

Group Installation Listing Requirements for Drives and Contactor-based Motor Controllers

This document discusses the importance of a motor controller being Listed for group installations and how to verify if a motor controller has been Listed for group installations.

In general multiple-motor branch circuits, installing a motor controller that is *not* Listed for group installation does not comply with the NEC® and NFPA® 79. Two product designations are permissible under the NEC:

- listed factory assembly
- separate assemblies listed for such use

Listed means that a third-party nationally recognized test laboratory, such as Underwriters Laboratory, Inc.® (UL®) has certified that the motor controller has met specific product safety standards.

This document contains four distinct one-page sections that describe requirements for motor controller group installation Listings:

- NEC 430.53(C) – Group Installation Listing Requirements for Drives
- NFPA 79 7.2.10.4 – Group Installation Listing Requirements for Drives
- NEC 430.53(C) – Group Installation Listing Requirements for Contactor-based Motor Controllers
- NFPA 79 7.2.10.4 – Group Installation Listing Requirements for Contactor-based Motor Controllers

NEC 430.53(C) – Group Installation Listing Requirements for Drives

In the general multiple-motor branch circuit case that is shown in Figure 1, installation of a drive that is not marked "Suitable for motor group installation..." does not comply with NFPA 70, *National Electrical Code* (NEC). A drive that is not marked means that the drive does not contain "Suitable for motor group installation..." markings, or equivalent, on the drive itself or in the instructions that ship with it. Only drives that comply with Section 46 of UL 508C can have this marking. UL 508C, *Power Conversion Equipment* (4th edition), is the drive product safety standard that includes Section 46, "Group Installation (Optional)".

Note: The general multiple-motor branch circuit case excludes the special restrictive rule that describes the maximum ampere rating of the motor branch short-circuit and ground-fault protective device, which is found in NEC 430.52. for a controller and its motor load.

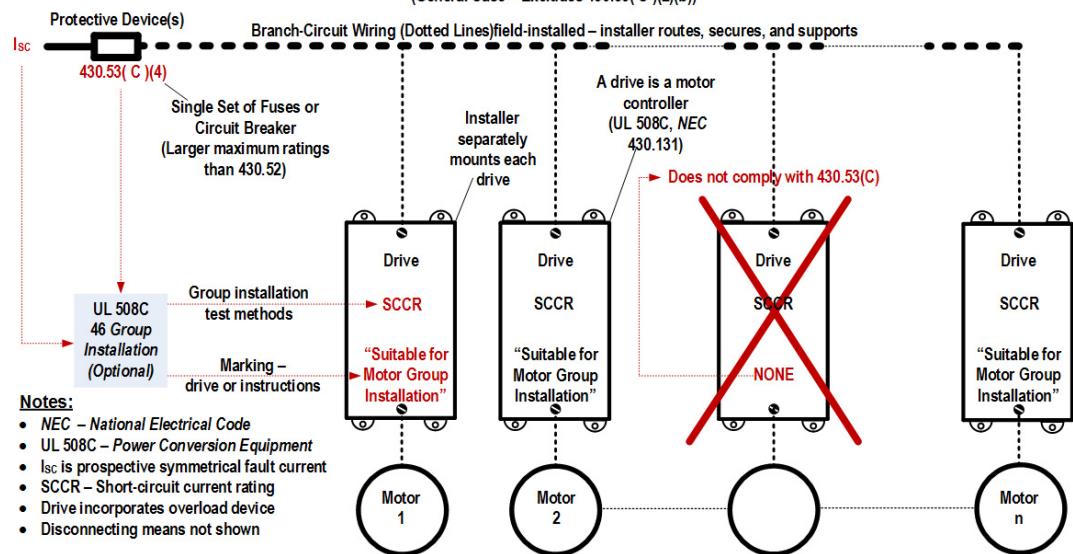
NEC 430.53(C) "Other Group Installations" permits one protective device to protect the multiple-motor branch circuit shown in Figure 1. There are two allowable possibilities: (1) "listed factory assembly" or (2) "separate assemblies listed for such use". The NEC does not define either case, but requires both to be Listed. Listed means that a third party, like Underwriters Laboratories Inc.[®] (UL[®]), has certified that a drive sample met the product safety standard's Listing requirements for NEC 430.53(C) group installations. UL 508C Section 46 contains the requirements for NEC 430.53(C) (added in 2010).⁽¹⁾

Because a drive is considered a motor controller according to 2014 NEC 430.131, UL 508C Section 46 verifies that when protecting and wiring it in accordance with NEC 430.53(C) and 430.53(D), the drive itself is not a shock or fire hazard. Using methods more demanding than standard drive methods, UL 508C Section 46 first verifies the drive's short-circuit current rating (SCCR) by fault testing with larger protective devices, and then requires this marking on the drive or in its instructions: "Suitable for motor group installation...". UL specifies this marking to identify drives that it Lists for group installations. To approve the drive's use, an electrical inspector verifies that the drive has the marking that UL 508C 46 requires.

