

Instruction manual

Ecosoft RO System MO6500BWTSS

Руководство по эксплуатации

систем обратного осмоса Ecosoft MO6500BWTSS



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1. ACRONYMS AND ABBREVIATIONS

CIP — Clean-in-place

FF — Forward flush

NC — Normally closed

NO — Normally open

TDS — Total dissolved solids

PCB — Printed circuit board

P&ID — Piping and instrumentation diagram

RO — Reverse osmosis

BW — Brackish water

2. PRODUCT DESCRIPTION

2.1. OVERVIEW

Ecosoft brackish water reverse osmosis systems are used for demineralizing water in industrial, municipal, commercial applications. Ecosoft BW RO system can be used to demineralize low to medium salinity feed water. System components comprise stainless steel skid, prefilter housing, high pressure pump, pressure vessels with membranes, electrical panel, process controller, and the necessary valves and instruments.



This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Ecosoft RO systems operate as follows.

Raw water is fed through sediment prefilter in order to remove particles. If raw water is treated with antiscalant or other RO chemicals, the prefilter housing ensures better mixing.

Then, high pressure pump feeds the water into the membrane module or membrane array, in which feed water undergoes separation process and splits into permeate and concentrate streams.

Permeate (purified water) goes to the permeate outlet and is collected in water tank. Permeate line is also fitted with a pressure switch to halt the unit if significant pressure builds in permeate line indicating a full pressurized tank or pipeline shutoff.

Float switch has to be put inside an ambient pressure tank (if used) to start and stop the unit depending on the level of permeate in the tank.

Part of the concentrate stream is discharged to drain via drain rotameter. The rest goes back to the suction end of the high pressure pump via recycle rotameter.

Flow rates of drained and recycled concentrate have to be regulated to specified ranges in the **Technical specifications** with the regulating valves built in the rotameters.

When service is interrupted by float switch or pressure switch signal, the system runs a forward flush (membrane rinse) cycle, then switches to standby. The controller receives temperature and conductivity of permeate, permeate level, pressure switch statuses, and external inhibition signals.

2.2. TECHNICAL SPECIFICATIONS

Table 1. Physical parameters

Model (SKU)	MO6500BWTSS	MO12000BWTSS
Rated capacity, LPH*	280	500
Membranes	1 × 4040	2 × 4040
Power consumption	2.2 kW	
Dimensions (Width × Depth × Height)	0.75 × 0.54 × 1.52 m	
Approximate dry weight	130 kg	150 kg
Port sizes (feed water inlet, permeate outlet, concentrate drain outlet)	½"	
Working flow rates in typical operating conditions**		
Drain flow rate	150...300 l/h	250...500 l/h
Permeate flow rate	250...400 l/h	450...700 l/h

* at feed water temperature = 25°C, TDS=10 g/l, 40% permeate recovery

** feed water must comply with requirements in Table 2. See **Installation and Startup** section for a more specific instruction on Permeate, Drain, and Recycle flow rates.

Table 2. Limitations

Influent water quality ***			
Max. Total Hardness	150 mg/l CaCO ₃ (without anti-scalant)	Max. Iron, Manganese, Hydrogen Sulfide	0.05 mg/l
Max. Silica	20 mg/l (without anti-scalant)	Max. Chemical Oxygen Demand (KMnO ₄)	5.0 mg/l O ₂
Max. Total Dissolved Solids	10 000 mg/l	Max. Chlorine (continuous)	0.1 mg/l
Operating parameters			
Required supply water pressure	0.2...0.4 MPa	Max. operating pressure	2.5 MPa
Temperature of water	5...30 °C	Electrical power	230 V, 50 Hz (1 phase)

***Some limitations may not apply if using antiscalant, oxygen scavenger, or other type of chemical pretreatment.



Tap feed water must be pre-filtered from fine particles and chlorine before entering the RO system. Well water may contain impurities such as hardness, iron, manganese, silica, hydrogen sulfide that can quickly lead to membrane failure. Some of these challenges can be addressed by using injection of antiscalant. Perform a detailed laboratory analysis of your well water and consult a water treatment specialist to see if you need additional equipment for treating your well water.

2.3. PRODUCT WATER CAPACITY CHARTS

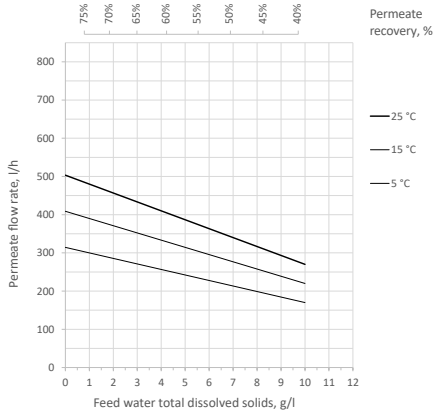


Figure 2.1 Ecosoft MO6500BWTSS flow rate chart

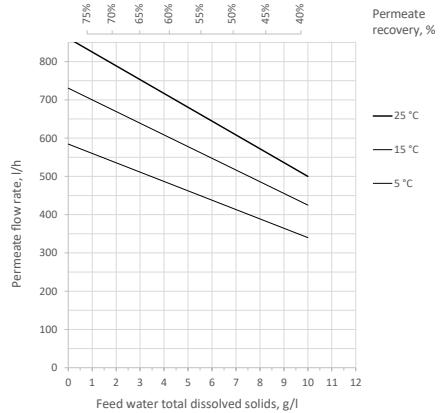


Figure 2.2 Ecosoft MO12000BWTSS flow rate chart

Permeate flow rates are calculated under the following conditions:

- 1.5...2.0 bar influent water pressure
- 0 bar backpressure in the permeate line
- variable permeate recovery (shown on the top)
- 80% of the rated membrane flux

See the following section for instructions on process setup.

3. INSTALLATION AND STARTUP



Caution! Electrical installation should only be done by a qualified electrician.

3.1 Rest the unit on a flat level surface capable of supporting its weight (see Table 1). Install permeate tank next to the unit. Inspect the RO system carefully for damage, including piping, valves and instruments, pump, pressure vessels, prefilter housings, electrical panel before proceeding with connection and startup.

3.2 Install membrane in each pressure vessel as follows. Remove the pipes connected to the pressure vessel ends. Take apart clamp unions or dismantle flange/Victaulic couplings if necessary. After all adjacent pipes are disconnected and will not get in the way, remove one of the lids of each pressure vessel. Typically, the lids are held with clamps that must be loosened.



