

CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM

CLIENT :	
CONSULTANT:-	
PROJECT :	WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM
DOC.NO :	
REF. P&ID :	

Tag	Instrument/ Equipment/ Type of Cycle	Condition	Full Scale Range (Of Instruments)	Full Scale Range (In HMI)	UNIT	Resolu- tion	Water Demand Signal	305.2F- 01	305.2AV -03	305.2AV -01/ 305.2H- 01	352.1P- 01/02	352.1AV- 02	352.1AV- 01	352.1AV- 03	352.1AV- 04	WFI Sanit. Signal	Fault lamp	Hooter	Alarm and Message	DISCRIPTION
							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				

WFI Distribution system will have Four operating modes. These are Manual Mode, Auto Mode, Tank Sterilization Mode and Loop Sterilization 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, To select the Tank Sterilization mode, user has to select the Tank Sterilization mode button from the HMI and To select Loop Sterilization Mode, User has to select Loop Sterilization Mode button from HMI. If user has selected the Manual mode, then Auto mode selection button, Tank Sterilization Mode Selection button and Loop Sterilization Selection Mode 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, Tank Sterilization Mode Selection button and Loop Sterilization Selection Mode button will become disable and will become enable only when Auto mode button is de-selected. If user has selected the Tank Sterilization mode, then Manual mode selection button, Auto Mode Selection button and Loop Sterilization Selection Mode button will become disable and will become enable only when Tank Sterilization mode button is de-selected. If user has selected the Loop Sterilization mode, then Manual mode selection button, Auto Mode Selection button and Tank Sterilization Selection Mode button will become disable and will become enable only when Loop Sterilization mode button is de-selected.

- Special Conditions:
- 1) During Manual Mode, Logic of Steam valve and Heater will remain enable.
 - 2) During Manual mode, Logic of low-low level at LT of WFI tank will remain enable i.e. when level at LT becomes low-low, system will not start the Distribution pump, Heater and Steam Valve manually.
 - 3) Distribution pump shall be selectable from HMI. When any one of the pump is running, pump selection button shall remain disable.
 - 4) User before stating the system in Auto, has to select the heating source either by selecting the Steam or by selecting the heater. If User selects the heating source as Steam Valve and then if he starts the Auto mode, then the heating source will be Steam Valve. Similarly, If User selects the heating source as heater and then if he starts the Auto mode, then the heating source will be heater. Once the Auto mode is started, User cannot change the heating source. In order to change the heating source, User has to turn off the auto mode, change the heating source and then has to start the auto mode again
 - 5) Durning Tank/Loop Sterilization mode Steam Valve and Heater shall remains close/tripped.
 - 6) During Tank/Loop sterilization cycle logic of return line conductivity shall remain disable.
 - 7) During Tank sterilization cycle, After buffer drain cycle , logic of level and as well as return line temperature transmitter and flow transmitter shall remain disable. Also Distribution pump shall remain tripped.
 - 8) In the Auto Mode When Electrical Heater is selected then heater will be control on return line temperture control set point and tank temperture high set point.
 - 9) In the Auto Mode Plant steam valve is selected, this valve will be control on return line temperture control set point and tank temperture high set point.
 - 10) In Manual Mode if Steam Valev is Open then Heater will not get ON and if Heater is ON then Steam Valve will not get Open.
 - 11) System in Auto / Manual Mode, Light Source 305.2LGS-01 can be ON/ OFF from HMI.

