

# PROTECTION & SWITCHGEAR ENGINEERING

## MODULE 1

### SUBSTATION EQUIPMENT

# SWITCHING DEVICES (Isolators, Earthing Switch, Contactors)

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# Introduction

## □ Isolators & Earthing Switch

i) Definition

ii) Construction

iii) Pantograph isolators

iv) Ratings

## □ Contactors

i) Working Principle

ii) Terms & definitions

iii) Contactor as motor

iv) Rated Characteristics

# Isolators/Disconnecting Switch

- ❑ Used in addition with Circuit Breaker
- ❑ In power system three pole isolator is used
- ❑ Opening Operation
- ❑ Isolators with electrical interlocking

# Pantograph Isolator

- ❑ Opening operation
- ❑ Closing Operation
- ❑ Covers Less Floor area



# Ratings of Isolators

□ An isolator may be constructed single pole or three poles and shall be rated in terms of:

1 – **Voltage** (3, 6, 7.2, 12, 24, 36, 72.5, 123, 145, 245, 300 and 420 kV)

2 – **Frequency** (Rated frequency should be 50 Hz in India)

3 - **Normal current** (for Disconnector only) 200 A, 400 A, 630 A (alternatively 800 Amps), 1250 A, 1600 A, 2000 A, 2500 A, 3150 A, 5000 A and 4000 A.

4 - **Short time withstand current** (8, 10, 12.5, 16, 20, 25, 31.5, 40, 50, 63, 80 or 100 KA).

# Earthing Switch

- Earth switches used in substation . in that when isolator OPEN condition earth switch is CLOSED. here any induction that passes through earth switch to ground. when isolator in CLOSED condition Earth switch should be Open



