

MULTI™ 9 System Catalog

Class 860



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SECTION 1—INTRODUCTION

MULTI 9™ PRODUCTS FOR OEM APPLICATIONS

Overview

The MULTI 9™ modular system of miniature circuit breakers and supplementary protectors, accessories, and peripherals is ideal for use by OEMs to provide complete 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.

All MULTI 9 products are in compliance with applicable IEC® Standards. Many are also compliant with UL® Standard 1077 as supplementary protectors or UL 489 as circuit breakers. 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
- IEC 60947-2
- IEC 60898
- CSA C22.2
- VDE 0660

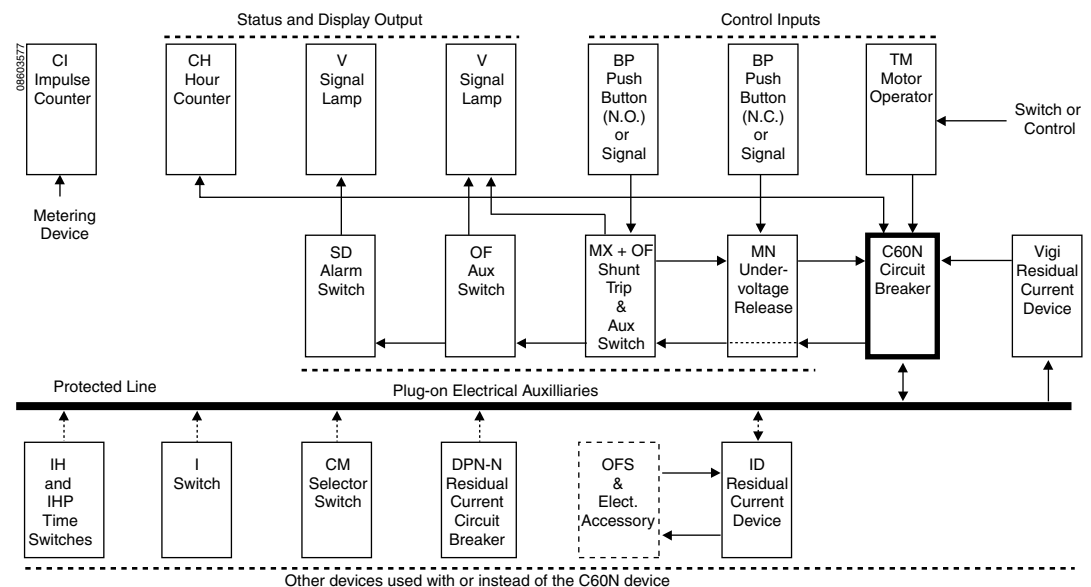
Applications

Potential applications include semi-conductor machines, communication equipment, 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 detectors, 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. See the following functional diagram, which shows many of the accessories of the MULTI 9 system.

Figure 1: Functional Diagram of MULTI™ 9 System



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Section 1—Introduction

Advantages

MULTI 9™ C60 and NC100 circuit breakers and supplementary protectors provide several advantages which are important to OEMs. These include:

- Small, compact size
- Easy installation on DIN rails
- Current-limiting, to provide more protection to sensitive circuits
- Resetability, more convenient than fuses
- Communication capabilities for control and status information
- Extensive variety of accessories

Figure 2: UL 489 Listed MULTI 9™ C60 Circuit Breakers



Better Protection—MULTI 9 supplementary protectors and miniature circuit breakers are current limiting, 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 and up to 80 A for the NC100 products.

Reduction of Nuisance Tripping—Available with different trip characteristics to meet system needs: B, C, D, and MA 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 and 1.06 in. (27 mm) for the NC100 circuit breaker. All of the products are built in a consistent format with incremental widths of 0.35 in. (9 mm) modules (therefore the name MULTI 9™).

Easy Installation—The MULTI 9 modules 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 series) and #1 AWG for the NC100 series.

Reverse Feeding—Reverse feeding of line power is permitted.

Reliability—Each C60 miniature circuit breaker has an endurance of 20,000 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 family, including Square D and Merlin Gerin.

From the Power Distribution Specialists—Square D can be your single source of protection equipment, with a comprehensive line of products for OEM products or the factory. These other products include the following:

- QO® and QOU Miniature Circuit Breakers 10–125 A
- COMPACT® Molded Case Circuit Breakers 15–3200 A
- POWERPACT® Electronic Trip Circuit Breakers 250–2500 A
- MASTERPACT® Universal Power Circuit Breakers 250–6300 A

CONFORMANCE TO STANDARDS

Overview

Conformance to Standards most needed by OEMs—UL® 489, UL 1077 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 or for a foreign market. A variety of MULTI 9 devices are tested per Underwriters Laboratories (UL) Standards that are required by the National Electrical Code® (NEC®) in the United States. They are also tested per the standards of the International Electrotechnical Commission® (IEC®) and may therefore be used in many foreign countries as these products meet both standards.

In this catalog, the products are grouped by the standards they are designed to meet. These standards include the following:

- UL 489—Defines rigorous testing requirements for circuit breakers in the United States
- 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 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 Standard for Molded-Case Circuit Breakers. (see UL 489 #1 in Figure 3, which is a drawing of a hypothetical piece of OEM equipment requiring multiple protection devices.)

Applications Requiring UL 489 Standards

In some instances, the protective devices being installed in equipment must comply with UL 489. These include the following situations:

1. If a circuit such as a convenience receptacle leaves the equipment, that circuit must be protected by a UL 489 branch circuit protection device (see UL 489 #2).
2. If a circuit such as to an external motor leaves the equipment, that circuit must be protected by a UL 489 branch circuit protection device (see UL 489 #3).
3. Motors within the equipment should also be protected by a UL 489 device (see UL 489 #4).
4. All equipment which requires HACR (Heating, Air Conditioning, and Refrigeration) rating must be protected by a UL 489 branch circuit protection device (see UL 489 #5).

NOTE: The motor control circuit may be protected by a UL 1077 device.

In general, a UL 489 circuit breaker could also be used in any application for which a UL 1077 device is allowed, since the UL 489 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 Standards.

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

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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 #1). A UL 489 circuit breaker must be located upstream from the equipment.
- Critical or sensitive internal circuitry (see UL 1077 #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 device is required).


Comparing Terminology for UL® 489 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 reverse UR symbol 

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

- Circuit breaker
- UL Listed
- UL 489
- The UL symbol 

UL 489A Standard DC Communication Applications

The 489A Standard covers dc rated circuit breakers intended to provide branch circuit protection in communications equipment. The products are marked as UL Listed circuit breakers for use in communication equipment.

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 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, 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 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 898 Standard The IEC 898 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 (equivalent to UL 489) and CSA C22.2 No. 235 (equivalent to UL 1077).

UL 508 Standard Industrial Control Equipment—Manual Motor Controllers

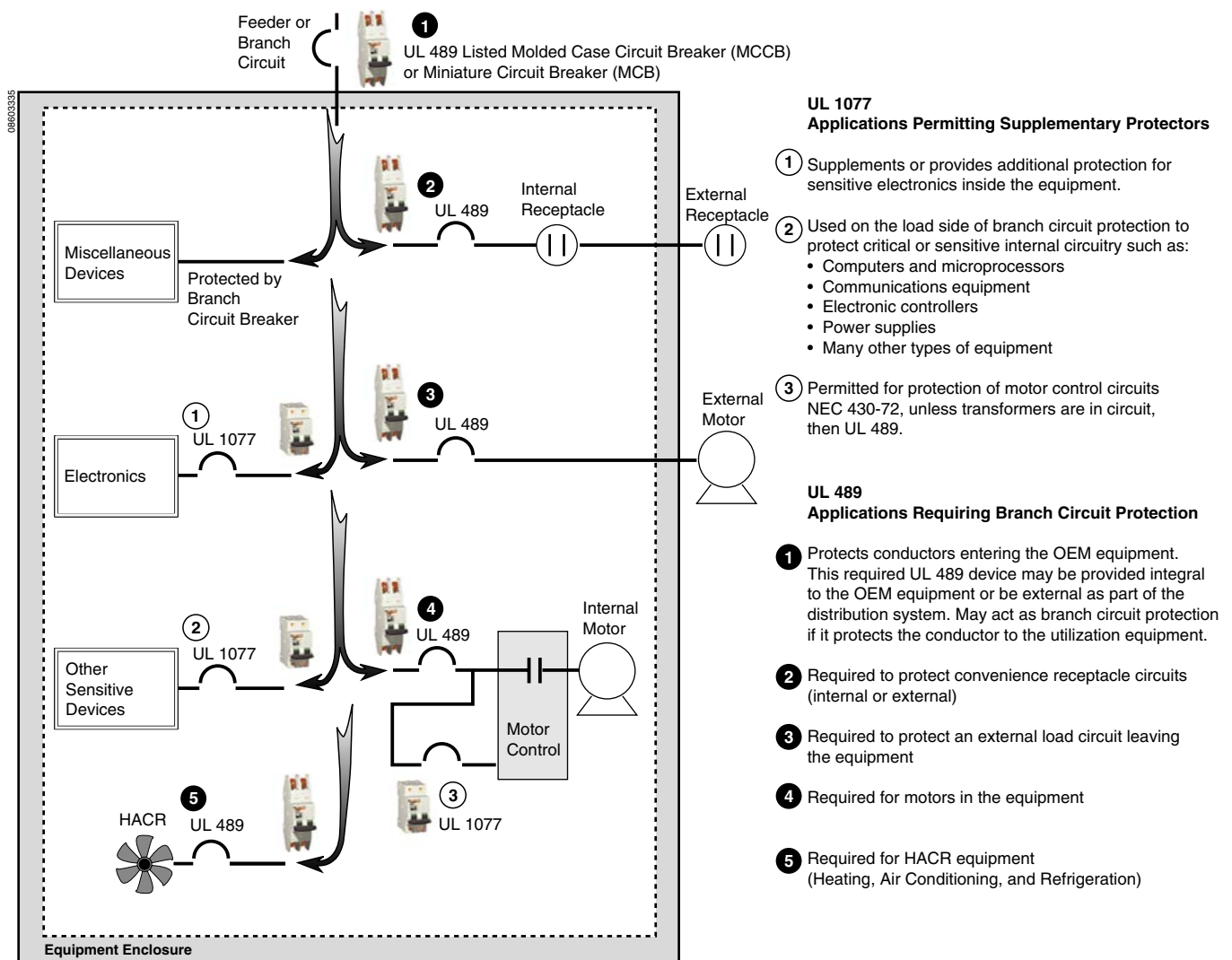
UL Standard 508 covers industrial control equipment, specifically for motor control functions. It covers individual devices as well as assemblies.

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 489 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 branch circuit breaker.

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

Figure 3: Guidelines for Application of UL 489 Circuit Breakers and UL 1077 Supplementary Protectors



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

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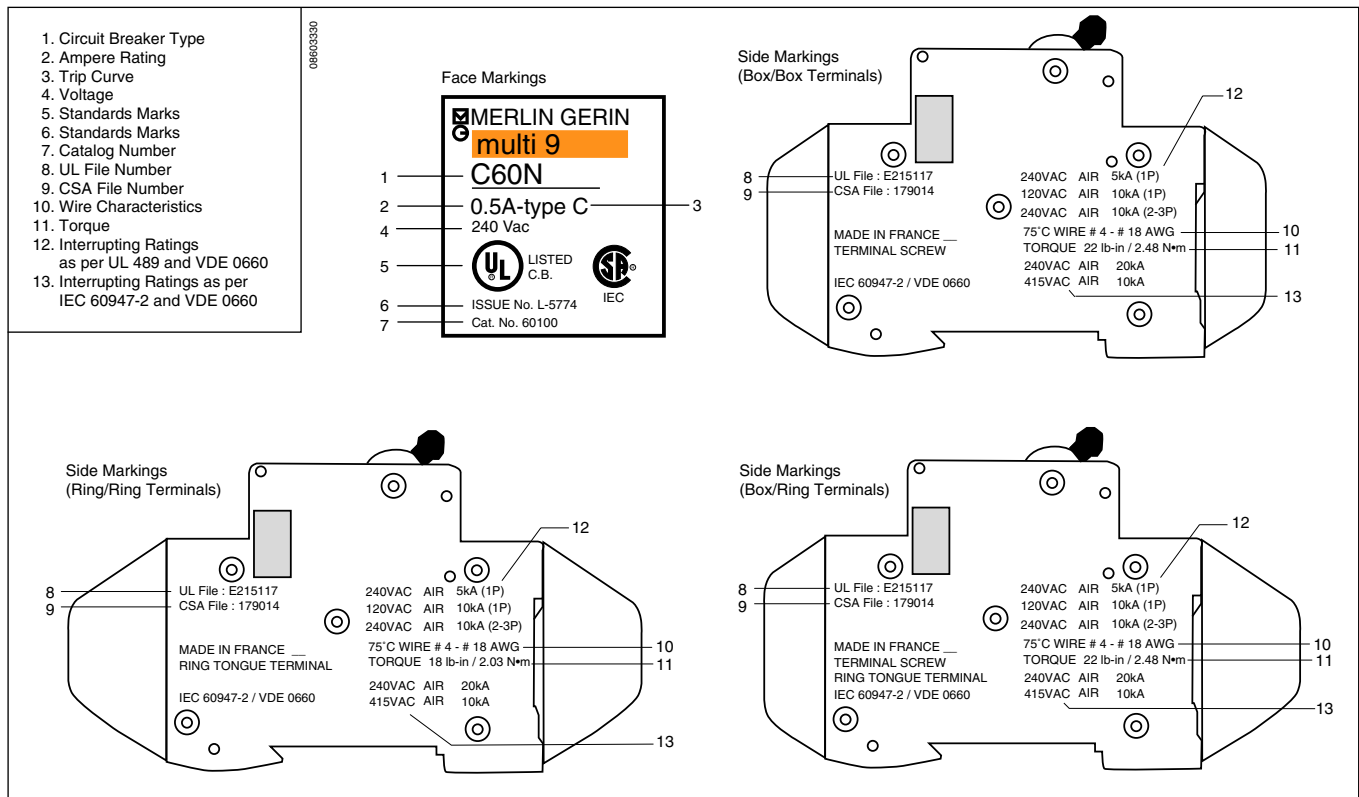
Section 1—Introduction

