OSMOSIS UNITS
MODULO SK
500 - 800 - 1000 & 1200

Assembly, start-up and operating manual

VERY IMPORTANT:
Read this manual carefully before any connection, filling and use.
Failure to comply with these requirements may invalidate the **PERMO** guarantee.

- ✓ **REGULATIONS: 3**
- ✓ **TECHNICAL DESCRIPTION: 3**
- ✓ **ASSEMBLY, HYDRAULIC AND ELECTRICAL CONNECTIONS: 8**
  - INLET FOR WATER TO BE TREATED: 8
  - TREATED WATER OUTLET (OSMOSIS UNIT PERMEATE): 8
  - WASTE EVACUATION PIPE: 8
  - WASTE EVACUATION PIPE (CONTINUED): 9
  - SALT TANK OVERFLOW EVACUATION PIPE: 9
  - ELECTRICAL CONNECTIONS: 9
- ✓ **DESCRIPTION OF PROCESS USED: 10**
  - GENERAL: 10
  - PRE-FILTRATION 12
  - SOFTENING 12
  - FILTRATION 12
  - 1µ MICROFILTRATION FILTER 13
  - OSMOSIS 13
  - SOURCE: 14
  - AVERAGE MINERALISATION: 14
  - WATER REQUIREMENTS: 14
  - ESTIMATED DAILY CONSUMPTION: 14
- ✓ **FILLING: 15**
- ✓ **USE OF OSMOSIS UNITS: 16**
  - RAW WATER 18
  - SOFTENING 18
  - MICROFILTRATION 18
  - OSMOSIS UNIT 18
- ✓ **GENERAL 20**
- ✓ **HYDRAULIC INTERVENTIONS 20**
- ✓ **ELECTRICAL INTERVENTIONS 20**
- ✓ **OSMOSIS UNIT MAINTENANCE 20**
- ✓ **EVERY DAY (USE THE DAILY FOLLOW-UP SHEET) 20**
  - RAW WATER 20
  - PRE-FILTRATION 20
  - SOFTENERS 20
  - ACTIVATED CARBON FILTERS AND MICRO-FILTRATION 21
  - OSMOSIS UNIT 21
- ✓ **EVERY WEEK 21**
  - RAW WATER 21
- ✓ **EVERY 3 MONTHS 21**
  - ACTIVATED CARBON FILTERS AND MICRO-FILTRATION 21
  - OSMOSIS UNIT 22
- ✓ **EVERY 6 MONTHS 22**
  - PRE-FILTRATION 22
  - OSMOSIS UNIT 22
- ✓ **EVERY YEAR 22**
- ✓ **EVERY 2 YEARS 22**
- ✓ **GENERAL 23**
- ✓ **OPERATING INSTRUCTIONS 23**

1 TECHNICAL DESCRIPTION

✓ REGULATIONS:

The EC marking on this equipment indicates its compliance with the requirements of:

- directive 89/336/CEE of 03/05/89 relating to electromagnetic compatibility, modified by directive 92/31/CEE of 28/04/92 modified by directive 93/68/CEE of 22/07/93
- directive 73/23/CEE of 19/02/73 relating to electrical equipment designed to be used within certain voltage limits, modified by directive 93/68/CEE of 22/07/93.

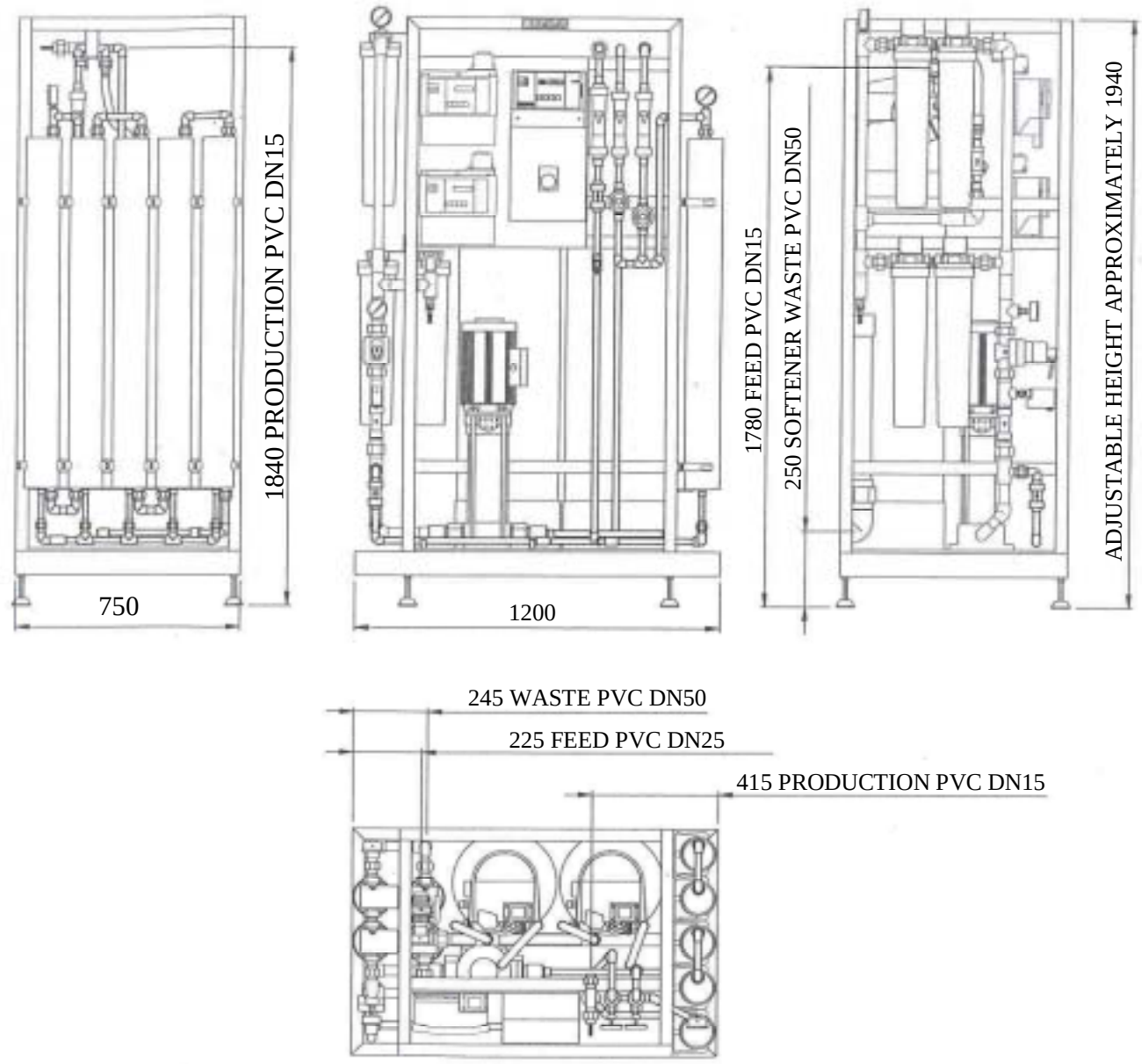
This equipment is subject to directive 97/23/CE of 29/05/97 relating to pressurised equipment. It meets the requirements of article 3 point 3 (design and production according to standard professional practice) but does not come under categories I to IV, and is therefore not concerned by the EC markings relating to pressurised equipment.

