

**CONTROL PHILOSOPHY FOR PRETREATMENT SKID**

CLIENT :	
CONSULTANT	
PROJECT :	PURIFIED WATER GENERATION SYSTEM - PRETREATMENT (MGF & SOFTENER)
DOC.NO :	
REF.DWG :	

Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions		199.1AV-02	101.1DP-01	103.1P-01/02	104.1AV-01	104.1AV-02	104.1AV-03	104.1AV-04	104.1AV-05	109.1AV-03	109.1AV-04	109.1AV-07	109.1AV-06	109.1AV-05	109.1AV-01	109.1AV-02	Fault lamp	Hooter	Alarm and Message	DESCRIPTION
							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve				

Pretreatment skids will have Two operating modes. These are Manual Mode and Auto Mode. These modes are selectable from HMI and at a time only one mode can be executed. To select the Manual mode, user has to select the Manual mode button from the HMI. To select the Auto mode, user has to select the Auto mode button from the HMI. If user has selected the Manual mode, then Auto mode selection button will become disable and will become enable only when Manual mode button is de-selected. If user has selected the Auto mode, then Manual mode selection button will become disable and will become enable only when Auto mode button is de-selected.

- Special Conditions:**
- 1) When MGF is performing its Backwash/Rinse cycle, system will close the Softener respective cycle valves and will hold the respective cycle timer.
  - 2) When Softener is performing its Regeneration / Rinse cycle, MGF shall remain in service mode.
  - 3) There shall be Timer reset button for MGF on the HMI. By pressing this button system will reset the MGF respective cycles and will go back to MGF service cycle. Access level to this button shall be to Manager and Administrator level only.
  - 4) There shall be Timer reset button for softener on the HMI. By pressing this button system will reset the respective timer and will go back to Softener service cycle. Access level to this button shall be to Manager and Administrator level only
  - 5) During Softener is performing its Regeneration cycle and at the same time if in case MGF service cycle is completed, then MGF will remain in its service cycle and Softener will first complete its regeneration cycle. Once Softener regeneration cycle gets completed, then only MGF will perform its Backwash/Rinse cycle.
  - 6) MGF Feed pump shall be selectable from HMI. When any one of the pump is running, pump selection button shall remain disable.
  - 7) During any Auto Cycle, Auto valve should open first and then after delay of 10 sec. respective pump will start.
  - 8) During Switch over of Existing Cycle to New Cycle, System will first Open the New Cycle Valve and then Close the Existing Cycle Valves and then after delay of 10 Sec. Start the respective Pump.

**MANUAL MODE**

AFR-PS-L	At Air Line	Low	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	"Air Pressure Low"	In case if the Air pressure switch installed at Air Filter Regulator unit becomes low, then system will stop or turn Off all the field devices and will initiate an alarm (Fault Lamp & Hooter) . Thenafter when the Air Pressure switch becomes healthy, then the system will not switch On the field devices. User has to again press the particular field devices icons in order to start or turn it On
Emergency Switch	On Control Panel	Emergency Switch Pressed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	"Emergency Switch Pressed"	In case if the user presses the Emergency switch button from the panel, then system will stop or turn Off all the field devices and will initiate an alarm (Fault Lamp & Hooter). Thenafter when the user releases the Emergency switch button from the panel, then the system will not switch On the field devices. User has to again press the particular field devices icons in order to start or turn it On
Power	Of Control Panel	Power Fails	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NA	In case if there is a power failure then the system will stop or turn Off all the field devices. When the Power resumes back, system will not switch On the field devices. User has to again press the particular field device icon in order to start or turn it On

**AUTO MODE**

AFR-PS-L	At Air Line	Low	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	"Air Pressure Low"	In case if the Air pressure switch installed at Air Filter regulator unit becomes low, then system will stop or turn Off all the field devices and will initiate an alarm (Fault Lamp & Hooter). Thenafter when the Air Pressure switch becomes healthy, then the system after a delay of 30 secs will restart automatically.
Emergency Switch	On Control Panel	Emergency Switch Pressed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	"Emergency Switch Pressed"	In case if the user presses the Emergency switch button from the panel, then system will stop or turn Off all the field devices and will initiate an alarm (Fault Lamp & Hooter). Thenafter when the user releases the Emergency switch button from the panel, then the system after a delay of 30 secs will restart automatically

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Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions		199.1AV-02	101.1DP-01	103.1P-01/02	104.1AV-01	104.1AV-02	104.1AV-03	104.1AV-04	104.1AV-05	109.1AV-03	109.1AV-04	109.1AV-07	109.1AV-06	109.1AV-05	109.1AV-01	109.1AV-02	Fault lamp	Hooter	Alarm and Message	DESCRIPTION	
							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve					
Power	Of Control Panel	Power Fails	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NA	In case if there is a power failure then the system will stop or turn Off all the field devices. When the Power resumes back, hen the system after a delay of 60 secs will restart automatically.
199.1LS-01	Level switch	High-High	NA	NA	NA	NA	X	X	X	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	X	Only Text "199.1LS-01 High-High"	High-high level at Raw water tank will trip the Raw water Demand signal, Close the Raw water inlet Valve , trip the NaOCl dosing pump and will initiate an alarm (Only Text)

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							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve					
199.1LS-01	Level switch	High	NA	NA	NA	NA	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	X	NA	High level at Raw water tank will start the Raw water Demand signal, Open Raw Water Inlet Valve, start the NaOCl dosing pump and will acknowledge the alarm of High-High level at Raw water tank
199.1LS-01	Level switch	Low-Low	NA	NA	NA	NA	/	/	/	X	X	X	X	X	X	X	X	X	X	X	X	X	/	/		"199.1LS-01 Low-Low"	Low-Low level at Raw water tank, will trip the MGF Feed pump, close the MGF auto valve and will hold the respective cycle timer, close the Softener auto valves and will hold the respective cycle timer, During this period system will initiate an alarm (Fault Lamp & Hooter)
199.1LS-01	Level switch	Low	NA	NA	NA	NA	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	X	NA	Low level at Raw water tank will start the MGF feed pumps, open the MGF respective cycle valves and will start the respective cycle timer (From Held Time), open the softener respective cycle valves and will start the respective cycle timer (From Held Time), and will acknowledge the alarm of Low-low level at Raw water tank.
199.1FS-01	Raw water inlet Flow Switch	Low	NA	NA	NA	NA	/	/	X	/	/	/	X	X	X	/	/	X	X	X	X	X	/	/		"199.1FS-01 Low"	When Raw water inlet signal is on, system will check for flow at raw water inlet line, If in case flow becomes low (Remains low for 10 secs) system will trip the NaOCl dosing pump and will initiate an alarm (Fault Lamp & Hooter)
199.1FS-01	Raw water inlet Flow Switch	Healthy	NA	NA	NA	NA	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	X	NA	When Raw water inlet signal is on and in case the flow at raw water inlet line becomes healthy, then only system will start the NaOCl dosing pump (Provided level at Raw water tank is not high-high level) and will acknowledge the alarm of Low flow at Raw water inlet line
101.1LS-01	Level Switch (of NaOCl dosing tank)	Low	NA	NA	NA	NA	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	/	X		"101.1LS-01 Low"	When level at NaOCl dosing tank becomes low, system will initiate an alarm (Fault Lamp & Hooter) Operator has to fill the tank manually. Once tank level becomes healthy, system will acknowledge the alarm of Low level at NaOCl dosing tank.
NA	MGF Service Cycle	MGF Service Cycle Timer Started / MGF Rinse Cycle Timer Completed	NA	0 to 9999	Minute	####	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	X	Only HMI Indication "MGF Service Cycle"	Whenever the system is started in Auto mode, system will start the Raw water inlet signal, start the NaOCl dosing pump (Provided Raw water tank level is not Low Low level), start MGF feed pump, start MGF service cycle for settable time period by opening respective valves. During this period system will give an indication on HMI stating "MGF Service Cycle". MGF service cycle timer shall be settable from the HMI having the range from 0 min to 9999 min. During this period Selected MGF feed pump shall become ON.
NA	MGF Backwash Cycle	MGF Service Cycle timer completed	NA	0 to 999	Minute	###.#	/	/	/	/	X	X	/	/	X	X	X	X	X	X	X	X	X	X	X	Only HMI Indication "MGF Backwash Cycle"	As soon as MGF Service cycle timer is completed, system will start the MGF backwash cycle for settable time period by opening respective valves. MGF Backwash cycle timer shall be settable from the HMI having range from 0 min to 999 min. During this period, system will give an indication on HMI stating "MGF Backwash Cycle". During this period Selected MGF feed pump shall become ON.

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							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve				
NA	MGF Rinse Cycle	MGF Backwash cycle timer is completed	NA	0 to 999	Minute	###.#	/	/	/	/	/	X	X	X	/	X	X	X	X	X	X	X	X	X	Only HMI Indication "MGF Rinse Cycle"	As soon as MGF Backwash cycle timer is completed, system will start the MGF Rinse cycle for settable time period by opening respective valves. MGF Rinse cycle timer shall be settable from the HMI having range from 0 min to 999 min. During this period, system will give an indication on HMI stating "MGF Rinse cycle". During this period Selected MGF feed pump shall become ON.
NA	MGF Service Cycle, Softener Service Cycle	Softener is in service mode (Provided MGF is in Service Mode)	NA	0 to 9999	Minute	####	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	Only HMI Indication "MGF Service Cycle" "Softener Service cycle"	Initially softener shall be in Service Mode. Softener is based on time which shall be settable from HMI having range from 0 min to 9999 min. System will give an indication on the HMI. During this period MGF shall in Service mode. During this period Selected MGF feed pump shall become ON.

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Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions		199.1AV-02	101.1DP-01	103.1P-01/02	104.1AV-01	104.1AV-02	104.1AV-03	104.1AV-04	104.1AV-05	109.1AV-03	109.1AV-04	109.1AV-07	109.1AV-06	109.1AV-05	109.1AV-01	109.1AV-02	Fault lamp	Hooter	Alarm and Message	DESCRIPTION	
							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve					
NA	MGF Service Cycle, Softener Backwash Cycle	If Softener Service cycle is completed (Provided MGF is in Service mode)	NA	0 to 999	Minute	###.#	/	/	/	/	/	/	X	X	X	X	X	/	/	X	X	X	X	X	X	Only HMI Indication "MGF Service Cycle" "Softener Backwash Cycle"	As soon as Softener Service cycle timer is completed, System will start Softener Backwash cycle for settable time period by opening its respective Valves by starting MGF feed pump along with MGF Service cycle. The timer for this cycle shall be settable from HMI having the range from 0 min to 999 min. System will give indication on the HMI. During this period Selected MGF feed pump shall become ON.
NA	MGF Service Cycle, Softener Brine Injection Cycle	Softener Backwash cycle is completed (Provided MGF is in Service mode)	NA	0 to 999	Minute	###.#	/	/	/	/	/	/	X	X	X	X	X	X	X	/	/	/	X	X	Only HMI Indication "MGF Service Cycle" "Softener Brine Injection Cycle"	As soon as Softener Backwash cycle timer is completed, System will start Softener Brine Injection cycle for settable time period by opening its respective Valves by starting MGF feed pump along with MGF Service cycle. The timer for this cycle shall be settable from HMI having the range from 0 min to 999 min. System will give indication on the HMI. During this period Selected MGF feed pump shall become ON.	
NA	MGF Service Cycle and Softener Slow Rinse Cycle	If Softener Brine Injection cycle is completed (Provided MGF is in Service mode)	NA	0 to 999	Minute	###.#	/	/	/	/	/	/	X	X	X	X	X	X	X	/	/	X	X	X	Only HMI Indication "MGF Service Cycle" "Softener Slow Rinse Cycle"	As soon as Softener Brine Injection cycle timer is completed, System will start Softener Slow Rinse cycle for settable time period by opening its respective Valves by starting MGF feed pump along with MGF Service cycle. The timer for this cycle shall be settable from HMI having the range from 0 min to 999 min. System will give indication on the HMI. During this period Selected MGF feed pump shall become ON.	
NA	MGF Service Cycle, Softener Fast Rinse Cycle	If Softener Slow Rinse cycle is completed (Provided MGF is in Service mode)	NA	0 to 999	Minute	###.#	/	/	/	/	/	/	X	X	X	/	X	X	X	/	X	X	X	X	Only HMI Indication "MGF Service Cycle" "Softener Fast Rinse Cycle"	As soon as Softener Slow Rinse cycle timer is completed, System will start Softener Fast Rinse cycle for settable time period by opening its respective Valves by starting MGF feed pump along with MGF Service cycle. The timer for this cycle shall be settable from HMI having the range from 0 min to 999 min. System will give indication on the HMI. During this period Selected MGF feed pump shall become ON.	
NA	MGF Service Cycle, Brine Filling Cycle	If Softener Fast Rinse cycle is completed (Provided MGF is in Service mode)	NA	0 to 999	Minute	###.#	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	/	X	X	Only HMI Indication "MGF Service Cycle" "Brine Filling Cycle"	As soon as Softener Fast Rinse cycle timer is completed, System will start Brine Filling cycle for settable time period by opening its respective Valves by starting MGF feed pump along with MGF Service cycle. The timer for this cycle shall be settable from HMI having the range from 0 min to 999 min. System will give indication on the HMI. During this period, selectable pump shall remain on and MGF shall in Service mode. During this period Selected MGF feed pump shall become ON.	
199.1LS-02	Level Switch (Soft water Storage Tank)	High-High	NA	NA	NA	NA	/	/	/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Only Text "199.1LS-02 High-High"	High-high level at Soft water tank, will trip the MGF Feed pump, close the MGF auto valve and will hold the respective cycle timer, close the Softener auto valves and will hold the respective cycle timer, and will initiate an alarm (Only Text)	

