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Multi 9™ System Catalog

Catalog
0860CT0201 R11/14

2014

Class 860



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Section 1—Introduction

Multi 9™ Products for Equipment Applications

Multi 9 modular system of miniature circuit breakers and supplementary protectors, accessories, and peripherals provides protection of equipment or especially sensitive circuits within the equipment. Installation labor and space are both minimized by the modular architecture of the Multi 9 system, whether a single protective device or multiple devices with their accessories are being used.

Schneider Electric offers an extensive line of UL 489/CSA C22.2 No.5 Circuit Breakers and UL 1077 Supplementary Protectors. In addition, a variety of IEC certified Circuit Breakers and Accessories are available for an original equipment manufacturer (OEM) whose products are destined for export beyond North America. To an OEM, this means that one family of electrical protection products can be used regardless of equipment destination.

The Standards include:

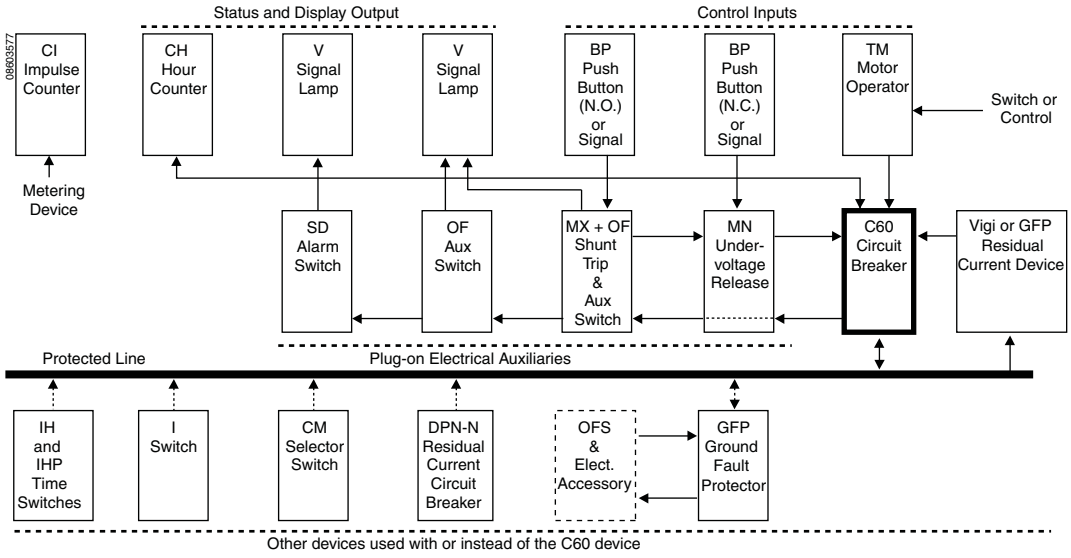
- UL 489 Standard for Circuit Breakers
- UL 489A Standard for DC Communication Applications
- UL 1077 Standard for Supplementary Protectors
- UL 1053 Ground Fault Sensing and Relaying Equipment
- IEC 60947-2 Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
- CSA C22.2 No. 5 Standard for Circuit Breakers
- CSA C22.2 No. 235 Supplementary Protectors
- CCC Pending
- C60 Miniature Circuit Breakers are RoHS Compliant

Potential applications include semi-conductor machines, communication equipment, process control panels, computers, medical equipment, electronic controls, transformers, power supplies, and other electrical equipment.

System Flexibility

The Multi 9 System includes an extensive line of field-installable accessories. Plug-on electrical auxiliaries include shunt trip, undervoltage release, auxiliary switch, and alarm switch. Other protection devices include residual current devices, dc circuit breakers, and switches. Control and display devices include signal lamps, push buttons, and motor operators. There are also mechanical accessories for locking, operating, shielding, mounting, etc. The following diagram shows many of the Multi 9 system accessories.

Figure 1: Functional Diagram of Multi 9 System



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Advantages

Multi 9 C60 circuit breakers and supplementary protectors provide several features which are important to OEMs. These include:

- Small, compact size
- Easy installation on DIN rails
- Limits let-thru current
- Resetability, more convenient than fuses
- Electrical auxiliaries for control and status information
- Extensive variety of accessories

Figure 2: UL 489/CSA C22.2 No. 5 Listed Multi 9 C60 Circuit Breakers



Better Protection—Multi 9 supplementary protectors and miniature circuit breakers limit let-through current, providing faster separation of the component from the fault, thereby reducing system damage.

More Selection—More ratings compatible with low-power electronic circuits are available in the range from 0.5 to 10 A. Others are provided in convenient steps, up to 63 A for the C60 products.

Reduction of Nuisance Tripping—Available with different trip characteristics to meet system needs: B, C and D curves, depending on the model.

Panel Space Savings—Multi 9 products are compact. Width per pole is only 0.71 in. (18 mm) for the C60 circuit breaker. All of the products are built in a consistent format with incremental widths of 0.35 in. (9 mm) (therefore the name Multi 9).

Simple Installation—The Multi 9 products mount easily onto a 35 mm DIN mounting rail. Large box lug terminals (pressure plate type) are suitable for use with copper wiring up to 2 AWG for C60 circuit breakers and supplemental protectors.

Reverse Feeding— Reverse feeding of line power is permitted.

Reliability—Each C60 miniature circuit breaker has an endurance of 10,000 operation cycles and voltage withstand of 6000 V impulse rating.

World-Wide Availability—The Multi 9 products are available and supported throughout the world by Schneider Electric.

From the Power Distribution Specialists—Schneider Electric can be your single source of protection equipment, with a comprehensive line of products for OEM products or the factory. In addition to the Multi 9 circuit breakers and supplementary protectors, these products include the following:

- QO™ and QOU Miniature Circuit Breakers 10–125 A
- Compact™ Molded Case Circuit Breakers 15–3200 A
- Powerpact™ Molded Case Circuit Breakers 15–3000 A
- Masterpact™ Universal Power Circuit Breakers 250–6300 A

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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.

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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:

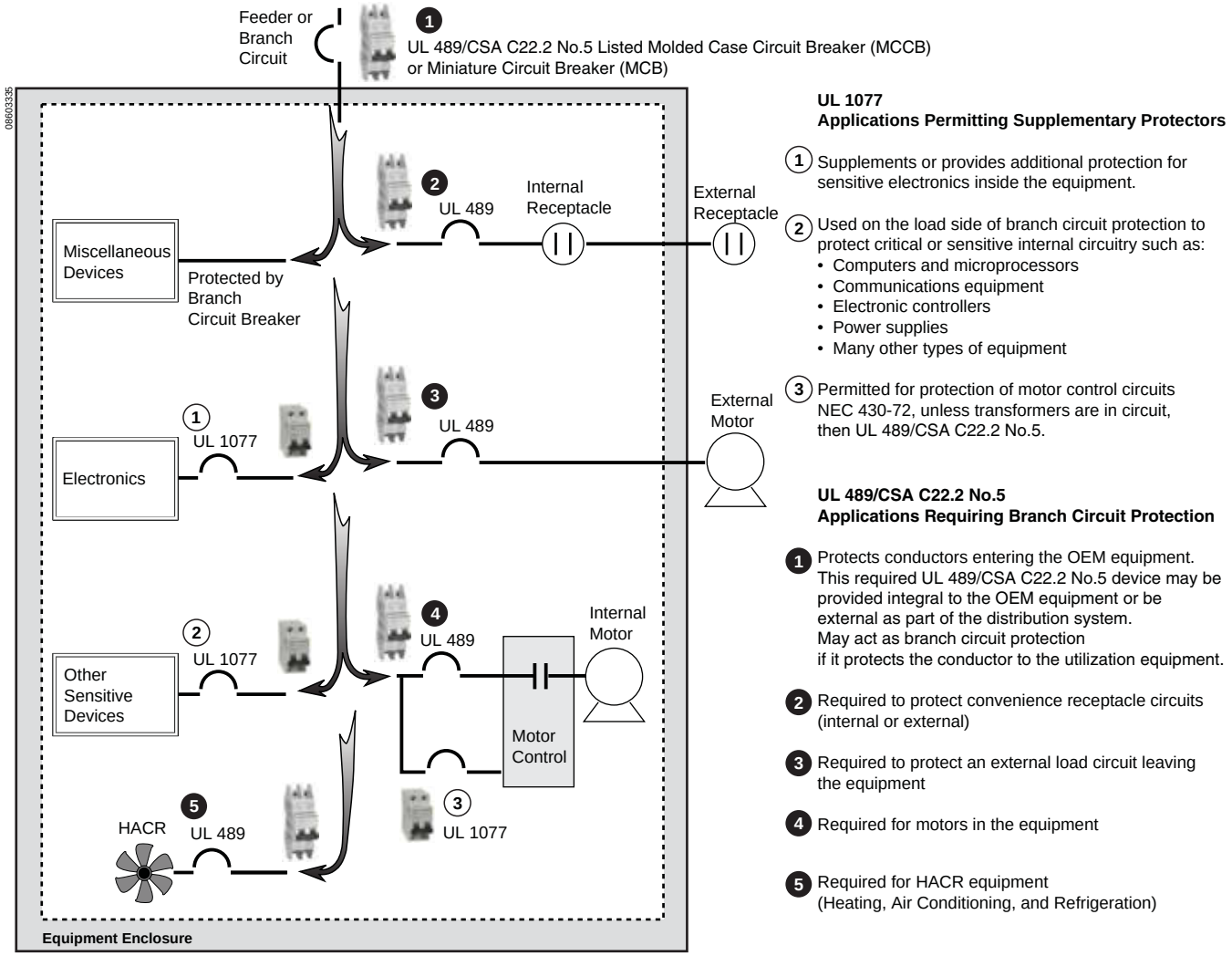
- When branch overcurrent protection is already provided
- If short-circuit protection is needed for sensitive devices within the equipment
- When wiring connected to the supplementary protector does not exit the equipment to external devices such as receptacles or motors
- If the UL 1077 device does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

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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

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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

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.

CCC Mark

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.

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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

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Section 2—UL and CSA Rated Protection Devices

The Multi 9 system includes several families of miniature circuit protection devices that have the UL ratings required in the United States and some other countries. The products are summarized below and are described in detail on the following pages. They include the following families:

- UL Listed C60 240 V Circuit Breakers (UL 489/CSA C22.2 No.5)
- UL Listed C60 480 V Circuit Breakers (UL 489/CSA C22.2 No.5)
- UL Listed C60 Circuit Breakers for use in Communication Equipment (UL 489A) not CSA certified
- UL Recognized C60 Supplementary Protectors (UL 1077 and CSA C22.2 No. 235)

NOTE: Protection devices with only IEC ratings are described in Section 3, while accessories for both the UL and IEC devices are described in Section 5.

Table 2: Specifications for UL 489/CSA C22.2 No.5 Circuit Breakers

Ratings per UL Standards			**UL 489/CSA C22.2 No.5 C60 (240 Vac)**				**UL 489/CSA C22.2 No.5 C60 (480Y/277 Vac)**		
Number of Poles			1P		2P	3P	1P	2P	3P
Rated Current at 77°F (25°C)			0.5–20 A	25–35 A	0.5–35 A	0.5–35 A	0.5–20 A	1–20 A	1–20 A
Interrupting Ratings as per UL 489/CSA C22.2 No.5	AC 50/60 Hz	120 V	10 kA	10 kA	—	—	10 kA	—	—
		240 V	10 kA	5 kA	10 kA	10 kA	10 kA	10 kA	10 kA
		277 V	—	—	—	—	10 kA	10 kA	10 kA
		480Y/277 V	—	—	—	—	—	10 kA	10 kA
	DC	60 V	10 kA		10 kA	—	—	—	—
		125 V	—		10 kA	—	—	—	—
Ultimate Breaking Capacity (I_{cu}) as per IEC 60947-2	AC 50/60 Hz	240 V	10 kA		20 kA	20 kA	10 kA	10 kA	10 kA
		415 V	10 kA		10 kA	10 kA	10 kA	10 kA	10 kA
		440 V	—		6 kA	6 kA	—	6 kA	6 kA
Service Breaking Capacity (I_{cs}) (%I_{cu})			75%	75%	75%	75%	75%	75%	75%
Magnetic Setting (Times Ampere Rating)	B curve		—				—		
	C curve		7 to 10				7 to 10		
	D curve		10 to 14				10 to 14		
Dimensions (in./mm)	Width		0.71/18	0.71/18	1.42/36	2.13/54	0.71/18	1.42/36	2.13/54
	Height	box/box	4.21/107	4.21/107	4.21/107	4.21/107	5.56/141	5.56/141	5.56/141
		ring/ring[1]	4.86/123.4	4.86/123.4	4.86/123.4	4.86/123.4	5.56/141	5.56/141	5.56/141
	Depth		3.00/76	3.00/76	3.00/76	3.00/76	3.00/76	3.00/76	3.00/76
Weight (oz./g) max.		box/box	4.4/136	4.4/136	8.7/271	13.1/407	5.3 (166)	10.6/332	15.9 (498)
		ring/ring	5.2/161	5.2/161	10.3/321	15.5/482	5.3 (166)	10.6/332	15.9 (498)

[1] Fingersafe 240 V C60 circuit breaker ring terminal dimensions are same as the 480 V C60 circuit breaker.

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Figure 4: UL 1077 Recognized C60 Supplementary Protectors



Table 3: Specifications for UL 1077 Recognized Supplementary Protectors

Ratings per UL Standards			**UL 1077 C60**			
Number of Poles			1P	2P	3P	4P
Rated Current at 77°F (25°C)			0.5–63 A	0.5–63 A	0.5–63 A	0.5–63 A
Interrupting Ratings as per UL 1077	50/60 Hz	120 Vac	10 kA	—	—	—
		240 Vac	10 kA	10 kA	10 kA	10 kA
		277 Vac	5 kA	—	—	—
		480Y/277 Vac	—	5 kA	5 kA	5 kA
	—	65 Vdc	10 kA	—	—	—
		125 Vdc	—	10 kA	—	—
Ultimate Breaking Capacity (I_{cu}) as per IEC 60947-2	50/60 Hz	240 Vac	10 kA	20 kA	20 kA	20 kA
		415 Vac	3 kA	10 kA	10 kA	10 kA
		440 Vac	—	6 kA	6 kA	6 kA
Service Breaking Capacity (I_{cs}) (%I_{cu})			75%	75%	75%	75%
Plug-On Auxiliary Modules with Mechanical Linkage:			MN Undervoltage Trip MX + OF Shunt Trip/Auxiliary Switch OF Auxiliary Switch SD Alarm Switch			
Magnetic Setting	B Curve		Between 3.2 and 4.8 Times Ampere Rating			
	C Curve		Between 7 and 10 Times Ampere Rating (Between 7 and 14 for dc)			
	D Curve		Between 10 and 14 Times Ampere Rating (No DC Rating for D Curve)			
Dimensions (in./mm)	Width		0.71/18	1.42/36	2.13/54	2.84/72
	Height		3.19/81	3.19/81	3.19/81	3.19/81
	Depth		3.00/76	3.00/76	3.00/76	3.00/76
Weight (oz./g)			3.85/110	7.70/220	11.55/330	15.40/440

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UL 489/CSA C22.2 No.5 Listed 240 Vac C60 Circuit Breakers (AC)

A selected range of Multi 9 circuit breakers rated 240 V are UL 489/CSA C22.2 No.5 Listed. Unlike UL 1077 Supplementary Protectors, these UL 489/CSA C22.2 No.5 circuit breakers can be used for branch circuit protection as required by the National Electrical Code.

As shown in tables 5 and 6 the UL 489/CSA C22.2 No.5 Listed products are available in C and D curves. They include devices ranging from 0.5 to 35 A.

Figure 5: UL 489/CSA C22.2 No.5 Listed Multi 9 C60 Circuit Breakers



Table 4: Specifications for UL 489/CSA C22.2 No.5 240 V Listed C60 Circuit Breakers

High Voltage Withstand	6 kV	
Connector: Box Lug	Rating	UL 486A File No. E216919 (Use with Copper Wire Only)
	Connection	0.5–25 A: 14–4 AWG (2–25 mm^2) Cables Torque to 22 lb-in. (2.48 N•m) 30–35 A: 14–2 AWG (1–35 mm^2) Cables Torque to 31 lb-in. (3.52 N•m)
Connector: Ring Tongue	Use Single UL Listed or CSA Certified Insulated Ring Tongue Only	Screw dia. 0.2 in. (5 mm) Torque to 18 lb-in. (2.03 N•m)
	Max Ring Terminal Width	0.54 in. (14 mm)
Mounting	35 mm DIN rail	
Degree of Protection	Case	IP40 as per IEC 529
	Terminals	IP20
Temperatures	Calibration	25°C (77°F)
	Storage	-40 to 80°C (-40 to 176°F)
	Operating	-30 to 70°C (-22 to 158°F)
Plug-On Auxiliary Modules with Mechanical Linkage:	MN Undervoltage Trip MX + OF Shunt Trip/Auxiliary Switch OF Auxiliary Switch SD Alarm Switch	
Tropicalization	Treatment 2	Relative Humidity: 95% at 131°F (55°C)
Number of Operating Cycles	Electrical (O-C)	6,000 load, 4,000 no-load
See specifications Table 2 on page 14 for dimensions, weights and interrupting ratings		

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads.
- Trip-free mechanism: Contacts cannot be held in the I-ON position when the C60 circuit breaker is tripped automatically.
- Positive indication of contact disconnect. Green mechanical indication on front face of circuit breaker shows that all poles are open.
- C curve: Overcurrent protection for all application types. Magnetic release operates from 7 to 10 times ampere rating (7 to 14 for DC applications).

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- D curve: Overcurrent protection for loads with high inrush currents (motors, transformers). Magnetic release operates between 10 and 14 times ampere rating (no dc rating for D curve).
- Suitable for reverse feeding.
- Allows locking in O-OFF position using padlock attachment.

Connections

Three versions of field wiring connectors are available for the 240 Vac UL 489/CSA C22.2 No.5 Listed devices:

- Box lug, meeting UL 486A requirements
- Ring tongue terminal with 5 mm screw
- Ring Tongue terminals with Fingersafe (IP20) shrouds

The circuit breakers can be ordered with the following combinations of connectors:

- Line terminal box lug/load terminal box lug
- Line terminal ring tongue/load terminal ring tongue (for fingersafe version, add -F suffix to catalog number)

Figure 6: Connection Options for 240 Vac UL 489/CSA C22.2 No.5 Listed Devices



Standards

- UL 489 Circuit Breaker: File No. E215117
- Single-pole 15–20 A is UL Listed as SWD (switching duty).
- 1-, 2-, and 3-pole 15–35 A are HID (high intensity discharge) rated.
- CSA C22.2 No. 5.1 Circuit Breakers: File No. 179014
- IEC 60947-2
- CE Marked

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Catalog Numbers

Table 5: Catalog Numbers for C Curve, UL 489/CSA C22.2 No.5 Listed 240 Vac C60 Miniature Circuit Breakers (Box Lug and Ring Tongue Terminal Combinations)

Rating	1P		2P		3P	
	Box/Box	Ring/Ring[1]	Box/Box	Ring/Ring[1]	Box/Box	Ring/Ring[1]
0.5 A	60100	60200	60134	60234	—	—
1 A	60101	60201	60135	60235	60168	60268
1.5 A	60102	60202	60136	60236	60169	60269
2 A	60103	60203	60137	60237	60170	60270
3 A	60104	60204	60138	60238	60171	60271
4 A	60105	60205	60139	60239	60172	60272
5 A	60106	60206	60140	60240	60173	60273
6 A	60107	60207	60141	60241	60174	60274
7 A	60108	60208	60142	60242	60175	60275
8 A	60109	60209	60143	60243	60176	60276
10 A	60110	60210	60144	60244	60177	60277
13 A	60111	60211	60145	60245	60178	60278
15 A	60112	60212	60146	60246	60179	60279
20 A	60113	60213	60147	60247	60180	60280
25 A	60114	60214	60148	60248	60181	60281
30 A	60115	60215	60149	60249	60182	60282
35 A	60116	60216	60150	60250	60183	60283

1 IP-20 Fingersafe ring tongue terminals may be ordered with an F suffix (example: 60210F).

Table 6: Catalog Numbers for D Curve, UL 489/CSA C22.2 No.5 Listed 240 Vac C60 Miniature Circuit Breakers (Line/Load as Box Lug or Ring Tongue Terminals)

Rating	1P		2P		3P	
	Box/Box	Ring/Ring[1]	Box/Box	Ring/Ring[1]	Box/Box	Ring/Ring[1]
0.5 A	60117	60217	60151	60251	—	—
1 A	60118	60218	60152	60252	60184	60284
1.5 A	60119	60219	60153	60253	60185	60285
2 A	60120	60220	60154	60254	60186	60286
3 A	60121	60221	60155	60255	60187	60287
4 A	60122	60222	60156	60256	60188	60288
5 A	60123	60223	60157	60257	60189	60289
6 A	60124	60224	60158	60258	60190	60290
7 A	60125	60225	60159	60259	60191	60291
8 A	60126	60226	60160	60260	60192	60292
10 A	60127	60227	60161	60261	60193	60293
13 A	60128	60228	60162	60262	60194	60294
15 A	60129	60229	60163	60263	60195	60295
20 A	60130	60230	60164	60264	60196	60296
25 A	60131	60231	60165	60265	60197	60297
30 A	60132	60232	60166	60266	60198	60298
35 A	60133	60233	60167	60267	60199	60299

1 IP-20 Fingersafe ring tongue terminals may be ordered with an F suffix (example: 60210F).

NOTE: UL 489/CSA C22.2 No.5 Listed Multi 9 circuit breakers are calibrated at 25°C (77°F). Please refer to the rating tables (page 81) for applications at temperatures greater than 25°C (77°F).

NOTE: The NEC requires that the continuous load applied to the circuit breaker shall not exceed 80% of the circuit breaker ampere rating.

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UL 489/CSA C22.2 No. 5 Listed 480Y/277 Vac C60 Circuit Breakers (AC)



The UL 489/CSA C22.2 No.5 Listed 480Y/277 Vac Multi 9 C60 miniature circuit breakers can be used in 480Y/277 Vac systems. With amperages from 0.5 A to 20 A, they are ideal for fuse replacement, yet carry the UL 489/CSA C22.2 No.5 Listing that is required for branch circuit applications. See specifications in Table 2 on page 14 for dimensions, weights, and interrupting ratings.

Table 7: Specifications for UL 489/CSA C22.2 No.5 Listed 480Y/277 Vac C60 Circuit Breakers

Interruption Rating	2P and 3P 1P	480Y/277 V @ 10kA 277 Vac @ 10kA
Amperage	0.5 A through 20 A	
Construction	1P, 2P and 3P	
Magnetic Trip Curves	C-curve D-curve	7 to 10 Times Ampere Rating 10 to 14 Times Ampere Rating
UL 486E Listed Lug	18–16 AWG (1–1.5 mm^2), Cu Only Stranded Wire: 14–10 AWG (2–5 mm^2), Cu Only Solid or Stranded Wire	Torque to 7 lb-in (0.68 N•m) Torque to 14 lb-in (1.6 N•m)
Ring Tongue Screw	5 mm	Torque to 18 lb-in (2 N•m)
Plug-On Auxiliary Modules With Mechanical Linkage:	MN Undervoltage Trip MX + OF Shunt Trip/Auxiliary Switch OF Auxiliary Switch SD Alarm Switch	
Mounting	35 mm DIN Rail	
See selection Table 2 on page 14 for dimensions, weights, and interrupting ratings.		

Benefits

- Satisfies customer's preferences to use circuit breakers instead of fuses.
- Eliminates costs of spare fuses, blown fuse indicators, additional wiring, etc.
- Reduces concerns and uncertainty of misapplying a UL 1077 supplementary protector where a UL 489 branch circuit breaker is required.
- Facilitates one common design for UL 489/CSA C22.2 No.5, CSA and IEC applications.
- Simplifies installation with a compact, DIN-mounted circuit breaker that accepts a wide range of accessories.
- Offers alternative terminations for ring terminals or cable.

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads.
- Trip-free mechanism: Contacts cannot be held in the I-ON position when the circuit breaker is tripped automatically.
- Positive indication of contact disconnect. Green mechanical indication on front face of device shows that all poles are open.
- C curve: Overcurrent protection for all application types. Magnetic release operates from 7 to 10 times ampere rating. (7 to 14 for dc)
- D curve: Overcurrent protection for loads with high inrush currents (motors, transformers). Magnetic release operates between 10 and 14 times ampere rating (no dc rating for D curve).
- Suitable for reverse feeding
- Allows locking in O-OFF position using padlock attachment.

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Connections

Two versions of field wiring connectors are available:

- Single-barrel lug with binding screws for two 18–10 AWG wires.
- Crimp-type ring tongue terminal for up to 8 AWG wire.

Both of these terminals provide fingersafe ingress protection per IP20 of IEC EN60529. This feature reduces the potential of incidental contact with live circuit breaker components.

Standards

- UL 489/CSA C22.2 No.5 Listed
- IEC 60947-2
- CE Marked

Catalog Numbers

Table 8: Catalog Numbers for UL 489/CSA C22.2 No.5 Listed 480Y/277 V C60 Miniature Circuit Breakers (AC)

Rating	Single Barrel Wire Lug			Ring-Tongue Terminal		
	1P	2P	3P	1P	2P	3P
C-curve, 7–10 Times Ampere Rating						
0.5 A	MGN61300	—	—	MGN61366	—	—
1 A	MGN61301	MGN61312	MGN61323	MGN61367	MGN61378	MGN61389
2 A	MGN61302	MGN61313	MGN61324	MGN61368	MGN61379	MGN61390
3 A	MGN61303	MGN61314	MGN61325	MGN61369	MGN61380	MGN61391
4 A	MGN61304	MGN61315	MGN61326	MGN61370	MGN61381	MGN61392
5 A	MGN61305	MGN61316	MGN61327	MGN61371	MGN61382	MGN61393
6 A	MGN61306	MGN61317	MGN61328	MGN61372	MGN61383	MGN61394
8 A	MGN61307	MGN61318	MGN61329	MGN61373	MGN61384	MGN61395
10 A	MGN61308	MGN61319	MGN61330	MGN61374	MGN61385	MGN61396
15 A	MGN61309	MGN61320	MGN61331	MGN61375	MGN61386	MGN61397
20 A	MGN61310	MGN61321	MGN61332	MGN61376	MGN61387	MGN61398
D-curve, 10–14 Times Ampere Rating						
0.5 A	MGN61333	—	—	MGN61399	—	—
1 A	MGN61334	MGN61345	MGN61356	MGN61400	MGN61411	MGN61422
2 A	MGN61335	MGN61346	MGN61357	MGN61401	MGN61412	MGN61423
3 A	MGN61336	MGN61347	MGN61358	MGN61402	MGN61413	MGN61424
4 A	MGN61337	MGN61348	MGN61359	MGN61403	MGN61414	MGN61425
5 A	MGN61338	MGN61349	MGN61360	MGN61404	MGN61415	MGN61426
6 A	MGN61339	MGN61350	MGN61361	MGN61405	MGN61416	MGN61427
8 A	MGN61340	MGN61351	MGN61362	MGN61406	MGN61417	MGN61428
10 A	MGN61341	MGN61352	MGN61363	MGN61407	MGN61418	MGN61429
15 A	MGN61342	MGN61353	MGN61364	MGN61408	MGN61419	MGN61430
20 A	MGN61343	MGN61354	MGN61365	MGN61409	MGN61420	MGN61431

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UL 489/CSA C22.2 No. 5 Listed C60 Circuit Breakers (DC)

Overview

A portion of the range of UL 489/CSA C22.2 No.5 circuit breakers are also Listed by UL for use with dc circuits. The specifications are the same as the UL 489/CSA C22.2 No.5 circuit breakers, with the following exceptions:

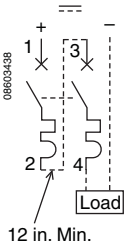
- Number of poles: 1 and 2
- Time/current curve: C curve
- Magnetic setting of C curve: between 7 and 14 times ampere rating
- DC voltage (nominal): 1 pole—60 Vdc, 2 pole—125 Vdc
- Connection: box lug, ring/ring only (same torque)



Table 9: Specifications for UL 489/CSA C22.2 No.5 C60 DC Circuit Breakers

Ratings per UL Standards		UL 489/CSA C22.2 No.5 C60 (DC)	
Number of Poles		1	2
Rated Current (A) at 77°F (25°C)		60 Vdc	
Interrupting Ratings per UL 489/CSA C22.2 No.5 (kA)	60 Vdc	10	—
	125 Vdc	—	10
Service Breaking Capacity (Ics) (%Icu)		75%	75%
Magnetic Setting (Times Ampere Rating)	B curve	—	—
	C Curve	7 to 14	7 to 14
	D Curve	—	—
Dimensions	Width	0.71 in. (18 mm)	1.42 in. (36 mm)
	Height (Box/Box)	4.21 in. (107 mm)	4.21 in. (107 mm)
	Depth	3.00 in. (76 mm)	—
Weight (Max.)		4.4 oz. (136 g)	8.7 oz. (271 g)

Catalog Numbers



2-Pole Wiring Diagram

Table 10: Catalog Numbers for UL 489/CSA C22.2 No.5 C60 Listed Miniature Circuit Breakers (DC)[1]

Rating	C Curve			
	1P, Box/Box	Ring/Ring	2P, Box/Box	Ring/Ring
0.5 A	60100	60200	60134	60234
1 A	60101	60201	60135	60235
1.5 A	60102	60202	60136	60236
2 A	60103	60203	60137	60237
3 A	60104	60204	60138	60238
4 A	60105	60205	60139	60239
5 A	60106	60206	60140	60240
6 A	60107	60207	60141	60241
7 A	60108	60208	60142	60242
8 A	60109	60209	60143	60243

Rating	C Curve			
	1P, Box/Box	Ring/Ring	2P, Box/Box	Ring/Ring
10 A	60110	60210	60144	60244
13 A	60111	60211	60145	60245
15 A	60112	60212	60146	60246
20 A	60113	60213	60147	60247
25 A	60114	60214	60148	60248
30 A	60115	60215	60149	60249
35 A	60116	60216	60150	60250
40 A	—	—	—	—
50 A	—	—	—	—
63 A	—	—	—	—

[1] The dc catalog numbers are the same as the UL 489/CSA C22.2 No.5 ac equivalents.

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UL 1077 Recognized C60 Supplementary Protectors

The UL 1077 products are intended for use as supplementary protectors to provide overcurrent protection within appliances or electrical equipment where branch circuit protection is already provided or is not required.

As shown in the table of catalog numbers below, the UL 1077 Recognized products are available in B, C and D curves. They include devices ranging from 0.5 A to 63 A.

Figure 7: UL 1077 Recognized C60N Supplementary Protectors



Table 11: Specifications for UL 1077 Recognized C60 Supplementary Protectors

Package Size	0.71 in. (18 mm)	Width per Pole
Voltage	Nominal Voltage	480Y/277 Vac
	High Voltage Withstand	6 kV
Connection, Box Lug	Cable: 0.5–25 A: 14–4 AWG (2–25 mm^2) Cu Only	Torque 22 lb-in (2.49 N•m)
UL 486A File No. E90509 Pending	Cable: 30–63 A: 14–2 AWG (2–35 mm^2) Cu Only	Torque 31 lb-in (3.50 N•m)
Optional Ring Terminal Kit	Screw Dia.: 0.2 in. (5mm)	Torque 18 lb-in (2.03 N•m)
Mounting	35 mm DIN rail	
Time-Current Curves	B, C, and D Curves	
Degree of Protection as per IEC 68-2-30	Case	IP40 as per IEC 529
	Terminals	IP20
Temperatures	Calibration	25°C (77°F)
	Storage	-40 to 80°C (-40 to 176°F)
	Operating	-30 to 70°C (-22 to 158°F)
Tropicalization	Treatment 2	Relative Humidity: 95% at 131°F (55°C)
Number of Operating Cycles:	Electrical (O-C)	10,000 at 0.5–63 A
See Specification Table 3 on page 15 for dimensions, weights and interrupting ratings.		

