SECTION 16482

MOTOR STARTERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The work of this section consists of providing labor, materials, tools, appliances and miscellaneous accessories associated with motor starter work indicated on the Drawings and schedules.

B. Types of motor starters in this section include the following:

1. Combination non-reversing.
2. Manual.

1.2 RELATED DOCUMENTS

A. Drawings.

B. General provisions of Contract, including General and Supplementary Conditions.

C. Division 01 - Specification Sections.

D. Section 16010 - General Electrical Provisions.

E. Extent of panelboard work is indicated by drawings and schedules.

PART 2 - PRODUCTS

2.1 MOTORS STARTERS

A. General: For each motor to which the Contractor makes connection and which is not otherwise noted, provide a disconnect switch and magnetic motor starter, separate or in combination as indicated or required. Overload devices must be suitable for protection by a minimum of 15 ampere circuit breaker or fuse. The overload devices in the starters shall be sized to agree with the current rating shown on the motor nameplate. Provide motor starters and ancillary components which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation.

B. Individual Motor Starters: Provide integrally mounted, magnetic, full-voltage nonreversing (FVNR), or 2-speed, 2-winding (2S-2W) starter in a heavy-duty type, dead front, sheet steel enclosure, surface-mounted. Size and number of poles shall be as

shown and required by equipment served. All starters shall be constructed and tested in accordance with the latest NEMA or standards.

1. Magnetic starter contacts shall be solid silver cadmium oxide alloy, and shall not require any filing, dressing, or cleaning throughout the life of the starter.
2. Operating coils shall be 120 or 24 volts as coordinated with the controlled equipment, and shall be pressure molded and designed so that accidental exposure to excessive voltage up to 480 volts will not damage the coil. The starter design shall also be such that when a coil fails due to an over-voltage condition, the starter shall definitely open, and shall not freeze in the closed position.
3. All starters shall have manual reset, trip fee overload relays in each phase conductor. Three-phase FVNR starters shall have three overload relays. Single-phase FVNR starters shall have an overload relay in each ungrounded conductor. Two speed, full-voltage magnetic starters shall have overload relays in all six control legs. Overload relays shall not be field-convertible from manual to automatic reset. For individual motors 15 hp or greater, provide phase failure relays to disconnect the unit in the even one leg of the motor supply or load is disrupted.
4. Provide Push-to-Test start/stop pilot lights for all motor starters. Provide FAST and SLOW pilot lights for all 2-speed starters. Pilot lights shall be mounted in the starter enclosure cover. Pilot lights shall be operated from an interlock on the motor starter, and shall not be wired across the operating coil.
5. Provide starters with HAND OFF-AUTOMATIC switches (for motors with automatic control), or START-STOP Pushbuttons (for motors with manual controls) as shown or required. Provide for FAST-SLOW speed selection from HVAC control system for all 2-speed starters. All 2-speed starters shall have deceleration relays between fast and SLOW speeds. Coordinate motor starter controls with the requirements of Division 15. Motor starter controls shall be mounted in the starter enclosure cover.
6. A single-phase control power transformer shall be included integrally with each starter for 120 or 24 volt control power. (Coordinate with Division 15). The primary shall be connected to the line side of the motor starter; the secondary shall have one leg fused and one leg grounded. Arrange transformer terminals so that wiring to terminals will not be located above the transformer.
7. Each starter shall have one normally open and one normally closed convertible auxiliary contact in addition to the number of contacts required for the "holding interlock" and control wiring as required by Division 15000. In addition, it shall be possible to field-install one or more additional auxiliary contacts without removing existing wiring, or removing the starter from its enclosure.
8. Unit shall be completely prewired to terminals to eliminate any interior field wiring except for: connection of power supply conductors to switch line side terminals; motor leads to the starter load side terminals; and control conductors to holding coil terminals.
9. All motor starter enclosures shall be NEMA 1, general-purpose enclosures, unless shown otherwise.

C. Combination Motor Starters: Provide an integrally mounted magnetic starter and a circuit breaker or fusible disconnect switch in a heavy-duty type, dead front, sheet steel enclosure, surface-mounted. Size and number of poles shall be as shown and required by equipment served. Combination motor starters shall be as specified for individual motor starters except as modified herein.

1. Disconnect Switch: Provide as specified in Section 16170.
2. Unit Wiring: Unit shall be completely prewired to terminals to eliminate any interior field wiring except for: connection of power supply conductors to switch line side terminals, motor leads to the starter load side terminals, and control conductors to holding coil terminals.
3. Circuit Breakers: Provide circuit breakers for the combinations units as specified in Section 16472. Breakers shall be adjustable instantaneous trip magnetic-only. Each breaker shall be provided with a single magnetic adjustment, which simultaneously sets the magnetic trip level of each individual pole. Adjustment shall be continuous throughout the trip range.
4. Enclosures: All combination motor starter enclosures shall be NEMA 1, general-purpose enclosure, unless shown otherwise.

D. Manual Motor Starters:

1. Manual motor starters shall consist of an integral starter and overload protection in a common enclosure, surface-mounted. Size and number of poles shall be as shown and required by equipment served. Furnish pilot light as indicated.
2. Manual motor starter with overload protection, 1 hp maximum, 115 or 230 volts; General Electric Model No. CK101Y1-(1) Pole, CR101H1-(2) Pole; CR101H11-(2) Pole; with pilot light.
3. All manual motor starter enclosures shall be NEMA 1, general-purpose enclosures, unless shown otherwise.

E. Switch: For self-protected motors where one pole toggle motor control switch is indicated, the switch shall be as specified for toggle switches in Section 16143.

PART 3 - EXECUTION

3.1 INSTALLATION OF MOTOR STARTERS

A. Install motor starters as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NEMA standards, and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Install fuses in fusible disconnects, if any.

C. Install overload heaters in each motor starter. Heater ratings shall be based on actual motor nameplate full load amps.

D. Motors starters shall be provided to properly coordinate with motors as furnished by Division 15. Motor starter controls shall be provided to properly coordinate with controls specified in Division 15.

E. Provide all individual and combination motor starters with galvanized angle or other suitable supports where mounting on wall or other rigid surface is impractical. Starters shall not be supported by conduit alone. Where motor starters are mounted on equipment served, the switch shall not inhibit removal of any service panels or interfere with any required access areas. Manual motor starters shall be installed plumb and aligned in the plane of the wall in which they are installed.

3.2 ADJUST AND CLEAN

A. Inspect operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finish.

3.3 FIELD QUALITY CONTROL: Subsequent to wire/cable hook-up, energize motor starters and demonstrate functioning of equipment in accordance with requirements.

END OF SECTION