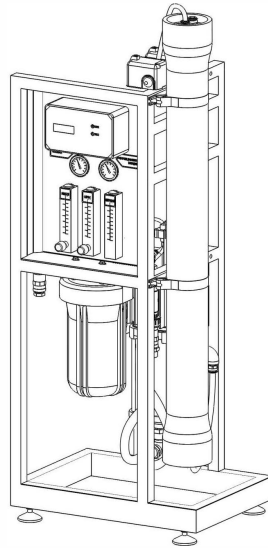


KADO CLEAN PROFESSIONAL UO S1 / UO S2 / UO S4 / UO S6  
Commercial RO Systems

## Bedienungsanleitung



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Gültig für: **Umkehrosmoseanlagen KadoCLEAN Professional UO S1 / UO S2 / UO S4 / UO S6**

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## 1. ACRONYMS AND ABBREVIATIONS

**RO** — Reverse osmosis

**CIP** — Clean-in-place

**FF** — Forward flush

**P&ID** — Piping and instrumentation diagram

**TDS** — Total dissolved solids

**PCB** — Printed circuit board

**NC** — Normally closed

**NO** — Normally open

**LPM** — Liter per minute

**LPH** — Liter per hour

## 2. RO SYSTEM

### 2.1. OVERVIEW

Ecosoft reverse osmosis systems are used for demineralizing water in industrial, municipal, commercial applications. Ecosoft RO system can be used to demineralize low to medium salinity feed water. System components comprise powder-coated steel skid, industry standard Big Blue 20 prefilters, high pressure pump, array of pressure vessels with membranes, power cabinet, 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 machines 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 operation 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.

The RO unit can be fitted with an optional permeate flush or raw water blending assembly.

## 2.2. TECHNICAL SPECIFICATIONS

Table 1. Physical parameters

KADO CLEAN Professional	UO S1	UO S2	UO S4	UO S6
Product code (SKU)	M6VCTFE0UN (less membrane) M6VCTFEUN (low energy membrane)	M10VCTFE0UN (less membrane) M10VCTFEUN (low energy membrane)	M24VCTFE0UN (less membrane) M24VCTFEUN (low energy membrane)	M36VCTFE0UN (less membrane) M36VCTFEUN (low energy membrane)
Rated capacity, LPH*	250	500	1200	1600
Forward flush flow demand, LPM**	40	40	80	80
4040 membrane housings	1	2	4	6
Rated voltage	1 × 230 VAC, 50 Hz (free from voltage surge, dip, and any interference)			
Rated power, kW	1	1	2	2
Dimensions (Width × Depth × Height), cm	55 × 42 × 145	55 × 42 × 145	70 × 62 × 145	90 × 62 × 145
Approx. weight (bare/ crated), kg	55 / 80	60 / 85	110 / 150	130 / 170
Ports (feed, permeate, waste)	½"	½"	1"	1"
Operating parameter specifications*				
Concentrate recycle flow, LPM	15	9,2	32	24
Concentrate drain flow, LPM	1,4	2,8	6,7	9
Permeate flow, LPM	4,2	8,3	20	27
Water demand per flush, liter	30 ... 35	30 ... 35	60 ... 70	60 ... 70

\* For 25 °C, 1500 mg/l feed water. Feed water must comply with requirements in Table 2. If some parameters do not meet the requirements, it is recommended to contact your product support for advice.

\*\* Only required briefly during membrane rinse — 60 seconds factory default. If this flow demand cannot be met, disable the forward flush in the controller settings.

Table 2. Limitations

Influent water quality***			
Hardness	150 mg/l CaCO <sub>3</sub>	Chemical Oxygen Demand	5 mg/l O <sub>2</sub>
Silica	20 mg/l	Iron	0,1 mg/l
Total dissolved solids	3000 mg/l	Manganese	0,05 mg/l
Residual Chlorine	0,1 mg/l	Hydrogen sulfide	none
Operating parameters			
Required supply water pressure	2...4 bar	Water temperature	5...30 °C
		Operating pressure	8...12 bar

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



*Tap feed water must be prefiltered 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. FLOW RATE CHARTS