Observe direction of arrow on pressure vessel when installing membrane. Use glycerol or a similar RO-compatible lubricant as needed. Avoid touching membrane with hands. Use sterile rubber gloves when handling membrane.

Make a cut in membrane packaging bag and insert membrane in the pressure vessel. The brine seal ring has to be at the feed end of the vessel. Central tube of the membrane has to mate with membrane adapter installed at the concentrate end of pressure vessel. If necessary, remove the opposite lid also for easier insertion of the membrane. Install the lids back in place. Install the holding clamps back on the lids.

3.3 Connect raw water pipeline from the water main or booster pump. Connect drain and permeate pipes to the respective connection ports of the RO system. Recommended pipe size is at least equal to that of the connection port. Use appropriate fittings as necessary. Ensure air gap at the end of drain line to prevent backsiphonage. Run permeate pipe from the permeate outlet to the permeate tank and connect using appropriate fittings or glands.



It is strongly recommended to use short runs of pipe or hose the size of which matches or exceeds that of the connection port.

3.4 Put the float switch inside permeate tank after moving ballast the necessary length up the cord to provide enough level difference between activated and deactivated position. After the first filling of the tank, verify that the float switch activates and deactivates in the right positions.

3.5 If the RO system has permeate rinse enabled, install the necessary piping. If using service interruption by external signal (microswitch), remove jumper from the stop terminals in the electrical panel. Then, run a cable from the microswitch to the panel and connect to the Stop terminals. If using antiscalant or other RO chemicals, refer to the dosing pump's instruction manual for information concerning the dosing pump.

3.6 Run power to the RO system. Connect the phase(s), neutral, and earth conductors as shown on the electrical diagram. Use a suitable ampacity circuit breaker in your distribution panel.

START UP THE SYSTEM AS FOLLOWS:

3.7 Fully open recycle and drain flow regulating valves before powering up the system. Make sure to discard all permeate obtained during the first run of the RO system.

3.8 Power up the system. The controller will boot up and begin service. Wait until the air is vented from the system and the pressure reading stabilizes. In case low feed pressure fault or another fault occurs, see **Troubleshooting** section for help.

Tighten drain flow control valve until drain rotameter reading meets the specifications (see Table 1). Then, start turning down recycle regulating valve. This will rapidly raise pressure in the membrane array (shown on pressure gauge up front). Stop regulating recycle flow control when the permeate flow rate reaches full capacity or when the pressure in the membrane module reaches the upper limit (see Table 1).

After setting up the recycle flow rate, check the drain flow rate again and readjust it to the approximate value obtained with the following formula:

$$\text{Target Drain Flow Rate} = \frac{\text{Permeate Flow Rate}}{\text{Permeate Recovery}} - \text{Permeate Flow Rate}$$

where the **Permeate Flow Rate** and **Permeate Recovery** values are to be found on the system capacity graphs (from your raw water TDS and temperature) in **Product description** section.

EXAMPLE:

Assume feed water TDS = 6 g/l, t = 15 °C.

On **Figure 2.1 MO6500BWTSS flow capacity chart** the following approx. values will be found:

Permeate flow rate = 300 l/h ≈ 5 l/min

Recovery ≈ 55% = 0.55

Using the above formula, **Target Drain Flow Rate = 300/0.55 - 300 = 245 l/h ≈ 4 l/min**

Therefore, the RO system has to be set up as follows:

1. Tighten **Drain Flow Control** until **Drain rotameter** shows 4 LPM.
2. Tighten **Recycle Flow Control** until **Permeate rotameter** shows 5 LPM.
3. Verify that the **Operating pressure** does not exceed the maximum value of 25 bar.
4. Verify that the obtained **Permeate Flow Rate** and **Drain Flow Rate** are consistent with the **Permeate Recovery** used in the calculation.



Take care not to exceed the maximum specified pressure in membrane module. If the membrane pressure rises above the upper limit in specification, open recycle flow regulating valve to bring it down.



Turn regulating valve knobs smoothly when regulating recycle and drain flow. Do not make rapid turns or apply disproportionate force as this can damage the unit.

3.9 Let the unit run for 1 hour discarding both permeate and concentrate to drain to flush out the membrane preservative. Watch flow rate and pressure gauges to make sure they do not deviate from the setpoint.

4. INSTALLATION REQUIREMENTS

- Installation and setup of the unit should be undertaken by a qualified professional. Room or area where the unit is to be installed must meet workplace standards of local building code.
- The unit must not be operated in outdoor environments. Do not expose to weather conditions (rain, temperature fluctuations, proximity of heating equipment, direct sunlight etc).
- Air at workplace should be free of corrosive vapors, airborne dust, and fibrous matter.
- To provide access to the unit for maintenance and repair purposes, respect the following clearances between the unit and building structures: 500 mm to the left or right, 200 mm above.
- Electrical connections must comply with local electrical code. Make sure to follow applicable grounding and insulation rules.
- Supply, drain, and delivery pipework must comply with local plumbing code and have sufficient flow capacity. Drain line of the unit must be separated from floor drain with an air gap.
- Construction material or inside lining of permeate tank must be resistant to water corrosion (e. g. stainless steel, polypropylene). Tank should be installed next to the unit.
- Antiscalant pump suction line length should not exceed 1.5 m. Refer to dosing pump's manual to adjust pump's settings if it has not been factory configured.

5. OPERATING REQUIREMENTS

5.1 Operator of the unit must strictly follow these guidelines and general electrical safety precautions.



If power supply cable or any other electrical wiring is damaged, it must be replaced by a vendor's service staff or similarly qualified person.

5.2 When operating the unit, ensure that pressure and flow rates are within specification limits and that power supply is clean and uninterrupted.

5.3 Perform the following at least once a month:

- verify that pressure and flow rate parameters have not deviated (substantially);
- verify tightness (absence of leaks) from connections and visual integrity of parts.

5.4 In order to monitor performance of the RO machine, regularly keep record of operation and write down parameter readings. Use membrane manufacturer's software tools for normalization to control for fluctuations of pressure, temperature, and other operating conditions.

5.5 Change polypropylene cartridge when it has clogged. Pressure drop of 0.1 MPa or greater on the sediment filter indicates that filter cartridge needs to be replaced as soon as possible.