WFI DISTRIBUTION MANUAL MODE

AFR-PSL	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 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	Emergency Stop	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	In 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

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				

WFI DISTIBUTION AUTO MODE

AFR-PSL	At Air Line	Low	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"Air Presure 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 Sec.will restart automatically.
Emergency Switch	Emergency Stop	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 has pressed 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 user has released the Emergency switch button from panel, system after a delay of 30 secs will restart automatically
Power	Control Panel Power	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 30 secs will restart automatically.
305.2LT-01	Capacitance Level Transmitter	High-high	0 to 5000	0 to 9999	Ltrs	####	X	/	/	/	/	X	X	X	X	X	X	X	Only Text "305.2LT-01 High-high"	High-high level at WFI Tank will trip the WFI Tank water demand signal and will initiate an alarm (Only Text)
305.2LT-01	Capacitance Level Transmitter	High	0 to 5000	0 to 9999	Ltrs	####	/	/	/	/	/	X	X	X	X	X	X	X	NA	High level at WFI Tank will start the WFI tank water demand signal and will acknowledge the alarm of High-high level at WFI tank
305.2LT-01	Capacitance Level Transmitter	Low-Low	0 to 5000	0 to 9999	Ltrs	####	/	/	/	X	X	X	X	X	X	X	/	/	"305.2LT-01 Low-Low"	Low-Low level at WFI Tank will trip the Distribution pump and System will initiate an alarm (Fault Lamp & Hooter).
305.2LT-01	Capacitance Level Transmitter	Low	0 to 5000	0 to 9999	Ltrs	####	/	/	/	/	/	X	X	X	X	X	X	X	NA	Low level at WFI Tank will restart the Distribution pump and will acknowledge the alarm of Low-Low level at WFI dist. tank
305.2TT-01	Tank Temperature transmitter	High	0 to 150	0 to 999.9	degree C	###.#	/	/	/	X	/	X	X	X	X	X	/	/	"305.2TT-01 High"	During Auto mode, when the tank temperature becomes high (Remains High for 3 secs), then the system will close the Steam Valve if Steam Valve is selcted or trip Heater if Heater is selected and will give an alarm (Fault Lamp & Hooter). Then after when the tank temperature falls below the High set-point minus temperature hysteresis set value, then the system will open the Steam Valve if steam Valve is selected or Start Heater if Heater is selected. System will also acknowledge the alarm of High tank temperature.
352.1CT-01	Conductivity Transmitter at Return Line	High	0 to 10	0 to 99.99	µS/cm	##.##	/	/	/	/	/	X	X	X	X	X	/	X	"352.1CT-01 High"	When Distribution pump is running and in case if Return line conductivity becomes High (Remains High for 3 secs) then the system will initiate an alarm (Only Fault Lamp)