Standards

- UL 1077 Circuit Breaker, File No. E90509
- CSA C22.2 No. 235 File No. 179014
- IEC 60947-2
- CE Marked

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Standard Features

- Trip-free mechanism: Contacts cannot be held in the on position when the C60 is tripped automatically.
- Positive indication of contact disconnect. Green mechanical indication on front face of device shows that all poles are open.
- B curve: Overcurrent protection for sensitive equipment (computers, electronic devices, etc.). Magnetic release operates between 3.2 and 4.8 (between 3.2 and 6.8 for dc).
- C curve: Overcurrent protection for all application types. Magnetic release operates from 7 to 10 times ampere rating (between 7 and 14 for dc).
- D curve: Overcurrent protection for loads with high inrush currents (motors, transformers). Magnetic release operates between 10 and 14 times ampere rating (no dc rating).
- Allows locking in O-OFF position using padlock attachment.
- Suitable for reverse feeding.

For rating and dimensional information, see Table 3 on page 15, Specifications for UL 1077 Recognized Supplementary Protectors.

Catalog Numbers

Table 12: Catalog Numbers for UL 1077 Recognized C60 Supplementary Protectors

Rating	B Curve				C Curve				D Curve			
	1P	2P	3P	4P	1P	2P	3P	4P	1P	2P	3P	4P
0.5 A	—	—	—	—	MG17411	—	—	—	MG17421	—	—	—
1 A	MG24110	MG24125	MG24140	MG24155	MG24425	MG24442	MG24459	MG24476	MG24500	MG24516	MG24532	MG24548
1.2 A	MG17402	MG17432	—	—	MG17412	MG17442	—	—	MG17422	MG17452	—	—
1.5 A	MG17403	MG17433	—	—	MG17413	MG17443	—	—	MG17423	MG17453	—	—
2 A	MG24111	MG24126	MG24141	MG24156	MG24426	MG24443	MG24460	MG24477	MG24501	MG24517	MG24533	MG24549
3 A	MG24112	MG24127	MG24142	MG24157	MG24427	MG24444	MG24461	MG24478	MG24502	MG24518	MG24534	MG24550
4 A	MG24113	MG24128	MG24143	MG24158	MG24428	MG24445	MG24462	MG24479	MG24503	MG24519	MG24535	MG24551
5 A	MG17404	MG17434	—	—	MG17414	MG17444	—	—	MG17424	MG17454	—	—
6 A	MG24114	MG24129	MG24144	MG24159	MG24430	MG24447	MG24464	MG24481	MG24504	MG24520	MG24536	MG24552
7 A	MG17405	MG17435	—	—	MG17415	MG17445	—	—	MG17425	MG17455	—	—
8 A	MG24115	MG24130	MG24145	MG24160	MG24431	MG24448	MG24465	MG24482	MG24505	MG24521	MG24537	MG24553
10 A	MG24116	MG24131	MG24146	MG24161	MG24432	MG24449	MG24466	MG24483	MG24506	MG24522	MG24538	MG24554
13 A	MG24117	MG24132	MG24147	MG24162	MG24433	MG24450	MG24467	MG24484	MG24507	MG24523	MG24539	MG24555
15 A	MG17406	MG17436	MG17461	—	MG17416	MG17446	MG17466	—	MG17426	MG17456	MG17471	—
16 A	MG24118	MG24133	MG24148	MG24163	MG24434	MG24451	MG24468	MG24485	MG24508	MG24524	MG24540	MG24556
20 A	MG24119	MG24134	MG24149	MG24164	MG24435	MG24452	MG24469	MG24486	MG24509	MG24525	MG24541	MG24557
25 A	MG24120	MG24135	MG24150	MG24165	MG24436	MG24453	MG24470	MG24487	MG24510	MG24526	MG24542	MG24558
30 A	MG17407	MG17437	MG17462	—	MG17417	MG17447	MG17467	—	MG17427	MG17457	MG17472	—
32 A	MG24121	MG24136	MG24151	MG24166	MG24437	MG24454	MG24471	MG24488	MG24511	MG24527	MG24543	MG24559
35 A	MG17408	MG17438	MG17463	—	MG17418	MG17448	MG17468	—	MG17428	MG17458	MG17473	—
40 A	MG24122	MG24137	MG24152	MG24167	MG24438	MG24455	MG24472	MG24489	MG24512	MG24528	MG24544	MG24560
50 A	MG24123	MG24138	MG24153	MG24168	MG24439	MG24456	MG24473	MG24490	MG24513	MG24529	MG24545	MG24561
60 A	MG17409	MG17439	MG17464	—	MG17419	MG17449	MG17469	—	MG17429	MG17459	MG17474	—
63 A	MG24124	MG24139	MG24154	MG24169	MG24440	MG24457	MG24474	MG24491	MG24514	MG24530	MG24546	MG24562

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Section 3—IEC 60947-2 Rated Protection Devices

The Multi 9 system includes several families of miniature circuit protection devices that have the IEC ratings that are applicable in many countries other than the United States. These products are summarized below and discussed in more detail in the following pages. UL Listed and UL Recognized protection devices are described in Section 2, while accessories for both UL Listed and IEC Certified products are described in Section 5.

Table 13: Specifications for IEC Rated Miniature Circuit Breakers

Ratings per IEC 60947-2		N40	C60N		C60H		C60L		C120H	
Number of Poles		1 (Ø + N)	1	2, 3, 4	1	2, 3, 4	1	2, 3, 4	1	2, 3, 4
Rated Current 25°C (77°F)	I_n	1–40 A	1–63 A	1–63 A	1–40 A	1–40 A	1–25 A	1–25 A	—	—
Rated Current (A) 40°C (104°F)	I_n	—	—	—	—	—	—		63–125	63–125
Rated Voltage	U_e	230 V	440 V	440 V	440 V	440 V	440 V	440 V	440 V	440 V
Ultimate Breaking Capacity (I_{cu}) as per IEC 60947-2 Standard	130 Vac	—	—	—	30 kA	—	—	—	30 kA	—
	230–240 Vac	7.5 kA	10 kA	20 kA	15 kA	30 kA	25 kA	50 kA	15 kA	30 kA
	400–415 Vac	2[1] kA	3[1] kA	10 kA	4[1] kA	15 kA	6[1] kA	25 kA	4[1] kA	15 kA
	440 Vac	—	—	6 kA	—	10 kA	—	20 kA	—	10 kA
	1P 60 Vdc	—	15 kA	—	20 kA	—	25 kA	—	—	—
	2P 125 Vdc	—	—	2P 20 kA	—	2P 25 kA	—	2P 30 kA	—	—
		—	—	3P 30 kA	—	3P 40 kA	—	3P 50 kA	—	—
	3P 250 Vdc	—	—	4P 40 kA	—	4P 50 kA	—	4P 60 kA	—	—
Service Breaking Capacity	I_{cs} (%I_{cu})	50%	75%	75%	50%	50%	50%	—	75%	75%
Magnetic Trip Curves	B Curve	3–5	—		—		—		3.2–4.8	
	C Curve	7–10	7–10		7–10		7–10		7–10	
	D Curve	—	10–14		10–14		10–14		10–14	
	K Curve	—	—		—		10–14		—	
	MA Curve	—	—		—		12		—	
	Z Curve	—	—		—		2.4–3.6		—	

[1] Single pole breaking capacity for IT type European grounding system (insulated neutral-double fault).

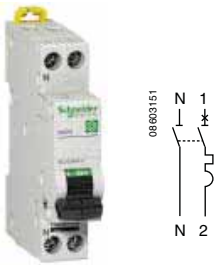
Table 14: Dimensions and Weights

Device	Size	Height		Width		Depth		Weight	
		in.	mm	in.	mm	in.	mm	oz.	g
N40	1P	3.19	81	0.71	18	3.00	76	4.23	120
C60N	1P	3.19	81	0.71	18	3.00	76	3.88	110
	2P	3.19	81	1.42	36	3.00	76	7.75	220
	3P	3.19	81	2.13	54	3.00	76	11.64	330
	4P	3.19	81	2.48	72	3.00	76	15.52	440
C60H	1P	3.19	81	0.71	18	3.00	76	4.23	120
	2P	3.19	81	1.42	36	3.00	76	8.47	240
	3P	3.19	81	2.13	54	3.00	76	12.70	360
	4P	3.19	81	2.48	72	3.00	76	16.93	480
C60L	1P	3.19	81	0.71	18	3.00	76	4.23	120
	2P	3.19	81	1.42	36	3.00	76	8.47	240
	3P	3.19	81	2.13	54	3.00	76	12.70	360
	4P	3.19	81	2.48	72	3.00	76	16.93	480
C120H	1P	3.19	81	0.71	27	3.00	76	6.35	180
	2P	3.19	81	2.13	54	3.00	76	12.70	360
	3P	3.19	81	3.19	81	3.00	76	19.05	540
	4P	3.19	81	4.25	108	3.00	76	25.40	720

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N40 Phase + Neutral Circuit Breakers

Figure 8:



The N40 Phase + Neutral Current Circuit Breaker provides phase and neutral protection against short-circuits and overloads. It provides protection on the phase pole, but switches both the phase and neutral. The N40 is available in only one version—1 phase + neutral. The N40 circuit breaker is available with C trip curve characteristics and with ratings from 1 to 40 A.

Table 15: Specifications for N40 Phase + Neutral Circuit Breakers

Package size:	Two 0.35 in. (9 mm) Modules	0.71 in. (18 mm) Width
Connection:	8 AWG (10 mm^2) Stranded Cables	
	6 AWG (16 mm^2) Solid cable (Copper Only)	
Mounting: 35 mm DIN rail	Mounting: 35 mm DIN Rail	
Degree of Protection	Case	IP40 as per IEC 529
	Terminals	IP20
Temperature	Calibration	86°F (30°C)
	Storage	40 to 176°F (-40 to 80°C)
	Operating	22 to 158°F (-30 to 70°C)
Tropicalization	Treatment 2	Relative Humidity: 95% at 131°F (55°C) as per IEC 68-2-30
Number of Operating Cycles	Mechanical	20,000 (O-C)
	Electrical	20,000 at 1–20 A 15,000 at 25 A 10,000 at 32 A 6,000 at 40 A
See selection table for dimensions, weights and interrupting ratings.		

Time/Current Curves

C curve—Provides control and protection against circuit overcurrents in tertiary and industrial final distribution with TT or TNS grounding systems. Magnetic trip units operate between 5 and 10 times ampere rating.

Accessories

These devices may be used in conjunction with the C60 electrical accessories, including the SD alarm switch, OF auxiliary switch, MN undervoltage release, and/or the MX + OF shunt trip and auxiliary switch.

Standards

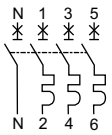
- IEC 60947-2
- IEC 60898

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Catalog Numbers

Catalog Numbers for N40 Phase + Neutral Circuit Breakers

Type	1P+N	3P + N
		
Rating (In)	C Curve	C Curve
1 A	**M9P22601**	—
2 A	**M9P22602**	—
3 A	**M9P22603**	—
4 A	**M9P22604**	—
6 A	**M9P22606**	**M9P22706**
10 A	**M9P22610**	**M9P22710**
16 A	**M9P22616**	**M9P22716**
20 A	**M9P22620**	**M9P22720**
25 A	**M9P22625**	**M9P22725**
32 A	**M9P22632**	**M9P22732**
40 A	**M9P22640**	**M9P22740**
Width in 9-mm modules	2	6

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IEC Rated C60 Miniature Circuit Breakers

The C60 family of Multi 9 circuit breakers meeting IEC 60947-2 is available primarily for equipment for export from the United States to countries requiring IEC Certification rather than UL Listing.

Three types of IEC Rated C60 devices are available: C60N, C60H, and C60L circuit breakers. These model numbers refer to the maximum current interrupting (Ultimate Breaking Capacity) ratings.

Each of these devices is available with several characteristic trip curve ratings, as listed in the tables with catalog numbers. They include devices ranging from 1 to 63 A. (For higher current ratings, select devices from the higher current C120 series.)

Table 16: Specifications for IEC Rated C60 Miniature Circuit Breakers

High Voltage Withstand	6 kV	
Connections (Box Lug) for C60N/H/L Except C60L-MA[1]	1–25 A, 18–4 AWG (1–25 mm^2) Cu Only Cables	Torque to 22 lb-in (2.5 N•m)
	30–63 A, 18–2 AWG (1–35 mm^2) Cu Only Cables	Torque to 31 lb-in (3.5 N•m)
Connections for C60L-MA:	1.5–10 A Stranded 6 AWG (16 mm^2)	Torque to 35 lb-in (4 N•m)
	1.5–10 A Solid 4 AWG (25 mm^2)	Torque to 18 lb-in (2 N•m)
	12.5–40 A Stranded 4 AWG (25 mm^2)	Torque to 35 lb-in (4 N•m)
	12.5–40 A Solid 2 AWG (35 mm^2)	Torque to 31 lb-in (3.5 N•m)
Mounting	35 mm DIN rail	
Time-Current Curves	B, C, D, K, and MA	
Degree of Protection	Case	IP40 as per IEC 529
	Terminals	IP20
Temperature:	Calibration temperature: 30°C (86°F)	C60L calibrated at 40°C (104°F)
	Storage temperature	-40 to 80°C (-40 to 176°F)
	Operating temperature	-30 to 70°C (-22 to 158°F)
Tropicalization	Treatment 2	Relative Humidity: 95% at 131°F (55°C) per IEC 68-2-30
Number of Operating Cycles	Mechanical (O-C)	20,000
	Electrical (O-C)	10,000
See selection table for dimensions, weights and interrupting ratings.		

[1] Ring tongue terminal is optional.

Standard Features

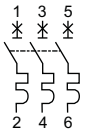
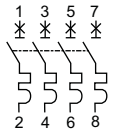
- Fast closing: Allows increased withstand to the high inrush currents of some loads
- Trip-free mechanism: Contacts cannot be held in the I-ON position when the C60 device is tripped automatically.
- Positive indication of contact disconnect. Green mechanical indication on front face of device shows that all poles are open.
- Suitable for reverse feeding.
- C curve: Overcurrent protection for all application types:
  - — C60N/H: The magnetic release operates between 5 and 10 times ampere rating.
  - — C60L: The magnetic release operates between 7 and 10 times ampere rating.
- D curve: Overcurrent protection for loads with high inrush currents (motors, transformers):
  - — C60N/H/L: The magnetic release operates between 10 and 14 times ampere rating.

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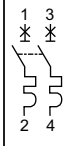
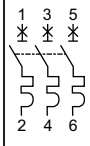
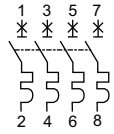
Catalog Numbers

C60N Circuit Breaker

Type	1P		2P		3P		4P	
								
Rating (In)	C Curve	D Curve	C Curve	D Curve	C Curve	D Curve	C Curve	D Curve
1 A	**M9F11101**	**M9F12101**	**M9F11201**	**M9F12201**	**M9F11301**	**M9F12301**	**M9F11401**	**M9F12401**
2 A	**M9F11102**	**M9F12102**	**M9F11202**	**M9F12202**	**M9F11302**	**M9F12302**	**M9F11402**	**M9F12402**
3 A	**M9F11103**	**M9F12103**	**M9F11203**	**M9F12203**	**M9F11303**	**M9F12303**	**M9F11403**	**M9F12403**
4 A	**M9F11104**	**M9F12104**	**M9F11204**	**M9F12204**	**M9F11304**	**M9F12304**	**M9F11404**	**M9F12404**
6 A	**M9F11106**	**M9F12106**	**M9F11206**	**M9F12206**	**M9F11306**	**M9F12306**	**M9F11406**	**M9F12406**
10 A	**M9F11110**	**M9F12110**	**M9F11210**	**M9F12210**	**M9F11310**	**M9F12310**	**M9F11410**	**M9F12410**
16 A	**M9F11116**	**M9F12116**	**M9F11216**	**M9F12216**	**M9F11316**	**M9F12316**	**M9F11416**	**M9F12416**
20 A	**M9F11120**	**M9F12120**	**M9F11220**	**M9F12220**	**M9F11320**	**M9F12320**	**M9F11420**	**M9F12420**
25 A	**M9F11125**	**M9F12125**	**M9F11225**	**M9F12225**	**M9F11325**	**M9F12325**	**M9F11425**	**M9F12425**
32 A	**M9F11132**	**M9F12132**	**M9F11232**	**M9F12232**	**M9F11332**	**M9F12332**	**M9F11432**	**M9F12432**
40 A	**M9F11140**	**M9F12140**	**M9F11240**	**M9F12240**	**M9F11340**	**M9F12340**	**M9F11440**	**M9F12440**
50 A	**M9F11150**	—	**M9F11250**	—	**M9F11350**	—	**M9F11450**	—
63 A	**M9F11163**	—	**M9F11263**	—	**M9F11363**	—	**M9F11463**	—
Width in 9-mm modules	2		4		6		8	

Catalog Numbers

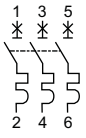
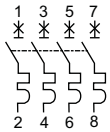
C60H Circuit Breaker

Type	1P		2P		3P		4P	
								
Rating (In)	C Curve	D Curve	C Curve	D Curve	C Curve	D Curve	C Curve	D Curve
1 A	**M9F14101**	**M9F15101**	**M9F14201**	**M9F915201**	**M9F14301**	**M9F15301**	**M9F14401**	**M9F15401**
2 A	**M9F14102**	**M9F15102**	**M9F14202**	**M9F15202**	**M9F14302**	**M9F15302**	**M9F14402**	**M9F15402**
3 A	**M9F14103**	**M9F15103**	**M9F14203**	**M9F15203**	**M9F14303**	**M9F15303**	**M9F14403**	**M9F15403**
4 A	**M9F14104**	**M9F15104**	**M9F14204**	**M9F15204**	**M9F14304**	**M9F15304**	**M9F14404**	**M9F15404**
6 A	**M9F14106**	**M9F15106**	**M9F14206**	**M9F15206**	**M9F14306**	**M9F15306**	**M9F14406**	**M9F15406**
10 A	**M9F14110**	**M9F15110**	**M9F14210**	**M9F15210**	**M9F14310**	**M9F15310**	**M9F14410**	**M9F15410**
16 A	**M9F14116**	**M9F15116**	**M9F14216**	**M9F15216**	**M9F14316**	**M9F15316**	**M9F14416**	**M9F15416**
20 A	**M9F14120**	**M9F15120**	**M9F14220**	**M9F15220**	**M9F14320**	**M9F15320**	**M9F14420**	**M9F15420**
25 A	**M9F14125**	**M9F15125**	**M9F14225**	**M9F15225**	**M9F14325**	**M9F15325**	**M9F14425**	**M9F15425**
32 A	**M9F14132**	**M9F15132**	**M9F14232**	**M9F15232**	**M9F14332**	**M9F15332**	**M9F14432**	**M9F15432**
40 A	**M9F14140**	**M9F15140**	**M9F14240**	**M9F15240**	**M9F14340**	**M9F15340**	**M9F14440**	**M9F15440**
Width in 9-mm modules	2		4		6		8	

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Catalog Numbers

C60L Circuit Breaker

Type	1P	2P	3P	4P
				
Rating (In)	C Curve			
1 A	**M9F17101**	**M9F17201**	**M9F17301**	**M9F17401**
2 A	**M9F17102**	**M9F17202**	**M9F17302**	**M9F17402**
3 A	**M9F17103**	**M9F17203**	**M9F17303**	**M9F17403**
4 A	**M9F17104**	**M9F17204**	**M9F17304**	**M9F17404**
6 A	**M9F17106**	**M9F17206**	**M9F17306**	**M9F17406**
10 A	**M9F17110**	**M9F17210**	**M9F17310**	**M9F17410**
16 A	**M9F17116**	**M9F17216**	**M9F17316**	**M9F17416**
20 A	**M9F17120**	**M9F17220**	**M9F17320**	**M9F17420**
25 A	**M9F17125**	**M9F17225**	**M9F17325**	**M9F17425**
Width in 9-mm modules	2	4	4	6

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IEC Rated C120H Circuit Breakers

The IEC Rated C120H family of Multi 9 circuit breakers meets the requirements of IEC 947-2 and are available for OEMs wishing to export manufactured products to countries requiring IEC Certification instead of UL Listing.

They are suitable for protection of cables against overloads and short circuits in equipment. They can also be used for manual control and isolation of circuits.

The C120H circuit breakers are available in B, C, and D trip curves, as listed in Table 19. They include devices ranging from 63 to 125 A. (For lower current ratings, select devices from the C60 series.)


1P


2P


3P


4P

Table 17: IEC 947-2 Rated C120H Circuit Breakers

Table 18: Specifications for IEC Rated C120H Circuit Breakers

Package Size	Three 9 mm Modules	27 mm Width per Pole
Voltage	High Voltage Withstand	6 kV
	Maximum Voltage Rating	440 Vac
Connection: Box Lug, 10–100 A	18 to 1 AWG (1–50 mm^2) Cables	Cu Wire Only
Mounting	35 mm DIN Rail	
Degree of Protection:	Case	IP40 as per IEC 60529
	Terminals	IP20
Time/Current Curves	B, C and D Curves	
Temperature:	Calibration	30°C (85°F)
	Storage	-40 to 80°C (-40 to 176°F)
	Operating	-30 to 70°C (-22 to 158°F)
Tropicalization	Treatment 2	Relative Humidity: 95% at 55°C (131°F) as per IEC 68-2-30
Number of Operating Cycles	1000 (O-C) at 63 A	
	5000 (O-C) at 80–125 A	

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads.
- Trip-free mechanism: Contacts cannot be held in I-ON position when C120 is tripped automatically.
- Isolation with positive break indication: Green strip on operating handle indicates all poles are open
- Terminals ensure pull-out withstand of cables, guiding of cables into correct position, and tightening of wide cross-section cables.
- B curve: Overcurrent protection of very long cables and protection of networks supplied by generators. The magnetic release operates between 3 and 5 times ampere rating.
- C curve: Overcurrent protection for all application types. The magnetic release operates between 5 and 10 times ampere rating.
- D curve: Overcurrent protection for loads with high inrush currents (motors, transformers). The magnetic release operates between 10 and 14 times ampere rating.
- Suitable for reverse feeding.

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Accessories

Ground-fault protection can be provided when combined with a Vigi C120 module. Remote tripping and indication can be provided by adding a variety of auxiliaries (see section 5 for accessories).

NOTE: The C120 circuit breakers use the same electrical auxiliaries as the C60 circuit breakers. They do not accept the NC100H circuit breaker accessories.

Standards

- IEC 60947-2
- VDE 0660
- CE Marked

Catalog Numbers

Table 19: Catalog Numbers for Multi 9 C120H (10–125 A) Circuit Breakers—15 kA at 240 Vac



Rating	1P	2P	3P	4P
B Curve (Magnetic Setting Between 3 and 5 Times Ampere Rating)				
63 A	**A9N18401**	**A9N18412**	**A9N18423**	**A9N18434**
80 A	**A9N18402**	**A9N18413**	**A9N18424**	**A9N18435**
100 A	**A9N18403**	**A9N18414**	**A9N18425**	**A9N18436**
125 A	**A9N18404**	**A9N18415**	**A9N18426**	**A9N18437**
C Curve (Magnetic Setting Between 5 and 10 Times Ampere Rating)				
63 A	**A9N18445**	**A9N18456**	**A9N18467**	**A9N18478**
80 A	**A9N18446**	**A9N18457**	**A9N18468**	**A9N18479**
100 A	**A9N18447**	**A9N18458**	**A9N18469**	**A9N18480**
125 A	**A9N18448**	**A9N18459**	**A9N18470**	**A9N18481**
D Curve (Magnetic Setting Between 10 and 14 Times Ampere Rating)				
63 A	**A9N18489**	**A9N18500**	**A9N18511**	**A9N18522**
80 A	**A9N18490**	**A9N18501**	**A9N18512**	**A9N18523**
100 A	**A9N18491**	**A9N18502**	**A9N18513**	**A9N18524**
125 A	**A9N18492**	**A9N18503**	**A9N18514**	**A9N18525**

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Section 4—Ground-Fault Protection Devices

Selection Table

The Multi 9 System includes one UL Listed and three IEC rated product families that provide ground-fault protection. These products are summarized below and discussed in more detail in the following pages.

Table 20: Selection Table for Multi 9 Ground-fault Protection Products

			GFP			ID		C60 Vigi			
Standard			UL 1053 IEC 61008			IEC 61008		IEC 61009			
Number of Poles			2P	2P	4P	2P	4P	2P	2P	3P	4P
Rated Current (A) 25°C (77°F)		I_n / Pickup	—	—	—	25–100	25–100	< 63	< 63	< 63	< 63
Sensitivities	Instantaneous	10 mA	—	—	—	Yes	—	—	Yes	—	—
		30 mA	25–63	25–63	25–63	Yes	Yes	Yes	Yes	Yes	Yes
		100 mA	25–63	25–63	25–63	—	—	—	—	—	—
		300 mA	25–100	25–100	25–100	Yes	—	Yes	—	—	—
		500 mA	—	—	—	—	—	—	—	—	—
	Selective	300 Ⓢ[1]	—	—	—	Yes	Yes	—	Yes	Yes	Yes
		500 Ⓢ[1]	—	—	—	—	—	—	—	—	—
		1000 Ⓢ[1]	—	—	—	—	—	—	Yes	Yes	Yes
Voltage (Nominal) Vac, 50-60 Hz			120, 240	277, 480Y	240, 480Y/277	240/415		130	240/415		
Time/Current Curve			Depends on Circuit Breaker Used.								
Dimensions (in./mm)		Width	1.42 (36)	1.42 (36)	2.84 (72)	1.42 (36)	2.84 (72)	1.42 (36)	1.42 (36)	2.13 (54)	12.84 (72)
		Height	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)	3.19 (81)
		Depth	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)	3.00 (76)
Weight (oz./g)			7.70/ 220	7.70/ 220	15.9/ 450	7.70/ 220	15.9/ 450	2.43/ 120	5.29/ 150	< 25 = 6.35 /180 > 63 = 7.41/210	

[1] Ⓢ Selective = has non-adjustable time delay to allow selective coordination.

Table 21: Overcurrent Protection Required for UL Applications of GFP

GFP	C60 Circuit Breaker				
	25 A, 240 Vac		20 A, 277 Vac	20 A, 480Y/277 Vac	
	1P and 2P	3 P	1P	2P	3P
2P 240 Vac	10	—	—	—	—
2P 480Y/277 Vac	—	—	10	10	—
4P 480Y/277 Vac	—	10	—	—	10

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UL 1053 Listed GFP Ground Fault Protectors



The GFP Ground Fault Protector provides ground fault protection for electrical circuits. It will automatically open the circuit in the case of a ground fault between phase and ground greater than 10, 30 or 300 mA, depending on the model. An electromechanical release operates without any auxiliary source of supply to open the circuit. The GFP is available in 2-pole and 4-pole (3 or 4-wire) versions.

NOTE: The GFP has only one protective function—detection of ground fault current. There is no thermal or magnetic overcurrent protection. Therefore, the circuit must be protected upstream by an approved device such as the Multi 9 C60, QOU, QO, or HGL circuit breaker, or a fuse.

Multi 9 GFP products contain ***Si*** technology to increase immunity to noise and to minimize the potential for nuisance tripping in noisy electrical environments.

The toggle on the front of the GFP is used to reset the device after it has tripped. It should not be used to switch loads. A test button located on the front of the GFP is provided to allow periodic testing of the device. The tripped condition due to ground fault is displayed on the front face by a red mechanical indicator.

Remote monitoring and control can be provided with optional C60 accessories including the OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release and/or MX + OF Shunt Trip.

NOTE: These auxiliaries require the use of the OFS Auxiliary Switch (Cat. No. 26923) to adapt to the ID Residual Current Switch.

Table 22: Specifications for UL 1053 Listed GFP Ground Fault Protectors

Voltage Rating	Two Poles at 120 or 240 Vac (-15/+10%) Two Poles at 277 or 480Y/277 Vac (-15/+10%) Four Poles at 240 Vac or 480Y/277 Vac (-15/+10%)	
Current Rating (40°C)	25 A, 40 A, 63 A, 80 A or 100 A	Depending on catalog number
Ground Fault Sensitivity:	GFP30	Must trip at 29.9 mA; must not trip below 22.1 mA
	GFP100	Must trip at 98.9 mA; must not trip below 73.1 mA
	GFP300	Must trip at 299 mA; must not trip below 221 mA
Short-Circuit Current Rating	10 kA with recommended circuit breaker or fuse upstream	See bulletin GHA1080850AB
Frequency	50 or 60 Hz	
Mounting	35 mm DIN rail	
Connection, Box Lug	Wire: 75°C copper wire only, stranded or solid 14 to 2 AWG (2.5 to 35 mm^2)	Torque to 31 lb-in (3.5 N•m)
Padlocking in the "Tripped" Position is Possible	Use a padlocking device	Requires addition of OFS on left side of circuit breaker plus padlocking attachment M9PAFL
Ground-Fault Indication	Red indicator flag on front face	
Temperature	Operating temperature	-25 to +60°C (-13 to +140°F)
	Storage temperature	-40 to +70°C (-40 to + 158°F)
Tropicalization	Treatment 2	Relative humidity 95% at 55°C (131°F)

See Table 20 on page 32 for dimensions and weights.

Standards

- UL 1053 (not CSA certified)
- IEC 61008
- CE Marked

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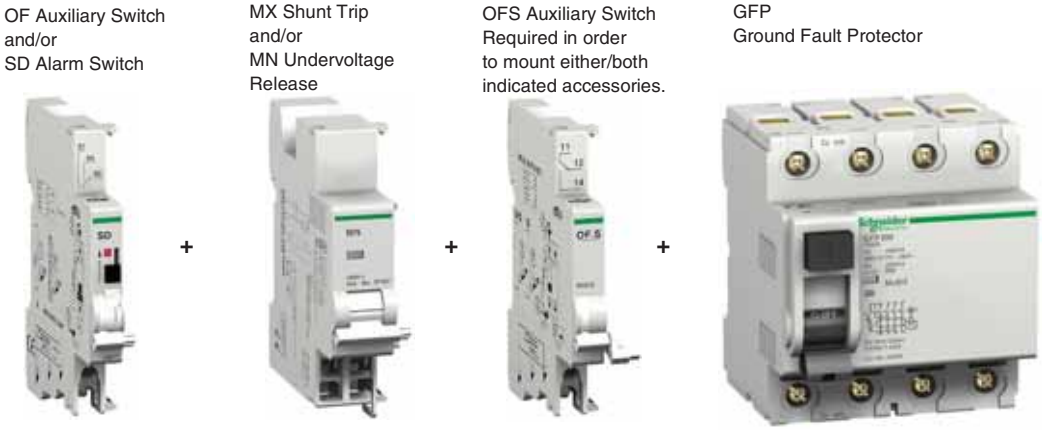
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Catalog Numbers

Table 23: Catalog Numbers for UL Rated GFP Ground Fault Protectors

Poles	Voltage	Current	Maximum Sensitivity	Tripping Range	Family	Catalog Number
2P	UL 1053 120/240 V, 240 V 60 Hz IEC 61008 230 V, 240 V 50 Hz	25 A	30 mA	22.1 to 29.9 mA	GFP 30	**60949**
			100 mA	73.1 to 98.9 mA	GFP 100	**60950**
			300 mA	221 to 299 mA	GFP 300	**60951**
		40 A	30 mA	22.1 to 29.9 mA	GFP 30	**60952**
			300 mA	221 to 299 mA	GFP 300	**60954**
		63 A	30 mA	22.1 to 29.9 mA	GFP 30	**60955**
2P	UL 1053 277 V, 480Y/277 V 60 Hz IEC 61008 230/400 V, 240/415 V 50 Hz	25 A	30 mA	22.1 to 29.9 mA	GFP 30	**60969**
			300 mA	221 to 299 mA	GFP 300	**60971**
		40 A	30 mA	22.1 to 29.9 mA	GFP 30	**60972**
4P	UL 1053 240 V, 480Y/277 V 60 Hz IEC 61008 230/400 V, 240/415 V 50 Hz	25 A	30 mA	22.1 to 29.9 mA	GFP 30	**60989**
			100 mA	73.1 to 98.9 mA	GFP 100	**60990**
			300 mA	221 to 299 mA	GFP 300	**60991**
		40 A	30 mA	22.1 to 29.9 mA	GFP 30	**60992**
			300 mA	221 to 299 mA	GFP 300	**60994**
		63 A	30 mA	22.1 to 29.9 mA	GFP 30	**60995**
			100 mA	73.1 to 98.9 mA	GFP 100	**60996**
		100 A	300 mA	221 to 299 mA	GFP 300	**60999**

Figure 9: Possible Device Combinations



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IEC Rated ID Residual Current Switches

The ID Residual Current Switches provide ground fault protection for electrical circuits, as well as the functions of isolation and switching. ID switches have an electromechanical release that opens a circuit automatically in the case of a fault between phase and earth greater than 10, 30, or 300 mA, depending on the model. The switch operates without the need for an auxiliary source of power. A version with time delay (selective) provides non-adjustable time delay for coordination with downstream instantaneous residual current devices. The ID Switch is available in 2-pole (1-phase) and 4-pole (3-phase) versions.

