disposal of electronic devices and electronic sub-assemblies and parts into the general garbage is not lawful. These parts must be disposed environmentally appropriate:

If not appointed otherwise and no private disposal management is available, these devices or possibly other environmental hazardous items can be sent back.

The filters and membrane can be disposed via the general garbage

1.13 Instruction / Further Documentation

The using personnel must be warned against the hazards during operation and must be warned against the hazards of misusing the product.

The personnel gets the instruction of operation and the specialties of usage. Instructed adult only are allowed to operate this device.

This instruction by the manufacturer or authorized personnel takes place during the commissioning of the device.

Further trainings are not necessary for this device.

For qualified personnel the following documents can be made available upon request.

- Circuit diagrams
- Spare parts list
- Technical manual

If the system is operated in combination with the hot cleaning system Phoenix One + or hot cleaning system Phoenix One + FH, an extension to these operating instructions is available.

1.14 Duration of usage

The device is designed for a use of 10 years

2 Intended operation

The unit is designed for the preparation of potable water. The pure water (permeate) thus produced may be used for dialysis treatment.

Other applications are only possible after consulting the manufacturer and receiving their approval.

The unit can only be maintained by the manufacturer or technicians trained by the manufacturer.

Only original replacement parts may be used for maintenance and repairs.

Installation operations, modifications or reparations, are only allowed to be performed by persons authorised by the manufacturer and may only be done with original replacement parts. Improper performed reparations or modifications can lead to hazards to the user and/or may damage the system.

The device may only be operated in perfect condition.
Before operating, check the following:

- Lose or defect parts
- Defect cables and/or isolations
- Serious soiling

The device may only be operated with the appropriate ring line.

The system does not produce water for injections.

The device has pressurized parts.

If the temperature sensor fails, the temperature in the permeate can increase. (Max 60°C)

The water treatment system Phoenix One may only be used for permeate supply of dialysis devices, which have a temperature measurement (permeate temperature).

The device has no direct patient contact and no patient application part.

2.1 Contraindications / side effects

None

3 Safety

3.1 Risk Assessment

There will be no dangers associated with the reverse osmosis model Phoenix One D if the operating instructions are followed.

The device can automatically start by way of an auto-start.

3.2 EMC

The device was developed and tested in accordance with current standards. Nevertheless, influence through electromagnetic fields cannot be completely excluded.

3.3 Emissions

The device does not produce dust or vibrations.
The noise level is under 609 dB (A).

4 Technical Data

Permeate performance / Feed quantity

Number of membranes	2	3	4	5	6	7	8
Permeate performance l/h [15°C]	700	1050	1400	1750	2100	2450	2800
Feed quantity min. at 3 bar dynamic	2000	2500	3000	3500	4000	4500	5500

Inlet water

Quality	Potable Water
Hardness	< 1 °dH
Silicate	< 25 mg/l
Chlorine	< 0,1 ppm (mg/l)
Iron	< 0,1 ppm (mg/l)
SiO2	< 30 ppm
Fouling Index (S.D.I)	< 3
Temperature	5-30°C
Conductivity	<1500µS/cm
pH	6,5-8,5
Pressure	3-6 bar

Connections

Water feed	G 1” external
Permeate connection	TriClamp d50,5 DIN
Drain	HT 50

Electrical data

Phoenix ONE

Supply voltage	400 V, 3 Phases, 50 Hz	400 V, 3 Phases, 60 Hz
Fuse	Automat 16 A-K, Fi ΔI 30mA	Automat 16 A-K, Fi ΔI 30mA
Output	3,5 KW	3,5 KW
Degree of pollution	1	1

Display system

Conductivity	0-1000 µS/cm ±5%
Pressure sensor	0-20 bar ±5%
Water meter	1impl/l ±1%
Flow	0-3000 l/h ±1%

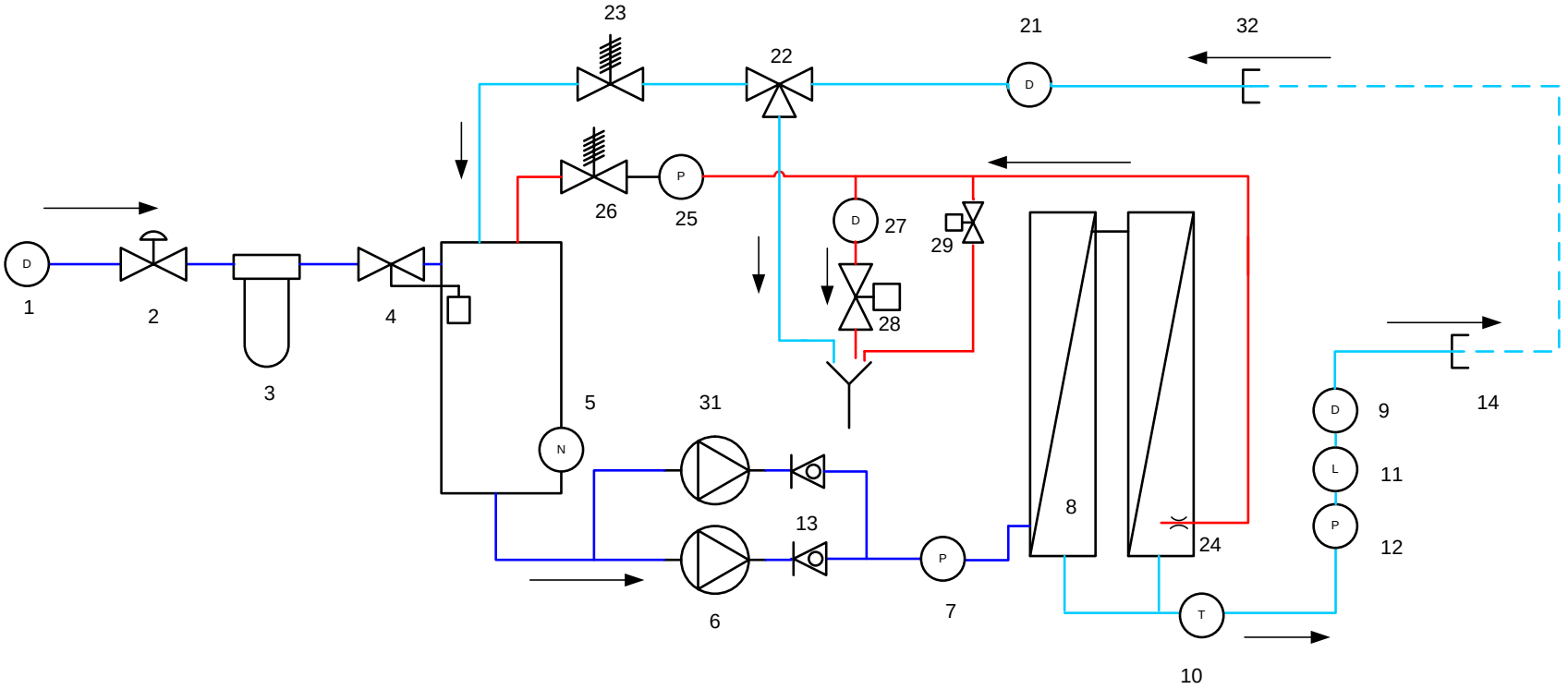
Ambient temperature

Storage / transport	1-40°C
Operation	10-35°C
Relative humidity	< 90% at 20°C not condensing
Air pressure	795-1062 hPa

Size

Type	Size in (LxBxH in mm)
1-4 Membranes	1330x800x1650
5-8 Membranes	1330x950x1650

5 Description of the device



5.1 Flow-Chart

1 Water meter
2 Membrane valve input
3 Fine filter
4 Float valve
5 Dry-run protection
6 Booster pump (Pressure 10-13 bar)
7 Pressure sensor pump pressure
8 Reverse osmosis membrane
9 Flow display Permeate
10 Temperature sensor permeate
11 Conductivity probe
12 Pressure sensor Permeate
13 Not used
14 Ring Flow
15 Not used
16 Not used
17 Not used
18 Not used
19 Not used
20 Not used
21 Flow display Permeate back flow
22 Three way valve permeate to drain
23 Permeate pressure retention valve (Pressure 1-6bar)
24 Pressure retention concentrate
25 Pressure retention concentrate
26 Concentrate valve
27 Flow display concentrate to drain
28 Proportional valve
29 Flush valve
30 Not used
31 2. Booster pump (Option)
32 Ring Back Flow

