

SECTION 16483 MOTOR CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Manual motor starters.
 - 2. Magnetic motor starters.
 - 3. Combination motor starters.
 - 4. Motor starter panelboards.
- B. Related Sections
 - 1. Section 16191, Supporting Devices
 - 2. Section 16196, Electrical Identification
 - 3. Section 16450, Grounding

1.3 REFERENCES

- A. Federal Specifications (FS)
 - 1. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
 - 2. FS W-P-115, Power Distribution Panel.
- B. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA AB 1-93, Molded Case Circuit Breakers and Molded Case Switches.
 - 2. NEMA ICS 2-93, Industrial Control and Systems Controllers, Contractors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC.
 - 3. NEMA ICS 6-93, Industrial Control and Systems Enclosures.
 - 4. NEMA KS 1-96, Enclosed and Miscellaneous Distribution Equipment Switches (600 V Max).
 - 5. NEMA PB 1-95, Panelboards.
 - 6. NEMA PB 1.1-91, General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
- C. Underwriters Laboratory (UL)
 - 1. UL 98-94, UL Standard for Safety Enclosed and Dead-Front Switches.
 - 2. UL 198C-86, UL Standard for Safety High-Interrupting Capacity Fuses; Current-Limiting Types.
 - 3. UL 198E-88, UL Standard for Safety Class R Fuses.
 - 4. UL 512-93, UL Standard for Safety Fuseholders.

1.4 SUBMITTALS

- A. Products furnished from listed manufacturers are pre-approved but still require submittal.
- B. Submit proposed substitutions for approval in accordance with General and Supplementary Conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space.
- B. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle in accordance with manufacturer's written instructions.
- D. Lift only with lugs provided for the purpose.

1.6 SPARE PARTS

- A. Keys: Furnish two each.
- B. Fuses: Furnish three spare fuses of each type and rating installed.
- C. Fuse Pullers: Furnish one fuse puller.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

- A. Allen-Bradley.
- B. Cutler Hammer/Westinghouse.
- C. General Electric.
- D. Seimens.
- E. Square D.

2.2 MANUAL MOTOR STARTERS

- A. Manual Motor Starter: NEMA ICS 2; three pole, alternating current general-purpose Class A manually operated nonreversing full-voltage controller for induction motors rated in horsepower, with overload relay, low voltage protection, red LED pilot light, (NO) (NC) auxiliary contact, push button operator.
- B. Fractional Horsepower Manual Starter: NEMA ICS 2, alternating current general-purpose Class A manually operated two pole, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red LED pilot light, and toggle operator.
- C. Motor Starting Switch: NEMA ICS 2, alternating current general-purpose Class A manually operated two pole, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, low voltage protection, red LED pilot light, push button operator.
- D. Enclosure: ANSI/NEMA ICS 6; Type 1, unless otherwise shown.

2.3 COMBINATION MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: NEMA ICS 2; alternating current general-purpose Class A magnetic controller for induction motors rated in horsepower; 600 V combination type with fused disconnect.

- B. Full Voltage Starting: Nonreversing type.
- C. Reduced Voltage Starting: Auto-transformer type with closed-circuit transition and circuit breaker or fused disconnect (as specified).
- D. Coil Operating Voltage: 120 V, 60 Hz.
- E. Size: NEMA ICS 2; size as shown.
- F. Overload Relay: NEMA ICS 2, bimetal.
- G. Three-Phase Motors: Magnetic Starters equipped with three thermal overload relays for overload protection.
- H. Enclosure: NEMA ICS 6; Type 1, unless otherwise shown.

2.4 CONTROL DEVICES

- A. Auxiliary Contacts: NEMA ICS 2, two field convertible contacts in addition to seal-in contact.
- B. Pushbuttons: NEMA ICS 2, heavy duty, oil-tight, START/STOP in front cover.
- C. Indicating Lights: NEMA ICS 2, heavy duty, oil-tight LED type, RUN: red in front cover.
- D. Selector Switches: NEMA ICS 2, heavy duty, oil-tight HAND/OFF/AUTO in front cover.
- E. Provide individual units with standard size legend plates; Markings on plates in accordance with drawings.
- F. Relays: NEMA ICS 2, 120-V, 60-Hz coils with convertible contacts, rated 0 A at 600 V, unless otherwise noted.
- G. Control Power Transformers: 120 V secondary, 100 VA minimum, in each motor starter.
 - 1. Fuse X1 terminal of control transformer secondary;
 - 2. Ground X2 terminal of control transformer secondary.

2.5 COMBINATION STARTER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

- A. Construction: operable by hand from outside enclosure and interlocked with door such that it must be turned in "Off" position before door can be opened.
 - 1. Include a semi-secret device to permit qualified personnel to open enclosure with breaker closed.
 - 2. Operating handle: lockable in "OFF" position.
- B. Molded Case Thermal-Magnetic Circuit Breakers: NEMA AB 1, FS W-C-375, circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
- C. Motor Circuit Protector: NEMA AB 1, FS W-C-375, circuitbreakers with integral instantaneous magnetic trip in each pole.
- D. Nonfusible Switch Assemblies: NEMA KS 1, UL 98, quick-make, quick-break, load interrupter enclosed knife switch.
- E. Fusible Switch Assemblies: NEMA KS 1, UL 98, quick-make, quick-break, load interrupter enclosed knife switch. Fuse Clips: UL 512. Designed to accommodate Class (J) fuses.

2.6 ACCEPTABLE MANUFACTURERS - MOTOR STARTER PANELBOARD

- A. Allen Bradley.
- B. Cutler Hammer/Westinghouse.
- C. General Electric.
- D. Siemens.
- E. Square D.

2.7 MOTOR STARTER PANELBOARD

- A. Motor Starter Panelboards: NEMA PB 1, circuit breaker type. FS W-P-115, Type I, Class 1.
- B. Motor Starters: As indicated.
- C. Enclosure: NEMA PB 1, Type 1, unless otherwise shown.
- D. Provide surface cabinet front with concealed trim clamps, screw cover, and hinged door with flush lock.
- E. Finish: manufacturer's standard gray enamel.
- F. Provide motor starter panelboards with copper bus, ratings as shown.
- G. Provide copper ground bus in all motor starter panelboards.
- H. Minimum Integrated Short Circuit Rating: 65,000 A rms symmetrical at 480 V, three phase.

2.8 ACCEPTABLE MANUFACTURERS - FUSES

- A. Bussman.
- B. Gould-Shawmut.
- C. Reliance.

2.9 FUSES

- A. Fuses: ANSI/UL 198C, Class J; ANSI/UL 198E, Class RK1 as indicated; current limiting, one-time fuse, 600 V.
- B. Interrupting Rating: 200,000 A rms.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Motor Starter Panelboard Installation: In conformance with NEMA PB 1.1.
- C. Install fuses in fusible switches.

- D. Select and install heater elements in motor starters to match installed motor characteristics.
- E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.2 FIELD QUALITY CONTROL

- A. Verify wiring connections are tight.
- B. Verify movable contact assembly is not binding and is free to move.
- C. Verify coil voltage is correct.
- D. Verify proper phasing and rotation for connected motor.
- E. Energize starter, measure motor load current and compare to motor nameplate data. Report discrepancies to CM.

END OF SECTION 16483