✓ TECHNICAL DESCRIPTION:

PERMO MODULO SK compact osmosis units are ready to be connected hydraulically and electrically and contain on a stainless steel frame all the systems enabling the pre-treatment, microfiltration and reverse osmosis of the water to be treated. They are composed of:

- One 100 µm pre-filter with a manual unclogging drain cock,
- 2 ***6000 A4-X Control*** type softeners mounted in parallel and equipped with a Bio-system chlorination sensor,
- 2 salt tanks installed outside the frame,
- 1 microfiltration assembly comprising (depending on the models):
  - 2 or 3 activated carbon 20" dechlorinating filters,
  - two or three 20" 1µm final filters,
- 1 reverse osmosis unit composed of:
  - 1 pre-treated water intake solenoid valve,
  - 1 stainless steel vertical centrifugal pump,
  - 1 set of osmosis modules,
  - the adjustment and control devices necessary for the operation of the unit,
  - 1 electromechanical power box
  - 1 ***Membran Control*** electronic control and conductivity box,

2 DIMENSIONS



Dimensions in millimetres

Diagram no. 1 " *Modulo SK* dimensions"
(type ***SK1200*** model represented)

Identical dimensions for all ***Modulo SK*** models.

3 TECHNICAL CHARACTERISTICS

MODULO "SK" OSMOSIS UNITS

Types		500	800	1000	1200
Code		PK0004502	PK0004503	PK0004504	PK0004505
Pre-treatment					
Filtration fineness	µm	100	100	100	100
Qty installed		1	1	1	1
Softening					
Types		6050 A3X Ctrl	6075 A3X Ctrl	6075 A3X Ctrl	6075 A3X Ctrl
Qty installed		2 in parallel	2 in parallel	2 in parallel	2 in parallel
Bio-system chlorination		yes	yes	yes	yes
L.P. suppression valve		yes	yes	yes	yes
Salt tank					
External diameter	mm	530	720	720	720
Qty installed		2	2	2	2
Microfiltration					
Activated carbon		CA - 20''	CA - 20''	CA - 20''	CA - 20''
Qty installed		2	2	3	3
1 micron filtration		1µ - 20''	1µ - 20''	1µ - 20''	1µ - 20''
Qty installed		2	2	3	3
Reverse osmosis					
H.P. pump		CRN2-130 Tri	CRN2-130 Tri	CRN2-150 Tri	CRN2-150 Tri
Number of pressure bodies		2	3	4	5
Number of membranes/body		1	1	1	1
Type of membrane		4''LE 30 40-40	4''LE 30 40-40	4''LE 30 40-40	4''LE 30 40-40
Permeate flow rate	l/h (*)	500	800	1000	1200
Connection diameter					
Feed	union PVC	DN25 (d=32)	DN25 (d=32)	DN25 (d=32)	DN25 (d=32)
Permeate	union PVC	DN15 (d=20)	DN15 (d=20)	DN15 (d=20)	DN15 (d=20)
Waste	union PVC	DN50 (d=63)	DN50 (d=63)	DN50 (d=63)	DN50 (d=63)
Delivery weight	Kg	180	240	280	300

Table no. 1 "Technical characteristics"

(*) - Permeate flow rate for a water to be treated at 15°C in off-line mode

(**) - For a water with mineralisation of 400 mg/l

The flow rates indicated depend on the adjustments and the operating requirements linked to the water to be treated and the conditions of use.

4 TECHNICAL OPERATING CONDITIONS

MODULO "SK" OSMOSIS UNITS

Types		500	800	1000	1200
Code		PK0004502	PK0004503	PK0004504	PK0004505
Softening voltage					
single-phase power supply	Volts	230 50/60Hz	230 50/60Hz	230 50/60Hz	230 50/60Hz
Power in service	Watts	10	10	10	10
Power in regeneration	Watts	50	50	50	50
Osmosis unit voltage					
three-phase power supply	Volts	3 x 400	3 x 400	3 x 400	3 x 400
Power	Kw	1.6	1.6	1.6	1.6
Pressure					
min. in operation(dynamic mode)	Bars	1.5	1.5	1.5	1.5
max. acceptable (static mode)	Bars	7.0	7.0	7.0	7.0
Flow rates (*)					
min. feed required	l/h	2400	2500	2800	3200
max. to sewer	l/h (*)	1600	1600	1800	1900
Temperatures					
minimum temperature of water	°C	1	1	1	1
maximum temperature of water	°C	35	35	35	35
minimum ambient temperature	°C	above freezing	above freezing	above freezing	above freezing
maximum ambient temperature	°C	40	40	40	40

Table no. 2 "Technical operating conditions"

(*) - Flow rates given for information only for a pressure of 4 bar which may fluctuate according to the adjustments of the various parameters linked to the quality of the water to be treated and the results to be obtained.

5 PLACE OF INSTALLATION

The ***Modulo SK*** osmosis unit must be installed in an accessible, clean, dry and well-ventilated room. This room must be above freezing temperature and the atmosphere must not contain chemical vapours liable to harm its functioning and its materials. The ground on which the frame rests must be perfectly horizontal.

The installer should check before installation of the equipment that the space requirement conditions (see dimensional drawing), the technical characteristics and the technical operating conditions (according to technical characteristics and description of the installation) are fully complied with.

The salt tanks shall be placed as close as possible to the softeners, preferably on the same horizontal plane (maximum acceptable difference in level: 0.5 to 1 metre depending on the pressure of the water to be treated). The maximum acceptable distance in the same plane is four metres depending on the pressure of the water to be treated. The salt tanks must be easily accessibly to enable reloading with salt for the regenerations and maintenance operations.