5.2 Operation Sequence Permeate Production.

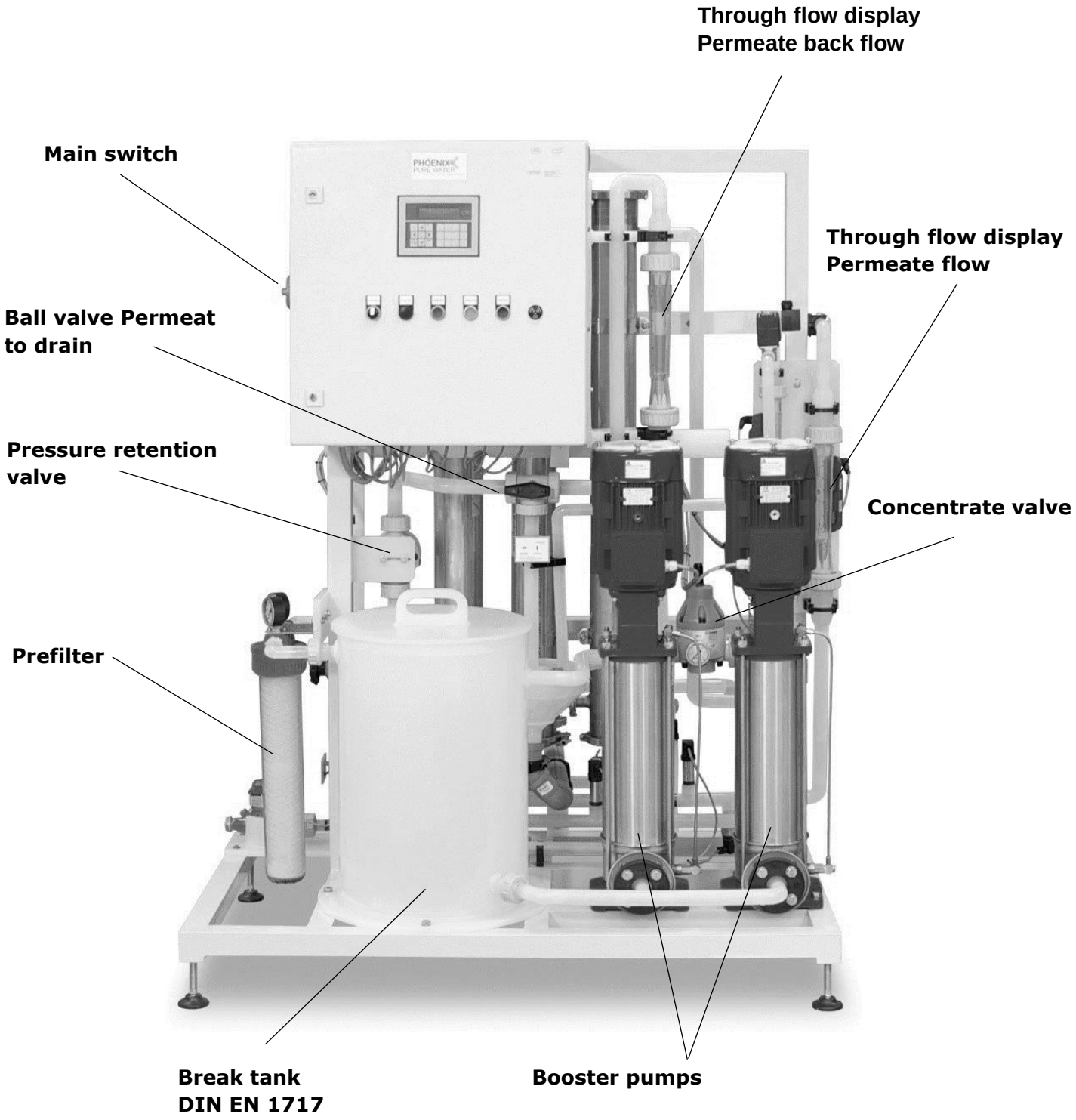
Untreated water flow the main through the water line **(1)** and the fine filter **(3)** into the break tank. The float valve **(4)** mounted in the break tank regulates the water level in the tank.
The booster pump **(6)** draws the water out of the tank and then presses it into the reverse osmosis membrane **(8)**. At the reverse osmosis membrane the water stream separates into the ***permeate stream*** (pure water) and the ***concentrate stream***.

The Quality of the produced permeate will be tested with the temperature probe **(10)** and the conductivity probe **(11)**. Afterwards it will flow into the ring line to the consumption points.

Unused permeate will be returned to the break tank over the permeate pressure valve **(23)**.

A portion of the concentration will flow through the concentrate valve **(26)** back into the cycle. The rest will leave the device through the proportional valve **(28)** to the drain. The ratio of concentrate return to concentrate drainage is regulated by the proportional valve **(28)** based on consumption.

5.4 Components



6 Installation

The installation must be conducted by the manufacturer or by personnel trained and authorized by the manufacturer.

6.1 Environmental Conditions

Conditions for the osmosis room:

- Relative air moisture < 90% at 20°C non-condensing
- Room temperature between +10°C und +35°C (frost proof)
- Equipped with floor drain, water supply and electrical supply

6.2 Assembly

- Bring the system into the appropriate position
- Adjust machine feet until the device stands level and secure on the floor.

Do not store easily flammable or explosive materials in the vicinity of the device.

Do not store chemicals in the vicinity of the device.

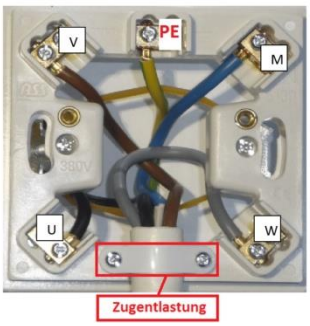
Only operate the device with the necessary water pre-treatment.

Room of osmosis may not be freely accessible. (Access for instructed personnel only)

6.3 Electrical installation

The installation may only be performed by a qualified electrician.

The system must be supplied by a permanent connection, connectors are not valid. The disconnection via the main switch at the control cabinet.



Connection box

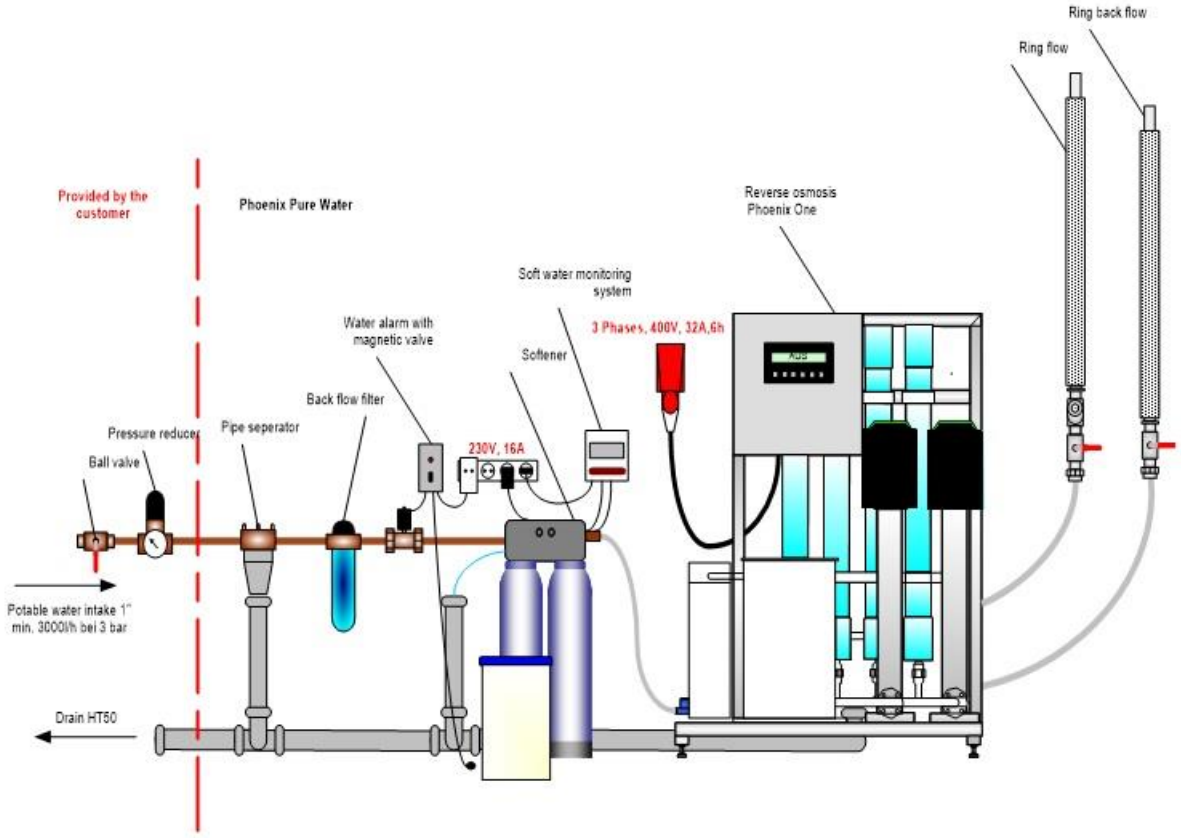
Main switch.
For protection against a re-start of the unit, the main switch can be locked with a padlock.

Safety class I

The device is equipped with a Protective earth terminal for prevention against high touch current
For prevention of the hazard of an electric shock, this device may only be connected to a power supply with protective earth.

The power cord is fixed to the system and cannot be replaced.

Installation plan (Example)

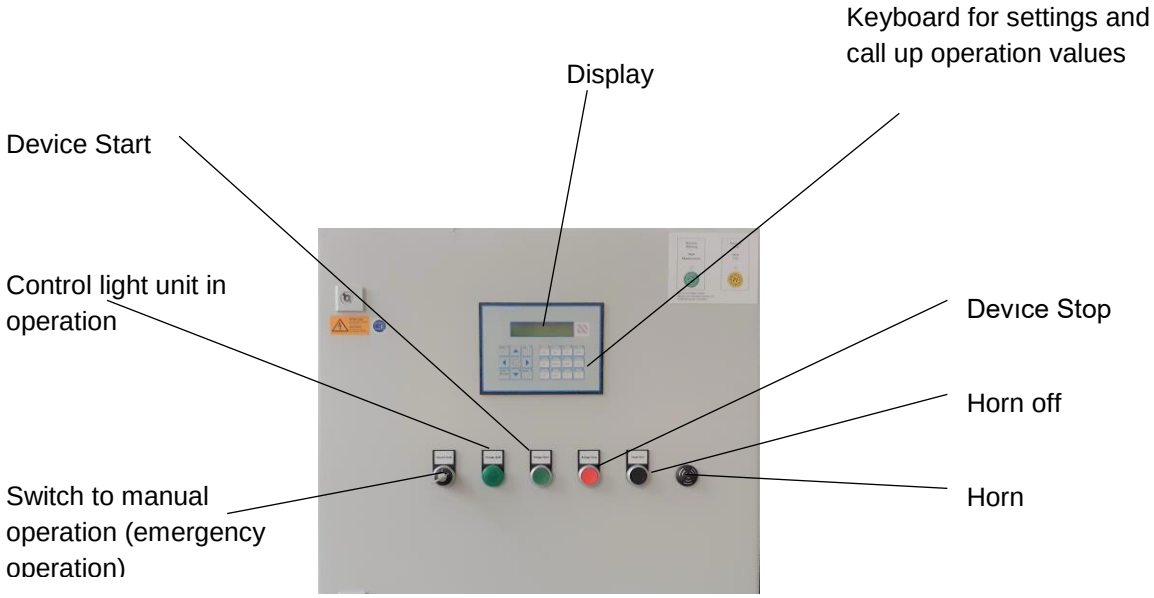


Local water works regulations and DIN EN 1717 must be followed.

