

# DAVEY PRODUCTS

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## AUTOMATIC OPERATION OF RO PLANT THROUGH AUTO CONTROLLER

### RO Plant Operates as follows:

Feed Pump draws water from feed storage tank and pumps to micron filter.

Once positive pressure is developed on the suction side, RO main pump is switched ON, boosting the pressure of the water to flow through the membranes.

For the first few seconds, feed water is flushed out to the drain

After completion of flushing, back pressure is applied at the concentrate port to feed flow to obtain the required permeate flow (low TDS water).

Appropriate dosing pump/s are switched ON dosing chemicals to prevent fouling.

Once Filtration is complete, at the set interval of time, Feed pump, RO pump and Dosing pump/s are stopped and CIP pump is switched ON for the set duration. This cleans the membrane with Permeate water, thus clearing high TDS water inside the membranes. Upon completion of Cleaning, the RO filtration continues.

At the end of the filtration, the plant is stopped. Once again the membranes are flushed with feed water for few seconds and only later all the pumps are switched OFF.

In view of various combinations of operation, direction of flow, time sequences etc., RO plant requires Automation through PLC

The PLC operates both in Manual / Auto mode

The following Operations are executed automatically through Auto controller:

- 1. Check Levels of Storage** – Raw Water, Product Water, and CIP/ Backwash and when levels are low, raise alarm signals & hooters and stop the

operations. Resume the operation on correcting the error and switch off error signals, alarms and hooters.

2. **2. Check Levels of Chemicals in Dosing Tanks** and when levels are low raise alarm signals & hooters and stop the operations. Resume the operation on correcting the error and switch off error signals, alarms and hooters.

3. **3. Check Low Pressure and High Pressure Settings** and when the limits are exceeded, raise alarm signals & hooters and stop the operations. Resume the operation on correcting the error and switch off error signals, alarms and hooters.

4. **4. Check Conductivity/TDS and pH Limits** set on the Instruments and when the limits are exceeded, raise alarm signals & hooters and stop the operations. Resume the operation on correcting the error and switch off error signals, alarms and hooters.

5. 5. Execute the **Auto cycle** at the set sequence and timing

6. **6. Auto start/stop** the Raw Water Pump, R O Pump, CIP Pump, Dosing Pump etc

- (i) Auto flush at Start
- (ii) Auto flush at End
- (iii) CIP Flush at set interval of Operation
- (iv) Time Delays

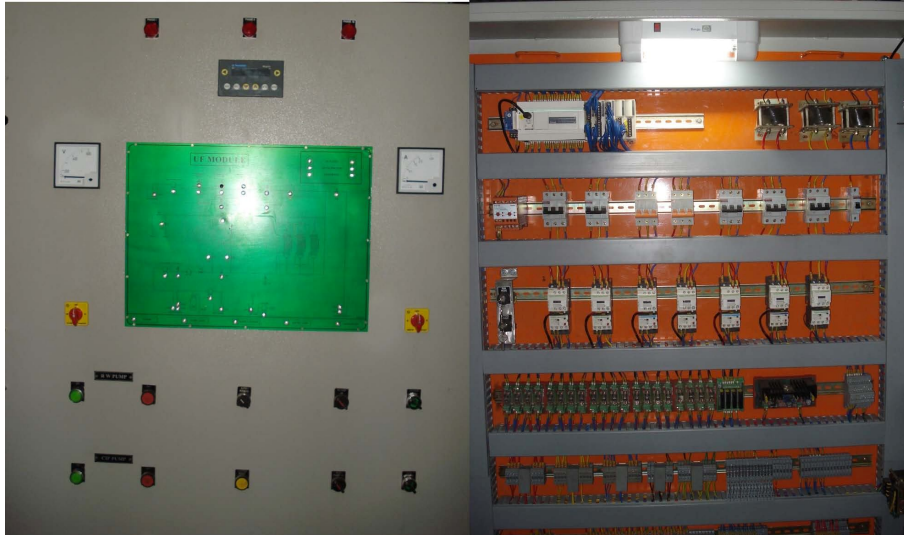
7. Display the **Operational Sequence, Error and Alarms on the Mimic Panel** through LED's

1. 8. Display the Operational Sequence, Error and Alarms on the MMI LCD and also the time of operation, sequence in progress

2. 9. **Raise alarm signals & hooters** and stop the operations when Overload **Current or Phase Errors** occur. Resume the operation on correcting the error and switch off error signals, alarms and hooters.

## ELECTRICAL PANEL DESCRIPTION

The above automation is achieved through an Electrical Panel – MS Fabricated and Powder Coated on which the following are mounted:



### Inside the Panel:

1. MCB + Contactor + Overload Relay for Feed/ Backwash/ Raw Water Pump
2. PLC of suitable no of Inputs and Outputs
3. Single Phase Preventors
4. Relay Boards
5. Terminals and Connectors
6. Interconnecting Wirings including Earthing, number ferrules

### Door of the Panel:

1. Mimic Panel with LED Indicators for Operation of the Pumps, Electrically Actuated Valves, Low and High Pressure Switches, Levels, Air Pr Switches, Alarm & Error Signals such as Overload or Phase Errors, Operational Sequence such as Filtration or Flushing or CIP Cleaning, etc
2. HMI Panel with LCD Display for Setting Timers and Display of Major Operation signals
3. Pushbuttons (a combination of Illuminated and Non Illuminated) for Cycle Start, Cycle Stop, Hooter Disconnect, Alarm Reset etc

4. 4. Rotary Main Switch
5. 5. Emergency Push Button Switch
6. 6. Hooters
7. 7. Switches for Dosing Pumps

### **Top of the Panel:**

1. Flasher with Red Light for Alarm and Green Light for Auto Operation in progress

The following **Makes of components** are generally used:

1. 1. PLC -Schneider/Eqvt
2. 2. MCB – Havell or Schneider/Eqvt
3. 3. Contactors – Schneider/Eqvt
4. 4. Overload Relays – Schneider/ Eqvt
5. 5. Connectors – Connecwell/Elmax
6. 6. PushButtons – Mimic/ Jai Balaji / Standard/ Eqvt
7. 7. Selector Switches – Mimic/ Jai Balaji/ Stanard/ Schneider/ Eqvt
8. 8. Wiring Cables – Finolex/ KEI/ Mardia/ Eqvt
9. 9. Rotary Switches – Salzer/ Jai Balaji/ Kaycee/Eqvt

Note: We will be using the above makes generally and in the absence of availability or due to design modification/ improvement, we will be using other reputed makes adhering to ISO Standards