# Limit Switch

**EXERCISE OBJECTIVE**

- Introduce the Limit Switch;
- Learn how and when limit switches are used.

**DISCUSSION OUTLINE**

The Discussion of this exercise covers the following points:

- Actuators

**DISCUSSION**

A limit switch is an electro-mechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection. Limit switches are used in a variety of applications and environments because of their ruggedness, simple visible operation, ease of installation, and reliability of operation.

In an automobile, for example, limit switches are used to automatically turn on the lights when a door is opened.

Limit switch contacts may be NO, NC, or any combination of NO and NC contacts. To prevent arcing or welding of the contacts, they must be connected to the proper polarity. There is no arcing between the contacts when the contacts energize and de-energize the load as long as the contacts are of the same polarity. Arcing or welding may occur if the contacts are connected to opposite polarity, as shown in Figure 29.

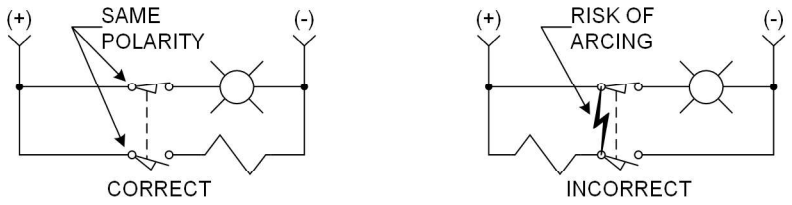


**Figure 29. Arcing or welding of the contacts may occur if the contacts are connected to opposite polarity.**

Contacts must be selected according to the voltage and current of the load and manufacturer specifications. A relay or a contactor must be used to interface the limit switch with the load if the load current exceeds the contact rating.

### Actuators

There are two types of limit switches: rotary lever-actuated and plunger-actuated.

The rotary lever-actuated limit switch works on the following principle: an object hits the end of a lever arm, which rotates a shaft that operates the switch contacts. In some rotary lever-actuated limit switches, the actuator attached to the shaft can be interchanged.

A plunger-activated limit switch works on the following principle: an object hits the end of the plunger, which is pressed in to operate the contacts of the switch.

The Limit Switch module of your training system is shown in Figure 30. It includes a set of NC and NO contacts. The position of the actuator is adjustable using a rod and a knob. The length of the lever arm is also adjustable. Other characteristics of the Limit Switch are shown in Table 12.


**Figure 30. Limit Switch module.**

**Table 12. Characteristics of the Limit Switch.**

| Characteristics of the Limit Switch | | | | |
|---|---|---|---|---|
| Contacts | NO and NC, snap acting | | | |
| AC rating | 600 V | 500 V | 250 V | 120 V |
| | 1.2 A | 1.4 A | 3 A | 6 A |
| DC rating | 600 V | 500 V | 250 V | 125V |
| | 0.4 A | 0.55 A | 1.1 A | 2.2 A |
| Actuator type | adjustable lever | | | |
| Max Switching Frequency | 6000 operations per hour | | | |

## PROCEDURE OUTLINE

The Procedure is divided into the following sections:

- Set up and connections
- Equipment required
- Characteristics

## PROCEDURE

### Set up and connections

*In this exercise, you will experiment with the operation of the Limit Switch module.*

### Equipment required

Refer to the Equipment Utilization Chart in Appendix A to obtain the list of equipment required to perform this exercise.

### Characteristics

1. What types of contacts are available on the Limit Switch module?

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2. What is the type of the Limit Switch?

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3. Referring to the ladder diagram shown in Figure 31, indicate which pilot light turns off when the Limit Switch is activated.

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4. Set up the circuit shown in Figure 31.


**Figure 31. Circuit using the Limit Switch.**

5. Perform the Energizing procedure.

6. Press on the roller to activate the Limit Switch. Describe what happens.

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7. Is your prediction confirmed?

❑ Yes ❑ No

8. Pull up the lever of the Limit Switch. Do your observations confirm that the switch operates in both directions?

❑ Yes ❑ No

9. Turn the individual power switch of the AC Power Supply off, disconnect the circuit, and return the equipment to the storage location.

## CONCLUSION

In this exercise, you were introduced to the Limit Switch.

You observed that the Limit Switch operates in both directions.

## REVIEW QUESTIONS

1. What precaution must be taken to prevent arcing or welding of the contacts of a limit switch?

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2. Name the two types of limit switches.

3. What should be done if the load current exceeds the contact rating of the limit switch?

4. What is the main difference between a limit switch and a photoelectric switch?

5. On which principle does the rotary lever-actuated limit switch work?