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				
352.1CT-01	Conductivity Transmitter at Return Line	High-High	0 to 10	0 to 99.99	µS/cm	###.##	/	/	/	/	/	/	X	X	X	X	/	/	"352.1CT-01 High-High"	When Distribution pump is running and in case if Return line conductivity becomes High-High, then the system will give an alarm (Fault Lamp & Hooter). System will open Return Line Dump port and will start the Quality Validation timer which shall be settable from the HMI having the range from 0 secs to 999 secs. During this period Distribution pump shall run with respect to the control set point of flow at FT.
352.1CT-01	Quality Validation Timer from HMI	Within Quality Validation timer if CT falls below high set point	NA	0 to 999	secs	###	/	/	/	/	/	X	X	X	X	X	X	X	NA	Within this Quality Validation timer, in case if conductivity falls below High Set-point, then the system will reset the Quality Validation timer, close the Return Line Dump port and will acknowledge the Return Line Conductivity High and High-High alarm. Distribution pump shall run with respect to the control set point of flow at FT.
352.1CT-01	Quality Validation Timer from HMI	Quality Validation timer is completed and CT remains above the high set point	NA	0 to 999	secs	###	/	/	/	X	X	X	X	X	X	X	/	/	"352.1CT-01 Validation Timer Over"	In case if the Quality Validation timer is completed and still if conductivity at Return Line is above the high set-point, then the system will trip the distribution pump and will close the Supply line Dump port and will initiate an alarm (Fault lamp & Hooter). User has to press System reset button from HMI. Once System reset button is pressed it will resatr automatically.
352.1TT-02	Return Line Temperature transmitter	Return Line TT Control Set Point is achived	0 to 150 °C	0 to 999.9	°C	###.##	/	/	/	/	/	X	X	X	X	X	X	X	NA	Steam inlet Valve / Electrical Heater shall be controlled with respect to the control set-point of return line temperature. If return line temperature is below the control set-point, then the system will open the Steam inlet Valve /ON Electrical Heater and if the temperature at return line is above the control set-point, then the system will close the Steam inlet Valve / OFF the Electrical Heater. During controlling system shall consider the temperature hysteresis set value so as to avoid the on-off fluctuations of the steam valve / Electrical Heater.
352.1TT-02	Return Line Temperature transmitter	Return Line TT High	0 to 150 °C	0 to 999.9	°C	###.##	/	/	/	X	/	X	X	X	X	X	/	/	"352.1TT-02 HIGH"	High Temperature at return line, then the system will close/trip the Steam Valve/Electrical Heater and will give an alarm (Fault Lamp & Hooter). When the return line temperature falls below the high set point minus the hysteresis set value for temperature,then the system will open Steam Valve//start the Electrical Heater and system will acknowledge the alarm of High Temperature at return line.
352.1TT-02	Return Line Temperature transmitter	Return Line TT Low	0 to 150 °C	0 to 999.9	°C	###.##	/	/	/	/	/	X	X	X	X	X	/	X	"352.1TT-02 LOW"	Once the return Line temperature control set point is achieved and then after if the temperature at return line falls below the Low set point, then the system will give an alarm (Fault Lamp).
352.1TT-02	Return Line Temperature transmitter	Return Line TT Low Low	0 to 150 °C	0 to 999.9	°C	###.##	/	/	/	/	/	/	X	X	X	X	/	/	"352.1TT-02 LOW LOW"	Once the return Line temperature control set point is achieved and then after if the temperature at return line falls below the Low- Low set point, then the system will give an alarm (Fault Lamp & Hooter). System will open Return Line Dump port and will start the Quality Validation timer which shall be settable from the HMI having the range from 0 secs to 999 secs. During this period Distribution pump shall run with respect to the control set point of flow at FT.

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				
352.1TT-02	Quality Validation Timer from HMI	Within Quality Validation timer if Temperature raises above RSP set point	NA	0 to 999	secs	###	/	/	/	/	/	X	X	X	X	X	X	X	NA	Within this Quality Validation timer, in case if temperature rises above the control set point, then the system will acknowledge the alarm of Low and Low Low Temperature at return line. System will reset the Quality Validation timer, close the Return Line Dump port. Distribution pump shall run with respect to the control set point of flow at FT.
352.1TT-02	Quality Validation Timer from HMI	Quality Validation timer is completed and Return Line Temperature remains Below Low set point	NA	0 to 999	secs	###	/	/	/	X	X	X	X	X	X	X	/	/	"352.1TT-02 Validation Timer Over"	In case if the Quality Validation timer is completed and still if Temperature at Return Line is below Low set-point, then the system will trip the distribution pump and will close the Supply line Dump valve and will initiate an alarm (Fault lamp & Hooter). User has to press System reset button from HMI. Once System reset button is pressed it will resatr automatically.
305.2RD-01	Rupture Disk	Burst	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	/	/	"305.2RD- 01Burst"	During Auto Mode in case PLC does not sense signal coming from Rupture Disc, then the system will trip the distribution pump and will close respective valve and will initiate an alarm (Fault lamp & Hooter). User has to press System reset button from HMI. Once System reset button is pressed it will resatr automatically.
352.1FT-01	Flow Transmitter	Pump speed will increase or decrease wrt to FT	0 to 15	0 to 9.99	m3/hr	###	/	/	/	/	/	X	X	X	X	X	X	X	NA	Distribution pump shall be controlled with respect the control set-point of the flow at FT. When the flow at FT is above the control set-point then the VFD for Distribution pump shall ramp down towards 0 Hz and when the flow at FT is below the control set-point then the VFD for Distribution pump shall ramp up towards 50 HZ.
352.1FT-01	Flow Transmitter	Low	0 to 15	0 to 9.99	m3/hr	###	/	/	/	/	/	X	X	X	X	X	/	/	"352.1FT-01 Low"	When Distribution pump is running and in case if flow at FT becomes Low (Remains Low for 90 secs), system will initiate an alarm (Fault Lamp & Hooter). When flow at FT rises above the low-set-point plus the flow hysteresis set value then the alarm for FT Low shall be acknowledged