The room must also have a sewer outlet sufficiently sized for the softening and osmosis unit waste regeneration waters (see table no. 2 "Technical operating conditions").
In the case of evacuation via a recovery pit and a lifting pump, size this equipment to avoid risks of flooding of the room.

To enable any maintenance operations, provide access all around the osmosis unit or, if this is not possible, make the connections with hoses or easily removable unions so that the equipment can be moved.

The installation must be protected against any backflows by suitable non-return devices, fitted downstream from the installation on the treated water pipe.

6 PRIOR CONDITIONS FOR START-UP OF THE INSTALLATION

✓ ASSEMBLY, HYDRAULIC AND ELECTRICAL CONNECTIONS:

The electrical and hydraulic connections must be made in accordance with standard professional practice and the standards and regulations applicable to the premises in which the osmosis unit is installed. In particular, if the water inlet and outlet pipes are equipped with devices which can cause water hammers, effective anti-hammers must be installed.
In addition, the electronics of the softener and osmosis unit control box is sensitive, like all electrical equipment, to electrical or magnetic interference. The control boxes are equipped with series of filters enabling the usual interference to be eliminated. However, if there are power relay contactors, transformers or any other equipment emitting interference nearby, the connections will have to be made with shielded cable and suitable anti-interference means will have to be used.

- ***Inlet for water to be treated:***

The inlet pipe for the water to be treated must be sized to ensure the required flow rates and pressures (see table no. 2 "Technical operating conditions").
It is up to the installer to verify all the specific sanitary regulations which may be in force on the place of installation and to comply with them.

- ***Treated water outlet (osmosis unit permeate):***

The outlet pipe for the osmosis water must be made of non-oxidising materials such as pressure PVC or stainless steel. Under no circumstances should materials such as copper or brass be used.
This pipe must take the most direct path possible in order to limit as far as possible any head losses which may adversely affect the efficiency of the osmosis unit.

- ***Waste evacuation pipe:***

The waste evacuation pipe must be sufficiently sized to enable the evacuation of the softening station and osmosis unit waste regeneration waters (see table no. 2 "Technical operating conditions"). The maximum flow rate is given for a softener in regeneration and the osmosis unit in service.

- ***Waste evacuation pipe (continued):***

The evacuation must be gravitational and the gradient must be sufficient to evacuate the maximum flow. It must follow the simplest and shortest possible route without head loss (free outflow).
It shall be made of PVC or non-oxidising materials (presence of concentrated brine during the regeneration of the softeners).

- ***Salt tank overflow evacuation pipe:***

The salt tanks are equipped with a safety overflow (grooved union, diameter 18 mm) which must be connected independently either in a gutter or to the main sewer pipe. The outflow must be gravitational, without head loss. It is imperative to create an air gap of at least two centimetres in accordance with the sanitary regulations.

- ***Electrical connections:***

The three-phase power supply (3 x 400 volts) of the ***Modulo SK*** is provided in the power box of the osmosis unit at the Phase and Ground terminals. (as per wiring diagram code 14410 appended to the documentation section of the manual).
The power supply of the ***6000 A4X Control*** softeners (230 volts 50 Hz single-phase) is to be provided on a standardised 2-pole connector (one connector to be provided per softener). Match the connection cable cross sections to the powers installed (see also table no. 2 "Technical operating conditions").

It is up to the installer to install the protections downstream from the unit and the appropriate type of cable in accordance with the standards in force on the place of installation.

Other electrical connections may need to be provided in accordance with the downstream installations and the chosen operating mode, such as, for example:

- level connection in an osmosis water storage tank,
- connection of a remote control,
- etc.

✓ DESCRIPTION OF PROCESS USED:

▪ *General:*

Modulo SK osmosis units enable purified water to be obtained from the town water network. Although it meets strict drinkability criteria, this water is not suitable in its existing condition for the various applications in industrial or other environments.
It must therefore undergo additional treatment to give it the required characteristics.

The ***Modulo SK*** models comprise the following treatments.