The ground fault is displayed on the front face by a red mechanical indicator.

NOTE: The ID residual current switch has only one protective function—detection of earth leakage current. There is no thermal or magnetic overcurrent protection. Therefore, the circuit must be protected by an upstream circuit breaker or supplementary protector. For combined overcurrent and residual current protection, an alternative is a C60 circuit breaker equipped with an auxiliary Vigi ground-fault detector module.

The ID device can also be manually operated as a switch. Remote monitoring and control can be provided with optional C60 accessories including the OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release, and/or MX + OF Shunt Trip.

NOTE: All of these auxiliaries require the use of the OFS Auxiliary Switch (Cat. No. 26923) to adapt to the ID Residual Current Switch.

A test button provided on the front of the ID Residual Current Switch to allow periodic testing of the device.

Figure 10: IEC Rated ID Residual Current Switches

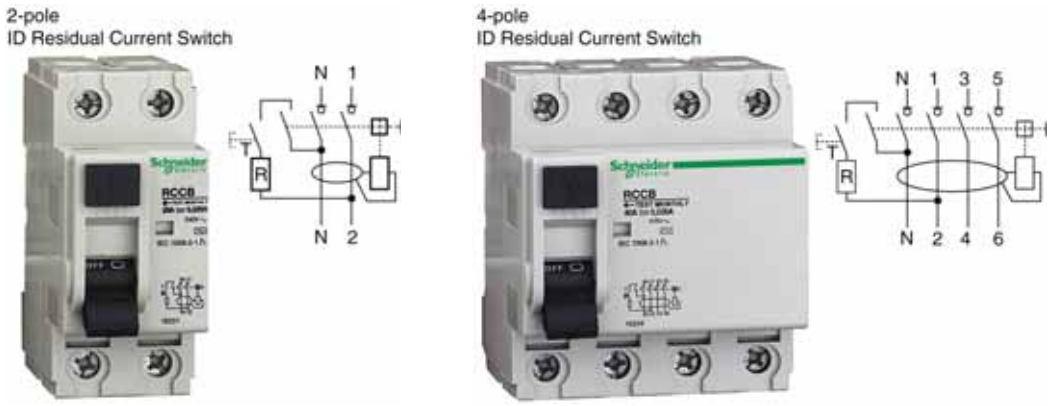


Table 24: Specifications for IEC Rated ID Residual Current Switches

Voltage	Nominal voltage	240 to 415 Vac, +10%, -20%, 50/60 Hz
	High voltage withstand	6 kV
Connection, Box Lug	14–2 AWG (2.5–35 mm^2) stranded cables, Cu wire only	Torque to 31 lb-in (3.5 N•m)
	1 AWG (50 mm^2) solid cables, Cu wire only	Torque to 31 lb-in (3.5 N•m)
Sensitivities	Fixed at 10, 30, or 300 mA	
Time/Current Curve	Instantaneous or selective release S (Time Delay)	
Level of Immunity	250 A Peak	According to 8/20 ms periodical wave
Operating Temperature	-5 to 60°C (22 to 140°F)	
Tropicalisation	Treatment 2	Relative humidity: 95% at 55°C (131°F) per IEC 68-2-30
Mounting	35 mm DIN Rail	
Number of Operating Cycles	Electrical (O-C)	20,000
See Table 20 for weights, dimensions and interrupting ratings.		

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Standards

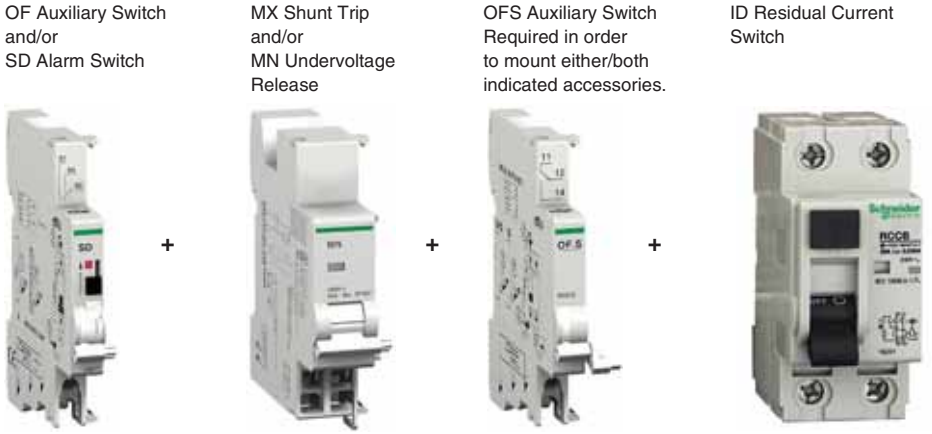
- IEC 61008
- CE Marked

Catalog Numbers

Table 25: Catalog Numbers for IEC ID Residual Current Switches—AC Class

Rating	Sensitivity (mA)	2P (240 Vac) 4 Modules	4P (415 Vac) 8 Modules
25 A	30	**M9R11225**	—
40 A	30	**M9R11240**	**M9R11440**
	300	**M9R14240**	**M9R14440**

Figure 11: Possible Device Combinations



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IEC Rated C60 Vigi™ Modules for Ground-fault Protection

Figure 12:



Vigi Module

The C60 Vigi residual current detector can be added to the C60 circuit breaker to provide a high level of protection against earth leakage faults. The Vigi module clips onto the right-hand side of a C60 protective device and is mechanically linked to the C60 circuit breaker, which it trips when the Vigi detects residual current. Vigi modules are available for use with 2-, 3-, and 4-pole C60 circuit breakers. The Vigi module may be field installed.

The Vigi module combines a current sensing toroid and residual current relay in one case and operates without an auxiliary power supply source. It may be ordered with a variety of non-adjustable sensitivities (10 to 1,000 mA). A version with time delay (selective) provides non-adjustable time delay for coordination with downstream instantaneous residual current devices.

A built-in filtering device minimizes nuisance tripping due to transient voltages (lightning, line disturbances, etc.) and transient currents (from high capacitive circuits).

A visual indicator of the ground fault is provided by a red flag on the Vigi operating handle. A manual test button on the face of the Vigi module allows manual testing of the Vigi module.

The C60 Vigi module can be field-adapted to reset in one of two modes: Automatic reset when the associated protective device handle is reset, or by manually resetting the Vigi prior to reclosing the supplementary protector.

A version with time delay (selective) provides additional time discrimination with downstream instantaneous residual current devices.

NOTE: The C60 version of the Vigi Module cannot be used with the C120 series. A different series of Vigi Modules is available for the C120 devices.

Figure 13: Example of Residual Current Circuit Breaker



C60 Circuit Breaker | Vigi Module | Residual Current Circuit Breaker

NOTE: Also see the ID Residual Current Switches.

Table 26: Specifications for IEC Rated C60 Vigi Modules for Ground-Fault Protection

Voltage (Nominal):	130–240 Vac	+10/ -20%, 50/60 Hz
	220–415 Vac	+10/ -20%, 50/60 Hz
High Voltage Withstand: 6 kV	6 kV	
Connection: Box Lug:	≤ 25 Stranded 6 AWG (16 mm^2) Cu Wire	4 N•m
	≤ 25 Solid 6 AWG (16 mm^2) Cu Wire	2 N•m
	≤ 63 Stranded 6 AWG (16 mm^2) Cu Wire	4 N•m
	≤ 63 Solid 6 AWG (16 mm^2) Cu Wire	3.5 N•m
Mounting	35 mm DIN rail	
Time-Current Curves	Depends on Circuit Breaker	
Time/Current Curve	Instantaneous or Selective Release S	
Sensitivities	Fixed at 10, 30, 300, or 1000 mA	
Temperatures	Calibration	77°F (25°C)
	Operating	22 to 140°F (-5 to 60°C)

See Table 20 on page 32 for weights, dimensions and interrupting ratings.

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Accessories

Terminal screw shields prevent contact with the Vigi module terminal screws. The bag includes twenty pieces of single-pole shields (Cat. No. 26982).

Standards

Combined with C60, the Vigi module forms a residual current device which conforms to the following standards:

- IEC 61009
- EN 61009

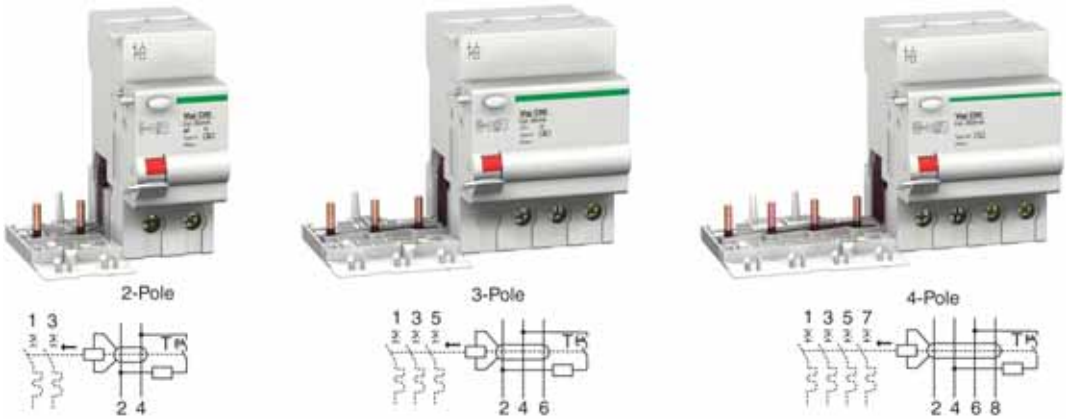
Catalog Numbers

Table 27: Catalog Numbers for Vigi C60 Modules—AC Class (Not UL/CSA Recognized)

Rating	Voltage	Sensitivity (mA)	2P	2P	3P	4P
≤ 63 A	220–415 Vac	30	—	**M9V11263**	**M9V11363**	**M9V11463**
		300 Ⓢ[1]	—	**M9V14263**	**M9V14363**	**M9V14463**

1 Ⓢ Selective = has non-adjustable time delay to allow selective coordination.

Figure 14: IEC Rated C60 Vigi Modules



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IEC Rated C120 Vigi Residual Current Circuit Breakers

Figure 15:



2P C120 Vigi Module

The C120 Vigi residual current detector can be added to the C120 circuit breaker to provide a high level of protection against earth leakage faults. The Vigi module clips onto the right-hand side of a C120 protective device and is mechanically linked to the C120 circuit breaker, which it trips when the Vigi detects residual current.

The C120 circuit breaker and Vigi module combination is reset in a single operation by resetting the circuit breaker.

The Vigi module combines a current sensing toroid and residual current relay in one case and operates without an auxiliary power supply source. It may be ordered with a variety of non-adjustable sensitivities (30 to 1,000 mA). A version with time delay (selective) provides additional time discrimination with downstream instantaneous residual current devices.

Vigi modules combine with the C120 2-, 3- and 4-pole circuit breakers to provide:

- Protection of people against indirect contact (per IEC Standards)
- Additional protection of people against direct contact (30 mA)
- Protection of electrical installations against insulation faults

The C120 circuit breaker and Vigi module combination is protected against nuisance tripping due to transient overvoltages such as lightning, switching on the network, etc.

Table 28: Specifications for IEC Rated C120 Vigi Residual Current Circuit Breakers

Current Rating	125 A	
Guarantees Tripping for Sinusoidal AC Residual Currents	Either suddenly applied or slowly increasing	
Total Vertical Discrimination with the $I_{\Delta n}$ 300 mA to 1 A [S] "Selective" Sensitivities if it is Installed:	Upstream from an instantaneous residual current device	
	Downstream from an Index II, Time-Delayed Residual Current Device	Where in both cases the $I_{\Delta n}$ of the downstream device ≤ $I_{\Delta n/2}$ of the upstream device
Connections	16–2 AWG (1–35 mm^2) stranded wire	31 lb-in (3.5 N•m)
	16–1 AWG (1–50 mm^2) solid wire	31 lb-in (3.5 N•m)
Voltage	220–415 Vac	+10%, -20%, 50/60 Hz
Mechanical Indication	Red indicator	On front face of the Vigi module
Instantaneous or Selective Tripping	Fixed sensitivities for all ratings	

See Table 20 on page 32 for weights and interrupting ratings.

Standards

Complies with IEC 1009 Standard

Catalog Numbers

Table 29: Catalog Numbers for IEC C120 Vigi *Si* (Noise Immune) Module—AC Class

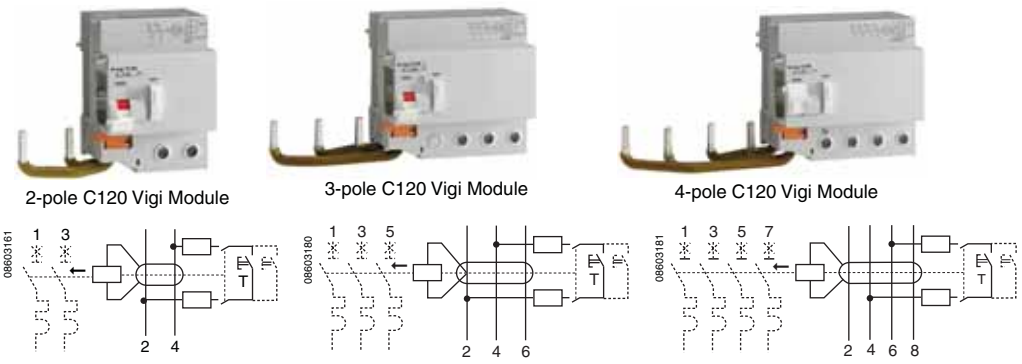
Rating	Voltage	Sensitivity (mA)	2P	3P	4P
125 A	220–415 Vac	30	**A9N18591**	**A9N18594**	**A9N18597**
		300	**A9N18592**	**A9N18595**	**A9N18598**
		300 [S][1]	**A9N18556**	**A9N18558**	**A9N18560**
		500	—	—	**A9N18599**
		1000	**A9N18557**	**A9N18559**	**A9N18561**

1 [S] Selective = has non-adjustable time delay to allow selective coordination.

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Figure 16: IEC Rated C120 Vigi™ Modules



N40 Vigi Residual Current Circuit Breaker

Function



- The DPN N Vigi residual current device provides complete protection of final circuits (overcurrents and insulation faults):
  - — protection of people against electric shocks by direct contacts (30 mA),
  - — protection of people against electric shocks by indirect contacts (300 mA),
  - — protection of installations from fire hazards (300 mA).
- Fast closing.
- Positive break indication.
- Display of earth fault on the front panel by position of toggle.
- The "si" range has been designed to maintain a network with optimum safety and continuity of service in installations disturbed by:
  - — extreme atmospheric conditions,
  - — harmonic generating loads,
  - — transient operating currents.

Catalog Numbers

Table 30: N40 VIGI Residual Current Circuit Breaker

Rating (A)	1-pole + N (C Curve) 4 Modules		Width in 9-mm Modules
	30 mA	300 mA	
10	**M9D11610**	**M9D14610**	
16	**M9D11616**	**M9D14616**	
20	**M9D11620**	**M9D14620**	4
25	**M9D11625**	**M9D14625**	
40	**M9D11640**	**M9D14640**	
Voltage Rating (Ue)	230 Vac		
Operating Frequency	50/60 Hz		

Standards

- European standard EN 61009.
- International standard IEC 61009.

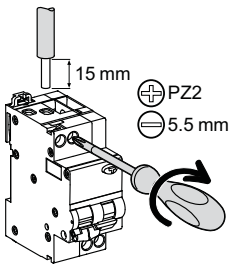
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Section 5—Accessories

The Multi 9 System includes an extensive line of field-installable accessories that enables the system to be used in many applications. Electrical auxiliaries include shunt trip, undervoltage release, auxiliary switch, and alarm switch. Control and display devices include push buttons, motor operators, and signal lamps. Also available is a variety of accessories for locking, operating, shielding, mounting, etc. Other devices include switches and timers. The following diagram shows many of the accessories.

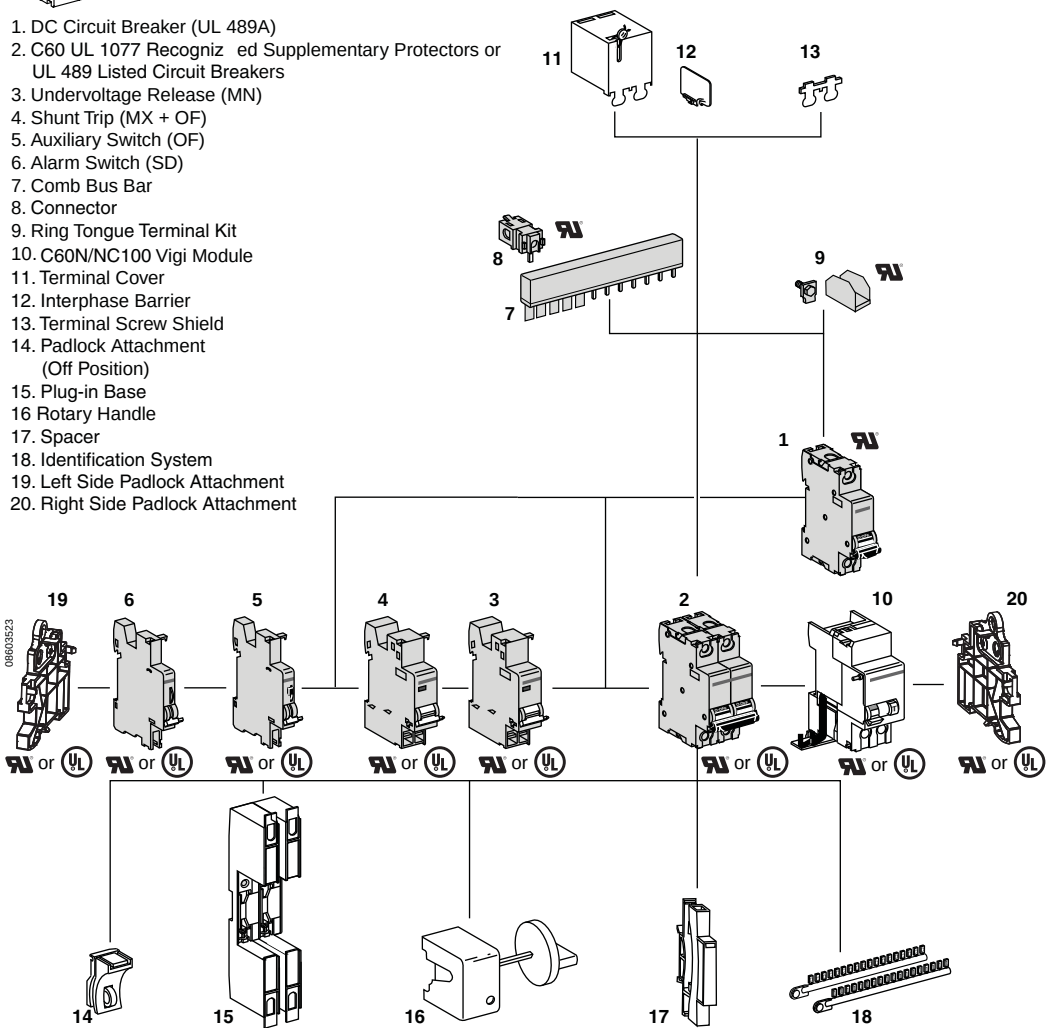
All of the accessories described in this section may be field-installed. These include electrical auxiliaries, comb bus bars, mounting devices, shielding and identification systems, operators, and display, status, and control devices.

Figure 17: Overview of Multi 9 System Accessories



Rating	Tightening Torque	Copper Cables	
		Rigid	Flexible or with End-Piece
4–40 A	3.5 N•m	1–16 mm²	1–10 mm²

1. DC Circuit Breaker (UL 489A)
2. C60 UL 1077 Recogniz ed Supplementary Protectors or UL 489 Listed Circuit Breakers
3. Undervoltage Release (MN)
4. Shunt Trip (MX + OF)
5. Auxiliary Switch (OF)
6. Alarm Switch (SD)
7. Comb Bus Bar
8. Connector
9. Ring Tongue Terminal Kit
10. C60N/NC100 Vigi Module
11. Terminal Cover
12. Interphase Barrier
13. Terminal Screw Shield
14. Padlock Attachment (Off Position)
15. Plug-in Base
16 Rotary Handle
17. Spacer
18. Identification System
19. Left Side Padlock Attachment
20. Right Side Padlock Attachment



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Electrical Auxiliaries

The Multi 9 product line includes a variety of electrical auxiliaries for the C60, N40, and C120 supplementary protectors and circuit breakers. They may be attached to the protective device as needed to fulfill the tripping or monitoring application requirements. They include the following devices:

- MN Undervoltage Release
- MX + OF Shunt Trip and Auxiliary Switch
- OF Auxiliary Switch
- SD Alarm Switch
- OFS Special Auxiliary Switch (For use with GFP and ID RCCB's, allows other accessories to be mounted to the side of the GFP.)

The Multi 9 Vigi Module, which adds ground-fault protection, is described in Section 4.

Accessories have a maximum width of 54 mm and are mechanically linked to the base C60, N40 or C120 protective devices.

Figure 18: Possible Auxiliary Combinations

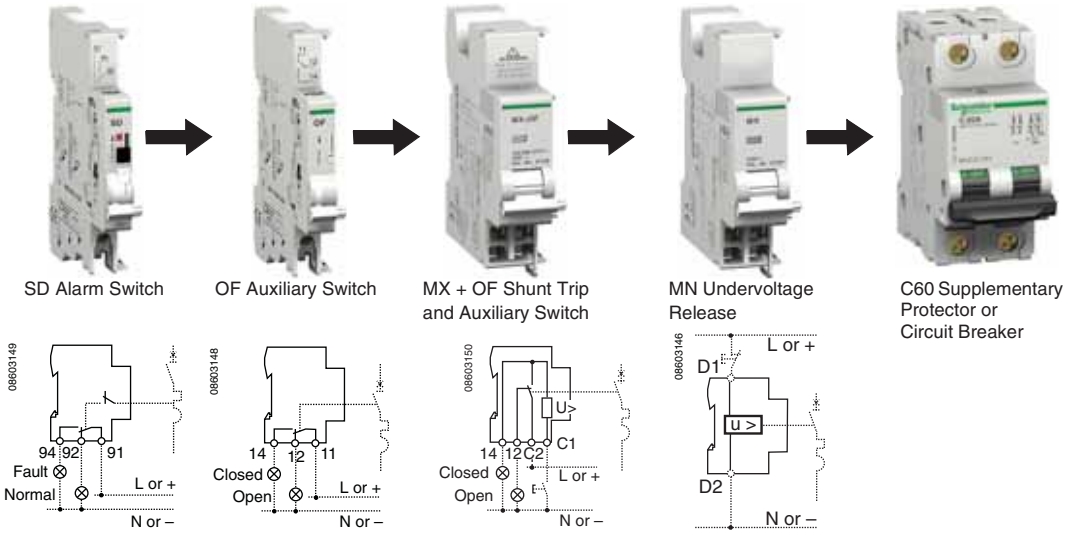


Table 31: Catalog Numbers for Electrical Auxiliary Devices

Device	Control Voltage		Modules (9mm)	C60 / GFP / N40		C120
	Vac	Vdc		UL/IEC	IEC	IEC
MX + OF Shunt Trip + Aux Switch	24	24	2	**27118**	**27118**	**A9N20948**
	48	48	2	**27110**	**27110**	**A9N26947**
	110-240-277	125	2	**27109**	**27109**	**A9N26946**
	220-277	—	—	—	—	—
MN Undervoltage Release	24	24	2	**27108**	**27108**	—
	48	48	2	**27106**	**27106**	**A9N26961**
	120	—	2	**27107**	**27107**	—
	240	—	2	**27105**	**27105**	**A9N26960**
OF Auxiliary Switch	12-277	12-125	1	**MG26925**	**26924**	**26924**
SD Alarm Switch	12-277	12-125	1	**MG26928**	**26927**	**26927**
OFS Alarm Switch for GFP Only	240/415	130	1	—	—	**26923**

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MN Undervoltage Release



The MN Undervoltage Release provides remote tripping of C60, N40 or C120 devices. It causes the device to trip whenever the MN detects a drop of its control voltage to the range of 70 to 35% of nominal. The tripped condition is shown by a red indicator flag on the front panel of the MN undervoltage release. The MN undervoltage release is mechanically linked to the C60, N40 or C120 device. It may be used in conjunction with the SD Alarm Switch, OF Auxiliary Switch, and/or the MX + OF Shunt Trip and Auxiliary Switch.

NOTE: The tripped circuit breaker or supplementary protector must be manually reset. The MN Undervoltage Trip prevents the device from being reclosed until the control voltage has been restored.

Models must be selected depending on the level of control voltage source (ac or dc).

- Used for emergency stop via push button.
- Used as safety feature on circuit supplying several machines, to prevent uncontrolled restarting of motors.
- UL Recognized for use with UL 1077 Recognized devices and UL Listed for use with UL 489/CSA C22.2 No.5 Listed devices.
- CSA and IEC Rated

The linkage is mechanical, thus ensuring the integrity of the protection function. Multiple auxiliaries may be used in combination with a single C60, N40 or C120 protective device. Terminal pads for connection of control wiring are provided for either one or two 16–14 AWG (1.5–2.5 mm^2) cables.

MN [S] Time-delayed Undervoltage Release

The time-delayed undervoltage release is identical to the standard MN undervoltage release, except that it allows brief interruptions of control power without opening the circuit breaker due to undervoltage. It allows a 0.5 second time delay before opening the associated protective device.

Table 32: Power Consumption of MX and MN Accessories

Type	Voltage	VA or W	Type	Voltage	VA or W
MX (inrush)	415 Vac	120	MN (holding)	220–240 Vac	4.1
	220–240 Vac	50		48 Vac	4.3
	48–130 Vac	200		48 Vdc	2.0
	110–130 Vdc	10	MN [S] (holding)[1]	220–240 Vac	4.1
	48 Vac/Vdc	22			
	24 Vac/Vdc	120			

[1] IEC Rated; not UL/CSA Recognized.

Table 33: Wiring for MX and MN Accessories

Wire	Torque
16–14 AWG (0.5–2.5 mm^2) solid or stranded wire	9 lb-in. (1 N•m)

MX + OF Shunt Trip and Auxiliary Switch

The MX + OF switch combines the functions of shunt trip and auxiliary switch into one device. The MX Shunt Trip, when energized by a control voltage, provides remote tripping of the associated C60 or N40 circuit breakers or supplementary protectors to which it is mechanically linked.
The tripped condition is indicated by a red indicator flag on the front panel of the MX + OF. The protective device must be manually reset after being tripped by the MX.



NOTE: When the OF function is combined with the MX Shunt Trip, no test button is provided.

The MX + OF Switch may be used in conjunction with the SD Alarm Switch, which presents the trip status, and/or the MN Undervoltage Release.

- UL Recognized for use with UL 1077 Recognized devices and UL Listed for use with UL 489/CSA C22.2 No.5 Listed devices.
- CSA and IEC Rated.

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OF Auxiliary Switch



The OF Auxiliary Switch communicates the OPEN or CLOSED status of the associated C60 or N40 circuit breaker or supplementary protector via auxiliary contacts. It is mechanically linked to the supplementary protector (See the SD Alarm Switch for TRIP status).

It may be used in conjunction with the SD Alarm Switch, which presents the trip status, and the MN Undervoltage Release. It would not normally be used with the MX + OF Shunt Trip because that device already includes the OF function.

- UL Recognized for use with UL 1077 Recognized devices and UL 489/CSA C22.2 No.5 Listed devices.
- CSA and IEC Rated.

OFS Auxiliary Switch and Adapter (for GFP and ID RCD)



The OFS Auxiliary Switch and Adapter has an auxiliary switch to provide the auxiliary switch function and an adapter which allows the UL Listed GFP ground fault protector and the IEC Rated ID Residual Current Switches (in Section 4) to use the same electrical accessories as the C60 and N40 supplementary protectors, including the OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release, and/or MX + OF Shunt Trip. It may be used alone or with accessories.

IEC Rated; not UL/CSA Recognized.

Table 34: Catalog Number for OFS Auxiliary Switch and Adapter

Description	Width in Modules	Catalog Number
OFS Auxiliary Switch and Adapter	1	**26923**

SD Alarm Switch



The SD Alarm Switch communicates the trip status of the associated C60, N40 or C120 circuit breakers or supplementary protectors via auxiliary contacts. It is mechanically linked to the protective device. Locally, it also indicates a tripped-on-fault condition of the protective device with a red indicator flag on the front panel. (Use the OF Auxiliary Switch for open or closed status.)

A test switch allows simulation of the SD function without operating the protective device.

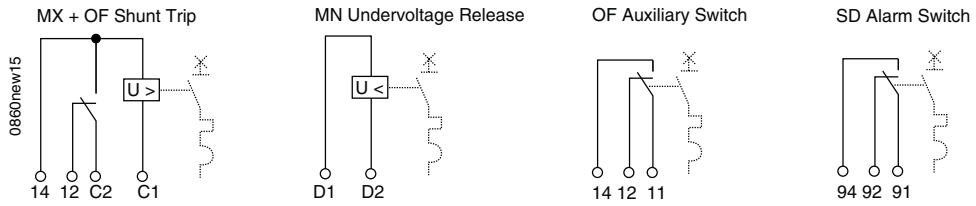
The SD Alarm Switch is reset when the associated protective device is reset, or it may by reset independently of the protective device with a reset lever on its front panel.

The SD Alarm Switch may show the circuit breaker status, using V Type Signal Lamps, other annunciators, or a control system. It may be used in conjunction with the OF Auxiliary Switch which presents the open or closed status, the MN Undervoltage Release, and/or the MX + OF Shunt Trip.

- UL Recognized for use with UL 1077 Recognized devices and UL Listed for use with UL 489/CSA C22.2 No.5 Listed devices.
- CSA and IEC Rated

Voltage	Breaking Capacity (A)	
	SD	OF
277 Vac	3	3
< 240 Vac	6	6
130 Vac	1	1
< 48 Vdc	2	2
< 24 Vdc	6	6

Figure 19: Electrical Auxiliary Schematics



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Comb Bus Bars

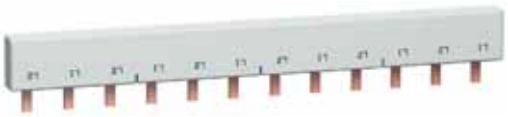
UL Recognized C60 and N40 Comb Bus Bars

A Comb Bus Bar can be used to provide common service to a number of Multi 9 supplementary protectors and accessories. This eliminates the hassle of providing discrete wiring to a number of protective devices operating from one power source. It is available in 0.71 in. (18 mm) pole spacings for the C60 and N40 series. It meets the UL 1077 requirements.

These are available in 1-, 2-, or 3-phase (conductor) models, and can be purchased in 12-pole (12P) lengths.

Field wiring may be applied directly to the comb bus bar by inserting both the conductor and the tooth of the comb into the same box lug connector of the C60N and N40N supplementary protector.

Figure 20: UL Recognized C60 and N40 3-phase Comb Bus Bar



Refer also to the tooth cap accessories for the comb bus bar.

