

**SPECIAL SPECIFICATION**  
**SECTION 16920S**  
**MOTOR CONTROL CENTERS**

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**SPECIAL SPECIFICATION**  
**SECTION 16920S**  
**MOTOR CONTROL CENTERS**

**PART 1 - GENERAL**

**1.01 SCOPE**

The work covered by this section of the specifications includes the furnishing and installation of a complete motor control center (MCC) as described herein and as indicated on the drawings.

**1.02 REQUIREMENTS**

Comply with applicable provisions of Sandia's Standard Specification Section 16001, Electrical Work.

**1.03 APPLICABLE SPECIFICATION AND STANDARDS**

A. The motor control centers covered by this specification shall be designed and assembled in accordance with the applicable standards of ANSI, IEEE, and NEMA including, but not limited to, the latest additions of the following standards:

UL	508
ANSI/NEMA	ICS1
ANSI/NEMA	ICS2
UL	845

B. The motor control center and all components shall meet all requirements of the latest National Electrical Code and the Occupational Safety and Health Act.

**1.04 SUBMITTALS**

A. Indicate detailed dimensions for the front and side views. Show elevation with position of each starter identified by nameplate data.

B. Indicate enclosure material finish and NEMA classification type.

C. Indicate conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.

- D. Furnish product data on starters.
- E. Provide operation and maintenance manual.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Coordinate schedule to avoid being blocked by stairwells, walls, doors, or other obstructions.

1.06 WARRANTY

- A. Warranty design, materials and workmanship for at least one year after acceptance by Owner from Contractor.

1.05 SERVICE CONDITIONS

- A. Design For Indoor Use.
- B. Seismic Design per IBC 2000: Seismic Design Category D; Use Group 3; Site Class D.
- C. Altitude: 6000 feet above sea level.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Cutler-Hammer.
- B. General Electric.
- C. Siemens.

2.02 MOTOR CONTROL CENTER

- A. Motor Control Centers: Class II, Type B, factory assembled, metal enclosed, dead-front construction. Provide 20-inch deep sections with the required number of vertical sections assembled to form a free-standing metal enclosure with sections and busing bolted together. Provide capability to add cubicles in the future by

bolting additional cubicle and splicing main bus. All wiring within control center shall be copper.

B. Main Overcurrent Protection: As scheduled.

C. Motor Starters

1. Magnetic Motor Starters: AC general-purpose, Class A, magnetic controller for induction motors rated in horsepower as indicated. IEC rated contractors are not acceptable.
2. Provide accessible terminals for wiring directly from the front of the starter.
3. Contacts: Provide silver, cadmium oxide alloy, double break, non-welding contacts which will not require filing, dressing or cleaning through the life of the control equipment.
4. Provide starter types as scheduled:
  - a. Full Voltage Starting: Non-reversing type
5. Coils: Pressure molded, 120 volts, 60 hertz. Provide integral control transformer.
6. Overload Relay: Provide bimetal overload relays in all three phases for three-phase full voltage starters, in ungrounded phases for single-phase full voltage starters and in all six legs for two-speed full voltage starters. Provide overload relays of the hand reset, trip-free variety so that blocking the reset mechanism in the reset position will not prevent the motor controller from dropping out if the motor is overloaded. Capability to field convert overload relays from hand to automatic reset is unacceptable.
7. Auxilliary Contacts: Provide each starter with the required auxiliary contacts for the control functions indicated and required, including the holding interlock and pilot light interlocks plus two additional contacts, field convertible to normally closed or normally open NEMA ICS 2 controls. Provide capability to add auxiliary contacts without removing existing wiring or removing the controller from its enclosure.
8. Selector Switches: HAND/OFF/AUTO for single-speed motors in front cover. Hand position shall bypass automatic controls but not safety interlocks.
9. Indicating Lights: RUN; red for single-speed motors; FAST/SLOW; red/amber for two-speed motors (push to test type) in front cover. Operate pilot lights by separate interlock not placed across the holding coil.
10. Control Power Transformers: Provide integral 120 volt secondary control transformer with both primary and secondary fuses for each controller.

D. Feeder Tap Units: As scheduled.

- E. Voltage Rating: 480 volts, 3 phase, 3 wire, 60 hertz.
- F. Provide full draw-out motor circuit protector type combination starters of modular sizes to allow interchanging of starters from one control center to another. Provide interlocks, selector switch, indicating lights as called for on individual motor starters. Provide a defeat mechanism on the door of each unit to allow authorized personnel to operate the door to each motor starter with the circuit breaker still in the ON position. Provide capability for each motor controller circuit breaker to be padlocked in the OFF position with up to 3 padlocks.
- G. Horizontal Busing: Silver-plated copper with a minimum continuous current rating of 600 amperes. Base bus ratings on a 50 degrees C maximum temperature rise in a 40 degrees C ambient. Provide for future splicing of additional sections onto either end of the motor control center without tapping or drilling bus duct.
- H. Vertical Busing: Silver-plated copper with a minimum continuous current rating of 300 amperes. Base bus ratings on a 50 degrees C maximum temperature rise in a 40 degrees C ambient.
- I. Ground Bus: Include a 600 ampere copper ground bus the entire length of the control center. Provide compression lugs capable of receiving No. 4/0 - 250 kcmil cable attached to the ground bus in the incoming section of the control center. Provide a minimum of six holes in ground bus in each vertical section. Bolt ground bus to enclosure. Provide a vertical ground bus in each section connected to the horizontal ground bus.
- J. Integrated Equipment Short Circuit Rating: 50,000 amperes (minimum) RMS symmetrical at 480 volts, or greater if shown on the one-line diagram.
- K. Configuration: Units front mounting only, accessible from the front only.
- L. Enclosure: Type 1, gasketed.
- M. Finish: Manufacturer's standard gray enamel.
- N. Provide bus supports of high strength, red glass, reinforced alkyd material.
- O. Isolate the phases of both the horizontal and vertical bus by the use of insulating barriers. Insulate horizontal bus bars. Provide cover over exposed vertical bus.
- P. Provide a continuous horizontal wireway a minimum of 12 inches high at top of motor control center and a continuous vertical wireway a minimum of 4 inches wide in each section of the control center. Provide a screw cover with captive screws for horizontal wireway and a hinged door cover with captive screws for the vertical wireway.

- Q. Provide grommets at entry and exit of wiring in wiring compartments, motor controller, etc. Do not leave rough edges in pathway of wiring.
- R. Support and grade each unit by a tilt and lift removable pan which fits into steel saddle to physically isolate unit from bus compartment and adjacent units.
- S. All control wiring shall be Type SIS, with labels to indicate destination of each wire.
- T. Control wiring shall be terminated on split-type draw-out terminal blocks.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Select and install heater elements in motor starters to match installed motor characteristics.
- C. 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.
- D. Provide 4-inch concrete housekeeping pad with anchor bolts. Bolt enclosure to pad plumb and square.
- E. Coordinate as required for control and interconnections with motors provided under other Divisions.

END OF SECTION