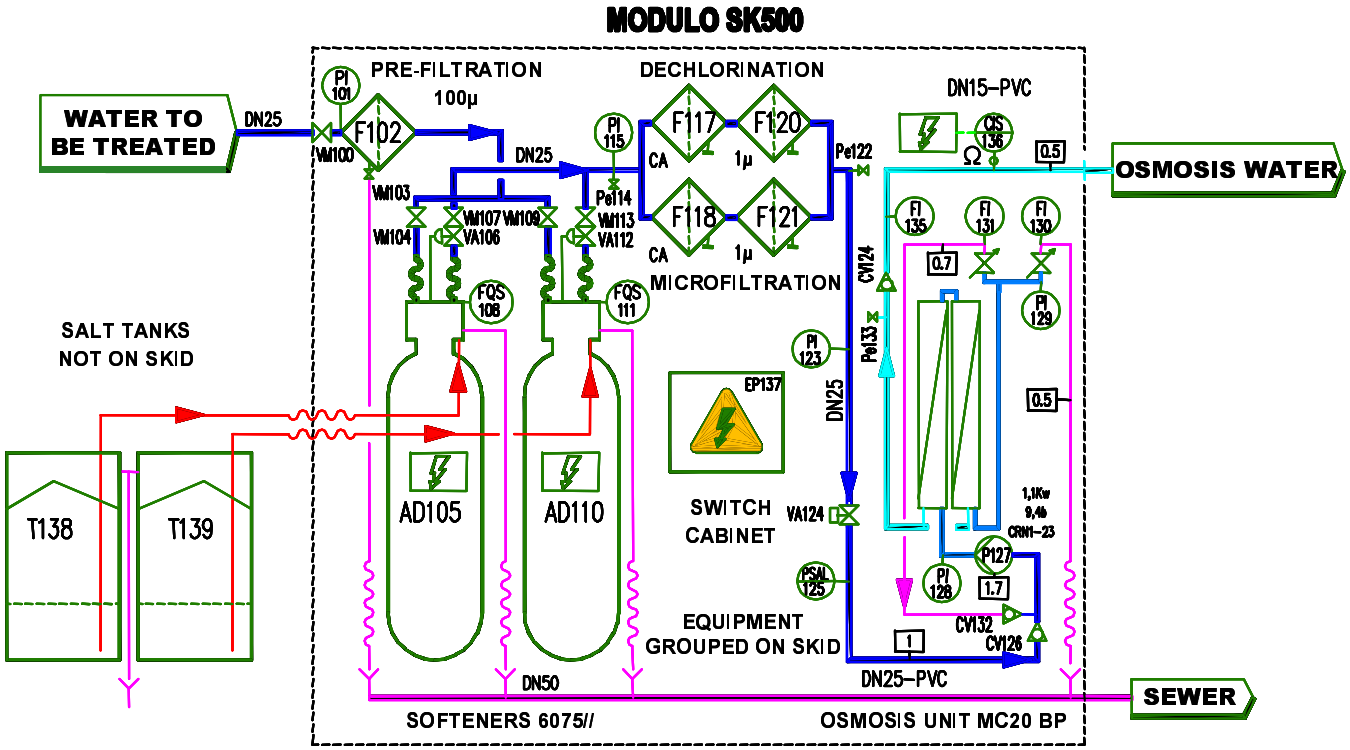


Diagram no. 2: Skeleton diagram

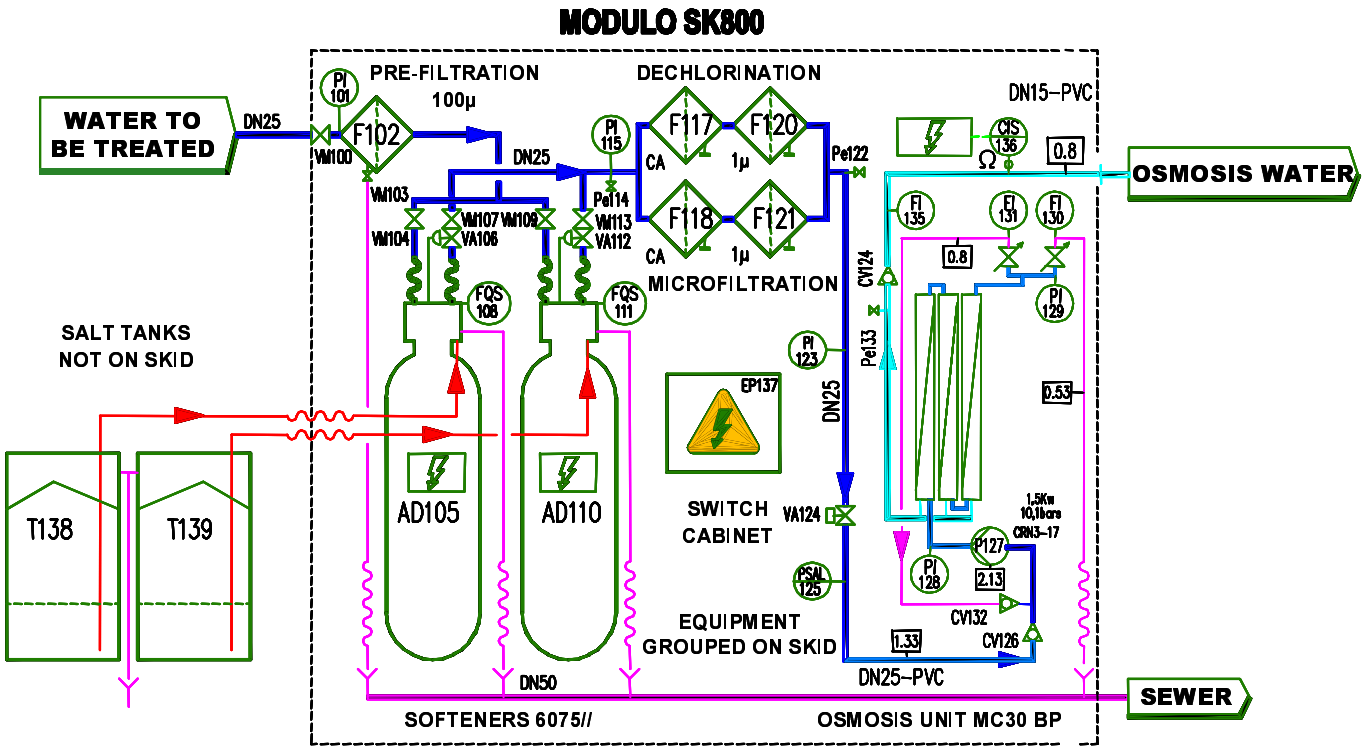


Diagram no. 2: Skeleton diagram

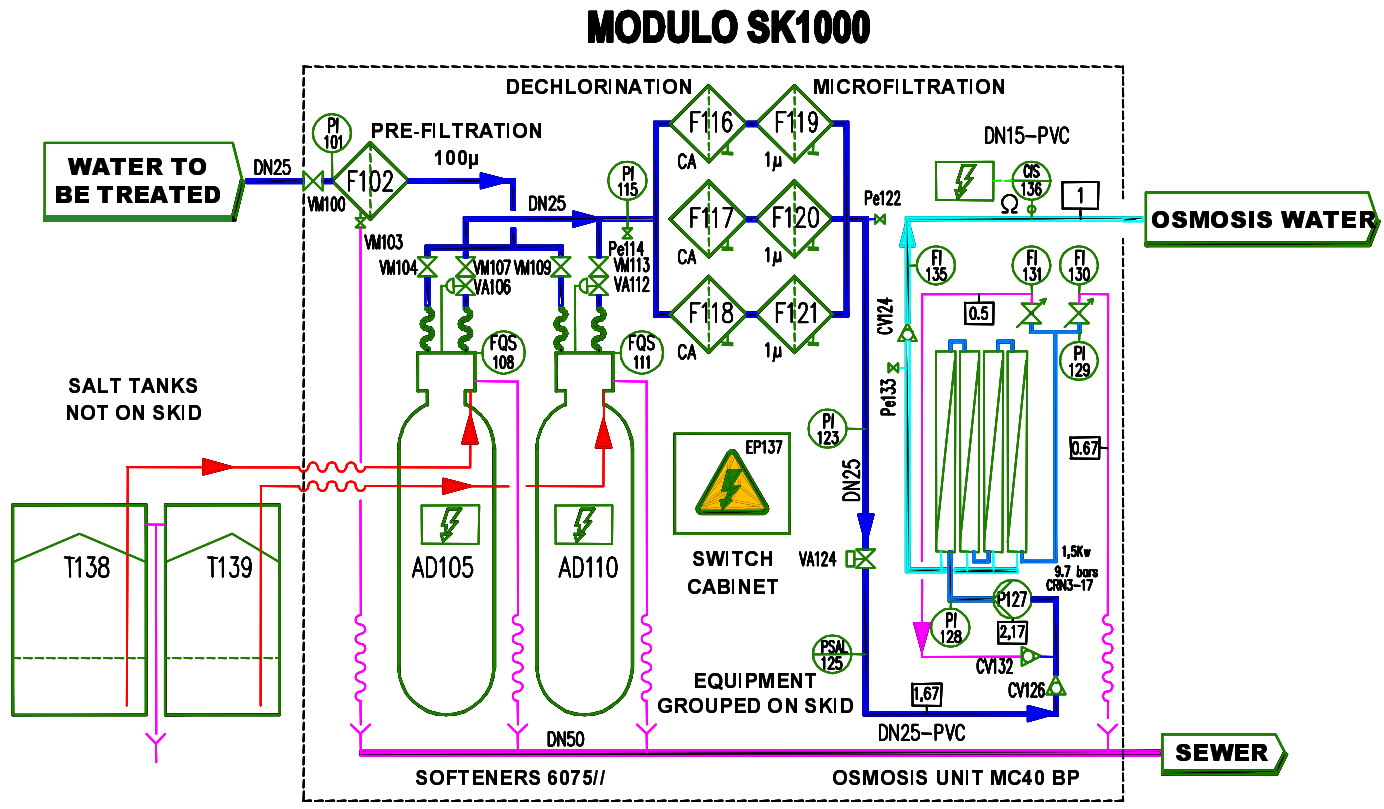


Diagram no. 2: Skeleton diagram

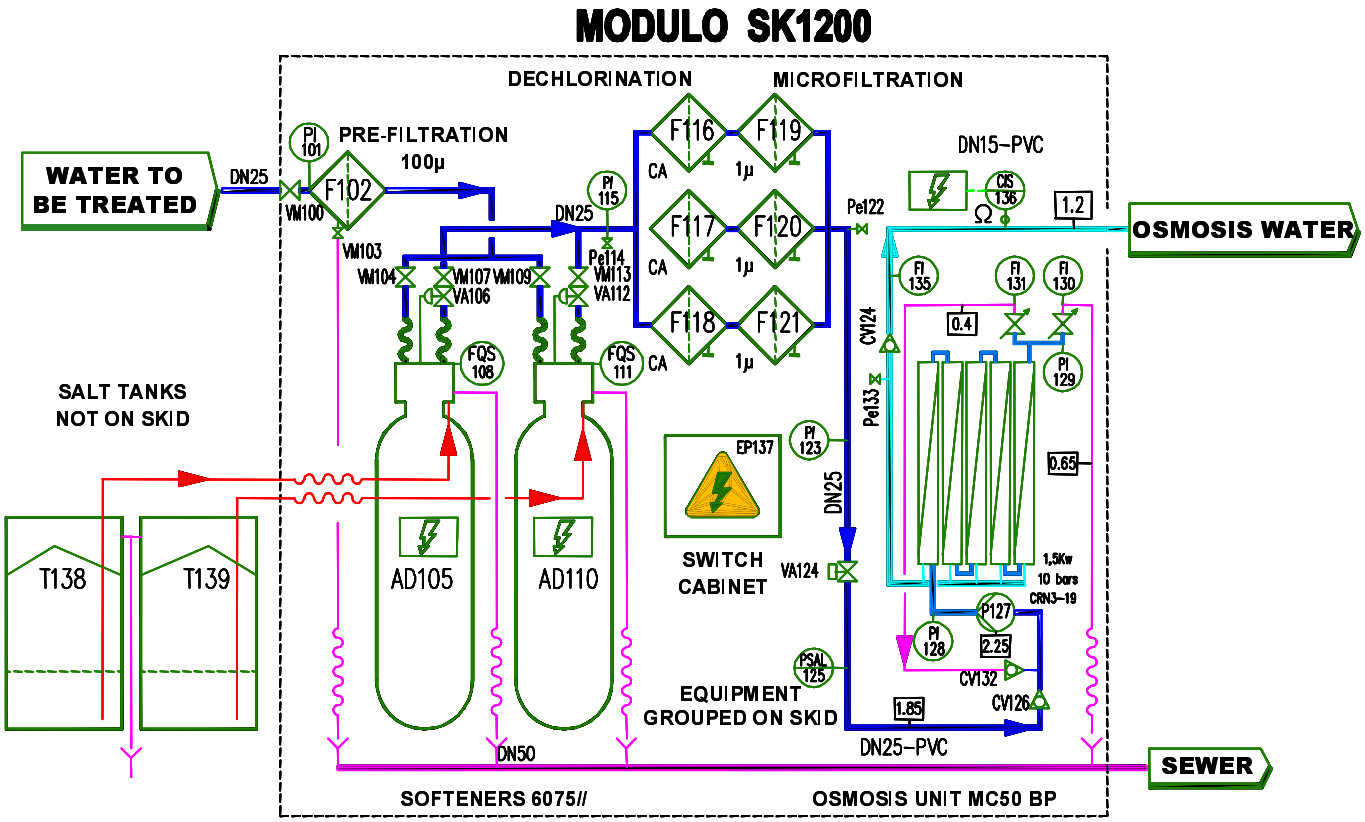


Diagram no. 2: Skeleton diagram

- ***Pre-filtration***

The feed water (town water) is pre-filtered on a 100-micron Nylon sieving filter in order to eliminate the coarse particles contained in the water.

- ***Softening***

Softening is the technique used to eliminate the TH (hardness) of the water.
It consists in replacing the calcium and magnesium ions which cause the hardness of the water with sodium ions fixed on the resin of the softener.
When all the sodium ions have been exchanged, the resin is said to be saturated and it must be regenerated. Regeneration of the resin with brine (saturated NaCl solution) is then carried out. The sodium ions are thus fixed again, while the calcium and magnesium ions are evacuated to the sewer in the form of chlorides.

- ***Filtration***

The filtration system is composed of dechlorinating activated carbon filters.
The dechlorination is carried out on cartridges of activated carbon which, thanks to their catalysing properties, convert the free chlorine contained in the water into chlorides. This operation is necessary because the osmosis membranes are sensitive to chlorine.

- ***1µ microfiltration filter***

The filtering cartridges with a fineness of 1 micron retain the finest suspended solids and thus prevent premature clogging of the membranes of the osmosis unit.

- ***Osmosis***

The osmosis system consists of one or more groups of reverse osmosis modules and a high-pressure pump.

A reverse osmosis module is a cylinder separated into two compartments by the membrane. The water to be purified is distributed on the surface of the membrane by a diffuser tube; the water passes through the membrane and is collected on the other side of this membrane to be evacuated from the module through a "production" hole.

