SECTION 262419 - MOTOR-CONTROL CENTERS

PART 1 - GENERAL

1.1 SUMMARY
   A. This Section includes motor-control centers for use on ac circuits rated 600 V and less.

1.2 SUBMITTALS
   A. Product Data: For each type of controller and each type of motor-control center.
   B. Shop Drawings: For each motor-control center.
      1. Include wiring diagrams.
   C. Qualification Data: For [manufacturer] [testing agency] [manufacturer and testing agency].
   D. Field quality-control test reports.
   E. Operation and maintenance data.
   F. Load-current and overload-relay heater list.
   G. Load-current and list of settings of adjustable overload relays.

1.3 QUALITY ASSURANCE
   A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.
   B. Comply with NFPA 70.
   C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for motor-control centers, including clearances between motor-control centers, and for adjacent surfaces and other items. Comply with indicated maximum dimensions and clearances.

1.4 COORDINATION
   A. Coordinate features of motor-control centers, installed units, and accessory devices with pilot devices and control circuits to which they connect.
   B. Coordinate features, accessories, and functions of each motor-control center, each controller, and each installed unit with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Siemens/Furnas Controls.
3. Square D.

2.2 MOTOR-CONTROL CENTERS

A. Wiring: NEMA ICS 3, Class [I, Type A] [I, Type B] [II, Type C] [II, Type B] [II, Type C].

B. Enclosures: Flush- or surface-mounting cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.

B.1. Outdoor Locations: NEMA 250, Type 3R.
B.2. Compartments: Modular; individual doors with concealed hinges and quick-captive screw fasteners. Interlocks on combination controller units requiring disconnecting means in off position before door can be opened or closed, except by operating a permissive release device.
B.3. Interchangeability: Compartments constructed to allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in motor-control center; same size compartments to permit interchangeability and ready rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.
B.4. Wiring Spaces: Wiring channel in each vertical section for vertical and horizontal wiring to each unit compartment; supports to hold wiring in place.

C. Short-Circuit Current Rating for Each Section: Equal to or greater than indicated available fault current in symmetrical amperes at motor-control center location.

2.3 BUSES

A. Material: Plated hard-drawn copper, 98 percent conductivity.

B. Ampacity Ratings: As indicated for horizontal and vertical main buses.

C. Neutral Buses: Full size.

D. Equipment Ground Bus: Noninsulated, horizontal configuration; adequate for equipment ground conductors; bonded to enclosure.

E. Horizontal Bus Arrangement: Main phase, neutral and ground buses extended with same capacity the entire length of motor-control center, with provision for future extension at both ends by bolt holes and captive bus splice sections or equivalent.

F. Short-Circuit Withstand Rating: Same as short-circuit current rating of section.
2.4 FUNCTIONAL FEATURES

A. Description: Modular arrangement of controllers, control devices, overcurrent protective devices, transformers, panelboards, instruments, indicating panels, blank panels, and other items mounted in compartments of motor-control center.

B. Controller Units: Combination controller units of types and with features, ratings, and circuit assignments indicated.

1. Install units up to and including Size 3 on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
2. Provide units with short-circuit current ratings equal to or greater than short-circuit current rating of motor-control center section.
3. Equip units in Type B and Type C motor-control centers with pull-apart terminal strips or drawout terminal boards for external control connections.

   a. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by an NRTL.

C. Overcurrent Protective Devices: Individual feeder-tap units through 225-A rating shall have drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.

D. Spaces and Blank Compartments: Fully bused and equipped, ready for insertion of drawout units.

E. Spare Units: Type, sizes, and ratings indicated; installed in compartments indicated "spare."

2.5 ACROSS-THE-LINE CONTROLLERS


B. Magnetic Controller: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.

1. Control Circuit: 120 V; obtained from [integral control power transformer] <Insert source of control power> with a control power [transformer] [source] of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.
2. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class [10] [20] [30] tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.
3. Adjustable Overload Relay: Dip switch selectable for motor running overload protection with NEMA ICS 2, Class [10] [20] [30] tripping characteristic, and selected to protect motor against voltage and current unbalance and single phasing. Provide relay with Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.

2.6 MULTISPEED CONTROLLERS

A. Multispeed Controller: Match controller to motor type, application, and number of speeds; include the following accessories:

1. Compelling relay to ensure that motor will start only at low speed.
2. Accelerating relay to ensure properly timed acceleration through speeds lower than that selected.
3. Decelerating relay to ensure automatically timed deceleration through each speed.

2.7 FEEDER OVERCURRENT PROTECTION


1. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
2. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
   a. Instantaneous trip.
   b. Long- and short-time pickup levels.
   c. Long- and short-time time adjustments.
   d. Ground-fault pickup level, time delay, and I^2t response.

3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
4. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
6. Molded-Case Switch: Molded-case circuit breaker without trip units.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
4. Communication Capability: [Circuit-breaker-mounted] [Universal-mounted] [Integral] communication module with functions and features compatible with power monitoring and control system.

5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at [55] [75] percent of rated voltage.

6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage [without intentional] [with field-adjustable 0.1- to 0.6-second] time delay.

7. Auxiliary Switch: [One SPDT switch] [Two SPDT switches] with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts; "b" contacts operate in reverse of circuit-breaker contacts.

8. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.


C. Fusible Switch: NEMA KS 1, Type HD, clips to accommodate fuses with lockable handle.

2.8 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.


C. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

D. Control Relays: Auxiliary and adjustable time-delay relays.

E. Meters:

1. Ammeter: Output current, with current sensors rated to suit application.
2. Voltmeter: Output voltage.
3. Frequency Meter: Output frequency.


G. Spare-Fuse Cabinet: Identified and compartmented steel box.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Select features of each controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, controller, and load; and configuration of pilot device and control circuit affecting controller functions.
3.2 INSTALLATION

A. Anchor each motor-control center assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and grout sills flush with motor-control center mounting surface.

B. Install motor-control centers on concrete bases.

C. Controller Fuses: Install fuses in each fusible switch. Comply with Section 262813 - Fuses.

3.3 IDENTIFICATION

A. Identify motor-control center, motor-control center components, and control wiring according to Division 16 Section "Electrical Identification."

B. Operating Instructions: Frame printed operating instructions for motor-control centers, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of motor-control centers.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Division 26 Section "Conductors and Cables." Bundle, train, and support wiring in enclosures.

B. Connect hand-off-automatic switch and other automatic-control devices where applicable.
   1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
   2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:
   1. Test insulation resistance for each motor-control center element, bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

B. Perform the following field tests and inspections and prepare test reports:
   1. Perform each electrical test and visual and mechanical inspection, except for optional tests, stated in NETA ATS "Motor Control Centers." Certify compliance with test parameters.
   2. Correct malfunctioning units and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION