## CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM

	CLIENT :																			
	CONSULTANT:-																			
	PROJECT :	WATER FOR INJE	CTION (WFI) DIST	RIBUTION S	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	
							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 Tank Sterilization mode, user has 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 the Manual mode, user has selected the Manual mode, user has to select the Tank Sterilization mode, user has to select the Tank Sterilization mode, user has to select the Manual mode, user has to select the Tank Sterilization mode button is de-selected. If user has selected the Auto mode, then Manual mode selection button, Tank Sterilization Mode button will become disable and will become disable

### 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) Distrubition 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 tempreture control set point and tank tempreture high set point.

9) In the Auto Mode Plant steam valve is selected, this valve will be control on return line tempreture control set point and tank tempreture 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 DISTIBUTION MANUAL MODE																			
AFR-PSL	At Air Line	Low	NA	NA	NA	NA	x	x	x	x	x	x	x	x	х	x	ſ	Ţ	"Air Pressure Low"	In case if the A then system wi Lamp & Hooter system will not devices icons ir
Emergency Switch	Emergency Stop	Emergency Switch Pressed	NA	NA	NA	NA	x	x	x	x	x	x	x	x	x	x	ſ	Ţ	"Emergency Switch Pressed"	In case if the u will stop or tur Hooter). Thena panel, then the the particular f
Power	In Control Panel	Power Fails	NA	NA	NA	NA	х	x	х	x	x	х	x	x	х	х	x	x	NA	In case if there devices. When User has to aga

### DISCRIPTION

e Air pressure switch installed at Air Filter Regulator unit becomes low, a will stop or turn Off all the field devices and will initiate an alarm (Fault oter). Thenafter when the Air Pressure switch becomes healthy, then the not switch On the field devices. User has to again press the particular field as in order to start or turn it On

e user presses the Emergency switch button from the panel, then system turn Off all the field devices and will initiate an alarm (Fault Lamp & enafter when the user releases the Emergency switch button from the the system will not switch On the field devices. User has to again press ar field devices icons in order to start or turn it On

ere is a power failure then the system will stop or turn Off all the field en the Power resumes back, system will not switch On the field devices. again press the particular field device icon in order to start or turn it On

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID 305.2F- 305.2AV 305.2AV 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Condition Full Scale Full UNIT Resolu-Water WFI Sanit. Fault Hooter Alarm and -03 01/02 Signal Scale 01 -01/ 02 01 03 04 lamp Equipment/ Range tion Demand Message 305.2H Type of Cycle (0f Range Signal Instruments) (In HMI) 01 Supply Return Steam Return Potential Electrical EVF Pure line Potential l ine Valve/ Distributio Line Flow Free Vent Isolation Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve WFI DISTIBUTION AUTO MODE "Air Presure AFR-PSL At Air Line NA NA NA NA Х Х Х Х Х Х Low Х Х Х Х Low" Emergency Emergency "Emergency NA NA NA NA Х Х Х Х Х Х Emergency Stop Х Х Х ſ Х 1 Switch Switch Pressed **Control Panel** Х Power Fails NA NA NA Х Х Х Х Х Х Х Х Х NA Power NA Х Х Power restart automatically. Only Text Capacitance 305.2LT-01 Х "305.2LT-01 Level High-high 0 to 5000 0 to 9999 Ltrs #### Х Л Л Х Х Х Х Х Х 1 High-high Transmitter Capacitance 305.2LT-01 High 0 to 5000 0 to 9999 Ltrs #### Г 1 Х Х Х Х Х Х NA Level Г Х Transmitter Capacitance "305.2LT-01 305.2LT-01 Level Low-Low 0 to 5000 0 to 9999 Ltrs #### Х Х Х Х Х Х Х ſ Low-Low" Transmitter Capacitance 305.2LT-01 0 to 5000 0 to 9999 #### Level Low Ltrs Г ſ ſ Х Х Х Х Х Х Х NA Г Transmitter Tank "305.2TT-01 degree 305.2TT-01 0 to 150 0 to 999.9 ###.# Л Х Л Х Х High Л Г Х Х Х Л Temperature Л С High" transmitter Conductivity "352.1CT-01 352.1CT-01 High 0 to 10 0 to 99.99 µS/cm ##.## Х Х Х Х Х Transmitter at Г Г Л Г Х ſ High" Return Line

### DISCRIPTION

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 Pressed" & Hooter). Thenafter when user has released the Emergency switch button from the panel, then the 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

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.

