

# MSC Guidelines for Motor Circuits, Controllers, & Protection

Procedure Number: E2-15

Revision Date: 01/15/2016

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**Purpose:**

This document outlines basic guidance for submitting steering-gear control and alarm system drawings for vessels meeting the requirements of 46 CFR Subchapter J.

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**References:**

- a) 46 CFR 111.70 – Motor Circuits, Controllers, and Protection
  - b) ABS “Rules for Building and Classing Steel Vessels, 2003”
  - c) ABS “Rules for Building and Classing Mobile Offshore Drilling Units, 2001”
  - d) NEC (2002), Article 430
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**Contact Information:**

If you have any questions or comments concerning this document, please contact the Marine Safety Center (MSC) by email or phone. Please refer to the Procedure Number E2-15.

Email: [MSC@uscg.mil](mailto:MSC@uscg.mil)  
Phone: 703-872-6729  
Website: <http://homeport.uscg.mil/msc>

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**Responsibilities:**

The submitter shall provide sufficient documentation and plans to indicate compliance with the applicable requirements outlined in references (a) through (d). The submission shall be made electronically to the above email address or, if paper, in triplicate to the MSC’s address found on the above website. To facilitate plan review, all plans and information specified in these guidelines should be submitted as one complete package through a single point of contact for the project.

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**Applicability:**

This document applies to all vessels inspected under Subchapters other than K & T.

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**General Guidance:**

- As per 46 CFR 111.25-1, each motor must meet the applicable construction and testing requirements in section 4-8-3 of reference (b) or section 4-3-4 of reference (c).

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- 46 CFR Table 111.60-7 states that motor feeder cables have the following current-carrying capacities:
  - a) For a single motor, at least 125% of the motor's full-load amps (FLA), as per reference (d) 430.22.
  - b) For multiple motors, at least 125% of the highest-rated motor's FLA plus the sum of the FLA ratings of all the other motors, as per reference (d) 430.24.
- 4-8-2/9.17.1 of reference (b), incorporated by 46 CFR 111.70-1(a), states that motor circuit overcurrent protection device trip settings must not exceed the values shown in Table 1. If the branch circuit cable capacity exceeds the motor's FLA, the trip setting may be higher as long as it does not exceed 150% of the cable capacity.

Table 1. Maximum motor overcurrent protection trip settings

<i>Type of motor</i>	<i>Rating or setting, % motor full-load current</i>
Squirrel-cage and synchronous full-voltage, reactor- or resistor-starting	250
Autotransformer starting	200
Wound rotor	150

- As per 46 CFR 111.70-3(b), the following motor controllers must have low-voltage release (LVR):
  - a) Fire pump
  - b) Elevator
  - c) Steering gear
  - d) An auxiliary that is vital to the vessel's propulsion system, unless it can be restarted from a central control station
- As per 46 CFR 111.70-3(b), one ship's service generator must be able to supply motor-starting current to all LVR loads. This can be accomplished by equipping the motor controllers with automatic sequential starting.
- As per 46 CFR 111.70-3(c), all motor controllers must have LVP unless they have LVR and/or the motor is less than 2hp.
- As per 46 CFR 111.70-7(b), motor controllers must be designed so that an accidental ground will not cause an inadvertent motor start or remove the ability to stop a running motor.

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- As per 46 CFR 111.70-1(a), reference (b) 4-8-3/5.7.2 and reference (c) 4-8-4/7.17.2 require that each branch circuit for a motor rated 0.5kW or above be provided with an externally-operated circuit-disconnecting device for maintenance purposes. This device may be located in the switchboard. For a pre-assembled or skid-mounted unit, a single disconnecting device may be provided for multiple motors as long as each motor has <6 FLA.
- As per 46 CFR 111.70-5, motor heaters or motor controller heaters that are energized from a separate circuit must be provided with a clearly marked disconnect that is independent of and adjacent to the motor (and controller) disconnect.
  - a) Instead of an independent disconnect, motor controller heaters may be provided with a device that de-energizes the controller from all sources of power upon opening the motor controller door or an interlock that prevents the door from opening unless all power has first been disconnected.
  - b) If the motor enclosure is remote from the controller, appropriate signage must be affixed to the enclosure warning of two sources of power.
- As per 46 CFR 111.70-7(c)&(d), the motor controller must draw power from between the motor and its overcurrent protection. If the control functions require that some circuits be common to more than one controller or it is otherwise impractical to energize the control circuit (>24V) from the load side and a second source of power is required, one of the following must be provided:
  - a) A clearly marked disconnect that is independent of and adjacent to the motor (and controller) disconnect device.
  - b) A device that de-energizes the controller from all sources of power upon opening the motor controller door or an interlock that prevents the door from opening unless all power has first been disconnected.

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### **Disclaimer:**

This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard's current thinking on this topic and may assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in applying statutory and regulatory requirements. You can use an alternative approach for complying with these requirements if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative, you may contact the Marine Safety Center (MSC), the unit responsible for implementing this guidance.