5.6 Perform CIP or another suitable chemical cleaning protocol when any of the following conditions are encountered:

- normalized permeate flow rate drops 10-15% of its initial value;
- normalized conductivity of permeate increases 10-15% of initial value, raw water conductivity remaining at the same level;
- normalized pressure drop along the membrane array rises 10-15% of its initial value.

5.7 After installing freshly cleaned membrane, perform 1 hour rinse discarding all permeate and concentrate. If chemical cleaning fails to restore normalized flow or rejection to design specifications, membrane element is irreparably fouled and has to be replaced.

5.8 To prevent microbial contamination, the unit should be operated for at least 1 hour a day. In case 48 hours or longer shutdown is to occur, membrane should be treated with preservative solution. Preservative treatment is accomplished by circulating 1% sodium metabisulfite solution through the membrane module for 30 minutes or by preparing metabisulfite solution of the above strength in the module. Before resuming operation of a machine that had been treated with preservative, rinse the membrane.



Do not use supply water with over 0.1 mg/L of free chlorine without pre treatment with activated carbon or other means of dechlorination. Chlorine will destroy the membrane.

5.9 To replace sediment filter cartridge proceed as follows:

- remove the power from the unit;
- shut off water supply and relieve pressure;
- screw off filter bowl and remove it, taking care not to spill water on parts of the unit;
- remove spent cartridge from the bowl, place a clean one inside and screw the bowl back on.

5.10 To replace membrane element proceed as follows:

- remove the power from the unit;
- shut off water supply and relieve pressure;
- disconnect feed, permeate, and concentrate tube connections at membrane module outlets;
- unfasten clamps holding the pressure vessel and take down the vessel;
- remove caps from the pressure vessel;
- push the membrane element from the feed end towards the discharge end (in the direction of the arrow). Extract the membrane element by pulling it at the discharge end of the vessel;
- install new membrane element, observing flow direction as indicated by the arrow;
- fasten the caps and install the vessel back in place;
- re-connect tubes back to the vessel.



Do not perform any maintenance, repair, cleaning, moving the unit or ancillary units (permeate tank, media filters etc), when the unit is connected to power and water supply.



Do not subject pressure vessel to mechanical impact (shocks, static load etc).



The manufacturer shall not be held liable for any damages incurred by the owner of the unit or any third party due to failure to adhere to the safety precautions or installation guidelines herein.

6. SHIPPING AND STORAGE REQUIREMENTS

- The unit must be stored indoors. Ambient air quality must meet workplace standards.
- Carry out preservative treatment of membrane elements when preparing for an extended downtime.
- The RO machine in its original packaging can be shipped by all types of air, sea or ground transport.
- During transportation, the unit must be protected from exposure to low temperatures and jolts/vibration.

7. TROUBLESHOOTING



Do not access any electrical parts before ensuring that the electrical power has been removed.

Do not access any electrical parts or attempt any diagnostics / repair unless you are a trained electrician.

Problem	Possible cause	Corrective action
The controller is not starting after powering up the unit	No power / incompatible power supply	Ensure that the power meets Technical specifications . If the power supply is adequate, then switch off the power first , open the controller housing and check: <ul style="list-style-type: none"> — the fuses are not blown — wires in screw terminals #30, #31, #32 are not loose
Circuit breaker trips in the main panel	Power supply does not meet system requirements	The system requires clean power supply compliant with the Technical specifications . Check for brownout, overvoltage, power surges.
The pump will not start after the controller boots up	Controller is in Standby mode	Check if the permeate tank is full, or if the float switch has stuck in the upward position. Check that the permeate pipeline is not blocked or shut off with a valve.
	Controller is in Stop mode	Push START button to see if it is manually stopped. If nothing happens, then (remove the power first!) open the electrical panel and check that Stop terminals are connected with a jumper wire.
	Controller is in Service mode but the pump isn't running	Thermal protection switch (built-in the motor junction box) may trip due to pump stalling, jamming, or inadequate voltage. It will release after cooling down. Another possibility is a loose wire in the controller terminal block or in the electrical panel (remove power before accessing the electrical parts!)
Low feed pressure fault occurs immediately after startup	The air has not been completely purged from the system	Fill the system completely with water. One way to do this is to enter controller settings and temporarily set 1.1 High pressure pump delay to 255 seconds, then revert back after the air bubbles disappear.
	Obstruction in the water supply pipeline	Avoid using long runs of small diameter pipes. Check that there are no sharp bends if using a flexible hose.
	Clogged prefilter	Check the filter cartridge and replace if necessary.

Problem	Possible cause	Corrective action
Low feed pressure fault occurs after running smoothly for a while	Clogged pre-filter cartridge or water supply pressure dip	Check the filter cartridge and replace if necessary. Check that the influent pressure is stable.
High permeate conductivity	High water temperature	Check that the feed water temperature meets the provisions of Technical specifications
	Operating pressure and/or concentrate flow rate is too low	Check that the flow rates and the operating pressure meet the provisions of Technical specifications
	Poor quality influent water	Verify that the water analysis meets the requirements of the Technical specifications
	Damaged seal on the membrane or membrane coupling connector	Replace the damaged seals
	Membrane fouling, scaling, or mechanical damage	Replace the membrane or carry out chemical cleaning
Low permeate flow rate	Low water temperature	Check that the feed water temperature meets the provisions of Technical specifications
	Operating pressure and/or concentrate flow rate is too low	Check that the flow rates and the operating pressure meet the provisions of Technical specifications
	Membrane fouling or scaling	Replace the membrane or carry out chemical cleaning
Other	Other issue / unclear possible cause	Contact your vendor's customer support

8. CONTROLLER

8.1. OVERVIEW

Ecosoft OC5000 process controller is used for automating reverse osmosis system operation. The input and output device connections are described in the table below.

Depending on current status and input device readings the controller will operate in any of the following modes: Service, Standby, Forward Flush, Stop, Fault (described in the following section).

The user interface comprises two buttons and an LCD display. **■** STOP button is used for stopping the unit (short press) or entering the **Settings** menu (long hold). **▶** START button is used for scrolling in the **Settings** menu or initiating a Forward Flush (if pressed during service screen display).