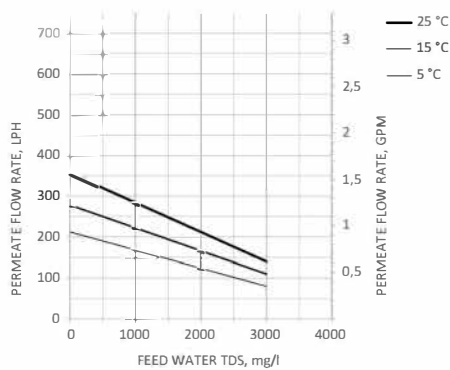


Figure 2.1 KADO CLEAN UO S1 flow rate chart

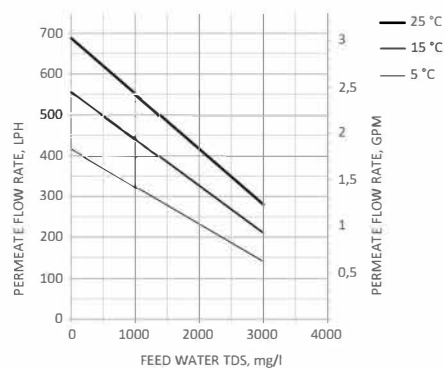


Figure 2.2 KADO CLEAN UO S2 flow rate chart

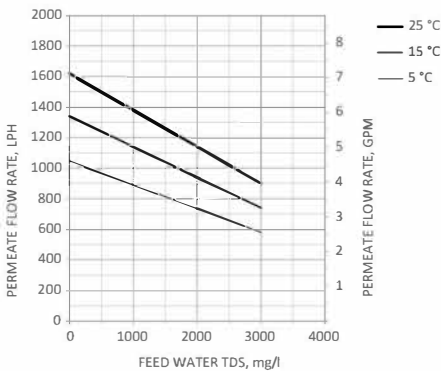


Figure 2.3 KADO CLEAN UO S4 flow rate chart

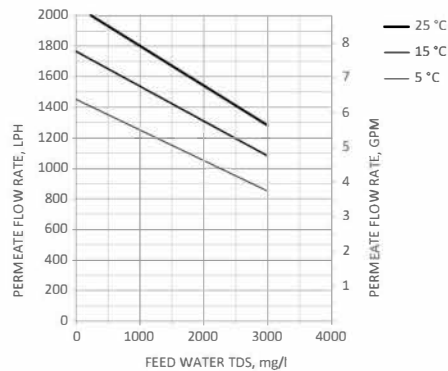


Figure 2.4 KADO CLEAN UO S6 flow rate chart

Permeate flow rates are calculated under the following conditions:

- 2 bar influent water pressure
- 0 bar backpressure in the permeate line
- 75% permeate recovery
- 0,85 flow factor (flux decline equivalent to 3 years of use)

Your system's flow capacity may be different depending on the above factors and water chemistry.

### 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, pre filter housings, power cabinet before proceeding with connection and startup.

**3.2** Install membrane in each pressure vessel as follows.

Remove PVC piping with the pressure vessel ports. To remove PVC pipes, take apart pipe unions at the pressure vessel ports. If necessary, also loosen next closest downstream union to remove the entire piping fragment leading to the vessel. Remove the lid at the feed end of pressure vessel. First, remove spiral retaining ring by pulling bent tab towards the center of circle. If the pressure vessel lid is retained by half rims, remove the fastening screws and pull half rims out of circular groove. Take out the lid with membrane adapter.



*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 brine seal last. Central tube of the membrane has to mate with membrane adapter installed at the concentrate end of pressure vessel. If necessary, remove the lid at the concentrate end before installing the membrane.

Install the lid back in place. Put spiral retaining ring (or half rims) in the groove, fasten half rims with screws. Re-assemble the RO system in reverse order.

**3.3** Connect raw water pipe from water main/pump, drain tube or hose and permeate pipe to the connection port of the RO system (see picture below). Recommended pipe size is at least that of the connection port, plastic/composite pipe or rigid non-kinking hose. Use appropriate fittings as necessary. Ensure air gap at the end of drain line to prevent backsiphonage. Connect tube or hose to permeate outlet and extend it to permeate tank. Cut or bore an aperture at the top of tank wall, install pipe gland and pull the permeate tube through the gland (note: run permeate line to drain when carrying out initial membrane rinse).



*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 conductor connecting the STOP terminals in the electrical panel. Then, run 2-wire cable from the microswitch inside the panel and connect to the terminals. If using antiscalant or other RO chemicals, refer to dosing pump's instruction booklet for information concerning the dosing pump.

**3.6** Power up the system by plugging the electrical plug in a 230 VAC, 50 Hz socket.

### START UP THE SYSTEM AS FOLLOWS:

**3.7** Ensure recycle and drain flow regulating valves are fully open before starting. Run the permeate tube to drain for the duration of the first run of the RO system.

**3.8** Switch on controller circuit breaker to start the RO system. After the controller starts up and the unit starts to operate, tighten drain regulating valve until drain rotameter reading meets specifications (see Table 1). Then, start turning down recycle regulating valve. This will raise pressure in the membrane module shown on pressure gauge. Stop when permeate flow rate meets specification or pressure in the membrane module reaches above upper limit (see Table 1). After the proper operating pressure is set, readjust drain flow rate (if it deviates in the process) to ensure that system operates with proper recovery (75% unless specified otherwise). To find out target drain flow rate, perform below calculation:

$$\text{Drain flow rate} = \frac{\text{Permeate flow rate}}{\text{Recovery}} - \text{Permeate flow rate}$$

**For example:**

Permeate flow rate = 9 LPM = 540 LPH

Recovery = 75% = 0,75 (default)

$$\text{Target drain flow rate} = 9/0,75 - 9 = 3 \text{ LPM} = 180 \text{ LPH}$$

Make sure that the permeate flow rate and drain flow rate conform to your recovery calculation. After you have finished setting up check that operating flow rates, rotameter and pressure gauge readings stay within specification limitations in Tables 1 and 2.



