MODULO OSMOSIS MACHINES

Types 125 & 250

Assembly, commissioning and operating manual

VITALLY IMPORTANT
Before connecting, filling with water and starting, please read this manual attentively.
Non-compliance with these prescriptions annuls the **PERMO** warranty.

TABLE OF CONTENTS

1 PRODUCT INFORMATION CARD

⇒ CARACTERISTICS:

The compact PERMO MODULO osmosis machine is ready to be hydraulically and electrically connected and consists of a 1-door chassis compartment for the MODULO 125 and a 2-door chassis compartment for the MODULO 250:

- 1 x 100 µm prefilter with a manual defouling discharge tap.
- 1 Permo 16 litre compact volumetric softener (with integrated salt tray),
- 1 dechlorinating filter with air bleed at top,
- 1 x 1 µm final filter with air bleed on top and a drain plug on the bowl.
- 1 x 125 or 250 litre reverse osmosis unit with its adjustment elements.
- 1 electromechanical power box
- 1 electronic automatic operations box with conductivity display.
- 1 powder-coated metal chassis and smoked Plexiglass door

On front of chassis (1 or 2 doors):

- 1 waste flow rate adjustment valve,
- 1 recycling flow rate adjustment valve,
- 3 stainless steel pressure gauges,
- two permeate and waste control flowmeters,
- an automatic operations box in which are assembled the product quality indicator (conductivity), warning devices and serviceability parameters, storage levels management system.

For the 2-door model (only), as option:

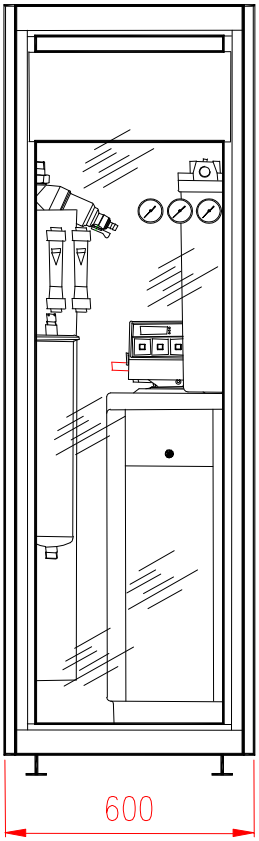
- 1 x 115 litre polyethylene storage tank with level contactors,
- 1 stainless steel recovery pump with integrated pressure control system.

2 OVERALL DIMENSIONS

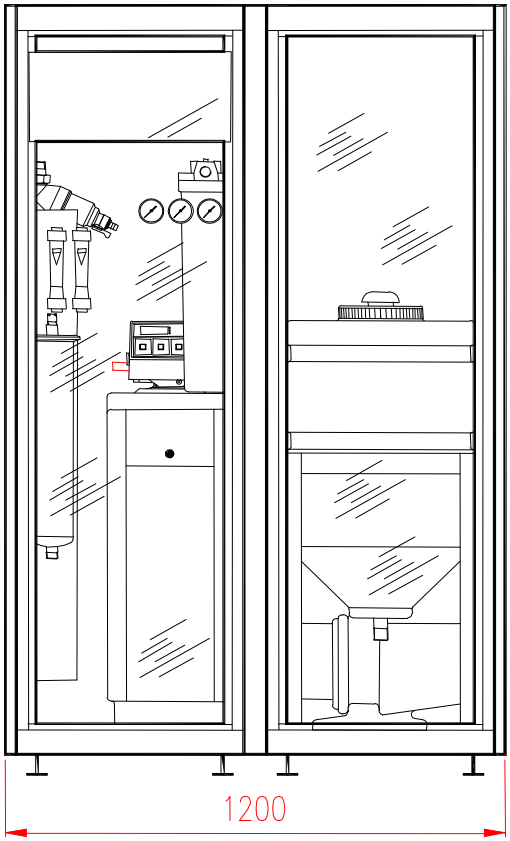
1-door type		
MODEL	**125**	**250**
Type of opening	1 door	1 door
Rate in l/h	125	250
Empty wt	170	180
Working wt	370	460
PERMO code	P0004486	P0004491

2-door type		
MODEL	**125**	**250**
Type of opening	2 doors	2 doors
Rate in l/h	125	250
Empty wt	310	320
Working wt	620	710
PERMO code	P0004485	P0004490

