# Contactor and relay

## Contactor:

**The contactor consists of a coil , main contacts and auxiliary contacts . The main contacts is always normally open while the auxiliary contacts may be normally open or closed .**

**The main contacts is closed to complete the circuit to the load , while auxiliary contacts used to control the operation of other device .**

**The operation of contactor is based on electromagnetism . When coil section of contactor is energized , an electromagnetic field causes an assembly within the contactor to pull down allowing the voltage to bridge across the main contact points . The most common type of contactor used in air conditioning systems is a contactor whose coil operated on 24 volt .**

**Contactor may be single , two or three phase depending on the application and type of equipments .**

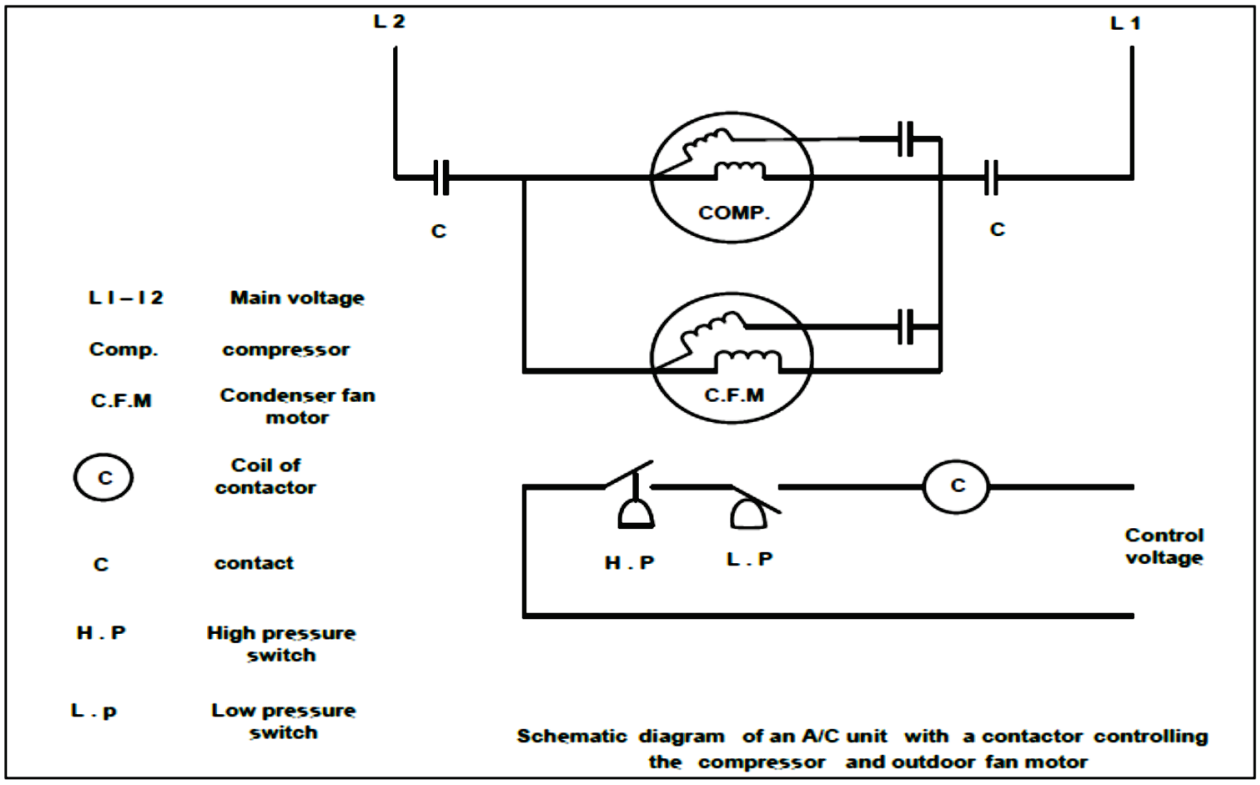
## Why contactor fail ?

