

Lesson 15: Dc Motor Control Components and Diagrams

ET 332a

Dc Motors, Generators and Energy Conversion
Devices

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Learning Objectives

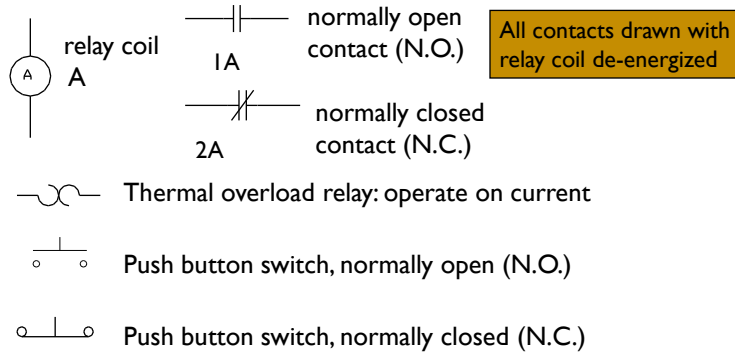
- Identify the schematic symbols of basic electromechanical components used in motor control
- Interpret the control logic of motor control diagrams
- Explain how simple industrial motor starters operate
- Identify the initial condition of schematic symbols in a motor control diagram

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Basic Control Diagram Symbols

Motor control diagrams consist of electromechanical relays and contacts



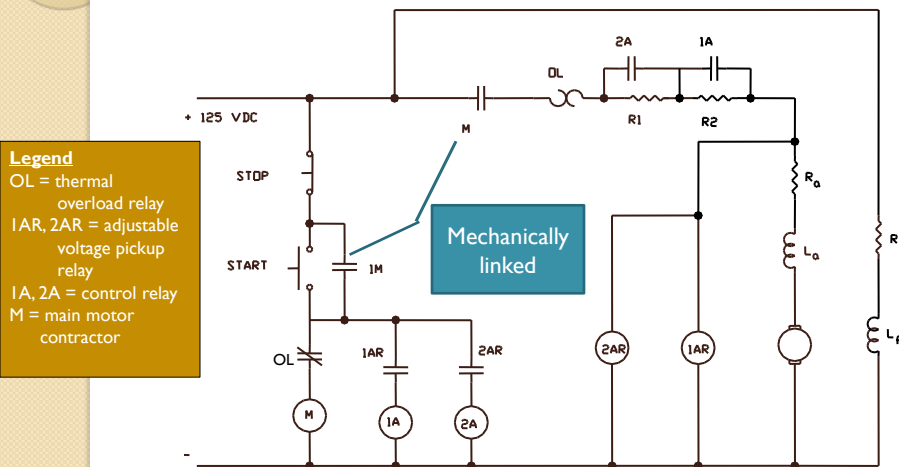
These are the basic symbols of motor control diagrams. Motor control relays can be energized from the same supply as the motor or from lower voltage sources that are interlocked with the main power supply. The interlock de-energizes all power to the motor and control for safety. The symbols above are combined into diagrams called ladder diagrams.

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Simplifies Practical Motor Starters

Multiple steps for starting resistors. On-off control thermal overload protection. Note: starting resistors are shorted out not switched as previously shown. Start-stop provided by push button control.



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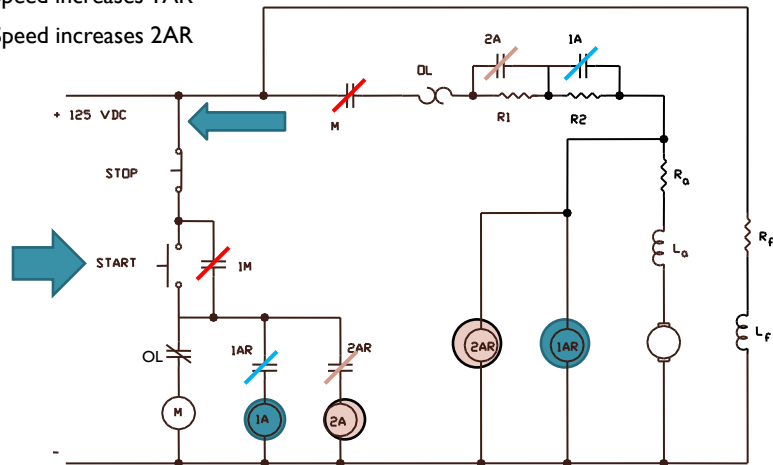
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Simplifies Practical Motor Starters

