
Manual

R.O. Process Controller

ESDI Model 250C

ESDI Part No. 000250C

February 29, 2008

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1.0 General:

The ESDI Model 250C is a low cost electronic control board that performs all of the functions necessary to control a Reverse Osmosis Water Purification System. This R.O. Controller operates from a 24VAC power transformer and directly controls 24VAC valves. The pump output is via an isolated onboard power relay, so it can control any pump voltage up to 2HP, 240VAC. The controller is available in several configurations. As a single circuit board assembly without power transformer, or as a completed assembly with power transformer, fuses, enclosure and power switch. The controller's description, features, and specifications are presented in this document.

2.0. Features:

2.1. Flush Status: To help increase the life of the RO membrane, this controller features several RO membrane flush cycles. These flush cycles can be enabled or disabled by the Flush Status switch S1. When S1 is on, all flush cycles will be active. See 2.1.4 for more information. When S1 is off no flushes will occur.

2.1.1. Flush Time: Switches S4 and S5 set the Flush Time. The selectable flush times are 1, 2, 3, and 5 minutes. During this time, the Flush and Feed Valves are opened and feed water is allowed to pass over the membrane and out the Flush Valve to the drain. This will remove any built up brine that has collected in the membrane enclosure and will help rinse off some of the contaminants from the membrane itself. At the completion of the flush cycle, the Flush Valve will close, and the controller will go back to the process it was performing prior to the beginning of the flush cycle. This flush time will be the same for all flush cycles that are initiated by the controller.

2.1.2. Flush Cycle Time, Processing: When the system has been processing water for an extended period of time, it is important that the system periodically stop and flush the RO membrane. This helps clean the membrane and improve its efficiency. This "Processing" Flush Cycle can be set by switch S3 to run every 2 hours, or every 4 hours. The flush time will be the same as that set by switches S4 and S5. Flush Status S1 must be on.

2.1.3. Flush Cycle Time, Tank Full: When the tank is full, the system is idle in a standby mode. During this time no water passes through the membrane. The Model 250 includes a flush cycle that periodically runs during this standby mode. During this flush, the feed and flush valves are opened, and the flush duration will be the same as that set by switches S4 and S5. The “tank full” Flush Cycle can be set by switch S2 to run every 12 hours, or every 24 hours. Flush Status S1 must be on.

2.1.4. Additional Flush Cycles: When the Flush Status switch S1 is on, the system will perform flush cycles in the following instances. The flush duration will be the same as that set by switches S1 and S2.

2.1.4.1. Power-Up Flush: A flush cycle will occur each time line power is first applied to the system

2.1.4.2. Stop Flush: A flush cycle will occur each time the tank is filled and prior to the system shutting down and going into standby.

2.1.4.3. Lockout Flush: A flush cycle will occur each time the system returns from a lockout condition. (Note: 10-minute timeout after lockout condition.)

2.1.5. Preset Controller Delays: The control board has internal preset delays to help the performance of the system and reduce any strain on the pump. The delays are as follows:

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| 2.1.5.1. Inlet Open to Pump Start Delay: | 5 seconds (6 sec with Flush). |
| 2.1.5.2. Pump Stop to Inlet Close Delay: | 5 seconds. |
| 2.1.5.3. Inlet Open to Flush Open Delay: | 5 seconds. |
| 2.1.5.4. Flush Open to Pump Start Delay: | 1 second. |
| 2.1.5.5. Tank Full Restart Delay: | 10 Minutes. |
| 2.1.5.6. Return from Lockout Delay: | 10 Minutes. |

3.0. Inputs:

3.1. Tank Level Input: The Tank Level input connects to a float located at the top of the water storage tank. This float is used as feedback to the controller so it can maintain a full storage tank. The Tank Level input requires an isolated contact closure when the tank is low, and an open circuit when the tank is full. The Tank float must have built-in hysteresis (the float must travel some distance before the switch can change states). Hysteresis prevents the system from cycling on and off with small changes in water level. An internal 10 minute restart delay will help prevent excessive cycling of the pump.

3.2. Lockout Input: The Lockout input allows an external device to disable the controller. It can be connected to a pre-conditioner (water softener) to disable it while the unit is reconditioning and inlet water is unavailable. It can also be connected to an inlet pressure switch, or TDS monitor to shut down the system if the TDS is too high. These peripherals can be used exclusively, or wired in series to the Lockout input, such that any one item can lockout the system.

An isolated contact closure will enable the system while an open circuit will disable it and place it into Lockout. If this input is not used, place a jumper across the Lockout terminals. Upon returning from Lockout, the system will time out for ten minutes, and then execute a flush cycle (if selected) and then it will return to its previous status prior to Lockout.

4.0. Outputs:

4.1 Pump Relay: The normally open contacts of the pump relay are located on the top of the relay. These contacts are isolated to allow the user the ability to switch any voltage to the pump motor. The relay is rated at 240VAC, 2HP.