High-high level at WFI Tank will trip the WFI Tank water demand signal and will initiate an alarm (Only Text)

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

Low-Low level at WFI Tank will trip the Distribution pump and System will initiate an alarm (Fault Lamp & Hooter).

Low level at WFI Tank will restart the Distribution pump and will acknowledge the alarm of Low-Low level at WFI dist. tank

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.

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)

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID 305.2F- 305.2AV 305.2AV 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Condition Full Scale Full UNIT Resolu-Water WFI Sanit. Fault Hooter Alarm and -03 -01/ 01/02 Signal Scale 01 02 01 03 04 lamp Equipment/ Range tion Demand Message 305.2H Type of Cycle (0f Range Signal Instruments) (In HMI) 01 Supply Return Steam Return Potential Electrical EVF Pure line l ine Potential Valve/ Distributio Line Flow Free Vent Isolation Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve Conductivity "352.1CT-01 352.1CT-01 Transmitter at High-High 0 to 10 0 to 99.99 µS/cm ##.## Г Г Х Х Х ſ Х Л High-High" Return Line Within Quality Ouality alidation timer 352.1CT-01 Validation Time NΑ 0 to 999 secs ### Л Л Г Х Х Х Х Х Х Х NA f CT falls below from HMI high set point Quality alidation time Quality "352.1CT-01 is completed 352.1CT-01 0 to 999 Х Validation Validation Time NA secs ### Х Х Х Х Х Х and CT remains from HMI Timer Over" above the high set point Return Line Return Line TT 352.1TT-02 Control Set 0 to 150 °C 0 to 999.9 °C ###.# Г Г Х Х Х Х Х NA Temperature Г Г ſ Х Х Point is achived transmitter Return Line "352.1TT-02 Return Line TT 352.1TT-02 0 to 150 °C 0 to 999.9 °C ###.# Х Х Х Х Temperature Л Л Х Л Л Х HIGH" High transmitter Return Line Return Line TT "352.1TT-02 352.1TT-02 0 to 150 °C 0 to 999.9 °C ###.# Г ſ Х Temperature Г Г Х Х Х Х Х LOW" Low transmitter alarm (Fault Lamp). Return Line Return Line TT "352.1TT-02 °C 352.1TT-02 0 to 999.9 Л Temperature 0 to 150 °C ###.# Г Л Л 1 Х Х Х Х Л Л LOW LOW" Low Low transmitter

### DISCRIPTION

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.

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.

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 resatrt automatically.

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.

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.

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).

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.

#### CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID Condition 305.2F- 305.2AV 305.2AV 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Full Scale Full UNIT Resolu-Water WFI Sanit. Fault Hooter Alarm and -03 -01/ 01/02 02 Signal Equipment/ Scale tion 01 01 03 04 lamp Range Demand Message 305.2H Type of Cycle (0f Range Signal Instruments) (In HMI) 01 Supply Return Return Steam Potential Electrical EVF Pure line Line Potential Distributio Line Flow Valve/ Isolation Free Vent Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve Within Quality Quality Validation timer 352.1TT-02 Validation Timer if Temperature NA 0 to 999 ### ſ ſ Х Х Х NA secs Г Х Х Х Х from HMI raises above RSP set point FT. Quality alidation timer Quality is completed "352.1TT-02 352.1TT-02 Validation Time and Return Line NA 0 to 999 secs ### ſ ſ Г Х Х Х Х Х Х Х ſ 1 Validation from HMI Temperature Timer Over" remains Below Low set point "305.2RD-305.2RD-01 Х Х Х Rupture Disk Burst NΑ NΑ NA NA Х Х Х Х Х Х Х Л ſ 01Burst" Pump speed will increase or 352.1FT-01 Flow Transmitter 0 to 9.99 m3/hr 0 to 15 #.## Г Г Х Х Х Х Х Х Х NA decrease wrt to FT "352.1FT-01 352.1FT-01 Flow Transmitter 0 to 9.99 m3/hr #.## ſ Л Х Х Х 1 ſ Low 0 to 15 Л Л 1 Х Х Low"

# CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM

### DISCRIPTION

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

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 resatrt automatically.