Type1 (1 door opening)
Depth = 800 mm
Total ht = 1880 mm



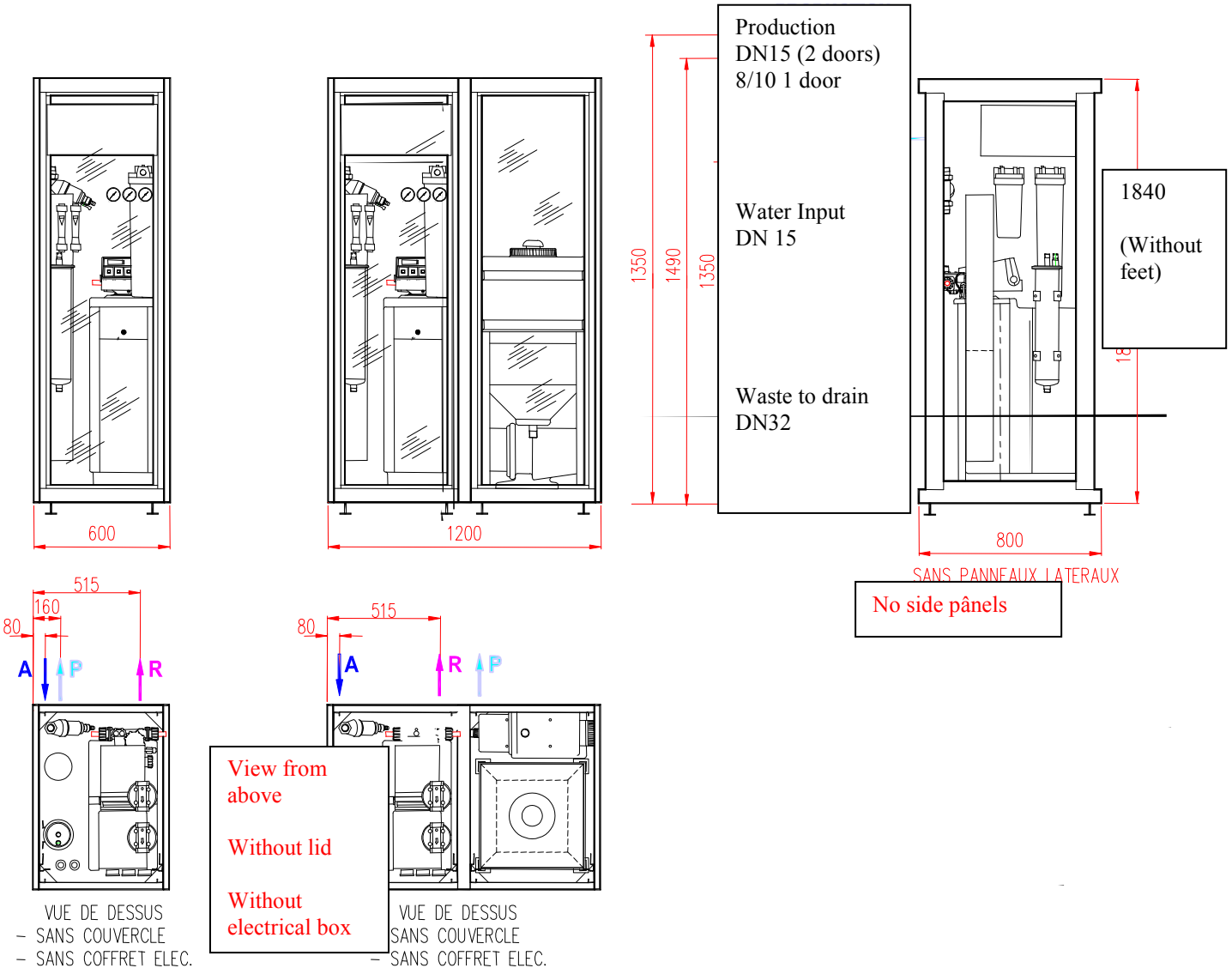
Type 2 (2 door opening)
Depth = 800 mm
Total ht = 1880 mm



Modulo overall dimensions (in millimeters)

