	Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 - Yale Design Standard Division: Electrical Standards	Section: 26 24.03 Motor Controllers
		Date: 6/15/16
		Author: Office of Facilities
CC: Project Folder		

Change History


Date	Description of Change	Pages / Sections Modified	Change Approver Initials
6/15/16	Updated division section from 16420 to 26 24.03, removed references to other section numbers	-	mgl44

A. Summary

This section contains design criteria for magnetic contactors, starters, and combination starters.

B. System Design and Performance Requirements

1. Combination starters are the preferred motor control devices. Do not provide separate enclosures for switches and starters unless required by the application; for example, HVAC equipment furnished with a starter as part of the equipment package, where a separate disconnect must be provided in compliance with electrical standards.
2. Starters and contactors designed to NEMA standards are preferred over IEC standards. Where IEC starters are necessary, specify type 2 coordination.
3. Starters must be full-voltage type, unless the specific application requires other types.
4. A solid-state overload relay, with a class 20 trip curve and phase loss protection, is the preferred type of overload protection, except as follows:
 - a. Where fractional motors are furnished with integral thermal protectors, separate overload protection is not required.
 - b. Where a specific application requires alternate type of overload protection.
5. Motor Circuit Protectors (MCP) are the preferred type of short-circuit protection for motor circuits, unless the specific application requires other types.
6. Locate starters within sight of the motor, unless a motor control center is provided.
7. For loads other than motor loads, the preferred location for branch circuit protection is a panelboard. Consequently, avoid the use of combination contactors, except where tapping from a feeder or other source that does not provide adequate protection.

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9. Select contactors specifically for the load served. Do not use lighting contactors for motor loads, or motor contactors for lighting. However, mixed loads may be connected where contactors are so rated.
10. Use mechanically held (latching) contactors in applications where the load returns to the previous state after loss of power (for example, certain lighting loads not controlled by timers or photocells). All devices controlling mechanically held contactors must be momentary-contact type to avoid coil burnout.
11. Locate contactors where the sounds of operation are not audible in normally-occupied areas.

C. Submittals

Submit shop drawings and product data.

D. Product Standards

Ensure that all products conform to the following standards:

- NEMA ICS 2, Industrial Control Devices, Controllers, and Assemblies
- UL 508, Electric Industrial Control Equipment


E. Manufacturers

Subject to compliance with the design requirements, provide products by one of the following manufacturers:

- Allen-Bradley
- Furnas
- General Electric
- Square D
- Eaton

F. Equipment

1. Magnetic starters or contactors shall include the following provisions:
 - Heaters sized 115% for magnetic starters must suit the actual nameplate ratings of the protected motor, unless integral overload protection is provided in the motor.
 - Holding circuit contact.
 - Auxiliary contacts.

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- Hand-off-automatic selector switch, unless other means of manual control, such as on-off pushbuttons, is provided in the control circuit.
 - Pilot light indicating load energized, unless the motor is within sight of the controller. All indication lights shall be LED type with RED (ON) and GREEN (OFF).
 - Control transformer for 120 VAC controls, unless other control voltage is required. If line voltage matches the control voltage, a transformer is not required. All CPT shall have two fuses on the primary and one fuse on the secondary. The secondary neutral shall be solid grounded. The CPT shall be sized for load requirement plus an additional 50 VA.
2. Combination starters or contactors must include the following provisions, in addition to the applicable provisions listed in paragraph F.1 for magnetic starters:
- Lockout
 - Defeatable cover interlock
 - Class R fuse clips with all fused disconnect-type devices

G. Installation Guidelines

Mount control equipment at uniform heights, with the center of the disconnecting handle approximately 48 inches above the finished floor. Where separate switches and starters are provided, mount the switches 48 inches above the finished floor and mount the starters below or adjacent to the switches. Mount control equipment installed in motor control centers or switchboards to suit the required arrangement.

“END OF SECTION”