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 resatrt automatically.

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 setpoint then the VFD for Distribution pump shall ramp up towards 50 HZ.

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

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Condition Full Scale Full UNIT Resolu-Water 305.2F- 305.2AV 305.2AV WFI Sanit. Fault Hooter Alarm and -03 01/02 Signal 01 -01/ 02 01 03 04 lamp Equipment/ Range Scale tion Demand Message Type of Cycle 305.2H (0f Range Signal Instruments) (In HMI) 01 Supply Return Steam Return Potential Flectrical EVF Pure line Potential l ine Valve/ Distributio Line Flow Free Vent Isolation Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve WFI DISTIBUTION TANK STERLIZATION "Air Pressure AFR-PSL At Air Line Low NA NA NA NA Х Х Х Х Х Х Х Х Х Х Г Lamp & Hooter). Low" Emergency "Emergency Emergency Emergency Stop NA NA NA NA Х Х Х Х Х Х Х Х Х Х Л Switch Switch Pressed Control Panel Х Х Power Power Fails NA NA NA NA Х Х Х Х Х Х Х Х Х Х NA Power restart automatically. Pop-Up Meassage Open 352.1MV 01, drain buffer If WFI Tank volume, Once NA Emptying Cycle Level is above 0 to 5000 0 to 9999 Ltrs #### Х Х ſ ſ Х Х ſ Х ſ buffer is Х Г Х Low Low Level Achieved then after close drain valve and Press Ack Button" Pop-Up Meassage When WFI tank 'Open 352.1MVlevel is low-low 01, drain buffer level after volume, Once NA Buffer Drain Empting Cycle / 0 to 5000 0 to 9999 Ltrs #### Х Х Х Х Х Х Х 1 buffer is Г Х Х ſ When WFI tank Achieved then level is already after close low-low level drain valve and Press Ack Button"

### DISCRIPTION

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 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

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.

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.

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.

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Condition Full Scale Full UNIT Resolu-Water 305.2F- 305.2AV 305.2AV WFI Sanit. Fault Hooter Alarm and -03 01/02 01 -01/ 02 01 03 04 Signal lamp Equipment/ Range Scale tion Demand Message Type of Cycle 305.2H (0f Range Signal Instruments) (In HMI) 01 Supply Return Steam Return Potential Electrical EVF line Potential Pure l ine Valve/ Distributio Line Flow Free Vent Isolation Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve Pop-Up Meassage "Open Manual Vlave 352.1MV-09, Open Valve Tank 352.1MV-02, Sterilization NA NA NA Х Х 1 Close Manual NA NA NA Х Х Х Х 1 1 1 1 Х Cycle Valve 352.1MV-07 and Close Manual Valve 352.1MV-04 then press ACK Button" Tank "305.2TT-01 Lamp & Hooter) degree 305.2TT-01 0 to 999.9 High 0 to 150 ###.# Х Х Х Х Х Х Х Л Л Temperature Л Л ſ High" C transmitter Temperature. Pure steam Supply line valve control wrt to CSP of steam trap degree 352.1TT-01 0 to 150 0 to 999.9 ###.# Х Х Х Х Х Х Х ſ ſ ſ Х NA supply line temperature C transmitter steam trap transmitter. Supply line Only Text Control set "Tank Steri. steam trap point achieved. degree 352.1TT-01 0 to 150 0 to 999.9 ###.# Х Х Х Х Х Х Х Х Γ ſ temperature Hold timer Hold Timer С transmitter started Started" Supply line steam trap "352.1TT-01 degree 352.1TT-01 High 0 to 150 0 to 999.9 ###.# Х Х Х Х Х Х Х ſ Л temperature С High" transmitter

### DISCRIPTION

After draining the buffer volume ,system will Close EVF isolation Valve and give popup 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".