1. **A break may occur in the coil wiring , resulting in an open coil that cannot**

**provide a magnetic field to operate the armature**

2. **A coil may become shorted .**
3. **The contact points may become badly burnt due to repeated arcing that occur naturally when the contactor makes a circuit to a load .**
4. **Insufficient voltage may be applied to contactor coil due to a poor connection somewhere in the low voltage circuit or due to incorrect voltage applied to the primary of transformer . If the correct voltage is not applied to the transformer primary , it can not deliver the correct voltage from its secondary winding.**

**The figure below shows a schematic diagram of air condition unit with a contactor controlling the compressor and outdoor fan motor .**




Schematic diagram of an A/C unit with a contactor controlling the compressor and outdoor fan motor

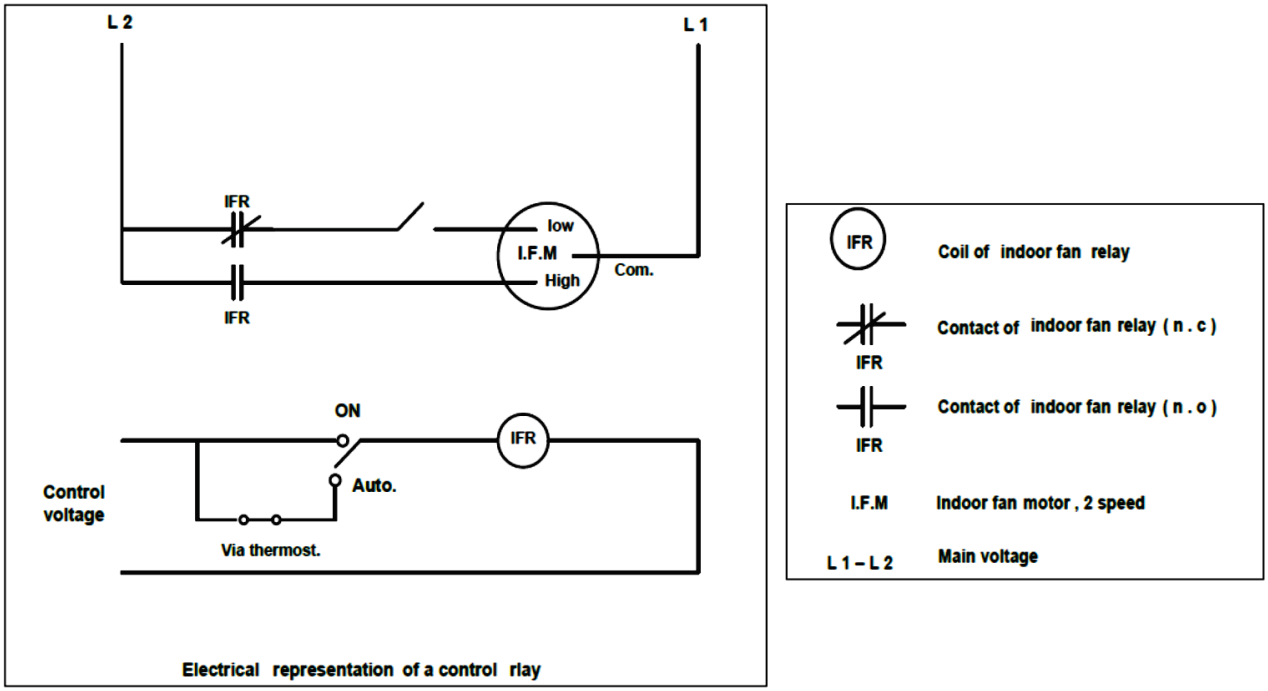
# Relay

**A relay operates in the same manner as a contactor . Its coil is energized through the control circuit to control another circuit to a load .**

**While the main contacts on a contactor are always normally open and are closed when the coil energized , a relay will commonly have both normally open and normally closed contacts . Therefore a relay can simultaneously control two separate circuits , making one when the coil energized and the other when the coil de energized .**

**A relay may be used to control a multi – speed fan motor in a combination heating / cooling unit . The indoor fan motor runs on a lower speed for heating mode and a higher speed for the cooling mode**

**Figure below illustrated a relay controlled a multi – speed fan motor .**




Electrical representation of a control rlay

## Time delay relay :

**It is used in several applications . It can be used to create a delay before the fan in gas furnace start . It also used to protect compressor in the event of a short – term power outage , it will not allow the compressor to restart until the control voltage has been restored .**

## Sequencer :

**Like a time delay relay , a sequencer prevents a load from being energized until a specified time has occurred . The sequencer differs from a relay in that it may control two or more loads in a sequence such as the heating elements in electrical furnace .**

## Magnetic starter :

**It consists of a contactor and overload protection . Magnetic starters are used in a large commercial refrigeration equipments that operates on three phase power . Most starters are equipped with a manual reset .**

**The figure below illustrated a schematic diagram of magnetic starter .**