0617-470 and 870 Controls for Manufacturing Automation

Department of MMET-PS

Rochester Institute of Technology

Laboratory Exercise # 5

10 Points

Objective:

The objective of this laboratory exercise is to create a PLC program to understand the control of a Stepper Motor and Solenoid Valve. You will be using Data Transfer Instructions, Timers and Counters.

Task to be accomplished:

1. The application is controlled by a NO Selector Switch (Main Switch - Local:5:I.Data.20). The experiment should start working only if the Main Switch is turned ON.

2. All the outputs should turn OFF and the system should RESET (Timers and Counters) when the Main Switch is turned OFF.

3. When the START Switch (Normally Open Momentary PB Switch – Local:5:I.Data.16) is pressed, store an integer value (10) into memory using an integer tag (DINT data type). This integer value represents the number of steps the Stepper Motor needs to rotate. (Note: The Stepper Motor Rotates by 1 step increment for every pulse that is provided)

4. Enable the Stepper Motor by turning the Output (Local:6:O.Data.26) ON. This does not turn the stepper motor but gets the Motor ready for the turn.

5. Rotate the stepper motor for the number of steps indicated by the integer value and stop. A Stepper motor runs on pulses (low to high) to step through each step angle. So, a pulse train needs to be provided for the output (Local:6:O.Data.29). The output should be programmed to go from low-to-high and back to low, to provide pulses to the stepper motor. The output should be maintained High for 1-seconds and Low for 1-seconds.

6. After the Stepper Motor turns through the required number of steps, set the Enable Output (Local:6:O.Data.26) to OFF.

7. Now extend (Local:6:O.Data.16) and retract (Local:6:O.Data.17) the Pneumatic Cylinder two times. The extension of the valve is sensed by the Extend Sensor (Local:5:I.Data.24) and the retraction is sensed by the Retract Sensor (Local:5:I.Data.25).

8. **VERY IMPORTANT:** Make sure to unlatch the Cylinder Retract output before latching the Cylinder Extend output and unlatch the Cylinder Extend output before latching the Cylinder Retract output.

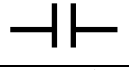
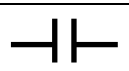
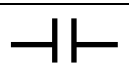
Note:
Using integer storage element in the memory to store variables, make the program modular and enable the use of same program for different requirements.

Input / Output listing for the experiment:

	Inputs/Outputs	PLC
Inputs	Main Switch NO Selector Switch	Local:5:I.Data.20
	Start Switch NO Momentary PB Switch	Local:5:I.Data.16
	NO Extend Sensor	Local:5:I.Data.24
	NO Retract Sensor	Local:5:I.Data.25
Outputs	Stepper Motor Enable	Local:6:O.Data.26
	Stepper Motor Pulse Train	Local:6:O.Data.29
	Cylinder Extend	Local:6:O.Data.16
	Cylinder Retract	Local:6:O.Data.17

What needs to be submitted?

1. Test the program and show the demo to the instructor in the lab.
   (Only for on-campus students)
2. A well documented functional PLC program (RsLogix File), containing all tasks should be submitted with title, your name and rung comments, in the drop box within MyCourses. (You should have tested the program before submission)
3. Use the table as a reference to understand the use of NO contact symbol for the Selector Switch used in this program.

Physical switch or sensor used on the experiment setup	Is the physical switch or sensor NO or NC?	Value recorded in the memory for the switch or sensor when PLC is powered (1 or 0)	User Changing Physical State (Switch can be Closed or Opened by user)	Value recorded in the memory, for the switch or sensor when the user changes its physical state	Switch or sensor programmed as a NO or NC contact	Logical State of contact (1 or 0)
Selector Switch Local:5:I.Data.20	NO	0	Not Activated (Open)	0		**0**
						**1**
			Activated (Closed)	1		**1**
						**0**
Momentary Push Button Switch Local:5:I.Data.16	NO	0	Not Activated (Open)	0		**0**
						**1**
			Activated (Closed)	1		**1**
						**0**
Extend Sensor - Local:5:I.Data.24 Retract Sensor - Local:5:I.Data.25	NO	0	Not Activated (Open)	0		**0**
						**1**
			Activated (Closed)	1		**1**
						**0**