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

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.

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"

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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### DISCRIPTION

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 acheived its control set point, system will acknowldge the alarm of Low temperature at supply line temp. transmitter and will restart the Tank sterlization hold cycle timer (From Zero). System

will again initiate an alarm (Only Text) "Tank Sterilization Hold Timer Started".

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"

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"

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 Acknowldge button.

As soon as pop-up message get acknowldged by User, system will initiate an alarm "Tank Sterilization Over"

Return Line Temperature shall be used only for data logging

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.

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID Condition 305.2F- 305.2AV 305.2AV 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Full Scale Full UNIT Resolu-Water WFI Sanit. Fault Hooter Alarm and -03 -01/ 01/02 02 Signal Equipment/ Scale tion 01 01 03 04 lamp Range Demand Message 305.2H Type of Cycle (0f Range Signal Instruments) (In HMI) 01 Supply Return Return Steam Potential Electrical EVF Pure Line Line Potential Distributio Line Flow Valve/ Isolation Free Vent Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve Emergency Emergency "Emergency Emergency Stop NA NA NA NA Х Х Х Х Х Х Х Х Х Х ſ 1 Switch Switch Pressed Control Panel Power Fails NA NA NA Х Х Х Х Х Х Х Х Х Х NA Power NΔ Х Х Power restart automatically. Pop-Up Meassage "Open User Loop to Drain NA Loop Drain Cycle NA NA NA NA NA Х Х Х Х Х 1 Х Х Х ſ Х 1 Loop and then Close all User Button" Pop-Up Meassage "Open Manual Valve 352.1MV-07, Open Manual Valve Loop Х 352.1MV-04. NA Sterilization NA NA NA NA NA Х Х Х Х Х 1 Л Л Л Х 1 Close Manual Cycle Vlave 352.1MV-09 and Close valve. Valve 352.1MV-02 then press ACK Button"

### DISCRIPTION

"Emergency Switch Pressed" & Hooter). Thenafter when user has released the Emergency switch button from the panel, then a larm (Fault Lamp & Hooter). Thenafter when user has released the Emergency switch button from panel, system after a delay of 30 secs will restart automatically

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.

MeassageAs soon as Loop sterlization is sleected from HMI, system will first start Buffer drain"Open Usercycle by opening Return Line Dump Port and will give pop-up message (With Hooter)Loop to Drainstating "Open User Loop to Drain Loop and then Close all User loop valve and thenLoop and thenPress Ack Button". User has to drain the buffer volume from loop manually through allClose all Useruser loop valves and then has to close all user loop valves manually. Once User looploop valve andpress Ack Button is to press Acknolwdeg button. Once acknowldge button isthen Press Ackpressed system will close Return Line Dump Port and will start Loop Sterlization Cycle

When all User loop valve get closed and User has pressed Acknowldge 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

#### CONTROL SEQUENCE FOR WFI DISTRIBUTION SYSTEM CLIENT CONSULTANT: PROJECT WATER FOR INJECTION (WFI) DISTRIBUTION SYSTEM DOC.NO REF. P&ID Condition 305.2F- 305.2AV 305.2AV 352.1P-352.1AV- 352.1AV- 352.1AV- 352.1AV-Tag Instrument/ Full Scale Full UNIT Resolu-Water WFI Sanit. Fault Hooter Alarm and -03 -01/ 01/02 Signal Scale 01 02 01 03 04 lamp Equipment/ Range tion Demand Message 305.2H Type of Cycle (0f Range Signal Instruments) (In HMI) 01 Supply Return Steam Return Potential Electrical EVF Pure line l ine Potential Valve/ Distributio Line Flow Free Vent Isolation Steam Steam Steam Free Electrica n Pump Diverter Contact Filter Valve Valve Trap Trap Contact l Heater Valve Valve Valve During Heating/steriliza Return line tion hold cycle, ' 352.1TT-02 degree 352.1TT-02 in case if return 0 to 150 0 to 999.9 ###.# Х Х Х Х 1 temperature Х Х Х 1 С High " transmitter line temperature becomes High Pure steam Supply line valve control steam trap wrt to CSP of degree 352.1TT-01 0 to 999.9 ###.# Х Х Х Х Х NA 0 to 150 Х Х Х Г Г ſ ſ temperature supply line C transmitter temperature transmitter Supply line Control set Only Text steam trap point achieved, "Loop Steri. degree 352.1TT-01 0 to 150 0 to 999.9 ###.# Х Х Х Х Х Х Х Х ſ ſ Г Hold Timer temperature Hold timer transmitter started Started" Supply line "352.1TT-01 steam trap degree 0 to 999.9 352.1TT-01 ###.# Х High 0 to 150 Х Х Х Х Х Х ſ ſ 1 High" temperature C transmitter "352.1TT-01 Low" Supply line Only Text degree 352.1TT-01 0 to 150 0 to 999.9 ###.# Х Х 1 temperature low Х Х Х Х Г Л Г ſ "Loop Steri. C transmitter Hold Timer Started" Only Text Loop Sterilization "Loop Steri. 0 to 999 NA NA Min ### Х Х Х Х Х Х Х Х Х NA ſ Г Г Hold timer is Hold Timer completed Completed'