*Take care not to exceed 14 bar in membrane module at any time. If membrane pressure rises above the upper limit in specification, open recycle flow regulating valve to bring it down.*



*Take care not to exceed proper recovery. If you are unsure what recovery your system should be operated with, contact Ecosoft Product support for assistance.*



*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 permeate and concentrate to drain to flush out membrane preservative. Watch pressure and flow rate readings to make sure these do not exceed requirements.

After 1 hour of operation, start forward flush cycle (by pressing START on controller front panel), then stop the unit. Connect permeate tube/hose to permeate tank. The RO system is ready for operation.

## 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 cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified person in order to avoid hazard.*

**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 readings on pressure gauges and rotameters fall within the specified range per requirements specification;
- verify tightness of hydraulic connections and 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 1 bar 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 module increases 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.



***Do not torque over 2 kgf×m when tightening bowl.***

### 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

Problem	Possible cause	Corrective action
Low feed water pressure fault during first run of the system (no water supply message on the display and counting restart attempts)	Air has not been vented from the system	Increase setting <i>1.1 High pressure pump delay</i> during the first run of the system for more time to purge the air from the system.
	Some of the membranes are not installed	Make sure all membranes are installed.
	High hydraulic resistance of the feed water pipeline	Check that all shutoff valves are open; feed pump is powered up; prefilters are clean and in service position; water mains has enough flow capacity.
	Insufficient feed water pump capacity	Verify that the feed pump has enough capacity and is powered up. If the feed pump is equipped with a variable frequency drive, try increasing the VFD sensitivity for faster speed gain.
Low feed water pressure fault after a period of running (no water supply message on the display and counting restart attempts)	Insufficient flow capacity for the forward flush	If using a feed water pump, check that it has the required flow capacity @ 2 bar or more. If it doesn't, disable the forward flush by changing <i>1.2 Forward flush duration</i> to zero.
		If using mains water supply, make sure the RO machine is connected as close as possible to the main pipeline, using ample pipe diameter.
	Clogged prefilter	Check after the filter pressure gauge. If the pressure drop is larger than 1 bar, replace the prefilter cartridge.
The controller stays in Standby mode even when it is supposed to deliver permeate	Float switch is in the raised position	Check that the movement of the float switch is not restricted and it hasn't stuck in the upper position; adjust the ballast if necessary.
	Permeate pressure switch is activated	Check that the permeate pipeline is not blocked or shut off; if using a pressure tank, it has to be near empty for the RO to go back to Service.
The controller is in Stop mode	Stop mode can be entered by pushing  button or by external signal (if connected)	Push  if the machine was manually stopped; if this doesn't help (nor does rebooting the controller) then check if the wire jumper is installed in the STOP signal terminals in the electrical panel (see the wiring diagram).



Problem	Possible cause	Corrective action
Permeate flow rate is too low and cannot be increased	Low feed water temperature or high Total Dissolved Solids	Check feed water temperature and TDS / conductivity and verify against the flow rate chart in the <b>RO System</b> section.
	Operating pressure is lower than recommended	In most cases, the RO will produce best results at the operating pressure of 8 ... 10 bar; read the <b>Installation and Startup</b> section how to raise the operating pressure.
	Concentrate drain flow rate is lower than recommended	Exceeding the permeate recovery rate of 75% may lead to buildup of impurities in the concentrate circuit; find out the right concentrate drain flow rate using the formula in the <b>Installation and Startup</b> section.
	Scaled or fouled membranes	May occur if using the RO machine to purify water with significant hardness or other impurities without prior pre-treatment; white or brown precipitate in the rotameters is a sign of scaling; the membranes must be replaced or undergo chemical cleaning using a CIP system.
Excessively high permeate conductivity or Total Dissolved Solids	Scaled or fouled membranes	See the previous paragraph ↑
	High feed water temperature or high Total Dissolved Solids	An estimation of the permeate chemical composition can be made using membrane vendor's CAD software.
	Damaged O-ring seal on the membrane housing end cap permeate port	Check and replace if necessary.
	Some of the membranes are not installed	Make sure all membranes are installed.
OTHER		Please contact your supplier's technical support.