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Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions		199.1AV-02	101.1DP-01	103.1P-01/02	104.1AV-01	104.1AV-02	104.1AV-03	104.1AV-04	104.1AV-05	109.1AV-03	109.1AV-04	109.1AV-07	109.1AV-06	109.1AV-05	109.1AV-01	109.1AV-02	Fault lamp	Hooter	Alarm and Message	DESCRIPTION	
							Water Demand Signal	Raw Water Inlet Valve	NaOCl Dosing Pump	MGF Feed Pump	MGF Service Inlet Valve	MGF Service Outlet Valve	MGF Backwash Inlet Valve	MGF Backwash Outlet Valve	MGF Rinse Outlet Valve	Soft Service Inlet	Soft Service Outlet	Soft Backwash Inlet	Soft Backwash Outlet	Slow Rinse Valve	Power Water Inlet	Brine Injection Valve					
199.1LS-02	Level Switch (Soft water Storage Tank)	High	NA	NA	NA	NA	/	/	/	/	/	/	/	X	X	X	/	/	X	X	X	X	X	X	X	NA	High level at Soft water tank will start the MGF feed pumps, open the MGF respective cycle valves and will start the respective cycle timer (From Held Time), open the softener respective cycle valves and will start the respective cycle timer (From Held Time) and will acknowledge the alarm of High-high level at Soft water storage tank.

R0			Client Approval									
Rev. no.	Date		Released for				Prepared By		Checked By		Approved By	

## CONTROL PHILOSOPHY FOR PRETREATMENT SKID

CLIENT :	
CONSULTANT:	
PROJECT :	PURIFIED WATER GENERATION SYSTEM - PRETREATMENT (UF)
DOC.NO :	
REF.DWG :	

Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions	199.1A V-01	103.2P-01/ 02	110.1AV-02	110.1AV-04	110.1AV-03	110.1P-01	103.3P-01/02	199.2A V-01	199.2A V-02	199.2A V-03	Fault lamp	Hooter	Alarm and Message	DISCRIPTION
							Utility Inlet Valve	UF Feed Pump	UF Bottom Drain Valve	UF Permeate Valve	UF Top Drain Valve	UF Back flush Pump	RO Feed Pump	Boiler Tank Inlet Valve	Chiller Tank Inlet Valve	Chiller Tank Inlet Valve				

UF System will have Two operating modes. These are Manual Mode and Auto Mode. These modes are selectable from HMI and at a time only one mode can be executed. To select the Manual mode, user has to select the Manual mode button from the HMI. To select the Auto mode, user has to select the Auto mode button from the HMI. If user has selected the Manual mode, then Auto mode selection button will become disable and will become enable only when Manual mode button is de-selected. If user has selected the Auto mode, then Manual mode selection button will become disable and will become enable only when Auto mode button is de-selected.