### DISCRIPTION

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 acknowldge the alarm of High temperature at return line.

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

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".

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 acknowldge the alarm of High temperature at supply line steam trap temp. transmitter

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 acheived its control set point, system will acknowldge the alarm of Low temperature at supply line steam trap temp. transmitter and will restart the Loop sterlization hold cycle timer (From Zero). System will again initiate an alarm (Only Text) "Loop Sterilization Hold Timer Started".

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"

NA   Condensate Drain CyCle   sterilization hold timer is completed   NA   0 to 999   Min   ###   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X										cc	ONTRO	l seque	NCE FO	OR WFI [	DISTRIB		SYSTEM				
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Aff. Poils     Aff. Poils     Condition     Full Scale (r) Poils     State (r) Poils <th< td=""><td></td><td>PROJECT :</td><td>WATER FOR INJE</td><td>CTION (WFI) DIST</td><td>RIBUTION S</td><td>SYSTEM</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>		PROJECT :	WATER FOR INJE	CTION (WFI) DIST	RIBUTION S	SYSTEM															
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Image: Name   Within Loop Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Liner Step/Li	Tag	Equipment/	Condition	Range (Of	Scale Range	UNIT		Demand			-01/ 305.2H-	01/02									
NA   Condensate Drain Cycle   sterilization hold timer is completed   NA   0 to 999   Min   ###   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X								Free	Vent	Isolation	Valve/ Electrica	n Pump	Line Flow Diverter	Steam	Line Steam Trap	Line Steam Trap	Free				
NA   When Condensate Drain Cycle timer is completed   NA   NA   NA   NA   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X	NA		sterilization hold timer is	NA	0 to 999	Min	###	x	x	x	x	x	х	x	Ţ	ſ	x	x	x	"Condensate	As soon as Lo valve and wil having range HMI stating"C
NA   Loop Sterilization Over   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   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X	NA	NA	Condensate Drain Cycle timer is	NA	NA	NA	NA	x	x	x	x	x	x	x	x	x	1	x	ſ	Meassage "Open Manual Vlave 352.1MV- 09 and Open Valve 352.1MV- 02 then press	As soon as Co Steam trap Va 352.1MV-09 a
	NA	Sterilization	Supply line steam trap valve close, Loop isolation valve open and message get	NA	NA	NA	NA	x	x	x	x	x	x	x	x	x	ſ	ſ	ſ	Sterilization	As soon as po "Loop Steriliz
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## DISCRIPTION

Loop sterilization hold timer is completed system will close Pure steam will start Condensate drain Cycle timer which shall be settable from HMI ge from 0 to 999 min. During this period system will give an indication on g"Condensate Drain Cycle"

Condensate drain cycle timer is completed system will Close the Supply line o Valve and give pop-up message (With Hooter) stating "Open Manual Vlave 9 and Open Valve 352.1MV-02 then press ACK Button"

pop-up message get acknowldged by User, system will initiate an alarm ilization Over"

Approved By