8. CONTROLLER

8.1. OVERVIEW

Eco UO 1 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, 50/60 Hz	L	32
Neutral		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	5 V (only use dry contact NC/NO switches)	P_in	8–9
High operating pressure switch		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	110-220 VAC (matching the power supply voltage)	PUMP	28–29 27 (ground)
Alarm signal out		ALARM	25–26
Entry electric valve		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

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	10 s*
1.2 Forward Flush 1 duration, s	60 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 hour
3.3 New maintenance passcode	

\*Before first start of the system change the high pressure pump delay to 255 seconds to vent the air from the system. After successfully running the RO unit, revert back to the factory setting of 10 seconds.

## 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 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.

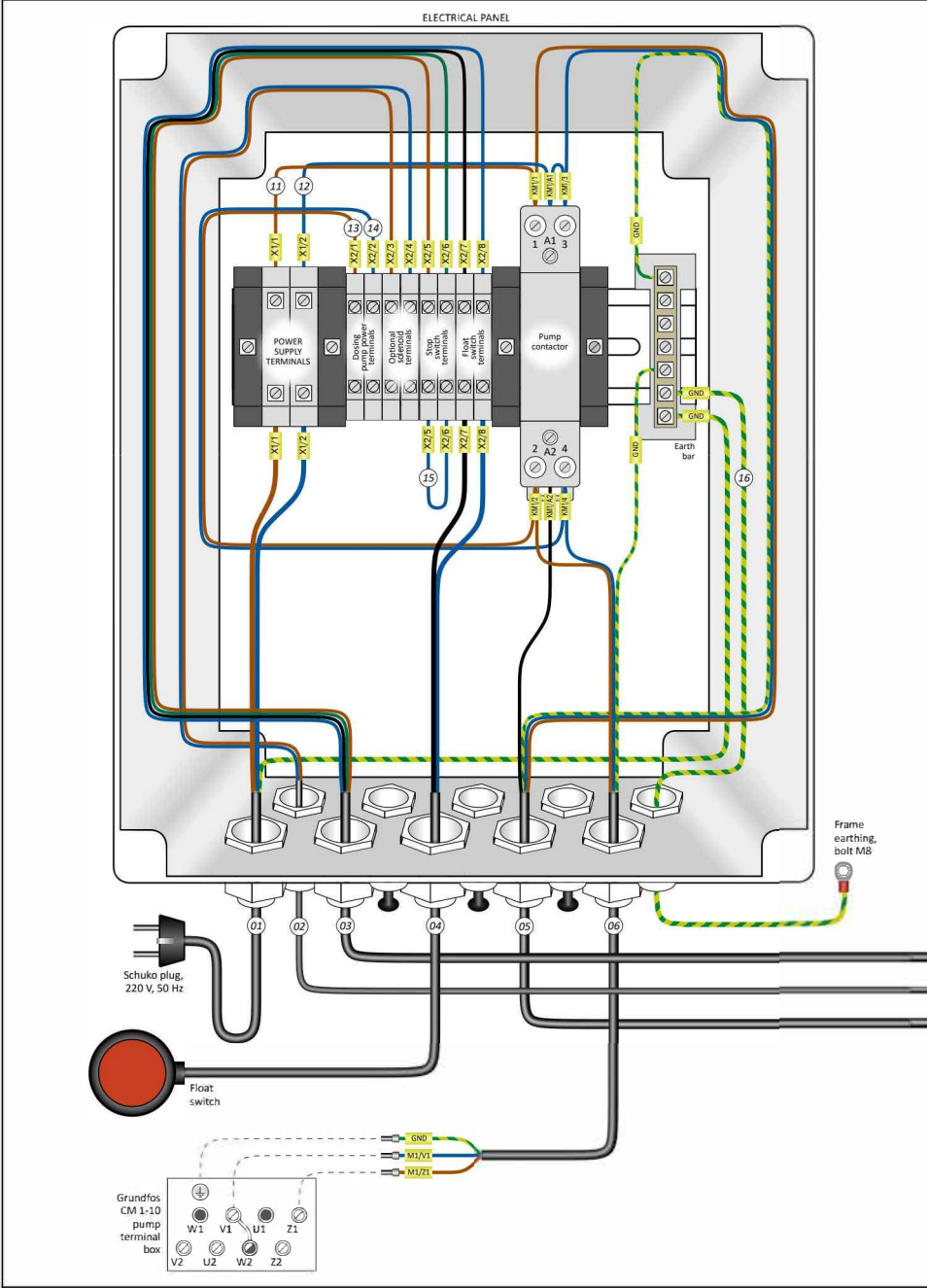
### 3.2 Scheduled stop period

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.