**Special Conditions:**

- 1) If in case UF service cycle timer is completed, system will check for high level at UF permeate tank, if the level at UF Permeate tank is below the high level then UF will remains in its service cycle. UF system will not start its Backflush up rinse and Backflush down rinse cycle unless and until UF Permeate tank level becomes high.
- 2) There shall be Timer reset button for UF on the HMI. By pressing this button system will reset the UF respective cycles and will go back to UF service cycle. Access level to this button shall be to Manager and Administrator level only.
- 3) When system is performing the UF Backflush cycle or UF Fast Flush cycle and in case if the level at UF Permeate Tank becomes Low-low level, then the system trip respective Backflush/fast flush pump, close the UF respective cycle valves and will hold the UF respective cycle timer. Supervisor / Manager or Administrator will press the UF Reset button to start the UF in Normal Mode. All the timer of UF will reset as soon as reset button is pressed.
- 4) When the Level in all 3 tanks Boiler Tank 199.2T-01, Chiller Tank 199.2T-02 and Chiller Tank 199.2T-03 is High- High Level then System will close the Utility inlet Valve and then after when level in any one Tank becomes High Level System will Open the Utility Inlet Valve.
- 5) In Auto Mode UF Feed Pump shall be controlled with respect to three variant conditions control set-point added in the HMI in Hz.
  - A) When UF Permeate Valve is Open and Utility Inlet Valve is Close.
  - B) When Utility Inlet Valve is Open and UF Permeate Valve is Close.
  - C) When UF Permeate Valve is Open and Utility Inlet Valve is Open.
- 6) UF Feed pump shall be selectable from HMI. When any one of the pump is running, pump selection button shall remain disable.
- 7) During any Auto Cycle, Auto valve should open first and then after delay of 10 sec. respective pump will start.
- 8) During Switch over of Existing Cycle to New Cycle, System will first Open the New Cycle Valve and then Close the Existing Cycle Valves and then after delay of 10 Sec. Start the respective Pump.

### MANUAL MODE

AFR-PS-L	At Air Line	Low	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"Air Pressure Low"	In case if the Air pressure switch installed at Air Filter regulator unit becomes low, then system will stop or turn Off all the field devices and will give an alarm . Thenafter when the Air Pressure switch becomes healthy, then the system will not switch On the field devices. User has to again press the particular field devices icons in order to start or turn it On
Emergency Switch	On Control Panel	Emergency Switch Pressed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"Emergency Switch Pressed"	In case if the user presses the Emergency switch button from the panel, then system will stop or turn Off all the field devices and will initiate an alarm (Fault Lamp & Hooter). Thenafter when the user releases the Emergency switch button from the panel, then the system will not switch On the field devices. User has to again press the particular field devices icons in order to start or turn it On
Power	Of Control Panel	Power Fails	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	NA	In case if there is a power failure then the system will stop or turn Off all the field devices. When the Power resumes back, system will not switch On the field devices. User has to again press the particular field device icon in order to start or turn it On

### AUTO MODE

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Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions	199.1A V-01	103.2P-01/ 02	110.1AV-02	110.1AV-04	110.1AV-03	110.1P-01	103.3P-01/02	199.2A V-01	199.2A V-02	199.2A V-03	Fault lamp	Hooter	Alarm and Message	DISCRIPTION
							Utility Inlet Valve	UF Feed Pump	UF Bottom Drain Valve	UF Permeate Valve	UF Top Drain Valve	UF Back flush Pump	RO Feed Pump	Boiler Tank Inlet Valve	Chiller Tank Inlet Valve	Chiller Tank Inlet Valve				
AFR-PS-L	At Air Line	Low	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"Air Pressure Low"	In case if the Air pressure switch installed at Air Filter regulator unit becomes low, then system will stop or turn Off all the field devices and will give an alarm. Thenafter when the Air Pressure switch becomes healthy, then the system after a delay of 30 secs will restart automatically.
Emergency Switch	On Control Panel	Emergency Switch Pressed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"Emergency Switch Pressed"	In case if the user presses the Emergency switch button from the panel, then system will stop or turn Off all the field devices and will give an alarm. Thenafter when the user releases the Emergency switch button from the panel, then the system after a delay of 30 secs will restart automatically
Power	Of Control Panel	Power Fails	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	X	NA	In case if there is a power failure then the system will stop or turn Off all the field devices. When the Power resumes back, then the system after a delay of 60 secs will restart automatically.
199.1LS-02	Level Switch (Soft water Storage Tank)	Low-Low	NA	NA	NA	NA	X	X	X	X	X	X	/	NA	NA	NA	/	/	"199.1LS-02 Low Low"	Low-low level at Soft Water tank will trip the UF feed pump, trip UF and Hold the respective cycle timer of UF and will initiate an alarm (Fault Lamp & Hooter).
199.1LS-02	Level Switch (Soft water Storage Tank)	Low	NA	NA	NA	NA	/	/	X	/	X	X	/	NA	NA	NA	X	X	NA	Low level at Raw water tank, will start the UF feed pump, Start UF by opening the respective Valves and start the respective cycle timer of UF from held time and will acknowledge the alarm of Low- Low level.
NA	UF Service Cycle	Level at UF permeate is not high-high level / When UF Fast Flush timer is Completed	NA	0 to 999	Minute	###.#	NA	/	X	/	X	X	/	NA	NA	NA	X	X	"UF Service Cycle"	Initially when the system is started in the Auto mode, System will start the UF service cycle for settable time period by opening respective valve. The timer shall be settable from the HMI having the range from 0 min to 999 min. During this period system will give an indication on the HMI stating "UF Service Cycle". During this selcted pump will be ON.

