

SECTION 16480  
MOTOR CONTROL

## PART 1 GENERAL

## 1.1 WORK INCLUDED:

- A. Manual motor starters.
- B. Magnetic motor starters.
- C. Combination magnetic motor starters.
- D. Motor control centers.
- E. Coordinate with Mechanical Section 15170 – Motors. PROVIDED UNDER THIS SECTION.

## 1.2 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.
- C. FS W-P-115 - Power Distribution Panel.
- D. FS W-F-870 - Fuse holders.
- E. FS W-S-865 - Switch, Box, Enclosed, Surface-Mounted.
- F. NEMA AB 1 - Molded Case Circuit Breakers.
- G. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- H. NEMA KS 1 - Enclosed Switches.
- I. NEMA PB 1 - Panelboards.
- J. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less.

## 1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.
- D. Submit manufacturers' instructions under provisions of Section 01300.

## 1.4 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Deliver in 30" maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.
- C. Store and protect products under provisions of Section 01600.
- D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

## 1.6 SPARE PARTS

A. Keys: Furnish two each to Owner.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

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

### 2.2 MANUAL MOTOR STARTERS

- A. Manual Motor Starter: NEMA ICS 2; AC general-purpose Class A manually operated full-voltage controller for induction motors rated in horsepower, with overload relay, red pilot light, auxiliary contact, and push button operator.
- B. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose Class A manually operated, pole, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and key operator.
- C. Motor Starting Switch: NEMA ICS 2; AC general-purpose Class A manually operated pole, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, red pilot light, auxiliary contact, and push button operator.
- D. Enclosure: ANSI/NEMA ICS 6

### 2.3 MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Full Voltage Starting
- C. Reduced Voltage Starting.
- D. Two Speed Starting: With integral time delay transition between FAST and SLOW speeds.
- E. Coil Operating Voltage: 120 volts, 60 Hertz.
- F. Size: NEMA ICS 2; size as shown on Drawings.
- G. Overload Relay: NEMA ICS 2; melting alloy.
- H. Enclosure: NEMA ICS 6
- I. Combination Motor Starters: Combine motor starters with disconnecting means, type as scheduled.
- J. Auxiliary Contacts: NEMA ICS 2; two normally opened and two normally closed contacts in addition to seal-in contact.
- K. Indicating Lights: NEMA ICS 2; RUN: red in front cover.
- L. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO, in front cover.
- M. Relays: NEMA ICS 2
- N. Control Power Transformers: 120 volt secondary, capacity as scheduled.
- O. Provide motor starters with overload heaters sized from nameplate full load amperage for each phase, manually reset.
- P. Motor starters shall be provided with phase failure relay protection. Provide phase failure, under voltage and phase reversal. Automatic reset between 3 to 5 minutes after motor shut down.

### 2.4 CONTROLLER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

- A. Molded Case Thermal-Magnetic Circuit Breakers: NEMA AB\1; circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
- B. Motor Circuit Protector: NEMA AB 1; circuit breakers with integral instantaneous magnetic trip in each pole.
- C. Non-fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed

knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

D. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870.

## 2.5 ACCEPTABLE MANUFACTURERS - MOTOR CONTROL CENTER

- A. Square D.
- B. General Electric.
- C. Cutler Hammer.
- D. Siemens/ITE.
- E. Allen Bradely.

## 2.6 MOTOR CONTROL CENTER

- A. Motor Control Centers: NEMA ICS 2
- B. Main Overcurrent Protection: As scheduled.
- C. Motor Starters: As scheduled.
- D. Feeder Tap Units: As scheduled.
- E. Horizontal Bussing: Include copper ground bus entire length of control center.
- F. Vertical Bussing: NEMA ICS 2; copper.
- G. Configuration: Units front mounting only, accessible from the front only.
- H. Enclosure: ANSI/NEMA ICS 6; Type as required to meet conditions of installation unless indicated on the Drawings.
- I. Finish: Manufacturer's standard enamel color.
- J. Provide phase loss protection relay with contacts to de-energize each motor starter in control center.
- K. Control Transformer: Provide control transformer in motor control center to provide 120 volt control source for all motor starters in control center.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Install fuses in fusible switches.
- C. Select and install heater elements in motor starters to match installed motor characteristics.
- D. 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.

END OF SECTION