The water pre-treatment must be adapted to the local potable water quality.

7 Operation

7.1 Control Panel

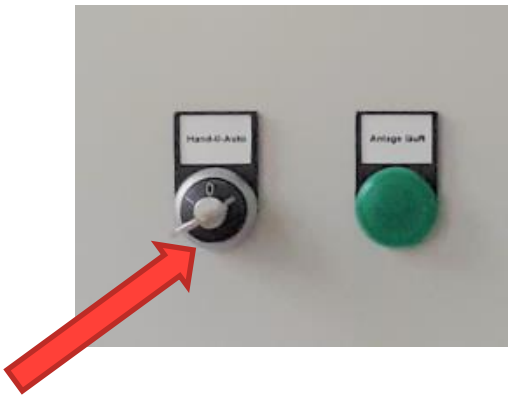


Device Start	Button	Starts the permeate production
Control light unit in operation	Light	If the unit is in operation, this will be signalled with a green light
Switch manual operation	Switch Hand, 0, Auto	Switch with three positions: 1 Hand: If the controls fail the unit can be switched to emergency operation. 2 0 : Unit off (no clean, no time start) Auto: The unit will be operated over by the controls
Horn	Signal	Horn will activate if an alarm is present.
Horn cancel	Button	Turns off the horn (tone off)
Device Stop	Taster	Stops the device
Keyboard		Call up operation value and settings for service.
Display	2 lines display	Display operation value and notifications.

7.2 Emergency operation

Only use emergency operation if the automatic function fails. Have device repaired as soon as possible.

Attention!
There is no monitoring of the water inflow during the emergency operation.
Therefore a continuous water inflow has to be guaranteed.
Absent water causes the **destruction of the pump**.



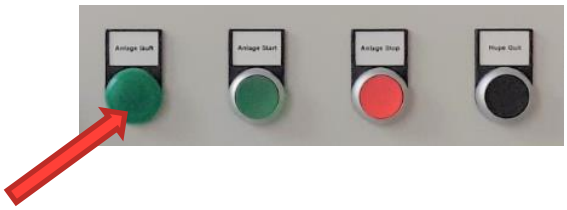
Turn the key operated switch to “Hand”.

To turn off the device, turn switch to position 0.

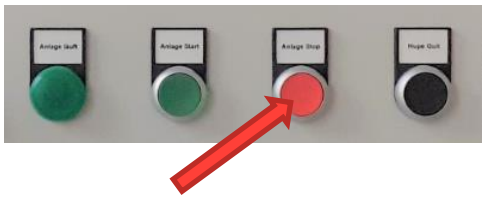
In emergency operation all automatic functions are turned off. No cleaning cycle and no automatic start and/or stop will be conducted.

The permeate quality will not be monitored.

7.3 Manual On / Off

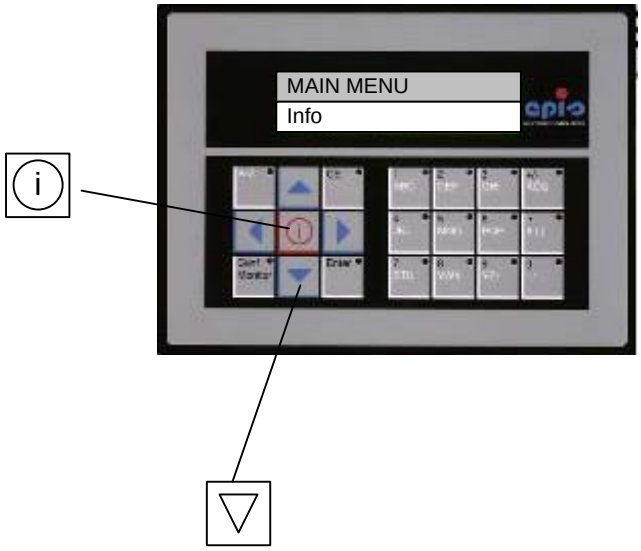


Press the green button to start the device. The green light will turn on.



Press the red button to stop the device. The green light will turn off.

7.4 Quick access keys



Display Conductivity

Report list

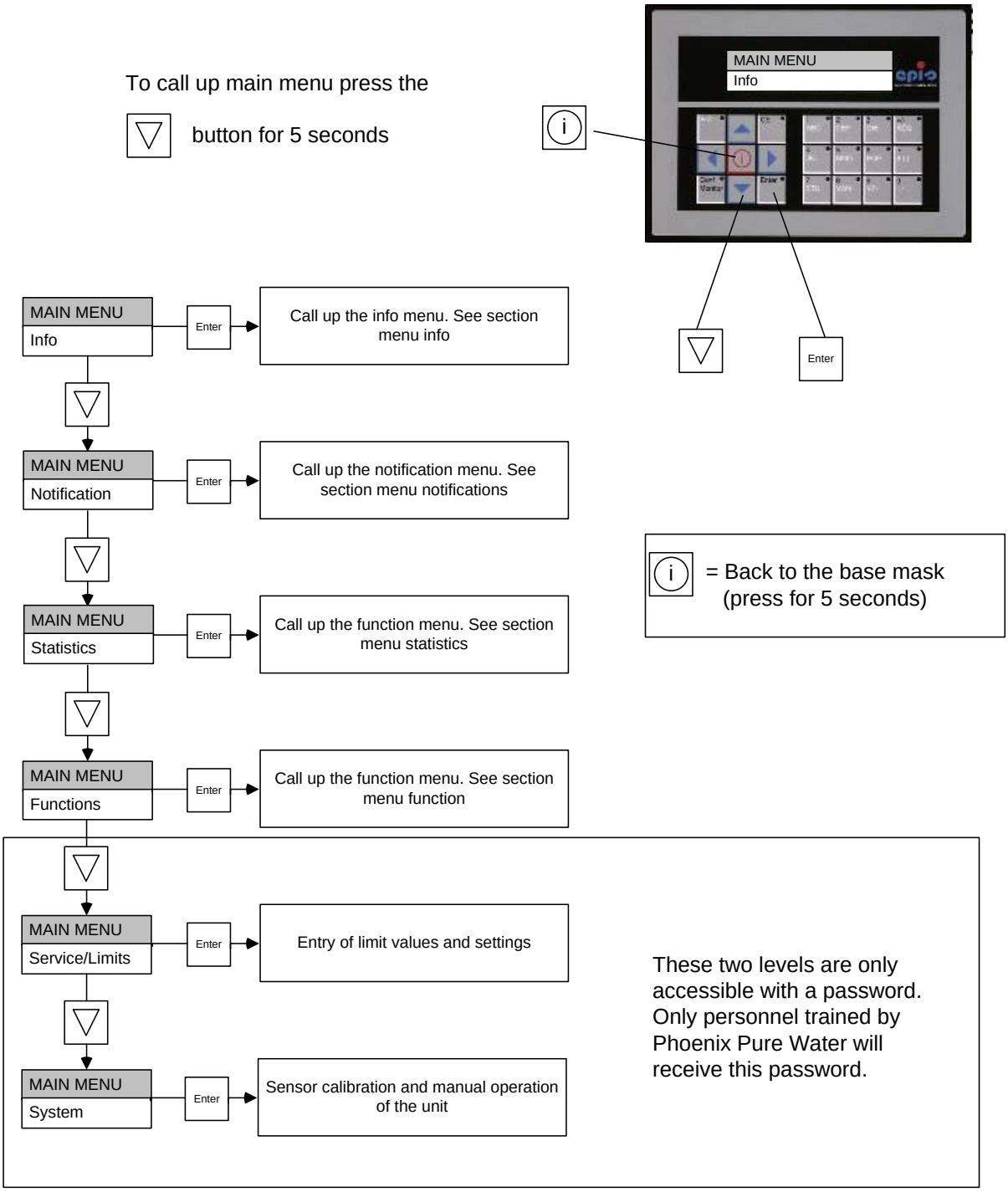
Program selection
RO start
Clean
discard permeate

Main menu (press
for 5 seconds)