What if UL Listed some drives for NEC 430.53(C) before 2010? Is UL 508C Section 46 retroactive? UL must determine this. Only UL can verify whether it Lists a drive for NEC 430.53(C) group installations that does not meet UL 508C Section 46 and if so, how to identify it.

Section 46 of UL 508C contains the only drive NEC 430.53(C) Listing requirements. In Figure 1, installing a drive without the "Suitable for motor group installation..." marking does not comply with the NEC because its Listing only covers NEC 430.52 individual-motor circuit installation. So in this case, the installer must add a separate protective device, sized for the motor that the drive serves, in each of the drive's input circuit.

Figure 1 – NEC 430.53(C) Group Installation Listing Requirements for Drives
(General Case – Excludes 430.53(C)(2)(b))



(1) UL 61800-5-1 is expected to replace UL 508C. It incorporates the Section 46 requirements in 5.2.3.6DV.1.

NFPA 79 7.2.10.4 – Group Installation Listing Requirements for Drives

In the general multiple-motor branch circuit case that is shown in Figure 2, installation of a drive that is not marked "Suitable for motor group installation..." does not comply with NFPA 79, *Electrical Standard for Industrial Machinery*. A drive that is not marked means that the drive does not contain "Suitable for motor group installation..." markings, or equivalent, on the drive itself or in the instructions that ship with it. Only drives that comply with Section 46 of UL 508C can have this marking. UL 508C, *Power Conversion Equipment* (4th edition), is the drive product safety standard that includes Section 46, "Group Installation (Optional)".

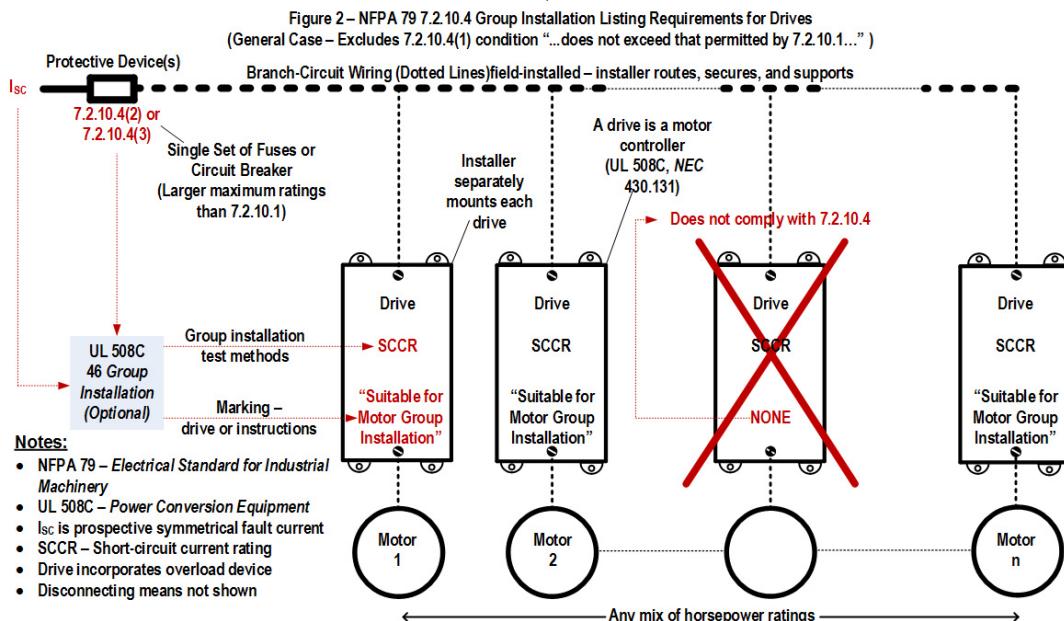
Note: The general multiple-motor branch circuit case excludes the special restrictive rule that describes the maximum ampere rating of the motor branch short-circuit and ground-fault protective device, which is found in NFPA 79 7.2.10.1 for an individual motor control device and its motor load.