Modulo overall dimensions; front view of 1-opening and 2-opening models

3 TECHNICAL CHARACTERISTICS



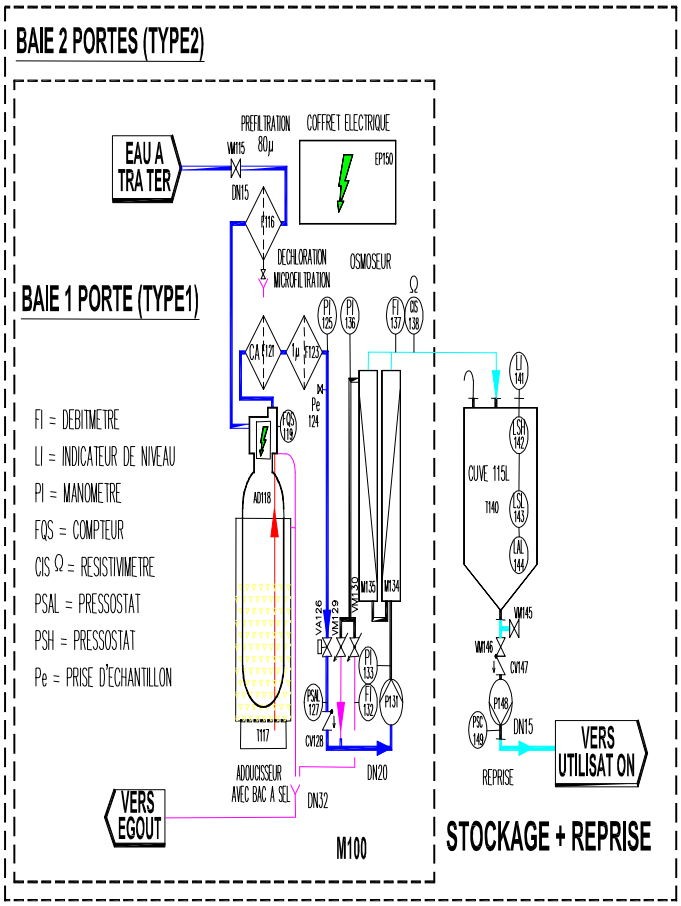
1 DOOR OPENING		
Locator	**FUNCTION**	**Diameter**
A	INPUT	union DN15
P	PRODUCTION	8/10
R	WASTE	union DN32

2 DOOR OPENING		
Locator	**FUNCTION**	**Diameter**
A	INPUT	union DN15
P	PRODUCTION	union DN15
R	WASTE	union DN32

ELECTRICAL POWER IN WATTS (Power supply single phase 220V 50 Hz)						
model	**Type**	**Softener (1)**	**H.P. pump (2)**	**Box (3)**	**Recov. pump**	**Total P (4)**
125/250	1 door	10 / 35	850 - 14/8	45 / 80	0	920 / 980
125/250	2 door	10 / 35	850 - 14/8	50 / 120	850	1775 / 1870

(1) – Softener power in service and for regeneration
(2) – High pressure pump and input electrovalve running/idling power.
(3) – Control box power with contactors in running and idling state.
(4) – Total minimum and maximum power (rounded) of Modulo osmosis machine.

4 FUNCTIONAL DIAGRAM



2 DOOR OPENING

PREFILTRATION ELECTRIC BOX

WATER TO BE TREATED

DECHLORINATION OSMOSIS
MICROFILTRATION MACHINE

1 DOOR OPENING

Flowmeter
Level indicator
Pressure gauge
Meter
Resistivity meter
Pressure sensitive switch
Pressure sensitive switch
Sampling

SOFTENER
WITH SALT TRAY RECOVERY TO OPERATIONS

TO DRAIN STORAGE & RECOVERY

Functional diagram

5 DESCRIPTION OF INSTALLATION

⇒ GENERAL:

The installation has been designed to obtain purified water derived from municipal networks. The said water, although meeting strict drinking water conditions, is without further treatment unsuitable for industrial or similar applications.
Additional treatments are required before it enjoys the necessary characteristics.

⇒ REGULATORY PROVISIONS:

EC markings on the equipment certify as to its compliance with the conditions of:

- directive 89/336/EEC of 03/05/89 relative to electromagnetic compatibility modified by directive 92/31/EEC of 28/04/92 modified by directive 93/68/EEC of 22/07/93
- directive 73/23/EEC of 19/02/73 relative to electrical equipment designed for use within certain voltage limits modified by directive 93/68/EEC of 22/07/93.