**CONTROL PHILOSOPHY FOR PRETREATMENT SKID**

CLIENT :	
CONSULTANT:	
PROJECT :	PURIFIED WATER GENERATION SYSTEM - PRETREATMENT (UF)
DOC.NO :	
REF.DWG :	

Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions	199.1A V-01	103.2P-01/ 02	110.1AV-02	110.1AV-04	110.1AV-03	110.1P-01	103.3P-01/02	199.2A V-01	199.2A V-02	199.2A V-03	Fault lamp	Hooter	Alarm and Message	DISCRIPTION
							Utility Inlet Valve	UF Feed Pump	UF Bottom Drain Valve	UF Permeate Valve	UF Top Drain Valve	UF Back flush Pump	RO Feed Pump	Boiler Tank Inlet Valve	Chiller Tank Inlet Valve	Chiller Tank Inlet Valve				
NA	UF Backflush Up Rinse Cycle	When UF service cycle timer is completed (Provided UF permeate tank level is high or high-high)	NA	0 to 999	Secs	###.#	NA	X	X	X	/	/	/	NA	NA	NA	X	X	"UF Backflush Up Rinse Cycle"	As soon as the UF Service cycle timer is completed (Provided UF Permeate teank level is high or high-high), system will stop the UF Service cycle and will start the UF Backflush up rinse cycle for settable time period. System will start the backflush pump and will open respective cycle valves. The timer shall be settable from the HMI having the range from 0 secs to 999 secs. During this period system will give an indication on the HMI stating "UF Backflush Up Rinse Cycle"
NA	UF Backflush Down Rinse Cycle	When UF Backflush Down rinse cycle is completed	NA	0 to 999	Secs	###.#	NA	X	/	X	X	/	/	NA	NA	NA	X	X	"UF Backflush Down Rinse Cycle"	As soon as UF Backflush UP rinse cycle timer is completed, system will start the UF Backflush down rinse cycle for settable time period. System will start the back wash pump and will open respective cycle valves. The timer shall be settable from the HMI having the range from 0 secs to 999 secs. During this period system will give an indication on the HMI stating "UF Backflush Down Rinse Cycle"
NA	UF Fast Flush Cycle	When UF Backflush Down rinse cycle is completed	NA	0 to 999	Secs	###.#	NA	/	X	X	/	X	/	NA	NA	NA	X	X	"UF Fast Flush Cycle"	As soon as UF Backflush down rinse cycle timer is completed, system will start the UF fast flush cycle for settable time period. System will start UF Feed pump and will open respective cycle valves. The timer shall be settable from the HMI having the range from 0 secs to 999 secs. During this period system will give an indication on the HMI stating "UF Fast Flush Cycle". During this selcted pump will be ON.
199.1LS-05	Level Switch (UF Permeate Tank)	High-High	NA	NA	NA	NA	NA	X	X	X	X	X	/	NA	NA	NA	X	X	"199.1LS-05 High High"	High-high level at UF Permeate tank will close UF Permeate valve and will hold the UF respective service cycle timer and will intiate an alarm (Only Text).
199.1.LS-05	Level Switch (UF Permeate Tank)	High	NA	NA	NA	NA	NA	/	X	/	X	X	/	NA	NA	NA	X	X	NA	High level at UF Permeat tank will Open UF Permeate valves and Start the UF Service Cycle timer from held time and will acknowledge the alarm of High-high level.
199.1LS-05	Level Switch (UF Permeate Tank)	Low-Low	NA	NA	NA	NA	NA	/	X	/	X	X	X	NA	NA	NA	/	/	"199.1LS-05 Low Low"	Low-low level at UF Permeat tank will trip the RO feed pump and will intiate an alarm (Fault Lamp & Hooter).
199.1.LS-05	Level Switch (UF Permeate Tank)	Low	NA	NA	NA	NA	NA	/	X	/	X	X	/	NA	NA	NA	X	X	NA	Low level at UF Permeat tank, will start the RO feed pump and will acknowledge the alarm of Low- Low level. During this selcted pump will be ON.