ANNEX A



# SETM5M6M12 ELECTRICAL PANEL WIRING LAYOUT

For KADO CLEAN PROFESSIONAL UO S1 + S2 reverse osmosis systems

rev 2021-07-23  
sheet 1 / 1

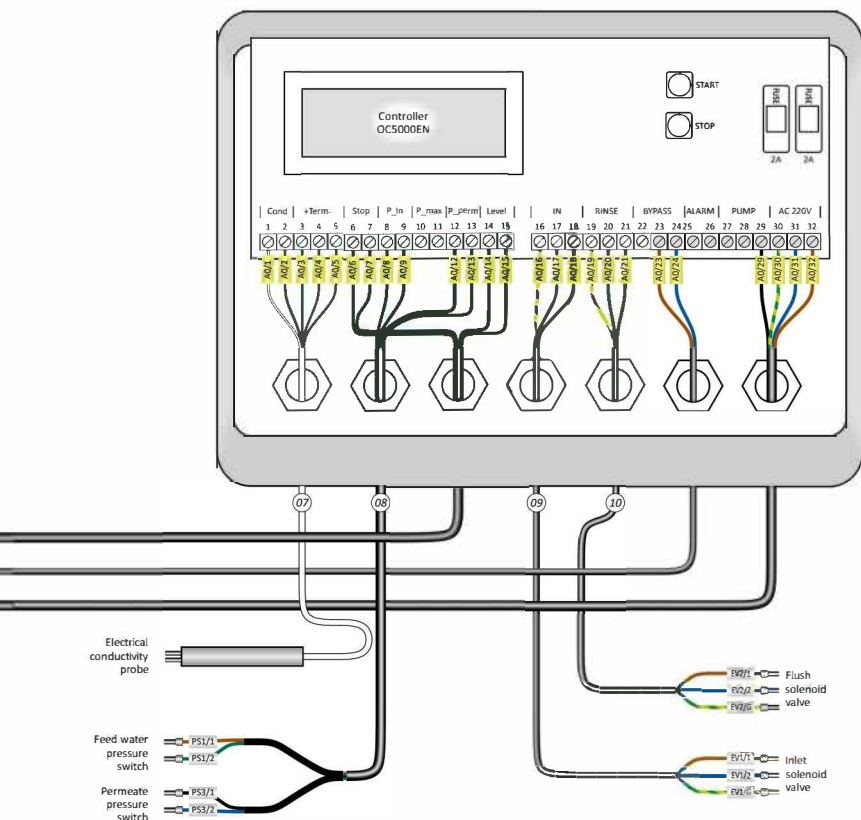
**kadotec**  
WASSTECHNIK

## No. Wire/cable

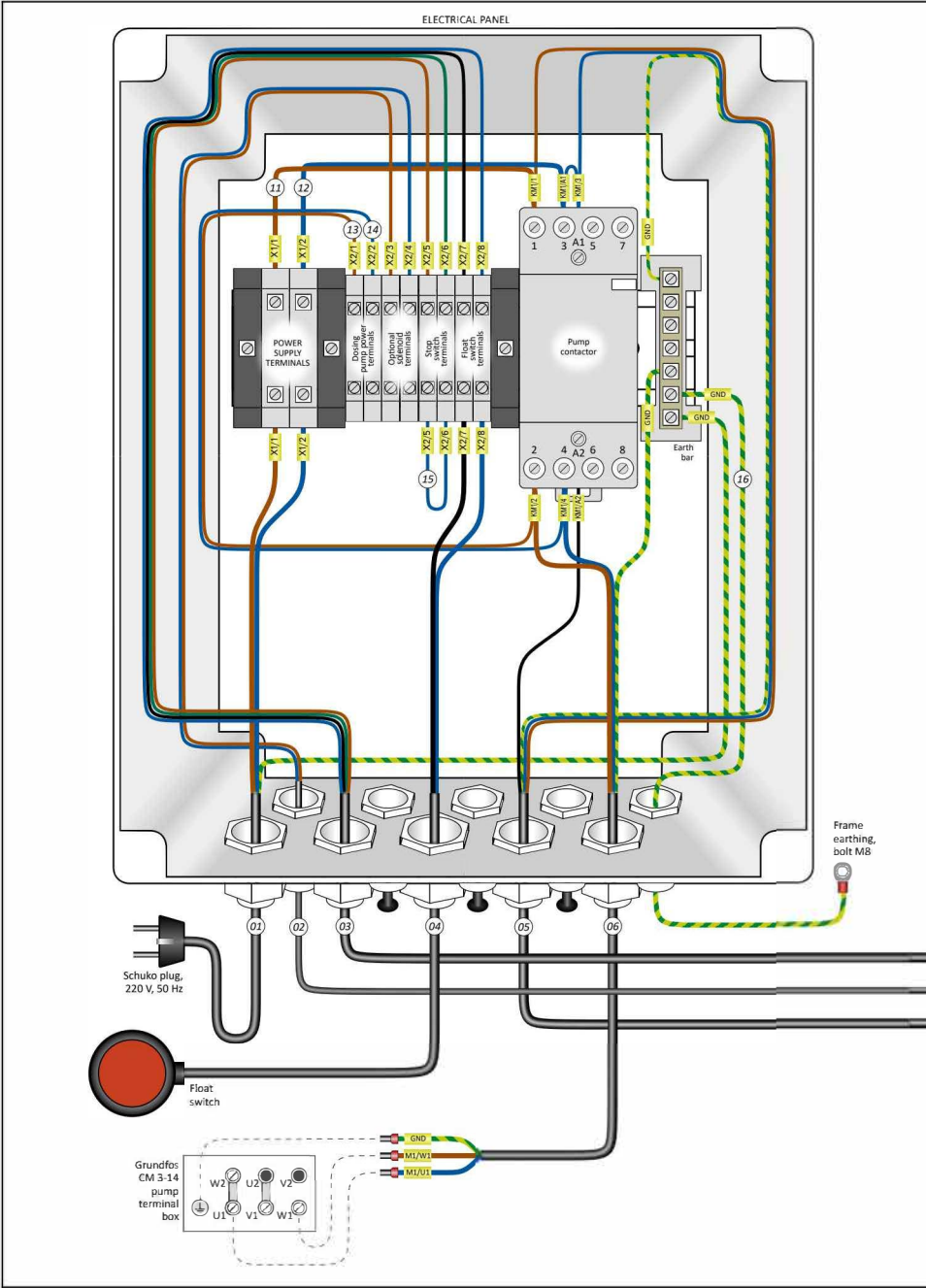
- 01: Schuko plug with 3 × 1,5 mm<sup>2</sup> cord
- 02: 2 × 0,75 mm<sup>2</sup> cable less PE
- 03: 4 × 0,75 mm<sup>2</sup> cable less PE
- 04: Float switch
- 05: 4 × 0,75 mm<sup>2</sup> cable with PE
- 06: 3 × 0,75 mm<sup>2</sup> cable with PE
- 07: Electrical conductivity probe
- 08: 4 × 0,75 mm<sup>2</sup> cable less PE
- 09: 3 × 0,75 mm<sup>2</sup> cable with PE
- 10: 3 × 0,75 mm<sup>2</sup> cable with PE