The equipment is subject to directive 97/23/EC of 29/05/97 relative to equipment under pressure. It meets the conditions of article 3 point 3 (design and manufacture according to current acknowledged rules of technology) but does not fall into categories I to IV and for that reason EC markings relative to equipment under pressure are not applicable.

⇒ CARACTERISTICS OF WATER TO BE TREATED:

Origin:
Supply pressure: bars
Temperature: °C
Average mineralization:

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

⇒ WATER CRITERIA:

. Use of water:
. Instantaneous flow rate: l/h
. Estimated daily consumption:
. Estimated peak flow: m3/h
. Conductivity: µS/cm

⇒ PREFILTRATION

The supply water is prefiltered through a 100-micron Nylon filtering screen to eliminate coarse particles in the water.

⇒ SOFTENING

Softening is the technique used to suppress the TH in the water. It is the exchange of calcium and magnesium ions responsible for water hardness with sodium ions associated with the softener resin.
When all of the sodium ions have been exchanged, the resin is said to be saturated and must be regenerated. Resin regeneration by a brine process (solution of saturated NaCl)is then performed. In that way, the fixation of sodium ions is now achieved on the resins while the calcium and magnesium ions are discharged to drains in the form of chlorides.

⇒ DECHLORINATION

Dechlorination is performed through active carbon cartridges that transform the free chlorine contained in the water into chlorides. The operation is essential because osmosis membranes are sensitive to chlorine.

⇒ MICROFILTRATION

The 1-micron filter cartridge keeps back the finest suspended matter thus preventing premature fouling of the osmosis machine membranes.

⇒ OSMOSIS

The osmosis unit is made up of one or several sets of reverse osmosis modules and of 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 across the surface of the membrane by a distribution tube: the water passes through the membrane and is collected on the other side of same to be discharged from the module through the so-called "production" outlet.

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

The conductivity of the purified water is continuously checked with a digital readout on the osmosis machine control box. The purified water is sent either to a distribution circuit or to an osmosis-purified water storage tank for the Modulo type 2.

6 TECHNICAL DESCRIPTION OF INSTALLATION

⇒ MODULO REVERSE OSMOSIS UNIT, COMPRISING:

- ***1 PERMOFINE Y 20 FILTER***

  . maximum flow: 3000 litres/hour
  . removable 3/4″ union connections
  . 100 µm screen
  . manual drain cock at lowest point

- ***1 PERMO COMPACT SOFTENER 16 D***

  . Glass fibre-reinforced resin shell
  . Resin shell volume: 16 litres
  . Minimum exchange capacity : 88° m3
  . Control box for automatic regeneration IP54
  . Electric current: 230 V +10-15% / 50/60 Hz
  . Electricity consumption: 10W in service - 35W for regeneration
  . Maximum production flow: 2 m3/h
  . Max. pressure : 7 bars static
  . Min. pressure : 2 bars dynamic
  . Water temperature: from 5°C to 35°C
  . Ambient temperature: Max. 40°C
  . Salt tray: salt capacity 60 kg
  . Regeneration rate: 125 g/l
  . Average salt consumption per regeneration: 2 Kg
  . Integrated pulse transmitter meter.

- ***1 x 5µ ACTIVE CARBON FILTER (DECHLORINATER)***

  . Type LP20
  . ¾" threaded connection
  . High density polypropylene fabrication
  . Diameter: 130 mm
  . Height: 530 mm
  . 20" long high performance cartridge
  . Air bleed

- ***1 x 1µ FILTER***

  . Type LP10
  . ¾" threaded connection
  . High density polypropylene fabrication
  . Diameter: 130 mm
  . Height: 310 mm
  . 10" long cartridge
  . Air bleed

❖ ***125 OR 250 LITRES/HR OSMOSIS MACHINE, COMPRISING:***

. 1 x 3/4" input electrovalve 220 volts 50 Hz
. 1 high pressure pump (refer to pump characteristics)

- type multicell submerged
- 316L stainless steel manufacture

. 1 or 2 x 4" diameter pressure shells containing:

- 1 x FILMTEC TW30 4040 membrane for Modulo 125
- 2 x FILMTEC TW30 4040 membranes for Modulo 250

