Title: **Stop/Start/Swap for two Three-Phase Motors** Job: 27

Course: Introduction to Automation Unit: Introduction of PLC CLO: 2, 4

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

**Objectives**

1. Student shall reinforce their knowledge of a stop/start motor control circuit.
2. Student shall develop a knowledge of motor swapping.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Job. Grading shall be based on the Introduction to PLC rubric.

**Devices**

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| Inputs | | |
| *Device* | *Description* | *Symbol* |
| NC Mushroom Head PB (ESTOP) | Emergency Stop | ESTOP |
| Three-position Selector Switch | Pump Select: Pump1 or Pump2 | PMP1, PMP2 |
| NC Pushbutton (PB1) | Stop Motor | STOP |
| NO Pushbutton (PB2) | Start Motor | START |
| NO Contacts (MS1-AUX) | Motor Starter 1 Status | MS1\_STAT |
| NO Contacts (MS2-AUX) | Motor Starter 2 Status | MS2\_STAT |
| NO Contacts (MS-OL) | Motor Overload Contacts | MS\_OL |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Motor 1 Running | M1\_RUNNING |
| Red Pilot Light | Both Motors Stopped | STOPPED |
| Yellow Pilot Light | Motor Overload | OVERLOAD |
| Blue Pilot Light | Motor 2 Running | M2\_RUNNING |
| 24VDC Three-Phase Motor Starter | Motor 1 Contactor | MS1 |
| 24VDC Three-Phase Motor Contactor | Motor 2 Contactor | MS2 |

**Instructions**

Design a stop/start/swap motor control circuit using the devices listed above. This circuit has two motors that are paired together to perform one function. One pump alone can handle all the process needs, but a second is utilized to back up the other pump. If one pump is broken or needs maintenance, it can be valved off and the other pump shall supply the process. Since only one pump is needed at a time, the circuit shall swap run time between the two pumps. One pump shall run for 1 hour, then the other pump shall run for the same duration. When the pumps are swapped, the initially running pump shall remain on for 15 seconds while the other is started. This will ensure there is no process flow interruption during the swap. Control can be forced to one of the pumps (ignoring the swapping logic) through the three-position selector switch. Retentive timers shall be used to keep track of each motor’s run hours. When each motor is running, a timer shall increment keeping track of how long the motor has been running and calculations will convert the seconds to hours. When the motor is off, the run hours shall be retained. Whenever motor 1 is running the green light shall illuminate. Whenever motor 2 is running the blue light shall illuminate. When the motor is not running, the red light shall illuminate. If an overload occurs, the yellow light shall blink.

**THIS CIRCUIT SHALL NOT BE CONNECTED TO 3-PHASE AT ANY TIME!!!**

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Discussed design \_\_\_\_\_\_\_, Test logic without motor \_\_\_\_\_\_\_, With motor \_\_\_\_\_\_\_