Table 1: Comparison Summary of Applicable UL® and IEC® Standards

Characteristic	UL® 489	UL® 1077	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	10,000 kA at 240 Vac	10,000 kA at 240 Vac	20,000 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	Same as UL 489
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	77°F (25°C), unless other value specified by manufacturer	Manufacturer must specify	Manufacturer must specify
Testing temperature	77°F (25°C) ambient, 122°F (50°C) rise max. at terminals	77°F (25°C) ambient, 122°F (50°C) rise max. at field wiring terminals; 149°F (65°C) rise max. on factory wiring terminals	At 77°F (25°C) ambient, 176°F (80°C) rise max. at terminals
Endurance	At rated current and voltage, 75–80% PF, 6,000 operations + 4,000 no load	At rated current and voltage, 75–80% PF, 6,000 operations	At rated current and voltage, 75–80% PF, 1,500 operations
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

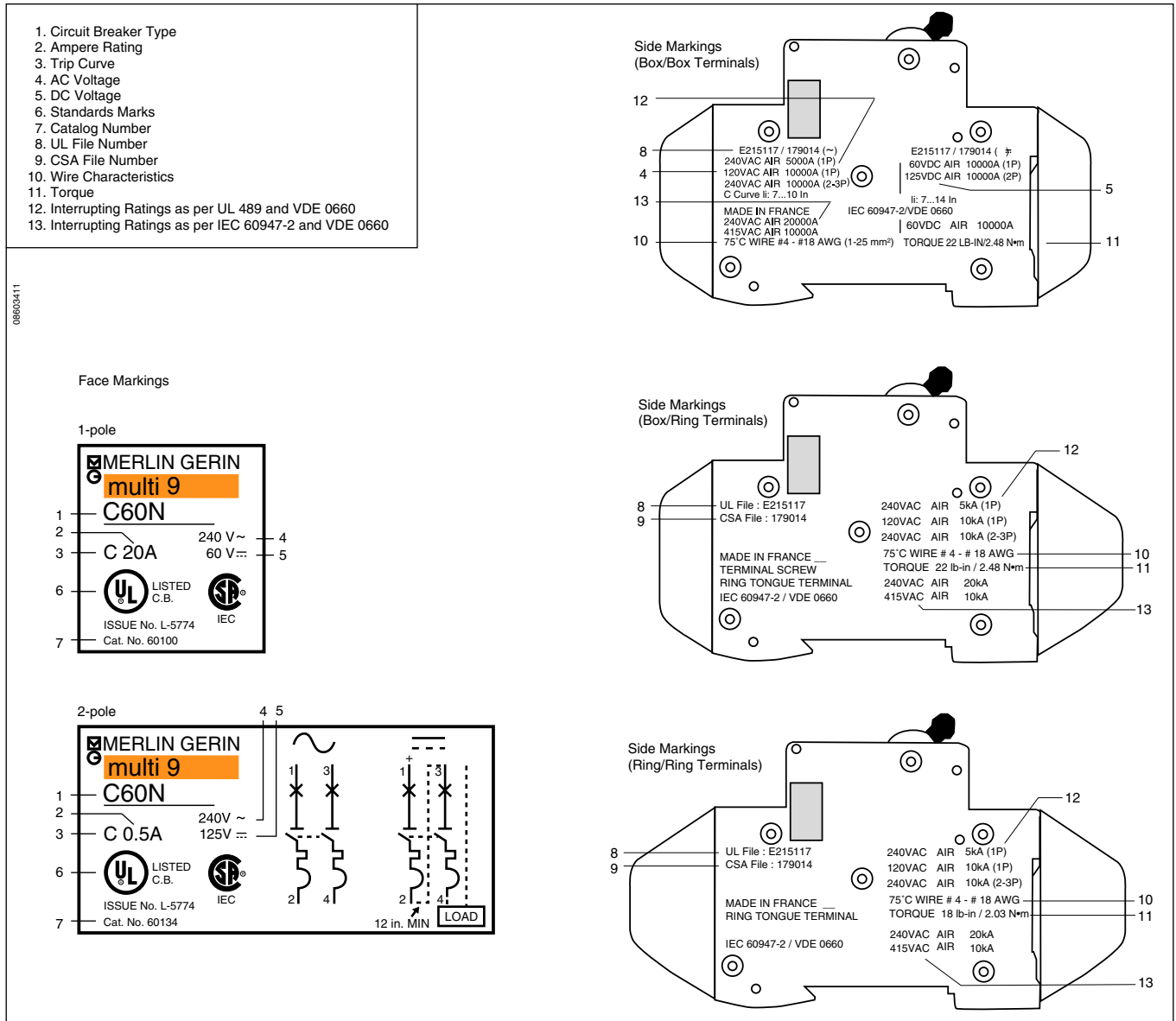
Labels and Markings

Figure 4: Labels and Markings for UL 489 Listed and CSA 22.2.5.1 Certified C60N Circuit Breakers (AC Only)



NOTE: Labels shown are for information only. Actual products may differ.

Figure 5: Labels and Markings for UL 489 Listed C60N DC Circuit Breakers (Dual Rated AC and DC)



NOTE: Labels shown are for information only. Actual products may differ.

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Section 1—Introduction

Figure 6: Labels and Markings for UL 489A Listed Circuit Breakers (Dual Rated 489A for DC Telecom and UL 1077 for Supplementary Protector Applications)

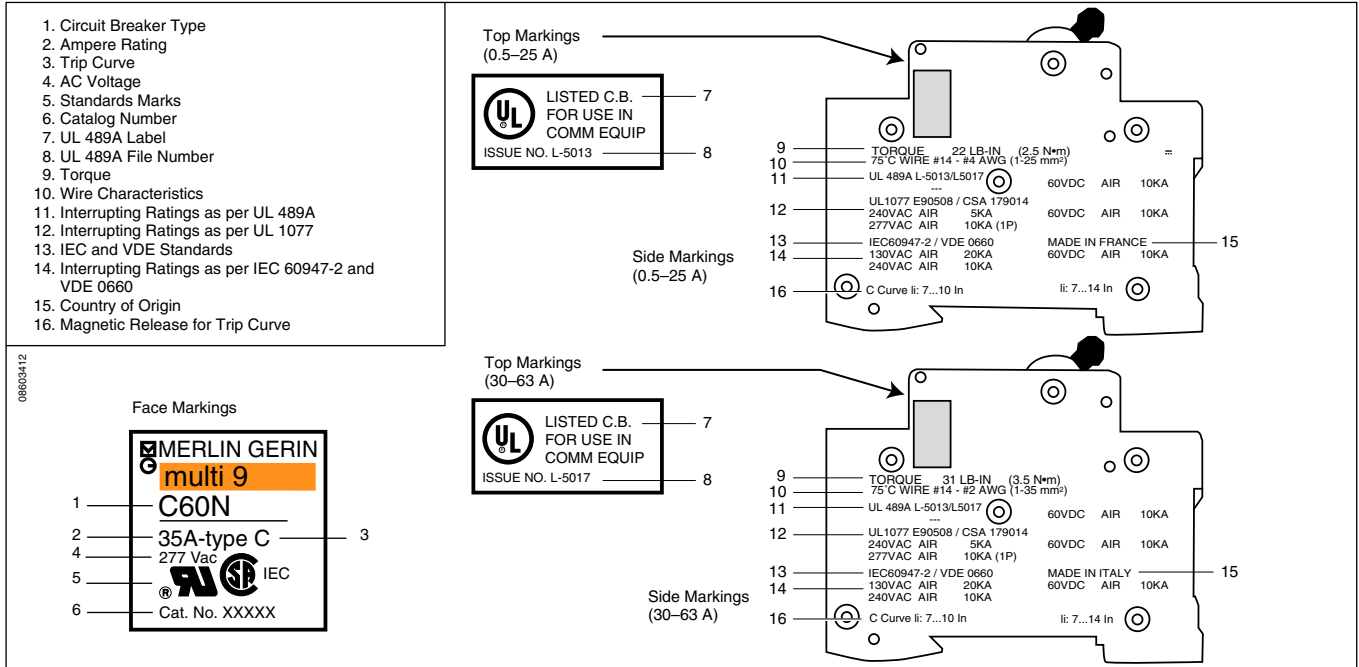


Figure 7: Labels and Markings for UL 1077 C60N Supplementary Protectors

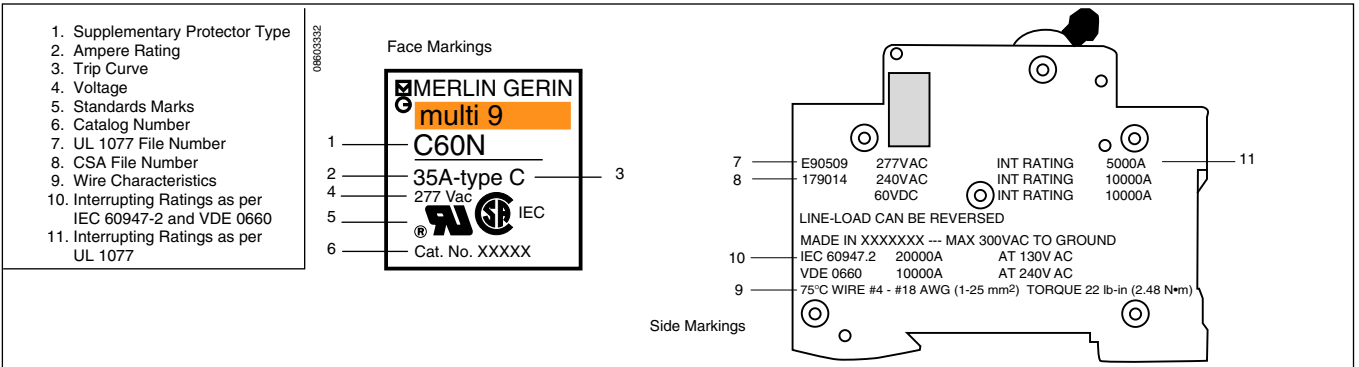
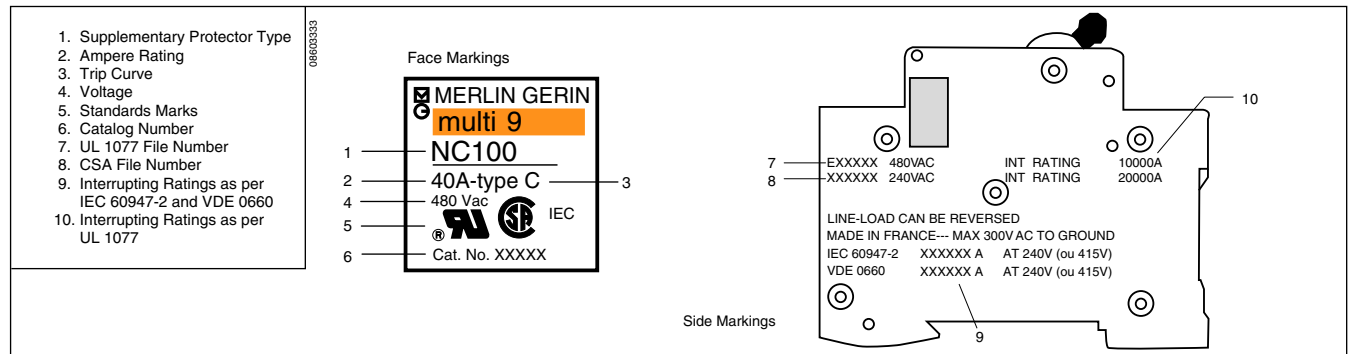


Figure 8: Labels and Markings for UL 1077 NC100 Supplementary Protectors



NOTE: Labels shown are for information only. Actual products may differ.