8.2. INPUT & OUTPUT SPECIFICATIONS

Table 2. List of terminals

PURPOSE	VOLTAGE	MARKING	PIN #
Power supply			
Live	110-220 VAC,	L	32
Neutral	50/60 Hz	N	31
Ground	Ground	⊥	30
Input terminals			
Conductivity meter		Cond	1 — white 2 — black
Temperature sensor		+ Term –	3 — red 4 — green 5 — blue
Low feed pressure switch		P_in	8–9
High operating pressure switch	5 V (only use dry contact NC/NO switches)	P_max	10–11
High permeate pressure switch		P_perm	12–13
Permeate float switch		Level	14–15
Stop switch		Stop	6–7
Output terminals			
Pump contactor		PUMP	28–29 27 (ground)
Alarm signal out		ALARM	25–26
Entry electric valve	110-220 VAC (matching the power supply voltage)	Valve_IN	24 (neutral) 23 (open) 22 (ground)
Flush electric valve		Valve_Rinse	21 (neutral) 20 (open) 19 (ground)
Bypass electric valve		Valve_Bypass	18 (neutral) 17 (open) 16 (ground)

For more detail, please see the wiring diagram.

8.3. OPERATING MODES

When operating, the controller will be in any one of the following modes: Service, Stop, Forward Flush 1, Forward Flush 2, Standby, Fault. Immediately after starting, the controller will display firmware version and then proceed to Service if tank permeate level is low and backpressure switch is not activated.

Here and below information is relevant to the firmware version "OC5000EC ver_03". For information on different firmware versions please contact your technical support.

Configuring and manipulating the controller is done using ► START and ◻ STOP buttons. Current mode of operation and pertaining information is shown on the LED display. Opening the circuit in the Stop domain of terminal block (see figure 1) will bring the controller to Stop mode regardless of its current mode of operation. Closing the circuit will take the controller back to the mode that had been interrupted. Stop terminals can be used to connect a microswitch on pre-treatment media filter, a relay or other means of external control to the controller.

Following is the description of controller modes.

SERVICE.

In Service mode, the RO machine produces permeate. If no fault conditions are taking place, float switch is low and backpressure switch is not activated, the controller will operate in Service mode.

Status of outputs in SERVICE

Booster and antiscalant pumps	on
Entry valve	open
Forward flush valve	closed
Bypass valve	open (if configuration step 1.3 is set to 0) closed (if configuration step 1.3 is non-zero value)
Alarm	off

Display will flash cumulative runtime of the RO machine, remaining time before scheduled maintenance alert (if set in configuration step 3.1), temperature and conductivity of permeate (or TDS of permeate if configuration step 1.15 is set to "on"). Pushing ► START once will initiate Forward Flush 1, pushing ► START twice in 0.5 seconds or less will initiate Forward Flush 2 (if configuration step 1.3 is set to non-zero value), pushing ◻ STOP will bring on Stop mode. If high feed pressure, low feed pressure, or high permeate conductivity condition occurs, the controller will go into Fault mode.

FORWARD FLUSH 1

During Forward Flush 1, membranes are rinsed with high flow of raw water allowing concentrate run freely to drain. Forward Flush 1 occurs during normal operation with frequency set in configuration steps 1.5, 1.6. It is also activated in Service mode if the controller is going to transition to Standby after reading high tank level or high permeate pressure. It can be manually activated while in Service by pushing ► START button.

Status of outputs in FORWARD FLUSH 1

Booster and antiscalant pumps	on
Entry valve	open
Forward flush valve	open
Bypass valve	closed
Alarm	off

Pushing **□ STOP** will abort Forward Flush 1 and bring the controller to Stop mode. Pushing **▶ START** will cycle the controller to Forward Flush 2 mode (if configuration step 1.3 is set to non-zero value). If high feed pressure or low feed pressure occurs, the controller will go into Fault mode. Low feed pressure fault during Forward Flush 1 can be disabled in configuration step 1.7.

FORWARD FLUSH 2

Forward Flush 2 consists in rinsing membranes with permeate supplied from permeate tank by permeate pump.



Forward flush 2 with permeate is only possible if the RO system is equipped with rinsing electric valve.

Forward Flush 2 occurs after each Forward Flush 1 if configuration step 1.3 is set to non-zero value. It can be manually brought on by pushing **▶ START** during Forward Flush 1 or double pushing **▶ START** during Service.

Status of outputs in FORWARD FLUSH 2

Booster and antiscalant pumps	on (if configuration step 1.4 is set to 'on') off (if configuration step 1.4 is set to 'off')
Entry valve	closed
Forward flush valve	open
Bypass valve	open
Alarm	off

Pushing **□ STOP** will abort Forward Flush 2 and bring the controller to Stop mode. Pushing **▶ START** will abort Forward Flush 2 and bring the controller to Service or Standby (depending on tank level and backpressure status).

STANDBY

In Standby, the unit is stalled and ready to resume service. Standby mode is brought on by reading high tank level or tripping permeate backpressure switch.

Status of outputs in STANDBY

Booster and antiscalant pumps	off
Entry valve	closed
Forward flush valve	closed
Bypass valve	closed
Alarm	off

Pushing **■** STOP will bring the controller to Stop mode. Pushing **▶** START will take the controller into Service if permeate is low and backpressure switch is inactive. Otherwise, pushing **▶** START will initiate Forward Flush 1 and Forward Flush 2 (if set) and then bring the controller back to Standby. When float switch or permeate backpressure switch deactivate, the controller will go back to Service.

FAULT

In Fault mode, the unit is stalled to protect the equipment from dangerous operating conditions. Fault mode is brought on by activating low feed pressure switch (to prevent 'dry running'), high feed pressure switch (to protect against overpressure), or reading an excessively high permeate conductivity value (which could mean membrane rupture or other malfunction if configuration step 1.16 is set to non-zero value.).

Status of outputs in FAULT

Booster and antiscalant pumps	off
Entry valve	closed
Forward flush valve	closed
Bypass valve	closed
Alarm	on

Fault mode can only be quit manually by pushing **▶** START. Ensure the cause of fault is eliminated before quitting Fault mode. Pushing **■** STOP will bring the controller to Stop mode.

STOP

In Stop mode, the unit is stalled and awaiting further input. Stop mode can be manually brought on by pushing **■** STOP in any mode, or by stop switch opening circuit between STOP terminals on the printed circuit board.

Status of outputs in STOP

Booster and antiscalant pumps	off
Entry valve	closed
Forward flush valve	closed
Bypass valve	closed
Alarm	off

Upon pushing **▶** START or deactivating stop switch, the controller will resume from where it was interrupted.

