

SECTION 16443

MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes motor control centers
- B. Related Sections:
  - 1. Section 16050 – Basic Electrical Materials and Methods

1.2 REFERENCES

- A. NEMA AB 1 (National Electrical Manufacturers Association) – Molded Case Circuit Breakers. (Circuit breakers and motor circuit protectors (MCP)
- B. NEMA FU 1 – Fuses. (Control Fuses)
- C. NEMA KS 1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
- D. NEMA ICS 2 – Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC
- E. NEMA ICS 2.3 – Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers.
- F. NEMA ICS 3 – Industrial Control and Systems: Factory Built Assemblies.
- G. NEMA ICS 5 – Industrial Control and Systems: Control Circuit and Pilot Devices.
- H. NETA ATS (International Electrical Testing Association) – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS:

- A. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends, size and number of bus bars per phase, including neutral if required, and ground; electrical characteristics including voltage, frame size and trip ratings withstand ratings, and time/current curves of all equipment and components.

B. Product Data: Submit electrical characteristics including voltage, frame size and trip ratings, and fault current withstand ratings, and time-current curves of all equipment and components.

C. Test Reports: Indicate/identify field test and inspection procedures and test results.

#### 1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations by contractor's record drawing requirement, configurations, and ratings of motor control centers and major components.

B. Operation and Maintenance Data: Submit recommended replacement parts list for all motor control center parts.

C. Section 01700 – Closeout and Turnover Procedures

#### 1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years motor control center manufacturing experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver in maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.

B. 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.

C. Handle in accordance with NEMA ICS 2.3. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

B. Conform to NEMA ICS 2 service conditions during and after installation of motor control center.

### PART 2 - PRODUCTS

#### 2.1 MOTOR CONTROL CENTER

A. Manufacturers: Square D Class 8999, General Electric Co., Cutler-Hammer, Allen Bradley, or approved equal.

- A. Products Description: NEMA ICS 3, Class I, Type B motor control center (Type A does not have terminal blocks for control wiring)
- B. Service Conditions: NEMA ICS 2.
- C. Main Overcurrent Protection: as shown on drawings.
- D. Feeder Tap Units: (No motor starter) molded case thermal-magnetic circuit breakers. See Specification Section 16412. Breakers larger than 200A shall be bolted in. Breakers 100A and below may be twin mounted, plug-in.
- E. Motor Overcurrent Protection: Motor circuit protector (MPC) conforming to NEMA AB1, with integral instantaneous magnetic trip in each pole.
- F. Voltage Rating: 480 volts, three phase, three wire, 60 Hertz or as shown on the drawings.
- G. Horizontal Bus: Tin-plated Copper, with minimum continuous current rating of 600 amperes or as shown on drawings. Include copper ground bus entire length of control center.
- H. Vertical Bus: Tin-plated Copper.
- I. Integrated Equipment Short Circuit Rating: 65,000 amperes rms symmetrical at 480 volts or as shown on drawings.
- J. Configuration: Units front mounting only, accessible from the front only suitable for mounting against a wall.
- K. Enclosure: NEMA 1, gasketed, indoor: NEMA 3R outdoor.
  - 1. Finish: Manufacturer's standard gray enamel.
  - 2. Starter size 4 and larger shall be bolt in. Starters size 3 and below shall be plug-in.
- L. Control Power shall be from individual control transformers located in each starter compartment. Control transformers shall be fused on primary and secondary. Auxiliary control relays shall be located in separate compartments and not in the compartment with the starter.
- M. Pilot Lights: LED, Red, "run"
- N. Hand-Off-Auto Selector Switch:

1. Except on pumps or other equipment that may be damaged by control bypass.

O. Provide time delays for “Load-Shed” start-up purposes.

## 2.2 FULL-VOLTAGE NON-REVERSING CONTROLLERS

- A. Product Description: NEMA ICS 2, AC general-purpose Class I Type B magnetic or solid-state controller for induction motors rated in horsepower.

## 2.3 REDUCED VOLTAGE START CONTROLLERS

- A. Product Description: NEMA ICS 2, AC general-purpose Class A magnetic or solid-state controller for induction motors rated in horsepower.

## 2.4 VARIABLE FREQUENCY CONTROLLER

- A. Refer to specification section 16265

## 2.5 TRANSIENT VOLTAGE SUPPRESSION DEVICES (TVSS)

- A. Product Description: IEEE C62.41, factory-mounted transient voltage surge suppressor, selected to meet requirements for medium exposure and to coordinate with system circuit voltage.

- B. Provide TVSS when control is by PLC or EMCS and as shown on drawings.

## 2.6 SOURCE QUALITY CONTROL

- A. Provide option to Stanford Project Engineer/Manager for inspection at manufacturer’s factory prior to shipment. Notify Stanford Project Engineer/Manager at least seven days before inspection is allowed.

# PART 3 – EXECUTION

## 3.1 INSTALLATION

- A. Install in accordance with NEMA ICS 2.3 and NEMA 3.1.
- B. Tighten all accessible bus connections and mechanical fasteners after placing motor control center.
- C. Provide fuses in primary and secondary of control transformers.

- D. Provide heater elements in motor controllers to match installed motor service factor and full load amps. Set motor circuit protectors (MCP) to match motor inrush amps.
- E. Provide engraved plastic nameplates under the provisions of Section 16050.
- F. Ground and bond motor control centers per California Electrical Code.

END OF SECTION