

Conformance to Standards

Overview

Multi 9 circuit protection products conform to the standards most needed by OEMs—UL 489/CSA C22.2 No.5, UL 1077, CSA C22.2 No. 235, and IEC 60947-2.

Different applications call for circuit protection devices that meet different standards. The Multi 9 family allows OEMs to use a single family of products in their equipment, whether it is destined for the United States, Canada or an international market outside of North America. A variety of Multi 9 devices are tested per Underwriters Laboratories® (UL®) and Canadian Standards Association® (CSA®) Standards as required by the National Electrical Code® (NEC®) in the United States and the Canadian Electrical Code (CEC) in Canada. They are also tested per the standards of the International Electrotechnical Commission® (IEC®) and may therefore be used in International Markets where these products meet the requirements.

In this catalog, the products are grouped by the standards they are designed to meet, including:

- UL 489—Defines rigorous testing requirements for circuit breakers in the United States
- CSA C22.2 No. 5—Defines rigorous testing requirements for circuit breakers in Canada
- CSA C22.2 No. 235—Defines requirements for supplementary protectors
- UL 489A—Limited applications (dc circuits in communications equipment)
- UL 1077—Defines supplementary protectors for use within electrical equipment protected by branch circuit breakers
- IEC 60947-2—International standards for circuit breakers to be used in industrial applications

UL 489/CSA C22.2 No.5 Standard—Branch Circuit Protection

An OEM product as a whole must be appropriately protected from overcurrent conditions, either by connection in the field to a protected branch circuit (in accordance with NEC) or by inclusion of branch circuit protection within the product itself. In the United States, these branch circuit protection devices must comply with the UL 489/CSA C22.2 No.5 Standard for Molded-Case Circuit Breakers. (see UL 489/CSA C22.2 No.5 No. 1 in Figure 3, which is a drawing of a hypothetical piece of OEM equipment requiring multiple protection devices.)

Applications Requiring UL 489/CSA C22.2 No.5 Listed Circuit Breakers

In some instances, the protective devices being installed in equipment must comply with UL 489/CSA C22.2 No.5. These include the following situations:

1. If a circuit such as a convenience receptacle could leave the equipment, that circuit must be protected by a UL 489/CSA C22.2 No.5 branch circuit protection device (see UL 489/CSA C22.2 No.5 No. 2).
2. If a circuit such as to an external motor could leave the equipment, that circuit must be protected by a UL 489/CSA C22.2 No.5 branch circuit protection device (see UL 489 No. 3).
3. Motors within the equipment should also be protected by a UL 489/CSA C22.2 No.5 device (see UL 489 No. 4).
4. All equipment which requires HACR (Heating, Air Conditioning, and Refrigeration) rating must be protected by a UL 489/CSA C22.2 No.5 branch circuit protection device (see UL 489 No. 5).

NOTE: The motor control circuit may be protected by a UL 1077 device. *It must also have over current protection even though there is a UL 1077 device downstream.*

In general, a UL 489/CSA C22.2 No.5 circuit breaker could also be used in any application for which a UL 1077 device is allowed, since the UL 489/CSA C22.2 No.5 devices meet or exceed the requirements of UL 1077 devices. The converse of this is not true, since UL 1077 devices cannot meet the more stringent UL 489/CSA C22.2 No.5 Standard.

UL 1077 Standard—Supplementary Protection within the Product

Within the OEM product itself, additional (supplementary) protection for sensitive or critical internal circuitry may be provided by one or more supplementary circuit protectors. A supplementary protector is an overcurrent protection device which is specifically designed for OEM applications and which complies with UL 1077 Standard for Supplementary Protectors for Use in Electrical Equipment.