NFPA 79 7.2.10.4 permits one protective device to protect the multiple-motor branch circuit shown in Figure 2 only if each drive (motor controller) is "listed for group installation". Listed means that a third party, like Underwriters Laboratories Inc. (UL), has certified that a drive sample met the product safety standard's Listing requirements for NFPA 79 7.2.10.4 group installations. UL 508C Section 46 contains the requirements for NFPA 79 7.2.10.4 (added in 2010).⁽¹⁾

Because a drive is considered a motor controller according to 2014 NEC 430.131, UL 508C Section 46 verifies that when protecting and wiring it in accordance with NFPA 79 7.2.10.4 and 7.2.10.5, the drive itself is not a shock or fire hazard. Using methods more demanding than standard drive methods, UL 508C Section 46 first verifies the drive's short-circuit current rating (SCCR) by fault testing with larger protective devices, and then requires this marking on the drive or in its instructions: "Suitable for motor group installation...". UL specifies this marking to identify drives that it Lists for group installations. To approve the drive's use, an electrical inspector verifies that the drive has the marking that UL 508C Section 46 requires.

What if UL Listed some drives for NFPA 79 7.2.10.4 before 2010? Is UL 508C Section 46 retroactive? UL must determine this. Only UL can verify whether it Lists a drive for NFPA 79 7.2.10.4 group installations that does not meet UL 508C Section 46 and if so, how to identify it.

Section 46 of UL 508C contains the only drive NFPA 79 7.2.10.4 Listing requirements. In Figure 2, installing a drive without the "Suitable for motor group installation..." marking does not comply with NFPA 79 because its Listing only covers individual-motor circuit installation. So in this case, the installer must add a separate protective device, sized for the motor that the drive serves, in each of the drive's input circuit.



NEC 430.53(C) – Group Installation Listing Requirements for Contactor-based Motor Controllers

In the general multiple-motor branch circuit case that is shown in Figure 3, installation of a contactor-based motor controller (magnetic motor controller) that is not marked "Suitable for motor group installation..." does not comply with NFPA 70, *National Electrical Code* (NEC). A controller that is not marked means that the controller does not contain "Suitable for motor group installation..." markings, or equivalent, on the controller itself or in the instructions that ship with it. Only controllers that comply with Section 52A of UL 508 can have this marking. UL 508, "Industrial Control Equipment" (17th edition), is the product safety standard that includes Section 52A, "Group Installation (Optional)".

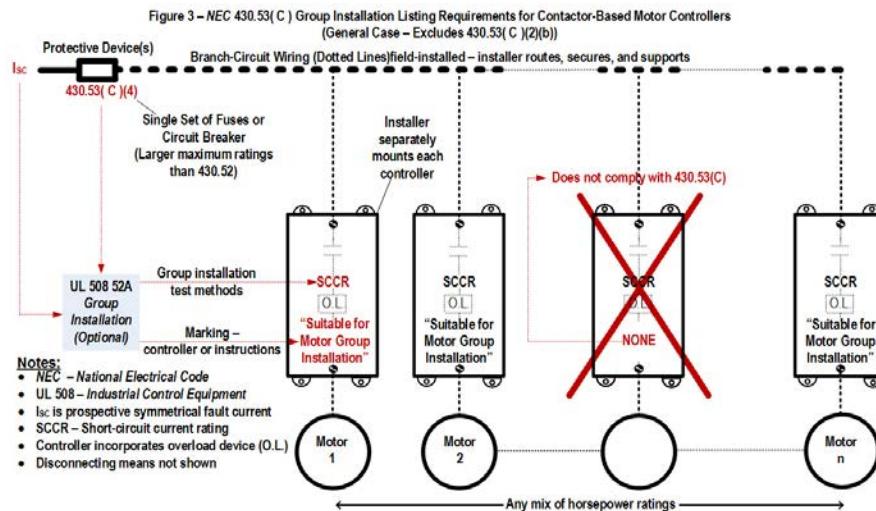
Note: The general multiple-motor branch circuit case excludes the special restrictive rule that describes the maximum ampere rating of the motor branch short-circuit and ground-fault protective device, which is found in NEC 430.52, for a controller and its motor load.