8.4. PROGRAM SETTINGS

Configuration settings are stored in non-volatile memory. Access to each submenu is protected with passcode. To enter configuration menu, hold **STOP** for 8 seconds. In the menu, editing and storing values is helped by flashing cursor. **START** button moves cursor one position to the right, **STOP** button increments selected digit by one, cycles between options, or scrolls to the next screen when the cursor is at the '>' symbol.

MENU	FACTORY SETTINGS
SETTINGS	
1. SETTINGS AND CALIBRATION PASSCODE PROMPT	0000
1.0 Language	English
1.1 High pressure pump delay, s	60 s*
1.2 Forward Flush 1 duration, s	0 s
1.3 Forward Flush 2 duration, s	0 s
1.4 High pressure pump power during Forward Flush 2, on/off	off
1.5 Frequency of periodic Forward Flush in Service, h	4 hour
1.6 Frequency of periodic Forward Flush in Standby, h	24 hour
1.7 Read low feed pressure during Forward Flush, on/off	on
1.8 Low feed pressure switch, NO/NC	NO
1.9 Low feed pressure Fault delay, s	3 s
1.10 High feed pressure switch, NO/NC	NO
1.11 Permeate backpressure switch, NO/NC	NC
1.12 Backpressure Standby delay, s	1 s
1.13 Tank level switch, NO/NC	NC
1.14 Tank level Standby delay, s	1 s
1.15 Display TDS in ppm	off
1.16 Permeate conductivity Fault threshold, $\mu\text{S}/\text{cm}$	0 $\mu\text{S}/\text{cm}$
1.17 Permeate conductivity Fault delay, s	0
1.18 Display temperature	C
1.19 New settings and calibration passcode	-
2. SETTINGS AND CALIBRATION PASSCODE PROMPT	0000
2.1 First point value, $\mu\text{S}/\text{cm}$	-
2.2 Second point value, $\mu\text{S}/\text{cm}$	-
3. MAINTENANCE PASSCODE PROMPT	0000
3.1 Schedule maintenance stop, on/off	off
3.2 Scheduled stop period, h (if 3.1 is set to 'on')	500 h
3.3 New maintenance passcode	

*During the first run of the R.O. unit, the parameter can be increased to the maximum value in order to vent the air and fill the system with water. Make sure to revert it back to the factory setting of 10 sec.

1. Settings

Hold STOP for 8 seconds to launch menu prompt. Push START to enter Settings submenu. Enter passcode in the prompt. Factory passcode is '0000'.

1.0 Language

Choose language to display operation information & menu. Available languages include English & Russian.

1.1 High pressure pump delay

Enter length of interval between opening the entry valve and starting the pump when the unit is going into Service (0...255 seconds).

1.2 Forward Flush 1 duration

Enter length of Forward Flush 1 (0...255 seconds). Forward Flush 1 will not be performed if the parameter is set to zero.

1.3 Forward Flush 2 duration

Enter length of Forward Flush 2 (0...255 seconds). Forward Flush 2 will not be performed if the parameter is set to zero. Default setting is zero (Forward Flush 2 disabled).

1.4 High pressure pump power during Forward Flush 2

This setting specifies whether the high pressure pump will be powered during Forward Flush 2 (on/off).

1.5 Frequency of periodic Forward Flush in Service

This setting determines how often Service mode is interrupted to run forward flush sequence (once in 0...255 hours).

1.6 Frequency of periodic Forward Flush in Standby

This setting determines how often Standby mode is interrupted to run forward flush sequence (once in 0...255 hours).

1.7 Read low feed pressure during Forward Flush

This setting specifies if low feed pressure switch status will be read by the controller during forward flush. If set to 'off', low feed pressure situation will not bring about Fault mode.

1.8 Low feed pressure switch

This setting specifies whether low feed pressure switch is normally closed (NC) or normally open (NO) type.

1.9 Low feed pressure Fault delay

Specify the length of time before the controller goes into Fault mode if low feed pressure condition occurs (0...255 seconds). The pump will continue to run for this many seconds before Fault mode is switched to. If set to 0, pump will stop running immediately after low feed pressure occurs.

1.10 High feed pressure switch

This setting specifies if high feed pressure switch is normally closed (NC) or normally open (NO) type.

1.11 Permeate backpressure switch

This setting specifies whether backpressure switch is normally closed (NC) or normally open (NO) type.

1.12 Backpressure Standby delay

Specify the length of time before the controller goes into Standby if high permeate pressure condition occurs (0...255 seconds). Controller will continue to operate in Service mode for the set length of time before running pre-Standby forward flush or will initiate Forward flush immediately if value set to 0.

1.13 Tank level switch

This setting specifies whether float switch is normally closed (NC) or normally open (NO) type.

1.14 Tank level Standby delay

Specify the length of time before the controller goes into Standby if tank level switch goes high (0...255 seconds). Controller will continue to operate in Service mode for the set length of time before running pre-Standby forward flush or will initiate Forward flush immediately if value set to 0.

1.15 Display permeate TDS in ppm

If set to "on", electrical conductivity (EC) of permeate will be displayed as TDS in ppm as $TDS = 0.5147 * EC$.

1.16 Permeate conductivity Fault threshold

Specify maximum acceptable permeate conductivity. Conductivity reading above this value will initiate Fault mode ('High permeate TDS'). If set to zero, fault threshold will not be used.

1.17 Permeate conductivity Fault delay

Specify the length of time before the controller goes into Fault mode when high permeate conductivity is being read. Step 1.17 is displayed only if step 1.16 is set to non-zero value.

1.18 Display temperature

Select units of temperature (C for Celsius, F for Fahrenheit).

1.19 New settings and calibration passcode

Verify passcode.

2. Calibration

Hold **□** STOP for 8 seconds to launch menu prompt. Push **□** STOP to skip Settings submenu and push **▶** START to enter Calibration submenu. Enter passcode in the prompt. Factory passcode is '0000'.

2.1 First point value

First calibration point can be done at zero electrical conductivity (dry conductivity meter). In order to use zero first point conductivity, remove the conductivity meter from its cell, wipe with clean cloth and keep dry for a few minutes. When conductivity reading on the display stabilizes, put zeroes in the bottom row, and go to the next step.

If using a weakly conducting solution to set the first point, rinse the meter with deionized water and wipe dry. Dip clean conductivity meter into sample of known standard conductivity, wait until the reading on display stabilizes and input actual conductivity. Then go to the next step.