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				

WFI DISTRIBUTION TANK STERLIZATION

AFR-PSL	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 initiate an alarm (Fault Lamp & Hooter). Thenafter when the Air Pressure switch becomes healthy, system after a delay of 30 secs will restart automatically.	
Emergency Switch	Emergency Stop	Emergency Switch Pressed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	X	X	/	/	"Emergency Switch Pressed"	In case if the user has pressed 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 user has released the Emergency switch button from panel, system after a delay of 30 secs will restart automatically
Power	Control Panel Power	Power Fails	NA	NA	NA	NA	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, then the system after a delay of 30 secs will restart automatically.
NA	Emptying Cycle	If WFI Tank Level is above Low Low Level	0 to 5000	0 to 9999	Ltrs	####	X	X	/	X	/	/	X	X	X	/	X	/	Pop-Up Meessage "Open 352.1MV- 01, drain buffer volume, Once buffer is Achieved then after close drain valve and Press Ack Button"	If the level at WFI tank is above the low-low level, then the system will start the distribution pump, Open Return Line Dump Port and will start draining the WFI water from WFI tank, During this period Distribution pump shall run with respect to control set point of FT. When the level at WFI tank becomes Low-Low Level, then the system will trip the distribution pump, Close Return Line Dump Port and will give a pop-up message (With Hooter) stating "Open 352.1MV-01, drain buffer volume, Once buffer is Achieved then after close drain valve and Press Ack Button". User then has to drain the buffer volume manually by opening the manual tank drain valve. Once the buffer volume is drained out from tank, User has to close the manual tank drain valve and then has to press the Acknowledge button from the Pop-up message. Once the Acknowledge button is pressed, system will Close EVF Isolation valve and start the Tank Sterilization cycle.	
NA	Buffer Drain	When WFI tank level is low-low level after Empting Cycle / When WFI tank level is already low-low level	0 to 5000	0 to 9999	Ltrs	####	X	X	/	X	X	X	X	X	X	/	X	/	Pop-Up Meessage "Open 352.1MV- 01, drain buffer volume, Once buffer is Achieved then after close drain valve and Press Ack Button"	If the level at WFI tank is already Low-Low level, then the system give a pop-up message (With Hooter) stating "Open 352.1MV-01, drain buffer volume, Once buffer is Achieved then after close drain valve and Press Ack Button". User then has to drain the buffer volume manually by opening the manual tank drain valve. Once the buffer volume is drained out from tank, User has to close the manual tank drain valve and then has to press the Acknowledge button from the Pop-up message. Once the Acknowledge button is pressed, system will Close EVF Isolation valve and start the Tank Sterilization cycle.	