SECTION 2—UL RATED PROTECTION DEVICES

OVERVIEW

The MULTI 9™ system includes four 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:

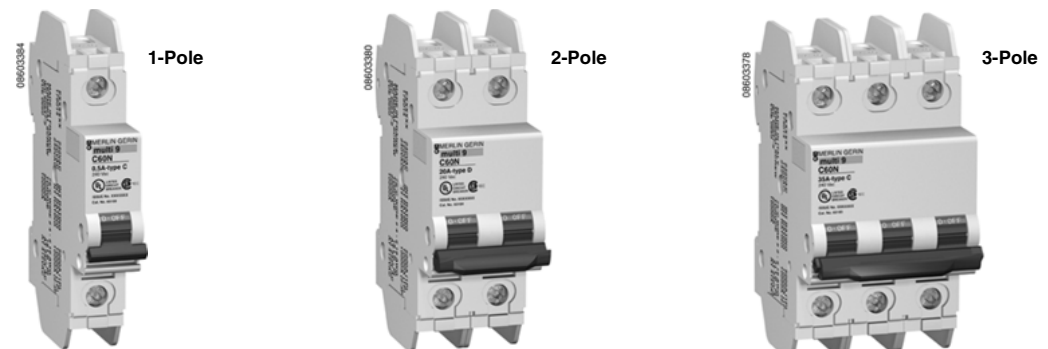
- UL Listed C60 Circuit Breakers (UL 489)
- UL Listed C60 Circuit Breakers for use in Communication Equipment (UL 489A)
- UL Recognized C60 and NC100 Supplementary Protectors (UL 1077)

NOTE: IEC Rated protection devices are described in Sections 3 and 4, while accessories for both the UL and IEC devices are described in Section 5.

Table 2: Selection Table for UL 489 and 489A Listed C60 Circuit Breakers

Ratings per UL Standards		UL 489 C60N (AC)			UL 489 C60N (DC)		UL 489A C60N (DC)	
Number of poles		1	2	3	1	2	1	
Rated current (A) at 77°F (25°C)		0.5–35	0.5–35	0.5–35	0.5–35	0.5–35	0.5–63	
Interrupting ratings as per UL 489 (kA RMS)	AC 50/60 Hz	120 V	10	—	—	10	—	
		240 V	5	10	10	5	10	
		277 V	—	—	—	—	—	—
		480Y/277 V	—	—	—	—	—	—
	DC	60 V	—	—	—	10	—	10
		125 V	—	—	—	—	10	—
Ultimate breaking capacity (I_{cu}) as per IEC 60947-2 (kA RMS)	AC 50/60 Hz	240 V	20	20	20	20	20	
		415 V	10	10	10	10	10	
		440 V	—	—	—	—	—	—
		440 V	—	—	—	—	—	—
Service breaking capacity (I_{cs}) (% I_{cu})		75%	75%	75%	75%	75%	75%	
Trip Units								
Magnetic setting (times ampere rating)	B curve	—			—		—	
	C curve	Between 7 and 10 times ampere rating			7 to 14	7 to 14	7 to 14	
	D curve	Between 10 and 14 times ampere rating			—	—	—	
Dimensions and Weights								
Dimensions (in./mm)	Width	0.71/18	1.42/36	2.13/54	0.71/18	1.42/36	0.71/18	
	Height	box/box	4.21/107	4.21/107	4.21/107	4.21/107	4.21/107	3.19/81
		ring/ring	4.86/123.4	4.86/123.4	4.86/123.4	4.86/123.4	4.86/123.4	4.86/123.4
		box/ring	4.54/115	4.54/115	4.54/115	4.54/115	4.54/115	4.54/115
Depth	3.00/76	—	—	3.00/76	—	—	3.00/76	
Weight (oz./g) max.	box/box	4.4/136	8.7/271	13.1/407	4.4/136	8.7/271	3.85/110	
	ring/ring	5.2/161	10.3/321	15.5/482	5.2/161	10.3/321	—	
	box/ring	4.8/148	9.5/297	14.3/445	4.8/148	9.5/297	—	

Figure 9: UL 489 Listed MULTI 9™ C60 Circuit Breakers



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Section 2—UL Rated Protection Devices

Table 3: Selection Table for UL 1077 Recognized Supplementary Protectors

Ratings per UL Standards		UL 1077 C60N				UL 1077 NC100					
Number of poles		1	2	3	4	1	2	3	4		
Rated current (A) at 77°F (25°C)		0.5–63	0.5–63	0.5–63	0.5–63	10–40	50–80	10–40	50–80	10–40	50–80
Interrupting ratings as per UL 1077 (kA RMS)	120 Vac	10	—	—	—	—	—	—	—	—	—
	240 Vac	10	10	10	10	20	5	20	5	20	5
	277 Vac	5	—	—	—	10	—	—	—	—	—
	480Y/277 Vac	—	5	5	5	—	—	10	—	10	—
Ultimate breaking capacity (I _{CU}) as per IEC 60947-2 (kA RMS)	65 Vdc	10	—	—	—	10	—	—	—	—	—
	125 Vdc	—	10	—	—	—	10	10	—	—	—
Service breaking capacity (I _{CS}) (%I _{CU})	240 Vac	10	20	20	20	10	10	20	20	20	20
	415 Vac	3	10	10	10	—	—	10	10	10	10
	440 Vac	—	6	6	6	—	—	6	6	6	6
Trip Units											
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 and Weights											
Dimensions (in./mm)	Width	0.71/18	1.42/36	2.13/54	2.84/72	1.06/27	2.13/54	3.19/81	4.25/108		
	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		
	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		
Weight (oz./g)		3.85/110	7.70/220	11.55/330	15.40/440	6.35/180	12.70/360	19.05/540	25.4/720		

Figure 10: UL 1077 Recognized C60N Supplementary Protectors

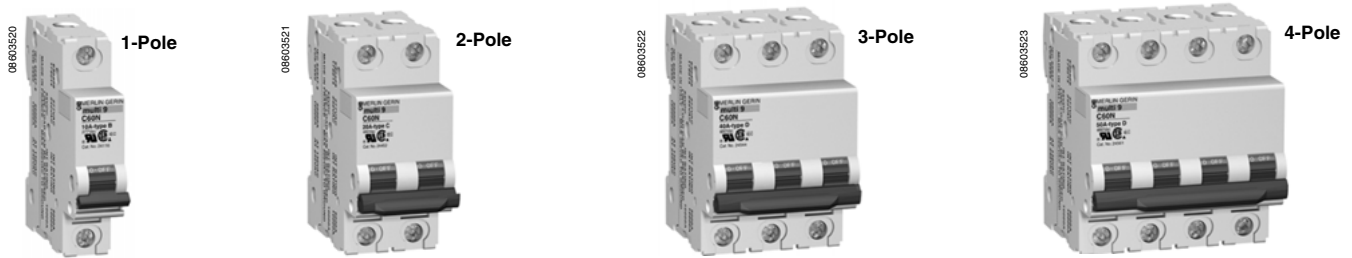


Figure 11: UL 1077 Recognized NC100H Supplementary Protectors



UL 489 LISTED C60N CIRCUIT BREAKERS (AC)

Overview

A family of circuit breakers meeting UL 489 requirements is now available in the MULTI 9 product line. These products meet many applications in which UL 1077 Recognized supplementary protectors are not allowed.

As shown in the table of catalog numbers below, the UL 489 Listed products are available in C and D curves. They include devices ranging from 0.5 to 35 A.

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads.
- Trip-free mechanism: Contacts cannot be held in the on (O) position when the C60 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 OFF position using padlock attachment.

Connections

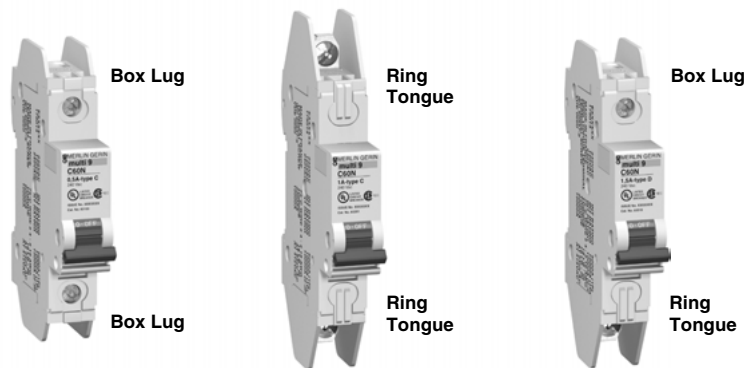
Two versions of field wiring connectors are available for the UL 489 Listed devices:

- Box lug meeting UL 486A requirements
- Ring tongue terminal with 5 mm screw

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
- Line terminal box lug/load terminal ring tongue

Figure 12: Connection Options for UL 489 Listed Devices



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Section 2—UL Rated Protection Devices

Specifications

Table 4: Specifications for UL 489 Listed C60 Circuit Breakers

Ratings per UL Standards			UL 489 C60N (AC)		
Number of poles			1	2	3
Rated current (A) at 77°F (25°C)			0.5–35	0.5–35	0.5–35
Interrupting ratings as per UL 489 (kA RMS)	AC 50/60 Hz	120 V	10	—	—
		240 V	5	10	10
		277 V	—	—	—
		480Y/277 V	—	—	—
Ultimate breaking capacity (I_{cu}) as per IEC 60947-2 (kA RMS)	AC 50/60 Hz	240 V	20	20	20
		415 V	10	10	10
		440 V	—	—	—
Service breaking capacity (I_{cs}) (% I_{cu})			75%	75%	75%
Trip Units					
Magnetic setting (times ampere rating)	B curve		—		
	C curve		Between 7 and 10 times ampere rating (7 and 14 for dc)		
	D curve		Between 10 and 14 times ampere rating		
Dimensions and Weights					
Dimensions (in./mm)	Width		0.71/18	1.42/36	2.13/54
	Height	box/box	4.21/107	4.21/107	4.21/107
		ring/ring	4.86/123.4	4.86/123.4	4.86/123.4
		box/ring	4.54/115	4.54/115	4.54/115
	Depth		3.00/76	—	—
Weight (oz./g) max.	box/box		4.4/136	8.7/271	13.1/407
	ring/ring		5.2/161	10.3/321	15.5/482
	box/ring		4.8/148	9.5/297	14.3/445

Table 5: Additional Specifications for UL 489 Listed Circuit Breakers

<ul style="list-style-type: none"> High voltage withstand: 6 kV Rating on box lug connector: UL 486A File #E216919 (use with copper wire only) Connection, box lug: <ul style="list-style-type: none"> 0.5–25 A: #18–#4 AWG (1–25 mm²) cables; torque 22 lb-in. (2.48 N•m) 30–35 A: #18–#2 AWG (1–35 mm²) cables; torque 31 lb-in. (3.52 N•m) Connection, ring terminal: Use single UL Listed or CSA Certified insulated ring tongue only, with screw dia. 0.2 in. (5 mm); torque 18 lb-in. (2.03 N•m) <ul style="list-style-type: none"> Max ring terminal width. 0.54 in. (14 mm) Mounting: 35 mm DIN rail 	<ul style="list-style-type: none"> Degree of protection: <ul style="list-style-type: none"> Case: IP40 as per IEC 529 Terminals: IP20 Temperatures: <ul style="list-style-type: none"> Calibration: 77°F (25°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) Number of operating cycles: <ul style="list-style-type: none"> Electrical (O-C): 6,000 load, 4,000 no-load See specifications table for weights and interrupting ratings
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Standards

- UL 489 Circuit Breaker: File #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 #5.1 Circuit Breakers: File #179014
- IEC 60947-2
- VDE 0660
- CE Marked

MULTI 9 System Catalog
Section 2—UL Rated Protection Devices

Catalog Numbers

**Table 6: C Curve, UL 489 Listed Miniature Circuit Breakers (AC)
(line/load as box lug or ring tongue terminals)**

Rating (A)	1-pole			2-pole			3-pole		
	Box/Box	Ring/Ring	Box/Ring	Box/Box	Ring/Ring	Box/Ring	Box/Box	Ring/Ring	Box/Ring
0.5	60100	60200	60300	60134	60234	60334	—	—	—
1	60101	60201	60301	60135	60235	60335	60168	60268	60368
1.5	60102	60202	60302	60136	60236	60336	60169	60269	60369
2	60103	60203	60303	60137	60237	60337	60170	60270	60370
3	60104	60204	60304	60138	60238	60338	60171	60271	60371
4	60105	60205	60305	60139	60239	60339	60172	60272	60372
5	60106	60206	60306	60140	60240	60340	60173	60273	60373
6	60107	60207	60307	60141	60241	60341	60174	60274	60374
7	60108	60208	60308	60142	60242	60342	60175	60275	60375
8	60109	60209	60309	60143	60243	60343	60176	60276	60376
10	60110	60210	60310	60144	60244	60344	60177	60277	60377
13	60111	60211	60311	60145	60245	60345	60178	60278	60378
15	60112	60212	60312	60146	60246	60346	60179	60279	60379
20	60113	60213	60313	60147	60247	60347	60180	60280	60380
25	60114	60214	60314	60148	60248	60348	60181	60281	60381
30	60115	60215	60315	60149	60249	60349	60182	60282	60382
35	60116	60216	60316	60150	60250	60350	60183	60283	60383

**Table 7: D Curve, UL 489 Listed Miniature Circuit Breakers (AC)
(line/load as box lug or ring tongue terminals)**

Rating (A)	1-pole			2-pole			3-pole		
	Box/Box	Ring/Ring	Box/Ring	Box/Box	Ring/Ring	Box/Ring	Box/Box	Ring/Ring	Box/Ring
0.5	60117	60217	60317	60151	60251	60351	—	—	—
1	60118	60218	60318	60152	60252	60352	60184	60284	60384
1.5	60119	60219	60319	60153	60253	60353	60185	60285	60385
2	60120	60220	60320	60154	60254	60354	60186	60286	60386
3	60121	60221	60321	60155	60255	60355	60187	60287	60387
4	60122	60222	60322	60156	60256	60356	60188	60288	60388
5	60123	60223	60323	60157	60257	60357	60189	60289	60389
6	60124	60224	60324	60158	60258	60358	60190	60290	60390
7	60125	60225	60325	60159	60259	60359	60191	60291	60391
8	60126	60226	60326	60160	60260	60360	60192	60292	60392
10	60127	60227	60327	60161	60261	60361	60193	60293	60393
13	60128	60228	60328	60162	60262	60362	60194	60294	60394
15	60129	60229	60329	60163	60263	60363	60195	60295	60395
20	60130	60230	60330	60164	60264	60364	60196	60296	60396
25	60131	60231	60331	60165	60265	60365	60197	60297	60397
30	60132	60232	60332	60166	60266	60366	60198	60298	60398
35	60133	60233	60333	60167	60267	60367	60199	60299	60399

NOTE: The UL 489 Listed MULTI 9 C60N circuit breakers are certified at 77°F (25°C), unlike some other UL 489 circuit breakers which are certified at 104°F (40°C). Depending on the operating environment, you may need to rerate according to the tables on page 96 to determine the appropriate handle rating.