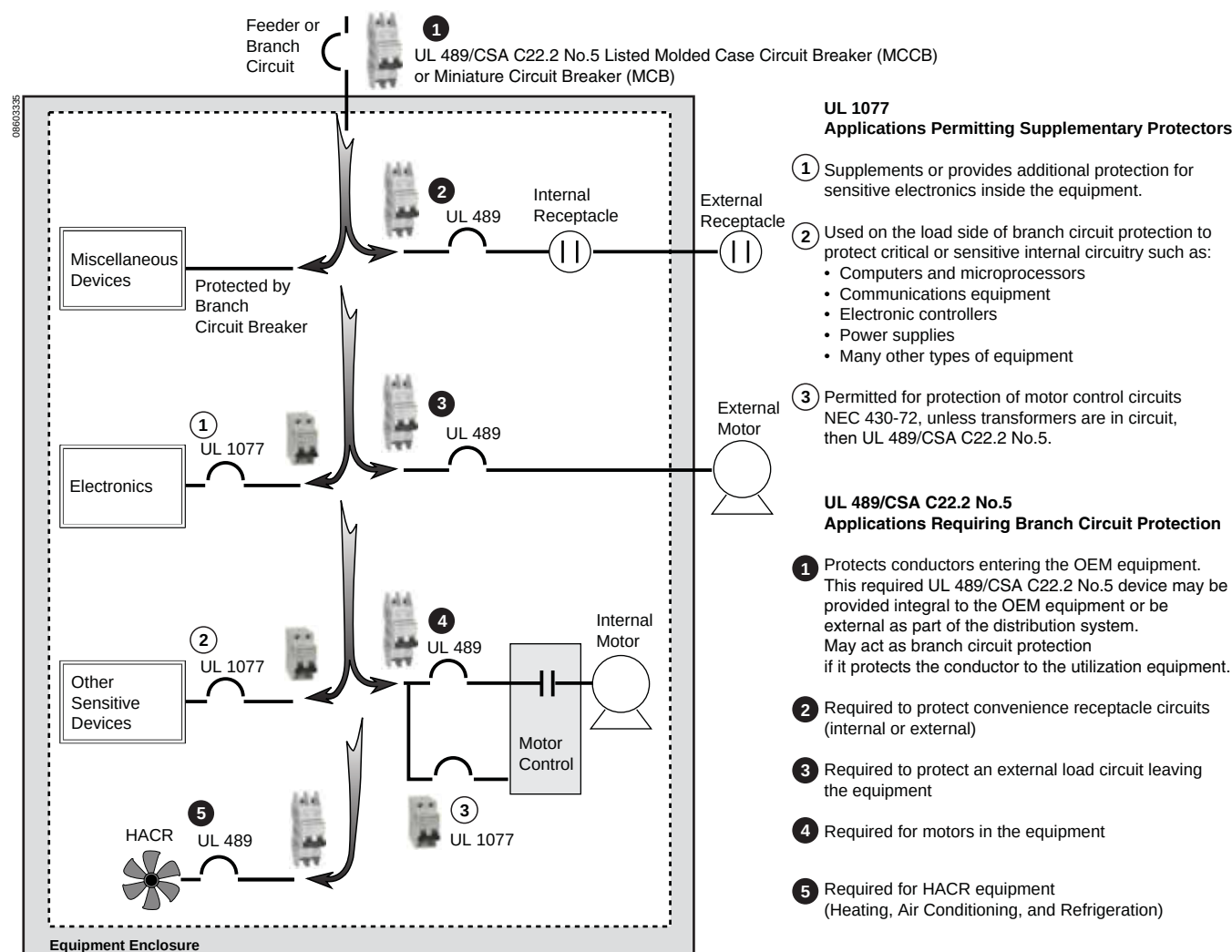
Under UL 1077, supplementary protectors may be used under the following conditions:

- When branch overcurrent protection is already provided
- If short-circuit protection is needed for sensitive devices within the equipment
- When wiring connected to the supplementary protector does not exit the equipment to external devices such as receptacles or motors
- If the UL 1077 device does not provide the only means of disconnecting the product

The following applications illustrated in Figure 3 allow the use of UL 1077 supplementary protectors:

- The supplementary protection is used to supplement or provide additional protection to sensitive components inside the equipment (see UL 1077 No. 1). A UL 489/CSA C22.2 No.5 circuit breaker must be located upstream from the equipment.
- Critical or sensitive internal circuitry (see UL 1077 No. 2) such as: Computers and microprocessors, communications equipment, electronic controllers, power supplies and many other types of equipment
- Motor control circuits may be protected by a UL 1077 device, unless the circuit includes a transformer (in which case a UL 489/CSA C22.2 No.5 device is required).

Figure 3: Guidelines for Application of UL 489/CSA C22.2 No.5 Circuit Breakers and UL 1077 Supplementary Protectors



NOTE: This is a simplified summary of the standards. Refer to applicable codes for specific applications.

Comparing Terminology for UL 489/CSA C22.2 No.5 and 1077 Standards

The terms used to differentiate these products can cause confusion if a user is not careful. Misapplying the terms may result in misapplication of the products.

Any one of the following terms can be used to identify supplementary protectors:

- Supplementary protector
- UL Recognized
- UL 1077
- The UL symbol 

Any of the following terms can be used to identify circuit breakers:

- Circuit breaker
- UL Listed
- UL 489/CSA C22.2 No.5
- The UL symbol 

UL 486 Standard—Connection Terminals

The UL 486 Standard applies to compression wiring connection terminals. It is a requirement for connections of a UL 489/CSA C22.2 No.5 circuit breaker. Although it is not a requirement for UL 1077 Recognized devices, UL 486 Rated terminals are included on those Multi 9 products. This allows the user to apply field wiring directly to any of these devices, without using intermediate, UL rated terminal blocks.

The connectors on Multi 9 devices are Rated UL 486A-B, which applies to copper conductors.

These standards apply to field-wired terminals that are an integral part of the equipment. Criteria includes static heating tests, secureness tests, and pull-out tests.