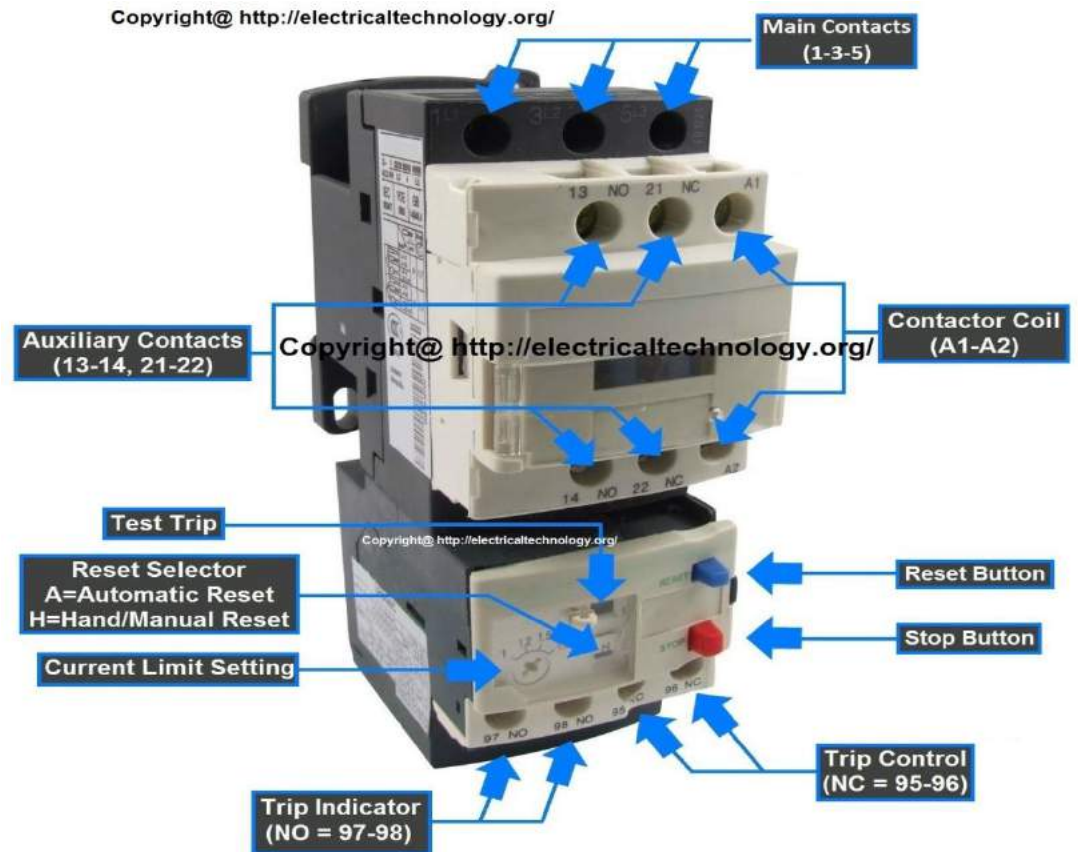


# CONTACTORS

❑ Switching Device operating under normal as well as overload conditions

❑ Differ from C.B

❑ Usually intended to operate at more frequency

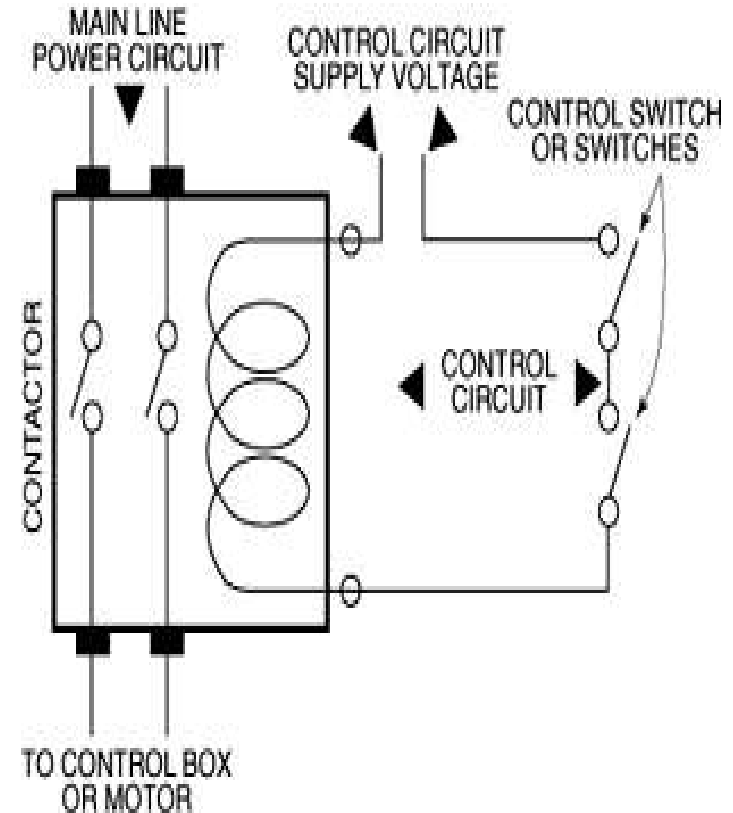


## Magnetic Contactor

# TERMS & DEFINITIONS

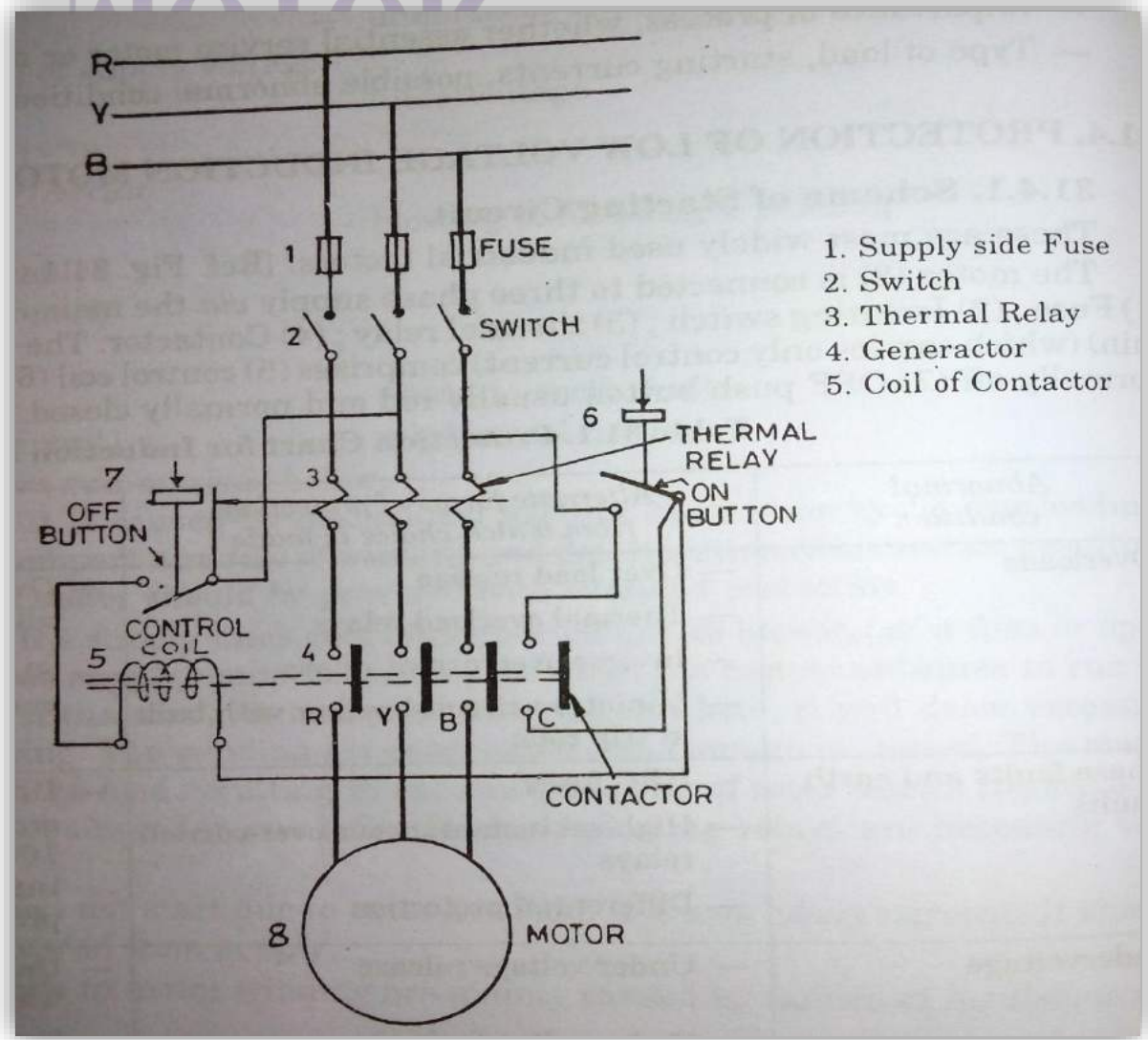
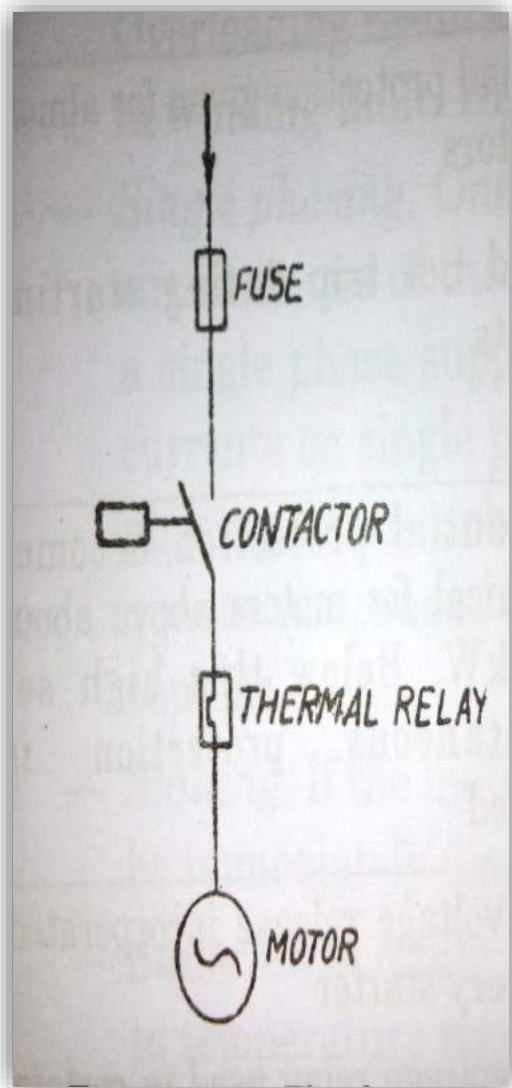
□ Contactor have Main Circuit & Control Circuit

□ Electromagnetic contactor, Electro-pneumatic contactor





# CONTACTOR AS STARTER FOR MOTOR



Fuse provided for S.C protection

Magnetic Contactor Starter

# RATED CHARACTERISTICS

- ❑ Type [Electromagnetic, Electro-pneumatic]
- ❑ Interruption medium[air,oil,SF6 gas,vacuum]
- ❑ Rated Voltage & Current
- ❑ Rated duty & Service conditions
  - 8 hours duty, Uninterrupted duty, Intermittent duty
  - Making capacity
  - Breaking capacity





**Thank You**