3.3. Gate Control

3.3.1. Process Description

The Sluice Gate Valve is installed in the junction chamber located upstream of the Wet Well inlet. The Sluice Gate Valve controls the amount of septage routed to the Wet Well.

3.3.2. Control Loop Schematic

A control loop schematic does not apply for this process area.

3.3.3. Control Description

The Sluice Gate Valve has an electric motor operated actuator controlled by utilizing the wet well low-low level float switch (LSLL-206). Once LSLL-206 is triggered the PLC latches open the sluice gate valve to allow septage into the Wet Well, the sluice gate valve actuator will remain on until the valve position reaches the maximum open position (adjustable setpoint, 65% default setting), at this point the gate will stay in the last position. The PLC does not have any control for closing the gate.

Should the Sluice Gate Valve close below 25% open for 3 seconds, based on the actuator feedback, it will generate an insufficient Gate Valve position alarm.

The Sluice Gate Valve is powered by an uninterruptable power supply (UPS). The electric actuator fails in the last position so if the UPS which provides power to the electric actuator should the main utility power or backup generator fail, the actuator will be able to function to open or close during a power failure.

Operation of the sluice gate can come from the following sources:

Rotork Actuator Local/Remote/Stop Selector & Open and Close Pushbuttons

The actuator has a Local/Remote/Stop selector switch:

- Local: Blocks all signals coming remotely from the actuator and permits only the local actuator controls.
- Remote: Permits all signals remote to the actuator. In this case it will permit the PLC auto open command OR the HMI-100 panel open/close/stop commands if the HMI-100 (HA) selector switch is in the hand position (see below HMI-100 Panel).
- Local Stop: Signals the valve actuator to stop.
- Local Open: The open pushbutton signals the valve actuator to open the valve.
- Local Close: The close pushbutton signals the valve actuator to close the valve.

The local and remote status selection also has indication lights on the HMI-100 panel to indicate where the controls for the gate are fed from (local buttons or remote PLC/HMI-100 operation).

HMI-100 Panel - Hand/Auto switch (HA) and Gate Close/Gate open/Gate Stop

The HMI-100 panel also has controls for the Sluice Gate Valve which are treated as remote to the Rotork actuator as per the following:

The assumption here is that the Rotork actuator selector switch above is in Remote

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Hand: Once the selector is in the hand position it disconnects the auto PLC signal going to the valve actuator permitting the three local controls:

- Gate Close: Operator can press the close pushbutton and close the valve.
- Gate Open: Operator can press the open pushbutton and open the valve.
- Gate Stop: Operator can press the stop pushbutton and stop the valve at the current position.

Auto: Once the selector (HA) is in auto the valve actuator will take the signal from the PLC.

3.3.4. Start Up Sequence

1) LSLL-206 Float switch triggers a low Wet Well level.
2) PLC latches open the Sluice Gate Valve to 65% (adjustable setpoint, 65% default setting) based on the valve position feedback (ZI-120).

3.3.5. Normal Operation

The Sluice Gate Valve is typically in remote and auto with the valve open.

3.3.6. Stop Sequence

There is no additional stop sequence in the PLC.

3.3.7. Emergency Shutdown

LSHH-206B is hardwired directly to the Sluice Gate valve close contact to automatically begin to close the gate when in the alarm position. This will initiate an emergency mode operation of the station as defined in section 3.1.7 above. The LSHH-206B float is wired directly to the callout system to generate an immediate callout from the security system when in alarm.

REFERENCE ONLY

3.3.8. Data Tables

3.3.8.1. Analog Signals

Tag	Descriptor	Type	EU Min	EU Max	EU	*ALL	*AL	*AH	*AHH	Notes
ZI-120	Gate position indication	4-20ma (0-100%)	0	100	%		5% (CRITICAL)	75% (URGENT)		

3.3.8.2. Digital Signals

			Alarms		States		
Tag	Descriptor	Type	Alarm Enable	Priority/ Severity	Zero	One	Notes
HS-120A	SLUICE GATE MODE IN AUTO	Hardwired-DI	Yes	CRITICAL	Not in Auto	Auto	
HS-120B	SLUICE GATE LOCAL CLOSE PUSHBUTTON	Hardwired-DI	N/A	N/A	Last state	Close	Located on HMI-100 door
HS-120C	SLUICE GATE LOCAL OPEN PUSHBUTTON	Hardwired-DI	N/A	N/A	Last state	Open	Located on HMI-100 door
HS-120D	SLUICE GATE LOCAL STOP PUSHBUTTON	Hardwired-DI	N/A	N/A	Last state	Stop	Located on HMI-100 door
HS-120E	SLUICE GATE ACTUATOR IS IN REMOTE	Hardwired-DI	N/A	CRITICAL	Local	Remote	
ZSO-120	SLUICE GATE OPEN STATUS	Hardwired-DI	N/A	N/A	Not open	Open	
ZSC-120	SLUICE GATE CLOSED STATUS	Hardwired-DI	N/A	N/A	Not Closed	Closed	
LSHH-206B	WET WELL HIGH-HIGH GATE CONTROL	Hardwired-DI	Yes	CRITICAL	Alarm	OK	
XS-120	GATE UPS OK	Hardwired-DI	Yes	CRITICAL	Alarm	OK	
ZIO-120	GATE OPEN PILOT LIGHT INIDICATOR	Hardwired-DO	N/A	N/A	Not open	Open	Located on HMI-100 door
ZIC-120	GATE CLOSED PILOT LIGHT INIDICATOR	Hardwired-DO	N/A	N/A	Not Closed	Closed	Located on HMI-100 door
HSV-120	GATE OPEN ACTUATOR COMMAND	Hardwired-DO	N/A	N/A	Last state	Open	Located on HMI-100 door

3.3.8.3. Switching Modules

REFERENCE ONLY

Device	Descriptor	Function	Control Type	Control Modes	Operator Interface	Safety Position	Interlock	Control Description	Drawing References
HSV-120	Sluice Gate Valve	Routes/isolates septage to wet well.	Electric motor operated valve (MOV)	• Auto • Hand • Open PB • Close PB • Stop PB	• HMI-100 • HMI-CP-100	Fails in Last position	N/A	Auto - PLC latch opens valve when LSLL-206 is triggered. When HMI -100 HA switch is in hand the pushbuttons below are active: Open - Operator can open the valve. Close- Operator can close valve. Stop- Operator can stop the actuator.	PID: CRPS-P-102 Electrical: CRPS-E-105

3.3.8.4. Soft Alarms

			Alarms		States		
Tag	Descriptor	Type	Delay	Priority/ Severity	Zero	One	Notes
ZI-120.Faulted	Gate position indication	Alarm	30s	CRITICAL	Alarm	OK	Provides alarm for wire fault, under range, over range and hardware fault.

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