- Rated insulation voltage: 480Y/277 Vac
- Rated current: 63 A service single-feed
- Available in 1-, 2-, or 3-phases (conductors)
- Spacing of outgoing poles: 0.71 in. (18 mm)
- Lengths: Fixed length of 12 poles
- Height: 0.80 inches (20 mm) above circuit breaker
- Connection: Comb tooth and main feed wire (10 AWG to 3 AWG) connect to box lug of UL 1077 C60N and C40N supplementary protector
- UL Recognized for use with UL 1077 devices only; not CSA Recognized

Table 35: Catalog Numbers for UL Recognized C60 and N40 Comb Bus Bars

Description	Length	Type	Cat. No.
12P Comb Bus Bar	8.5 in. (216 mm)	1Ø	**MG10285**
		2Ø	**MG10286**
		3Ø	**MG10287**

Tooth Caps for UL Recognized Comb Bus Bars

Figure 21:



Tooth Caps for UL Recognized Comb Bus Bars may be slipped onto the unused teeth of the Comb Bus Bar. They come in strips of five with 1-pole spacing, but can be snapped apart to be used individually.

Table 36: Tooth Caps for UL Recognized Comb Bus Bars

Description	Cat. No.
Tooth Caps for 0.71 in. (18 mm) Comb Bus Bar (20 Pieces)	**60488**

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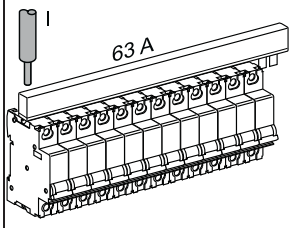
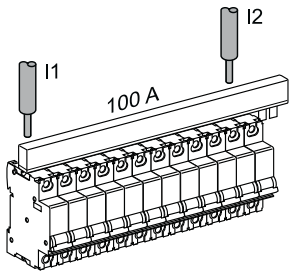
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Connection Comb Bus Bars for C60 UL 1077 Circuit Breakers

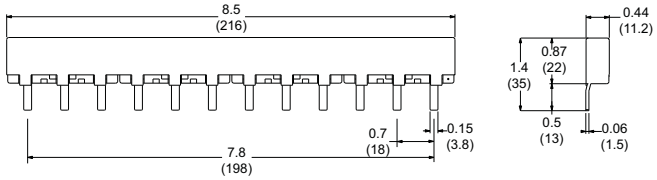
The comb busbars are used only for C60 circuit breakers in conformity with standards UL 1077/ CSA C22.2 No. 3345-04 / IEC 60947-2 / GB 14048-2.

They perform distribution and sub-distribution of the electric power supply and allow rapid assembly and disassembly of equipment.

Connection Accessories	Comb Bus Bars			Tooth Cover End-Place Accessory
				
Function				
	• The comb bus bars make it easier to install Schneider Electric UL 1077 circuit breakers • Power supply directly in the cage of the circuit breaker			• The Tooth Caps are insulated protectors which may be slipped onto the unused teeth of the comb busbar • They come in strips with 1-pole spacing, but can be snapped apart to be used separately
Number of poles	1P	2P	3P	All
Voltage rating (Ue)	4870Y/277 Vac			—
Catalog number	10285	10286	10287	60488
Number of 18 mm modules	12 (8.5 in. / 216 mm)	12 (8.5 in. / 216 mm)	12 (8.5 in. / 216 mm)	—
Set of	1	1	1	29

Technical Specifications			
Insulation Voltage (U)	690 V		
Impulse withstand voltage (Uimp)			
Acceptable current at 40°C	65 A with 1 central power supply point	100 A with 2 power supply points	
			
	Power supply via cable directly in the cage of the device: • cross section max: 3 AWG (25 mm^2) • cross section min: 10 AWG (5.27 mm^2)		
Resistance to short-circuit currents	Compatible with the breaking capacity of C60 YL 1077 Schneider Electric modular circuit breakers		
FIre resistance	Self-extinguishability 960°C 30 s/30 s		
Color	RAL 9001		RAL 1021

Dimensions: :in. (mm)



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Connection Comb Bus Bars for C60 UL489 Circuit Breakers

The comb busbars are used only for C60 circuit breakers in conformity with standards UL 489 / CSA C22.2 No.5-02 or IEC 60947-2 /fitted with tunnel terminals.

They perform distribution and sub-distribution of the electric power supply and allow rapid assembly and disassembly of equipment.

cULus IEC

Country approval pictograms

Connection Accessories	Comb Busbar								Insulated Connector		Tooth Cover End-Place
											
	1P x 240 V - 12 modules				3p x 480Y - 12 modules		3p 480Y - Can accept auxiliaries				
Function											
	• The comb busbars make it easier to install Schneider Electric UL 489 circuit breakers • They must not be cut								• Comb busbar power supply • Vertical incoming feeder		• Insulation of teeth remaining free
Use											
	• Power supply by insulated connector								• For semi-rigid copper cable of #1–#12 AWG (4–36 mm^2) • Tightening torque: 53 lb-in (6 N•m) max.		
No. of poles	1P				2P		3P		All		All
Voltage rating (Ue)	240 Vac		480Y/277 Vac		240 Vac	480Y/277 Vac	240 Vac	480Y/277 Vac	240 Vac	480Y/277 Vac	—
Catalog Numbers	10170	10171	10180	10181	10172	10182	10173	10183 10193[1]	10175	10185	10190
No. of 18 mm modules	6	12	6	12	12		12		—		—
Set of	5				5		5		15		9

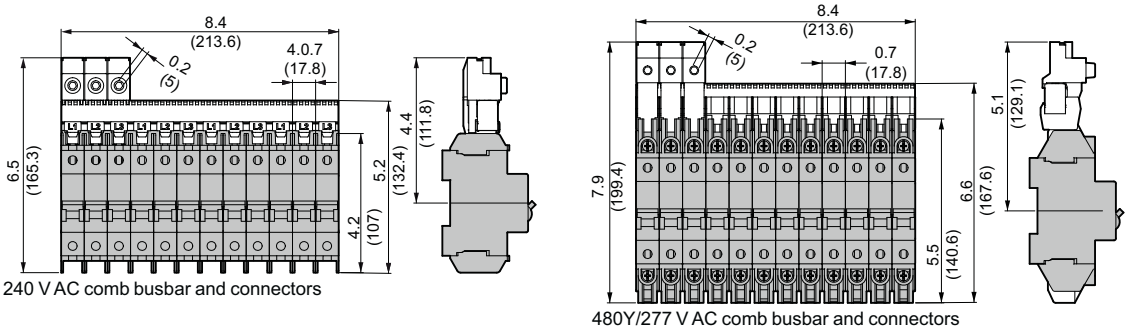
Technical Specifications			
Insulation voltage (Ui)	1000 V		
Impulse withstand voltage (Uimp)	12 kA		
Acceptable current at 40°C (Ia)	240 V: 100 A 480Y: 20 A		—
Max. current per feeder		—	—
Resistance to short-circuit currents	Compatible with the breaking capacity of Schnieder Electric modular circuit breakers		—
Fire resistance	Self-extinguishiability 960°C 30s/30s		
Color	RAL9001		RAL1021
Standards	UL506	UL485E	—

[1] With spare spaces of 18 mm for electrical auxiliary.

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Dimensions: :in. (mm)



IEC Rated C60 Comb Bus Bars

These are available in 1-, 2-, 3- or 4-phase (conductor) models, and can be purchased in 12-pole, 24-pole, or 54-pole (1 meter) lengths.

Refer also to the accessories for the Comb Bus Bar described below.

- Rated insulation voltage: 500 Vac as per IEC 664.
- Rated Current: 100 A service single-feed, 120 A double-feed
- Available in 1-, 2-, 3-, or 4-phase (conductor) models
- Spacing of outgoing poles: 18 mm (0.71 in.) on center
- Lengths:12, 24, or 54 poles; may be cut to desired length
- IEC Rated

Figure 22: IEC Rated C60 Comb Bus Bars and End Caps



Table 37: Catalog Numbers for IEC Rated C60 Comb Bus Bars

Description	Length	Type	Cat. No.
12P Comb Bus Bar	8.5 in. (216 mm)	1Ø	**A9XPH112**
		2Ø	**A9XPH212**
		3Ø	**A9XPH312**
		4Ø	**A9XPH412**
24P Comb Bus Bar (package of 2)	17 in. (432 mm)	1Ø	**A9XPH124**
		2Ø	**A9XPH224**
		3Ø	**A9XPH324**
		4Ø	**A9XPH424**
54P Comb Bus Bar	39.4 in. (1 m)	1Ø	**A9XPH157**
		2Ø	**A9XPH257**
		3Ø	**A9XPH357**
		4Ø	**A9XPH457**

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End Caps for IEC Rated C60 Comb Bus Bars

The End Caps are IEC Rated insulating devices which snap onto the ends of the Comb Bus Bar to retain the bus bars within their protective shield and to ensure the spacing of the conductors.

Figure 23:



Table 38: End Caps for IEC Rated C60 Comb Bus Bars

Description	Type	Cat. No.
End Caps for Comb Bus Bar (10 pieces)	1Ø	**A9XPE110**
	2Ø	**A9XPE210**
	3Ø	**A9XPE310**
	4Ø	**A9XPE410**

Connector for IEC Rated Comb Bus Bars

Figure 24:



The IEC Rated connectors are provided for connecting field wiring to a comb bus bar.

- These connectors accept up to 2 AWG wiring.
- Torque to 22 lb-in (2.5 N•m)

Table 39: IEC Rated C60 Connectors

Description	Wire Size	Cat. No.
Connector (4 Pieces)	2 AWG (25 mm^2)	**A9XPCM04**

Tooth Caps for IEC Rated Comb Bus Bars



Tooth Caps for IEC Rated Comb Bus Bars are insulated protectors which may be slipped onto the unused teeth of the Comb Bus Bar. Tooth caps come in strips of five with 1-pole spacing, but can be snapped apart to be used individually.

Table 40: Tooth Caps for IEC Rated Comb Bus Bars

Description	Cat. No.
Tooth Caps for Comb Bus Bar (20 pieces)	**A9XPT920**

Device Shielding

DIN Rail Spacer

Figure 25:



The Spacer clips onto a DIN rail to occupy the space of one 0.35 in. (9 mm) module. It can be used to provide space for future protective devices and accessories. It may also be used to provide a ventilation gap to prevent overheating.

IEC Rated; not UL/CSA Recognized

Table 41: Catalog Numbers for IEC Rated DIN Rail Spacer

Description	Width	US No.	IEC No.
Spacer for IEC Rated C60 and C120 Circuit Breakers	0.354 in. (9 mm)	**MG27062**	**27062**

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Interphase Barriers

The Interphase Barriers snap onto the top and bottom of the C60 devices to provide increased isolation distance between two adjacent connectors.

NOTE: These are not needed with the versions of C60 with UL 489/CSA C22.2 No.5 Rating nor with the Ring Lug Terminal kit, since those products already include increased isolation barriers.

IEC Rated; not UL/CSA Recognized

Figure 26:



Table 42: Catalog Numbers IEC Rated Interphase Barrier

Description	Quantity	US No.	IEC No.
Interphase Barriers for C60 Circuit Breakers	10 Pieces	**MG27001**	**27001**

Terminal Screw Shields

The Terminal Screw Shield snaps onto the front of the C60N or C120 protective devices to provide greater insulation of the terminal screws.

IEC Rated; not UL/CSA Recognized

Figure 27:



Table 43: IEC Rated Terminal Screw Shields for C60 Circuit Breakers[1]

Description	Quantity	Cat. No.
Terminal Screw Shield	Bag of 2 strips of 4	**MG26981**

1 Not for the UL 489/CSA C22.2 No.5 Listed C60 circuit breakers.

Terminal Covers



The Terminal Covers completely cover the terminals, either standard or screw-type connectors. They make the use of the interphase barriers unnecessary.

IEC Rated; not UL 1077/CSA C22.2 No. 235 Recognized

Table 44: Catalog Numbers for Terminal Covers for C60 Circuit Breakers[1]

Description	Device	Size	UL Recognized Cat. No.	IEC Rated Cat. No.
Terminal Cover	C60	1P	**MG26975**	**26975**
		2P	**MG26976**	**26976**
		3P	**MG26975 + MG26976**	**26975 + 26976**
		4P	**MG26978**	**26978**

1 Not for the UL 489/CSA C22.2 No.5 Listed C60 circuit breaker.

Ring Lug Terminal Kit

The Ring Lug Terminal kit provides isolation barriers and ring terminals to convert a standard box lug UL 1077 Recognized C60 supplementary protector or UL 489A DC rated Communications circuit breaker to allow front or rear connection with ring type terminals. The kit allows a UL 1077 Recognized C60 device or UL 489A DC rated Communications to retain its rating. It cannot be field-installed on a UL 489/CSA C22.2 No.5 Listed C60 product. UL 489/CSA C22.2 No.5 circuit breakers may be ordered with factory installed ring terminals.

Figure 28:



These are user-installed. The Interphase Barriers (or Terminal Covers) cannot be used in conjunction with the ring tongue terminal kits.

- Torque for ring tongue into box lug: 30 lb-in. (3.4 N•m).
- Torque for ring terminal: 18 lb-in (2.0 N•m).

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Table 45: UL Recognized Ring Lug Terminal Kit

Description	Quantity	Cat. No.
Ring Lug Terminal Kit	Two Ring Tongue Terminals Two Isolation Shrouds Two 5 mm Screws	**17400**

Identification System

Snap-on Marking Symbols

Figure 29:



The Identification System provides marking symbols which can be used on the C60 and C120 devices. They provide pre-labeled, snap-on plastic clips with one character each. They mount just below the toggle on the C60 devices.

The following symbols are available: Blank, 0-9, +, -, and A-Z.

Orders must specify standard package quantity of 25 strips of each character or multiples of 25.

NOTE: These are same as markers for Telemecanique AB1 terminal blocks.

IEC Rated; not UL/CSA Recognized

Table 46: Catalog Numbers for Snap-on Marking Symbols

Marking	Quantity	Cat. No.
A	Strip of 10	**AB1GA**
B	Strip of 10	**AB1GB**
C	Strip of 10	**AB1GC**
D	Strip of 10	**AB1GD**
E	Strip of 10	**AB1GE**
F	Strip of 10	**AB1GF**
G	Strip of 10	**AB1GG**
H	Strip of 10	**AB1GH**
I	Strip of 10	**AB1GI**
J	Strip of 10	**AB1GJ**
K	Strip of 10	**AB1GK**
L	Strip of 10	**AB1GL**
M	Strip of 10	**AB1GM**
N	Strip of 10	**AB1GN**
O	Strip of 10	**AB1GO**
P	Strip of 10	**AB1GP**
Q	Strip of 10	**AB1GQ**
R	Strip of 10	**AB1GR**
S	Strip of 10	**AB1GS**
T	Strip of 10	**AB1GT**
U	Strip of 10	**AB1GU**
V	Strip of 10	**AB1GV**
W	Strip of 10	**AB1GW**
X	Strip of 10	**AB1GX**
Y	Strip of 10	**AB1GY**
Z	Strip of 10	**AB1GZ**

Marking	Quantity	Cat. No.
1	Strip of 10	**AB1R1**
2	Strip of 10	**AB1R2**
3	Strip of 10	**AB1R3**
4	Strip of 10	**AB1R4**
5	Strip of 10	**AB1R5**
6	Strip of 10	**AB1R6**
7	Strip of 10	**AB1R7**
8	Strip of 10	**AB1R8**
9	Strip of 10	**AB1R9**
0	Strip of 10	**AB1R0**
0-9	Strip of 10	**AB1R11**
+	Strip of 10	**AB1R12**
-	Strip of 10	**AB1R13**
Blank	Strip of 10	**AB1RV**

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Operation Devices

Rotary Handles

A C60 or C120 protection device with 2-, 3-, or 4-poles can be equipped with a rotary handle with an extension to allow operation of the circuit breaker from either the front or the side (lateral) from the outside of a panel.

The handle requires that an operating subassembly be affixed to the supplementary protector or circuit breaker. The operating subassembly requires one of two versions of the rotary handle:

— The first is a fixed handle for front or lateral mounting on a fixed panel.

— The second is a draw-out extended handle which may be mounted on a door or hinged panel. It mates with the operating subassembly as the door is closed.

- Minimum depth for drawout is 6.8 in. (174 mm) including circuit breaker.
- Minimum depth for lateral installation is 4.8 in. (122 mm) including circuit breaker.
- IEC Rated; not UL/CSA Recognized

Table 47: IEC Rated Rotary Handles

Description	US Cat. No.	IEC Cat. No.
Operating Subassembly for C60 or C120 Protection Device (Fixed to Protection Device)	**MG27046**	**27046**
Drawout Extended Handle (Mounted on Door or Hinged Panel)	**MG27047**	**27047**
Fixed Handle Front or Lateral (Mounted on Fixed Panel)	**MG27048**	**27048**

Operating Subassembly with Lateral Rotary Handle



Padlock Attachments

Padlock Attachment



The Padlock Attachment clips onto the face of the C60N device to prevent the handle from being operated. It cannot be installed or removed when padlocked. No tools are needed to install it.

The Padlock Attachment allows the IEC C60 circuit breaker to be locked in either the ON or the OFF position (UL 489/CSA C22.2 No.5 Listed and UL 1077 Recognized devices can lock in the OFF position only). The padlock attachment accepts a 0.315 in. (8 mm) diameter padlock, which is not supplied.

The front plate or functional door can be opened with the circuit breaker locked in the OFF position.

NOTE: Locking the C60 or C120 in the ON position will not prevent the device from tripping under overcurrent or ground fault conditions.

IEC Rated; not UL/CSA Recognized

Table 48: Catalog Numbers for IEC Rated Padlock Attachments

Description	Quantity	US Cat. No.	IEC Cat. No.
Padlock Attachment for C60 Protection Device	Bag of 2	**MG26970**	**26970**
Heavy-Duty Padlock Attachment for C60N	Bag of 1	**4LD**	—
Padlock Attachment for C120 Protection Device	Bag of 4	**MG27145**	**27145**

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Lock-Off Attachments

Handle Lockoff Attachment



The Lock-Off Attachment is a permanently-installed, side-mounted accessory for the C60 and C120 circuit breakers to allow locking the circuit breaker in the off position. The attachment is available for right or left side application and is made of optically clear materials so text on the side of the circuit breaker can still be read after installation. The lock-off attachment accepts a 0.25–0.375 in. (6–9.5 mm) diameter padlock, which is not supplied.

The front plate or functional door can be opened with the circuit breaker locked in the OFF position.

UL Rated; CSA Recognized

Table 49: Catalog Numbers for Handle Lock-Off Attachments

Description	Left Hand Kit	Right Hand Kit
Handle Lock-Off Kit for C60 Protection Device	**MGN26380**	**MGN26381**
Handle Lock-Off Kit for C120 Protection Device	**MGN26382**	**MGN26383**

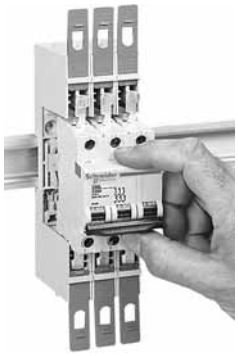
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Mounting Accessories

Plug-in Base

Figure 30:



The Plug-in Base allows permanent field wiring connections to be made to the base, so that a C60 device can be plugged in or removed without affecting field wiring.

The Plug-in Base kit includes spade connectors which must be installed on the circuit breaker so it will mate with the Plug-in Base. The Plug-in Base provides no-load isolation of a circuit protected by C60 supplementary protectors.

While the circuit breaker is removed, the base can be locked using a 0.32 in. (8 mm) dia. padlock (not provided).

- Height of base: 7.0 in. (178 mm); with terminal cover extended, 9.3 in. (237 mm)
- Allow minimum center spacing of 7.87 in. (200 mm) between two rows of bases
- Multiple bases may be used for multi-pole devices
- IEC Rated; not UL/CSA Recognized

Table 50: Catalog Numbers for IEC Rated Plug-in Base

Description	US Cat. No.	IEC Cat. No.
Plug-In Base for C60 Devices	**MG26996**	**26996**

Front Mounting Bracket (Kit)

Figure 31:



The Front Mounting Bracket provides a convenient way to mount Multi 9 circuit breakers, supplementary protectors or accessories. Its height is equal to a 35 mm DIN rail, and allows the C60 and C120 devices to be clipped onto it in a standard manner. Its width is available for 1-, 2-, 3-, or 4-pole devices.

In 480 Vac UL 1077 applications, Cat. No. 26981 (C60) or 27152 (C120) Terminal Screw Shield should be used for increased isolation between the terminal screws of the Multi 9 device and the mounting bracket. These shields are included with the mounting bracket kits.

UL/CSA Recognized and IEC Rated

Table 51: Catalog Numbers for Front Mounting Bracket Ordering Information

Description	Size	Cat. No.
Front Mounting Bracket for C60 Protective Devices	1P	**MG26983**
	2P	**MG26984**
	3P	**MG26985**
	4P	**MG26989**
Front Mounting Bracket for C120 Protective Devices	1P	**MG26986**
	2P	**MG26987**
	3P	**MG26988**
	4P	**MG26990**

NOTE: See dimensional drawings in Section 7.

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DIN Rail Mounting Clips

Additional DIN Rail Mounting Clips for Multi 9 products are available.

Figure 32:



Table 52: DIN Rail Mounting Clips

Description	Cat. No.
DIN Rail Mounting Clip (Bag of 50)	**MG27124**

UL/CSA Recognized Mounting Base for Multi 9 C60 Circuit Breakers



The mounting base for UL 489/CSA C22.2 No.5 240 V Multi 9 C60 miniature circuit breakers is designed for OEM applications requiring a large number of Multi 9 circuit breakers in a single piece of equipment. Providing a means for mounting and a bus for line power, this mounting base offers a convenient solution to powering an entire group of circuit breakers. In addition to simplifying wiring for multiple UL 489 240 V devices, the mounting base minimizes the cost of installation by eliminating discrete wiring of line conductors.

The mounting bases for UL 489/CSA C22.2 No.5 240 V Multi 9 C60 circuit breakers are offered in a variety of configurations, which meet most OEM applications. Available in lengths from 12 to 60 poles, this mounting base handles the large number of Multi 9 circuit breakers found in OEM equipment.

The standard terminals on the US mounted base are 1-inch wide and have 1/4-20 x 1-in. studs, which can be used with compression (ring) terminals or with a bus bar. Nuts with washers are provided for each terminal stud. The terminals of the UL mounting base are aligned with the load terminals of the PowerPact H- and J-frame molded case circuit breakers. This allows them to be connected using straight, flat jumper bars.

UL/CSA Recognized for use with U489 240 V Multi 9 C60 miniature circuit breakers per UL 67, CSA C22.2 No. 29 and IEC 60439-1. Also CE marked.

Table 53: Specifications for Mounting Base for UL 489/CSA C22.2 No.5 Multi 9 C60 Circuit Breakers

Voltage	240 Vac 125 Vdc
Ampacity	200 A Maximum, see table below
Withstand Rating	10 ka @ 0.05 seconds
Conductors/Bus	1, 2 and 3 Conductors, Suitable for Use with 1P, 2P and 3P Circuit Breakers
Pole Capacity	12, 24, 36, 48, 60
Branch Circuit Breakers	UL 489/CSA C22.2 No.5 240 V C60 with 18 mm Spacing
Input Terminal	1 in. Wide Terminal with 1/4-20 x 1 in. Studs with Nuts/Washers for Compression Ring Lugs, Bus Bar or Optional Lugs

Table 54: Catalog Numbers for Mounting Base for UL 489/CSA C22.2 No.5 Multi 9 C60 Circuit Breakers

Poles	1 Conductor		2 Conductors		3 Conductors	
	Maximum Amperage	Cat. No	Maximum Amperage	Cat. No	Maximum Amperage	Cat. No
12	200 A	**US11220018**	150 A	**US21215018**	100 A	**US31210018**
24	200 A	**US12420018**	200 A	**US22420018**	200 A	**US32420018**
36	200 A	**US13620018**	200 A	**US23620018**	200 A	**US33620018**
48	200 A	**US14820018**	200 A	**US24820018**	200 A	**US34820018**
60	200 A	**US16020018**	200 A	**US26020018**	200 A	**US36020018**

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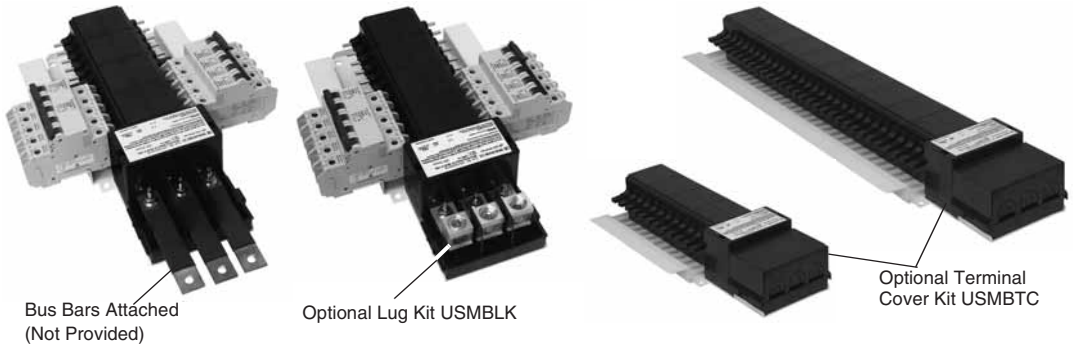
Mounting Base Accessories

Wire Lug Kit

The optional Wire Lug Kit, Catalog Number USMBLK, can be field installed for use with cable. Each kit consists of one lug, one nut and washer assembly. One kit must be ordered for each conductor terminal. The lug mounts on the 1/4-in. terminal stud of the mount base and is secured with a nut with washer. This lug accepts 6 AWG to 300 kcmil copper or aluminum cable. The barriers between the phases provide separation between the phases; an optional terminal cover is also available.

Terminal Cover Kit

The optional Terminal Cover Kit, Catalog Number USMBTC, is designed to provide shielding of the terminals, bus bars, lugs and cabling. Snapping onto the terminal end of the mounting base, the terminal cover has an opening for a bus bar jumper and knock-outs to accommodate various sizes of cable.



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Multi-Pole Front Mounting Kit

The Multi-Pole Front Mounting Kit consists of a transparent, hinged, weatherproof cover. It allows installation of up to twenty modules (10 poles of C60) of Multi 9 circuit breakers or supplementary protectors and accessories. A DIN mounting rail with support is also available.

- Degree of protection as per IEC 529: IP55
- Dimensions (w x h x d): 9.25 x 4.96 x 1.3 in. (235 x 126 x 33 mm)
- Cutout dimensions: 7.32 x 3.78 in. (186 x 96 mm)
- IEC Rated; not UL/CSA Recognized

Figure 33:

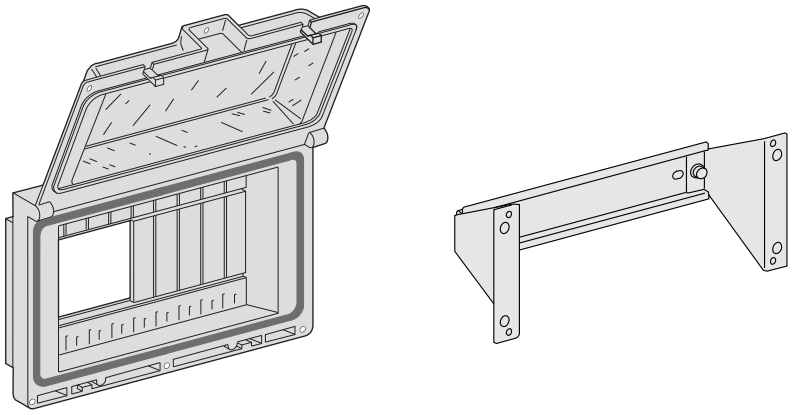


Table 55: Catalog Numbers for IEC Rated Multi-Pole Front Mounting Kit

Description	Cat. No.
Multi-Pole Front Mounting Kit with Transparent Hinged Cover (Includes a 10-Module Divisible Blanking Plate and Mounting Template)	**14210**
DIN Rail with Support	**14211**

Pole Filler



One Strip of M9PF4

The Multi 9 M9PF4 pole filler is used to fill empty panel spaces. They clip into the space. Each M9PF4 consists of four strips of four by 18 mm pole fillers (16 poles total). They may be snapped apart in 9 mm increments.

Table 56: Pole Filler

Description	Cat. No.
Pole Filler, four strips of four by 18 mm	**M9PF4**

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Section 6—Additional System Devices

In addition to the C60 and C120 Circuit Breakers and Supplementary Protectors which form the heart of the Multi 9 product line, there are a variety of other devices which may be used with C60 or C120 devices or as stand-alone devices.

These include the following:

- CM Selector Switches (Change-Over)
- I Current Isolating Switches
- V Signal Lamps and BP Push Buttons
- CI Impulse Counters and CH Hour Counters

NOTE: See Section 4 for Ground-Fault Protection Devices.

All of these devices adhere to the Multi 9 packaging format, and can be mounted on a DIN rail in the protection and control cabinet.

NOTE: See Class 1312 Catalog (document no. 1312CT0101) for recommended protection of the SPD.

CM Selector Switches

Figure 34:



The CM Selector Switch allows manual selection of circuits. Different models are available to allow selection of two or three positions (including off) for one or two circuits. They have maximum ratings of 20 A and 250 Vac and accept cable up to 7 AWG (10 mm^2). Torque cable to 11 in-lb (1.2 N•m).

This device may be installed on the DIN rail adjacent to the C60 device and its accessories or remotely in a user interface panel.

IEC Rated; not UL/CSA Recognized

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Table 57: IEC Rated CM Selector Switches

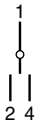
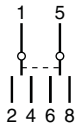
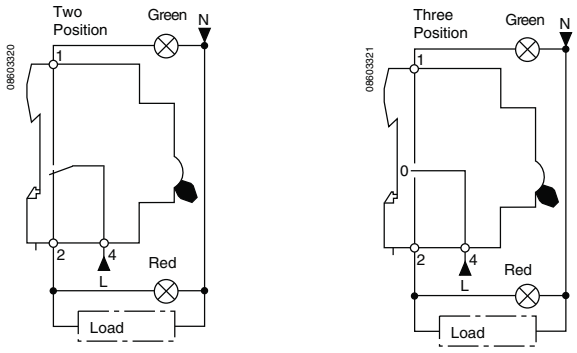
CM Selector Switch Type	No. of Circuits	No. of Positions	Width in Modules	Cat. No.
	1	2	2	**A9E18070**
	1	3	2	**A9E18073**
	2	2	4	**A9E18071**
	2	3	4	**A9E18074**
	2	2	4	**A9E18072**

Figure 35: IEC Rated CM Selector Switch Schematics



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I Current Isolating Switch

The I Isolating Switch provides manual on-load opening or closing of a circuit. Note that it does not provide either thermal or magnetic protection.

It can be used with the OF auxiliary switch and with other non-electrical accessories in the C60 circuit breaker family. This device may be installed on the DIN rail adjacent to the C60 device and its accessories or remotely in a user interface panel.

IEC Rated; not UL/CSA Recognized

Table 58: I Current Isolating Switch Termination

Amperage	Wire Type	Wire Size		Torque	
20 and 32 A	Stranded	16–6 AWG	1.5–10 mm^2	16 lb-in.	1.8 N•m
	Solid	16–6 AWG	1.5–10 mm^2	16 lb-in.	1.8 N•m
40–125 A	Stranded	10–1 AWG	6–50 mm^2	40 lb-in.	4.5 N•m
	Solid	14–4 AWG	2.5–35 mm^2	40 lb-in.	4.5 N•m

Table 59: Catalog Numbers for IEC Rated I Current Isolating Switches

Rating (A)	1P (250 Vac) 2 Modules	2P (415 Vac) 2 Modules	3P (415 Vac) 4 Modules	4P (415 Vac) 4 Modules
20	**A9S60120**	**A9S60220**	**A9S60320**	**A9S60420**
32	**A9S60132**	**A9S60232**	**A9S60332**	**A9S60432**
40	**A9S60140**	—	—	—
63	**A9S60163**	—	—	—
100	**A9S60191**	—	—	—
125	**A9S60192**	—	—	—

Figure 36: I Switches



1P 2P 4P

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Status, Display and Control Accessories

There are a variety of other accessories which may be used with the C60 or C120 devices to communicate control and/or status information. These include the following:

- V Type Signal Lamps
- BP Push Buttons
- CH Hour Counter
- CI Impulse Counter

These accessories may be located adjacent to the C60 or C120 devices or may be located remotely.