## No. Wire/cable

- 11: 0,75 mm<sup>2</sup> brown wire
- 12: 0,75 mm<sup>2</sup> blue wire
- 13: 0,75 mm<sup>2</sup> brown wire
- 14: 0,75 mm<sup>2</sup> blue wire
- 15: 0,75 mm<sup>2</sup> blue wire
- 16: 1,5 mm<sup>2</sup> PE wire



ANNEX A





# PIP NG L OUT DRAW NGS

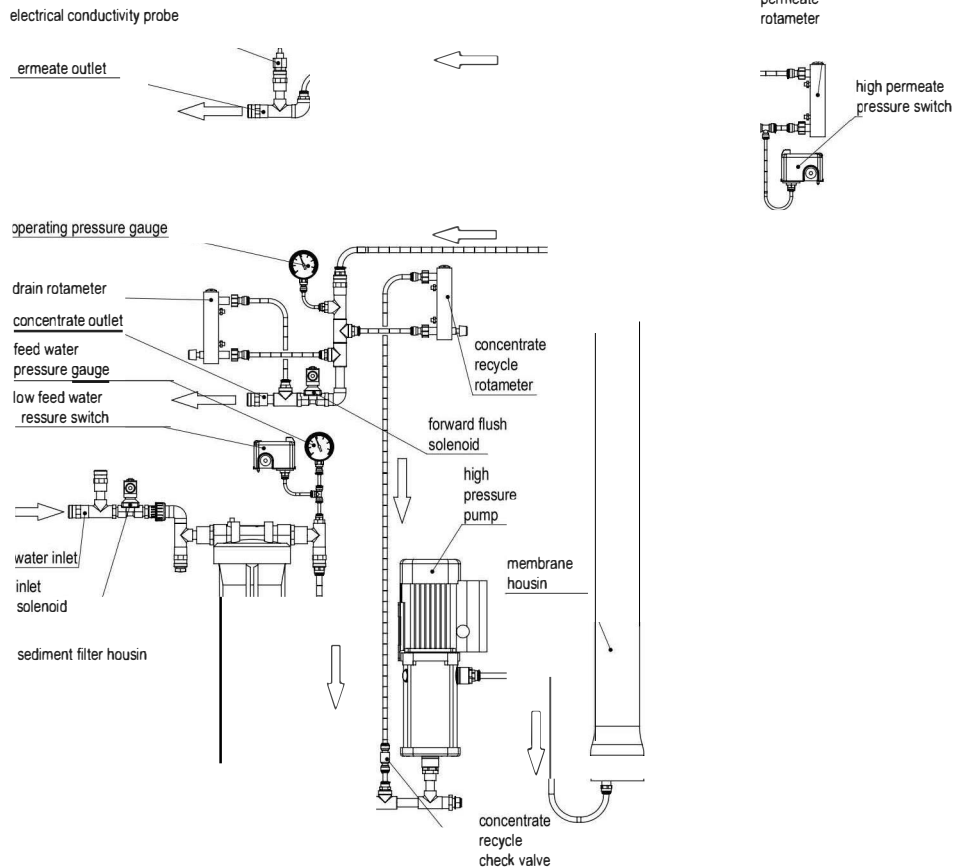


Figure 1. Layout of KADO CLEAN PROFESSIONAL UO S1

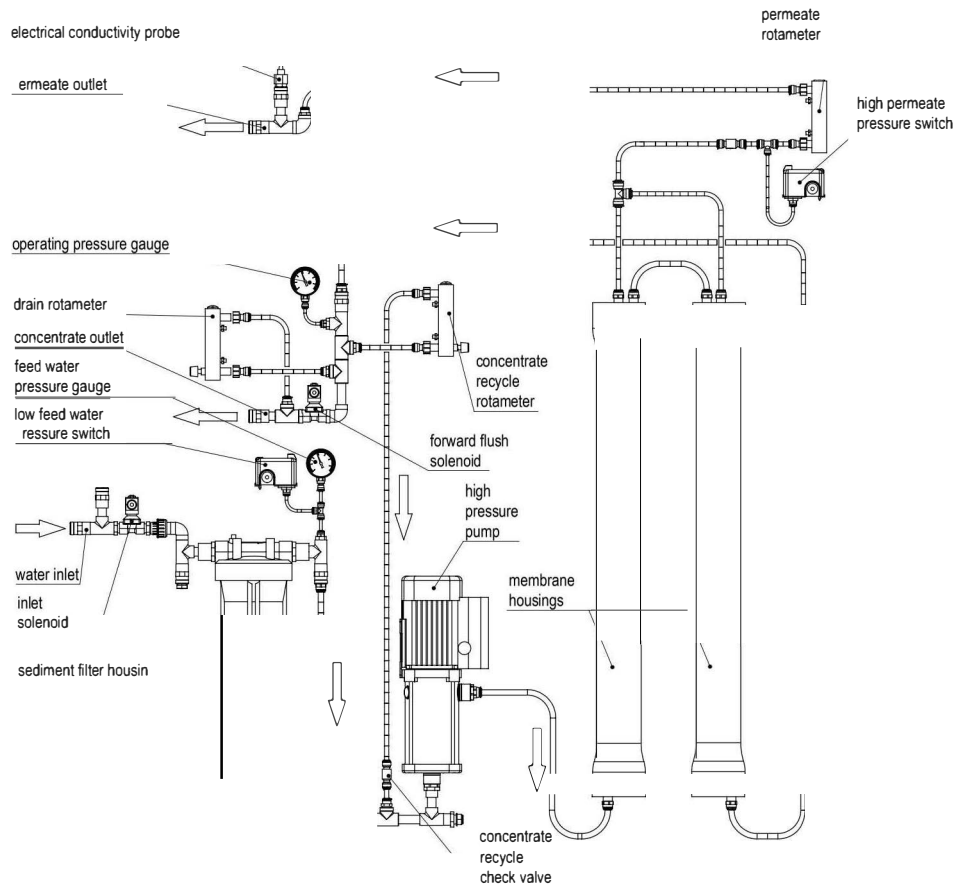


Figure 2. Layout of KADO CLEAN PROFESSIONAL UO S2

