Title: **Tank 1 Process Control** Project: 1

Course: Intro to Automation Unit: Manual Motor Control CLO: 1, 2

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall repeat the designs from the Manual Motor Control unit to automate a process tank.
2. Student shall create a hand drawn design of the process schematic.
3. Student shall render a computer aided schematic of the same design.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Project. Grading shall be based on the Manual Motor Control rubric.

**Controls**

* Tank Level Control
* Hot Water Supply Control
* Water Temperature Control
* Tank Vent Control

**Devices**

Tank Level Control

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Three-position Selector Switch | Mode: On, Off, Automatic | TL1\_MD |
|  | Float Switch (M-GRE-40-W) | High Level Indication | HI\_LVL1 |
|  | Float Switch (M-GRE-40-W) | Low Level Indication | LO\_LVL1 |
|  | Outputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Green Pilot Light | Water Valve Open | VLV1\_OPEN |
|  | Red Pilot Light | Water Valve Closed | VLV1\_CLSD |
|  | Blue Pilot Light | Tank High Level Indication | TK1\_FULL |
|  | Eleven-Pin Relay | Valve Control Relay | VLC1 |
|  | 120VAC Normally Closed Solenoid Valve | Supply Water Valve | VLV1 |

Hot Water Supply Control

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Two-position Selector Switch | Mode: On, Automatic | WS1\_MD |
|  | Float Switch (M-GRE-40-W) | Low Level Indication | LO\_LVL1 |
|  | Flow Switch (230500-5-05) | Low Flow Indication | LO\_FLO1 |
|  | Outputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Green Pilot Light | Pump is Running | PMP\_ON |
|  | Red Pilot Light | Pump is Off | PMP\_OFF |
|  | Yellow Pilot Light | Pump Overload | PMP\_OVLD |
|  | 8-pin 24VDC Time-On Relay | Low Flow Interlock | ILK1 |
|  | 3-Phase Motor Starter w/aux. contacts, 2 NO, 2 NC | Pump Motor Starter | PC1 |
|  | 208VAC 3-Phase 5HP Motor | Pump Motor | PMP1 |

Water Temperature Control

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Two-position Selector Switch | Mode: Off, Automatic | TMP1\_MD |
|  | Temperature Switch () | High Temperature Indication | HI\_TMP1 |
|  | Temperature Switch () | Low Temperature Indication | LO\_TMP1 |
|  | Float Switch (M-BLU-40-W) | Water Level Indication | LVL1 |
|  | Outputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Green Pilot Light | Steam Valve Open | STM1\_OPEN |
|  | Red Pilot Light | Steam Valve Closed | STM1\_CLSD |
|  | Yellow Pilot Light | Tank Level Indication | LEVEL1 |
|  | Eleven-Pin Relay | Steam Control Relay | SC1 |
|  | 120VAC Valve | Normally Closed Solenoid Valve | STM1 |

Tank Vent Control

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Two-position Selector Switch | Mode: On, Automatic | VT1\_MD |
|  | Outputs | | |
|  | *Device* | *Description* | *Symbol* |
|  | Green Pilot Light | Vent is Open | VNT\_OPEN |
|  | Red Pilot Light | Vent is Closed | VNT\_CLSD |
|  | Eight-pin Control Relay | Vent Valve Control Relay | VTC1 |
|  | 120VAC Valve | Normally Open Solenoid Valve | VT1 |

**Instructions**

Tank Level Control

The tank level control shall consist of the devices listed above. The three-position selector switch shall determine the mode of this control scheme. In the center position, the circuit shall be disabled and not open the valve. If the switch is in the A position, the valve shall open and remain open as long as the mode switch is in this position. If the switch is in the B position, the level in the tank shall be controlled by two float switches. When the low-level switch closes, it shall open the inlet valve, VLV1, and the valve shall remain open even if the low-level switch is no longer closed. If the high-level switch opens, the valve shall close. The valve shall remain closed even if the high-level switch closes. Only the low-level switch shall open the valve and only the high-level switch shall close the valve. If the high-level occurs, the blue light shall illuminate. If the valve is open, the green light shall illuminate. If the valve is closed, the red light shall illuminate.

Hot Water Supply Control

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Discussed design \_\_\_\_\_\_\_\_ Checked wiring \_\_\_\_\_\_\_\_ Energized Test \_\_\_\_\_\_\_\_