The quality of a water purified by reverse osmosis is defined in terms of physical composition, chemical composition (mineral and organic) and microbiological population.

The conductivity of the purified water is continuously monitored with a digital indication on the control box of the osmosis unit. The purified water is sent either for direct distribution or to an osmosis water storage area.

Before starting up a ***Modulo SK***, it is necessary to check that the water to be treated corresponds to the following characteristics (basic elements of the study).
For additional information on the principles used, refer to the "general information" chapter.

- GE4A1 Filtration
- GE6A1 Treatment by activated carbon
- GE7 Ion exchangers
- GE9 Membrane separation techniques
- GE10A3 Conductivity

7 CHARACTERISTICS OF WATER TO BE TREATED

- ***Source:***

  Feed pressure: bar

  Temperature: °C

- ***Average mineralisation:***

- pH :	
- Ca^{2} :	mg/l
- TH :	°f
- Mg^{2+} :	mg/l
- TA :	°f
- Na+ :	mg/l
- TAC :	°f
- K+ :	mg/l
- Fer :	mg/l
- Cl- :	mg/l
- SiO2 :	mg/l
- SO4 :	mg/l
- SAF :	°f
- NO3 :	mg/l

- ***Water requirements:***

  Use of water:

  Instantaneous flow rate: l/h

- ***Estimated daily consumption:***

  Estimated peak flow rate: m3/h

  Conductivity: µS/cm

8 START-UP OF THE INSTALLATION

Once the electrical and hydraulic connections have been made and checked as indicated in the previous chapters and in the technical documentation and wiring diagrams in the appendix, and the water to be treated has been checked, start up the installation in accordance with the instructions below.

- Check that all the manual valves are closed.
  - . ***Modulo SK*** inlet upstream from the 100-micron filter
  - . Inlet and outlet of each softener.
- Check that the stainless steel needle valves on the reverse osmosis unit (below the flowmeters) are fully open.
- Switch on the ***Modulo SK*** using the switch on the front face of the power box.
- Programming of softener control boxes
- Check the feed to the softeners; the readouts on the ***A4-X Control*** boxes must be lit up.
- Refer to the ***A4-X Control 6000*** start-up instructions appended to the "***A4-X Control*** box programming" section to program the control boxes.
- Note the programmed values on page 18 ("Start-up values").
- Refer in these instructions to the "first start-up" section and the paragraph entitled "brine regulator adjustment" and adjust the brine regulator located in the salt tanks of each softener.

✓ FILLING:

- Open the valve upstream from the 100µ pre-filtration and open the pre-filtration sewer drain in order to rinse the upstream pipe.
- Once the pipe has been correctly rinsed, start the regeneration on one of the softeners (see A4X Control 6000 manual), then slowly open the valve at the inlet of the softener to drain it and rinse the ion exchanger resins.

Once the softener has been drained and rinsed, stop the regeneration (see 6000 A4X manual) and
then carry out the same operation on the other softener.
Once the softeners have been drained and rinsed correctly,

- install the activated carbon cartridges of the filtration system, taking care to position the seals correctly.
- Open the isolating valves downstream from the softeners, drain the activated carbon filters (drain cock on the upper part of the filtration casings), then open the sampling point downstream from the filtration to rinse the activated carbon cartridges.

Once the cartridges have been rinsed, close the isolating valves downstream from the softeners and lower the pressure.

- install the 1-micron cartridges, being careful to position the seals correctly.
- Open the shut-off valves downstream from the softeners, drain the 1-micron filters and open the sampling point downstream from the filtration to rinse the 1-micron cartridges.

Then carry out an analysis of the TH, the chlorine and the iron and a measurement of the fouling index downstream from the pre-filtration in order to check the correct functioning of the pre-treatment. Note the values indicated on page 18 under "Start-up values".

IMPORTANT

To ensure the correct operation of the reverse osmosis installation, certain parameters must be particularly closely monitored.

The maximum acceptable values are indicated below:

IC < 3	1µ filter outlet
Chlorine = 0 ppm	Activated carbon filter outlet
pH < 10	1µ filter outlet
Fe < 0,01 ppm	1µ filter outlet
TH < 0,5°f	Softened water outlet

FAILURE TO COMPLY with these instructions may invalidate the guarantee covering the equipment (particularly the reverse osmosis modules).

✓ USE OF OSMOSIS UNITS:

Once the pre-treatment has been started up and the characteristics of the pre-treated water have been checked:

- program the control box of the ***"Membran Control"*** osmosis unit in accordance with the appended specific instructions and refer to the programmed values on the data sheet appended to the instructions.
- Check that adjustment valves of the osmosis unit are fully open.

On delivery the osmosis unit contains a preservative solution (1% bisulphite solution), which needs to be evacuated on start-up. For this purpose, disconnect the osmosis water outlet and connect it to the sewer. Start up the osmosis unit and adjust the waste and recirculation valves so as to obtained the recommended pressures and flow rates indicated in the table below.

9 START-UP VALUES

The values indicated are basic average values for a water of average mineralisation of 30° (French) at a temperature of 15° C.
These values may differ according to the results required, the operating conditions and the nature of the water to be treated.

MODULO "SK" OSMOSIS UNITS

Types		500	800	1000	1200
Code		PK0004502	PK0004503	PK0004504	PK0004505

Membrane inlet HP pressure	bars	10 / 15	10 / 15	10 / 15	10 / 15
Waste flow rate	l/h	500	500	700	800
Recycling flow rate	l/h	700	800	500	400
Permeate flow rate (not adjustable)	l/h	500	800	1000	1200

The average conversion rate is between 50 and 60%. The above values may therefore differ according to the real performances of the equipment.

Comply <u>at least</u> with the waste flow rates indicated in the table above (unless specified otherwise by ***PERMO***). An insufficient waste flow rate may lead to irreversible clogging of the reverse osmosis membranes without the guarantee being applicable.

- Rinse the osmosis unit until the desired quality is obtained, then stop the equipment.
- Reconnect the reverse osmosis outlet.
- Restart the osmosis unit and refine the adjustments if necessary.
- Note the adjustment values on page 18 under "Start-up values")

The flow rate and pressure values indicated take into account a stable dynamic input pressure without washing or regeneration equipment, with the osmosis unit in normal service and new filters.

