

Experiment No.: 1

Experiment Name: **Changing the rotation direction of asynchronous motor**

Purpose: In many areas where asynchronous motor is used, it is required to change rotation direction of the motor. Elevators, cranes, conveyors, mixers e.g. In order to change rotation direction of motors in 3 phase motors, changing any two of the phases is enough. If the rotation direction will be changed when desired, appropriate controller circuit or a system with PLC will cover this need. Aim of this application; changing the rotation direction of asynchronous motor by using classic controller circuit and PLC. Developing the PLC program that is necessary for operating the application by using ladder programming method and installing to PLC. Making connections of PLC input/outputs, circuit components and energy lines.

Operating Principle of the Application:

Conventional controller circuit and power circuit, which are used to change the rotation direction of the asynchronous motor, can be seen in the figures below. Electrical locking (sealing) method is used in this controller circuit. First of all, operate this application by installing it according to the controller and power circuit below, without using PLC. Modules and tools to be used in the application;

- 1 . Y-0030-A01/01 (Contactor Module)
- 2 . Y-0030-A01/02 (Button, Switch, Signal Lamp Module)
- 3 . Y-0030-A01/05 (3 Phase Asynchronous motor Module)
- 4 . Y-0030-A01/06 (I/O Link Module)
- 5 . 3 Phase Power Cable and 4 mm test cables

Controller Circuit Schema:

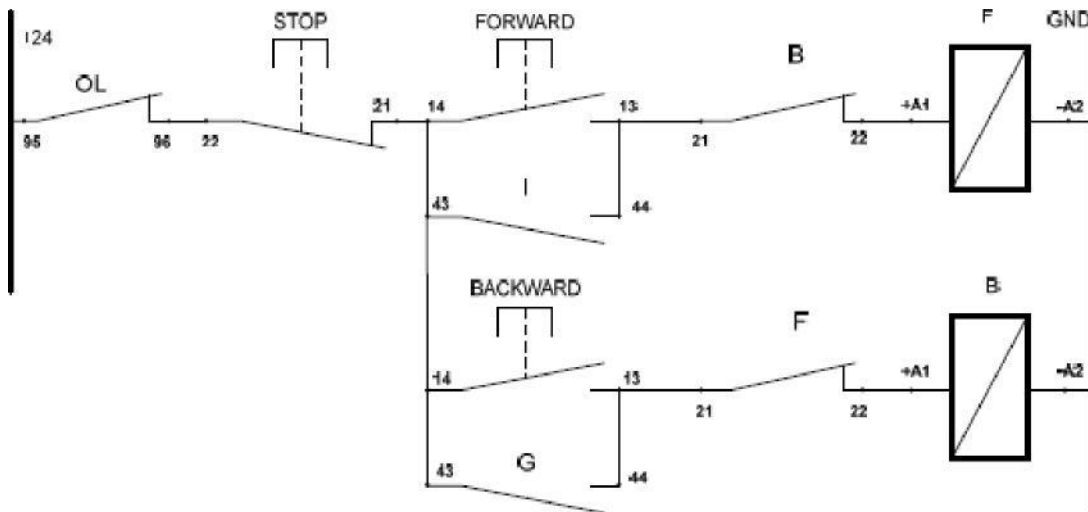


Figure 1: Controller circuit to change the rotation direction of asynchronous motor.

Power Circuit Schema:

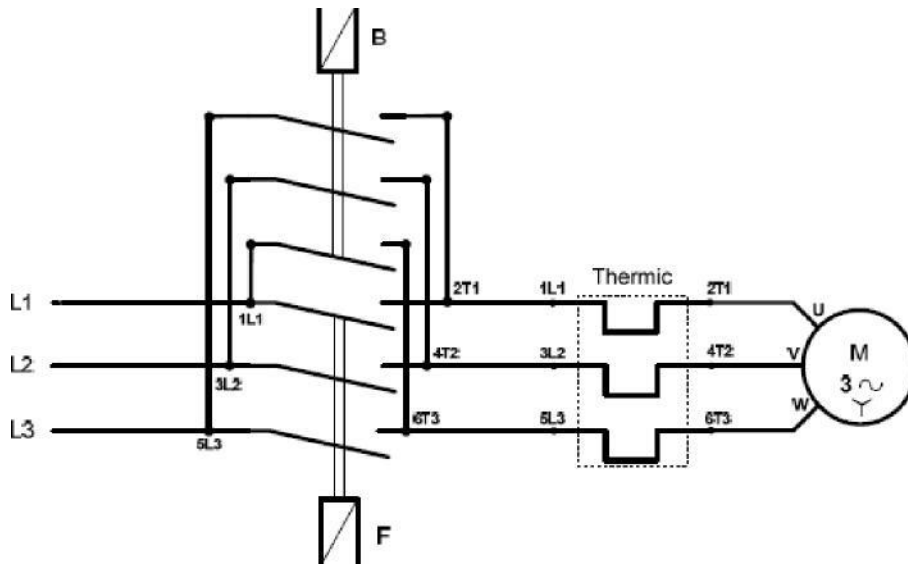


Figure 2: Power circuit to change the rotation direction of asynchronous motor.