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				
NA	Tank Sterilization Cycle	NA	NA	NA	NA	NA	X	X	X	X	X	X	/	/	/	/	X	/	Pop-Up Meassage "Open Manual Vlave 352.1MV- 09, Open Valve 352.1MV-02, Close Manual Valve 352.1MV- 07 and Close Manual Valve 352.1MV-04 then press ACK Button"	After draining the buffer volume ,system will Close EVF isolation Valve and give pop-up message (With hooter) Pop-Up Meassage "Open Manual Vlave 352.1MV-09, Open Valve 352.1MV-02, Close Manual Valve 352.1MV-07 and Close Manual Valve 352.1MV-04". User has to Open and Close the respective Manual Valve and has to press the Acknowldge button. During Tank sterilization cycle, Water demand signal, EVF and Distribution pump shall remain tripped. once Pop-up message gets acknowldged system will start Tank sterilization Cycle by opening the Pure steam valve. During this period system will give an indication on HMI stating "Tank Sterilization Cycle".
305.2TT-01	Tank Temperature transmitter	High	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	X	/	/	/	/	/	"305.2TT-01 High"	During tank sterilization cycle in case if Tank tempertures becomes High (Remains High for 3 secs), system will Close Pure Steam Valve and will initiate an alarm (Fault Lamp & Hooter) Thenafter when temperature falls below high set point minus hysteresis set value, System will Open the Pure Steam valve and acknowldged the alarm of High Tank Temperature.
352.1TT-01	Supply line steam trap temperature transmitter	Pure steam valve control wrt to CSP of supply line steam trap transmitter.	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	X	X	NA	During Tank sterilization, Pure steam valve will controlled with respect to the control set point of Supply line steam trap temperature transmitter If in case the temperature rises above control set point, then system will close the Pure steam valve and if in case the temperature falls below control set point, then Pure steam valve shall become open. During controlling of temperature system shall consider temperature hysteresis set value, to avoid open-close fluctuations of Pure steam valve.
352.1TT-01	Supply line steam trap temperature transmitter	Control set point achieved, Hold timer started	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	X	X	Only Text "Tank Steri. Hold Timer Started"	As soon as Supply line steam trap temperature transmitter control set point is achieved, system will start Tank sterilization hold timer which shall be settable from HMI having range from 0 min to 999 min. During this period system will give an alarm (Only Text) "Tank Sterilization Hold Timer Started"
352.1TT-01	Supply line steam trap temperature transmitter	High	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	/	/	"352.1TT-01 High"	During tank sterilization hold cycle, in case if Supply line steam trap temperature becomes High (Remains High for 3 secs), system will close Pure steam valve and will initiate an alarm (Fault Lamp & Hooter) When temperature at supply line steam Trap falls below high set point minus hysteresis set value, system will open the Pure steam valve and will acknowldge the alarm of High temperature at supply line Steam Trap.

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact					
352.1TT-01	Supply line steam trap temperature transmitter	Low	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	/	/	/	"352.1TT-01 Low" Only Text "Tank Steri.Hold Timer Started"	During tank sterilization hold cycle, in case if Supply line steam trap temperature becomes Low (Remains Low for 3 secs), system will reset the Tank sterilization hold timer and will initiate an alarm (Fault Lamp & Hooter) When temperature at Supply line steam trap again achieved its control set point, system will acknowledge the alarm of Low temperature at supply line temp. transmitter and will restart the Tank sterilization hold cycle timer (From Zero). System will again initiate an alarm (Only Text) "Tank Sterilization Hold Timer Started".
NA	NA	Tank Sterilization Hold timer is completed	NA	0 to 999	Min	###	X	X	X	X	X	X	X	/	/	/	X	X	Only Text "Tank Steri. Hold Timer Completed"	As soon as Tank sterilization hold timer is completed system will close the Pure steam valve and will initiate an alarm (Only Text) "Tank sterilization Hold Timer Completed"	
NA	Condensate Drain CyCle	When Tank sterilization hold timer is completed	NA	0 to 999	Min	###	X	X	X	X	X	X	X	/	/	/	X	X	HMI Indication "Condensate Drain Cycle"	As soon as Tank sterilization hold timer is completed system will close Pure steam valve and will start Condensate drain Cycle timer which shall be settable from HMI having range from 0 to 999 min. During this period system will give an indication on HMI stating "Condensate Drain Cycle"	
NA	NA	When Condensate Drain Cycle timer is completed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	/	X	/	Pop-Up Meassage "Open Manual Valve 352.1MV- 07 and Open Manual Valve 352.1MV-04 then press ACK Button"	As soon as Condensate drain cycle timer is completed system will give pop-up message (With Hooter) "Open Manual Valve 352.1MV-07 and Open Manual Valve 352.1MV-04 then press ACK Button". User has to Open the respective Manual valves and has to press the Acknowledge button.	
NA	NA	Tank Sterilization Over	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	/	/	/	"Tank Sterilization Over"	As soon as pop-up message get acknowledged by User, system will initiate an alarm "Tank Sterilization Over"	
352.1TT-02	Return line Temperature Transmitter	Data Logging	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	X	X	NA	Return Line Temperature shall be used only for data logging	

