

current-sensing devices, or both. Protective device settings for each motor circuit shall be determined under engineering supervision.

Selecting the proper overload and short-circuit protection for medium-voltage motor circuits is more complex than for low-voltage circuits. For medium-voltage motor circuits, it is critical for the overload relay to coordinate with the short-circuit protection, because some short-circuit protective devices cannot safely open below certain multiples of their rating. In these overload cases, the overload relay must open before the short-circuit protective device is asked to open. At the same time, the overload relay might not safely open beyond certain multiples of its rating, requiring the short-circuit protective device to open. The curves of both the overload relay and the short-circuit protective device must be correlated to ensure that each opens only on levels of current for which it can safely open.

(2) Wound-Rotor Alternating-Current Motors. The secondary circuits of wound-rotor ac motors, including conductors, motor controllers, and resistors rated for the application, shall be considered as protected against overcurrent by the motor overload protection means.

(3) Operation. Operation of the overload interrupting device shall simultaneously disconnect all ungrounded conductors.

(4) Automatic Reset. Overload sensing devices shall not automatically reset after trip unless resetting of the overload sensing device does not cause automatic restarting of the motor or there is no hazard to persons created by automatic restarting of the motor and its connected machinery.

(C) Fault-Current Protection.

Δ (1) Type of Protection. Fault-current protection shall be provided in each motor circuit as specified by either 430.206(C)(1)(a) or (C)(1)(b).

(a) A circuit breaker of suitable type and rating arranged so that it can be serviced without hazard. The circuit breaker shall simultaneously disconnect all ungrounded conductors. The circuit breaker shall be permitted to sense the fault current by means of integral or external sensing elements.

(b) Fuses of a suitable type and rating placed in each ungrounded conductor. Fuses shall be used with suitable disconnecting means, or they shall be of a type that can also serve as the disconnecting means. They shall be arranged so that they cannot be serviced while they are energized.

(2) Reclosing. Fault-current interrupting devices shall not automatically reclose the circuit.

Exception: Automatic reclosing of a circuit shall be permitted where the circuit is exposed to transient faults and where such automatic reclosing does not create a hazard to persons.

(3) Combination Protection. Overload protection and fault-current protection shall be permitted to be provided by the same device.

430.207 Rating of Motor Control Apparatus. The ultimate trip current of overcurrent (overload) relays or other motor-protective devices used shall not exceed 115 percent of the motor controller's continuous current rating. Where the motor branch-circuit disconnecting means is separate from the motor controller, the disconnecting means current rating shall not be less than the ultimate trip setting of the overcurrent relays in the circuit.

430.208 Disconnecting Means. The motor controller disconnecting means shall be a switch or circuit breaker having a voltage rating not less than that of the circuit involved, and shall be lockable in accordance with 110.25. The disconnecting means shall have a current rating of not less than 100 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have a current rating not less than 100 percent of the rated input current of the power conversion equipment.

Part XII. Protection of Live Parts — All Voltages

430.231 General. Part XII specifies that live parts shall be protected in an approved manner for the hazard involved.

430.232 Where Required. Exposed live parts of motors and motor controllers operating at 50 volts or more between terminals shall be guarded against accidental contact by enclosure or by location as follows:

- (1) By installation in a room or enclosure that is accessible only to qualified persons
- (2) By installation on a suitable balcony, gallery, or platform, elevated and arranged so as to exclude unqualified persons
- (3) By elevation 2.5 m (8 ft) or more above the floor

Exception: Live parts of motors operating at more than 50 volts between terminals shall not require additional guarding for stationary motors that have commutators, collectors, and brush rigging located inside of motor-end brackets and not conductively connected to supply circuits operating at more than 150 volts to ground.

430.233 Guards for Attendants. Where live parts of motors or motor controllers operating at over 50 volts to ground are guarded against accidental contact only by location as specified in 430.232, and where adjustment or other attendance could be necessary during the operation of the apparatus, suitable insulating mats or platforms shall be provided so that the attendant cannot readily touch live parts unless standing on the mats or platforms.

Informational Note: See 110.26 and 110.34 for information on working space.