

TECH TIP # 55



One of a series of dealer contractor technical advisories prepared by HARDI wholesalers as a customer service.

THE RUNGS OF THE LADDER

The purpose of a ladder diagram in any system is to graphically show how to get electrical power to the proper motor or device at the proper time. It can be said that a ladder diagram is a description of the electrical functions of a system using lines and symbols.

In the ladder diagram, the source of the electrical power is a line drawn down the left-hand side of the diagram. This source is commonly called “hot” and usually designated L1. On the right-hand side parallel to the hot line, a second line or wire is drawn and is commonly called “neutral” (if we are working with 120 volts). If the control voltage is a single phase, 2 wire, 208 or 240 volts, then there is no neutral and both lines would be hot. The two lines would then be labeled L1 and L2 respectively. An “L” leg refers to an electrical wire that has power in it. If a path is created between these two wires, current will flow. By inserting an electrical device that is current-consuming in the path, the device will function provided, of course, it is of the correct voltage.

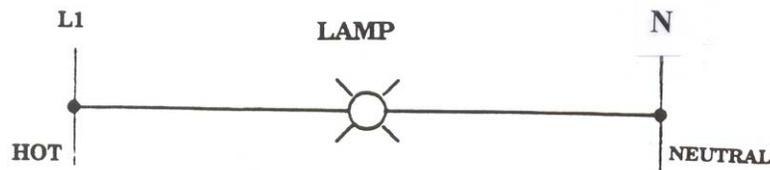


FIGURE 1

In Figure 1, the electrical device is a lamp. When a proper power source is applied to L1, the lamp will light.

The electrical devices which are placed between L1 and N may be divided into two basic groups. The lamp in Figure 1 is a potential device (load) and is current-consuming. The next step is to install a switch which will control the potential device.

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Figure 2 illustrates a lamp on the first line and a lamp and a switch on the second. When a proper power source is applied the lamp on the first line will light, yet the lamp on the second line will not light until force is applied to close the switch. When force is applied, electrical power will flow and the lamp will light.

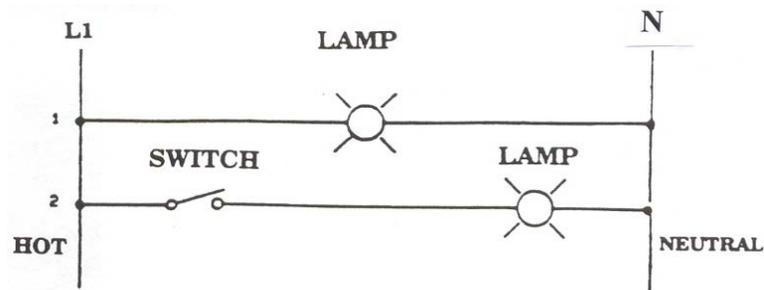


FIGURE 2

As shown in Figure 2, more than one potential device such as a lamp may be placed between L1 and L2. However, an important thing to note is that each lamp is connected from L1 to N by a separate line or wire. It is not usual to find more than one potential device in a single circuit. A circuit or line usually has only one potential device but may have as many switches as are required to control that potential device.

As mentioned previously, current flow from L1 to N or left to right, therefore drawings should always be read in this manner. Switches should always be to the left of all potential devices so that the switch may control the flow of electricity to the devices.

Ladder diagrams are drawn without any applied operating force or without any electrical power flowing. This is commonly denoted as being in a de-energized state. This means that all lines and symbols are shown without voltage being applied.

Figure 2 also shows line numbers which are the numbers placed to the left of the diagram. Each number is normally placed to the left of each horizontal line or rung. This is done for reference only in order to easily identify or find a device within the diagram.