WFI DISTIBUTION LOOP STERLIZATION

AFR-PSL	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 initiate an alarm (Fault Lamp & Hooter). Thenafter when the Air Pressure switch becomes healthy, system after a delay of 30 secs will restart automatically.
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CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM

CLIENT :	
CONSULTANT:-	
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DOC.NO :	
REF. P&ID :	

Tag	Instrument/ Equipment/ Type of Cycle	Condition	Full Scale Range (Of Instruments)	Full Scale Range (In HMI)	UNIT	Resolu- tion	Water Demand Signal	305.2F- 01	305.2AV -03	305.2AV -01/ 305.2H- 01	352.1P- 01/02	352.1AV- 02	352.1AV- 01	352.1AV- 03	352.1AV- 04	WFI Sanit. Signal	Fault lamp	Hooter	Alarm and Message	DISCRIPTION
							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				
Emergency Switch	Emergency Stop	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 has pressed 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 user has released the Emergency switch button from panel, system after a delay of 30 secs will restart automatically
Power	Control Panel Power	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 30 secs will restart automatically.
NA	Loop Drain Cycle	NA	NA	NA	NA	NA	X	X	X	X	X	/	X	X	X	/	X	/	Pop-Up Meassage "Open User Loop to Drain Loop and then Close all User loop valve and then Press Ack Button"	As soon as Loop sterlization is slected from HMI, system will first start Buffer drain cycle by opening Return Line Dump Port and will give pop-up message (With Hooter) stating "Open User Loop to Drain Loop and then Close all User loop valve and then Press Ack Button". User has to drain the buffer volume from loop manually through all user loop valves and then has to close all user loop valves manually. Once User loop valves get closed, User has to press Acknowldge button. Once acknowldge button is pressed system will close Return Line Dump Port and will start Loop Sterlization Cycle
NA	Loop Sterilization Cycle	NA	NA	NA	NA	NA	X	X	X	X	X	X	/	/	/	/	X	/	Pop-Up Meassage "Open Manual Valve 352.1MV- 07, Open Manual Valve 352.1MV-04, Close Manual Vlave 352.1MV- 09 and Close Valve 352.1MV- 02 then press ACK Button"	When all User loop valve get closed and User has pressed Acknowledge button from Pop-Up message then system will give an pop-up message (With Hooter) stating "Open Manual Valve 352.1MV-07, Open Manual Valve 352.1MV-04, Close Manual Vlave 352.1MV-09 and Close Valve 352.1MV-02 then press ACK Button". User has to open and Close the respective Valve and has to press acknowldge button. During Loop sterilization cycle,, EVF, Distribution pump shall remain tripped. Once the pop-up message gets acknowldged, system will start Heating cycle by open the Pure steam valve.

