

262900-H: SUPPLEMENTAL MOTOR CONTROLS

Related Sections

Basis Guideline: [262900](#) – “Motor Controls”
[261010](#) – “Electrical Power Systems”
[260553-H](#) – “Supplemental Electrical Equipment Identification”
[260800-H](#) – “Supplemental Electrical Acceptance Test”
[220514-H](#) – “Supplemental Variable Speed Drives”

For an explanation of the use of these guidelines, see [“Design Guidelines for UMHHC Facilities”](#)

Applicability:

The information expressed herein is unique to UMHHC owned, operated, and leased facilities, and are intended to supplement the University of Michigan’s Architecture, Engineering, and Construction (UMAEC), design guideline [16480](#). All information presented in the referenced UMAEC guideline applies to UMHHC facilities, unless explicitly stated otherwise below. Where differences and/or conflicts exist between the supplemental information noted below, and the information in the UMAEC guideline, this supplementary information shall take precedence.

The Design Professional (A/E) shall adhere to UMHHC Design Guidelines for all work at UMHHC facilities. Any requested deviations from these guidelines, shall be sent, in writing, to UMHHC’s Facilities Planning and Development (FP&D). Address the correspondence to the assigned FP&D engineer for the given project. The deviation shall not be incorporated into the construction documents until written approval of the deviation is received by the Design Professional.

The Design Professional is fully responsible for the professional quality, technical accuracy, code compliance, and overall coordination of the contract documents. Compliance with these guidelines shall not be construed so as to relieve the Design Professional of any of that responsibility.

General:

1. Provide motor controls in conformance with NEMA Standard ICS 2, “Standards for Industrial Control Devices, Controllers and Assemblies.”
2. All starters to be labeled and to be color coded in accordance with Section 16195-H.
3. Wiring Classification to be Class I, Type B.
4. Enclosures shall be NEMA type 1 for indoor applications, NEMA type 12 for areas where dust can be a problem and NEMA 3R for exterior and wet areas.

Products

1. Medium Voltage Motor Starters
 - a. Coordinate the selection of medium voltage motor starters with UMHHC Facilities Planning and Development.
 - b. Medium voltage motor starters shall be rated 5kV, include a fused disconnect switch, for fault protection and isolation, and a vacuum breaker contactor (draw-out type) for motor control, 3 current transformers, Hand-Off-Auto selector switch, and red “run”, green “off”, yellow “fault” pilot lights.
 - c. Starter shall include an Eaton Electrical MP-3000 motor protection relay with residual sensing ground fault protection. Provide Eaton Electrical Poni Communication card to interface with facility customer metering system.
 - d. Starter shall include electronic metering system, Eaton Electrical IQ DP-4000 Series. Provide Eaton Electrical Poni Communication card to interface with facility customer metering system.

- e. Provide 120 volt fused control power transformer with primary and secondary fuses. Size transformer to 125% of control system loads, and condensate heaters (if so equipped).
 - f. 5kV fuses shall be on the load side of the switch. Switchblades to be de-energized when the switch is in open position. Switch to be lockable, open or closed.
 - g. Starter should have at least 2 N.O. and 2 N.C. auxiliary spare contacts beyond needs of supplied starter controls. Contacts shall be rated 10 amperes minimum at 120 volts inductive.
 - h. Starter shall be totally front accessible. Enclosure shall be code gauge metal that has been primed and painted. Enclosures shall have windows in front to view the position of blades.
 - i. Doors shall be hinged, interlocked, and lockable. Doors shall only open when the fused disconnect switch is in an open position.
 - j. A Fuse switch shall be interlock with contactor so the contactor will open before the switch.
 - k. Reduced voltage capabilities will be considered for any motor over 500 Hp or served by a dedicated transformer. A/E shall calculate voltage drop during start and evaluate effects on starter, associated controls, and overall distribution system.
 - l. Provide current limiting, medium voltage fuses sized in accordance with the motor nameplates and with time current characteristics to allow coordination with upstream devices.
 - m. Also see section 261010, Electrical Power Systems.
2. 600 Volt Motor Control Centers
- a. Provide MCC's in conformance with UL Standard 845, "Motor Control Centers."
 - b. Install MCC's in accordance with NEMA Standard ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of MCC's".
 - c. Provide 25% spare space in MCC for future loads. Enclosures shall be constructed to allow easy additions of new sections of gear from either end.
 - d. Provide 4" high housekeeping pad. Housekeeping pad shall be extended to accommodate future sections.
 - e. Each MCC shall have an analog ammeter with selector switch (with off positions) to monitor incoming power.
 - f. Compartments: Modular, with individual doors with concealed hinges and quick-captive screw fasteners.
 - g. Interchangeability: Construct compartments so it is possible to remove units without opening adjacent doors, disconnecting adjacent compartments, or disturbing the operation of other units in the control center. Units requiring the same size compartment shall be interchangeable, and compartments shall be constructed to permit ready rearrangement of units.
 - h. Horizontal Bus Arrangement: Extend main phase and ground buses with same capacity the entire length of the MCC, with provision for future extension at both ends by means of bolt holes and captive bus splice sections or approved equivalent. Provide silver plated copper buses, aluminum buses are not allowed.
 - i. Vertical Bus Arrangement: All vertical sections shall be fully bussed. Vertical buses shall be full capacity the entire height of the section.
 - j. Individual components (switches, starters, fuses, etc.) within MCC shall comply with related sections of Design Guidelines.
3. Combination Starters
- a. Combination starters shall be rated 600 volts, NEMA size 1, 2, 3 or 4 or as shown, 3 pole, fusible disconnect switch type, with Hand-Off-Auto selector switch, 120 volt fused control power transformer (with 50 VA spare capacity) red and green pilot lights, and Code Gauge NEMA enclosure as specified that has been primed and painted.
 - b. Provide Class R dual element fuses (low peak type), fuse rejection kits, and overload heaters sized in accordance with the motor nameplates.
 - c. Fuses shall be easily accessible for testing and replacing.

- d. Provide at least 1 N.O. and 1 N.C. auxiliary spare contacts beyond needs of supplied starter controls and contract documents. Contacts shall be rated 10 amperes minimum at 120 volts inductive.
- 4. Variable Speed Drives
See Design Guideline 220514-H for variable speed drive applications.
- 5. Manual Motor Starters
 - a. Manual motor starters shall be of the voltage shown, horsepower rated for the motor shown, single pole, single throw, toggle operated, with red "run" pilot light, motor overload heater and padlock provision.
- 6. Control Devices
Control devices shall be heavy duty, rated for operation at 120 volts, AC, and contained in a NEMA enclosure as specified. Pilot lights shall be Push-To-Test, LED transformer type.

Execution

- 1. If safe and suitable for application with the associated system, motor starters shall be wired or controlled through BMS so that the motors automatically restart after a power disruption.
- 2. Starters shall be labeled and painted as noted in section 260553-H. If powered from emergency power or serve fire equipment they shall be painted as noted in 260553-H.
- 3. Starters shall have controls coordinated with, and prepared for connections to BMS systems.
- 4. Consider use of electronic controls/metering whenever possible to facilitate interconnections to BMS or remote monitoring.
- 5. Field Quality Control: The contractor shall perform testing in accordance with specification Section 260800-H, and shall submit a test report to the owner's representative.