PART 1  GENERAL

1.01  SUMMARY

A. Section Includes:

3. Combination magnetic motor starters.
5. Power factor correction.

B. Related Sections:

1. Section 16195 - Identification
2. Section 16010 - Load Shedding requirements
3. Individual motor starters shall be provided by Division 15 in full compliance with these requirements. All starters in MCC’s shall be provided in accordance with this section by Division 16 contractor.

1.02  REFERENCES

A. Specify Underwriters Laboratories (UL) listed equipment, assemblies and materials.

B. Where appropriate, refer to current ANSI and NEMA Standards for material ratings.


1.03  SUBMITTALS

A. Require submittals under the provisions of Section 16010 - Basic Electrical Requirements and 01300 - Submittals.

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.

PART 2  PRODUCTS

2.01  MANUFACTURERS

A. Motor Starters and Motor Control Centers:
1. General Electric CR306 series starters
2. Westinghouse Class A200/Cutler Hammer Type AN16 series starters
3. Furnas Class 14 starters
4. Cutler Hammer File A-10 series starters
5. Allen-Bradley
6. Square-D
7. Sprecher and Schuh (shall have an “S” designation next to the contractor size, i.e. CA3-23S...)

2.02 MATERIALS

A. Manual Motor Starters: (NEMA.1CS 2)

1. AC general purpose Class A manually operated full-voltage controller for induction motors rated in horsepower, with Class 10 overload relay, red pilot light and toggle operator. Number of poles as required. Enclosure rating as required. Housing finished in manufacturer’s standard enamel.

B. Magnetic Motor Starters: (NEMA 1CS 2)

1. AC general purpose Class A magnetic controller for induction motors rated in horsepower. Coil operating voltage 120V. Melting alloy Class 10 overload relay. Push-button operators in front cover with operation indicating lights. Number of poles as required. Housing finished in manufacturer’s standard enamel. Provide an HOA switch for all motors with automatic operation.

2. Combination Motor Starter:
   a. AC general purpose Class A magnetic controller in the same enclosure with motor circuit protector.

3. Operation Configurations:
   a. Full voltage starting
   b. Full voltage reversing
   c. Where soft starting is required use Cutler Hammer sof starter, or University approved equal. Do not use reduced voltage or two speed starters.

4. Auxiliary Contacts:
   a. Two normally open and two normally closed contacts in addition to seal-in contact.

5. All starters shall be UL listed and rated in accordance with the requirements of NEMA Standards Publication ICS-2.

C. Controller Overcurrent Protection and Disconnecting Means:

1. Motor Circuit Protector:
   a. Circuit breakers with integral instantaneous magnetic trip in each pole.

2. Fusible Switch Assemblies:
   a. 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. Motor Control Center:
1. Class I or II as required by controls. Main overcurrent protection, molded case circuit breaker, fusible switch or main lugs as required. Voltage rating 120/208V or 480V, 1Ø or 3Ø, 60 Hz as required. Horizontal bussing, copper with continuous current rating as required. Provide with continuous copper ground bus entire horizontal length of control center. Vertical bussing copper. Integrated short circuit rating as required by available fault current. Enclosure rating as required with manufacturer’s standard enamel finish.

E. Fuses:

1. Dual element current limiting one time fuses.

F. Accessories: Provide the following for all motors 10 HP at 208 volt, 20 HP at 480 volt and above.

   1. Undervoltage protection relay.
   2. Overvoltage protection relay.
   3. Phase monitoring relay (rotation and single phasing).

G. Power Factor Correction:

1. For all motor installations 5 HP or larger, provide power factor correction to 0.90 power factor. Power factor to be measured at no load on motor.

H. IEC style starters are prohibited, NEMA style starters shall be specified and utilized. Starters shall be capable of starting a range of motors with no degradation of starter life.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide a neatly typed label inside each motor starter enclosure identifying motor served, nameplate horsepower, full load amperes, code letter and service factor.

B. Provide nameplates as required by Section 16195 - Identification.

C. Locate controllers and motor control centers in acceptable environments not subject to temperature extremes beyond UL listing criteria. Provide appropriate enclosure rating for environments in which installed.

D. Provide 4” high full sized housekeeping pad under motor control centers.

E. Identify control wiring as required in Section 16195 - Identification. Maximum control voltage - 120V.

F. Direct contractor to size heater elements in starters in accordance with manufacturer’s recommendations for motor type.
G. Coordinate size of control center with door openings and access corridors to assure that control center can be moved into room after structure is completed. Indicate shipping splits as necessary.

H. Require tightening of shipping split and termination bolts on busses using calibrated torque wrench to manufacturer’s requirements.

3.02 ADJUSTING AND CLEANING

A. Require the Following:

1. Touch up scratched or marred surfaces to match original finish.
2. Verification that control sequences, time delay and adjustments are as indicated on documents.

END OF SECTION 16480