NOTE: UL 489 Listed circuit breakers should be loaded to no more than 80% if used with continuous loads; that is unlike UL 1077 recognized supplementary protectors, which may be operated at 100% of rating.

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Section 2—UL Rated Protection Devices

UL 489 LISTED C60N CIRCUIT BREAKERS (DC)

Overview

A portion of the range of UL 489 MULTI 9 circuit breakers is also Listed by UL for use with dc circuits. The specifications are the same as the UL 489, 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 only (same torque)

Specifications

Table 8: Specifications for UL 489 DC Circuit Breakers

Ratings per UL Standards			UL 489 C60N (DC)	
Number of poles			1	2
Rated current (A) at 77°F (25°C)			0.5–35	0.5–35
Interrupting ratings as per UL 489 (kA RMS)	DC	60 V 125 V	10 —	— 10
Service breaking capacity (I _{CS}) (%I _{CU})			75%	75%
Trip Units				
		B curve	—	—
Magnetic setting (times ampere rating)		C curve	7 to 14	7 to 14
		D curve	—	—
Dimensions and Weights				
		Width	0.71/18	1.42/36
Dimensions (in./mm)		Height	box/box	4.21/107
		Depth	3.00/76	—
Weight (oz./g) max.		box/box	4.4/136	8.7/271

Catalog Numbers

Table 9: C Curve, UL 489 Listed Miniature Circuit Breakers (DC)¹

Rating (A)	1-pole	2-pole
	Box/Box	Box/Box
0.5	60100	60134
1	60101	60135
1.5	60102	60136
2	60103	60137
3	60104	60138
4	60105	60139
5	60106	60140
6	60107	60141
7	60108	60142
8	60109	60143
10	60110	60144
13	60111	60145
15	60112	60146
20	60113	60147
25	60114	60148
30	60115	60149
35	60116	60150
40	Availability to be Announced	
50		
60		
63		

¹ The dc catalog numbers are the same as UL 489 ac equivalents.

UL 489A LISTED C60N MINIATURE CIRCUIT BREAKERS FOR DC TELECOMMUNICATION APPLICATIONS

Overview



A limited range of the UL 1077 C60N supplementary protectors are also UL Listed as UL 489A circuit breakers for protection of dc telecommunications circuits.

The specifications are the same as the UL 1077 C60N, with the following exceptions:

- Number of poles: 1 only
- Time/Current Curve: C Curve
- Magnetic settings of C Curve: Between 7 and 14 times ampere rating
- DC voltage (nominal): 1-pole—60 Vdc
- Connection: Box Lug only (same torque)

Catalog Numbers

Table 10: UL 489A Circuit Breakers for DC Telecommunications Applications

Rating (A)	C Curve		Rating (A)	C Curve		Rating (A)	C Curve	
	1-pole	2 Modules		1-pole	2 Modules		1-pole	2 Modules
0.5	MG17411		6	MG24430		25	MG24436	
1	MG24425		7	MG17415		30	MG17417	
1.2	MG17412		8	MG24431		32	MG24437	
1.5	MG17413		10	MG24432		35	MG17418	
2	MG24426		13	MG24433		40	MG24438	
3	MG24427		15	MG17416		50	MG24439	
4	MG24428		16	MG24434		60	MG17419	
5	MG17414		20	MG24435		63	MG24440	

NOTE: These catalog numbers are the same as their UL 1077 equivalents.

MULTI 9 System Catalog

Section 2—UL Rated Protection Devices

UL 1077 RECOGNIZED C60 SUPPLEMENTARY PROTECTORS

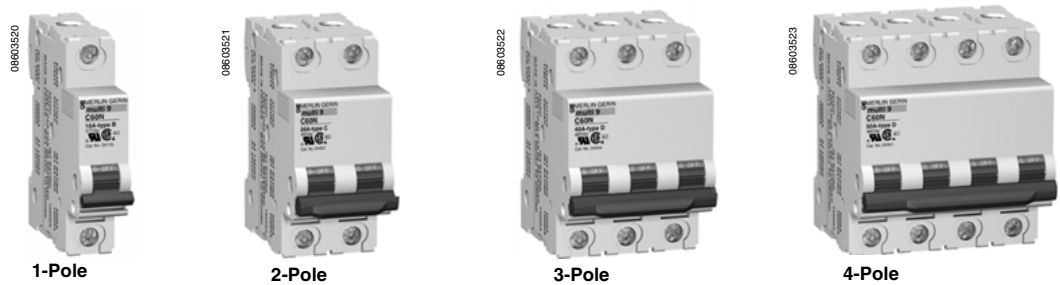
Overview

A family of MULTI 9™ supplementary protectors meeting the UL 1077 Standard is available.

These 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. (For higher current ratings, select devices from the higher current NC100 series.)

Figure 13: UL 1077 Recognized C60N Supplementary Protectors



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 OFF position using padlock attachment.
- Suitable for reverse feeding.

NOTE: Other features of the UL 1077 Recognized C60 circuit breaker are identical to those of the UL 489 version. A variety of accessories are available for these products.

Table 11: Specifications for UL1077 Recognized C60 Supplementary Protectors

<ul style="list-style-type: none"> • Package size: 0.71 in. (18 mm) width per pole • Voltage (nominal): 480Y/277 Vac • High voltage withstand: 6 kV • Connection, box lug <ul style="list-style-type: none"> — 0.5–25 A: #18–#4 AWG (1–25 mm²) cables; torque 22 lb-in (2.49 N•m) — 30–63 A: #18–#2 AWG (1–35 mm²) cables; torque 31 lb-in (3.50 N•m) • Connection, ring terminal kit: Use Cat. No. 17400 • Mounting: 35 mm DIN rail • Time-current curves: B, C, and D curves 	<ul style="list-style-type: none"> • Degree of protection as per IEC68-2-30: <ul style="list-style-type: none"> — Case: IP40 as per IEC 529 — Terminals: IP20 • Rating on connector: UL 486A File #E90509 pending; use with copper wire only. Screw dia.: 0.2 in. (5mm); torque 18 lb-in (2.03 N•m) • Temperatures: <ul style="list-style-type: none"> — Calibration: 77°F (25°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) • Number of operating cycles <ul style="list-style-type: none"> — electrical (O-C): 10,000 at 0.5–63 A • See selection table for weights and interrupting ratings
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MULTI 9 System Catalog

Section 2—UL Rated Protection Devices

Table 12: Selection Table for UL 1077 Recognized Supplementary Protectors

Ratings per UL Standards		UL 1077 C60N				UL 1077 NC100							
Number of poles		1	2	3	4	1	2	3	4				
Rated current (A) at 77°F (25°C)		0.5–63	0.5–63	0.5–63	0.5–63	10–40	50–80	10–40	50–80	10–40	50–80	10–40	50–80
Interrupting ratings as per UL 1077 (kA RMS)	120 Vac	10	—	—	—	—	—	—	—	—	—	—	—
	240 Vac	10	10	10	10	20	5	20	5	20	5	20	5
	277 Vac	5	—	—	—	10	—	—	—	—	—	—	—
	480Y/277 Vac	—	5	5	5	—	—	10	—	10	—	10	—
Ultimate breaking capacity (I _{CU}) as per IEC 60947-2 (kA RMS)	65 Vdc	10	—	—	—	10	—	—	—	—	—	—	—
	125 Vdc	—	10	—	—	—	10	10	10	—	—	—	—
Service breaking capacity (I _{CS}) (%I _{CU})	240 Vac	10	20	20	20	10	10	20	20	20	20	20	20
	415 Vac	3	10	10	10	—	—	10	10	10	10	10	10
	440 Vac	—	6	6	6	—	—	6	6	6	6	6	6
Service breaking capacity (I _{CS}) (%I _{CU})		75%	75%	75%	75%								

Trip Units	
Magnetic setting	B curve C curve D curve
	Between 3.2 and 4.8 times ampere rating (between 3.2 and 6.8 for dc) Between 7 and 10 times ampere rating (between 7 and 14 for dc) Between 10 and 14 times ampere rating (no dc rating for D curve)

Dimensions									
Dimensions (in./mm)	Width	0.71/18	1.42/36	2.13/54	2.84/72	1.06/27	2.13/54	3.19/81	4.25/108
	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
	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
Weights (oz./g)		3.85/110	7.70/220	11.55/330	15.40/440	6.35/180	12.70/360	19.05/540	25.4/720

Standards

- UL 1077 Circuit Breaker, File #E90509
- CSA C22.2 #235-M89 File # 179014
- IEC 60947-2
- VDE 0660
- CE Marked

Table 13: Catalog Numbers for UL 1077 Recognized C60N Supplementary Protectors

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

MULTI 9 System Catalog

Section 2—UL Rated Protection Devices

UL 1077 RECOGNIZED NC100H SUPPLEMENTARY PROTECTORS

Overview

The NC100H family of MULTI 9 UL 1077 Recognized supplementary protectors is available for applications requiring higher current levels than available in the C60 family

These UL 1077 Listed 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. These products are similar to the C60, except larger in size (three 0.35 in. [9 mm] modules or a total of 1.06 in. [27 mm] per pole). In many cases, the accessories for the C60 products will not function with the NC100. Separate accessories are available (see accessories in Section 5).

Standard Features

- Fast closing: Allow increased withstand to the high inrush currents of some loads
- Trip-free mechanism: Contacts cannot be held in the on position when the NC100 circuit breaker 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.
- B curve: Overcurrent protection for sensitive equipment such as computers and electronics. The magnetic release operates between 3.2 and 4.8 times ampere rating.
- C curve: Overcurrent protection for all application types. The magnetic release operates between 7 and 10 times ampere rating.
- D curve: Overcurrent protection for loads with high inrush currents such as motors and transformers. The magnetic release operates between 10 and 14 times ampere rating.
- Ground-fault protection with optional add-on VIGI module (see accessories in Section 5).