V Signal Lamp



The V Type Signal Lamp indicates when voltage is applied to a circuit and may be used with Multi 9 circuit protection systems or other applications. The lamps are high-efficiency, long-life LEDs. The lenses are available in a variety of colors.

This accessory device may be installed on the DIN rail adjacent to the C60 devices and its accessories or remotely in a user interface panel. It accepts cable up to 7 AWG (10 mm^2). Torque cable to 11 lb-in. (1.2 N•m).

NOTE: IEC Rated; not UL/CSA Recognized

Table 60: Multi 9 IEC Rated V Indicator Lights

Type	Width in 9 mm Modules	Color	Cat No. 110-230 Vac	Cat No. 12–48 Vac/Vdc
Single LED Indicator Light				
	2	Red	**A9E18320**	—
		Green	**A9E18321**	—
		White	**A9E18322**	—
		Blue	**A9E18323**	—
		Yellow	**A9E18324**	—
Double LED Indicator Light				
	2	Green/Red	**A9E18325**	**A9E18335**
Blinker				
	2	Red	**A9E18326**	

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BP Push Buttons

Figure 37:



Push Buttons with Signal Lamps

The BP Push Button device may be used to control Multi 9 circuit protection systems or other equipment. It provides momentary switching and is available with one N.O., one N.C., or combined with one each N.O. + N.C. contact.

It is available with or without a signal lamp, which is available in a variety of colors. The lamps are high-efficiency long-life LEDs.

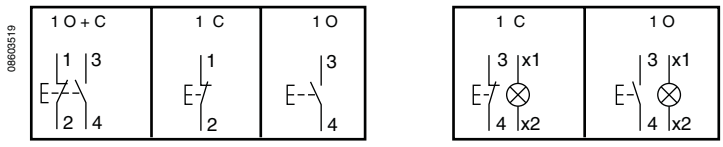
This device may be installed on the DIN rail adjacent to the C60 and its accessories or remotely in a user interface panel. It accepts cable up to 7 AWG (10 mm^2). Torque cable to 11 lb-in. (1.2 N•m).

IEC Rated; not UL/CSA Recognized.

Table 61: IEC Rated Multi 9 BP Pushbuttons Catalog Numbers

Type	Width in 9 mm Modules	Power	Lamp Color	Pushbutton Color	Circuit	Catalog Number
Single BP						
	2			Grey	1 NC	**A9E18030**
				Red	1 NC	**A9E18031**
				Grey	1 NO	**A9E18032**
				Grey	1 NO + 1 NC	**A9E18033**
Double BP						
	2			Green/Red	1 NO / 1 NC	**A9E18034**
				Grey/Grey	1 NO / 1 NO	**A9E18035**
Single BP + LED Indicator Light						
	2	110-230 Vac	Green	Grey	1 NO	**A9E18036**
			Red	Grey	1 NC	**A9E18037**
		12-48 Vac/Vdc	Green	Grey	1 NO	**A9E18038**
			Red	Grey	1 NC	**A9E18039**

Figure 38: Schematics for IEC Rated BP Push Button Types



Push Buttons without Signal Lamps

Push Buttons with Signal Lamps

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CH Hour Counter

Figure 39:



The CH Hour Counter is used for measuring the total operating time of a circuit or load. It is capable of counting to a maximum of 99,999.99 hours. It operates on 224–440 Vac, 50 Hz. The CH must be installed downstream of a circuit breaker or supplementary protector.

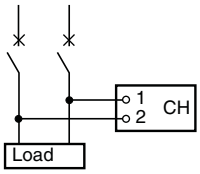
The CH Hour Counter is useful for metering of activity or for scheduling maintenance.

This device may be installed on the DIN rail adjacent to the C60 and its accessories or remotely in a user interface panel.

NOTE: IEC Rated; not UL/CSA Recognized

Table 62: Information for IEC Rated CH Hour Counter

Wire Size		Torque	
16–14 AWG	1–2.5 mm^2	0.8 lb-in	1.1 N•m



CI Impulse Counter



The CI Impulse Counter is an electromechanical counter designed to measure impulses produced by various devices. It displays the running total of metered impulses up to a maximum count of 9,999,999 impulses. The CI Impulse Counter is unaffected by interruptions in the main power supply.

It is most suitable for counting impulses emitted by detectors such as kilowatt-hour metering, temperature overrun, etc.

This device may be installed on the DIN rail adjacent to the C60 device and its accessories or remotely in a user interface panel.

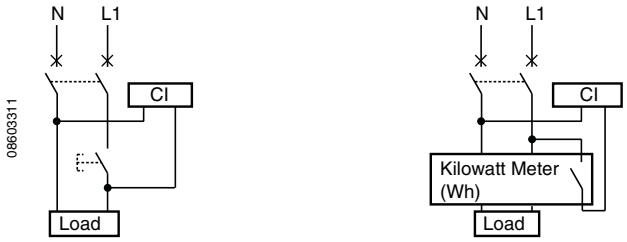


Figure 40: Schematics for IEC Rated CI Impulse Counter

NOTE: IEC Rated; Not UL/CSA Recognized

Table 63: CH Hour Counter and CI Impulse Counter

Type	Voltage (Vac)	Frequency (15% to +6%)	Width in Modules	Cat. No.
CH	220–240	50 Hz	4	**15440**
CI	220–240	50/60 Hz	4	**15443**

Table 64: Wiring Information

Wire Size		Torque	
16–14 AWG	1–2.5 mm^2	0.8 lb-in	1.1 N•m

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Kaedra™ Weatherproof DIN Type Enclosures

Applications

- Expandable enclosures for service, industrial, or equipment applications
- Protects against water, dust, and chemical and atmospheric agents
- Kaedra mini-enclosures are designed for small installations (3 to12 modules) replacing Mini-Pragma™ weatherproof enclosures.
- Kaedra enclosures come in seven sizes from 12 to 72 modules (18 mm per module).

Standard Features

- IP 65: as per IEC 60529 for protection against ingress of solids and liquids.
- IK09: Protection against shocks and resistance to chemical and atmospheric agents, ultraviolet light, etc.
- Class 2: Total insulation
- Flame and abnormal heat resistance: 750°C as per IEC 60695-2-1
- Conformity with IEC 670 standard for empty enclosures and with IEC 439-3 standard for equipped switchboards.
- It is made of insulating material, Class 2, and can be sealed and/or locked (keylock or insert). It complies with IEC 60439-3 Standards.
  Not UL/CSA recognized.

Construction

- Modern, non-metallic (styrene), sturdy appearance in light gray RAL 7035; smooth surfaces and rounded corners to increase impact strength.
- Transparent (green) door for immediate visibility; door can be mounted left or right with clip-on hinges; secure closing due to multiple latching points; door may be locked to limit access.
- Punchout holes on four sides and back enable cable insertion throughout.

Installation

- Can be installed horizontally and/or vertically
- Enclosures can be combined and added at any time using the association kits to provide mechanical connection and cable routing.
- Cabling is quick and efficient with the provided terminal blocks and wiring straps.
- Distance between rails (125, 150, 175 mm) and rail depth are adjustable. Chassis can be removed for assembly of equipment.
- Function identification with a clip-on label with protection cover.

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Figure 41:



KAEDRA™ Weatherproof Mini-Enclosure

Table 65: Kaedra Weatherproof Mini-Enclosures[1]

Description	Dimensions						Cat. No.
	W		H		D		
	in.	mm	in.	mm	in.	mm	
1 Row of 3 Modules[2]	3.15	80	5.9	150	3.86	98	**13956**
1 Row of 4 Modules	4.84	123	7.87	200	4.41	112	**13957**
1 Row of 6 Modules	6.26	159	7.87	200	4.41	112	**13958**
1 Row of 8 Modules	7.68	159	7.87	200	4.41	112	**13959**
1 Row of 12 Modules	10.51	267	7.87	200	4.41	112	**13960**

1 Accessories include: terminal blocks and terminal block support; Class II plugs.

2 Enclosure modules are 18 mm wide.

NOTE: The Kaedra Weatherproof enclosures replace the Mini-Pragma enclosures.

Figure 42:



KAEDRA™ Weatherproof Enclosure

Table 66: Kaedra Weatherproof Enclosures[1]

Description	Dimensions						Cat. No.
	W		H		D		
	in.	mm	in.	mm	in.	mm	
1 Row of 12 Modules[2]	13.39	340	11.02	280	6.23	160	**13962**
2 Rows of 12 Modules	13.39	340	18.11	460	6.23	160	**13964**
3 Rows of 12 Modules	13.39	340	24.02	610	6.23	160	**13966**
1 Row of 18 Modules	13.39	340	11.02	280	6.23	160	**13963**
2 Rows of 18 Modules	13.39	340	18.11	460	6.23	160	**13965**
3 Rows of 18 Modules	13.39	340	24.02	610	6.23	160	**13967**
4 Rows of 18 Modules	13.39	340	33.15	842	6.23	160	**13968**

1 Accessories include: Terminal blocks and terminal block support; 1 marking kit per row; 1 wiring strap per row; Class II plugs, and blanking plates (5 x 18 mm modules per row).

2 Enclosure modules are 18 mm wide.

Accessories

Necessary accessories are included with enclosure, including: Terminal blocks and terminal block support; one marking kit; Class II plugs.

Other options available are listed in Table 67.

Table 67: Kaedra Weatherproof Enclosure Accessories

Description	Cat. No.
Association Kit (2 Sleeves + 4 Nuts + 4 Washers)	**13934**
Blanking Plate (Set of 10 x 5 Modules)	**13940**
Sealing Kit (2 Screws, 5 Fasteners)	**13947**
Keylock (Eurolock no. 850)	**13948**
Plain Front Plate, 12 Modules	**13944**
Plain Front Plate, 18 Modules	**13945**
Cable Gland, PG11 (0.732 in./18.6 mm)	**83992**
Cable Gland, PG13.5	**83993**
Cable Gland, PG16 (0.886 in./22.5 mm)	**83994**
Cable Gland, PG21 (1.114 in./28.3 mm)	**83995**
Cable Gland, PG29 (1.457 in./37 mm)	**83996**
Cable Gland, PG36 (1.85 in./47 mm)	**83997**

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Section 7—Dimensions

UL 489/CSA C22.2 No. 5 Listed C60 Circuit Breakers

Figure 43: UL 489/CSA C22.2 No.5 Listed C60 240 Vac Circuit Breaker with Box Lug Terminals

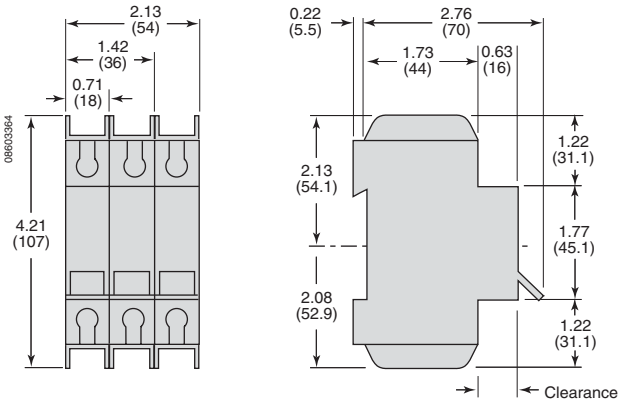


Figure 44: UL 489/CSA C22.2 No.5 Listed C60 240 Vac Circuit Breaker with Ring Tongue Terminals

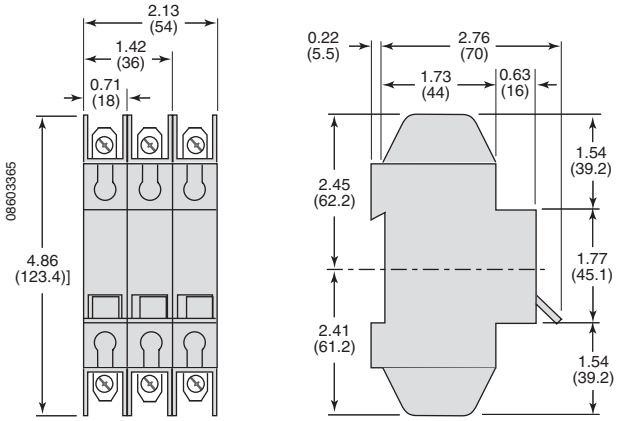
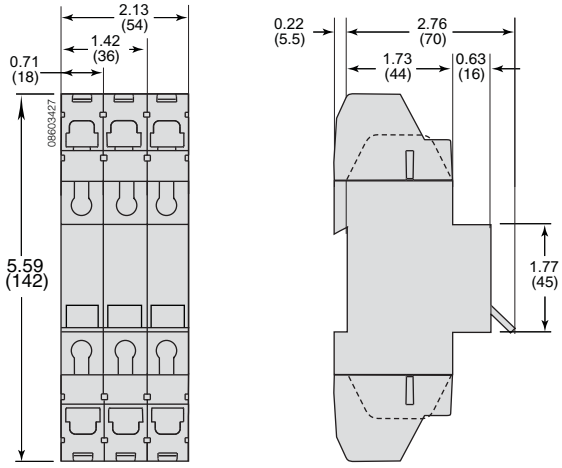


Figure 45: UL 489/CSA C22.2 No.5 C60 480 Vac and 240 Vac Circuit Breaker with Fingersafe Shields



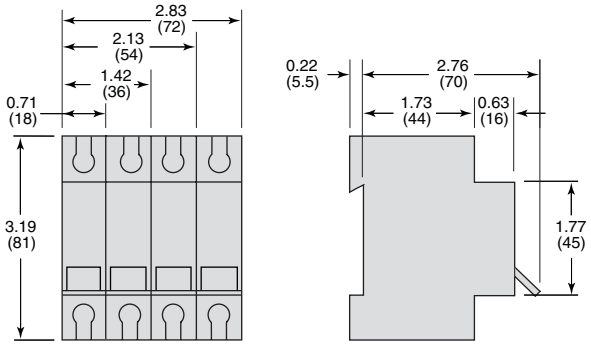
Dimensions: in. (mm)

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UL 1077 Supplementary Protectors

Figure 46: C60 UL 1077 Supplementary Protectors



Dimensions: in. (mm)

IEC Rated Circuit Breakers

Figure 47: IEC N40 Circuit Breaker

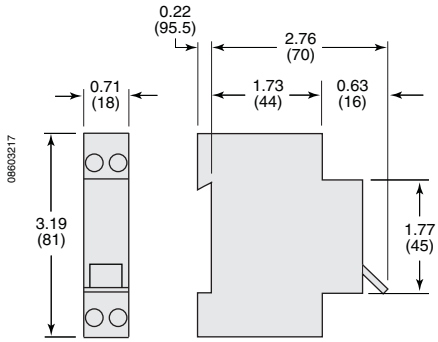


Figure 48: C60 IEC Circuit Breakers

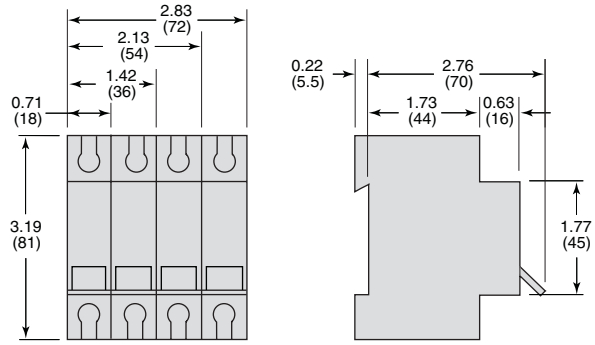
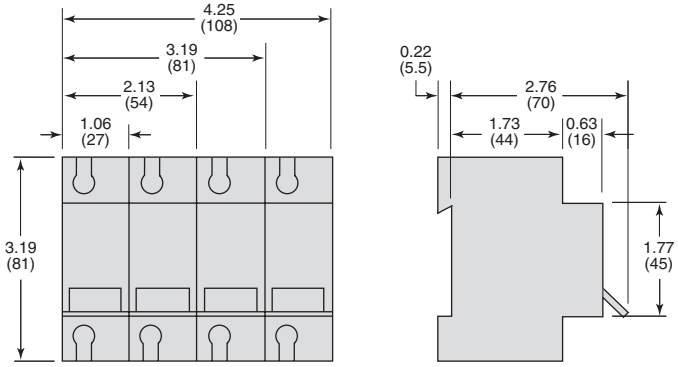


Figure 49: C120 IEC Circuit Breaker



Dimensions: in. (mm)

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UL and IEC Rated Ground-Fault Products

Figure 50: UL GFP Ground-Fault Protector and IEC ID Residual Current Switch

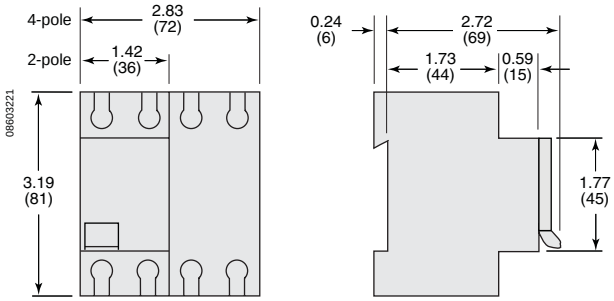


Figure 51: IEC Vigi Ground-Fault Module for C60 Devices

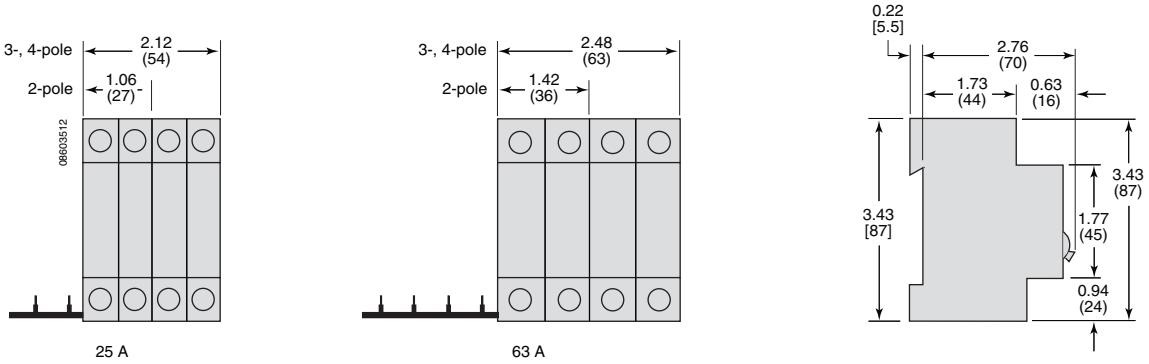
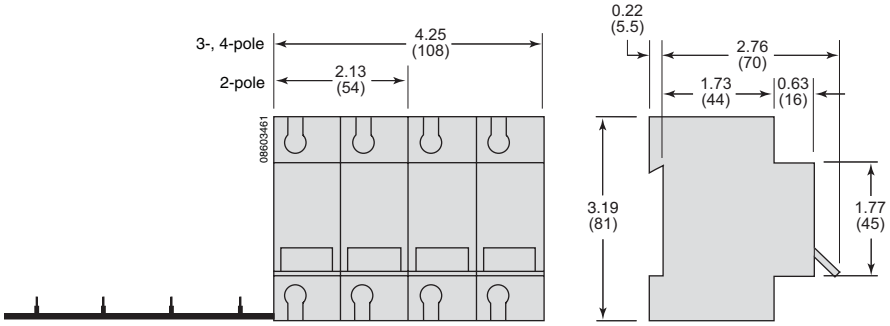


Figure 52: IEC Vigi Ground-Fault Module for C120 Devices



Dimensions: :in. (mm)

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Accessory Dimensions

Figure 53: OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release and MX + OF Shunt Trip with Auxiliary Switch for C60 and C120

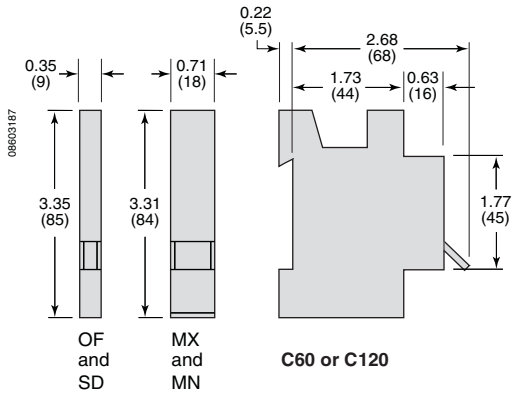


Figure 54: OFS Auxiliary Switch and Adapter for GFP Ground-Fault Protector and ID Residual Current Switch

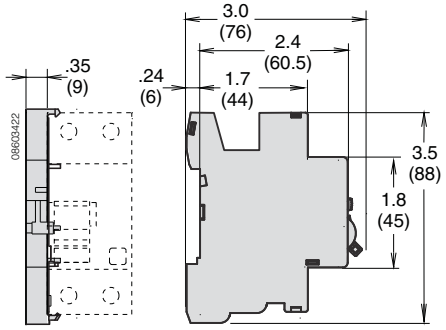


Figure 55: TM Motor Operator for C60 Devices

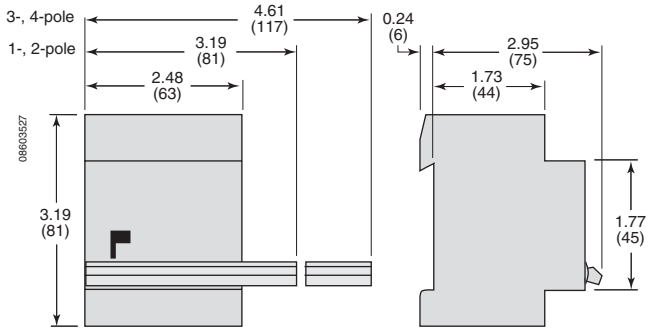


Figure 56: Spacer for C60 and C120 Devices

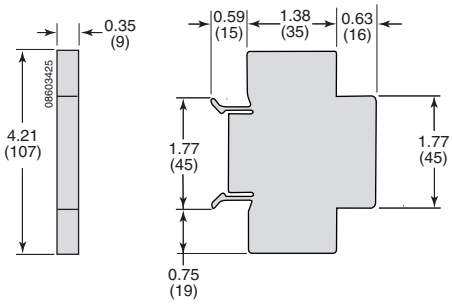


Figure 57: Interphase Barriers for C60 Devices

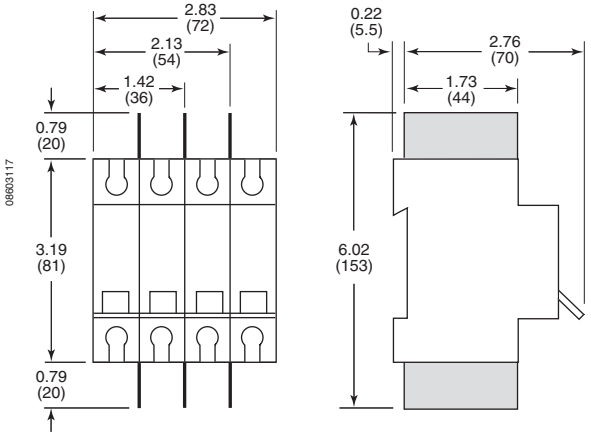
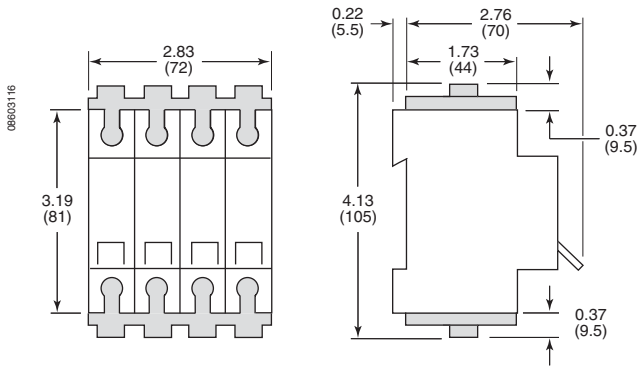


Figure 58: Terminal Screw Shield for UL 489A, UL 1077 and IEC C60 Devices



Dimensions: :in. (mm)

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Figure 59: Plug-In Base for UL 489A, UL 1077 and IEC C60 Devices

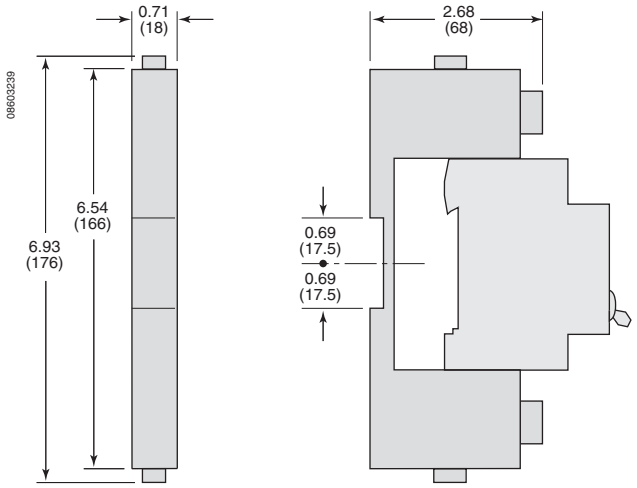


Figure 60: Terminal Cover for UL 489A, UL 1077 and IEC C60 Devices

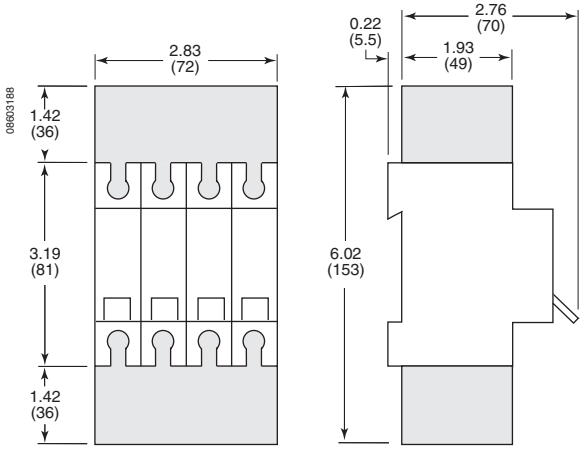
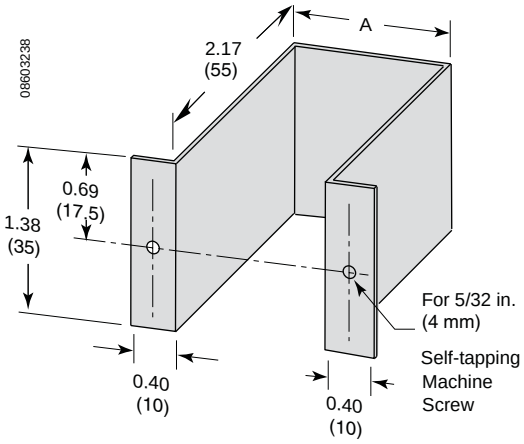
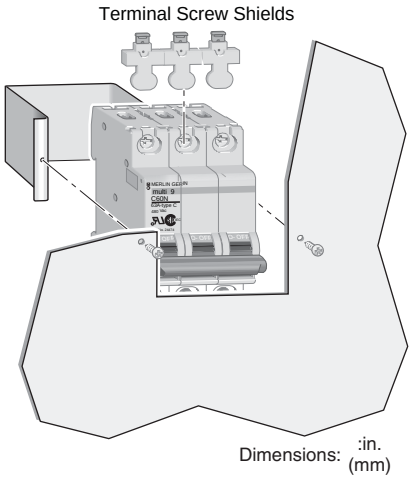


Figure 61: Front Mounting Bracket Kit

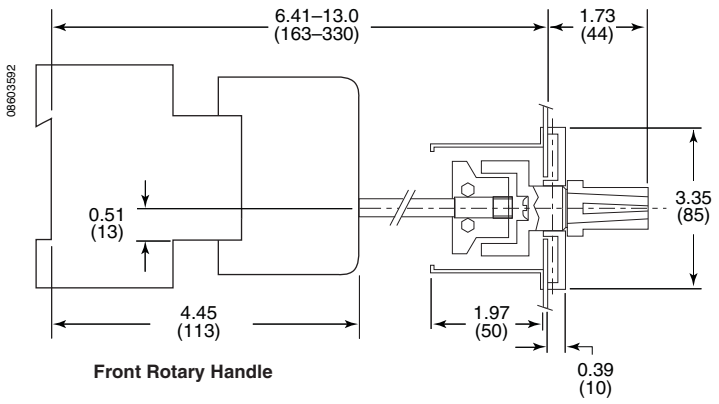




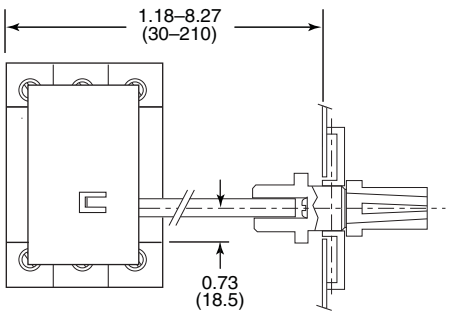
Dimension A

No. of Poles	in.	mm	Catalog No.
Bracket for C60 (18 mm/pole)			
1	0.75	19	MG26983
2	1.46	37	MG26984
3	2.32	55	MG26985
4	2.87	73	MG26989
Bracket for C120 (27 mm/pole)			
1	1.10	28	MG26986
2	2.16	55	MG26987
3	3.23	82	MG26988
4	4.29	109	MG26990

Figure 62: Rotary Handle for C60 Devices



Front Rotary Handle



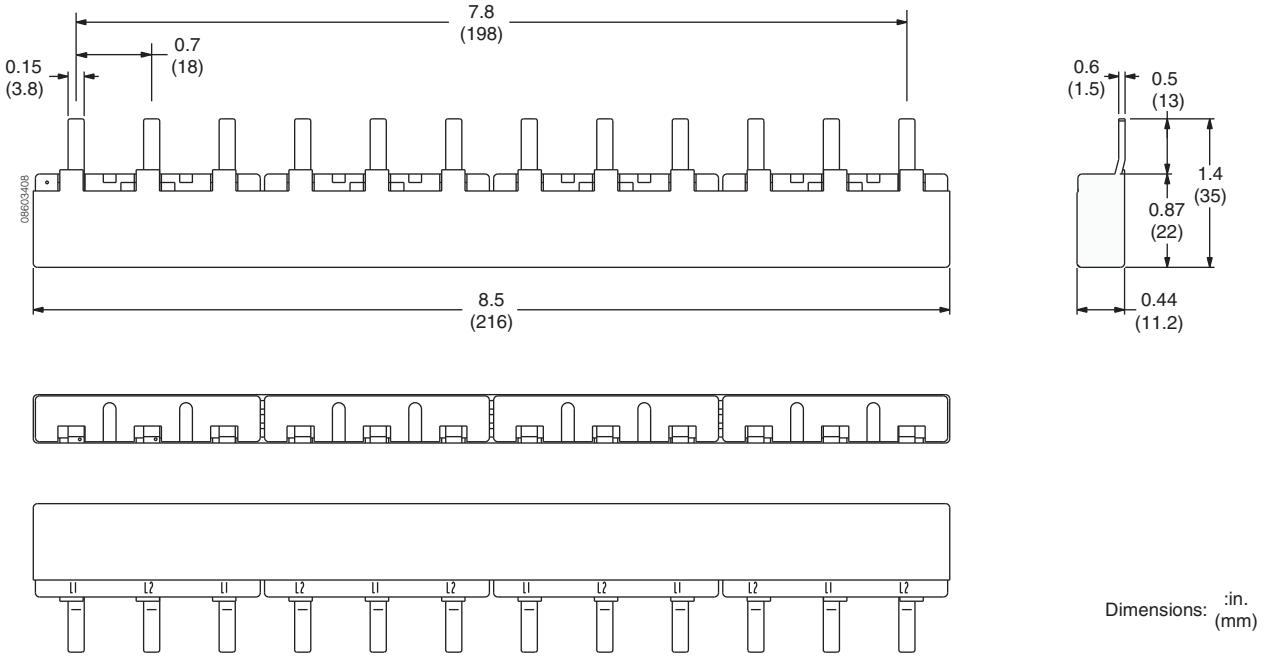
Lateral Rotary Handle

Dimensions: in. (mm)