. 1 pressure sensitive switch. 0.4 / 3.5 bars
. 1 x 0 - 10 bar pressure gauge upstream of H.P. pump.
. 1 x 0-25 bar pressure gauge + separator downstream of H.P. pump.
. 1 x 0-25 bar pressure gauge + separator on waste
. 1 stainless steel needle valve for setting the waste flow rate
. 1 stainless steel needle valve for setting the recycling flow rate
. 1waste control flowmeter,
. 1permeate control flowmeter

❖ ***1 CONTROL BOX COMPRISING:***

. 300 x 240 x 150 box with chassis
. Power supply 230 Volts 50Hz
. 1 x 16-amp main on/off lever
. 1 MEMBRAN control module on front side
. 1 conductivity meter incorporated in the control module
. Fuse protection of softener and control module
. H.P. pump motor and recovery pump circuit breakers (type 2)
. Remote control mechanical contactors
. terminal block with fault carry function

❖ ***1 COMPACT 1 OR 2 DOOR CHASSIS***

. Modulo 125 / 250 dimensions (according to overall dimensions)
. Steel construction with epoxy paint
. Side panels in powder coated steel plate
. Hinged, smoked Plexiglass door with key lock.

⇒ TECHNICAL CHARACTERISTICS

The osmosis membranes are guaranteed 3 years with graded rates in proportion to the time of operation, subject to absolute compliance with minimal quality conditions for supply water and with operating instructions (changing filter cartridges, regular cleaning, tests, analyses, settings, etc.).

Type MODULO	125 type 1 & 2	250 type 1 & 2
Min. supply pressure.	2 bars dynamic	2 bars dynamic
Max. supply pressure	7 bars	7 bars
Modulo supply rate in l/h	400	600
Production rate at 15°C en l/h	125	250
Waste rate (soft. + osmosis) en l/h	850	950
Conversion % rate	50	50
Residual salinity (1)	10 mg/l	10 mg/l
Conductivity (1)	10 µS/cm	10 µS/cm
Max. working temperature	35°C	35°C
Permissible chlorine content	0 ppm	0 ppm
Barium	<10 ppb	<10 ppb
Fouling index	<4	<4

(1) – The salinity and conductivity of treated water depends on the salinity and conductivity of the untreated water.

⇒ STORAGE AND RECOVERY UNIT (TYPE 2 ONLY)

❖ ***1 FULLY EMPTYABLE STORAGE TANK***

. High density polyethylene construction
. Volume: 115 litres
. Working pressure: atmospheric
. Calculation temperature: 20°C

❖ ***EQUIPPED WITH:***

. 1 vacuum safety valve
. 3 level contactors
. necessary connection pieces
. 1horizontal centrifugal distribution pump type MQ3-35
- maximum flow. 3 m3/h
- 35 meter total pressure head of water column
- fuse protection IP54

. 1 pressure hold device integrated in pump

7 PUTTING IN PLACE

The Modulo osmosis machine must be set up in an accessible, clean, dry and well-aired room. It must be frost-free and the air must not contain chemical vapours likely to harm its serviceability and components.

The installer should check before installing the machine that space requirements (refer to overall dimensions), technical characteristics and technical running conditions (in compliance with technical characteristics and description of the installation) are properly respected.

The room must also be provided with a drain to mains sufficiently large to cope with softener regeneration and waste waters from the osmosis machine (refer to the Modulo osmosis machine technical manual and the special manual for the compact softener).

In the case of discharge via a recovery pit and a lift pump, size the equipment in such a way as to avoid the risk of flooding the room.
The floor on which is set the osmosis machine chassis must be totally horizontal.

To allow for maintenance jobs, provide access all the way around the osmosis machine or where that is not possible, carry out connections with flexible hose such that the machine can be moved.

The installation must be protected from possible backwash by appropriate anti-backwash devices mounted downstream of the installation on the treated water pipe.

Electrical and hydraulic connections must be carried out in compliance with acknowledged rules of technology and with standards and regulations applicable to the location where the osmosis machine is set up. Attention! Where water feed pipes and treated water output pipes are fitted with devices likely to cause a water hammer effect, efficient anti-water hammer systems must be installed.

Furthermore, the electronics in the softener and osmosis machine control box is sensitive, like any electronic unit, to electrical or magnetic interference. The control boxes are fitted with a series of filters designed to eliminate all known interference. However, where excess current switches, transformers or any other interference emitting source is nearby, you must ensure connections are achieved with shielded cables and suitable anti-interference devices put in place.