Table 14: Specifications for UL Recognized NC100H Supplementary Protectors

<ul style="list-style-type: none"> • Current rating: 10–80 A • Package size: Three 0.35 in. (9 mm) modules; 1.06 in. (27 mm) width per pole • Voltage (nominal): 240, 480Y/277; up to 125 Vdc • High voltage withstand: 6 kV • Connection, box lug: <ul style="list-style-type: none"> — 10–40 A: #18–#2 AWG (1–35 mm²) cables; torque 31 lb-in. (3.5 N•m) — 50–80 A: #8–#1 AWG (10–50 mm²) cables; torque 49 lb-in. (5.5 N•m) • Connection: Use with copper wire only • Mounting: 35 mm DIN rail 	<ul style="list-style-type: none"> • Degree of protection: <ul style="list-style-type: none"> — Case: IP40 as per IEC 529 — Terminals: IP20 • Time/Current curves: C and D curves • Temperature: <ul style="list-style-type: none"> — Calibration: 77°F (25°C) — Operation: 23 to 140°F (-5 to 60°C) — Storage: -40 to 212°F (-40 to 100°C) • Tropicalization: Treatment 2—relative humidity: 95% at 131°F (55°C) as per IEC68-2-30 • Number of operating cycles (O–C): 20,000 • See selection table for weights and interrupting ratings
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Standards

UL 1077 Circuit Breaker File #E90509, CSA C22.2 No. 235-M89 file #179014, IEC 60947-2, VDE 0660, CE Marked

Table 15: Catalog Numbers for UL 1077 Recognized NC100H Supplementary Protectors

Rating (A)	B Curve				C Curve				D Curve			
	1-pole 3 Modules	2-pole 6 Modules	3-pole 9 Modules	4-pole 12 Modules	1-pole 3 Modules	2-pole 6 Modules	3-pole 9 Modules	4-pole 12 Modules	1-pole 3 Modules	2-pole 6 Modules	3-pole 9 Modules	4-pole 12 Modules
10	—	—	—	—	MG27154	MG27166	MG27177	MG27188	MG27333	MG27344	MG27355	MG27366
15	—	—	—	—	MG18256	MG18271	MG18286	—	MG18261	MG18276	MG18291	—
16	—	—	—	—	MG27155	MG27167	MG27178	MG27189	MG27334	MG27345	MG27356	MG27367
20	—	—	—	—	MG27156	MG27168	MG27179	MG27190	MG27335	MG27346	MG27357	MG27368
25	—	—	—	—	MG27157	MG27169	MG27180	MG27191	MG27336	MG27347	MG27358	MG27369
30	—	—	—	—	MG18257	MG18272	MG18287	—	MG18262	MG18277	MG18292	—
32	—	—	—	—	MG27158	MG27170	MG27181	MG27192	MG27337	MG27348	MG27359	MG27370
35	—	—	—	—	MG18258	MG18273	MG18288	—	MG18263	MG18278	MG18293	—
40	—	—	—	—	MG27159	MG27171	MG27182	MG27193	MG27338	MG27349	MG27360	MG27371
50	—	—	—	—	MG27160	MG27172	MG27183	MG27194	—	—	—	—
60	—	—	—	—	MG18259	MG18274	MG18289	—	—	—	—	—
63	—	—	—	—	MG27162	MG27173	MG27184	MG27195	—	—	—	—
80	MG27164	MG27175	MG27186	MG27197	MG27163	MG27174	MG27185	MG27196	—	—	—	—

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 the previous Section 2, while accessories for both the UL and IEC Rated devices are described in Section 5 of this catalog.

Table 16: Selection Table for IEC Rated Miniature Circuit Breakers

Ratings per IEC 60947-2 Standards	DPN-N	C60N		C60H		C60L		C32H-DC		NC100H, NC125H	
		1 (Ø + N)	1	2, 3, 4	1	2, 3, 4	1	2, 3, 4	1	2	1
Number of poles	1 (Ø + N)	1	2, 3, 4	1	2, 3, 4	1	2, 3, 4	1	2	1	2, 3, 4
Rated current (A) 77°F (25°C)	I_n	1–40	0.5–63	0.5–63	0.5–63	0.5–63	—	—	—	—	—
Rated current (A) 104°F (40°C)	I_n	—	—	—	—	—	—	1–40	1–40	10–125	10–125
Rated voltage (V)	U_e	230	440	440	—	—	—	—	—	440	440
Ultimate breaking capacity as per IEC 60947-2 Standard (kA RMS)	130 Vac	—	—	—	—	—	—	—	—	20	—
	230–240 Vac	7.5	10	20	—	—	—	—	—	10	20
	400–415 Vac	3 ¹	3 ¹	10	—	—	—	—	—	4*	10
	440 Vac	—	—	6	—	—	—	—	—	—	6
	127 Vdc	—	—	—	—	—	—	—	10	20	—
250 Vdc	—	—	—	—	—	—	—	—	10	—	
Service breaking capacity	I_{cs} (% I_{cu})	50%	75%	75%	50%	50%	50%	—	—	75%	75%
Ultimate breaking capacity as per IEC 898 (kA RMS)	230–400 Vac	6	6	—	10	—	—	—	—	—	—
	415 Vac	—	—	—	—	10	—	—	—	—	—
Trip Units											
Magnetic setting	B curve	3–5	3–5	3–5	3–5	3.2–4.8	—	—	—	3.2–4.8	—
	C curve	5–10	5–10	5–10	5–10	7–10	—	7–10	—	7–10	—
	D curve	—	10–14	10–14	10–14	10–14	—	—	—	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).

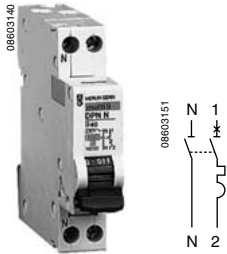
Table 17: Dimensions and Weights

Device	Size	Height		Width		Depth		Weight	
		in.	mm	in.	mm	in.	mm	oz.	g
DPN-N	1-pole	3.19	81	0.71	18	3.00	76	4.23	120
C60N	1-pole	3.19	81	0.71	18	3.00	76	3.88	110
	2-pole	3.19	81	1.42	36	3.00	76	7.75	220
	3-pole	3.19	81	2.13	54	3.00	76	11.64	330
	4-pole	3.19	81	2.48	72	3.00	76	15.52	440
C60H	1-pole	3.19	81	0.71	18	3.00	76	4.23	120
	2-pole	3.19	81	1.42	36	3.00	76	8.47	240
	3-pole	3.19	81	2.13	54	3.00	76	12.70	360
	4-pole	3.19	81	2.48	72	3.00	76	16.93	480
C60L	1-pole	3.19	81	0.71	18	3.00	76	4.23	120
	2-pole	3.19	81	1.42	36	3.00	76	8.47	240
	3-pole	3.19	81	2.13	54	3.00	76	12.70	360
	4-pole	3.19	81	2.48	72	3.00	76	16.93	480
C32H-DC	1-pole	3.03	77	0.71	18	3.00	76	4.48	127
	2-pole	3.03	77	1.42	36	3.00	76	8.47	240
NC100H/NC125H	1-pole	3.19	81	0.71	18	3.00	76	6.35	180
	2-pole	3.19	81	2.13	54	3.00	76	12.70	360
	3-pole	3.19	81	3.19	81	3.00	76	19.05	540
	4-pole	3.19	81	4.25	108	3.00	76	25.40	720

MULTI 9™ System Catalog
Section 3—IEC 60947-2 Rated Protection Devices

DPN-N PHASE + NEUTRAL CIRCUIT BREAKERS

Overview



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

Time/Current Curves

B curve—Provides control and protection against overcurrents for very long cables. Magnetic trip units operate between 3 and 5 times ampere rating.

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.

The VIGI residual current detector can be added to the DPN-N to provide residual current protection. This combination must be ordered as an integral product from the factory (see Section 4 for the DPN-N residual current detector).

Table 18: Specifications for IEC Rated DPN-N Phase + Neutral Circuit Breakers

<ul style="list-style-type: none"> Package size: Two 0.35 in. (9 mm) modules; 0.71 in. (18 mm) width Connection: <ul style="list-style-type: none"> #8 AWG (10 mm²) stranded cables #6 AWG (16 mm²) solid cable (copper only) Mounting: 35 mm DIN rail Degree of protection: <ul style="list-style-type: none"> Case: IP40 as per IEC 529; Terminals: IP20 Time-current trip curve: B curve and C curve 	<ul style="list-style-type: none"> Temperature: <ul style="list-style-type: none"> Calibration at 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 IEC68-2-30 Number of operating cycles: <ul style="list-style-type: none"> 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 weights and interrupting ratings
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Standards

- IEC 60947-2
- IEC 60898

Catalog Numbers

Table 19: DPN-N Phase + Neutral Circuit Breaker Catalog Numbers

Rating (A)	B Curve	C Curve
	1-pole + Neutral 2 Modules	1-pole + Neutral 2 Modules
1	—	19260
2	—	19261
4	19249	19263
6	19250	19264
10	19252	19266
16	19254	19268
20	19255	19269
25	19256	19270
32	19257	19271
40	19258	19272

IEC RATED C60 MINIATURE CIRCUIT BREAKERS

Overview

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 not requiring UL Ratings.

As shown in the table below, three types of IEC Rated C60 devices are available: C60N, C60H, and C60L circuit breaker. These model numbers refer to the maximum current interrupting rating.

The relative interrupting ratings per IEC 60947-2 are listed below; for other ratings, see the table on the next page.

Table 20: Ratings Overview

Circuit Breaker	Rating	Curves
C60N	10 kA at 415 Vac	B, C and D
C60H	15 kA at 415 Vac	B, C and D
C60L	25 kA at 415 Vac	B, C, K and MA

Each of these devices is available in several trip curves, as listed in the tables with catalog numbers. They include devices ranging from 0.5 to 63 A. (For higher current ratings, select devices from the higher current NC100 series.)

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads
- Trip-free mechanism: Contacts cannot be held in the 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.
- B curve: Overcurrent protection for sensitive equipment (computers, electronic devices, etc.):
 - C60N/H: The magnetic operates between 3 and 5 times ampere rating.
- C curve: Overcurrent protection for all application types:
 - C60N/H: The magnetic operates between 5 and 10 times ampere rating.
 - C60L: The magnetic operates between 7 and 10 times ampere rating.
- D and K curves: Overcurrent protection for loads with high inrush currents (motors, transformers):
 - C60N/H/L: The magnetic release operates between 10 and 14 times ampere rating.
- MA curve: C60L-MA circuit breakers are designed for motor circuit protection against short circuits. These circuit breakers are equipped with magnetic-only trip units at 12 times ampere rating. Therefore they must be combined with a suitable thermal protection device (see the coordination table at the end of this section).

Specifications

Table 21: MULTI 9 C60 Circuit Breakers with IEC 60947-2 Rating

<ul style="list-style-type: none"> • Package size: Two 9 mm modules; 18 mm width per pole • High voltage withstand: 6 kV • Connections for C60N/H/L except L-MH (box lug—Use with copper wire only) <ul style="list-style-type: none"> — Ring tongue terminal is optional — 0.5–25 A, #18–#4 AWG (1–25 mm²) cables; torque 22 lb-in. (2.48 N•m) — 30–63 A, #18–#2 AWG (1–35 mm²) cables; torque 31 lb-in. (3.50 N•m) • Connections for C60L-MA: <ul style="list-style-type: none"> — 1.5–10 stranded #6 AWG (16 mm²) — 1.5–10 solid #4 AWG (25 mm²) — 12.5–40 stranded #4 AWG (25 mm²) — 12.5–40 solid #2 AWG (35 mm²) • Mounting: 35 mm DIN rail • Time-current curves: B, C, D, K, and MA 	<ul style="list-style-type: none"> • Degree of protection: <ul style="list-style-type: none"> — Case: IP40 as per IEC 529 — Terminals: IP20 • Temperature: <ul style="list-style-type: none"> — Calibration temperature: 86°F (30°C); C60L rated at 104°F (40°C) — Storage temperature: -40 to 176°F (-40 to 80°C) — Operating temperature: -22 to 158°F (-30 to 70°C) • Tropicalization: Treatment 2—Relative humidity: 95% at 131°F (55°C) per IEC68-2-30 • Number of operating cycles: <ul style="list-style-type: none"> — Mechanical (O-C) 20,000 — Electrical (O-C) 10,000 • See selection table for weights and interrupting ratings
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Standards

- IEC 60947-2
- VDE 0660, CE Marked

MULTI 9™ System Catalog

Section 3—IEC 60947-2 Rated Protection Devices

Table 22: Catalog Numbers for IEC 60947-2 Rated C60N Miniature Circuit Breakers

Rating (A)	B Curve				C Curve				D Curve			
	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules
0.5	—	—	—	—	24067	24068	24069	24070	—	—	—	—
1	24045	24071	24084	24097	24395	24331	24344	24357	24625	24653	24667	24681
2	24046	24072	24085	24098	24396	24332	24345	24358	24626	24654	24668	24682
3	24047	24073	24086	24099	24397	24333	24346	24359	24627	24655	24669	24683
4	24048	24074	24087	24100	24398	24334	24348	24360	24628	24656	24670	24684
6	24049	24075	24088	24101	24399	24335	24348	24361	24629	24657	24671	24685
10	24050	24076	24089	24102	24401	24336	24349	24362	24630	24658	24672	24686
16	24051	24077	24090	24103	24403	24337	24350	24363	24632	24660	24674	24688
20	24052	24078	24091	24104	24404	24338	24351	24364	24633	24661	24675	24689
25	24053	24079	24092	24105	24405	24339	24352	24365	24634	24662	24676	24690
32	24054	24080	24093	24106	24406	24340	24353	24366	24635	24663	24677	24691
40	24055	24081	24094	24107	24407	24341	24354	24367	24636	24664	24678	24692
50	24056	24082	24095	24108	24408	24342	24355	24368	24637	24665	24679	24693
63	24057	24083	24096	24109	24409	24343	24356	24369	24638	24666	24680	24694