2.2 Second point value

Use water sample with greater conductivity than that of the first point standard. Follow the same procedure rinsing and wiping residual moisture on conductivity meter electrodes. Dip clean conductivity meter into sample of known standard conductivity, wait until the reading on display stabilizes and input actual conductivity. Then go to the next step. The controller will display 'OK' and show Maintenance submenu prompt.

3. Maintenance

Maintenance submenu will be shown after completing calibration of conductivity meter and can be called up during Service by holding **□** STOP for 8 seconds, then skipping Settings and Calibration prompt displays. Enter Maintenance passcode in the prompt. Factory passcode is '0000'.

3.1 Schedule maintenance stop

Select 'on' to turn on maintenance reminder after preset number of hours of cumulative runtime. Controller will put the RO machine to a halt and display maintenance alert message. Operation can only be continued after entering Maintenance submenu (with proper Maintenance passcode) and resetting scheduled stop period. If set to 'off', the controller will continue to count overdue hours after reaching zero hour count.

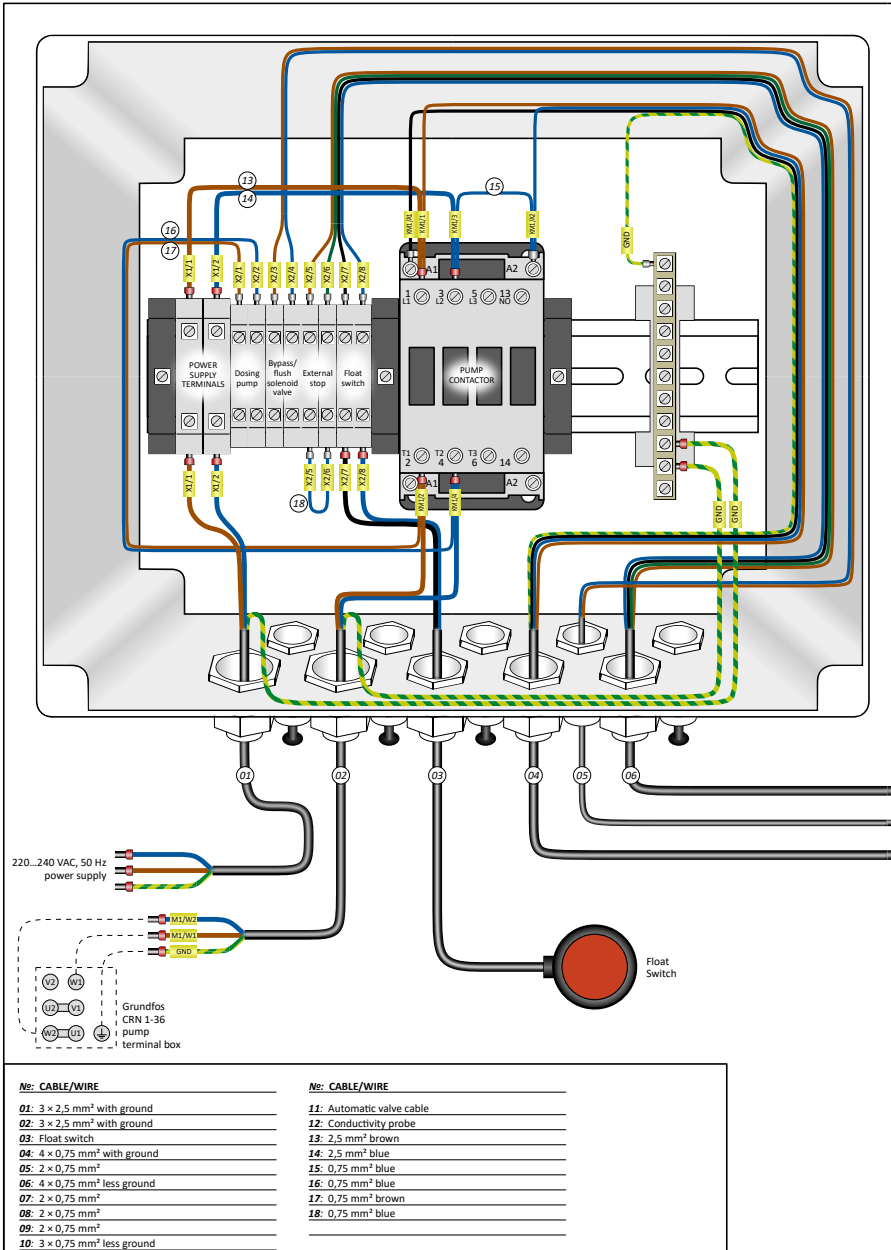
3.2 Scheduled stop period

Enter the number of hours before the RO machine will be brought to a scheduled stop for maintenance. This setting will not be shown if the scheduled stop is turned off in step 3.1.

3.3 New Maintenance passcode

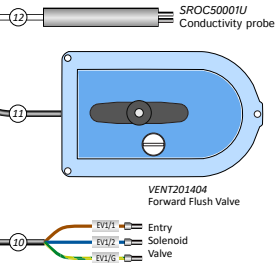
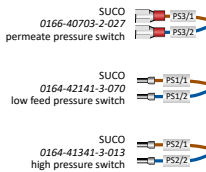
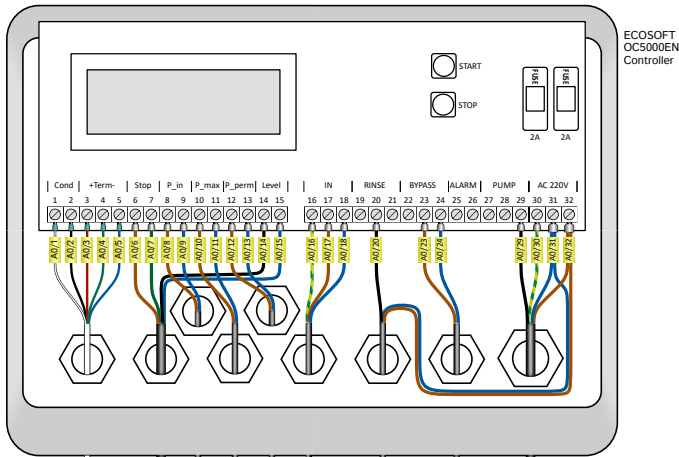
Enter new passcode for Maintenance submenu and confirm. This will exit the Configuration menu.