8 CONNECTIONS

With the osmosis machine set in its permanent location, carry out the hydraulic and electrical connections in compliance with technical specifications.

⇒ HYDRAULIC CONNECTION

(in compliance with technical specifications and functional diagram)

- Untreated water input: - PVC union DN15 for bonding (1and 2 door types).
- Treated water output: - quick connection for 8/10 pipe (1 door type).
- Waste to mains drainage: - PVC union DN32 for bonding (1and 2 door types)

(osmosis machine waste + softener regeneration water).

- Treated water output: - PVC union DN15 for bonding (2 door type)

(osmosis-purified water recovery lift pump from 115 litre storage tank).

- 115 litre tank drain outlet: - PVC female connection DN15 for bonding

⇒ ELECTRICAL CONNECTION

For the electrical connection, pull the drawer by its handles from its location to the front then tip it. Open the lid of the power box mounted in the drawer and connect to comply with wiring diagram N°97019.

- Power supply 220V 50 Hz on terminals 1 and 2 with U1000 RO2V 3G4mm² cable.
- Terminals 17 and 18 put into service remotely in compliance with the operating mode selected by the osmosis machine, cable HO5 VV-F 3G1mm².
- If the rinsing option is installed, connect the rinsing NO & NC electrovalves to terminals 21 and 22 with cable HO5 VV-F 3G1mm².
- Fault carry, terminals 25 and 26 with cable HO5 VV-F 3G1mm².

the above cables can be replaced by equivalent cables.

.

9 STARTING UP THE INSTALLATION

⇒ COMMISSIONING

Having made the electrical and hydraulic connections to comply with instructions in the Putting in Place & Connections chapter and with technical specifications & technical equipment documentation appendices, now proceed with starting up Modulo.

- Check for the presence of prefitration cartridges and if necessary, put them in place in accordance with operating instructions.
- Switch on the Modulo osmosis machine with the start/stop switch.
- Open the isolating valves (if fitted) upstream and downstream of the installation, then drain the piping properly.
- Now proceed with programming the softener and the Membran control box controlling the osmosis machine.

⇒ SOFTENING

- Check the softener supply, the display should be lit.
- Refer to compact softener starting and operating instructions to program the control box and commission the softener in compliance with manual N° P0010222.

As the sotenener's ion exchange resins are delivered regenerated, the machine can straightaway supply softened water. No regeneration operation is therefore necessary.

⇒ OSMOSIS

The Membran control box offers three types of function modes: manual, automatic by remote control or by level. It can also manage an osmosis-purified water recovery pump if the installation is so fitted.

To program the Membran control box, follow the instructions in the box's technical manual. Fill out the Membran control box programming sheet "EXP76" correctly along with the installation's monthly monitoring sheet.

The osmosis machine is delivered in a bisulfite solution to preserve membranes. Before using the osmosis machine, just rinse it properly. Set the machine in production and allow to treated water to flow into drains by disconnecting the production output, locator "P", (refer to Modulo 1 and 2 door technical characteristics) until the desired quality of water is reached.

When the Modulo type 2 osmosis machine is first commissioned make sure the storage tank is filled with water such that the level contact is very low, failing which the osmosis machine will not start. You can also shunt the very low level contactor terminals on the control box to make the osmosis machine produce water to fill the storage tank.

⇒ HALTING THE INSTALLATION

To halt the machine for a short period (up to 48 hr), set the control switch to stop and close the upstream and downstream isolating valves.
To halt the machine for several days, proceed as before but before restarting the osmosis machine, disinfect the equipment in compliance with the enclosed operating sheets.

10 COMMISSIONING VALUES

⇒ UNTREATED WATER

- Tap water pressure	bars
- Water temperature:	°C
- TH analysis:	°f
- Chlorine analysis:	mg/l
- pH value:	
- Fouling index value:	

⇒ SOFTENING

- Softener cycle:	litres
- Regeneration duration:	minutes
- Regeneration time:	
- Brine control setting:	mm
- Softened water pressure:	bars

⇒ OSMOSIS MACHINE

- Production flow:	l/h
- Waste flow:	l/h
- Osmosis input pressure:	bars
- Waste pressure:	bars
- Treated water conductivity:	µS/cm
- Min. pressure sensitive switch setting. :	bars

Also fill out "EXP76" - the Membran control box programming sheet.