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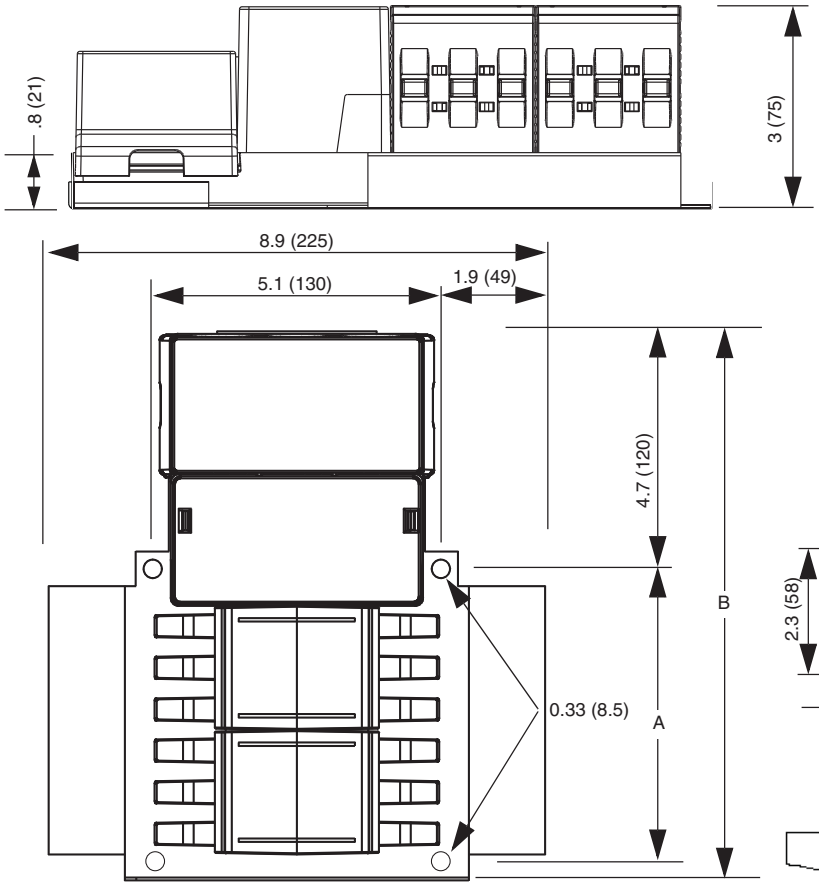
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Figure 63: Comb Bus Bar Dimensions



Dimensions: :in. (mm)

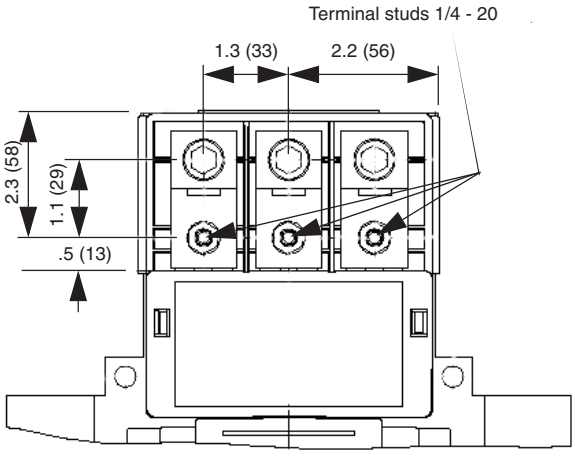
Figure 64: Multi 9 UL C60 Mounting Base



Number of Poles	A	B
12	5 (127)	10.2 (258)
24	9.2 (235)	14.4 (366)
36	13.5 (343)	18.7 (474)
48	17.7 (451)	23 (582)
60	22 (559)	27.2 (690)

Dimensions: inches (mm)

Dimensions: in. (mm)



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Figure 65: IEC MSC Chassis for C60 Devices

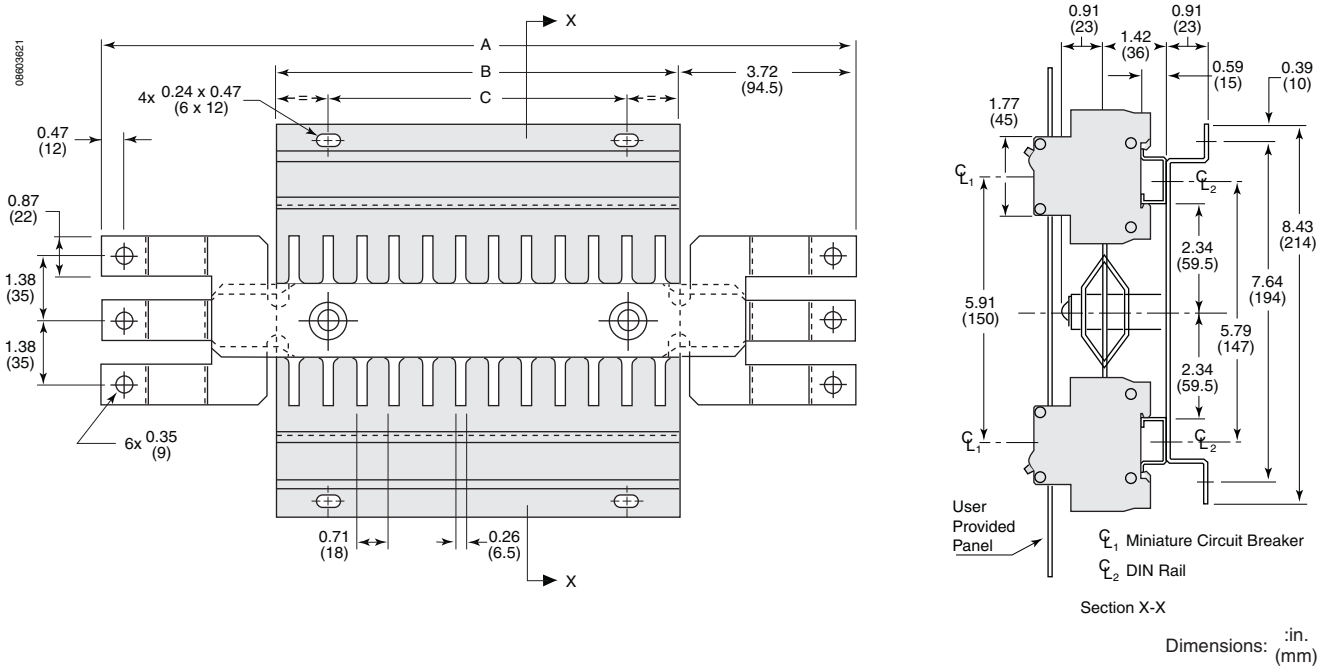


Table 68: MSC Chassis for C60 Devices

Type	Number of Poles	Dimensions					
		A[1]		B		C	
		in.	mm	in.	mm	in.	mm
MSC DC (for C60 2 pole)	12	11.7	299	4.33	110	2.13	54
	16	13.2	335	5.75	146	3.54	90
	20	14.6	371	7.17	182	4.57	116
MSC 18 (for C60 3 pole)	12	11.7	299	4.33	110	15.9	405
	18	13.9	353	6.46	164	8.58	218
	24	15.9	405	8.58	218	6.38	162
MSC 27 (for C120 3 pole)	12	17.0	432	9.57	162	4.25	108
	18	21.7	551	14.35	243	7.44	189
	24	26.5	673	19.13	324	10.63	270

1 For TF suffix (top feed only), reduce length by 3.72 in. (94.5 mm).

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Figure 66: Multi-Pole Front Mounting Kit for C60 Devices

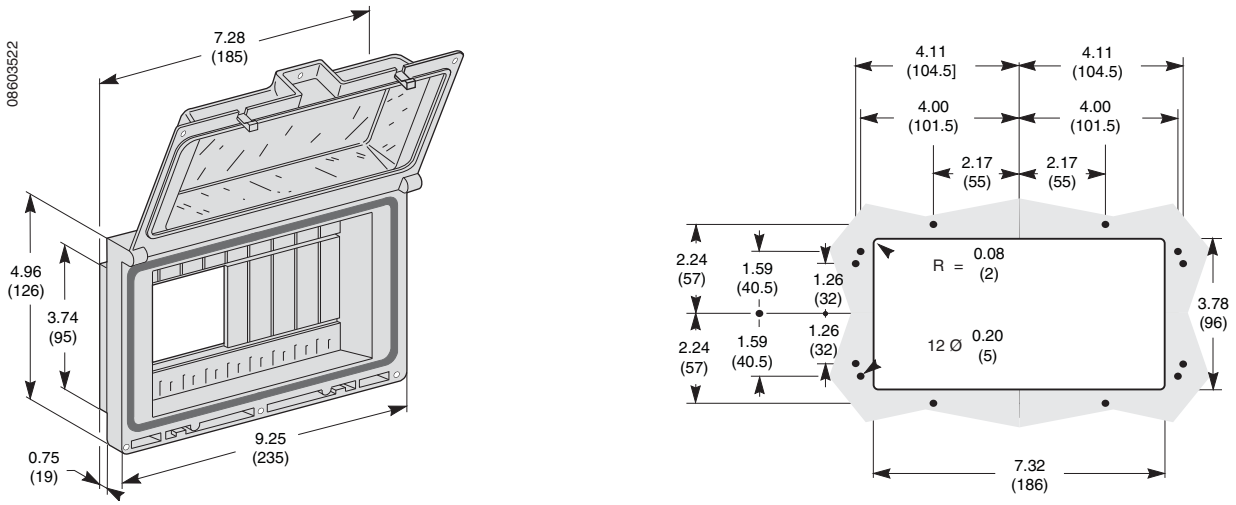


Figure 67: Bracket for Front Mounting Kit

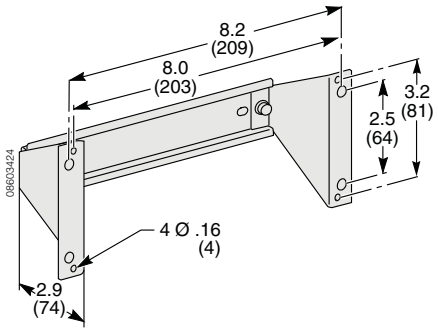


Figure 68: M9PF4 Pole Filler

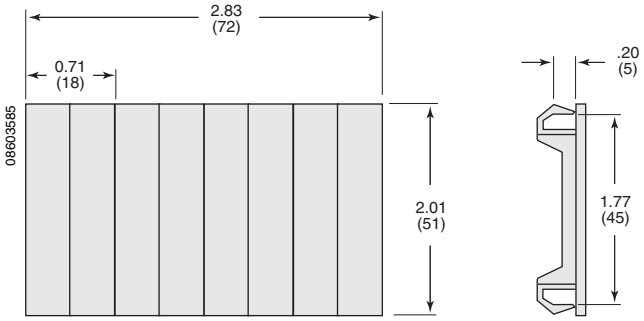
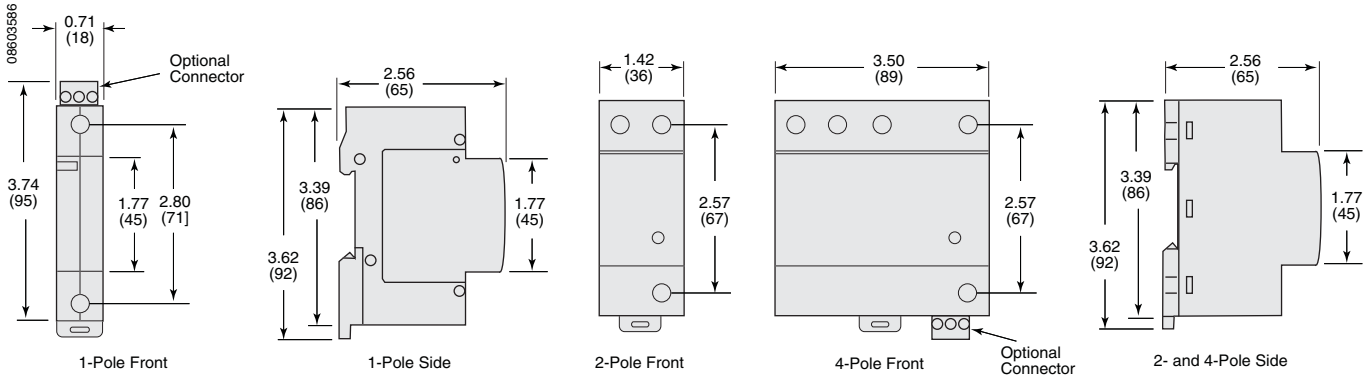


Figure 69: SPD Surge Protectors



Dimensions: in. (mm)

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Figure 70: CM Switches

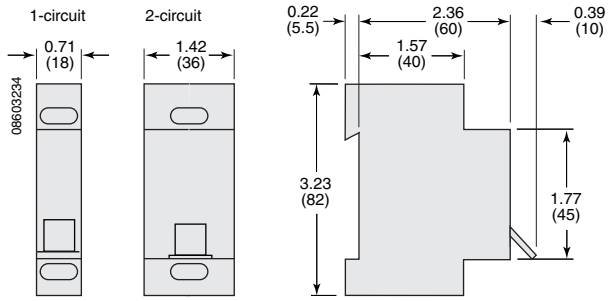


Figure 71: I Switch (20–32 A)

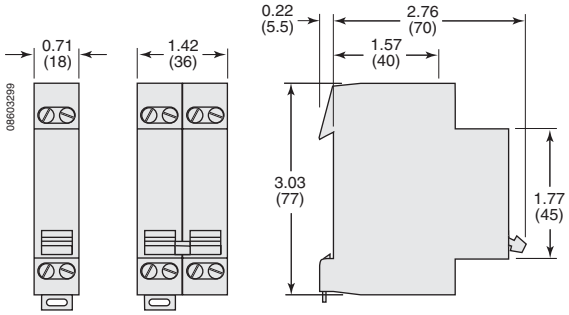


Figure 72: I Switch (40–125 A)

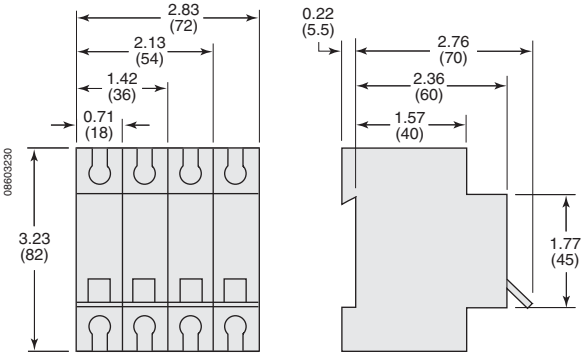


Figure 73: V Signal Lamps

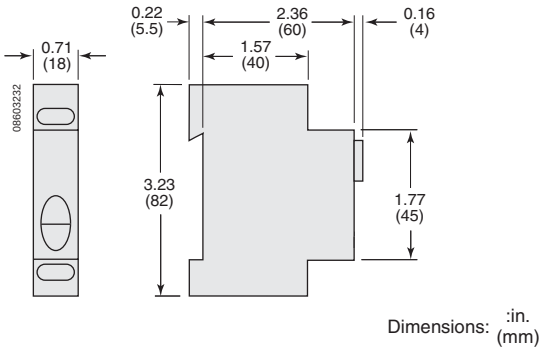


Figure 74: BP Push Buttons

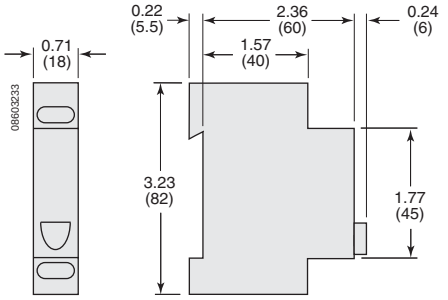


Figure 75: CH Hour Counter

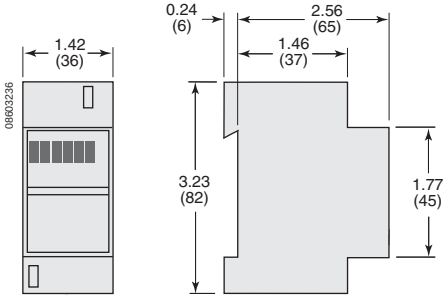
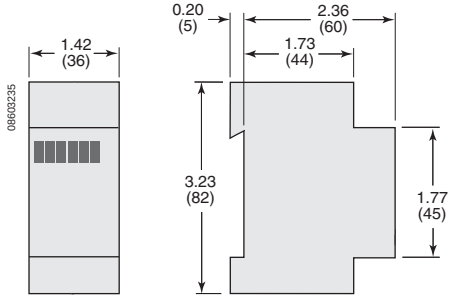


Figure 76: CI Impulse Counter



Dimensions: in. (mm)

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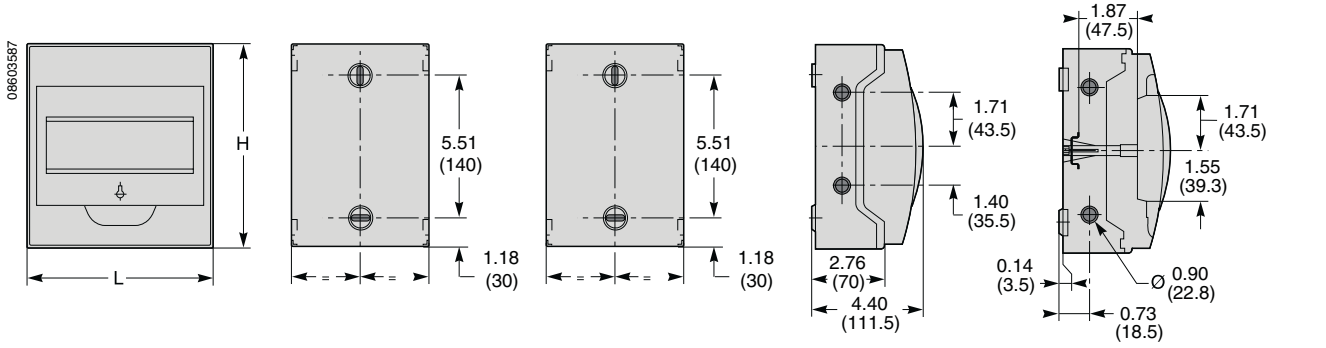
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Kaedra Weatherproof Mini-Enclosure Dimensions

Table 69: Kaedra Weatherproof Mini-Enclosure Dimensions

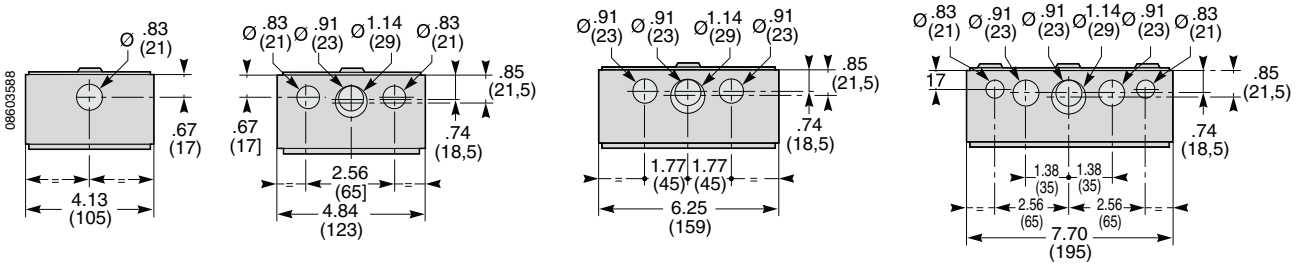
No. of Modules	L		H		Weight		Cat. No.
	in	mm	in	mm	lbs	grams	
3	3.1	80	5.9	150	0.66	300	13956
4	4.8	123	7.9	200	0.99	450	13957
6	6.3	159	7.9	200	1.32	600	13958
8	7.7	195	7.9	200	1.76	800	13959
12	10.5	267	7.9	200	1.98	900	13960

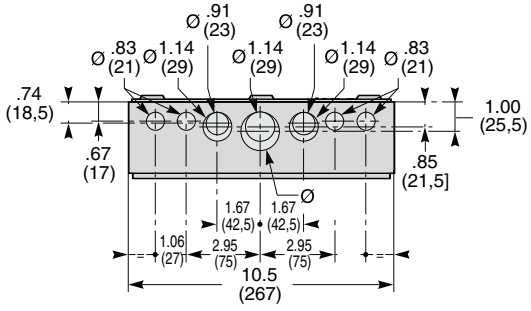
Figure 77: Kaedra Weatherproof Mini-Enclosures



Dimensions: :in. (mm)

Figure 78: Top View for Kaedra Weatherproof Type Mini Enclosures





12 Modules

Dimensions: :in. (mm)

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Kaedra Weatherproof Enclosures

Table 70: Kaedra Weatherproof Enclosure Dimensions (12 Module)

A		B		C		Weight		Cat. No.
in	mm	in	mm	in	mm	lbs	grams	
11.02	280	4.65	118	3.19	81	4.19	1900	13962
18.11	460	9.88	251	4.15	104.5	7.28	3300	13964
24.02	610	15.79	401	4.15	104.5	9.04	4100	13968

Figure 79: Kaedra Weatherproof Type Enclosures (12 Module)

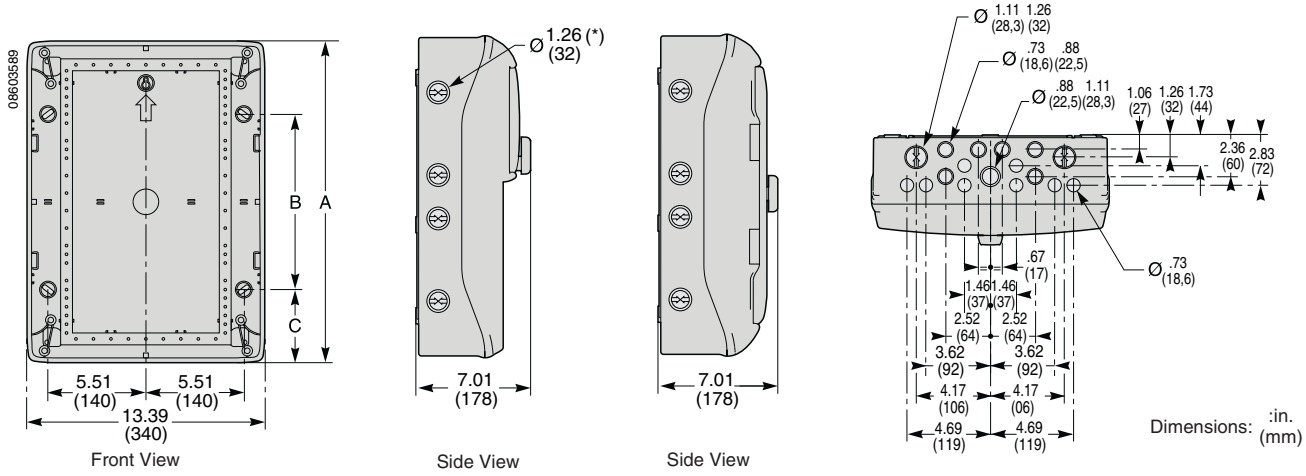
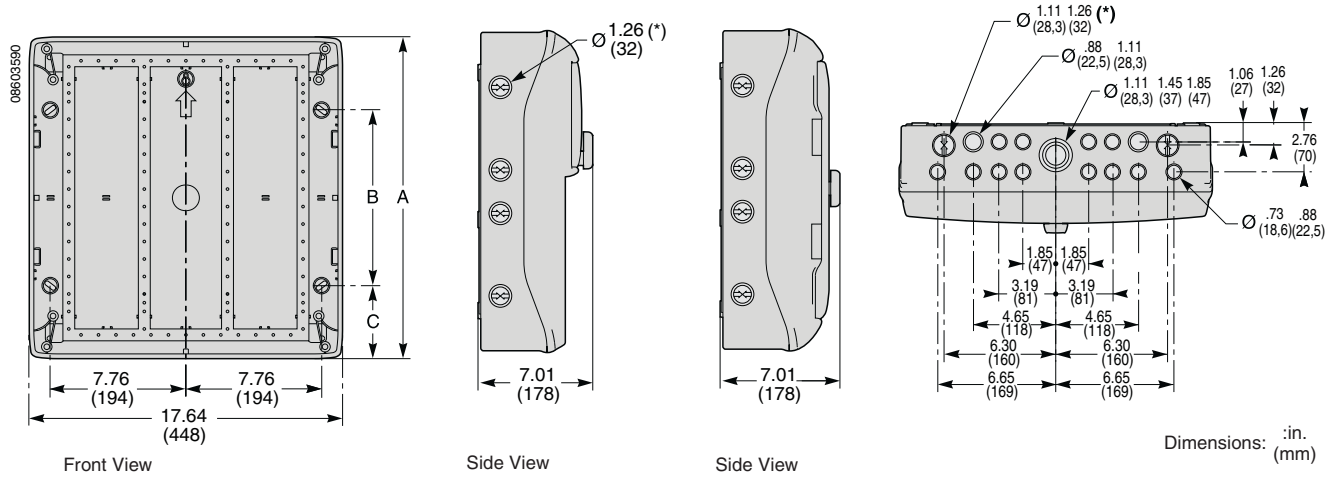


Table 71: Kaedra Weatherproof Enclosure Dimensions (18 Module)

A		B		C		Weight		Cat. No.
in	mm	in	mm	in	mm	lbs	grams	
11.02	280	4.65	118	3.19	81	5.29	2400	13963
18.11	460	9.88	251	4.15	104.5	9.04	4100	13965
24.02	610	15.79	401	4.15	104.5	12.35	5600	13967
33.15	842	24.92	633	4.15	104.5	14.55	6600	13968

Figure 80: Kaedra Weatherproof Type Enclosures (18 Module)

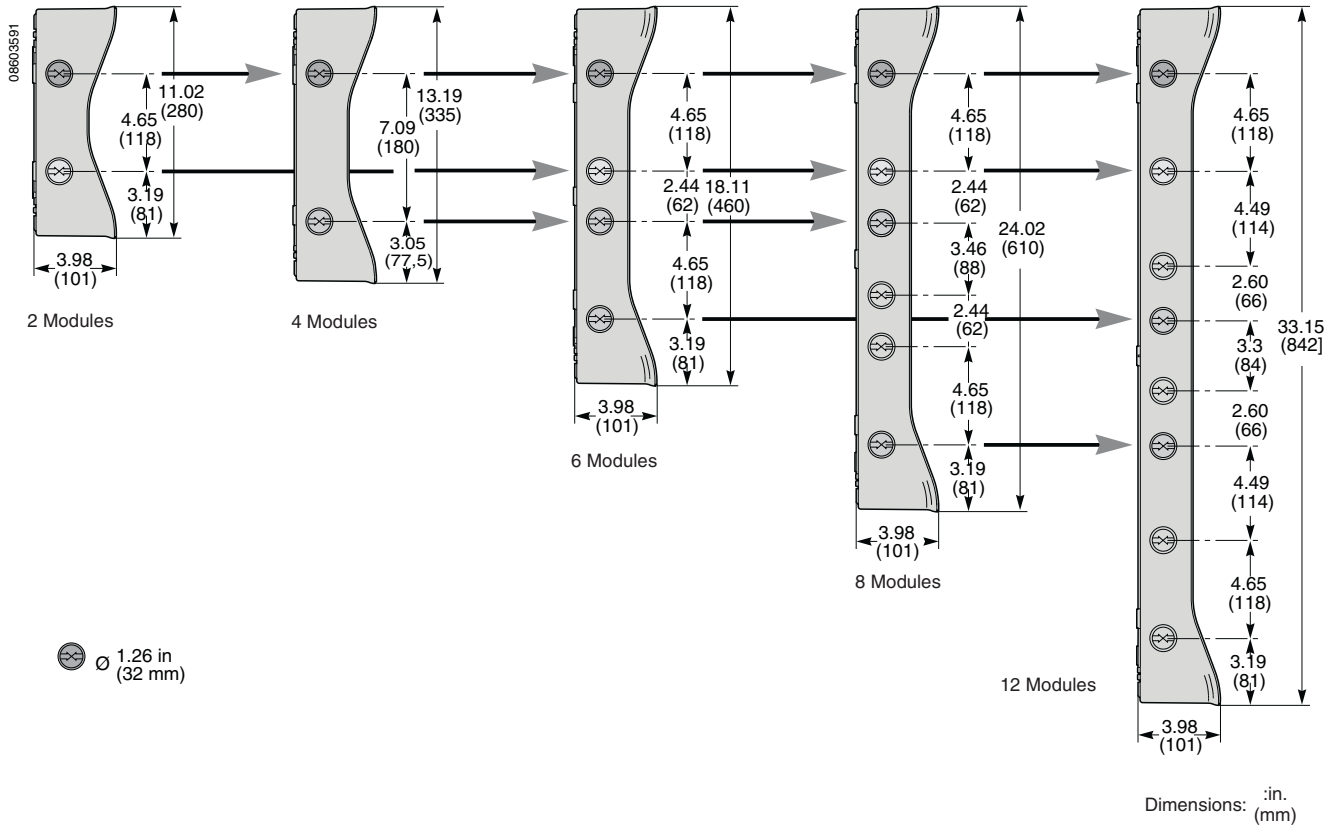


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Table 72: Kaedra Cable Glands for Weatherproof Enclosures

Cable Size		Drilling Diameter		Thread Diameter	Pre-Punchout	Cat. No.
in	mm	in	mm	mm	mm	
0.354–0.433	9–11	0.740	18.8	18.6	PG 11	83992
0.354–0.472	9–12	0.815	20.7	20.4	PG 13.5	83993
0.394–0.512	10–13	0.898	22.8	22.5	PG 16	83994
0.551–0.669	14–17	1.125	28.6	28.3	PG 21	83995
0.748–1.024	19–26	1.472	37.4	37	PG 29	83996
1.102–1.417	28–36	1.870	47.5	47	PG 36	83997

Figure 81: Kaedra Horizontal Side-by-Side Interconnection References



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Section 8—Applications

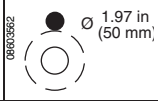
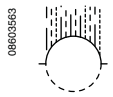
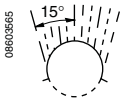
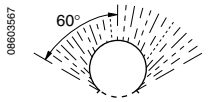
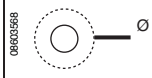
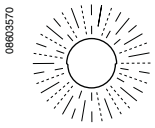
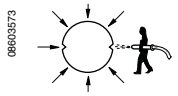
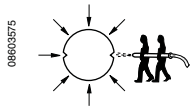
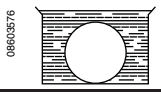
Degree of Protection (IP)

The IEC 529 Standard publication or the European EN 60529 Standard define the IP degree of protection characterizing the ability of a device to withstand the two external influences below:

- Ingress of solid bodies and protection of people
- Ingress of water

The IP contains two digits, one for each of these external influences, and is assigned to the device after a series of tests defined by the NF EN 60529 Standard. The IP degree of protection must always be read and understood digit by digit and not globally. The two IP digits may contain an optional letter which indicates the enclosure's ability to protect people against access to live parts.