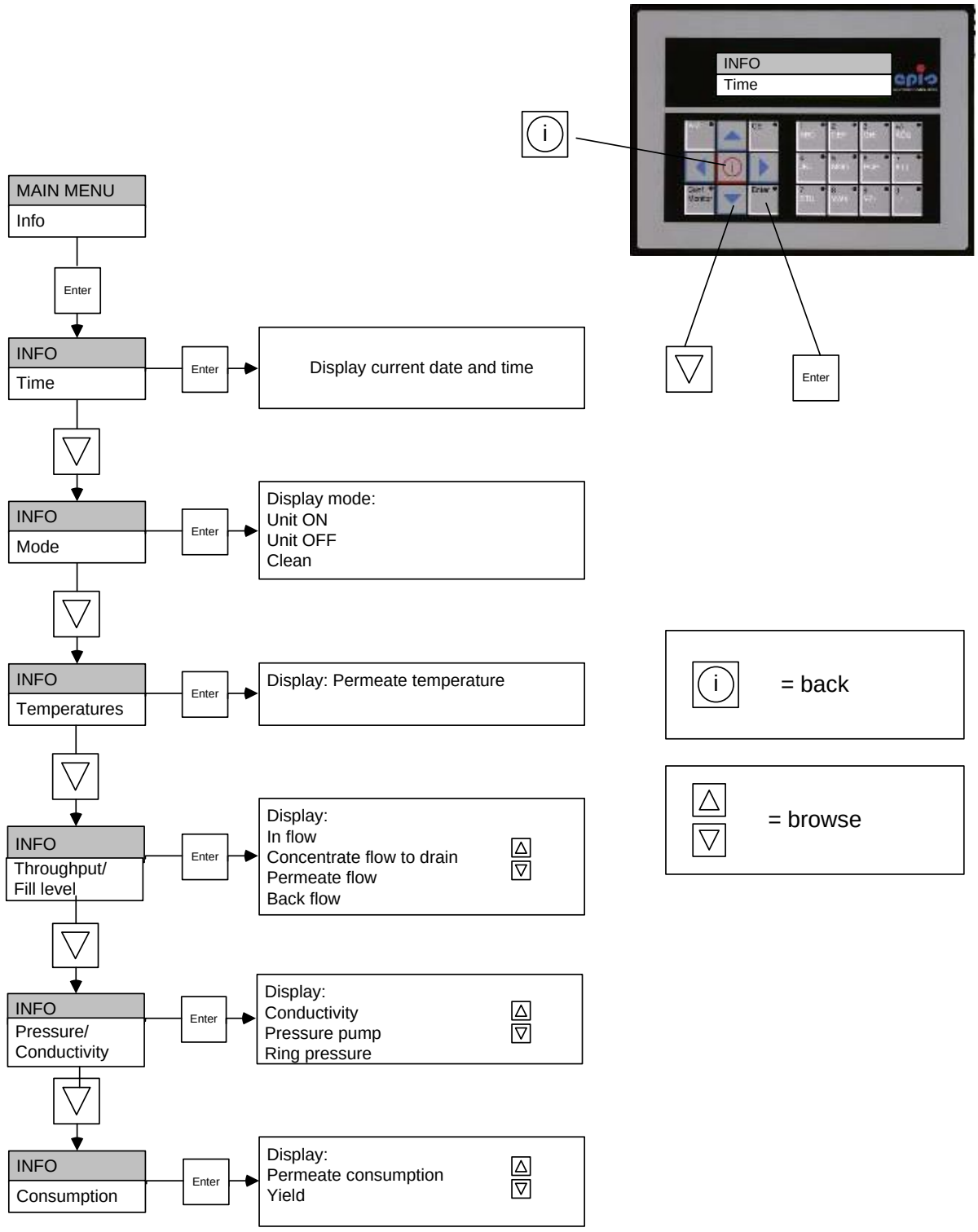
i = back

To start the selected program, the green start button must be pressed. The device will start shortly after. Press the red button to stop the device.

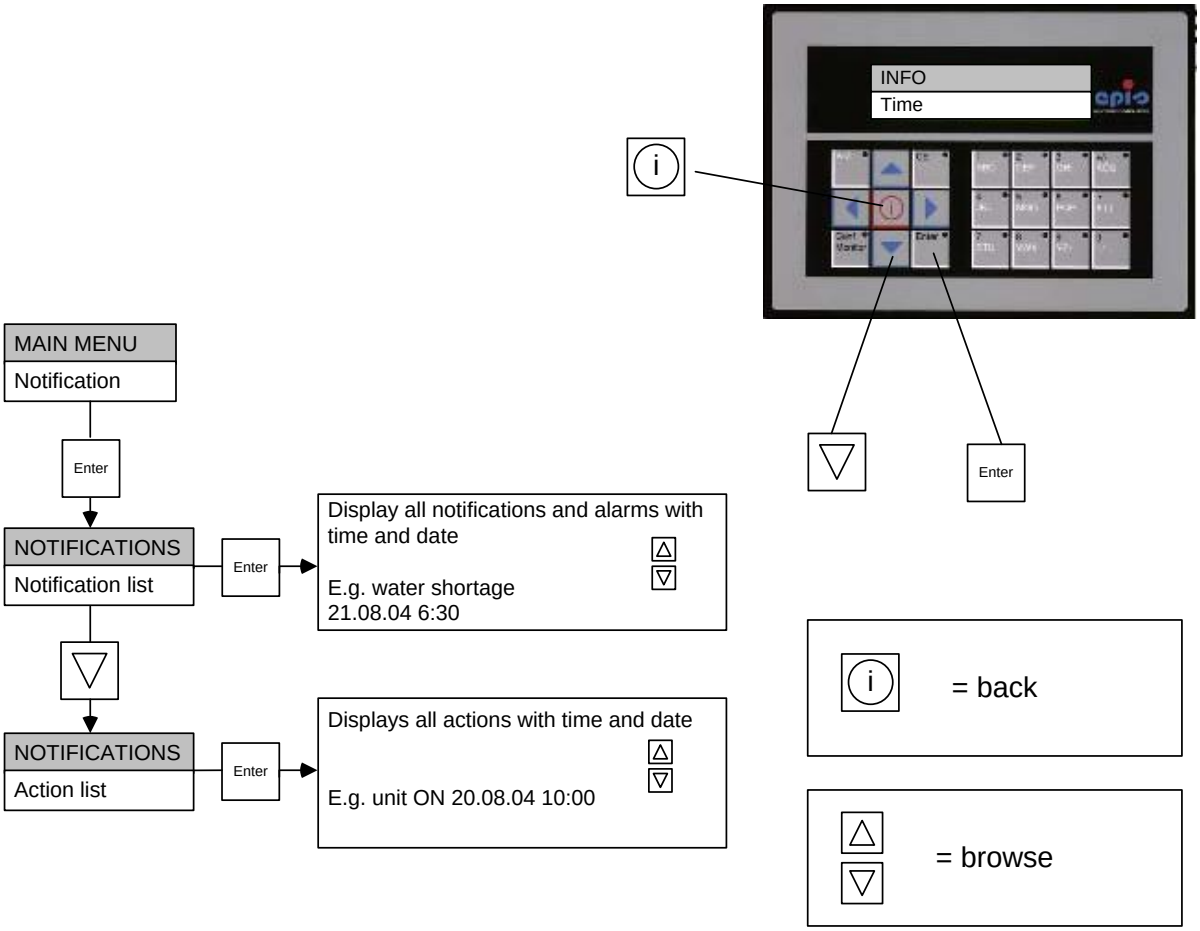
7.5 Main menu


To call up main menu press the
button for 5 seconds
MAIN MENU
Info
Enter
MAIN MENU
Info
Enter
Call up the info menu. See section menu info
MAIN MENU
Notification
Enter
Call up the notification menu. See section menu notifications
MAIN MENU
Statistics
Enter
Call up the function menu. See section menu statistics
MAIN MENU
Functions
Enter
Call up the function menu. See section menu function
MAIN MENU
Service/Limits
Enter
Entry of limit values and settings
MAIN MENU
System
Enter
Sensor calibration and manual operation of the unit
= Back to the base mask (press for 5 seconds)
These two levels are only accessible with a password. Only personnel trained by Phoenix Pure Water will receive this password.