11 OPERATING

Operating the osmosis machine can be summed up as adjusting the conversion factor while respecting the specific operating instructions in this manual. The conversion factor is the ratio of the permeate flow to the osmosis machine water input flow.

The conversion factor is adjusted solely by changing recycling and waste valve settings.
Using the two valves, you must ensure a conversion factor of roughly 50% on the membranes (production flow equals waste flow) and maintain a pressure of the order of10 bars (refer to values for commissioning).

A decrease in waste flow rate will cause irreversible fouling of membranes and a modification of working pressure could lead to the production of a poorer osmosis-purified water quality.

The modules are calculated for a water supply temperature of 15°C except where specifically stated in the technical characteristics chapter. It should be known that flow decreases by roughly 3% per degree centigrade below the temperature of reference and also increases by 3% for temperatures above it.
As production flow can vary, it might be necessary to readjust the waste and recycling flow rates in such a way as to keep the conversion factor to roughly 50% and the pressure similar to the Modulo commissioning value.

12 MAINTENANCE

⇒ GENERAL

We would draw your attention to the importance of scrupulous monitoring of instructions drawn up to correspond with the operating conditions of the installation.
We would also insist on the necessity of correctly keeping the monthly monitoring sheet so that all anomalies are identified and cleared in time.
Any significant variations or modifications of performance must be brought to the notice of PERMO so that we can provide preventive and corrective solutions.

⇒ SPECIAL OPERATIONS ON HYDRAULICS

Put the equipment in question out of service beforehand. In the event of special operations, properly isolate the installation and drain it to reduce pressure in piping and constitutive components.

⇒ SPECIAL OPERATIONS ON ELECTRICAL SYSTEM

Any jobs must without fail be performed by qualified personnel. The appropriate control equipment must be switched off.

⇒ MODULO MAINTENANCE

Fill out the monthly monitoring sheet legibly so that are recorded flow rates, pressures, quality measurements and possible incidents.
To be usable, the readings must be performed during the same operating phase, i.e.: during production.
Inspect the installation to detect any possible leaks or faults.

⇒ TAP WATER

Weekly task:

- note the tap water pressure,
- analyse le TH,
- analyse the chlorine
- measure the pH,
- measure the fouling index.

⇒ PREFILTRATION

One a week, drain the PERMOFINE Y20 filter by the drain cock.

Every 6 months, change the screen.

⇒ SOFTENER

Daily task:

- check the TH on output from the softener,
- check the salt level in the salt tray and top up if necessary.
- note the remaining quantity of softened water on the softener display.

At least every 6 months:

- thoroughly clean the salt tray.

Operating instructions

Special operating instructions are included in this manual.

Please refer to them for the following operations:

- "EXP14" - disinfection of ion exchange resins
- "EXP15" - halting the softener
- "EXP15" - protection against bacterial proliferations

⇒ ACTIVE CARBON FILTER

Once a week, note the upstream pressure (if pressure gauge fitted) and downstream pressure during production. Permissible pressure drop must be roughly 300 grams relative to a new cartridge. Change the cartridge if necessary.

You must, without fail, change the active carbon cartridge every 3 months.

⇒ 1 MICRON FILTRATION

once a week, check filter fouling and change the 1 micron filter cartridge if the pressure drop has increased by more than 0.3 bars compared with the measurement by a new cartridge.

You must, without fail, change the 1-micron cartridge every 3 months.

Operating instructions

Special operating instructions are included in this manual. Please refer to them - "EXP02" - for instructions for changing the filtering and active carbon cartridges.

WARNING

To ensure serviceability of the reverse osmosis installation, certain parameters especially must be monitored.

Maximum permissible values are set out below:

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

Non-compliance with these instructions can lead to the cancellation of the equipment warranty (especially the reverse osmosis modules).

⇒ OSMOSIS MACHINE

Regularly check and note:

- osmosis machine production (or permeate) flow rate,
- waste (or concentrate) flow rate,
- supply pressure downstream of the high pressure pump,
- waste pressure,
- conductivity on output from the osmosis machine.

Operating instructions

Special operating instructions are included in this manual.

Please refer to them for the following operations:

- "EXP43" - warning
- "EXP45" - fouling index
- "EXP46" - disinfection of osmosis machines fitted with composite membranes
- "EXP47" - chemical cleaning of osmosis machines fitted with composite membranes
- "EXP48" halting osmosis machines

⇒ SWITCHBOX

Check every year:

- the serviceability of controls and automatic operations.
- the tightness of cable brackets and connectors.