Table 73: Explanation of IP Degree of Protection Digits[1]

First Digit Solid Body Protection			Second Digit Liquid Protection			Third Digit Mechanical Protection		
IP		Tests	IP	Tests		IP	Tests	IK
0		No protection	0	No protection		0	No protection	00
1		Protected against solid bodies larger than 1.97 in. (50 mm), e.g., accidental hand contact	1		Protected against vertically falling water droplets (condensation)	1	Impact energy 0.225 joules	02
2		Protected against solid bodies larger than 0.47 in. (12 mm), e.g., fingers	2		Protected against falling water droplets up to 15° from vertical	3	Impact energy 500 joules	04
3		Protected against solid bodies larger than 0.098 in. (2.5 mm), e.g., tools, wires	3		Protected against rainwater up to 60° from vertical	5	Impact energy 2.00 joules	07
4		Protected against solid bodies larger than 0.039 in. (1 mm), e.g., fine tools, small wires	4		Protected against water spray from all directions	7	Impact energy 6.00 joules	08
5		Protected against dust (no harmful deposit)	5		Protected against water splashes from all directions by jet pipes	9	Impact energy 20.00 joules	10
6		Completely protected against dust	6		Protected against water splashes/waves (of the heavy sea kind)			
			7		Protected against immersion effects			

1 When mounted outdoors, the IP ≥ 54 enclosures must be equipped with a protectable top, or installed in a shelter.

The degrees of protection given in this catalog apply for enclosures as described here. However, the initial degree of protection can only be maintained if the device is properly assembled and installed.

Class 2: The term "double insulation" is also used. This consists of backing up the main insulation of an electrical device by an additional insulation in order to protect people against direct contact.

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Vibration

Table 74: Vibration as per IEC 68.2.6 Standard[1]

Curve	Sequence	Vibration
Curve B	Sequence S3: 0.14 oz. (4 g)	5–13 Hz: ±0.24 in. (6 mm) 13–300 Hz: 0.14 oz. (4 g)
Curve C and D	Sequence S6: 0.25 oz. (7 g)	5–58 Hz: ±0.02 in. (0.5 mm) 58–300 Hz: 0.25 oz. (7 g)

[1] Results depend on magnetic trip level. Five frequency sweeps per axis.

Mechanical Shock (IK)

As per IEC 68.2.27 Standard: 1.06 oz./30 g, 18 ms., 3 shocks per axis.

Standard EN 50.102 defines an IK code characterizing the ability of a device to withstand mechanical shocks. The IK code replaces the third digit of the old IP.

Protection of 400 Hz Circuits

The C60 and C120 miniature circuit breakers are designed to be applied on 50/60 Hz systems and can be re-rated for use on 400 Hz systems.

Table 75: 400 Hz Circuits

Type	No. of Poles	Interrupting Ratings (Vac)		
		240	277	480Y/277
C60N	1P	4,000	3,000	—
(0.5–63 A)	2P, 3P and 4P	4,000	—	3,000
C120H (50–80 A)	1P	3,000	—	—
	2P, 3P and 4P	3,000	—	—
C120H (10–40 A)	1P	5,000	4,000	—
	2P, 3P and 4P	5,000	—	4,000

- Thermal: No variation
- Magnetic increase in thresholds multiplier:
  - — N40: 1.50
  - — C60N: 1.48
  - — C120H: 1.40

Vigi ground-fault modules and residual current circuit breakers and switches can also be used on 400 Hz systems. Note in Figure 82 that the mA threshold varies according to system frequency.

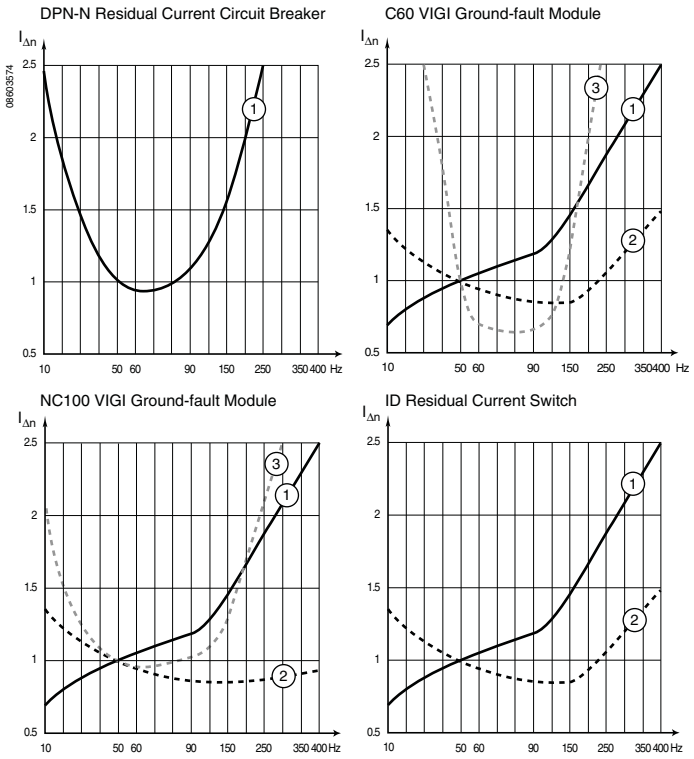
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Table 76: Curve Sensitivity at 400 Hz

Class	Rating (A)	Curve No. Sensitivity (mA)			
		10	30	100	300
N40 Residual Current Circuit Breakers					
AC	≤ 25	①	①	—	①
C60 Vigi Ground-Fault Module					
110/220 V, 50 Hz Vigi C60					
AC	≤ 25	②	①	①	—
	≤ 63	—	②	①	—
2P, 3P, 4P 220/415 V, 50 Hz Vigi C60					
AC	≤ 25	②	①	①	—
	≤ 63	—	②	①	—
AC S		—	③	②	②
C120 Vigi Ground-Fault Module					
AC	≤ 100	—	③	—	①
AC S	≤ 100	—	②	②	②
ID Residual Current Switch					
AC	25	②	①	—	①
	25–40	—	①	①	①
	63–80–100	—	②	①	①
AC S	63–80–100	—	—	—	②

Figure 82: Protection of 400 Hz Circuits



Temperature Rating

The operating current of the circuit breakers varies depending on the ambient temperature in which the circuit breaker is located.
If the circuit breaker is installed in an enclosure or in a hot room (boiler room, etc.), the current needed to trip the circuit breaker in the event of an overload will be lower. If the ambient temperature exceeds the circuit breaker's reference temperature, the supplementary protective device or the circuit breaker will then be "derated". That is why circuit breaker manufacturers supply tables showing the derated current (A) to be applied for given temperatures. NB: In the event of an ambient temperature less than the rated temperature, the supplementary protective device or the circuit breaker is "uprated".

Moreover, when several circuit breakers operating simultaneously are mounted side by side in a small enclosure, the temperature rise inside the enclosure entails a reduction in the operating current.
This mutual temperature rise in theory requires the application of an additional derating factor of 0.8.

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Table 77: Rated Temperatures for UL Listed Circuit Breakers and UL Recognized C60 Supplementary Protectors (The reference temperature is in half-tone color.)

Rating (A)	-22°F -30°C	-13°F -25°C	-4°F -20°C	5°F -15°C	14°F -10°C	23°F -5°C	32°F 0°C	41°F 5°C	50°F 10°C	59°F 15°C	68°F 20°C	77°F 25°C	86°F 30°C	104°F 40°C	122°F 50°C	140°F 60°C	158°F 70°C
0.5	1.26	1.24	1.22	1.20	1.17	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.97	0.92	0.85	0.79	0.72
1	1.21	1.19	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	0.02	1.00	0.98	0.93	0.89	0.84	0.79
1.2	1.26	1.24	1.22	1.20	1.17	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.97	0.92	0.85	0.79	0.72
1.5	1.32	1.29	1.27	1.24	1.21	1.19	1.16	1.13	1.10	1.07	1.03	1.00	0.97	0.89	0.81	0.73	0.63
2	1.21	1.19	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	0.98	0.93	0.89	0.84	0.79
3	1.27	1.25	1.22	1.20	1.18	1.15	1.13	1.11	1.08	1.05	1.03	1.00	0.97	0.91	0.85	0.78	0.71
4	1.25	1.23	1.21	1.19	1.17	1.15	1.12	1.10	1.07	1.05	1.03	1.00	0.97	0.92	0.86	0.80	0.73
5	1.26	1.24	1.22	1.19	1.17	1.15	1.13	1.10	1.08	1.05	1.03	1.00	1.97	0.92	0.86	0.79	0.72
6	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.87	0.82	0.76
7	1.29	1.26	1.24	1.22	1.19	1.17	1.14	1.11	1.09	1.06	1.03	1.00	0.97	0.91	0.84	0.76	0.68
8	1.29	1.26	1.24	1.22	1.19	1.17	1.14	1.11	1.09	1.06	1.03	1.00	0.97	0.91	0.84	0.76	0.68
10	1.28	1.25	1.23	1.21	1.18	1.16	1.13	1.11	1.08	1.06	1.03	1.00	0.97	0.91	0.85	0.78	0.70
13	1.20	1.18	1.16	1.15	1.13	1.11	1.09	1.08	1.06	1.04	1.02	1.00	0.98	0.94	0.90	0.85	0.80
15	1.28	1.25	1.23	1.21	1.18	1.16	1.13	1.11	1.08	1.06	1.03	1.00	0.97	0.91	0.85	0.78	0.70
16	1.24	1.22	1.20	1.18	1.16	1.14	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.87	0.81	0.75
20	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.87	0.82	0.76
25	1.24	1.22	1.20	1.18	1.16	1.14	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.87	0.81	0.75
30	1.30	1.27	1.25	1.22	1.20	1.17	1.15	1.12	1.09	1.06	1.03	1.00	0.97	0.90	0.83	0.75	0.66
32	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.04	1.02	1.00	0.98	0.93	0.88	0.82	0.77
35	1.31	1.29	1.26	1.23	1.21	1.18	1.15	1.12	1.09	1.06	1.03	1.00	0.97	0.90	0.82	0.74	0.64
40	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.88	0.82	0.76
50	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.93	0.88	0.82	0.76
60	1.29	1.27	1.24	1.22	1.19	1.17	1.14	1.11	1.09	1.06	1.03	1.00	0.97	0.90	0.84	0.76	0.67
63	1.27	1.25	1.22	1.20	1.18	1.15	1.13	1.11	1.08	1.05	1.03	1.00	0.97	0.91	0.85	0.78	0.71

NOTE: The UL 489/CSA C22.2 No.5 Listed Multi 9 C60 circuit breakers are calibrated at 77°F (25°C), unlike some other UL 489/CSA 22.2 No.5 circuit breakers which are calibrated at 104°F (40°C). Depending on the operating environment, you may need to rerate according to these tables to determine the appropriate handle rating.

NOTE: UL 489/CSA C22.2 No.5 Listed circuit breakers should be loaded to no more than 80% if used with continuous loads.

Table 78: Rated Temperatures for IEC Rated N40 Circuit Breakers

Ampere Rating (A)	68°F 20°C	77°F 25°C	86°F 30°C	95°F 35°C	104°F 40°C	113°F 45°C	122°F 50°C	131°F 55°C	140°F 60°C
1	1.04	1.02	1.00	0.98	0.96	0.93	0.91	0.89	0.86
2	1.04	1.02	1.00	0.98	0.96	0.94	0.91	0.89	0.86
3	1.04	1.02	1.00	0.97	0.94	0.92	0.89	0.86	0.82
6	1.04	1.02	1.00	0.98	0.96	0.93	0.91	0.89	0.86
10	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83
16	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.87	0.85
20	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.88	0.85
25	1.04	1.02	1.00	098	0.95	0.93	0.91	0.88	0.86
32	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83
40	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83

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Table 79: Rated Temperature for IEC Rated C60H (C Curve) and C60L (B and C Curve) Circuit Breakers

Ampere Rating (A)	68°F 20°C	77°F 25°C	86°F 30°C	95°F 35°C	104°F 40°C	113°F 45°C	122°F 50°C	131°F 55°C	140°F 60°C
1	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.88	0.85
2	1.04	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.87
3	1.06	1.03	1.00	0.97	0.94	0.90	0.87	0.83	0.79
4	1.06	1.03	1.00	0.97	0.94	0.91	0.88	0.84	0.81
6	1.04	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.88
10	1.06	1.03	1.00	0.97	0.93	0.90	0.86	0.82	0.78
16	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83
20	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.87	0.84
25	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83
32	1.05	1.03	1.00	0.98	1.19	0.93	0.89	0.88	0.86
40	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.81
50	1.05	1.03	1.00	0.97	0.95	0.91	0.88	0.85	0.81
63	1.05	1.03	1.00	0.97	0.92	0.90	0.86	0.82	0.78

Table 80: Rated Temperatures for IEC Rated C60 (D Curve) and C60L (B, C, Z and K Curve) Circuit Breakers

Ampere Rating (A)	68°F 20°C	77°F 25°C	86°F 30°C	95°F 35°C	104°F 40°C	113°F 45°C	122°F 50°C	131°F 55°C	140°F 60°C
1	1.10	1.08	1.05	1.03	1.00	0.97	0.95	0.92	0.89
2	1.09	1.07	1.04	1.02	1.00	0.98	0.95	0.93	0.90
3	1.14	1.10	1.07	1.04	1.00	0.96	0.92	0.88	0.84
4	1.13	1.10	1.06	1.03	1.00	0.97	0.93	0.89	0.86
6	1.08	1.06	1.04	1.02	1.00	0.98	0.96	0.93	0.91
10	1.14	1.11	1.07	1.04	1.00	0.96	0.92	0.88	0.84
16	1.12	1.09	1.06	1.03	1.00	0.97	0.94	0.90	0.87
20	1.11	1.08	1.06	1.03	1.00	0.97	0.94	0.91	0.88
25	1.11	1.08	1.06	1.03	1.00	0.97	0.94	0.91	0.87
32	1.10	1.07	1.05	1.03	1.00	0.97	0.95	0.92	0.89
40	1.11	1.09	1.06	1.03	1.00	0.97	0.94	0.91	0.87
50	1.12	1.09	1.06	1.03	1.00	0.97	0.93	0.90	0.86
63	1.14	1.11	1.07	1.04	1.00	0.96	0.92	0.88	0.84

Table 81: Rated Temperatures for IEC Rated C120 Circuit Breakers

Ampere Rating (A)	68°F 20°C	77°F 25°C	86°F 30°C	95°F 35°C	104°F 40°C	113°F 45°C	122°F 50°C	131°F 55°C	140°F 60°C
10	1.10	1.07	1.05	1.03	1.00	0.95	0.90	0.87	0.85
16	1.06	1.03	1.00	1.00	1.00	0.97	0.94	0.91	0.88
20	1.13	1.10	1.05	1.03	1.00	0.95	0.93	0.90	0.85
25	1.08	1.06	1.04	1.02	1.00	0.96	0.92	0.90	0.88
32	1.13	1.09	1.06	1.03	1.00	0.97	0.92	0.88	0.84
40	1.14	1.10	1.08	1.04	1.00	0.96	0.93	0.88	0.84
50	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82
63	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82
80	1.15	1.11	1.08	1.04	1.00	0.96	0.92	0.87	0.83
100	1.15	1.12	1.08	1.04	1.00	0.96	0.92	0.87	0.83
125	1.12	1.10	1.08	1.04	1.00	0.96	0.90	0.86	0.82

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Typical IEC Grounding Systems

All electrical installations complying with safety standards and regulations are grounded in order to protect people and equipment. The term “grounding system” standardizes the grounding method used in the installation. The grounding system runs:

- First, from the neutral of the secondary side of the transformer,
- Next, from the installation frames.

The IEC 364 (Section 3) Standard defines three types of grounding systems: TT, IT and TN-C or TN-S.

Codification of the Grounding Systems

Grounding systems are referred to by two or three letters T N S for example:

- 1st letter—Status of the neutral of the transformer or source:
  - I: Ungrounded
  - T: Grounded
- 2nd letter—Status of the electrical frames of the loads:
  - T: Grounded
  - N: Connected to neutral
- 3rd letter—Status of the neutral (N) and the protective conductor (PE):
  - S: N and PE are separate
  - C: N and PE are in the same conductor (PEN)

The TT Grounded Neutral System

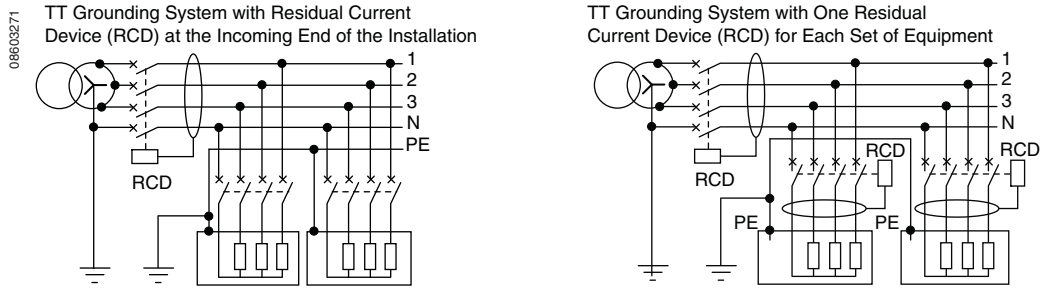
This “directly-grounded neutral” system is the easiest to install, monitor and use. Main features are:

- The neutral point of the distribution transformer is directly grounded.
- The installation frames are connected to several ground connections by the PE protective conductor.
- The frame and neutral ground connections are separate.

System characteristics upon installation:

- Tripping is compulsory on the first fault.
- Thus, at least one RCD is necessary at the incoming end of the installation.
- If the load frames are not all connected to the same grounding connection, one RCD must be installed for each set of equipment.

Figure 83: TT Grounding Systems



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The IT Grounding System

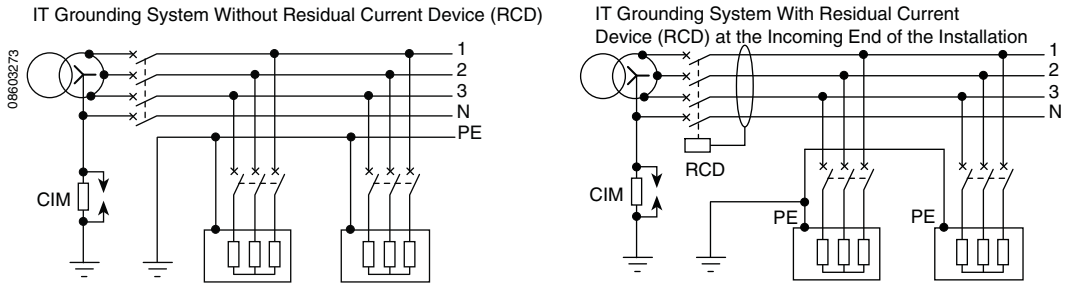
This “ungrounded neutral” system has the following main features:

- The neutral point of the distribution transformer is ungrounded, or grounded by a high impedance.
- The installation frames are connected to the same grounding connection by the PE protective conductor.

System characteristics and constraints upon installation:

- The appearance of the first insulation fault is risk-free for people.
- The appearance of the second insulation fault is dangerous to people, and thus requires tripping.
- If the application frames and the transformer frame are not all connected to the same ground connection, an RCD must be placed at the incoming end of the installation.
- The standard stipulates the installation of a Continuous Insulation Monitor (CIM) at the incoming end of the installation.

Figure 84: IT Grounding Systems



The TN-S Grounding System

This “multiple-grounded neutral” system has the following main features:

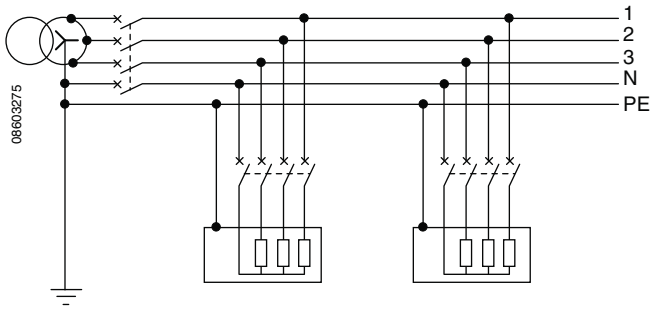
- The neutral point of the distribution transformer is grounded.
- All installation frames are grounded by a PE protective conductor.
- The PE protective conductors and the N neutral conductor are separate.

System characteristics and constraints upon installation:

- Allows tripping on the first fault via an overcurrent protection device.
- Use of an RCD, although not compulsory, is recommended.
- Requires calculation, sometimes complex, of loop impedance.
- Tripping of the protection devices must be checked when these devices are installed, B curve is recommended.

NOTE: This grounding system is compulsory on premises where there is a risk of explosion.

Figure 85: TN-S Grounding System



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Section 9—Time/Current Curves

UL 489/CSA C22.2 No. 5 and UL 489A Listed C60 Miniature Circuit Breakers

Figure 86: UL 489/CSA C22.2 No.5 Listed C60—C Curve (0.5–35 A) AC & DC

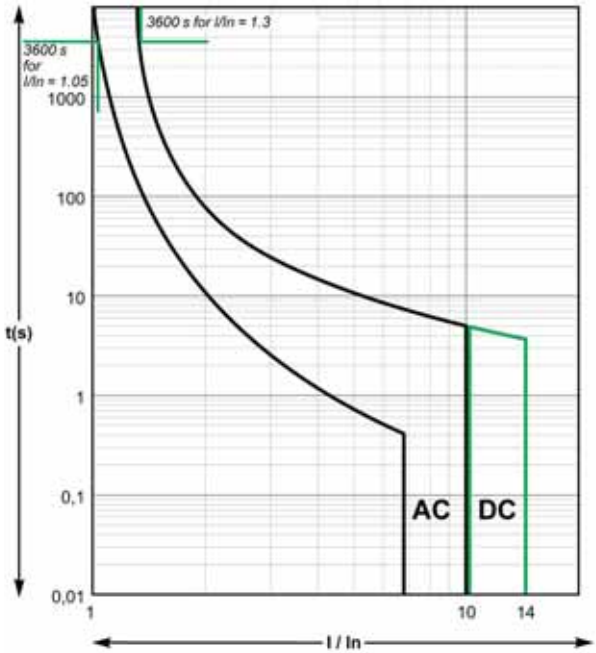


Figure 87: UL 489/CSA C22.2 No.5 Listed C60—D Curve (0.5–35 A) AC

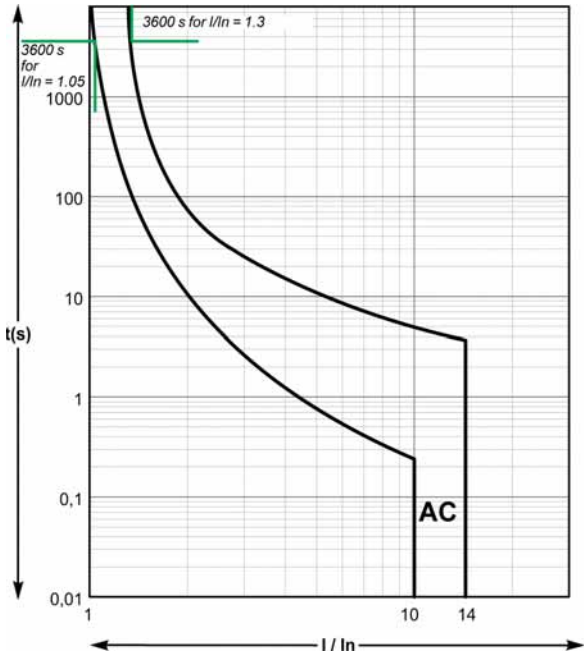
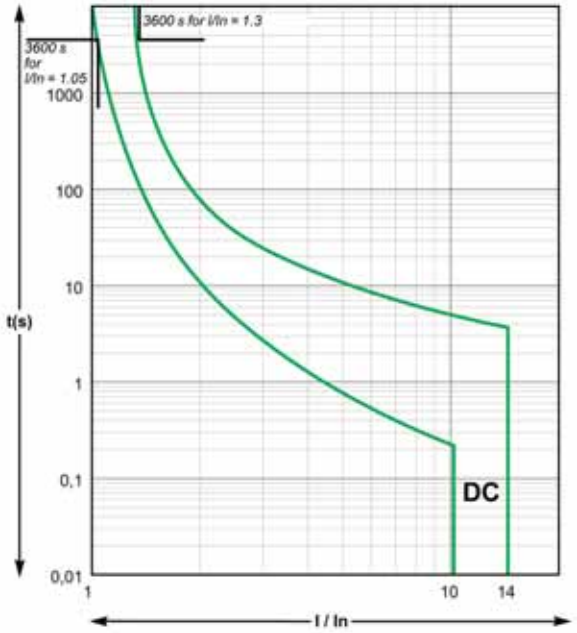


Figure 88: UL 489/CSA C22.2 No.5 Listed C60—C Curve (0.5–35 A) DC



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UL 1077 Recognized Supplementary Protectors[1]

Figure 89: UL 1077 Recognized C60—B Curve

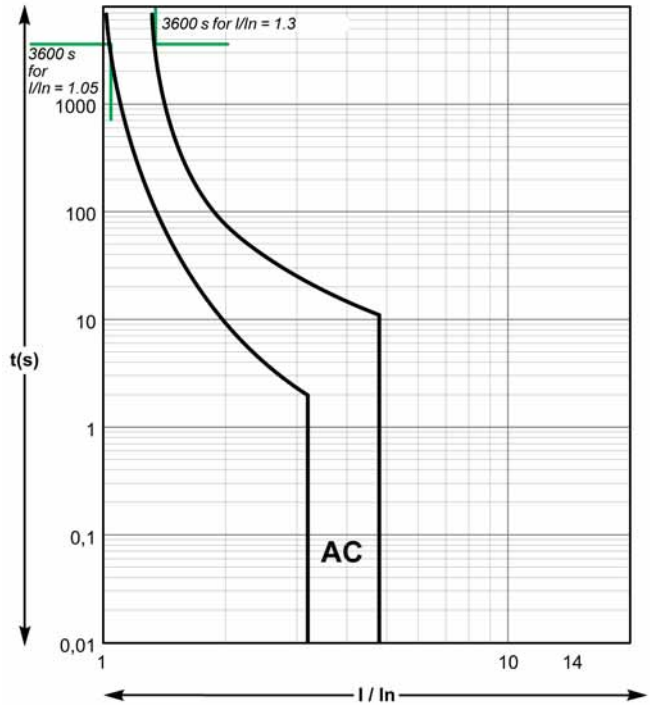


Figure 90: UL 1077 Recognized C60—C Curve

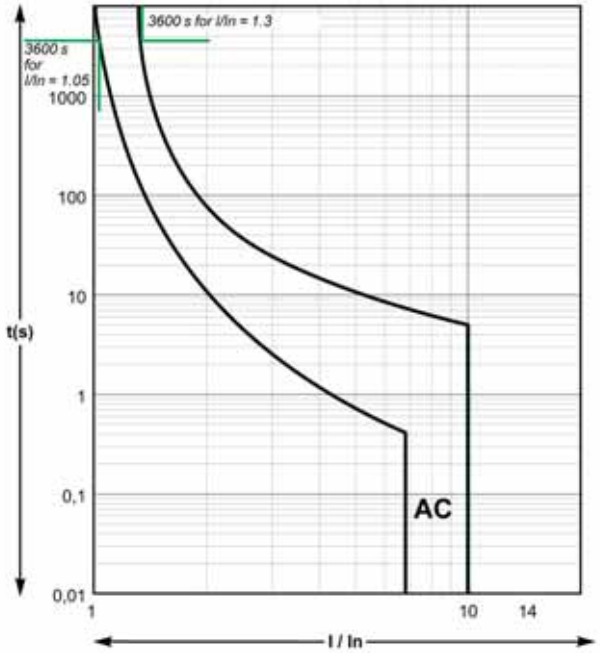
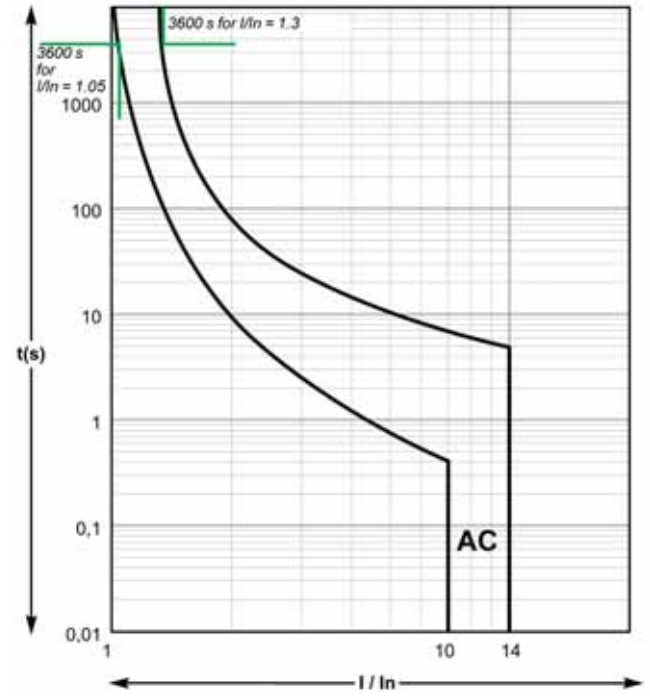


Figure 91: UL 1077 Recognized C60—D Curve



[1] Dotted Line is the tripping limit of a single pole of multi-pole device.