NEC 430.53(C) "Other Group Installations" permits one protective device to protect the multiple-motor branch circuit shown in Figure 3. There are two allowable possibilities: (1) "listed factory assembly" or (2) "separate assemblies listed for such use". The NEC does not define either case, but requires both to be Listed. Listed means that a third party, like Underwriters Laboratories Inc. (UL), has certified that a controller sample met the product safety standard's Listing requirements for NEC 430.53(C) group installations. UL 508 Section 52A contains the requirements for NEC 430.53(C).⁽¹⁾

UL 508 52A verifies that when protecting and wiring a controller in accordance with NEC 430.53(C) and 430.53(D), the controller itself is not a shock or fire hazard. UL 508 Section 52A first verifies the controller's short-circuit current rating (SCCR) by fault testing with larger protective devices, and then requires this marking on the controller or in its instructions: "Suitable for motor group installation...." UL specifies this marking to identify controllers that it Lists for group installations. To approve the controller's use, an electrical inspector verifies that the controller has the marking that UL 508 Section 52A requires.

What if UL Listed some contactor-based motor controllers for NEC 430.53(C) without using UL 508 Section 52A? Is UL 508 Section 52A retroactive? UL must determine this. Only UL can verify whether it Lists a controller for NEC 430.53(C) group installations that does not meet UL 508 Section 52A and if so, how to identify it.

Section 52A of UL 508 contains the only contactor-based motor controller NEC 430.53(C) Listing requirements. In Figure 3, installing a controller without the "Suitable for motor group installation..." marking does not comply with the NEC because its Listing only covers NEC 430.52 individual-motor circuit installation. So in this case, the installer must add a separate protective device, sized for the motor that the controller serves, in each of the controller's input circuit.



NFPA 79 7.2.10.4 – Group Installation Listing Requirements for Contactor-based Motor Controllers

In the general multiple-motor branch circuit case that is shown in Figure 4, installation of a contactor-based motor controller (magnetic motor controller) that is not marked "Suitable for motor group installation..." does not comply with NFPA 79, *Electrical Standard for Industrial Machinery*. A controller that is not marked means that the controller does not contain "Suitable for motor group installation..." markings, or equivalent, on the controller itself or in the instructions that ship with it. Only controllers that comply with Section 52A of UL 508 can have this marking. UL 508, "Industrial Control Equipment" (17th edition), is the product safety standard that includes Section 52A, "Group Installation (Optional)".

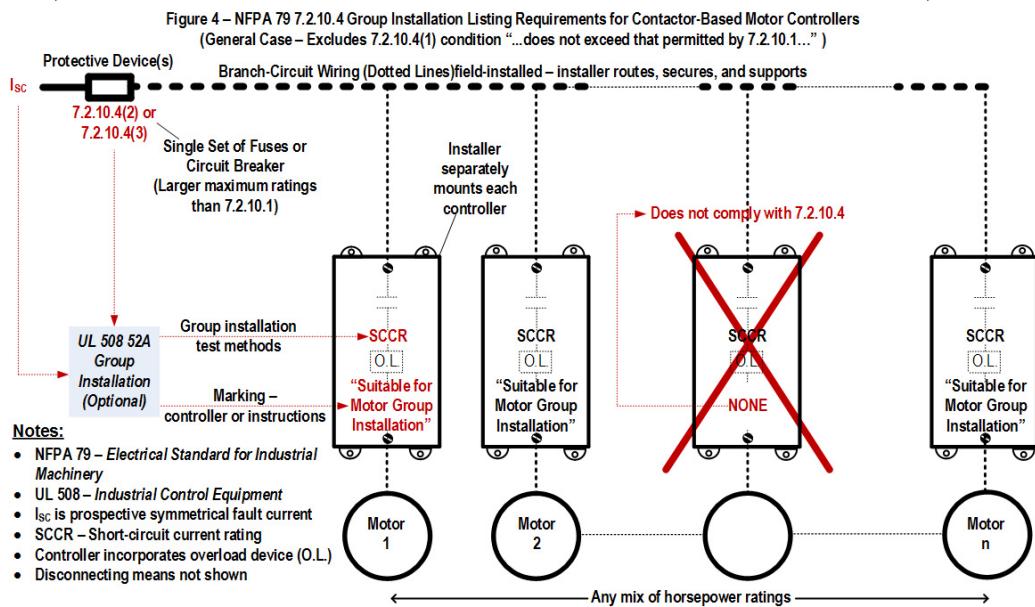
Note: The general multiple-motor branch circuit case excludes the special restrictive rule that describes the maximum ampere rating of the motor branch short-circuit and ground-fault protective device, which is found in NFPA 79 7.2.10.1 for an individual motor control device and its motor load.