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Tag	Instrument/Equipment/Type of Cycle	Condition	Full Scale Range (Of Instrument)	Full Scale Range (Of HMI)	Unit	Resolutions	199.1A V-01	103.2P-01/ 02	110.1AV-02	110.1AV-04	110.1AV-03	110.1P-01	103.3P-01/02	199.2A V-01	199.2A V-02	199.2A V-03	Fault lamp	Hooter	Alarm and Message	DISCRPTION
							Utility Inlet Valve	UF Feed Pump	UF Bottom Drain Valve	UF Permeate Valve	UF Top Drain Valve	UF Back flush Pump	RO Feed Pump	Boiler Tank Inlet Valve	Chiller Tank Inlet Valve	Chiller Tank Inlet Valve				
199.2LS-01	Level Switch (Boiler Tank)	High-High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	X	NA	NA	X	X	"199.2LS-01 High High"	High-high level at Boiler tank will close Boiler Tank Inlet Valve and will initiate an alarm (Only Text).
199.2LS-01	Level Switch (Boiler Tank)	High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	∫	NA	NA	X	X	NA	High level at Boiler tank will Open Boiler Tank Inlet Valve and will acknowledge the alarm of High-high level.
199.2LS-01	Level Switch (Boiler Tank)	Low-Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	∫	NA	NA	∫	∫	"199.2LS-01 Low Low"	Low-low level at Boiler tank will initiate an alarm (Fault Lamp & Hooter).
199.2LS-01	Level Switch (Boiler Tank)	Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	∫	NA	NA	X	X	NA	Low level at Boiler tank will acknowledge the alarm of Low- Low level.
199.2LS-02	Level Switch (Chiller Tank Tank)	High-High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	X	NA	X	X	"199.2LS-02 High High"	High-high level at Chiller tank will close Chiller Tank Inlet Valve and will initiate an alarm (Only Text).
199.2LS-02	Level Switch (Chiller Tank Tank)	High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	∫	NA	X	X	NA	High level at Chiller tank will Open Chiller Tank Inlet Valve and will acknowledge the alarm of High-high level.
199.2LS-02	Level Switch (Chiller Tank Tank)	Low-Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	∫	NA	∫	∫	"199.2LS-02 Low Low"	Low-low level at Chiller tank will initiate an alarm (Fault Lamp & Hooter).
199.2LS-02	Level Switch (Chiller Tank Tank)	Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	∫	NA	X	X	NA	Low level at Chiller tank will acknowledge the alarm of Low- Low level.
199.2LS-03	Level Switch (Chiller Tank Tank)	High-High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	NA	X	X	X	"199.2LS-03 High High"	High-high level at Chiller tank will close Chiller Tank Inlet Valve and will initiate an alarm (Only Text).
199.2LS-03	Level Switch (Chiller Tank Tank)	High	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	NA	∫	X	X	NA	High level at Chiller tank will Open Chiller Tank Inlet Valve and will acknowledge the alarm of High-high level.
199.2LS-03	Level Switch (Chiller Tank Tank)	Low-Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	NA	∫	∫	∫	"199.2LS-03 Low Low"	Low-low level at Chiller tank will initiate an alarm (Fault Lamp & Hooter).
199.2LS-03	Level Switch (Chiller Tank Tank)	Low	NA	NA	NA	NA	∫	NA	NA	NA	NA	NA	NA	NA	NA	∫	X	X	NA	Low level at Chiller tank will acknowledge the alarm of Low- Low level.

R0		Client Approval																		
Rev. no.	Date	Released for				Checked By				Prepared By				Approved By						