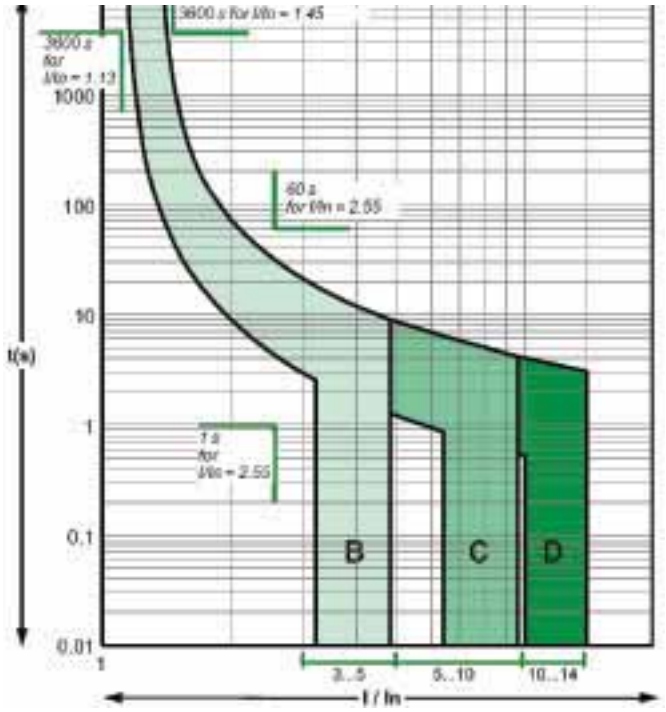
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IEC60947-2 Rated D PN-N Circuit Breakers

Table 82: DPNa/N

According to IEC/EN 6098 (Reference Temperature 30°C)

Curves B, C, D



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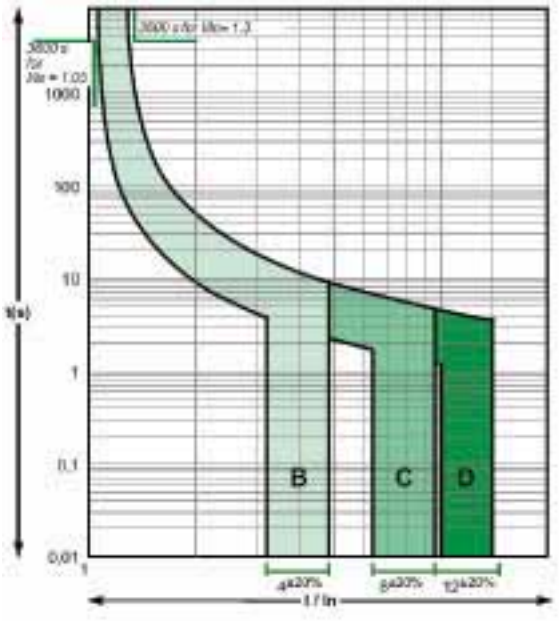
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Alternative Current 50/60 Hz

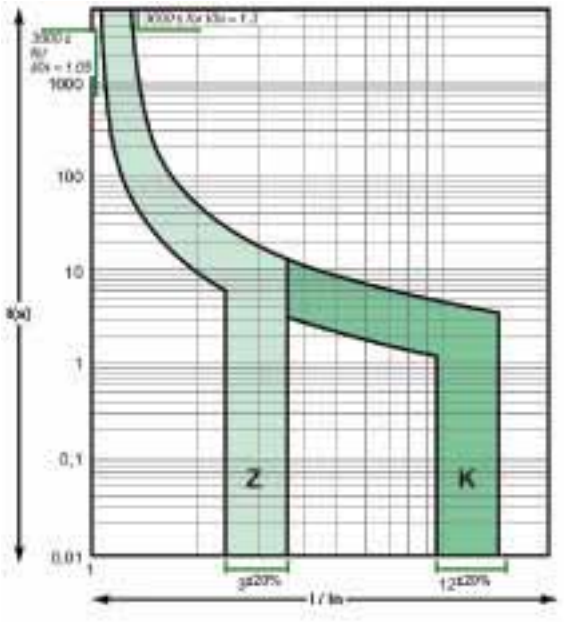
Table 83: C60N/H/L

According to IEC/EN 60947-2 (Reference Temperature 50°C)

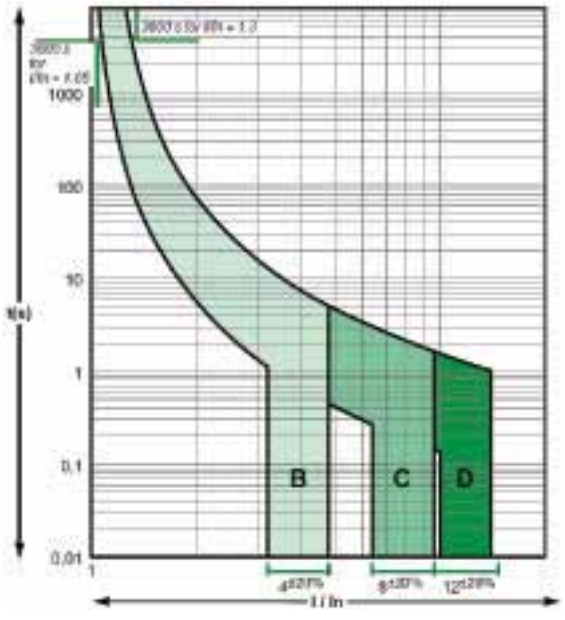
Curves B, C, D Rating up to 4 A



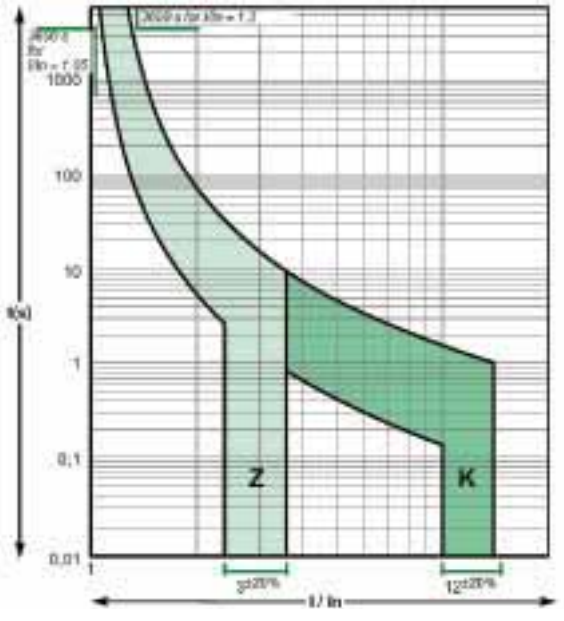
Curves Z, K Rating up to 4 A



Curves B, C, D Rating 6 A to 63 A



Curves Z, K Rating 6 A to 63 A



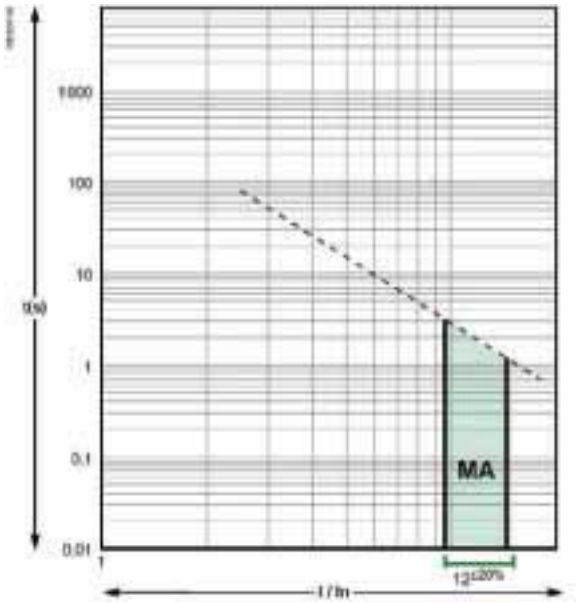
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Motor Curve

Table 84: C60L-MA

According to IEC/EN 60947-2

Curve MA



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Section 10—Let-Through Curves

UL Listed C60 Miniature Circuit Breakers and UL Recognized C60 Supplementary Protectors

Figure 92: UL 489/CSA C22.2 No.5/489A Listed and UL 1077 Recognized C60 1P (240 Vac) Max Let-Through Peak Current

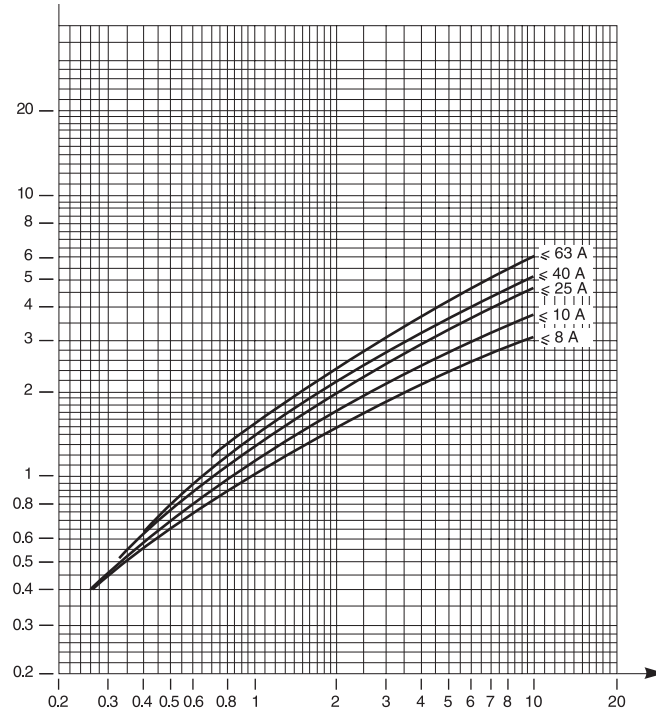
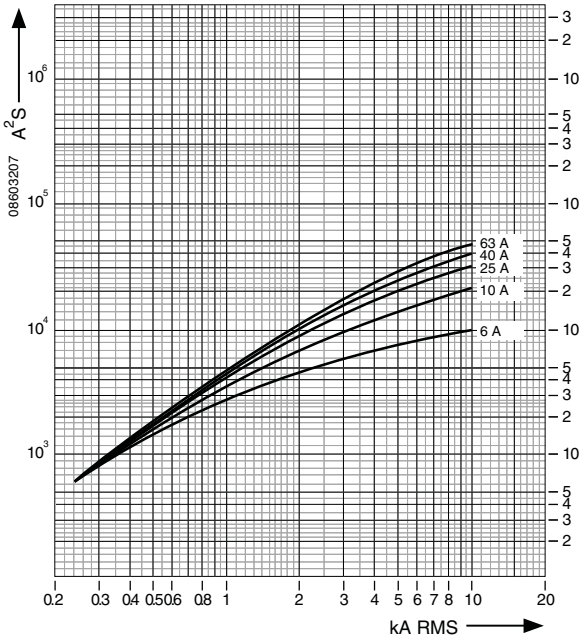


Figure 93: UL 489/CSA C22.2 No.5/489A Listed and UL 1077 Recognized C60 1P (240 Vac) Max Let-Through I^2t Current



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Figure 94: UL 489/CSA C22.2 No.5 Listed and UL 1077 Recognized C60 2P, 3P, and 4P (240 Vac) Max Let-Through Peak Current

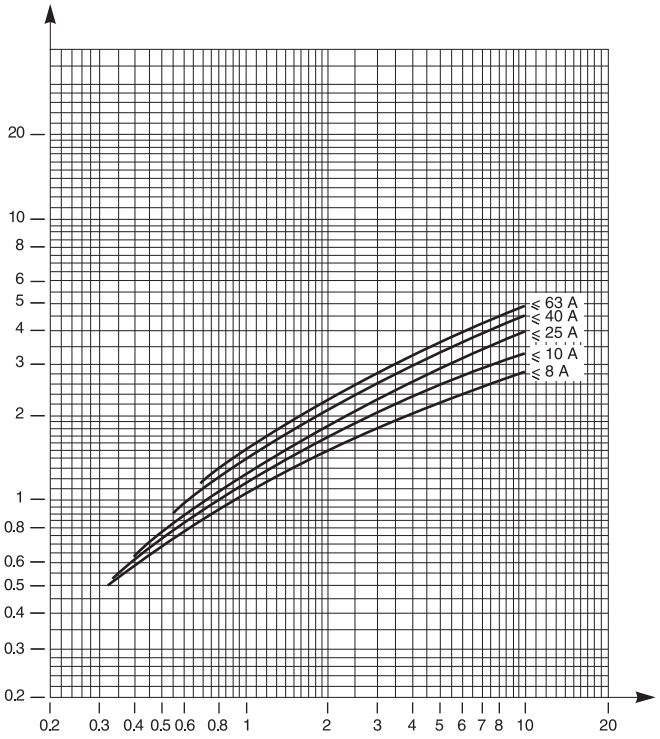
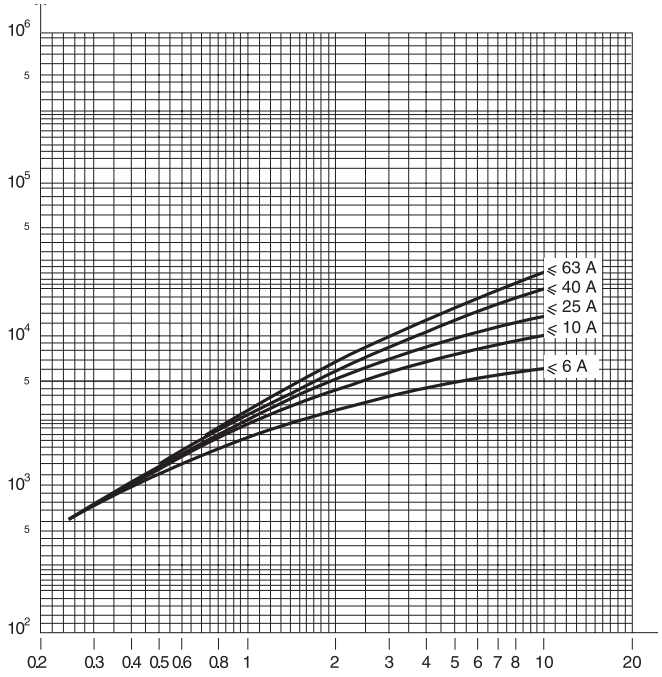


Figure 95: UL 489/CSA C22.2 No.5 Listed and UL 1077 Recognized C60 2P, 3P, and 4P (240 Vac) Max I^2t Peak Current



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Figure 96: UL 489/CSA C22.2 No.5 Listed and UL 1077 Recognized C60 1P (277 Vac) Maximum Let-Through Peak Current

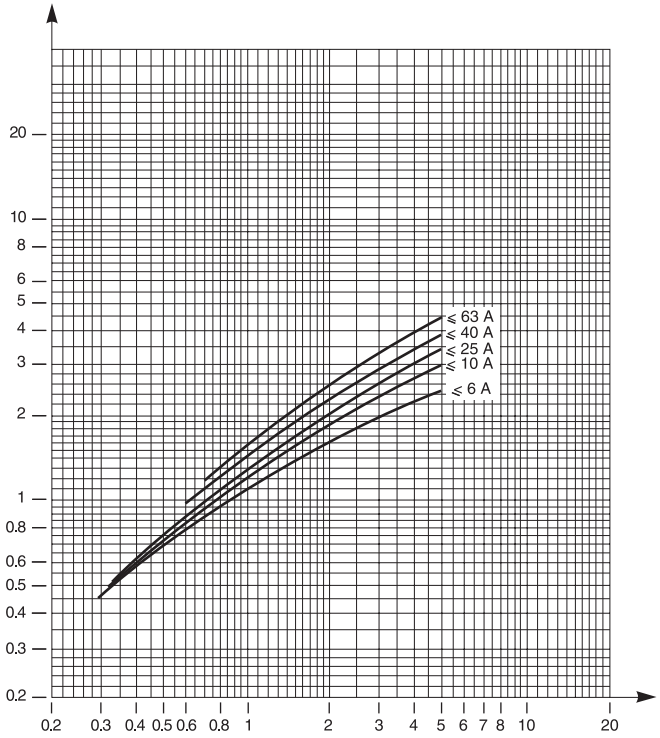


Figure 97: UL 489/CSA C22.2 No.5 Listed and UL 1077 Recognized C60 1P (277 Vac) Maximum I^2t Peak Current

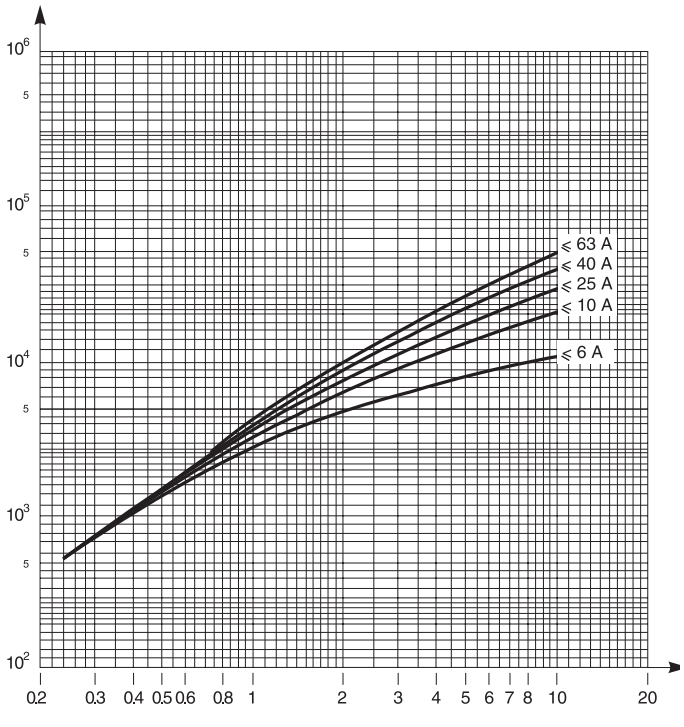


Figure 98: UL 1077 Recognized C60 2P, 3P, and 4P (480Y/277 Vac) Maximum Let-Through Peak Current

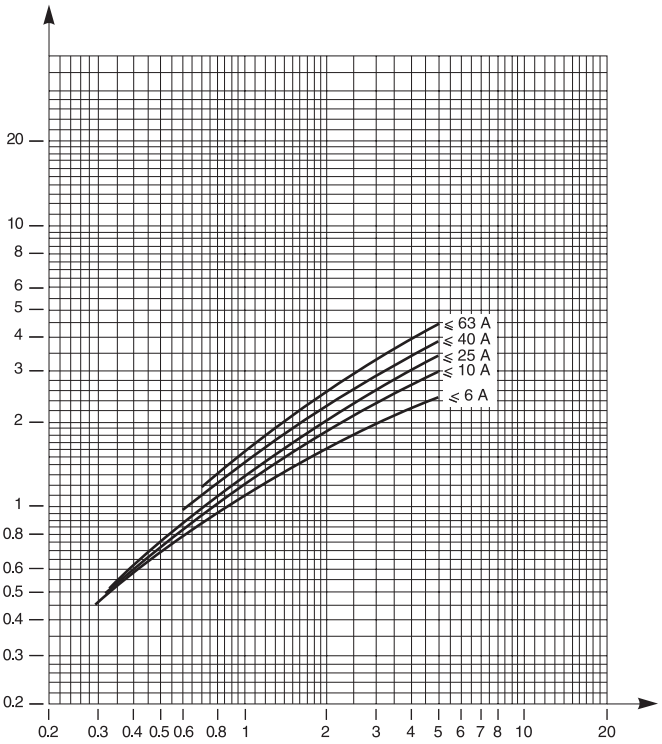
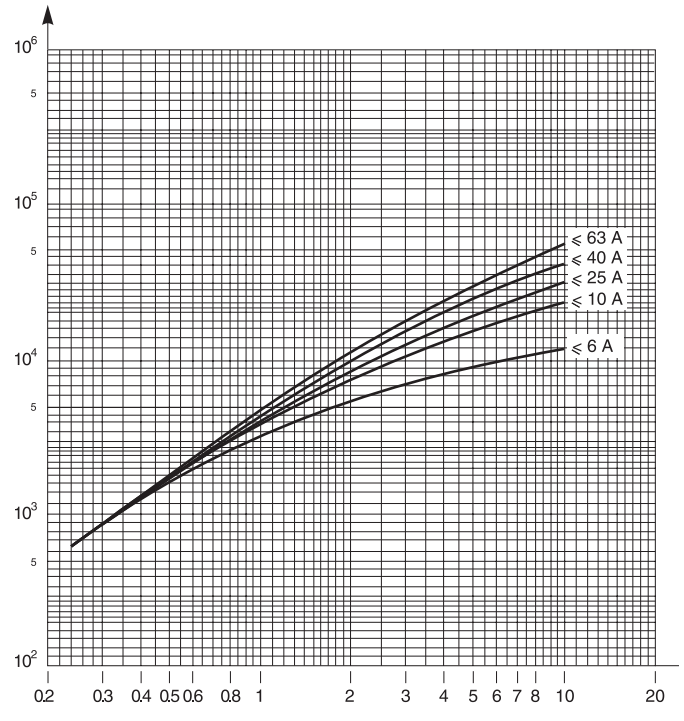


Figure 99: UL 1077 Recognized C60 2P, 3P, and 4P (480Y/277 Vac) Maximum Let-Through I^2t Current



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Figure 100: UL 1077 Recognized C60 2P, 3P, and 4P (480 Vac) Maximum Let-Through Peak Current

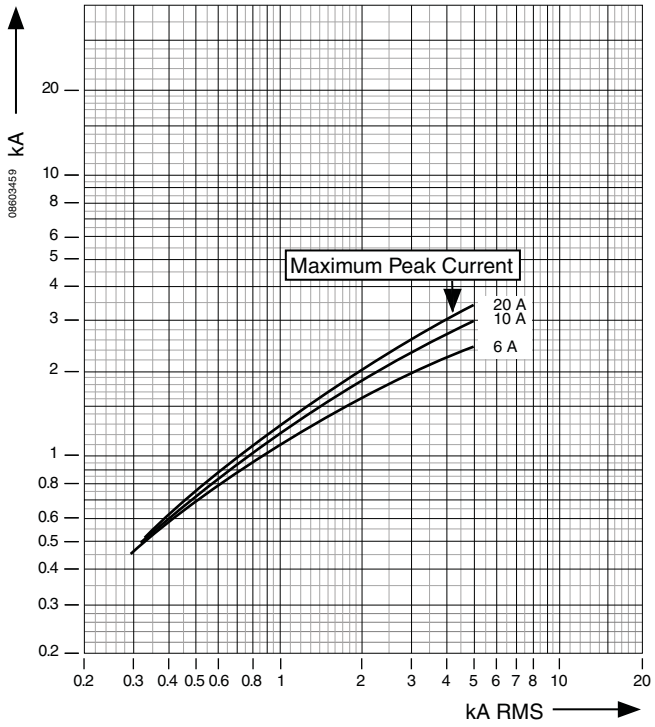
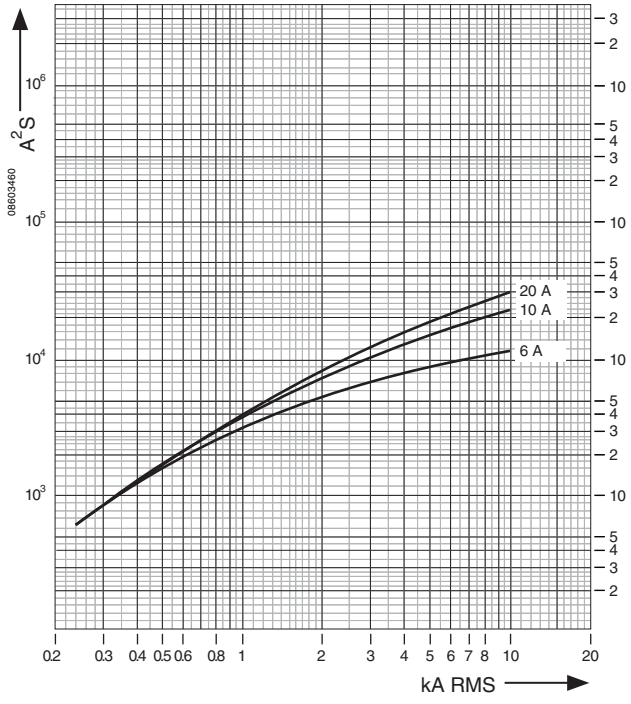


Figure 101: UL 1077 Recognized C60 2P, 3P, and 4P (480 Vac) Maximum Let-Through I²t Current



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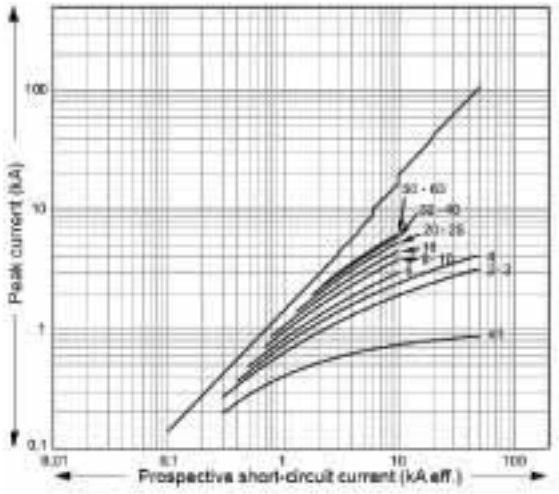
Limitation curves

For 230 V single-phase or 400 V three-phase network (TN or TT earthing system.

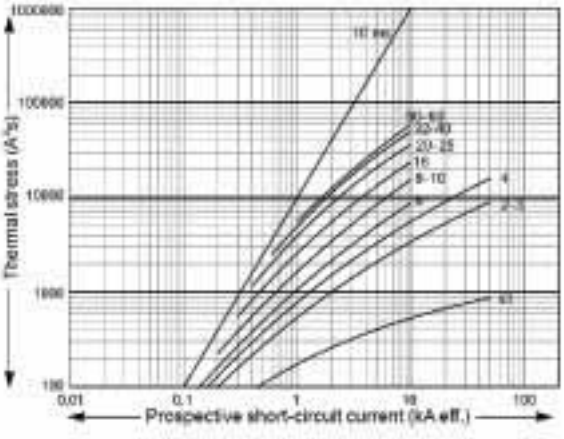
Table 85: Limitation Curves—C60N

1P / 3P / 4P Circuit Breakers

Peak Currents

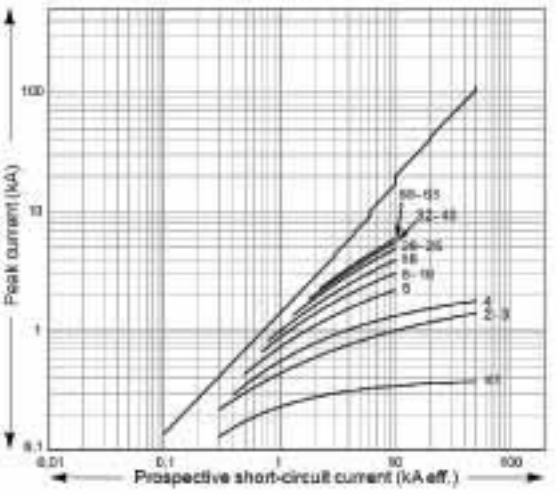


Thermal Stress

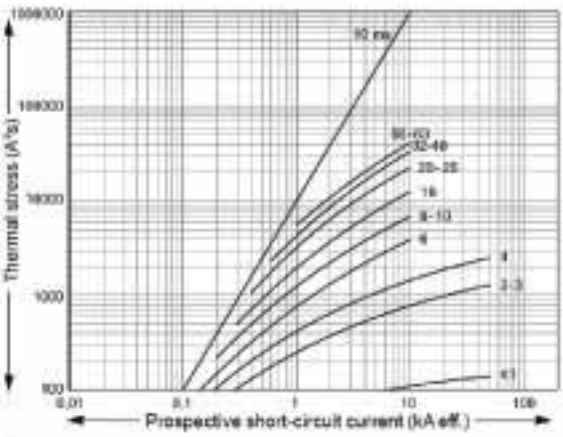


1P+N / 2P Circuit Breakers

Peak Currents



Thermal Stress

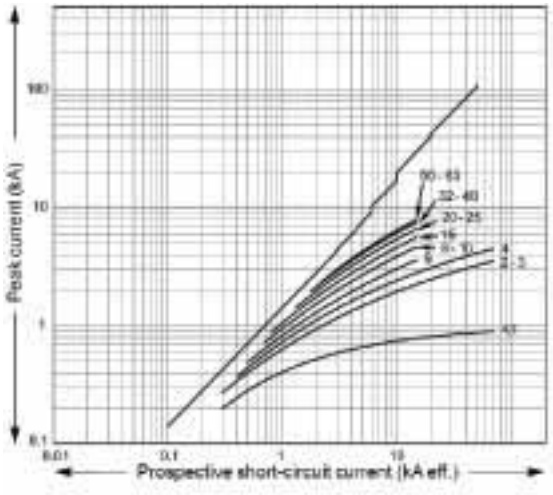


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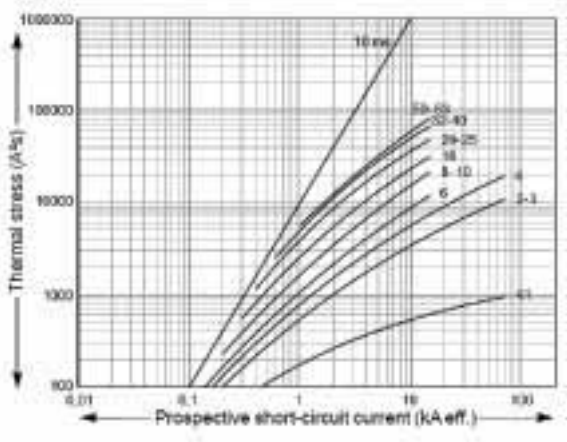
Table 86: Limitation Curves—C60H

1P / 3P / 4P Circuit Breakers

Peak Currents

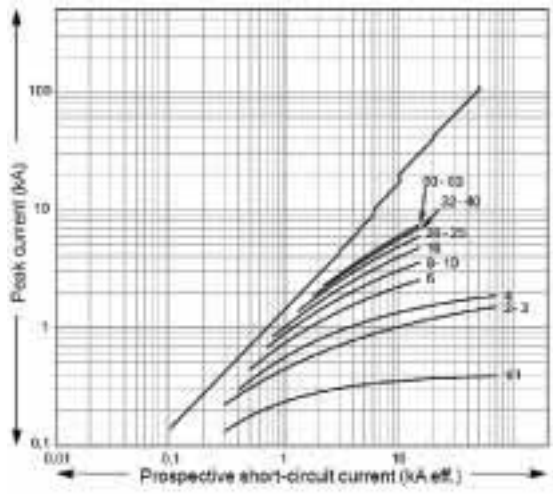


Thermal Stress

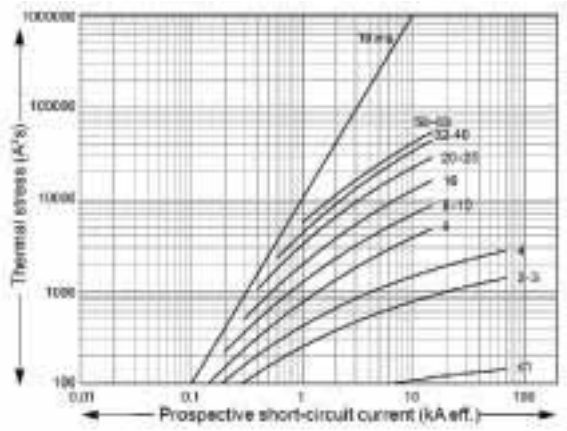


1P+N / 2P Circuit Breakers

Peak Currents



Thermal Stress



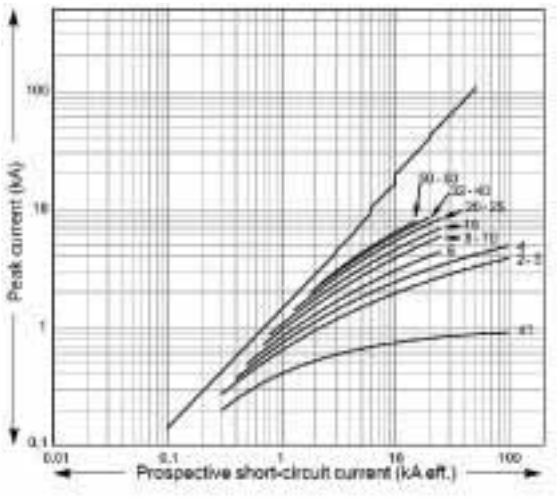
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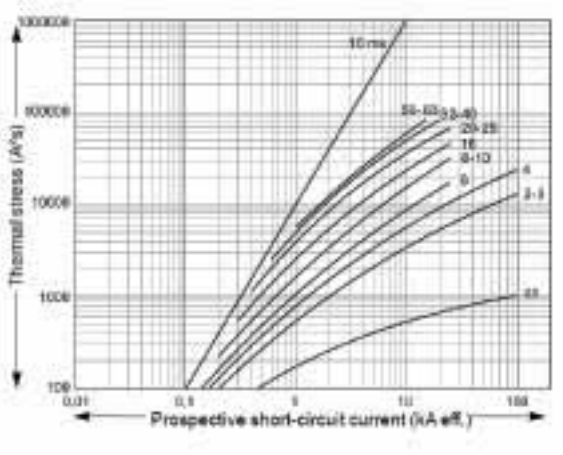
Table 87: Limitation Curves—C60L

1P / 3P / 4P Circuit Breakers

Peak Currents

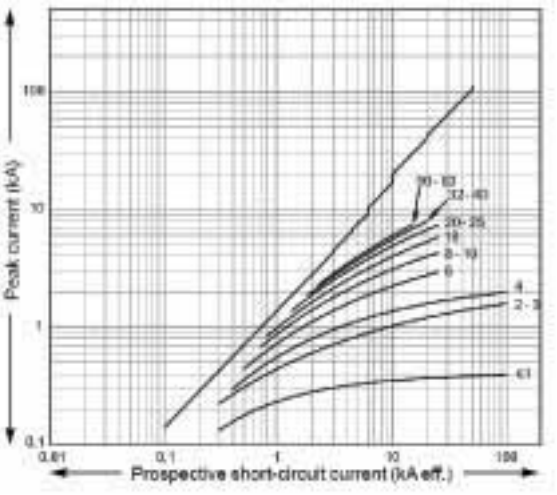


Thermal Stress

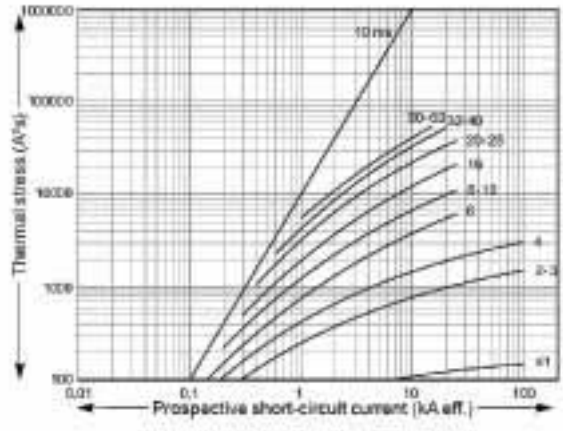


1P+N / 2P Circuit Breakers

Peak Currents



Thermal Stress



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