- ***Raw water***

- Town water pressure :	bar
- Water temperature:	°C
- TH analysis:	°f
- Chlorine analysis:	mg/l
- pH measurement:	
- Fouling index measurement:	

- ***Softening***

- Softener cycle:	litres
- Regeneration time (duration:	minutes
- Possible time of regeneration:	
- Brine regulator adjustment:	mm
- Softened water pressure:	bar

- ***Microfiltration***

- Filter upstream pressure:	bar
- Filter downstream pressure:	bar
- Upstream/downstream differential pressure:	mb

- ***Osmosis unit***

- Recycling flow rate:	l/h
- Production flow rate:	l/h
- Waste flow rate:	l/h
- Osmosis inlet pressure:	bar
- Waste pressure:	bar
- Treated water conductivity:	µS/cm
- Min. pressure switch adjustment:	bar
- Regulation mode:	☐ Levels
	☐ Automatic
	☐ Manual

Also fill in the programming data sheet of the "EXP76" ***Membran control*** box.

10 OPERATION

The operation of the osmosis unit will be limited to adjustments of the conversion rate while complying with the specific operating instructions included in this manual. The adjustment of the conversion rate is the ratio of the permeate flow rate to the flow rate of water supplying the osmosis unit.

The conversion rate is adjusted only by manoeuvring the recycling and waste adjustment valves.
The two valves should be used to maintain a conversion rate of approximately 50% to 60% on the membranes and maintain a pressure between 10 and 15 bar (see start-up values).

A reduction of the waste flow rate would lead to an irreversible clogging of the membranes and a modification of the operating pressure could lead to the obtaining of an osmosis water of lower quality.

Remarks:

The modules are calculated for a feed water at a temperature of 15°C, except in cases specified in the technical characteristics section.
This means that the flow rate decreases by approximately 3% per degree centrigrade below the reference temperature and also increases by 3% for higher temperatures.
The production rate may therefore vary. It may be necessary to adjust the waste flow rate and the recycling flow rate again so as to maintain a conversion rate between 50% and 60% and a pressure close to the value read on start-up of the ***Modulo SK*** osmosis unit.

11 MAINTENANCE

✓ GENERAL

We draw your attention to the need for strict compliance with the instructions drawn up in accordance with the operating conditions of the installation.
We also stress the need to fill in a monthly follow-up sheet correctly so that all anomalies are identified and corrected in time.
All noticeable variations or modifications of the performances must be brought to the attention of ***PERMO*** so that any preventive corrections can be made.

✓ HYDRAULIC INTERVENTIONS

Switch off the equipment concerned beforehand. In case of intervention, correctly isolate the installation and drain it to reduce the pressure in the pipes and the constituent devices.

✓ ELECTRICAL INTERVENTIONS

All interventions must always be carried out by qualified personnel. The corresponding control equipment must be switched off.

✓ OSMOSIS UNIT MAINTENANCE

Fill in the follow-up sheet, noting legibly the flow rates, the pressures, the qualities and, if need be, the incidents encountered.
To be usable, the readings must be made during the same operating phase, i.e. in production.
Inspect the installation to detect any leaks or faults.

✓ EVERY DAY (USE THE DAILY FOLLOW-UP SHEET)

- ***Raw water***

  Read the pressure at the entry of the installation

- ***Pre-filtration***

  Check the clogging of the cartridges and replace them if necessary.
  Drain the installation after intervention.

- ***Softeners***

  Check the TH at the equipment outlet with the sampling valve.
  Check the level of salt in the tank and top up if necessary.

Read the volume displayed on the softener control box.

- ***Activated carbon filters and micro-filtration***

  Adjust the upstream and downstream pressures using the pressure gauges. The maximum head loss must not exceed the head loss noted on start-up by more than 0.3 bar (300 grams). Otherwise, replace the cartridges.
  Measure the chlorine on the filtration battery outlet.
  Drain the casings of the filters using the red button located above the head of the filters.
  After each cartridge replacement, the fouling index downstream from the filter battery should be measured. This index must not exceed 3. To carry out this operation, use the PERMO FOULING TEST case, code P0005050, and procedure EXP 45.

- ***Osmosis unit***

  Check and note the operating parameters.
  Waste (or concentrate) flow rate.
  Production (or permeate) flow rate.
  Recycling flow rate.
  Waste pressure.
  The feed pressure downstream from the high pressure pump
  Conductivity on the readout of the Membran Control box

✓ **EVERY WEEK**

- ***Raw water***

  Read the pressure of the raw water, carry out a TH analysis, carry out a chlorine analysis and measure the pH. Measure the fouling index.

✓ **EVERY 3 MONTHS**

- ***Activated carbon filters and micro-filtration***

  Replace the filtering and activated carbon cartridges. This replacement shall be systematic even if the maximum head loss is not reached.

The filtering cartridges should be handled with care. Do not unwrap them until the time of installation. They must be handled with clean gloves.

After each cartridge replacement, you should:

Note the head loss of the clean filter.
Measure the fouling index to check the correct assembly of the cartridges. To carry out this operation, use the PERMO FOULING TEST case,

code P0005050, and procedure EXP 45. The fouling index must not exceed 3.

- ***Osmosis unit***

  Test the high-pressure pump safety device (thermal circuit-breaker).
  Test the pressure safety device.
  Check that if there is a shortage of water the pressure switch which controls the pressure of the pre-treated water stops the osmosis unit.

✓ EVERY 6 MONTHS

- ***Pre-filtration***

  Replace the filtering cartridges. This replacement shall be systematic even if the maximum head loss is not reached.

The filtering cartridges should be handled with care. Do not unwrap them until the time of installation. They must be handled with clean gloves.

- ***Osmosis unit***

  Carry out preventive disinfection and cleaning.
  Clean the flowmeters.
  Verify the program of the Membran Control box.

✓ EVERY YEAR

Clean the salt tanks of the softeners.
Check the functioning of the softeners and the condition of the internal valves.
Switch cabinet: check that the controls and the automated system are functioning correctly. Check the tightening of the terminal lugs and the connections.

✓ EVERY 2 YEARS

Replace all the fuses of the installation.

✓ GENERAL

Familiarise yourself with the manufacturers' technical manuals to carry out the recommended maintenance.

WARNING

To ensure the correct functioning of the reverse osmosis installation, certain parameters must be particularly closely monitored.

The maximum acceptable values are indicated below:

IC < 3	1µ filter outlet
Chlorine = 0 ppm	Activated carbon filter outlet
pH < 10	1µ filter outlet
Fe < 0.01 ppm	1µ filter outlet
TH < 0.5°f	Softened water outlet

FAILURE TO COMPLY with these instructions may invalidate the guarantee covering the equipment (particularly the reverse osmosis modules).