Table 23: Catalog Numbers for IEC 60947-2 Rated C60H Miniature Circuit Breakers

Rating (A)	B Curve				C Curve				D Curve			
	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules
0.5	—	—	—	—	24900	24902	24906	24908	25171	25172	25173	25174
0.75	—	—	—	—	24901	24903	24907	24909	—	—	—	—
1	—	—	—	—	24968	24981	24994	25007	25152	25183	25196	25211
2	—	—	—	—	24969	24982	24995	25008	25155	25184	25197	25212
3	—	—	—	—	24970	24983	24996	25009	25157	25185	25198	25213
4	—	—	—	—	24971	24984	24997	25010	25158	25186	25199	25214
6	24643	24725	24738	24751	24972	24985	24998	25011	25159	25187	25200	25215
10	24644	24726	24739	24752	24973	24986	24999	25012	25160	25188	25201	25216
13	24645	—	—	—	—	—	—	—	—	—	—	—
16	24646	24727	24740	24753	24974	24987	25000	25013	25161	25189	25202	25217
20	24647	24728	24741	24754	24975	24988	25001	25014	25164	25190	25203	25218
25	24648	24729	24742	24755	24976	24989	25002	25015	25165	25191	25204	25219
32	24649	24730	24743	24756	24977	24990	25003	25016	25166	25192	25205	25220
40	24650	24731	24744	24757	24978	24991	25004	25017	25167	25193	25206	25221
50	24651	24732	24745	24758	24979	24992	25005	25018	25168	25194	25207	25222
63	24652	24733	24746	24759	24980	24993	25006	25019	25169	25195	25208	25223

Table 24: Catalog Numbers for IEC 60947-2 Rated C60L Miniature Circuit Breakers

Rating (A)	B Curve				C Curve				K Curve			
	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules
0.5	—	—	—	—	25406	25407	25408	25409	—	—	—	—
1	—	—	—	—	25392	25418	25431	25444	25460	25478	25496	25514
1.6	—	—	—	—	—	—	—	—	25461	25479	25497	25515
2	—	—	—	—	25393	25419	25432	25445	25462	25480	25498	25516
3	—	—	—	—	25394	25420	25433	25446	25463	25481	25499	25517
4	—	—	—	—	25395	25421	25434	25447	25464	25482	25500	25518
6	25331	25357	25370	25383	25396	25422	25435	25448	25465	25483	25501	25519
10	25332	25358	25371	25384	25397	25423	25436	25449	25467	25485	25503	25521
16	25333	25359	25372	25385	25398	25424	25437	25450	25468	25486	25504	25522
20	25334	25360	25373	25386	25399	25425	25438	25451	25469	25487	25505	25523
25	25335	25361	25374	25387	25400	25426	25439	25452	25470	25488	25506	25524
32	25336	25362	25375	25388	25401	25427	25440	25453	25471	25489	25507	25525
40	25337	25363	25376	25389	25402	25428	25441	25454	25472	25490	25508	25526
50	25338	25364	25377	25390	25403	25429	25442	25455	—	—	—	—
63	25339	25365	25378	25391	25404	25430	25443	25456	—	—	—	—

Coordination of C60L-MA Circuit Breaker, Thermal Relay and Contactor

Standard IEC 60947-4 defines tests at various current levels with the aim of placing the switchgear in extreme conditions. According to the status of components after testing, the standard defines two types of coordination.

Table 25: Coordination of C60L-MA Circuit Breaker, Thermal Relay and Contactor

Types of Coordination	Type 1	Type 2
Deterioration of the contactor and relay is accepted under two conditions	<ul style="list-style-type: none"> There is no risk to the operator Parts other than the contactor and relay must not be damaged 	<ul style="list-style-type: none"> Welding of the contactor or starter contacts is accepted only if they can be easily separated After Type 2 coordination tests, the functions of protection and operation can be achieved
The choice of coordination type depends on the operating parameters. It must be suitable for the user's needs and ensure optimized cost of the installation	<ul style="list-style-type: none"> Qualified maintenance service Reduced volume and cost of equipment Continuity of service not required or ensured by replacing the faulty motor bucket 	<ul style="list-style-type: none"> Continuity of service is vital Reduced maintenance service Specification calling for Type 2 coordination Various thermal relay classes: Thermal relay class must be appropriate for motor starting time

The magnetic release of MA devices operates at 12 times ampere rating. These C60L-MA circuit breakers are listed in Table 26.

Table 26: Catalog Numbers for IEC 60947-2 Rated C60L Miniature Circuit Breakers

Rating (A)	MA Curve				Rating (A)	MA Curve			
	1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules		1-pole 2 Modules	2-pole 4 Modules	3-pole 6 Modules	4-pole 8 Modules
1.6	—	26345	26357	—	12.5	—	26350	26362	—
2.5	—	26346	26358	—	16	—	26352	26368	—
4	—	26347	26359	—	25	—	26353	26369	—
6.3	—	26348	26360	—	40	—	26355	26370	—
10	—	26349	26361	—					

Table 27: Tripping Times

Class	Tripping Time (sec.) at 7.2 I _r
10 A	2–10
20 A	6–20

Contactors and thermal relays referenced in the table below are TELEMECANIQUE® products. See Square D Digest 172 (March, 2000) pages 15-16/17 for contactors.

Table 28: Catalog Numbers for Contactors and Thermal Relays (TELEMECANIQUE)

Voltage (Vac)	Motors			Circuit Breaker ^{1 2}				Contactor	Thermal Relay ³	
	P (kW)	I (A)	I _e max	Type	A	I _{rm} (A)	I _q (kA)		Type	I _{rth}
415	0.37	1.1	1.6	C60L-MA	1.6	20	25	LC1-D09	LR2 D13 06	1/1.6
	0.75	1.8	2.5	C60L-MA	2.5	32	25	LC1-D09	LR2 D13 07	1.6/2.5
	1.5	3.4	4	C60L-MA	4	50	25	LC1-D18	LR2 D13 08	2.5/4
	2.2	4.8	6	C60L-MA	6.3	80	25	LC1-D25	LR2 D13 10	4/6
	7.5	14	16	C60L-MA	16	20	25	LC1-D25	LR2 D13 21	12/18
	11	21	25	C60L-MA	25	320	25	LC1-D32	LR2 D13 22	17/25
	18.5	34	40	C60L-MA	40	500	20	LC1-D40	LR2 D13 53	23/32
	18.5	34	40	C60L-MA	40	500	20	LC1-D40	LR2 D13 55	30/40

¹ I_{rm} (A) = Magnetic release (in amperes)

² I_q (kA) = Interrupting rating (in kA)

³ I_{rth} = Thermal relay current rating

MULTI 9™ System Catalog
Section 3—IEC 60947-2 Rated Protection Devices

IEC RATED C32H-DC CIRCUIT BREAKERS FOR DC CIRCUITS

Overview

The C32H-DC circuit breakers are used in circuits with dc power supplies up to 125 Vdc (1-pole) or 127/250 Vdc (2-pole). The C32H-DC provides protection of circuits against short-circuit currents and overload currents, and is available with ratings from 1 to 40 A. Additionally, it allows manual control or isolation of a dc circuit.

These are typically used in applications such as emergency lighting, automatic systems, electrolysis, telephony, etc.

Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads.
- Trip-free mechanism: Contacts cannot be held in the on position when the C32H-DC is tripped automatically.
- Isolation with positive break indication: Green strip on the operating handle indicates that all poles are open.
- C curve: Overcurrent protection for all application types. Magnetic release operates between 7 and 10 times ampere rating.
- Suitable for reverse feeding.

Connection

Box lug connections for copper wiring are provided for the C32H-DC devices.

Accessories

Remote monitoring and control can be provided with optional NC100 electrical accessories including the OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release, and/or MX + OF Shunt Trip.

NOTE: The C60 electrical accessories are not compatible with the C32H-DC circuit breaker.

Standards

Compliance with IEC 60947-2 Standards

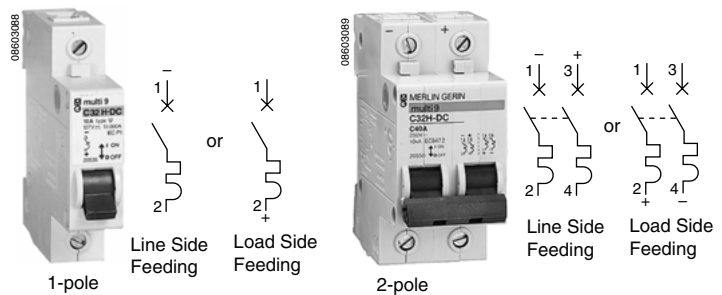
Table 29: Specifications for IEC Rated C32H-DC Circuit Breakers

<ul style="list-style-type: none"> • Package size: Two 9 mm modules; 18 mm width per pole • Voltage (nominal): 1-pole: 127 Vdc; 2-pole: 127/250 Vdc • High voltage withstand: 6 kV • Connection: Box lug—Tunnel terminals for #18–#4 AWG (1–25 mm²) cables • Mounting: 35 mm DIN Rail • Time-current curves: C curve; Magnetic releases operate between 7 and 10 I_n • Degree of protection: <ul style="list-style-type: none"> — Case: IP40 — Terminals: IP20 as per IEC 529 	<ul style="list-style-type: none"> • Rating on connector: Copper wiring only • Temperature: <ul style="list-style-type: none"> — Calibration: 104°F (40°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: <ul style="list-style-type: none"> — 10,000 (O-C) at L/R ≤ 0.015 sec. • See selection table for weights and interrupting ratings
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Catalog Numbers

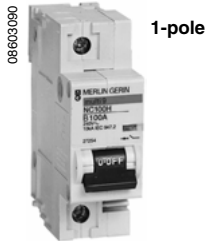
Table 30: C Curve—C32H-DC Circuit Breakers

Rating (A)	1-pole 2 Modules	2-pole 4 Modules
1	20531	20541
2	20532	20542
3	20533	20543
6	20534	20544
10	20535	20545
16	20536	20546
20	20537	20547
25	20538	20548
32	20539	20549
40	20540	20550



IEC RATED NC100H CIRCUIT BREAKERS

Overview

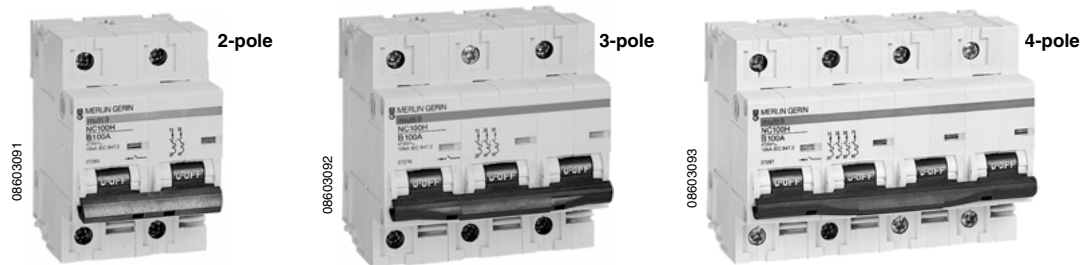


The NC100H family of MULTI 9™ circuit breakers meeting IEC 60947-2 is available primarily for OEMs wishing to export manufactured products to countries requiring IEC Ratings instead of UL Ratings.

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 NC100H circuit breakers are available in B, C, and D trip curves, as listed in the tables with catalog numbers. They include devices ranging from 10 to 125 A. (For lower current ratings, select devices from the C60 series.)

Figure 14: IEC 60947-2 Rated NC100H Circuit Breakers



Standard Features

- Fast closing: Allows increased withstand to the high inrush currents of some loads
- Trip-free mechanism: Contacts cannot be held in ON position when NC100 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. Magnet release operates between 7 and 10 times ampere rating. The magnetic release operates between 7 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.

Accessories

Ground-fault protection can be provided when combined with a VIGI NC100 module. Remote tripping and indication can be provided by adding a variety of auxiliaries (see section 5 for accessories).

NOTE: The C60 accessories may not match the NC100 circuit breaker.