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact					
352.1TT-02	Return line temperature transmitter	During Heating/steriliza tion hold cycle, in case if return line temperature becomes High	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	X	/	/	/	/	/	/	" 352.1TT-02 High "	During Heating/sterilization hold cycle, in case if return line temperature becomes High (Remains High for 3 secs), system will close Pure steam valve and will initiate an alarm (Fault Lamp & Hooter). When temperature at return line falls below high set point minus hysteresis set value, system will open the Pure steam valve and will acknowledge the alarm of High temperature at return line.
352.1TT-01	Supply line steam trap temperature transmitter	Pure steam valve control wrt to CSP of supply line temperature transmitter	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	X	X	NA	During Loop sterilization, Pure steam valve will controlled with respect to the control set point of Supply line steam trap temperature transmitter. If in case the temperature rises above control set point, then system will close the Pure steam valve and if in case the temperature falls below control set point, then Pure steam valve shall become open. During controlling of temperature system shall consider temperature hysteresis set value, to avoid open-close fluctuations of Pure steam valve	
352.1TT-01	Supply line steam trap temperature transmitter	Control set point achieved, Hold timer started	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	X	X	Only Text "Loop Steri. Hold Timer Started"	As soon as Supply line steam trap temperature transmitter control set point is achieved, system will start Loop sterilization hold timer which shall be settable from HMI having range from 0 min to 999 min. During this period system will give an alarm (Only Text) "Loop Sterilization Hold Timer started".	
352.1TT-01	Supply line steam trap temperature transmitter	High	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	/	/	"352.1TT-01 High"	During Loop sterilization hold cycle, in case if Supply line Steam Trap temperature becomes High (Remains High for 3 secs), system will close Pure steam valve and will initiate an alarm (Fault Lamp & Hooter). When temperature at supply line steam trap falls below high set point minus hysteresis set value, system will open the Pure steam valve and will acknowledge the alarm of High temperature at supply line steam trap temp. transmitter	
352.1TT-01	Supply line temperature transmitter	Low	0 to 150	0 to 999.9	degree C	###.#	X	X	X	X	X	X	/	/	/	/	/	/	"352.1TT-01 Low" Only Text "Loop Steri. Hold Timer Started"	During Loop sterilization hold cycle, in case if Supply line steam trap temperature becomes Low (Remains Low for 3 secs), system will reset the Loop sterilization hold timer and will initiate an alarm (Fault Lamp & Hooter) When temperature at Supply line steam trap again achieved its control set point, system will acknowledge the alarm of Low temperature at supply line steam trap temp. transmitter and will restart the Loop sterilization hold cycle timer (From Zero). System will again initiate an alarm (Only Text) "Loop Sterilization Hold Timer Started".	
NA	NA	Loop Sterilization Hold timer is completed	NA	0 to 999	Min	###	X	X	X	X	X	X	X	/	/	/	X	X	Only Text "Loop Steri. Hold Timer Completed"	As soon as Loop sterilization hold timer is completed system will close the Pure steam valve and will initiate an alarm (Only Text) "Loop sterilization Hold Timer Completed"	

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							Potential Free Contact	Electrical Vent Filter	EVF Isolation Valve	Steam Valve/ Electrica l Heater	Distributio n Pump	Return Line Flow Diverter Valve	Pure Steam Valve	Supply Line Steam Trap Valve	Return Line Steam Trap Valve	Potential Free Contact				
NA	Condensate Drain CyCle	When Loop sterilization hold timer is completed	NA	0 to 999	Min	###	X	X	X	X	X	X	X	/	/	X	X	X	HMI Indication "Condensate Drain Cycle"	As soon as Loop sterilization hold timer is completed system will close Pure steam valve and will start Condensate drain Cycle timer which shall be settable from HMI having range from 0 to 999 min. During this period system will give an indication on HMI stating"Condensate Drain Cycle"
NA	NA	When Condensate Drain Cycle timer is completed	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	/	X	/	Pop-Up Meassage "Open Manual Vlave 352.1MV- 09 and Open Valve 352.1MV- 02 then press ACK Button"	As soon as Condensate drain cycle timer is completed system will Close the Supply line Steam trap Valve and give pop-up message (With Hooter) stating "Open Manual Vlave 352.1MV-09 and Open Valve 352.1MV-02 then press ACK Button"
NA	Loop Sterilization Over	As sson as Supply line steam trap valve close, Loop isolation valve open and message get acknowldged	NA	NA	NA	NA	X	X	X	X	X	X	X	X	X	/	/	/	"Loop Sterilization Over"	As soon as pop-up message get acknowldged by User, system will initiate an alarm "Loop Sterilization Over"

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