A. WIRING DIAGRAM



WIRING DIAGRAM
ECOSOFT MO6500BWTSS, MO12000BWTSS

ver. 2020-11-20
sheet 1 / 1

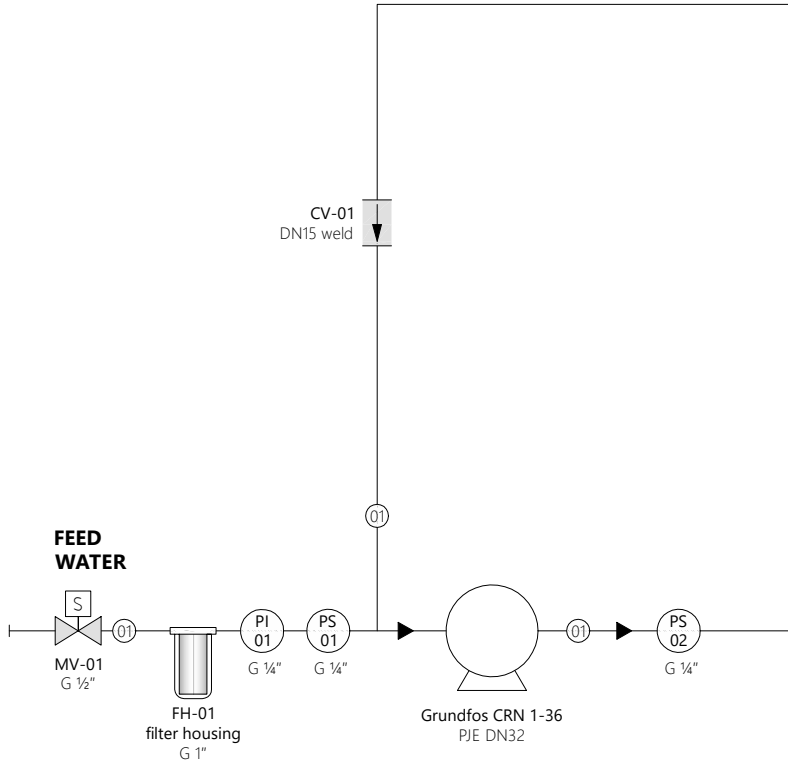


B. PIPE AND INSTRUMENT DIAGRAMS

ECOSOFT MO-6500 BW SS REVERSE OSMOSIS SYSTEM

Pipe and Instrument Diagram

* process design may be amended on manufacturer's discretion without deteriorating product functionality and application compatibility

