

MEASURE 10.4.1 Install power switching that prevents unnecessary operation of standby equipment.



In many systems, standby components are installed for the sake of reliability. This practice can waste energy if it allows duplicate units to be operated unnecessarily. For example, this often occurs with spare pumps because operators are not sure of how many pumps to operate.

There is a simple and reliable way to prevent this problem: connect power to the equipment so that only the proper number of units can receive power simultaneously. Where only two units of equipment are installed, a transfer switch is the simplest way of achieving this. Where more than two units are installed, a rotary switch is the simplest approach.

The only caution is to be sure that no conditions may arise that require the standby unit to operate along with the other units.

Method for Two Units: Transfer Switch

Where equipment is installed in pairs, you prevent operation of both units by providing power to the pair through a transfer switch. A transfer switch routes power to one unit or the other, but not to both.

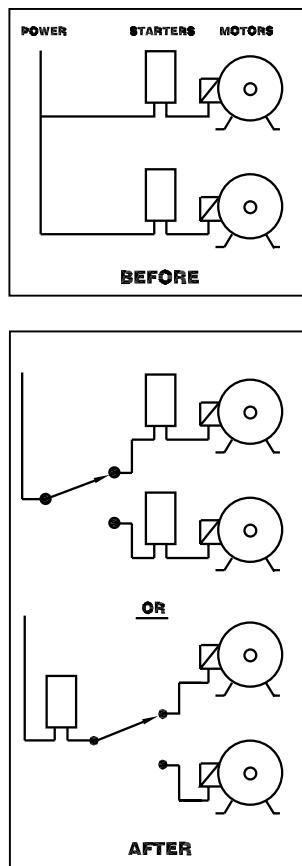


Fig. 1 How to install a transfer switch

SUMMARY

Simple, foolproof methods of preventing unnecessary operation of standby equipment.

SELECTION SCORECARD

Savings Potential	\$	\$	\$
Rate of Return, New Facilities	%	%	%
Rate of Return, Retrofit	%	%	%
Reliability	✓	✓	✓
Ease of Retrofit	😊	😊	😊

Figure 1 shows how a transfer switch is wired. Typically, an ordinary double-throw knife switch suffices for this purpose. The switch is inexpensive, and installation is routine.

In new construction, this method can save the cost of one starter and/or one set of circuit protection equipment. Only one motor can operate at a time, so you need only one set of this equipment.

Method for More Than Two Units: Rotary Switch

If more than two identical units are installed, and one is intended to be a spare, you can use a rotary switch to deny power to any one of the units. The rotary switch feeds power to all the units except one, the unpowered unit being selected by the position of the switch. Figure 2 shows how to install the rotary switch.

You can use a rotary switch even in applications where the controlled units are not operating in parallel. For example, a chiller plant has two chillers and three chilled water pumps. One of the pumps is connected to the first chiller, while another pump is connected to the second chiller. An identical third pump is connected between the first two pumps for use as a spare. The rotary switch keeps this pump from running. If one of the first two pumps fails, valve positions are changed to allow the third pump to substitute for it. Then, the rotary switch is simply turned to remove power from the defective pump.

If you cannot find an appropriate rotary switch in stock, you can order a custom switch at modest cost from a number of manufacturers. If the equipment requires too much current for an available rotary switch to handle directly, use a rotary switch to control each unit through a relay.

■ Rotary Switch Limitations

The rotary switch removes only one unit from operation. It cannot prevent waste of energy from unnecessary operation of the remaining units. For example, consider a chiller system having four chilled water pumps, one of which is a spare. The rotary switch ensures that only three of the pumps are operated. However, the system may need only one or two pumps when the cooling load is low. In this situation, you need different methods to avoid wasting pump power. Refer to the Measures dealing with the specific type of system.

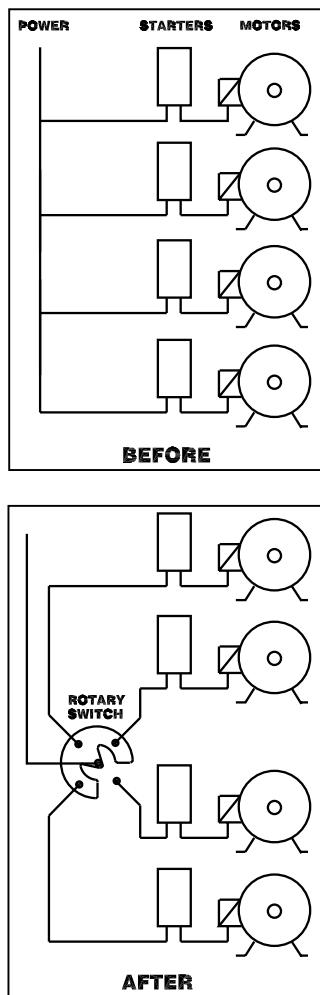


Fig. 2 How to install a rotary switch

Do not install a rotary switch in addition to automatic controls that control the running of equipment. For example, a battery of pumps may be installed to provide service water pressure, and the number operating may be controlled automatically in response to the water demand. In such cases, a rotary switch would complicate the control installation without doing much to reduce the possibility of energy waste.

Automatic Switching

These switching functions do not have to be manual. They can be performed automatically if you install appropriate control devices. Automatic switching is desirable in high-reliability and unmanned installations. For switching power between two units, you can use a simple solenoid-actuated transfer switch. For switching power between more than two units, you need a more complex set of relays. Or, you can program an energy management computer for this purpose.

ECONOMICS

SAVINGS POTENTIAL: *All the cost of operating standby equipment unnecessarily, including excess energy and maintenance.*

COST: *The switches are relatively inexpensive, costing a few dollars to several hundred dollars, depending mainly on their current capacity. In designing new facilities, this modification costs little or nothing. In retrofit, the installation cost may range from several hundred to several thousand dollars, depending on the amount of rewiring needed.*

PAYBACK PERIOD: *Less than one year, to many years, depending on the power consumption of the equipment and the likelihood that someone will operate the units unnecessarily.*

TRAPS & TRICKS

EXPLAIN IT: *Install a placard on the power switch to tell the staff how to use it. Do this for both manual and automatic switches. See Reference Note 12, Placards, for tips on installing effective placards.*