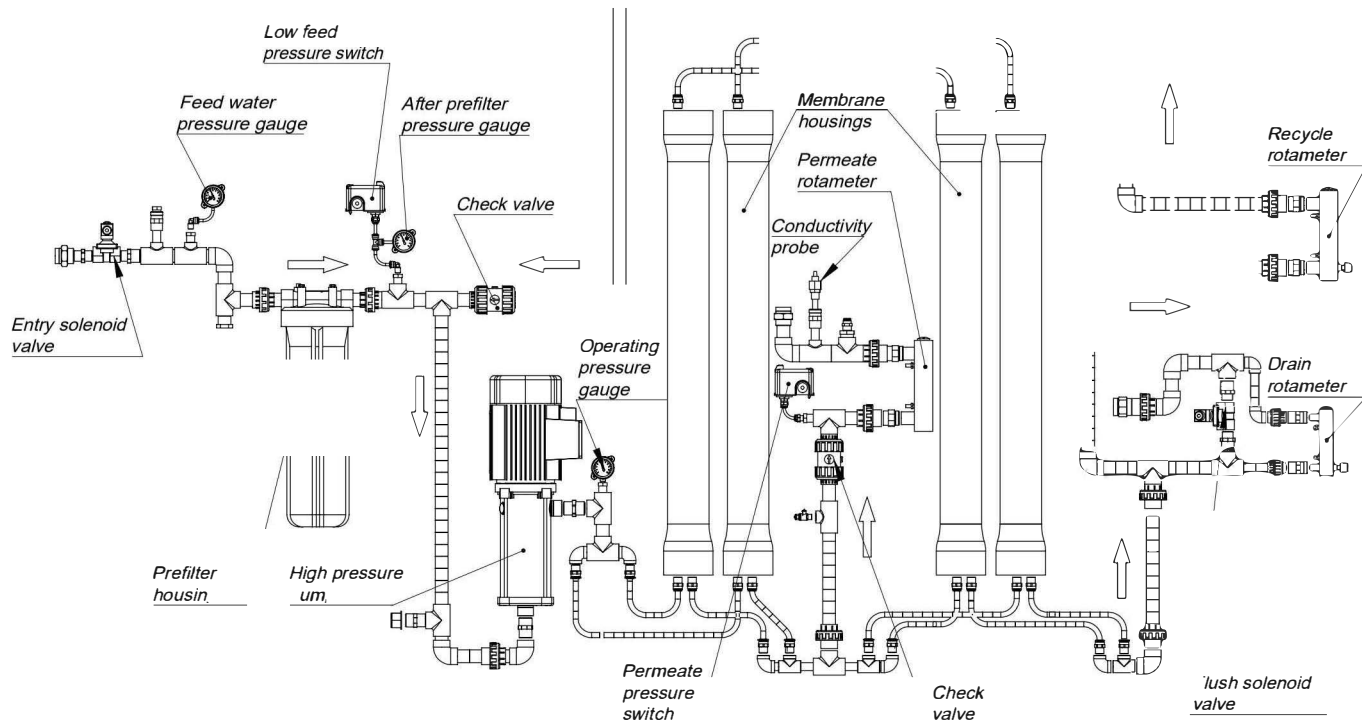


Figure 3. Layout of KADO CLEAN Professional UO S4

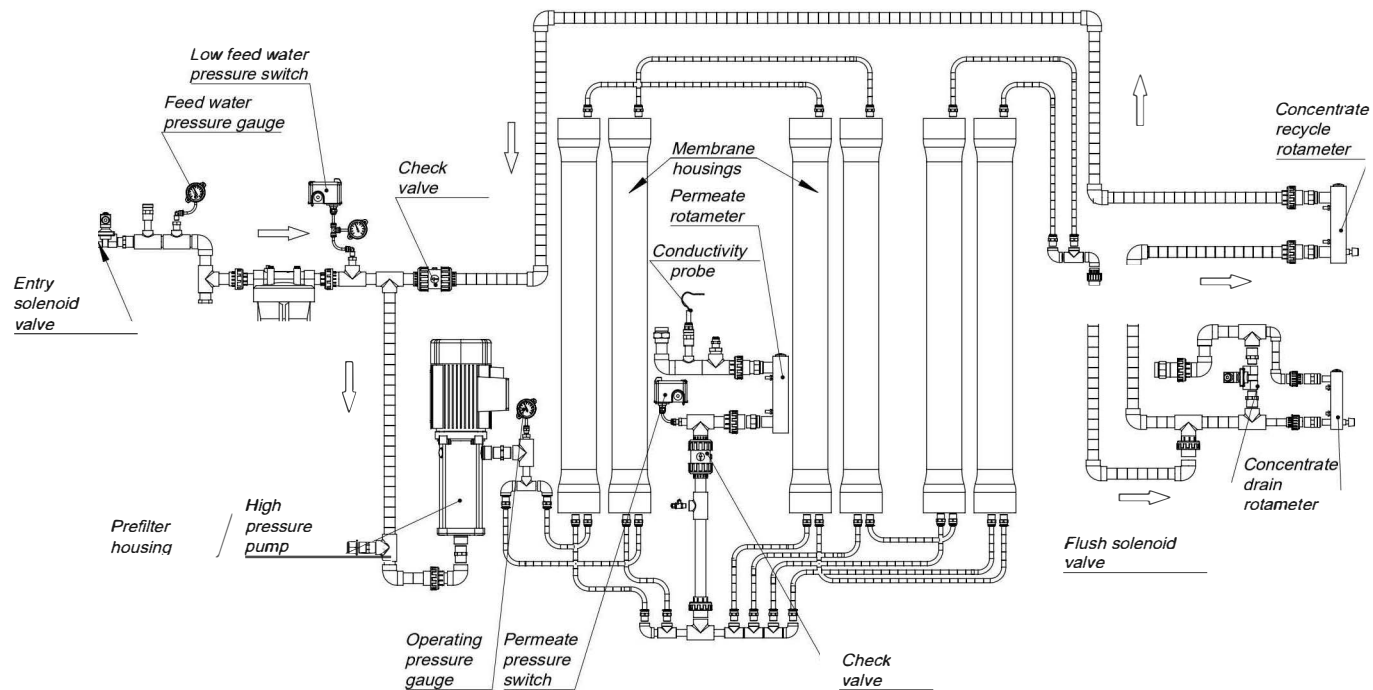


Figure 4. Layout of KASDO CLEAN PROFESSIONAL UO S6



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