✓ OPERATING INSTRUCTIONS

Specific operating instructions are included in this manual.
They should be consulted for the following operations:

- warning ("EXP43")
- fouling index ("EXP45")
- disinfection of osmosis units equipped with composite membranes ("EXP46")
- chemical cleaning of osmosis units with composite membranes ("EXP47")
- stopping of osmosis units ("EXP48")

PERMO can offer you a maintenance contract; consult us for details.

12 MONTHLY FOLLOW-UP SHEET FOR MODULO SK OSMOSIS UNITS

Name of inspector: **Month:** **Year:**

	RAW WATER				SOFTENER				FILTRATION				OSMOSIS				
Day	Pressure bars	T° °C	TH °f	pH	Filters (1)	Qty salts (2)	Cycle l	TH °f	CA (1)	1µ (1)	Cl^2 mg/l	Fi	Q prod. l/h	Q waste l/h	Input P bars	Emission P bars	Conduct. µS/cm
01																	
02																	
03																	
04																	
05																	
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(1) - Specify the replacement ("X") of the cartridges

(2) - Specify the quantity of salt (in kilograms) placed in the salt tanks

13 LIST OF CONSUMABLE PRODUCTS

Code	Designation	Qty installed / min. required per year (*)			
		SK500	SK800	SK1000	SK1200
P0003740	Set of 2 spare Permofine sieves	1 - 1/yr	1 - 1/yr	1 - 1/yr	1 - 1/yr
P0094828	1µ flat seal 20" Polypure cartridge	2 - 12/yr	2 - 12/yr	3 - 18/yr	3 - 18/yr
P0093150	20" activated carbon cartridge	2 - 12/yr	2 - 12/yr	3 - 18/yr	3 - 18/yr

(*) – Minimum recommended quantity to be kept in stock

(As indicated in the "maintenance" section of the ***MODULO SK*** osmosis unit technical manual)

14 LIST OF SOFTENER SPARES

Code	Designation	Packaging	Qty installed
P0009068	Silex 1.35 in 25 kg bag	bag	12 Kgs
P0009051	Resin for softener in 25-litre bag	bag	(1)
P0042850	Diaphragm valve 520 1/2"	1	2
P0101737	Hydro no.2 complete 6000 valve for SK500	1	2
P0101738	Hydro no.3 complete 6000 valve except for SK500	1	2
P0011998	2 EV hydraulic S/A without box for SK500	1	2
P0011999	2 EV hydraulic S/A without box except for SK500	1	2
P0012007	Mobile train and membrane S/A	1	2 (*)
P0012009	Hydro ejector no. 2 S/A for S SK500	1	2
P0012018	Hydro ejector no. 3 S/A except for SK500	1	2
P0012002	24V 50 Hz double EV	1	2 (*)
P0012011	Sewer union S/A	1	2
P0012017	Intake union S/A	1	2
P0010530	Pierced cylinder head S/A with union	1	2
P0012234	1 1/4" flange S/A+ seals + screws	1	2
P0012620	ILS 6000 A4X Control S/A	1	2 (*)
P0024416	A4X Control Box with transformer	1	2
P0012014	A4-X electronic board	1	2 (*)
P0012626	Transformer S/A for control box	1	2 (*)
P0014854	Brine regulator S/A without chimney	1	2 (*)
P0013327	1" plunger tube S/A with strainer and seals	1	2
P0013340	Upper strainer S/A	1	2
P0012006	Chlorine emission cell S/A without cable	1	2 (*)

(1) - For ***Modulo SK500*** provide 100 litres (two 6050 softeners in parallel)

- For the other types provide 150 litres (two 6075 softeners in parallel)

(*) - Urgent spare spares to be kept in stock

15 LIST OF OSMOSIS UNIT SPARES

Code	Designation	Packaging	Qty installed
P0048319	3/4" threaded 20" filter body	1	(1)
P0048611	100 to 1000 l/h scale flowmeter DN20	1	2
P0048612	150 to 1600 l/h scale flowmeter DN25	1	1
P0003976	Permofine Y25 filter	1	1
P0962384	Solenoid valve 142 PVC 220 volts 50Hz DN25	1	1 (*)
P0959158	Resistivity sensor	1	1 (*)
P0956615	Stainless steel 0 to 10 bar pressure gauge with separator	1	1
P0956554	Stainless steel 0 to 10 bar pressure gauge 1/4" d=63	1	3
P0955130	Osmosis membrane 4" LE 30-4040	1	(2)
P0011491	Membrane Control box	1	1 (*)
P0048117	0.4 to 3.5 bar pressure switch	1	1 (*)
P0048061	Stainless steel needle valve 316L 1/2"	1	2
P0954517	High Pressure Pump for SK500	1	1
P0954519	High Pressure Pump for SK800 & SK1000	1	1
P0954522	High Pressure Pump for SK1200	1	1

(1) - 4 filters for ***Modulo SK500 & 800*** and 6 filters for ***Modulo SK1000 & 1200***.

(2) - 2 membranes for ***Modulo SK500***

3 membranes for ***Modulo SK800***

4 membranes for ***Modulo SK1000***

5 membranes for ***Modulo SK1200***

(*) - Urgent spare parts to be kept in stock

16 GENERAL INFORMATION

GE4 A1 - FILTRATION

GE6 A1 - ACTIVE CARBON TREATMENT

GE7 - ION EXCHANGERS

GE9 - SEPARATION TECHNIQUES USING MEMBRANE FILTERS

GE10 A3 - CONDUCTIVITY

17 OPERATING INSTRUCTIONS

EXP02 - FILTER CARTRIDGE REPLACEMENT

EXP14 - DISINFECTION OF ION-EXCHANGING RESINS USED IN SOFTENING TREATMENTS

EXP15 - SHUTTING DOWN SOFTENING APPARATUS PROTECTION AGAINST BACTERIAL PROLIFERATION

EXP45 - FOULING INDEX

EXP46 - DESINFECTION OF REVERSE OSMOSIS UNITS FITTED WITH COMPOSITE MEMBRANES

EXP47 - CHEMICAL CLEANING OF REVERSE OSMOSIS UNITS FITTED WITH COMPOSITE MEMBRANES

EXP48 - SHUTTING DOWN THE REVERSE OSMOSIS UNIT

EXP92 - CHEMICAL DESINFECTION OF SUPPLY SYSTEMS

18 EQUIPMENT DOCUMENTATION