Start sequence

Speed increases 1AR

Speed increases 2AR

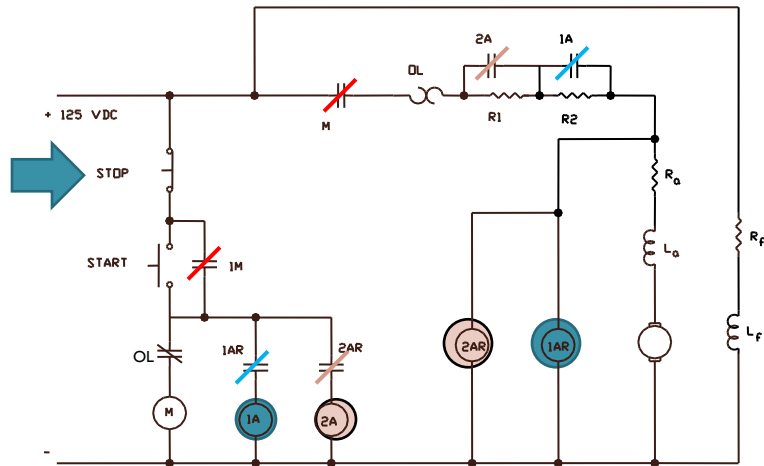


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Simplifies Practical Motor Starters

Stop Sequence



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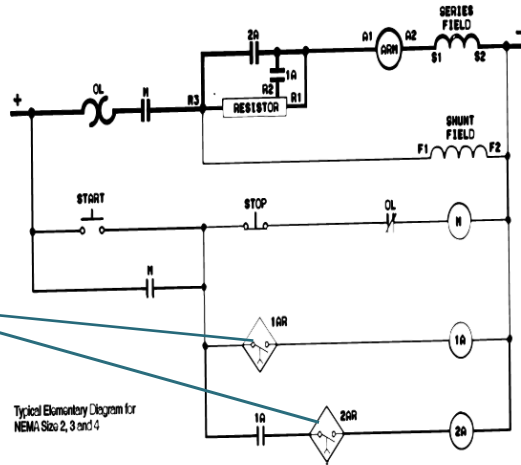
Industrial Dc Motor Starters

Control and Power Schematic Diagram

Heavy Line indicate power wiring. Light weight lines indicate control circuits

Timed Contacts

Timed contact close after preset delay



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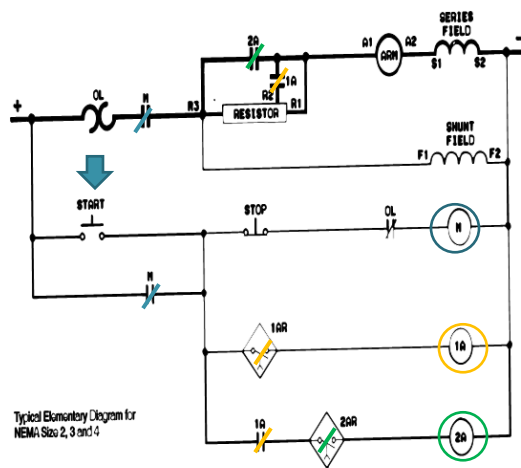
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Industrial Dc Motor Starters

Start Sequence

- Press start switch
- 1AR time out
- 2AR time out

Starting resistor shorted out and motor connected directly to dc source



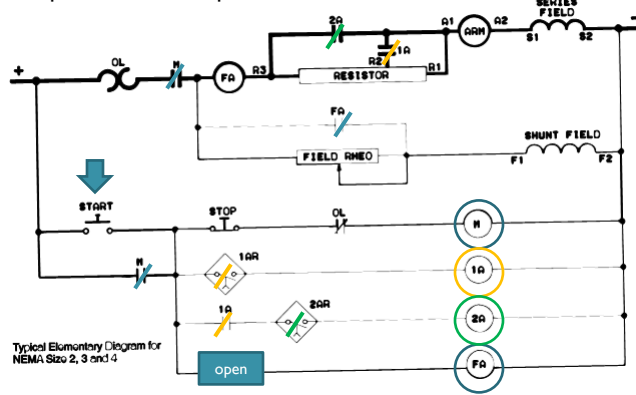
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Industrial Dc Motor Starters

