

SECTION 16420 - MOTOR CONTROLLERS

PART 1 - GENERAL

SUMMARY

Section Includes: Types of motor controllers, including:

1. Reversing drum switches.
2. Combination controllers.
3. Solid-state reduced voltage controllers.
4. Fractional HP manual controllers.
5. Autotransformer reduced voltage.
6. Wye-delta.
7. Part winding.

SUBMITTALS

Shop Drawings: Submit Shop Drawings of motor controllers showing dimensions and sizes

Product Data: Submit manufacturer's data and installation instructions on motor controllers.

Wiring Diagrams: Submit power and control wiring diagrams for motor controllers

QUALITY ASSURANCE

Codes and Standards:

1. UL Compliance: Comply with applicable requirements of UL 486A and B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL listed and labeled.
2. NEMA Compliance: Comply with applicable requirements of NEMA Standards ICS 2, "Industrial Control Devices, Controllers and Assemblies," and Pub No. 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)," pertaining to motor controllers and enclosures.

PART 2 - PRODUCTS

MANUFACTURERS

Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Allen-Bradley Co.
2. Crouse-Hinds Co.
3. Cutler-Hammer Products/Eaton Corp.
4. Emotron.
5. Furnas Electric Co.
6. General Electric Co.
7. Siemens, Inc.
8. Square D Company.

MOTOR CONTROLLERS

Except as otherwise indicated, provide motor controllers and ancillary components which comply with manufacturer's standard materials, design, and construction in accordance with published product information and as required for a complete installation.

Reversing Drum Switches: Capable of starting and reversing squirrel cage and single-phase motors which are designed for reversing service, and direct-current shunt and compound wound motors, of types, sizes, ratings, and NEMA size drums indicated. Equip with non-spring return (non-self-centering) construction, and with type interlock which provides low-voltage protection, and requires that drum return to OFF position after voltage failures. Equip switches with ball lever operating handles, and with NEMA Type 4 enclosure; coat with manufacturer's standard color finish.

Combination Controllers: Consist of controller and circuit breaker or fusible disconnect switch mounted in common enclosure of types, sizes, ratings, and NEMA sizes indicated. Equip starters with block-type manual reset overload relays. Provide control and pilot devices indicated. Provide 90 degree C SIS or MTW, No. 14 AWG control wiring, tagged at each termination. Provide operating handle for disconnect switch mechanism with indication and control of switch position, with enclosure door either opened or closed, and capable of being locked in OFF position with 3 padlocks. Construct and mount controllers and disconnect switches in single NEMA-type enclosure suitable for the location in which it is installed; coat with manufacturer's standard color finish.

1. The 3-phase starter may be the following types:
 - a. Full Voltage Non-reversing (FVNR): One 3-pole magnetic contactor with a set of 3 overload devices.
 - b. Full Voltage Reversing (FVR): Two 3-pole magnetic contactors with a common set of 3 overload devices.
 - c. Two-speed (for two winding motor): Two, 3-pole magnetic contactors, each with its own set of 3 overload devices.
 - d. Two-speed (for single winding motor): Two magnetic contactors, a 5-pole for high speed, and a 3-pole for low speed, each with its own set of 3 overload devices.
 - e. Reduced Voltage (for wye-connected part winding motors): Two 3-pole magnetic contactors, each with its own set of 3 overload devices and a timer for closing of the running contactor. Running contactor shall be sized for motor full load current, and starting (half-winding) contactor shall be sized for at least 75 percent of the full load current and shall be capable of interrupting at least 10 times full load current.
 - f. Reduced Voltage (closed transition autotransformer type): Three magnetic contactors, two 2-pole and one 3-pole with a common set of 3 overloads, a timing relay and an autotransformer with taps at 50, 65, 80, and 100 percent, and an integral temperature switch or timing relay to protect transformer windings.

Solid-State Reduced Voltage Controllers: Provide 3-phase, solid-state, reduced voltage motor controllers of sizes and ratings indicated.

1. The controller shall be microprocessor-based and shall provide as a minimum the following modes of operation.
 - a. Soft start with selectable kick-start.
 - b. Soft stop.
 - c. Current limit.
 - d. Full voltage.
2. The controller shall be self-calibrating and shall automatically adjust itself for line voltage, frequency and current fluctuations. It shall have adjustable starting acceleration and stopping deceleration. Provide transient protection for all controllers furnished.

Control and Pilot Devices: Provide an individually fused control power transformer in each starter unit. Provide 2 fuses in the transformer primary circuit and 1 in transformer secondary circuit. Size transformers such that they can supply 100VA in excess of the unit requirements or provide 150VA rated transformer, whichever is greater. Provide 300 volt rated, oiltight type, LED pilot lights, push buttons with extended guard and black color insert. Equip stop push buttons with half guard and red color insert. Provide 120/6 volt transformer type push-to-test, LED pilot lights with lens color indicated. Provide machine tool type relays, each with 1 spare N.O. contact. Provide 6-digit elapsed time indicators with one-tenth hour increments. When timers are required, they shall be synchronous type. Control and pilot devices shall have "finger-safe terminals".

Fractional HP Manual Controllers: Provide 3-phase and single-phase fractional horsepower manual motor controllers, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms, and with one-piece melting alloy type thermal units. Controller shall become inoperative when thermal unit is removed. Provide controllers with double-break silver alloy contacts, visible from both sides of controller, and switch capable of being padlocked-OFF. Enclose controller unit in NEMA-type enclosure suitable for the location in which it is installed; coat with manufacturer's standard color finish.

PART 3 - EXECUTION

NOT USED

END OF SECTION 16420