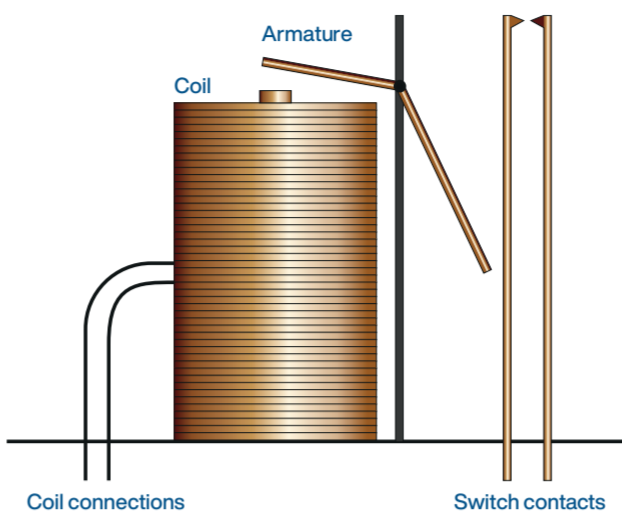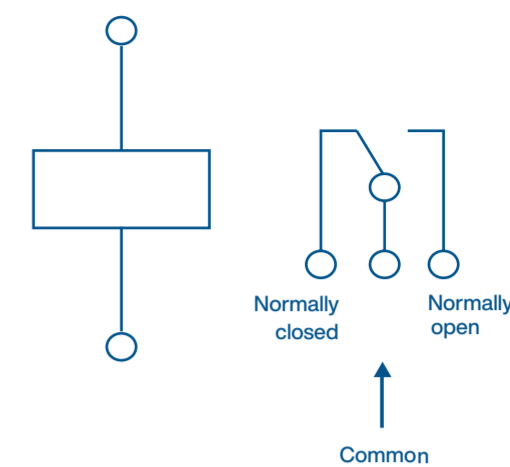# Relays Reference Guide

Relays

Relays are electrically operated switches. A low-voltage, low-current control signal is used to operate a set of contacts that quickly and safely switch larger voltages and currents. Traditionally, the control signal energises an electromagnet to open or close the contacts. Solid-state relays using semiconductor technology for the control and switching functions are also available.
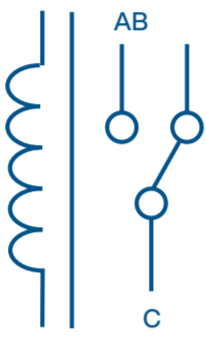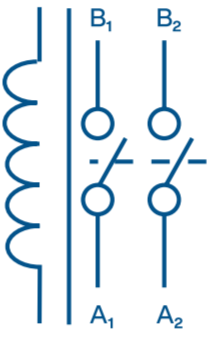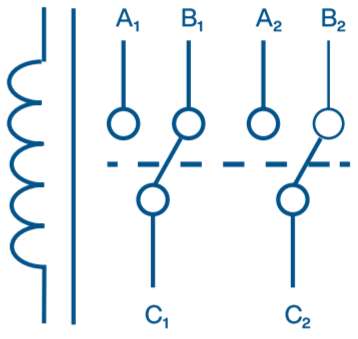
Basic functional diagram
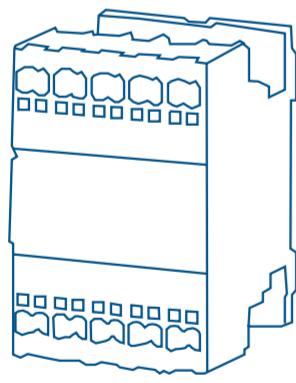
Basic circuit symbol

Basic relay contact forms

SPST

Single-Pole
Single-Throw

NO: Normally open („make")
NC: Normally closed („break")

Two terminals which can be connected or disconnected.

SPDT

Single-Pole
Double-Throw

CO: Change-Over („break before make")

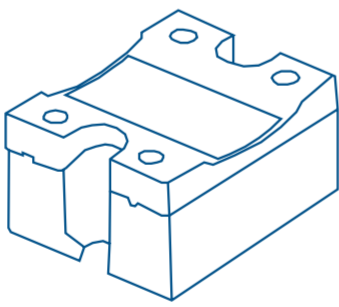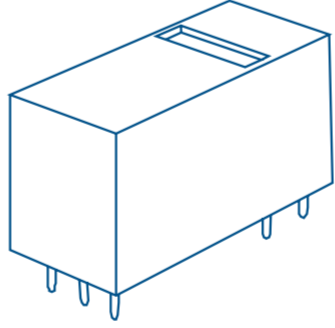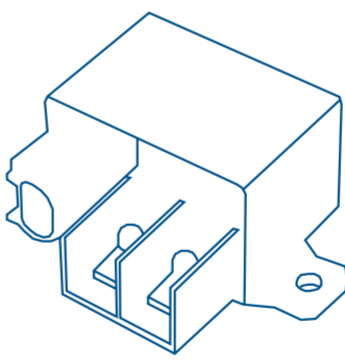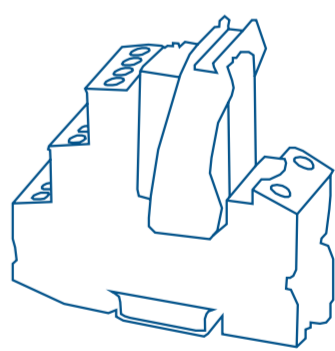A common terminal connects to either of two others, never connecting to both at the same time.

DPST

Double-Pole
Single-Throw

Equivalent to a pair of SPST switches or relays actuated by a single coil.

DPDT

Double-Pole
Double-Throw

Equivalent to two SPDT switches or relays actuated by a single coil

Common relay types

Contactor

A special case of relay designed to safely switch high-current loads such as electric motors. Fast operating speed minmises arcing caused by the load.

Solid-State Relay

Similar to an electromechanical relay but has no moving parts instead using optical or electronic means to switch the load. Care needed when used with AC.

Latching relay

Maintains either contact position indefinitely without power applied to the coil. Consumes power only for an instant while the relay is being switched.

Automotive Relay

Robust relays working with 12V or 24V. Starter relay controls the high current of the cranking motor by small wiring and contacts in the ignition key.

AC relay

Three basic types:
1) DC relay with rectifier
2) Phase relay with 2 coils on separate cores
3) Split-pole relay uses a short-cut coil. The induced short-cut current is out-of-phase to the control current.