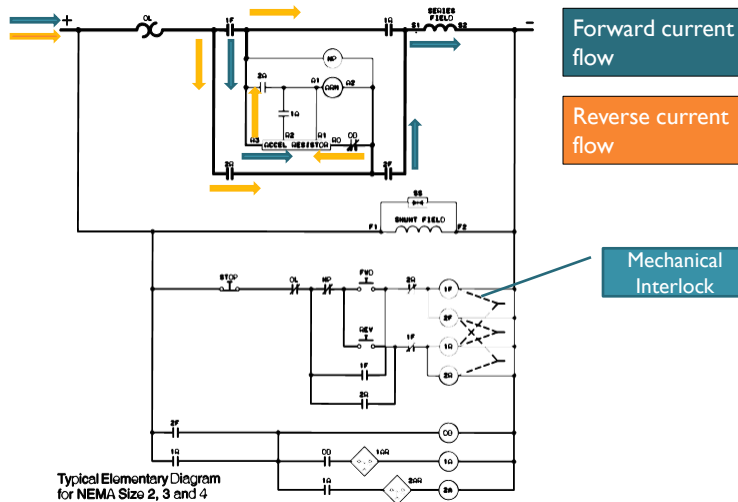
Adjustable speed DC starter

Start sequence similar to previous scheme



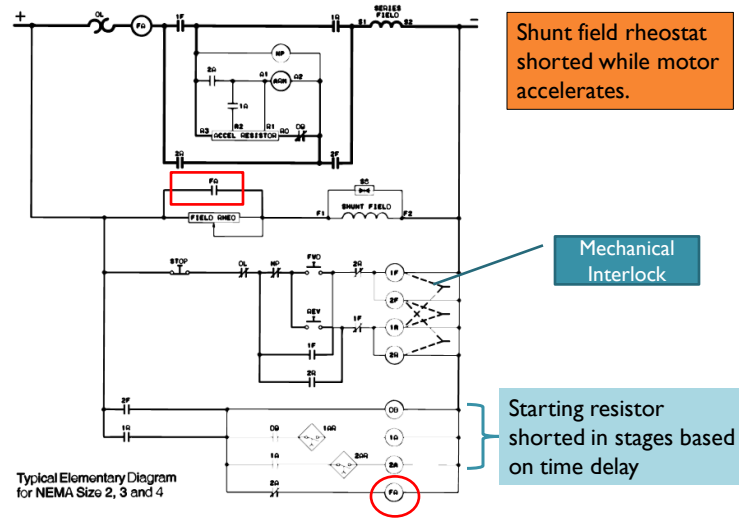
Note: that the field rheostat is shorted out by contact FA while the motor is starting. Motor will accelerate to running speed with full field current applied.

Reversing Industrial Motor Starter



Typical Elementary Diagram for NEMA Size 2, 3 and 4

Reversing Starter With Speed Control

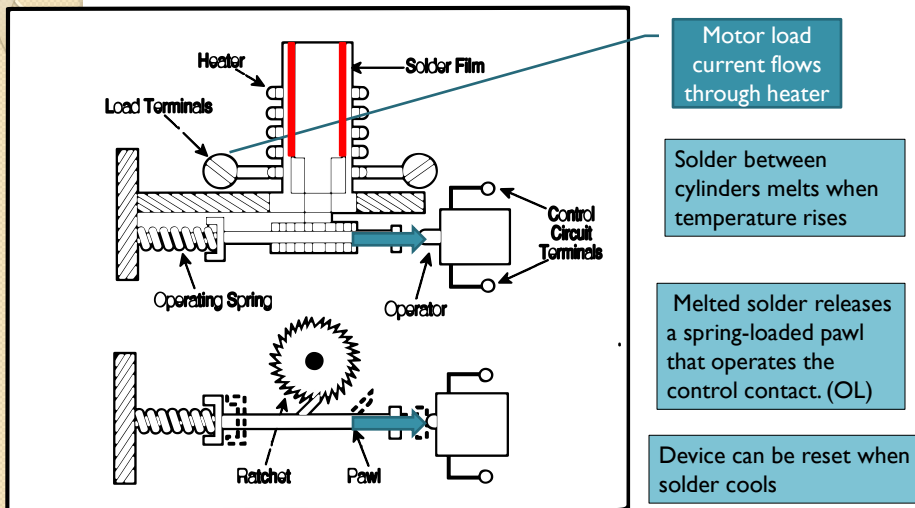


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Overload Relay Construction

Eutectic-alloy (Solder-pot) thermal overload relay mechanical details.



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 **END LESSON 15**