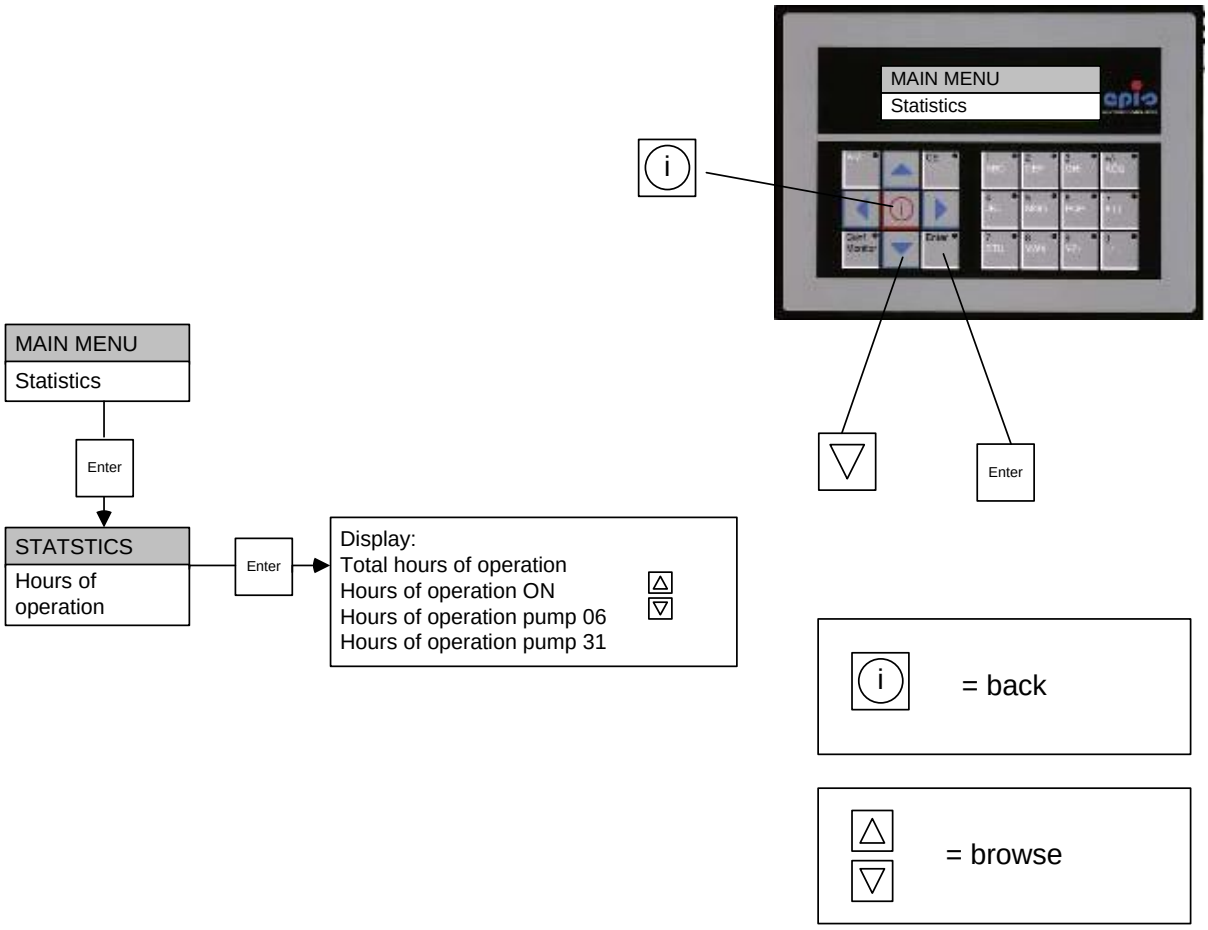
7.6 Menu Info


INFO
Time
MAIN MENU
Info
Enter
INFO
Time
Enter
Display current date and time
INFO
Mode
Enter
Display mode:
Unit ON
Unit OFF
Clean
INFO
Temperatures
Enter
Display: Permeate temperature
INFO
Throughput/
Fill level
Enter
Display:
In flow
Concentrate flow to drain
Permeate flow
Back flow
INFO
Pressure/
Conductivity
Enter
Display:
Conductivity
Pressure pump
Ring pressure
INFO
Consumption
Enter
Display:
Permeate consumption
Yield
Enter
= back
= browse