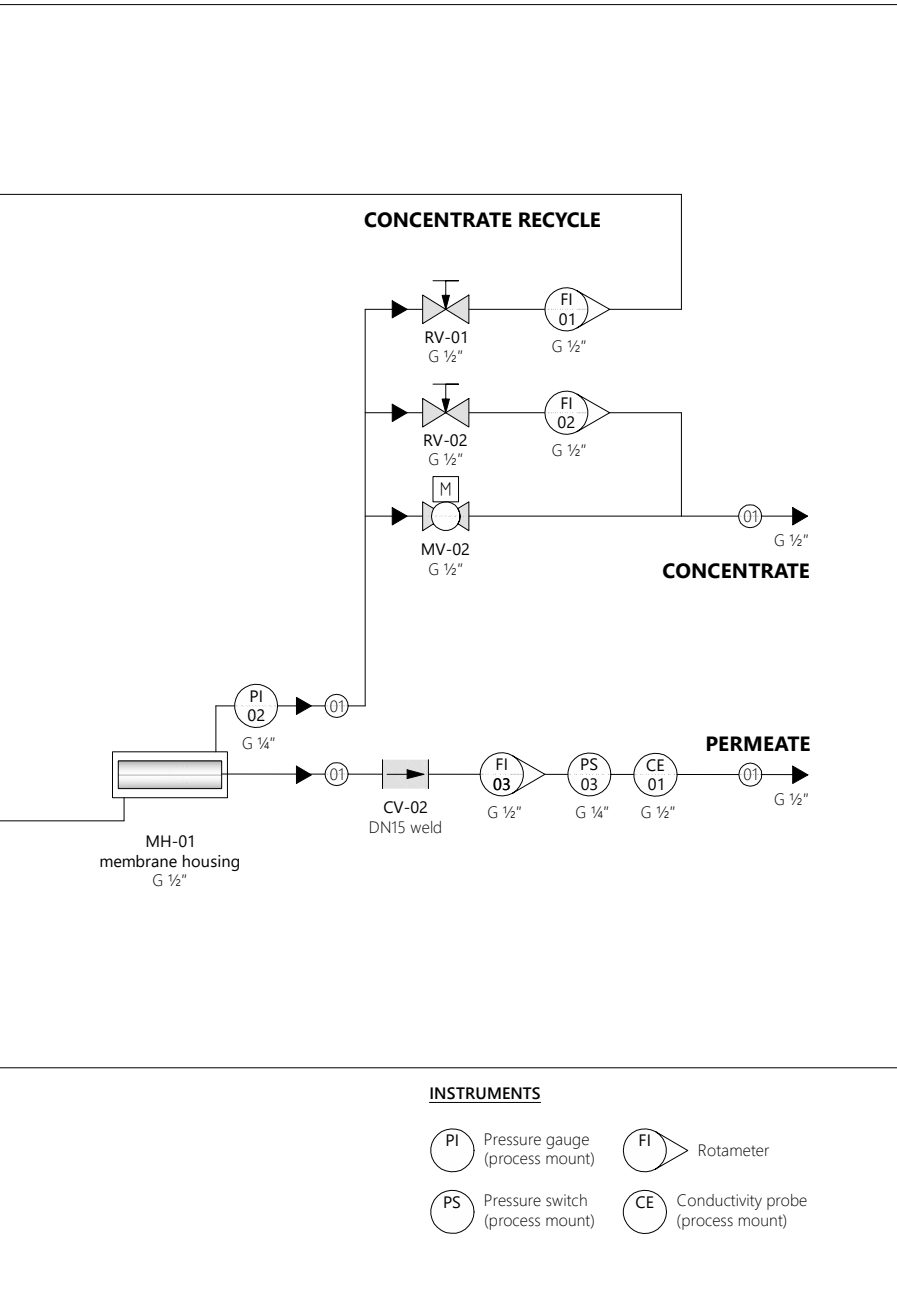


PIPES

—(01)— Stainless steel pipe DN15

VALVES

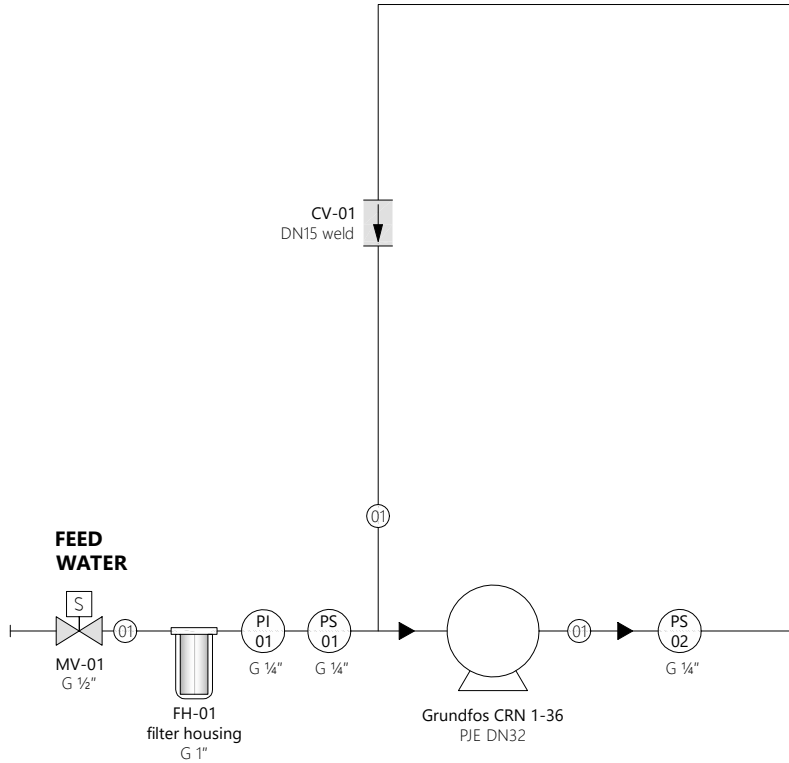
- Solenoid Valve
 Needle Valve
- Motorized Valve
 Check Valve



ECOSOFT MO-12000 BW SS REVERSE OSMOSIS SYSTEM

Pipe and Instrument Diagram





* process design may be amended on manufacturer's discretion without deteriorating product functionality and application compatibility

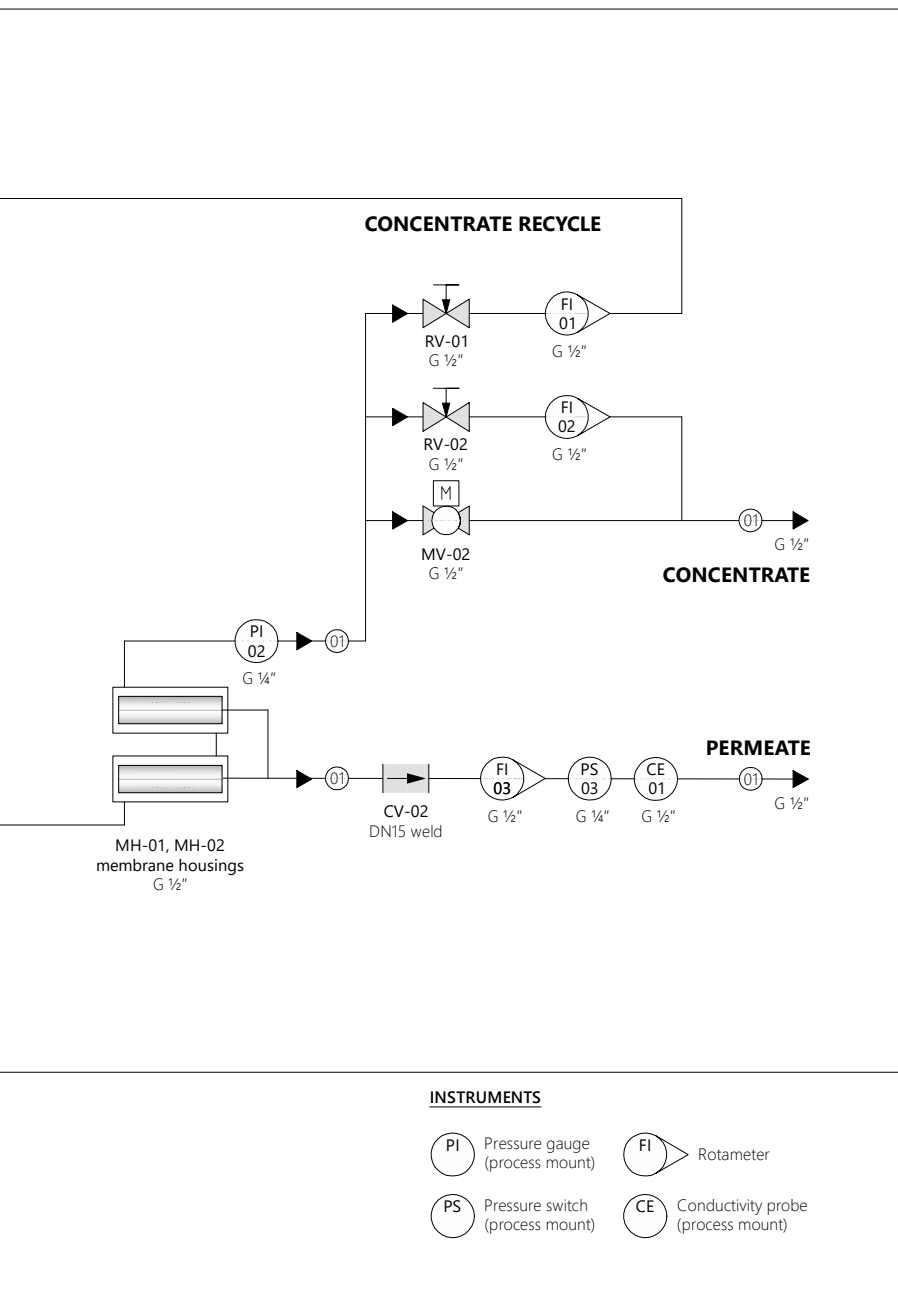


PIPES

—(01)— Stainless steel pipe DN15

VALVES

-  Solenoid Valve
  Needle Valve
-  Motorized Valve
  Check Valve

**INSTRUMENTS**Pressure gauge
(process mount)

Rotameter

Pressure switch
(process mount)Conductivity probe
(process mount)

