

CONTACTORS IN ELECTRICAL SYSTEMS

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**OPERATION, CONSTRUCTION,
AND APPLICATIONS**

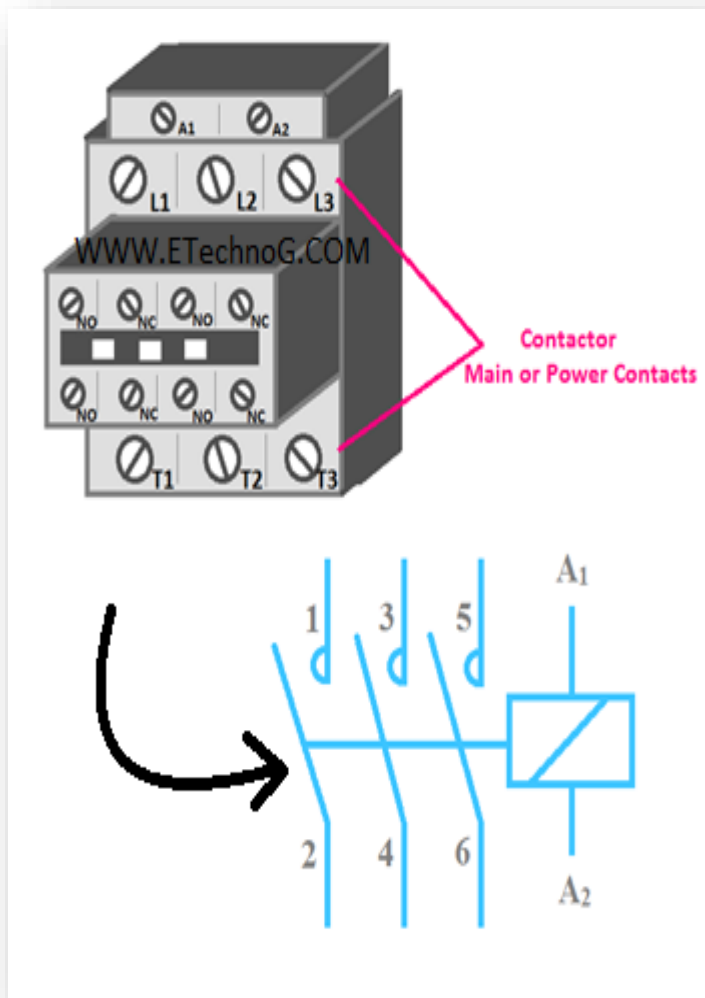
CONTENT

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- Contactor Ratings
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WHAT IS A CONTACTOR?

- A contactor is a mechanical switching device capable of making, carrying & breaking electric current under normal circuit conditions, including operating overload conditions.
- It consists of a coil that opens or closes a set of contacts due to the magnetic attraction created by the coil when it is energized.
- A backup HRC fuse always backs contactors for short-circuit protection.
- It has a main circuit and a control circuit. It is used to control an electric load in a control system.

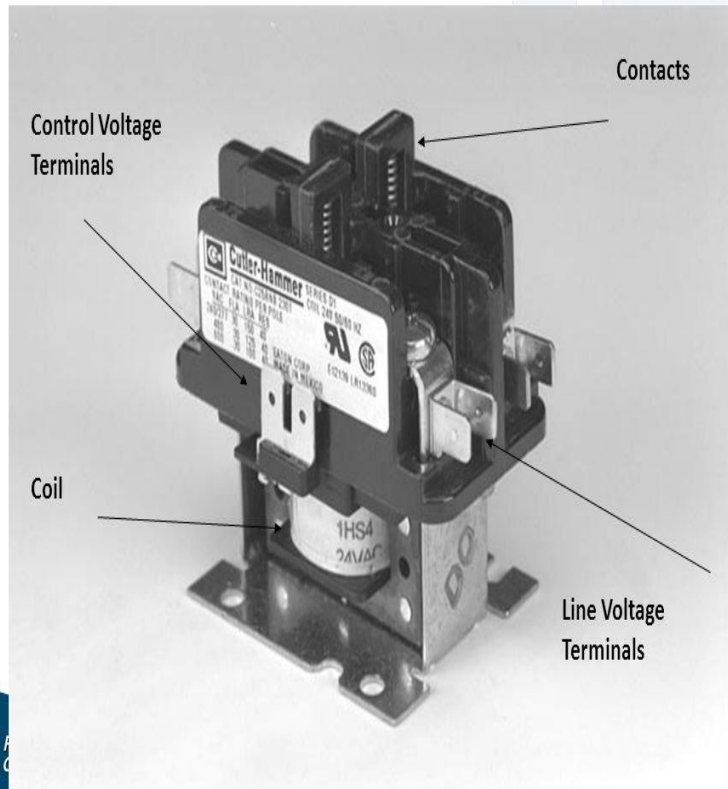
INTERNAL CONSTRUCTION & PARTS



- **Electromagnet:** Provides the initial force to pull and close the contacts.
- **Enclosure (Frame):** Both the electromagnet and contacts are housed inside an insulating frame.

Parts of a contactor

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- **Insulation:** The frame material completely insulates the internal contacts, preventing accidental touches and short circuits.
- **Open-Frame Designs:** Used in high-end contactors to provide extra protection against oil, dust, weather, and explosions.

OPERATING PRINCIPLE & WORKING MECHANISM

- **Energization:** Passing current through the control coil excites the electromagnet, creating a magnetic field.
- **Action:** This magnetic flux pulls the contactor core (armature), closing the gap between fixed and moving contacts.
- **Power Flow:** The circuit is completed, allowing heavy current to flow directly to the load.
- **De-energization:** When control current is removed, the coil de-energizes, a spring pushes the contacts apart, and the circuit opens rapidly.

RATINGS OF CONTACTOR

Type:	1. Electro-magnetic 2. Electro-pneumatic
Interrupting medium:	1. Air 2. Oil 3. SF6 gas 4. Vacuum
Rated voltage:	1. Rated operational voltage 2. Rated insulation voltage
Rated current:	1. Rated thermal current 2. Rated operational current
Rated duty and service condition:	1. Eight-hour duty 2. Uninterrupted duty 3. Intermittent duty

TYPES OF CONTACTORS

- **Auxiliary Contactor:** A low-power relay built into a contactor frame, used strictly to connect/disconnect control circuits.
- **Power Contactor:** The main heavy-duty switch, capable of handling large loads up to 600A for motors and heavy machinery
- **Mini contactor:** The flattest contactors on the market, ideal for compact, modular applications where space is limited.
- **Vacuum contactor:** Uses vacuum interrupters to break contacts; highly reliable for industrial and service sector apparatus.

ADVANTAGES & DISADVANTAGES

Advantages	Disadvantages
• Highly safe and reliable for control circuits. • Extremely fast switching operation. • One contactor switch can control multiple circuits. • Works efficiently with both AC and DC devices.	• Coil may burn out in the absence of a strong magnetic field. • Internal components can corrode or age when exposed to moisture. • Requires physical space in the panel compared to solid-state devices.

DIFFERENCE BETWEEN RELAY & CONTACTOR

Feature	Relay	Contactor
✓ Primary Use	→ Low voltage, low amperage control circuits.	→ High voltage, high current power switching
✓ Load Types	→ Small components, indicator lights, alarms.	→ Heavy loads like induction motors, lighting banks, heaters.
✓ Physical Size	→ Comparatively small and lightweight	→ Much larger and heavier to handle arcing.
✓ Classification	→ Similar to an auxiliary contactor.	→ Classified as power or auxiliary contactors.

THANK YOU

**Any Questions? Contact me through this
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