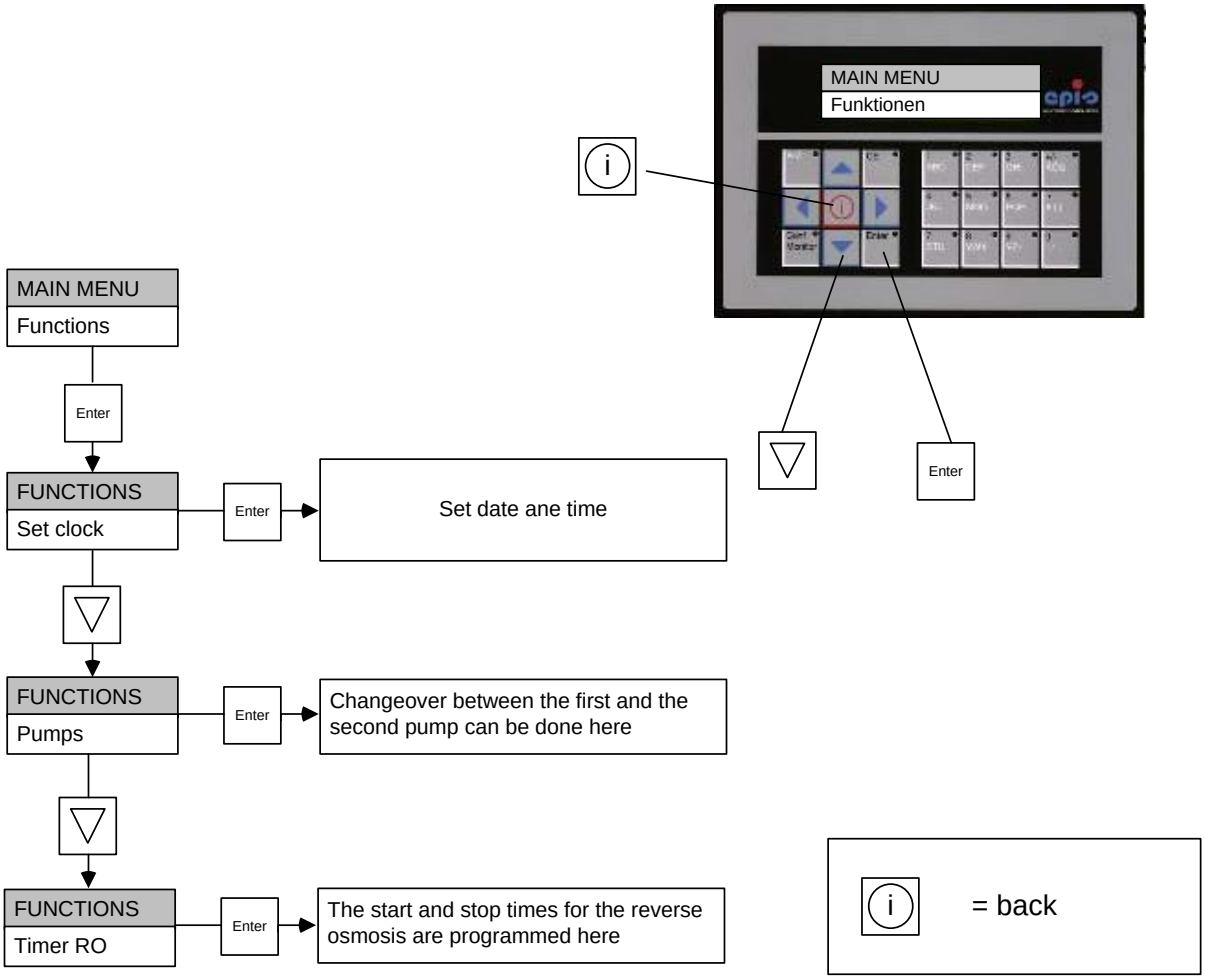
7.7 Menu Notification



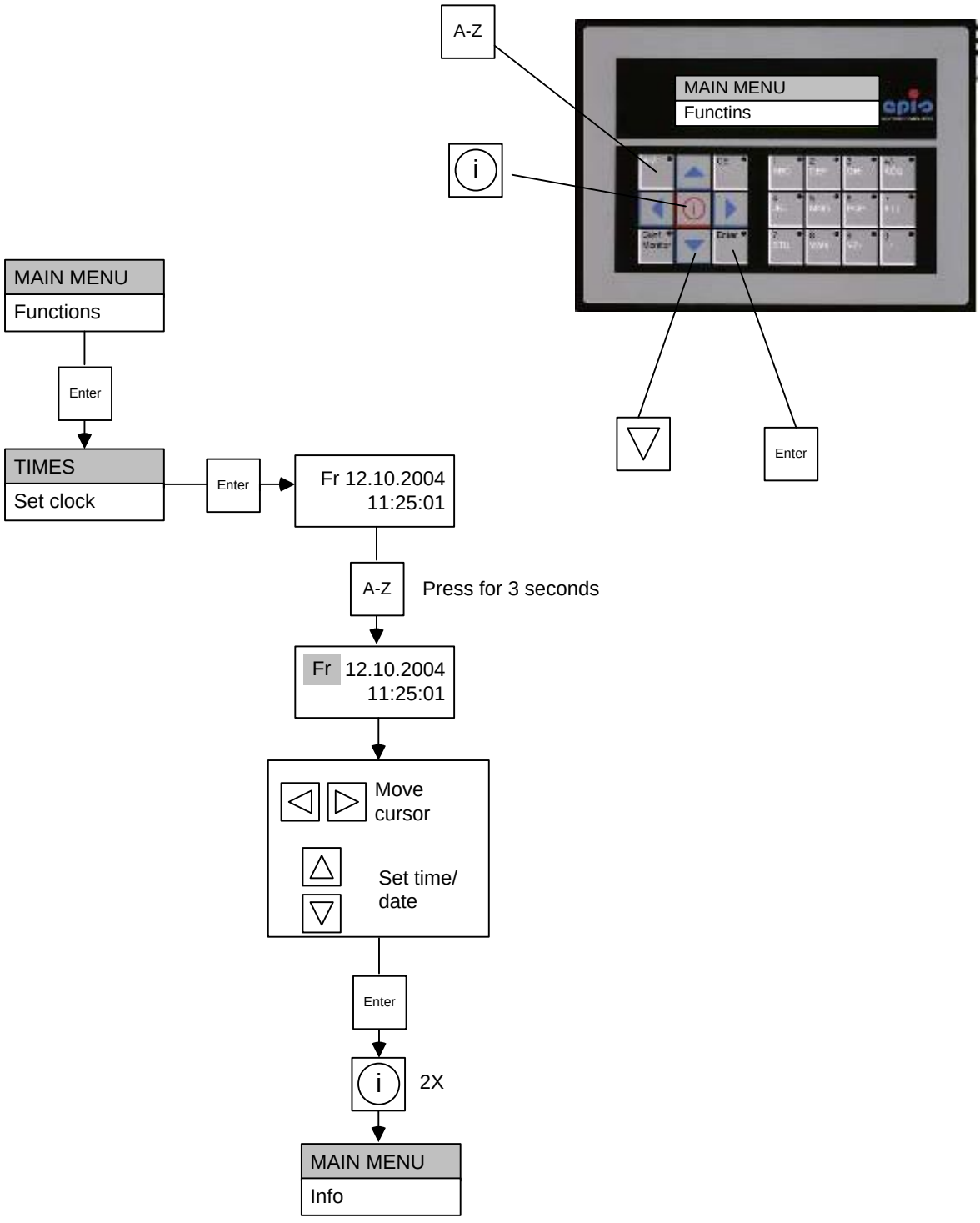
7.8 Menu Statistics



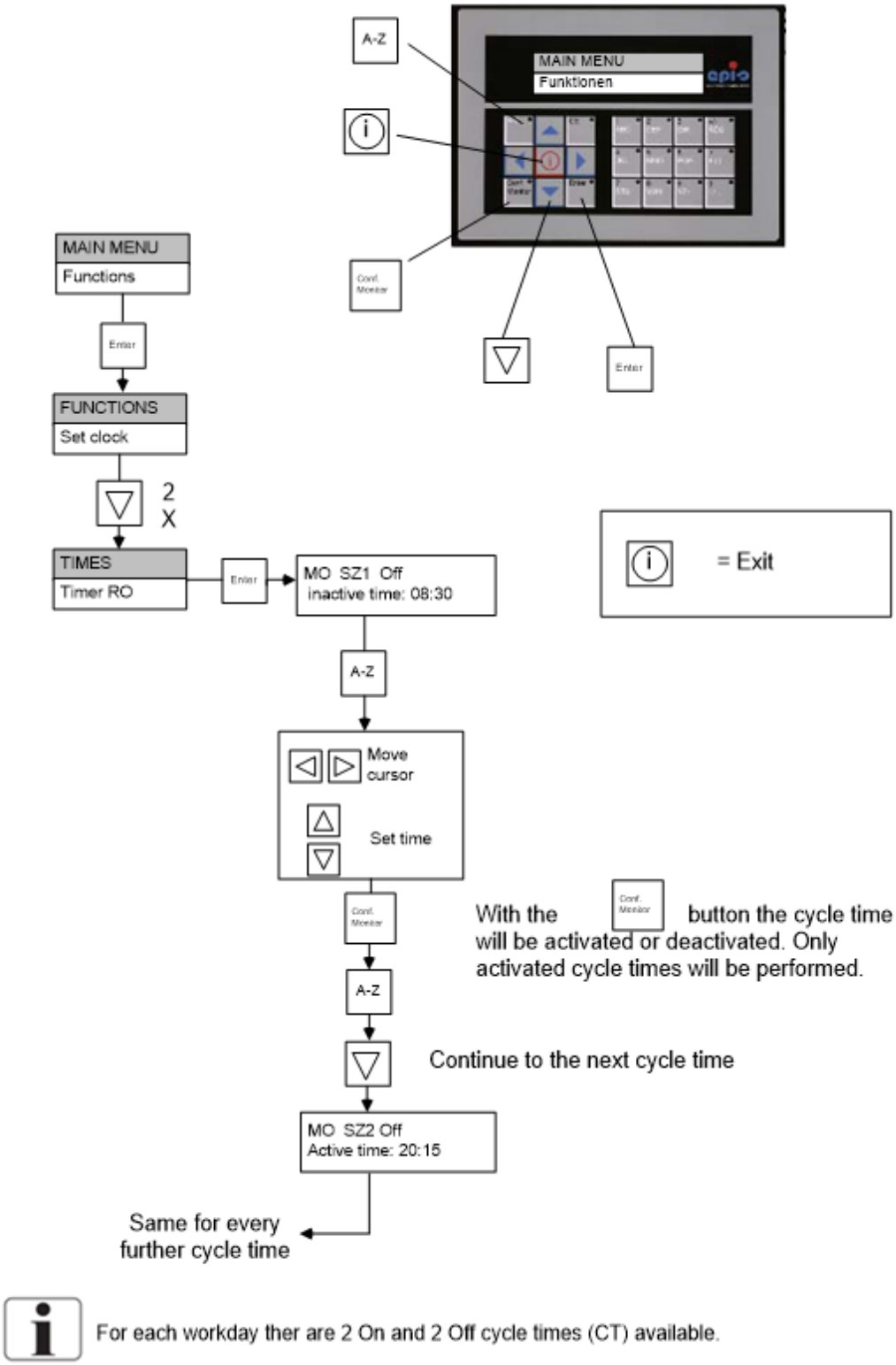
7.9 Menu Functions



7.10 Set clock



7.11 Timer



For each workday ther are 2 On and 2 Off cycle times (CT) available.

8 Maintenance and cleaning

8.1 External Cleaning

A slightly dampened, lint-free cloth can be used to remove dirt stains and dust from pipes and other surfaces

Do not clean the device with solvents.

Stains from softening salts or disinfectants must be removed immediately.

8.2 Maintenance Intervals

No service or maintenance work may be carried out during treatment.

Measure	period	Notes	user
Change pre-filter	2 months or after pressure drop> 1bar	If the filter shows discoloration, a change must be performed as well	user
Fill salt at softener	Daily		user
Chemical disinfection	If needed		Manufacturer or persons authorized by manufacturer
Maintenance	Yearly		Manufacturer or persons authorized by manufacturer
Safety related check	Every 2 years		Manufacturer or persons authorized by manufacturer
Microbiological analysis	Every 3 months		User
Chemical analysis	Every 12 months		User

Not replacing the filter or replacing it too late can lead to damaging of the reverse osmosis.

8.3 Prefilter Replacement

1. Stop the device by pressing the red button.

2. Close the membrane valve (2) by turning it clockwise.

3. Open filter casing with the filter key by turning it clockwise.

4. Unscrew blue union nut. Pull it away (downwards) together with the filter casing.
5. Remove old filter.
6. Empty filter casing.
7. Unpack new filter and set it in the casing.

8. Screw the filter casing back in (counter-clockwise). Ensure that the filter is centred.
9. Re-attach filter casing using the filter key.

10. Re-open membrane valve. Ensure that the filter is not leaking

When the system is switched on again, there may be strong hissing noises.

8.4 Chemical Disinfection

A chemical disinfection should only be performed upon new installation or when high pathogen values are encountered

Disinfection may only be performed by **Nipro Pure Water** or by **instructed** persons.

Caution when handling disinfectants!
Per acetic acids can cause damage to your health. Always **read** safety **guidelines** before handling.

Before the next **dialysis each** consumption point must be tested for **disinfectant traces.**

8.5 Microbiological Inspection

Necessary Values

□	Pathogens	< 100 CFU/ml no traces of Pseud. aeruginosa and E. coli
□	Endotoxins	< 0,25 EU/ml

Inspection Interval

Inspection of permeate every 3 months.

Inspection method

Pathogen count determination:

Nutrient medium: TGEA (OXID Nr.CM 127), R2A
Incubation temperature: 22°C ± 2°C

Endotoxins determination:

Method: GEL-Clot; Cromogen; Turbid metric

9 Malfunctions

The device discerns between notifications and alarms. Notifications are simply for information, the appropriate measures will be started automatically. Alarms on the other hand will always result in the device shutting down.

Notification / Malfunction	Meaning	Measure	Notes
Display remains dark, device does not start	Power supply missing.	Is the power supply connected? Check main switch, power cable and building circuit breaker	
Green light is lit, but the device does not produce permeate.	Pump will not start.	Check pump's motor protection fuse. Check water level in break tank. Contact Nipro Pure Water Service.	The pump is blocked for one minute after a low water alarm
Unit will no longer start upon pressing the green button.	Undefined device state.	Turn off mains switch and turn it back on after 3 seconds.	
Unit automatically shuts down on its own when not being used for dialysis.	Automatic shut down is programmed.	Change programming.	The service password is required to make changes.
Error Insufficient water	Too little or no water is flowing into the device.	Check water supply and prefilter.	The device is blocked for one minute after this error occurs. After this minute the device can be restarted.
Error Conductivity too high	The conductivity is higher than the set range of allowed values. Possible causes: - Membrane is defect - Sensor is defect	Contact Nipro Pure Water	After a restart the device will run for 15 minutes. (Cond. Alarm suppressed)
Error Intake temperature to high.	The temperature is higher than the set	If no permeate is being extracted for an extended period, shut down the	By intake temperature of

	range of allowed values. Possible causes: - Intake water too warm - No permeate is being extracted	device or use the automatic shut down function	> 25°C it may be necessary to increase the size of the concentrate drain

Notification / Malfunction	Meaning	Measure	Notes
Error Ring pressure max.	The ring pressure is higher than the set range of allowed values	Open valves on ting end and ring start and reset pressure.	See section 11
Error Ring pressure min.	The ring pressure is lower than set range of allowed values	Check ring line for leaks. Reset ring pressure.	See section 11
Error Leak	During cleaning the device detected permeate extraction.	Check the ring for leaks.	
Error Leak sensor	The external leak sensor has shut down the device.	Check the ring for leaks. Reset the water sensor.	
Error Pump P06	The motor protection fuse has been tripped.		
Too little permeate is being produced.	The performance of the membranes is decreasing. This may be caused by one of the following factors: - Blockage - Intake water is getting colder	Check pump pressure; should be 14 bars. To resolve the problem quickly, pump pressure may be slightly increased.	**Only change pump pressure after coordinating with Nipro Pure Water**
Notification Conductivity rising.	Conductivity has exceeded the 1st limit value (HL).	**No immediate measures necessary.** The device will automatically start a cooling program.	Should this notification be generate often, the device should be inspected by Nipro Pure Water
Notification Temperature rising.	Temperature has exceeded the 1st limit value (HL).	**No measures necessary.** The device will automatically start a cooling program.	During the summer months this notification may occur more often.

Technical Appendix

The settings and functions described in the following may only be performed by technically trained personnel.

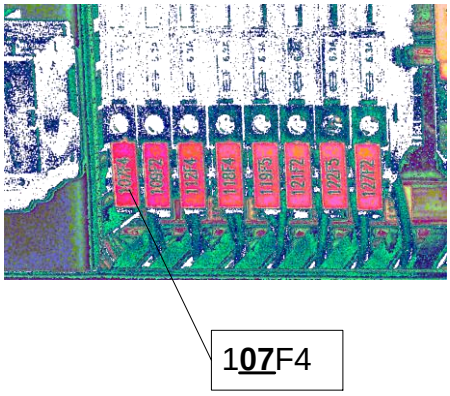
No service or maintenance work may be carried out during treatment.