Specifications

Table 31: Specifications for IEC Rated NC-100H Circuit Breakers

<ul style="list-style-type: none"> • Package size: Three 9 mm modules; 27 mm width per pole • High voltage withstand: 6 kV • Maximum voltage rating: 440 Vac • Connection: <ul style="list-style-type: none"> — Box lug: 10–100 A: #18 to #1 AWG (1–50 mm²) cables — Use with copper wire only • Mounting: 35 mm DIN rail • Degree of protection: <ul style="list-style-type: none"> — Case: IP40 as per IEC 60529 — Terminals: IP20 	<ul style="list-style-type: none"> • Time/Current curves: B, C and D curves • Temperature: <ul style="list-style-type: none"> — Calibration: 85°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 IEC68-2-30 • Number of operating cycles: <ul style="list-style-type: none"> — 1000 (O-C) at 63 A — 5000 (O-C) at 80–125 A • See selection table for weights and interrupting ratings
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Standards

- IEC 60947-2
- VDE 0660
- CE Marked

MULTI 9™ System Catalog

Section 3—IEC 60947-2 Rated Protection Devices

Table 32: B Curve—NC100H and NC125H Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27201	27212	27223	27234
16	27202	27213	27224	27235
20	27203	27214	27225	27236
25	27204	27215	27226	27237
32	27205	27216	27227	27238
40	27206	27217	27228	27239

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
50	27207	27218	27229	27240
63	27208	27219	27230	27241
80	27209	27220	27231	27242
100	27210	27221	27232	27243
125	27211	27222	27233	27244

Table 33: C Curve—NC100H and NC125H Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27245	27256	27267	27278
16	27246	27257	27268	27279
20	27247	27258	27269	27280
25	27248	27259	27270	27281
32	27249	27260	27271	27282
40	27250	27261	27272	27283

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
50	27251	27262	27273	27284
63	27252	27263	27274	27285
80	27253	27264	27274	27286
100	27254	27265	27276	27287
125	27255	27266	27277	27288

Table 34: D Curve—NC100H and NC125H Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27289	27300	27311	27322
16	27290	27301	27312	27323
20	27291	27302	27313	27324
25	27292	27303	27314	27325
32	27293	27304	27315	27326

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
40	27294	27305	27316	27327
50	27295	27306	27317	27328
63	27296	27307	27318	27329
80	27297	27308	27319	27330
100	27298	27309	27320	27331

Table 35: C Curve—NC100LS Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27377	27388	27399	27410
16	27378	27389	27400	27411
20	27379	27390	27401	27412
25	27380	27391	27402	27413

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
32	27381	27392	27403	27414
40	27382	27393	27404	27415
50	27383	27394	27405	27416
63	27384	27395	27406	27417

Table 36: D Curve—NC100LS Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27421	27432	27443	27454
16	27422	27433	27444	27455
20	27423	27434	27445	27456
25	27424	27435	27446	27457

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
32	27425	27436	27447	27458
40	27426	27437	27448	27459
50	27427	27438	27449	27460
63	27428	27439	27450	27461

Table 37: C Curve—NC100LH Circuit Breakers

Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
10	27509	27520	27531	27542
16	27510	27521	27532	27543
20	27511	27522	27533	27544
25	27512	27523	27534	27545




Rating (A)	1-Pole 3 Modules	2-Pole 6 Modules	3-Pole 9 Modules	4-Pole 12 Modules
32	27513	27524	27535	27546
40	27514	27525	27536	27547
50	27515	27526	27537	27548
63	27516	27527	27538	27549

SECTION 4— IEC RATED GROUND-FAULT PROTECTION DEVICES

SELECTION TABLE

The MULTI 9™ System includes four products that provide ground-fault protection per IEC Standards. These products are summarized below and discussed in more detail in the following pages.

Table 38: Selection Table for IEC Rated Ground-fault Protection Devices

Ratings		ID RCD		C60 VIGI				NC100 VIGI			DPN-N VIGI	
		2-pole	4-pole	2-pole	2-pole	3-pole	4-pole	2-pole	3-pole	4-pole	1Ø + N	
Rated current (A) 77°F (25°C)	I_n	25–100	25–100	< 25	< 63	< 63	< 63	10–125	10–125	10–125	4–40	
Sensitivities (mA)	Instantaneous	10	—	Yes	—	—	—	Yes	Yes	Yes	—	
		30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
		300	Yes	Yes	—	—	—	—	Yes	Yes	Yes	Yes
	Selective	500  ¹	—	—	—	—	—	—	Yes	Yes	Yes	—
		500  ¹	—	—	—	—	—	—	Yes	Yes	Yes	—
		1000  ¹	—	—	—	Yes	Yes	Yes	Yes	Yes	Yes	—
Voltage (nominal)		240–415 Vac		130–240 Vac, 220–415 Vac				240–415 Vac			230/400 Vac	
Trip Units												
Time/Current curve	B curve	N/A		Depends on circuit breaker used				Depends on circuit breaker used			Yes	
	C curve	N/A		Depends on circuit breaker used				Depends on circuit breaker used			Yes	
	D curve	N/A		Depends on circuit breaker used				Depends on circuit breaker used			—	
Dimensions (in./mm)												
	Width	1.42/36	2.84/72	1.42/36	1.42/36	2.13/54	12.84/72	2.13/54	3.19/81	4.25/108	1.42/36	
	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	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	3.00/76	
Weight (oz./g)												
		7.70/220	15.9/450	2.43/120	5.29/150	< 25 = 6.35/180 > 63 = 7.41/210		14.82/420	19.75/560	25.40/720	6.70/190	


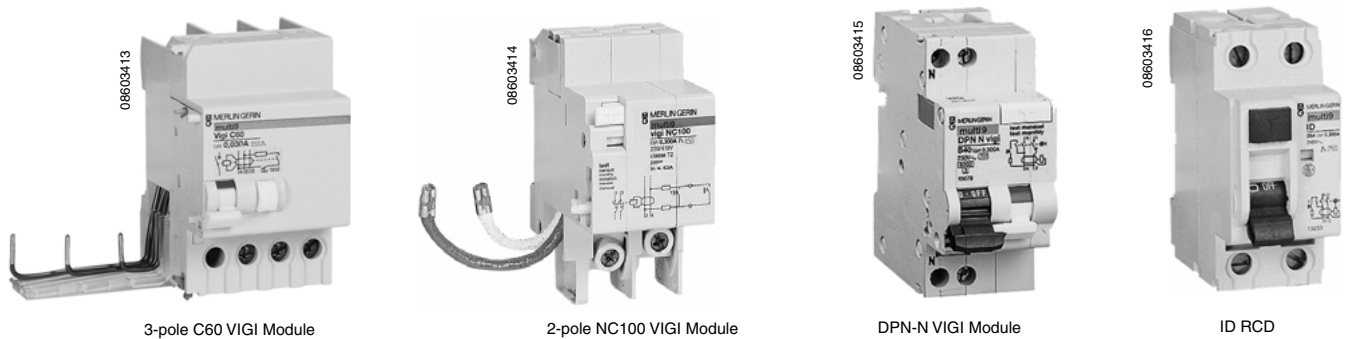
¹  Selective = time delay

Table 39: IEC Rated Ground-fault Protection Devices



MULTI 9™ System Catalog

Section 4—IEC Rated Ground-fault Protection Devices

IEC RATED ID RESIDUAL CURRENT SWITCHES

Overview

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

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

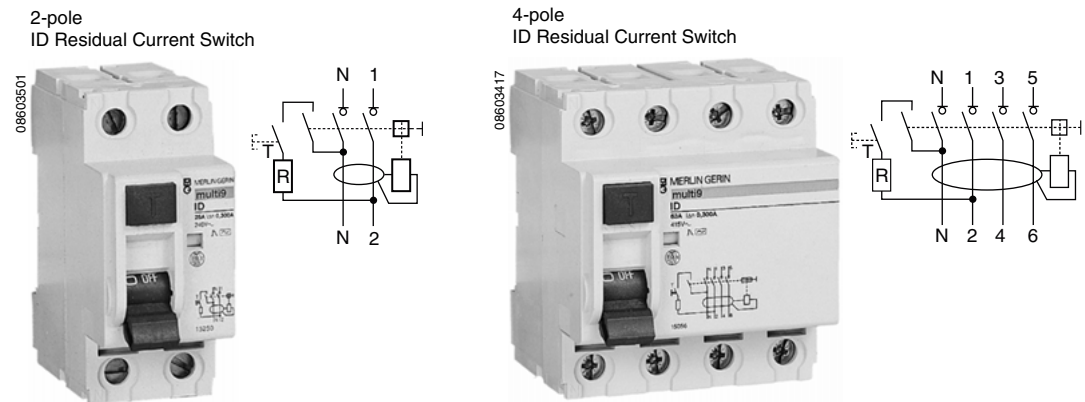
NOTE: The ID residual current switch has only one protective function—detection of earth leakage current. There is no thermal or magnetic overcurrent protection. Therefore, the circuit must be protected by an upstream circuit breaker or supplementary protector. For combined overcurrent and residual current 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.

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

Table 40: IEC Rated ID Residual Current Switches



Specifications

Table 41: Specifications for IEC Rated ID Residual Current Switches

<ul style="list-style-type: none"> • Package size: See Table 38 • Voltage (nominal): 240 to 415 Vac, +10%, -20%, 50/60 Hz • High voltage withstand: 6 kV • Connection, box lug: (copper wire only) <ul style="list-style-type: none"> — #2 AWG (35 mm²) stranded cables — #1 AWG (50 mm²) solid cables • Sensitivities: Fixed at 10, 30, or 300 • Time/current curve: Instantaneous or selective release S (time delay) 	<ul style="list-style-type: none"> • Level of immunity: 250 A peak, according to 8/20 ms periodical wave • Operating temperature: 22 to 140°F (-5 to 60°C) • Tropicalization: Treatment 2—Relative humidity: 95% at 131°F (55°C) per IEC68-2-30 • Mounting: 35 mm DIN rail • Number of operating cycles (O-C): Electrical: 20,000 • See selection table for weights and interrupting ratings
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Standards




- IEC 1008
- EN 61-008
- CE Marked

MULTI 9™ System Catalog

Section 4—IEC Rated Ground-fault Protection Devices

Catalog Numbers

Table 42: Catalog Numbers for ID Residual Current Switches—AC Class

Rating (A)	Sensitivity (mA)	2-pole (240 Vac) 4 Modules	4-pole (415 Vac) 8 Modules
25	10	16200	—
	30	16201	16251
40	30	16204	16254
	30	16208	16258
63	300  ¹	23028	16265
	30	16212	—
80	300  ¹	23032	16266
	300	23034	—
100	300  ¹	23035	23059


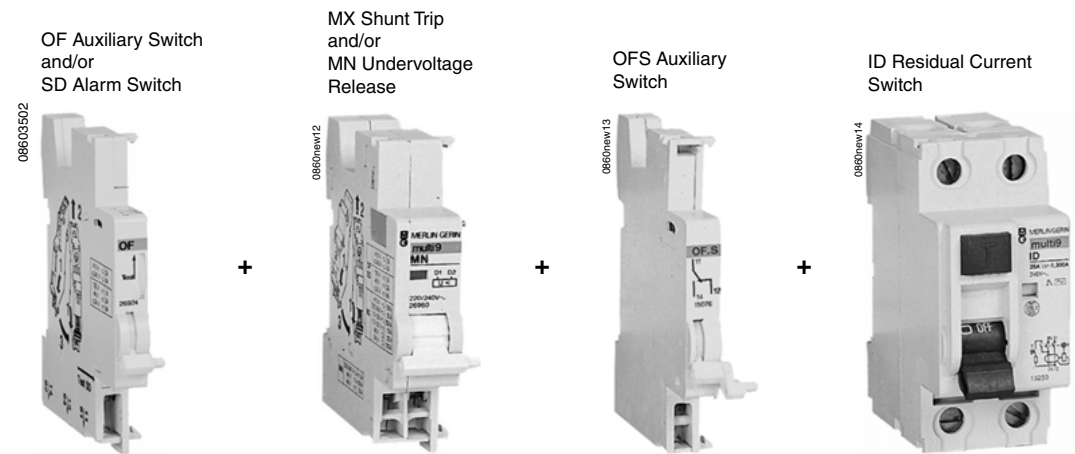
¹  Selective = time delay

Figure 15: Possible Device Combinations

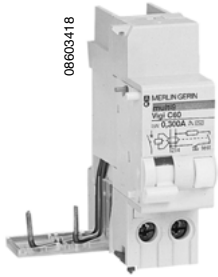


NOTE: Availability of UL 1053 Listed products to be announced.

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Section 4—IEC Rated Ground-fault Protection Devices

IEC RATED C60 VIGI MODULES FOR GROUND-FAULT PROTECTION

Overview



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.

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 additional time discrimination 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).

VIGI modules are available for use with 2-, 3-, and 4-pole C60 circuit breakers. The VIGI module may be field installed.

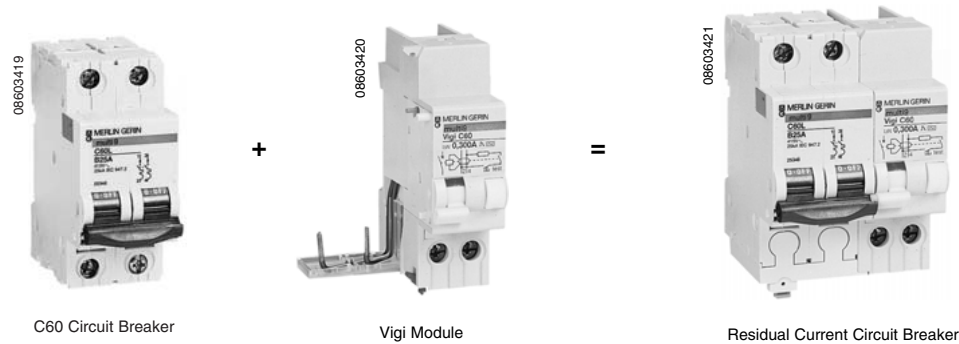
A visual indicator of the ground fault is provided by a red flag on the VIGI operating handle. A manual test button on the front panel allows manual testing of the VIGI module.

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 NC100 series. A different series of VIGI Modules is available for the NC100 devices.

Figure 16: Example of Residual Current Circuit Breaker



NOTE: Also see the DPN-N Residual Current Circuit Breakers and ID Residual Current Switches in this catalog.