PLC Technology Schema:

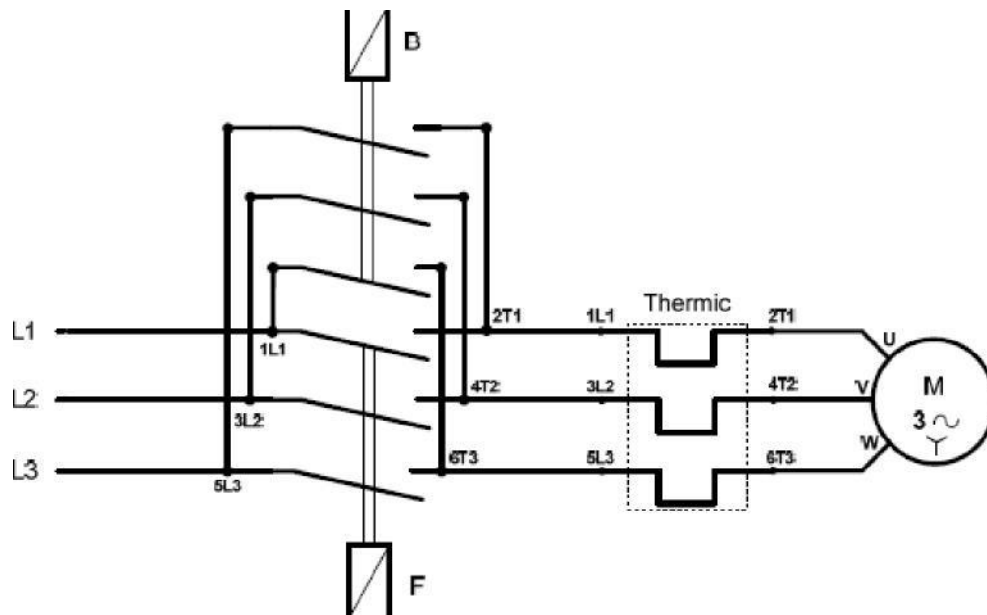


Figure 3: PLC connection to change the rotation direction of asynchronous motor.

Process Steps:

1. Make the connections with 4 mm test cables according to controller circuit in the figure 1.
2. Make motor electric terminal connection according to the star connection.
3. Make the connections with 4 mm test cables according to power circuit in the figure 2.
4. After taking the necessary measures, apply DC 24V energy to the controller circuit and apply 3 phase AC 380V to the power circuit.
5. Press FORWARD button and observe rotation direction of the motor.
6. Press the STOP button and stop the motor.
7. Press BACKWARD button and observe rotation direction of the motor.
8. Can we change rotation direction without pressing STOP button when motor is turning in one direction? Why?
9. Why serial connected B closed contact is connected to F forward contactor and serial connected F closed contact is connected to B backward contactor?
10. What happens if both FORWARD and BACKWARD buttons are pressed at the same time? Discuss.
11. Close all energy sources on the circuit.
12. Undo the controller circuit in Figure 1 however leave power circuit as it is. In place of controller circuit, install the circuit again according to the PLC technology schema in figure 3.
13. Open Step 7-Micro/Win program. Open ...\\A01 Uygulamaları\\A01Uyg3.mwp file in the application CD and install it to the PLC. Set PLC to the RUN position.
14. After taking the necessary measures, apply DC 24V energy to the controller circuit and apply 3 phase AC 380V to the power circuit.
15. Press FORWARD button and observe rotation direction of the motor.
16. Press the STOP button and stop the motor.
17. Press backward button and observe rotation direction of the motor.
18. Can we change rotation direction without pressing STOP button when the motor is turning in one direction? Why?
19. Why serial connected B closed contact is connected to F forward contactor and serial connected F closed contact is connected to B backward contactor?
20. What happens when both forward and backward buttons are pressed at the same time? Discuss.
21. Press the STOP button and examine the movement of the motor
22. Is there any difference between circuit schemas of PLC applications of asynchronous motor intermittent operation and asynchronous motor continuous operation in a direction?
23. Can you create various scenarios just by changing PLC softwares, without making any change in Power and Controller schemas of PLC applications? Discuss.