10 Fuses

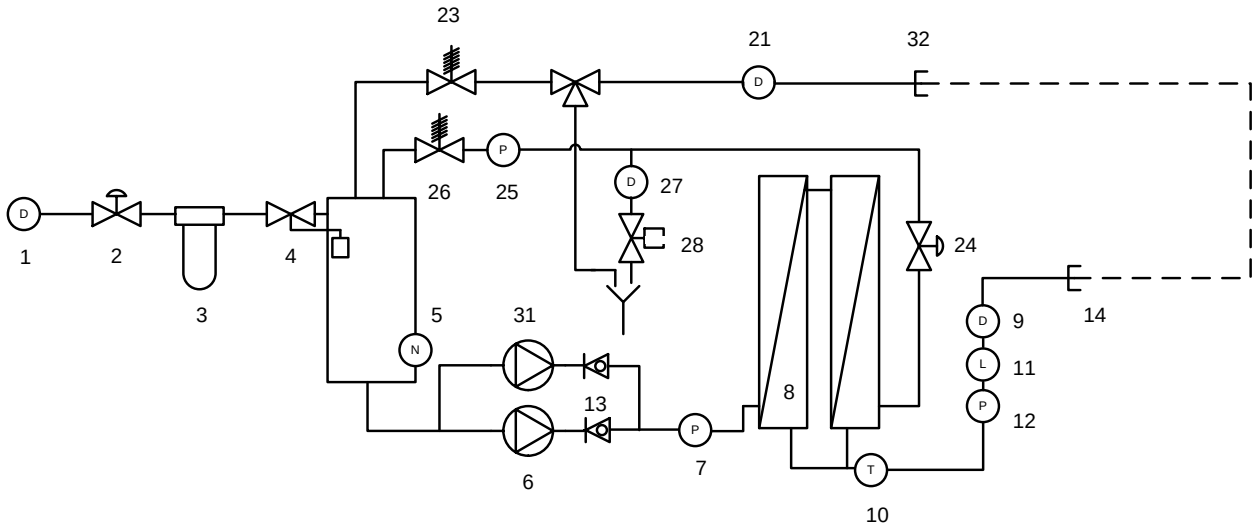
10.1 Labelling

All electrical components are labelled accordingly. This allows for clear and simple identification.

Here is an example:



The labelled number (07) equates to the item number on the flow-chart (see section 5.1)
The number 107 shows the page number of the wiring diagram. This is the fuse for the pump pressure sensor (Pos.7)
The labelling is also fixed at the sensor.



10.2 Micro Fuses in Control Cabinet

Danger!
Turn off main switch before opening the control cabinet.

All fuses are **2A (20x5mm) time-delay fuse.**

1. Open fuse case by pulling on the upper clip.
2. Remove fuse and replace with a new one.
3. Close fuse case.

11 Settings

Setting Ring Pressure (Permeate Pressure)

Increasing the permeate pressure will lead to lower permeate performance.

1. Press the green button to start the device.

2. Select Ring Pressure from the Info menu.

3. Remove black protection cap from the valve.

4. Loosen counter nut

5. Use an allen wrench to set pressure. Pressure level will be shown on the display.

6. Re-tighten counter nut.

7. Re-attach protection cap.

Pressure may only be set between 3 and 6 bars. If a higher pressure is required, the limit values will need to be adjusted.

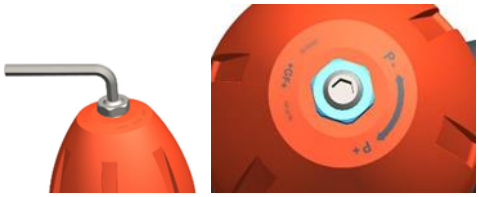
Setting Concentrate Pressure

To be performed precisely
The concentrate pressure directly affects the concentrate drain amount. Setting the pressure too high will consume more water. Setting the pressure too low can lead to damaging of the membrane.

1. Remove black protection cap.

2. Loosen counter nut

3. Start the device.



4. Set the concentrate pressure to 1 bar ± 0.2 by turning the concentrate valve (emergency operation valve) (26). The pressure can be read 0-4 bar on manometer.

12 Replacement of the reverse osmosis membrane

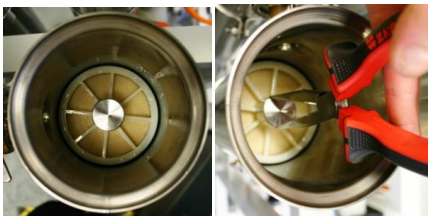
Beware of pressure!
Membrane tubes are under pressure. Open carefully!

1. Stop device by pressing the red button.

2. Open wing screw and take off the clip**.**

3. Lift module cover by using a screwdriver.

4. Take off cover.



5. Take the end plug out of the module.

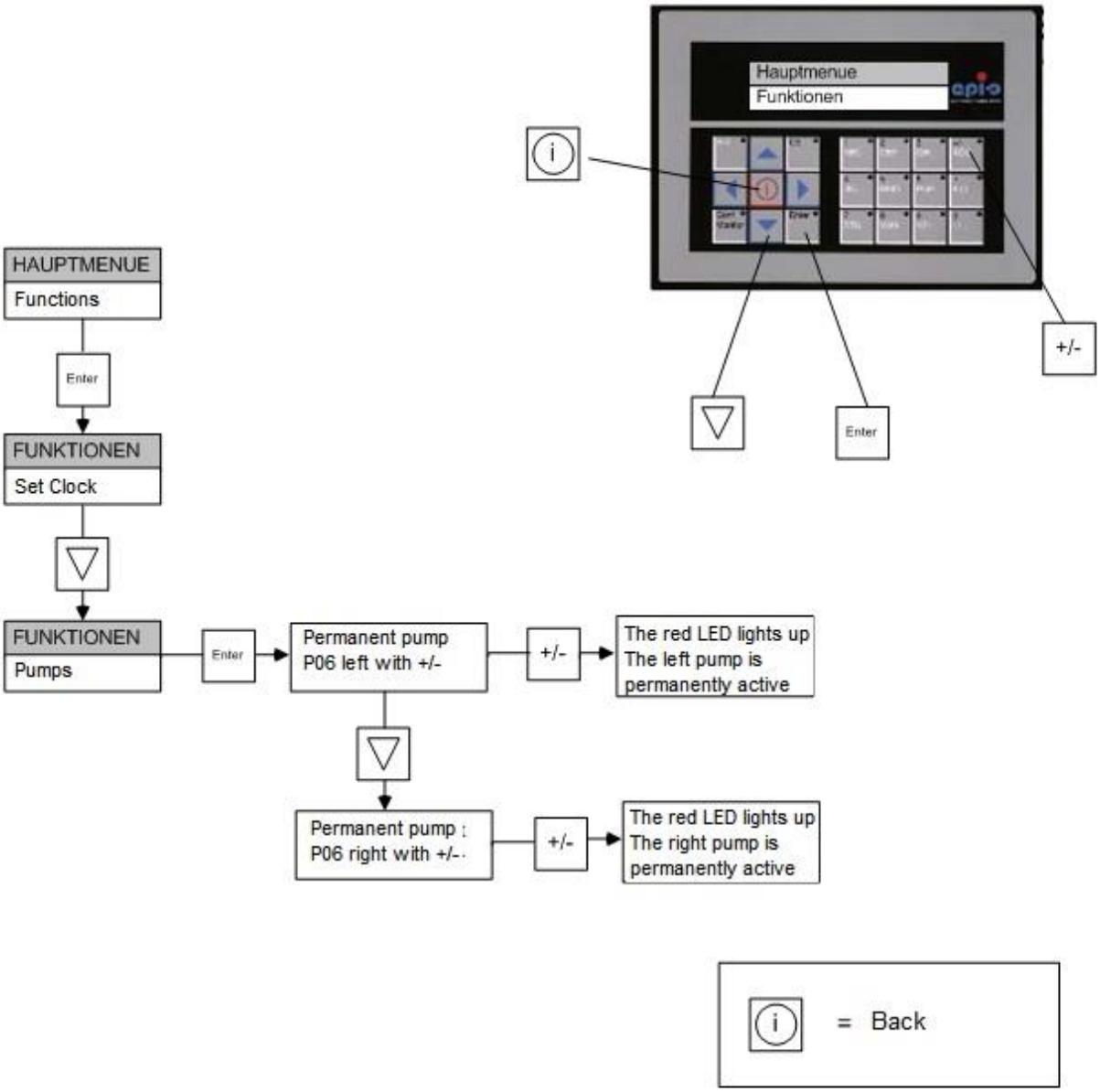
. Pull out the membrane by using a tong.

7. Reinstall the new membrane in reverse order. **Take care of the flow direction and position of the gasket.**

.

Rinse membrane!
After the new membrane has been installed the mode “drain permeate” has to be started for 20 minutes

13 Decommissioning of a pump



14 Disinfection

Disinfection may only be performed by **Nipro Pure Water** or by **instructed** persons.

Caution when handling disinfectants!
Per acetic acids can cause damage to your health. Always **read safety guidelines** before handling.

To be performed precisely!
Danger!
Ensure that no dialysis can be performed while disinfecting. Only approve thoroughly rinsed system for treatment use.


CAUTION!
While using chemicals.
Wear safety gloves and safety goggles during the here described jobs.

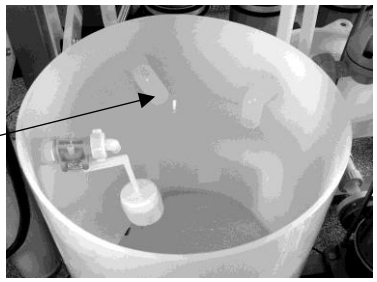

CAUTION!
Do not eat, drink or smoke while working.