IEC 60947-2 Standard

In countries which follow the IEC Standards, IEC 60947-2 is used for most industrial applications of circuit protection. IEC 60947-2 does not distinguish between the two levels of protection equivalent to UL 489/CSA C22.2 No.5 circuit breakers and 1077 supplementary protectors. Therefore, in equipment like that illustrated in figure 3, if IEC guidelines apply, then all of the devices could be selected from the IEC Rated portion of this catalog.

IEC 60898 Standard

The IEC 60898 Standard is less stringent than 60947-2. It applies primarily to residential applications of circuit breakers in countries adhering to IEC Standards, and is not generally applicable to OEMs.

CSA C22.2 Standard

The CSA (Canadian Standards Association) C22.2 Standards closely correspond to the UL Standards: CSA C22.2 No. 5-02 (harmonized to UL 489/CSA C22.2 No.5) and CSA C22.2 No. 235 (equivalent to UL 1077). All UL rated devices also have the corresponding CSA rating, unless otherwise noted.

CCC Mark



CCC Mark

The China Compulsory Certification (CCC) mark is a new safety and quality mark system. Compulsory Product Certification System (CPCS) prohibits the sale or importation of equipment under the scope of the law that does not bear the CCC Mark issued by a Designated Certification Body (DCB). The CCC Mark covers both safety and Electromagnetic compatibility.

The CPCS regulates twenty-two different product groups, which include the following:

Electrical wires and cables; switches for circuits, installation protective and connection devices; low-voltage electrical apparatus; small power motors; electric tools; welding machines; household and similar electrical appliances; audio and video apparatus; information technology equipment; lighting apparatus; telecommunications terminal equipment; motor vehicles and safety parts; motor vehicle tires; safety glass; agricultural machinery; latex products; medical devices; fire fighting equipment; detectors for intruder alarm systems; wireless local area network equipment; security and protection equipment; and decoration and renovation products.

UL 508 Standard—Manual Motor Controllers

UL Standard 508 covers industrial control equipment, specifically for motor control functions. It covers individual devices as well as assemblies.

There are UL 508 Listed manual motor controllers that look much like miniature circuit breakers, and have thermal settings and instantaneous settings similar to circuit breakers. These are specialized devices and cannot be used for a wide range of applications, as can UL 1077 and UL 489/CSA C22.2 No.5 devices.

Like UL 1077 supplementary protectors, a UL 508 Listed manual motor controller (or a group of them) must be protected by a UL 489/CSA C22.2 No.5 Listed branch circuit breaker.

Manual motor controllers are available from Schneider Electric (Telemecanique products GV2 and GV3) but are not included in this catalog.

Table 1: Comparison Summary of Applicable UL and IEC Standards

Characteristic	UL 489/CSA C22.2 No. 5	UL 1077/CSA C22.2 No. 235	IEC 60947-2
Labeling	UL Listed	UL Recognized component	IEC Certified device
Nomenclature	Circuit breakers	Supplementary protectors	Circuit breakers or supplementary protectors
Dielectric test (for 240 Vac)	2 times rated plus 1000 V for 1 minute (1,480 at 240 Vac)	2 times rated plus 1,000 V for 1 minute (1,480 at 240 Vac)	1,500 V
Interrupting rating	10 kA at 240 Vac	10 kA at 240 Vac	20 kA at 240 Vac
Overload protection	50 operations at 600% rating	50 operations at 150% rating	12 operations at 600% rating
Service capacity	Must be operational after two interruptions	May be tested in series with branch circuit device and may become inoperable after test	Must be operational after two interruptions
Calibration test	200% I _n , 2 minutes max. (0–30 A)	Per manufacturer's trip curve	At 200% I _n , time shall not exceed manufacturer's stated value
Calibration temperature	25°C (77°F), unless other value specified by manufacturer	Manufacturer must specify	Manufacturer must specify
Testing temperature	25°C (77°F) ambient, 50°C (122°F) rise max. at terminals	25°C (77°F) ambient, 50°C (122°F) rise max. at field wiring terminals; 65°C (149°F) rise max. on factory wiring terminals	At 25°C (77°F) ambient, 80°C (176°F) rise max. at terminals
Endurance	6000 operations at rated current and voltage, 75-80% PF, plus 4000 operations at no load	6000 operations at rated current and voltage, 75-80% PF	1500 operations at rated current and voltage, 75-80% PF
Air spacing	3/4 in. (20.1 mm)	3/8 in. (9.53 mm)	See dielectric
Surface spacing	1-1/4 in. (31.8 mm)	1/2 in. (12.7 mm)	See dielectric
Test and follow up tests	Initial, periodic and quarterly follow-up tests observed by UL representative	Initial tests observed by UL representative, plus quarterly visual follow-up inspection by UL	Conducted by manufacturer