To help insure the pump will not run dry, the system is programmed to open the Feed valve five seconds prior to turning on the pump. Upon shutting off the pump, the Feed valve will remain open for five seconds after the pump turns off.

4.2. Flush Valve: This output connects to the Flush Valve. This valve, when open, will allow water to pass by the RO membrane and route the brine water into the drain. This valve should be rated for 24VAC operation. See 5.4.

4.3. Inlet Valve: The Inlet (or Feed) Valve is connected to this output. This valve, when open, will allow water to pass into the system from the municipal water line. This valve should be rated for 24VAC operation. See 5.5.

5.0 Specifications:

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| 5.1. Tank Level Input: | Isolated contact closure.
Open = Stop.
Close = Run. |
| 5.2. Lock Out Input: | Isolated contact closure.
Open = Stop.
Close = Run. |
| 5.3. Pump Relay Rating: | 30 Amps max
240VAC, 2HP
120VAC, 1HP |
| 5.4. Flush Valve Output: | 24VAC, 2 Amps max.
(5 Watt Max with supplied transformer) |
| 5.5. Inlet Valve Output: | 24VAC, 2 Amps max.
(5 Watt Max with supplied transformer) |
| 5.6. Circuit board Size: | 4.0" X 4.0" X 1.25". |
| 5.7. Enclosure Size: | 6.0" X 6.0" X 4.0". |
| 5.8. Board Power Requirements: | 24VAC, 50/60 Hz, 100ma (nominal).
Voltage tolerance: ± 10 % Minimum. |

6.0. Power Transformer Selection: It is important to select the proper power transformer. If the transformer is not capable of supplying the required current, the voltage will collapse and the system may not operate correctly. To do this, one must totalize all of the current drawing components.

Nominal Secondary Voltage:	24 VAC, 50/60 Hz
Total Secondary Current (Maximum):	420 ma

7.0. Switches & Indicators:

7.1. Option Settings DIP Switch:

7.1.1. Flush Duration:	<u>S4</u>	<u>S5</u>	<u>Time:</u>
	On	On	1 minute
	On	Off	2 minutes
	Off	On	3 minutes
	Off	Off	5 minutes

7.1.2. Flush Cycle Time (Process):	<u>S3</u>	<u>Time:</u>
	On	2 Hrs.
	Off	4 Hrs.

7.1.3. Flush Cycle Time (Tank Full):	<u>S2</u>	<u>Time:</u>
	On	12 Hrs.
	Off	24 Hrs.

7.1.4. Flush Status:	<u>S1</u>	<u>Active:</u>
	On	On
	Off	Off

7.2. Power LED (GRN): Indicates that there is power to the board.

7.3. Tank Full LED (GRN): Indicates that the water storage tank is full.

7.4. Process LED (GRN): Indicates that the system is processing water.

7.5. Flush LED (YEL): Indicates that the system is in a flush cycle.

7.6. Lock Out LED (RED): Indicates that the system is locked out.

8.0. Connectors: The terminal block is pluggable and can be removed without having to remove the individual wires from the terminal block. The pluggable terminal blocks can be oriented either vertically or at right angles to the circuit board headers. It is recommended that all interconnect wiring be with UL type 1015, 20 AWG minimum, with the power input being 18 AWG minimum. The terminal blocks will accommodate up to 16 AWG wire.

8.1. Inputs: All inputs are low voltage (+5VDC). Signals are either open, or closed. **DO NOT APPLY ANY EXTERNAL VOLTAGES TO ANY OF THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.**

J1-1	Tank Level Input Return
J1-2	Tank Level Input
J1-3	Lock Out Input Return
J1-4	Lock Out Input

8.2. Outputs: Valve Outputs are 24VAC. These outputs are not fused, or current limited. Therefore, **CARE MUST BE TAKEN TO PREVENT SHORTING OF THESE OUTPUTS TOGETHER, TO COMMON, OR TO ANY OTHER VOLTAGE SOURCE, OR CIRCUIT BOARD MAY BE DAMAGED.**

J1-5	Flush Valve 24 VAC Return
J1-6	Flush Valve 24 VAC
J1-7	Inlet Valve 24 VAC
J1-8	Inlet Valve 24 VAC Return

Pump Output: Two 1/4" FASTON terminals are located at the top of the pump relay (K3). These are normally open contacts to be connected in line with the power to the pump motor. This relay will act as a switch to power the pump ON and OFF under automatic control. These contacts are isolated to allow the user the ability to switch any voltage (240VAC, 30A Max) to the pump motor.

8.3. Power Input: The power input should be connected to the secondary of the power transformer, with the transformer primary being connected to the primary power line. It is recommended that a fuse of appropriate current rating be used in series with this input, to help prevent damage to the transformer and circuit board.

J1-9	Power Input 24VAC
J1-10	Power Input 24VAC Return