Disinfectant: MINNCARE® Cold Sterilant (Artikelnr.:489)


Detection method: MINNCARE® Test Strips Residual (Artikelnr.:490)
MINNCARE® Test Strips 1 Indication (Artikelnr.:491)

1. Fill Cold Sterilant into the break tank (1 litre).
2. Start osmosis.
3. After 3-5 minutes test the back flow into the break tank for disinfectant.
4. If the test is positive (blue test strips), turn off the device for 20 minutes.
5. Start the permeate drain program and open the three-way permeate drain valve.
6. After 30 minutes set the tree-way back to the operation position.
7. Test permeate back flow at the nozzle in the break tank (see image) for disinfectant.
8. If disinfectant is still present (0 ppm white test strips), return the three-way valve to the drain position and let device continue running. Otherwise proceed to step 10.
9. Close three-way valve and shut down the device.
10. After 5 minutes start the program drain permeate.
11. Test all consumption points for disinfectant.
12. Let the device run until all consumption Points test negative for disinfectant.
13. Document disinfection. (see section 14.2).

Permeate back flow



Break tank

Three-way valve drain position

Before the next **dialysis**, test strips must be used to test the **absence of disinfectants** at **each** extraction point.

*** Free of disinfection means 0ppm-** no discoloration of the test strip.
See the colour scale on the packaging of the test strip Residual.

14.1 Disinfection Protocol

Dialysis centre	
Section	
Contact person	
Function	
Street / Bldg. No.	
Postcode / City	
Unit model :	☐ Phoenix One ☐ Phoenix One+
Serial number:	
Ring line length	

Disinfectant type	Inoculated amount in litres	
Wash time in minutes	Wait time in minutes	
Rinse time in minutes	Tested for disinfectant at all dialysis stations and results were negative?	☐ yes

If disinfection was preformed the operator is obligated by its signature to re-test all dialysis stations for **disinfectant**. This test must be conducted before the dialyses are performed

_____

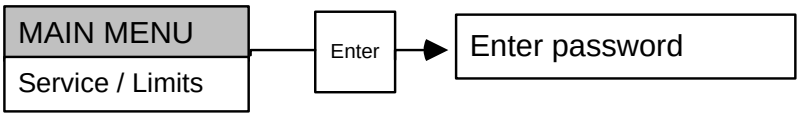
Date

_____

Signature

15 Service/Limits

Limit values can be changed here. This section can only be accessed with a password



HL (high Level) = Notification will be generated (1st limit value)
HHL (high high Level) = Alarm point (device will be shut down)

Limit	Meaning	Default	Notes
Temp. Permeate HHL	Max. Permeate temperature. Reaching this temperature will lead to shut down	38°C	
Temp. Permeate HL	At this temperature a cooling program will start. (concentrate drain will be increased)	32°C	
Temp.Ring end	The temperature to be reached at the ring end during hot water sanitisation.	80°C	*Only necessary for devices with hot water sanitization*
Temp. Cool	The temperature to be cooled to after hot water sanitization.	35°C	*Only necessary for devices with hot water sanitization*
Temp.Tank	The temperature the tank will be heated to.	85°C	*Only necessary for devices with hot water sanitization*
Ring pressure min.	If the ring line pressure drops below this pressure the device will shut down.	0,5 bar	
Ring pressure max.	At this value the device will shut down due to too high pressure	5 bar	
Conductivity max.	At this value the device will shut down due to too high conductivity	100µS/cm	
Conductivity Alarm	At this value the yield will be reduced.	50 µS/cm	
Yield	Desired yield	80%	
Reduce yield	If the limit value „Conductivity alarm“ is reached, the yield	10%	

	will be reduced by the value entered here.		

Yield hard water	If an error in the softening device is registered by the external hardness gauge, the yield will be reduced to this value.	60%	
Rinse time	Duration of the idle rinsing	5 min	
Rinse interval	Interval until the next rinsing	180 min	
Permeate min. delayed	If no permeate is required for longer than the value entered here, the device will automatically shut down	5 h	
Heat max.	If the set temperature is not reached within this amount of time, the hot water sanitization will abort	300min	*Only necessary for devices with hot water sanitization*
Circulation	Circulation time during hot water sanitization.	20 min	*Only necessary for devices with hot water sanitization*
Pre-rinse hot water sanitisation	Rinse time for hot water sanitization	5 min	*Only necessary for devices with hot water sanitization*
Circulation quick cleaning	Circulation time during quick cleaning.	10 min	*Only necessary for devices with hot water sanitization*
Pre-rinse quick cleaning.	Rinse time for quick cleaning	3 min	*Only necessary for devices with hot water sanitization*
Clearance Heating	Minimum fill level to start heating	100 l	*Only necessary for devices with hot water sanitization*
Contents hot water sanitisation	Tank fill level for hot water sanitization	300 l	*Only necessary for devices with hot water sanitization*
Contents quick cleaning	Tank fill level for quick cleaning	150 l	*Only necessary for devices with hot water sanitization*
Contents rinse tank	Required rinse amount for cleaning the tank	100 l	*Only necessary for devices with hot water sanitization*
Contents empty	The tank will be displayed as empty at or below the value entered here.	5 l	*Only necessary for devices with hot water sanitization*

16 EMC manufacturer’s Declaration

Electromagnetic emissions and electromagnetic immunity

The RO device is intended for use in electromagnetic environments as described below.
The customer or the operator of the RO should ensure that the device is only used in such an environment.

This EMC manufacturer's declaration is based on the use of the power supply unit from Phoenix Contact.
The power supply is installed in the control cabinet.

Warning
The use of other accessories, other power supply units and cables than specified can lead to increased emissions and / or reduced interference immunity of the RO.

Requirements
During the interference immunity tests, the temperature accuracy and conductivity accuracy were checked.

Emission measurement	**Compliance**	**Electromagnetic environment - Guidelines**
RF emission in accordance with CISPR 11 / EN 5511	Group 1	The device only uses RF energy for its internal function. Its RF emissions are therefore very low and interference to nearby electronic devices is unlikely.
RF emission in accordance with CISPR 11 / EN 55011	Class B	The device is suitable for use at any location, including residential areas and facilities directly connected to the public low-voltage grid for residential buildings.
Harmonics in accordance with IEC 61000-3-2	Class A	
Voltage fluctuations / flickers in accordance with IEC 61000-3-3	Fulfilled	

Immunity test	**Test level – IEC 60601**	**Compliance level**	**Electromagnetic environment - Guidelines**
Discharge of static electricity (ESD) in accordance with EIC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	The floor should be made of wood, concrete, or of tiles. In case of synthetic flooring, relative air humidity should be at least 30%.
Electrical fast transient	± 2 kV for power cables	± 2 kV for power cables	The quality of supply voltage should comply with that of a

burst/immunity test in accordance with IEC 61000-4-4	± 1 kV for input and output cables	± 1 kV for input and output cables	typical commercial or hospital environment.
Surge voltage in accordance with IEC 61000-4-5	± 1 kV outer conductor-outer conductor ± 2 kV outer conductor-ground	± 1 kV outer conductor-outer conductor ± 2 kV outer conductor-ground	The quality of supply voltage should comply with that of a typical commercial or hospital environment.
Voltage drops, short interruptions, and fluctuations in supply voltage in accordance with IEC 61000-4-11	95% voltage drop for ½ period 60% voltage drop for 5 periods 30% voltage drop for 25 periods 95% voltage drop for 5 s	95% voltage drop for ½ period 60% voltage drop for 5 periods 30% voltage drop for 25 periods 95% voltage drop for 5 s	The quality of supply voltage should comply with that of a typical commercial or hospital environment. If the device is to continue functioning uninterruptedly in case of power interruptions, it is recommended that the device be operated via uninterrupted power supply or a battery.
Magnetic field at supply frequency (50/60 Hz) in accordance with IEC 61000-4-8	3 A/m	3 A/m	In supply frequency, the magnetic fields should comply with the values characteristic of locations in a typical commercial or hospital environment.
Conducted RF disturbances in accordance with IEC 61000-4-6	3 V rms 150 kHz to 80 MHz	3 V rms 150 kHz to 80 MHz	When operating portable or mobile RF communication devices (transmitters), a safety distance should be observed to all parts of the device, including cables, calculated on the basis of one of the following equations depending on the transmission frequency. Recommended safety distance:
Radiated RF disturbances in accordance with IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m 80 MHz to 2.5 GHz	$d = 1.2\sqrt{P}$ 150 kHz to 80 MHz $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz Whereby P is the maximum nominal output of the respective transmitter specified by the manufacturer in Watts (W), and d is the

			recommended safety distance in meters (m). The field strength of stationary RF transmitters, which is definable via electromagnetic site survey a, should be below the compliance level of the individual frequency ranges b. Disturbances are possible near devices which bear the symbol below. 
Note: These guide values may not apply to all situations. Spreading of electromagnetic waves is also influenced by absorption and reflection via buildings, items, persons, and animals.			
a. The field strength of stationary transmitters (e.g. base stations of mobile phones (mobile/cordless) and mobile land mobile radios, amateur radio stations, AM and FM radio, and TV transmitters), cannot be theoretically calculated in advance. To identify the electromagnetic environment with regard to stationary RF transmitters, an electromagnetic site survey should be considered. If the field strength identified at the location at which the device is used exceeds the RF compliance level specified above, the device should be closely observed. It may be necessary to take additional measures (e.g. changing the alignment or transposition of the device). **b.** Across the frequency range of 150 kHz to 80 MHz, the field strength should be less than 3 V/m.			

Recommended minimum distances between portable and mobile RF communication devices and the RO

The RO is intended for use in electromagnetic environments in which radiated RF disturbances are controlled. The buyer or user of the RO can help prevent electromagnetic interference by maintaining a minimum distance between portable/mobile RF communications equipment (transmitters) and the RO as recommended below, according to the maximum output power of the communications equipment.