NFPA 79 7.2.10.4 permits one protective device to protect the multiple-motor branch circuit shown in Figure 4 only if each drive (motor controller) is "listed for group installation". Listed means that a third party, like Underwriters Laboratories Inc. (UL), has certified that a controller sample met the product safety standard's Listing requirements for NFPA 79 7.2.10.4 group installations. UL 508 Section 52A contains the requirements for NFPA 79 7.2.10.4.⁽¹⁾

UL 508 Section 52A verifies that when protecting and wiring a controller in accordance with NFPA 79 7.2.10.4 and 7.2.10.5, the controller itself is not a shock or fire hazard. UL 508 Section 52A first verifies the controller's short-circuit current rating (SCCR) by fault testing with larger protective devices, and then requires this marking on the controller or in its instructions: "Suitable for motor group installation...". UL specifies this marking to identify controllers that it Lists for group installations. To approve the controller's use, an electrical inspector verifies that the controller has the marking that UL 508 Section 52A requires.

What if UL Listed some contactor-based motor controllers for NFPA 79 7.2.10.4 without using UL 508 Section 52A? Is UL 508 Section 52A retroactive? UL must determine this. Only UL can verify whether it Lists a controller for NFPA 79 7.2.10.4 group installations that does not meet UL 508 Section 52A and if so, how to identify it.

Section 52A of UL 508 contains the only contactor-based motor controller NFPA 79 7.2.10.4 Listing requirements. In Figure 4, installing a controller without the "Suitable for motor group installation..." marking does not comply with NFPA 79 because its Listing only covers individual-motor circuit installation. So in this case, the installer must add a separate protective device, sized for the motor that the controller serves, in each of the controller's input circuit.



(1) UL 60947-1 and UL 60947-4-1 are expected to replace UL 508.

Conclusions

Each distinct one-page section within this document addresses this **general** case: If a motor controller is Listed for group installation, the NEC and NFPA 79 permit (1) installing it in a branch circuit with other motors having any mix of horsepower ratings and (2) protecting all of the wiring and controllers with a single set of fuses or a single circuit breaker large enough to operate this mix of motors. The rules for this general multiple-motor branch circuit case are found in the NEC 430.53(C) and 450.53(D) and in NFPA 79 7.2.10.4 and 7.2.10.5.

For this **general** case, the following conclusions apply.

Importance of a motor controller being listed for group installation -

- Unless a motor controller is Listed for group installation, its Listing covers only individual motor circuit installation and installing it in a general multiple-motor circuit does not comply with the NEC and NFPA 79.
- This Listing is important because it verifies that the controller's short-circuit current rating is valid with the larger fuses and circuit breakers necessary to operate the multiple-motor circuit.
- If a motor controller is not Listed for group installation, the installer must add fuses or a circuit breaker in each motor controller's input circuit.
- So, the group installation Listing is important because it verifies that the controller's short-circuit current rating applies to the multiple-motor branch circuit and removes the requirement for the additional input circuit protective device(s).

Drives and Motor Controllers -

- A drive is a motor controller and therefore, it must be Listed for group installation.

Verifying UL lists a motor controller for group installation -

- UL specifies this marking to identify a motor controller that UL Lists for group installation: "Suitable for motor group installation...". So, to verify UL Lists a motor controller for group installation, confirm it has this marking on the controller or in its instructions.
- And, if it does not have this marking, only UL can (1) verify whether it Lists the controller for group installation and (2) specify the marking it uses to identify this special equipment.

Listing requirements for a "factory assembly" and "separate assemblies" –

- The first sentence of NEC 430.53(C) relies on two terms that the NEC does not define: "factory assembly" and "separate assemblies". But the text also requires both to be "listed": "listed factory assembly" or "separate assemblies listed for such use". Section 46 of UL 508C contains the 430.53(C) listing requirements for drives. Section 52A of UL 508 contains the 430.53(C) listing requirements for contactor-based motor controllers. Neither contains the term "factory assembly" or the term "separate assemblies" and each requires this marking: "Suitable for motor group installation...".
- Therefore, the terms "factory assembly" and "separate assemblies" do not change the Listing requirements. All drives and contactor-based motor controllers that are Listed for 430.53(C) installation are marked "Suitable for motor group installation...".

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Applying More Than One ArmorStart Motor Controller in a Single Branch Circuit on Industrial Machinery, publication 280-AT003	Explains how to use the group installation Listing to apply the ArmorStart product family of motor controllers in multiple-motor branch circuits.
For UL resources, see https://www.ul.com	UL resources can help an inspector to apply the rules consistently and provides the relevant UL references for the inspector or installer, to determine compliance with the NEC. UL provides information on both the Suitable for motor group installation marking and Industrial Control Equipment or Power Conversion Equipment identification on products.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Rockwell Automation maintains current product environmental information on its website at
<http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

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