13 MONTHLY MONITORING SHEET FOR MODULO OSMOSIS MACHINES

Inspector's name: **Month:** **Year:**

	UNTREATED WATER				SOFTENER			FILTRATION				OSMOSIS				
Day	Pressure bars	T° °C	TH °f	pH	Permofine (1)	Cycle l	TH °f	CA (1)	1µ (1)	Cl2 mg/l	Fi	Q prod. l/h	Q waste l/h	P input bars	P waste bars	Conduct. µS/cm
01																
02																
03																
04																
05																
06																
07																
08																
09																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																

(1) - Stipulate by "R" if the screen has been changed or by "P" if the filter has only been drained.
- Stipulate by "X" a change of active carbon cartridge and 1µ cartridge

14 LIST OF CONSUMABLES

Code	Designation	Quantity installed	Planned yearly Qty (*)
P0093147	1 x 20" active carbon cartridge	1	4 to 6
P0094827	1 x polypure10" flat seal 1µ-cartridge	1	4 to 6
P0003740	Set of 2 spare screens for Permofine 100µ	1	1

(*) - Quantity strongly advised to be held in stock

(in accordance with "maintenance" chapter in the MODULO osmosis machine technical manual).

15 LIST OF SPARE PARTS FOR SOFTENER

Code	Designation	Nbr packages
	PREFILTRATION	
P0003975	Equipped Permofine Y20 3/4" filter	1
	SOFTENER	
P0101717	Complete N°1 hydro-valve without unions to be welded	1
P0012170	Sub-unit hydraulic unit with clamp, drain connection & rear seal, without suction connections or box	1
P0012007	Sub-unit mobile train + membrane	1 (*)
P0012008	Sub-unit hydro-ejector N°1	1
P0012002	double solenoid 24 volts 50Hz	1 (*)
P0012011	Sub-unit drain union	1
P0012017	Sub-unit suction union	1
P0010531	Packet of 10 flow limiters	1
P0012027	Sub-unit rear unit with clamp and seal without shutters, with flanges, without unions to be welded	1
P0012021	Sub-unit dry reed contact for A3X / A4X box	1 (*)
P0012005	Sub-unit residual TH adjustment device	1
P0010252	Sub-unit 22 diameter unions to be welded	1
P0010238	A4X electronic box with transformer	1
P0012014	A4X electronic card	1 (*)
P0012023	Sub-unit transformer for A4X box	1 (*)
P0014854	Sub-unit 8/13 brine controller without vent or tubes	1 (*)
P0013327	Sub-unit 1" plunger tube with strainer and seals	1
P0013340	Sub-unit upper strainer	1

(*) - Emergency spares to have available in stock

16 LIST OF OSMOSIS MACHINE SPARE PARTS

Code	Designation	Qty installed
	OSMOSIS MACHINE	
P0048082	0 to10 bar pressure gauge	1
P0048084	25 bar pressure gauge	2
P0048117	0.4 to 3.5 bar pressure sensitive switch	1
P0962235	3/4" electrovalve 220 volts 50Hz	1 (*)
P0993417	20 to 250 l/h flowmeter for MODULO 100	2
P0096137	40 to 400 l/h flowmeter for MODULO 200	2
P0048047	Female ¼ stainless steel control valve	2
P0953769	SQ1.65 shell and high pressure pump	1 (*)
P0007002	MQ3 - 35 recovery pump flow rate 3 m3/h	1 (*)
P0097606	Float switch	3
P0011491	Membran control box	1 (*)
P0959158	Conductivity probe for Membran control	1
P0095048	TW30 4040 4" ∅ membrane length100 cm P=<21 bars	(**)
P0048319	Filter shell length 20" threaded 3/4"	1
P0048324	Filter shell length 10" threaded 3/4"	1

(*) - Emergency spares to have available in stock

(**) - provide 1 membrane for Modulo 100, 1 or 2 door type

- Provide 2 membranes for Modulo 200, 1 or 2 door type

17 GENERAL

GE4A1	Filtration
GE6A1	Active carbon treatment
GE7	Ion exchangers
GE9	Separating techniques on membrane
GE10A3	Conductivity