Accessories

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

Specifications

Table 43: Specifications for IEC Rated VIGI Modules for Ground-fault Protection

<ul style="list-style-type: none"> • Package size: See Selection Table 38 • Voltage (nominal): <ul style="list-style-type: none"> — 130–240 Vac, +10% -20%, 50/60 Hz; — 220–415 Vac, +10% -20%, 50/60 Hz • High voltage withstand: 6 kV • Connection: Box lug; (copper wire only) • Cables: <ul style="list-style-type: none"> — ≤ 25 stranded #6 AWG (16 mm²), ≤ 25 solid #6 AWG (16 mm²), — ≤ 63 stranded #6 AWG (16 mm²), ≤ 63 solid #6 AWG (16 mm²) 	<ul style="list-style-type: none"> • Mounting: 1.38 in. (35 mm) DIN rail • Time-current curves: Depends on circuit breaker • Time/current curve: Instantaneous or selective release • Sensitivities: Fixed at 10, 30, 300, or 1000 • Temperatures: <ul style="list-style-type: none"> — Calibration: 77°F (25°C). — Operating: 22 to 140°F (-5 to 60°C) • See selection table for weights and interrupting ratings
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MULTI 9™ System Catalog

Section 4—IEC Rated Ground-fault Protection Devices



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 44: Catalog Numbers for VIGI C60 Modules—AC Class

Rating (A)	Voltage (Vac)	Sensitivity (mA)	2-pole 3 Modules ¹	2-pole 4 Modules ¹	3-pole 7 Modules ¹	4-pole 7 Modules ¹
≤ 25	220–415	10	26580	—	—	—
		30	26581	—	—	—
≤ 63	220–415	30	—	26611	26620	26643
		300  ²	—	26616	26631	26648
		1000  ²	—	26618	26636	26650

¹ Width of one module = 0.354 in. (9 mm).


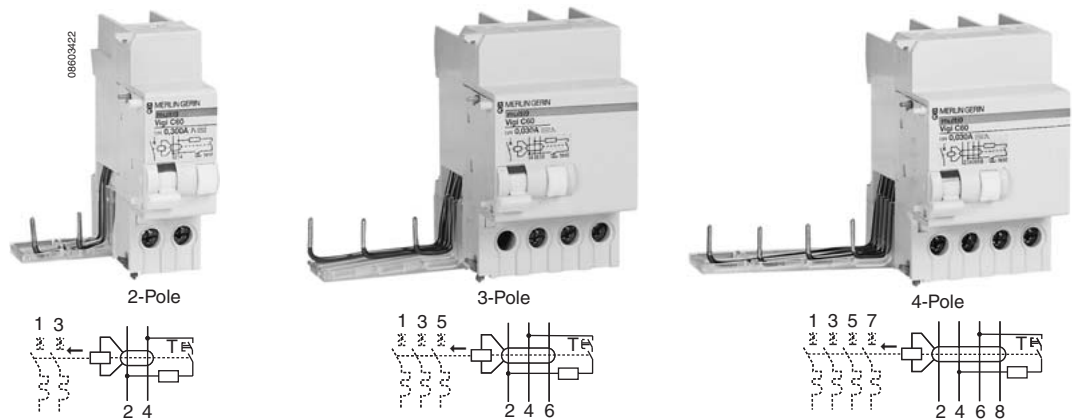
²  Selective = time delay

Figure 17: IEC Rated C60 VIGI Modules



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Section 4—IEC Rated Ground-fault Protection Devices

IEC RATED NC100 VIGI RESIDUAL CURRENT CIRCUIT BREAKERS

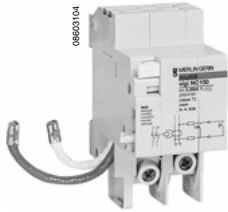
Introduction

The NC100 VIGI residual current detector can be added to the NC100 circuit breaker to provide a high level of protection against earth leakage faults. The VIGI module clips onto the right-hand side of a NC100 protective device and is mechanically linked to the NC100 circuit breaker, which it trips when the VIGI detects residual current.

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 complete the NC100 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



2-pole NC100 Vigi Module

Table 45: Specifications for IEC Rated NC100 VIGI Residual Current Circuit Breaker

<ul style="list-style-type: none"> • The NC100 circuit breaker and VIGI module combination is protected against nuisance tripping due to transient overvoltages such as lightning, switching on the network, etc. 	<ul style="list-style-type: none"> • Connections: <ul style="list-style-type: none"> — Stranded: ≤ 100 A #2 AWG 35 mm² — Solid: ≤ 100 A #1 AWG 50 mm²
<ul style="list-style-type: none"> • Current rating: 100 A 	<ul style="list-style-type: none"> • Voltage: 220–415 Vac, +10%, -20%, 50/60 Hz
<ul style="list-style-type: none"> • The ac class VIGI module guarantees tripping for sinusoidal ac residual currents, either suddenly applied or slowly increasing 	<ul style="list-style-type: none"> • Resetting the NC100 circuit breaker and VIGI module combination in a single operation by resetting the circuit breaker
<ul style="list-style-type: none"> • Total vertical discrimination with the $I_{\Delta n}$ 300 mA to 1 A \square "selective" sensitivities if it is installed: <ul style="list-style-type: none"> — 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 $\leq I_{\Delta n}/2$ of the upstream device 	<ul style="list-style-type: none"> • Mechanical indication of the ground-fault is shown on the front face of the VIGI module with a red indicator • Instantaneous or selective tripping: Fixed sensitivities for all ratings • See selection table for weights and interrupting ratings

Standards

Complies with IEC 1009 Standard

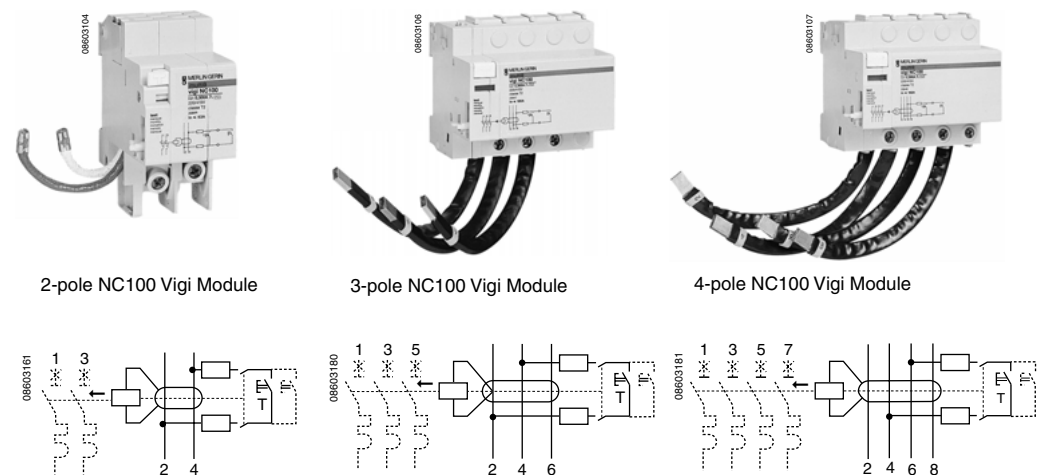
Table 46: Catalog Numbers for NC100 VIGI Module—AC Class

Rating (A)	Voltage (Vac)	Sensitivity (mA)	2-pole 7 Modules ¹	3-pole 10 Modules ¹	4-pole 10 Modules ¹
≤ 100	220–415	30	27818	27826	27835
		300 \square ²	27823	27831	27840
		1000 \square ²	27825	27833	27842

¹ Width of one module = 0.354 in. (9 mm).

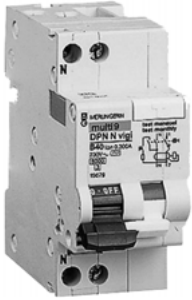
² \square Selective = time delay

Figure 18: IEC Rated NC100 VIGI Modules



DPN-N VIGI RESIDUAL CURRENT CIRCUIT BREAKERS

Overview

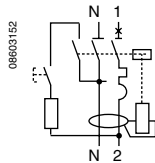


DPN-N VIGI Residual Current Circuit Breaker

The DPN-N VIGI Residual Current Circuit Breaker protects against short-circuit and overload as well as earth leakage faults, in one device. It provides overcurrent protection on the phase pole, but switches both the phase and neutral. The DPN-N is available in only one version: with one phase and neutral. This combination must be ordered as an integral product from the factory.

B curve—Provides control and protection against overcurrents for very long cables. Magnetic trip units operate between 3 and 5 I_n .

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 I_n .



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.

Specifications

Table 47: Specifications for IEC Rated DPN-N VIGI Residual Current Circuit Breakers

<ul style="list-style-type: none"> Package size: Four 0.35 in. (9 mm) modules; 1.42 in. (36 mm) width Connection: <ul style="list-style-type: none"> #8 AWG (10 mm²) stranded cable #6 AWG (16 mm²) solid cable (copper only) Time-current trip curve: B curve and C curve Operating temperature: 22 to 140°F (-5 to 60°C) Tropicalization: Treatment 2—Relative humidity: 95% at 131°F (55°C) as per IEC68-2-30 Calibration at 86°F (30°C) 	<ul style="list-style-type: none"> Degree of protection: <ul style="list-style-type: none"> Case: IP40 as per IEC 529; Terminals: IP20 Mounting: 1.38 in. (35 mm) DIN rail Number of operating cycles: <ul style="list-style-type: none"> Mechanical: 20,000 (O-C) Electrical: 10,000 (O-C) at 32 A See selection table for weights and interrupting ratings
--	--

Standards

- IEC 60947-2, IEC 60898 and IEC 61009
- CE Marked

Catalog Numbers

Table 48: DPN-N VIGI Residual Current Circuit Breaker

Rating (A)	1-pole + N (B Curve) 4 Modules		1-pole + N (C Curve) 4 Modules	
	30 mA	300 mA	30 mA	300 mA
4	19650	19670	—	—
6	19651	19671	19661	19681
10	19653	19673	19663	19683
16	19655	19675	19665	19685
20	19656	19676	19666	19686
25	19657	19677	19667	19687
32	19658	19678	19668	19688
40	19659	19679	19669	19689

MULTI 9™ System Catalog
Section 4—IEC Rated Ground-fault Protection Devices

SECTION 5—ACCESSORIES

OVERVIEW

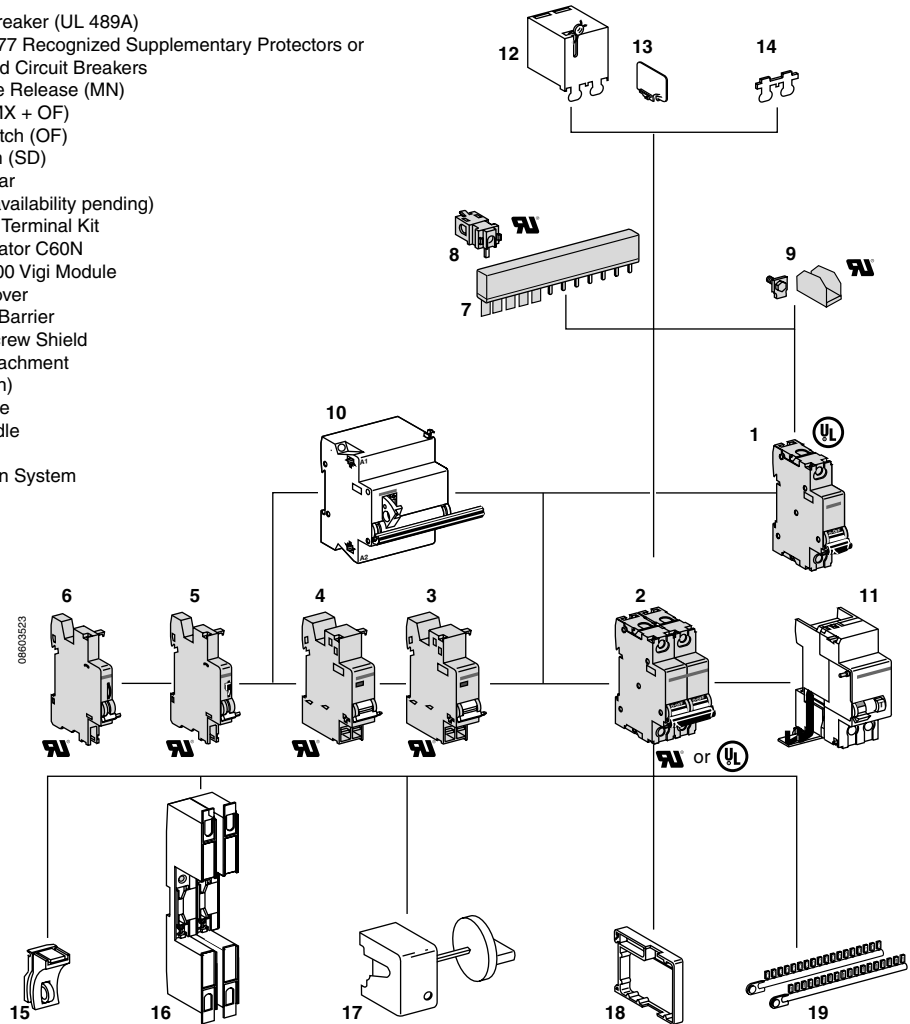
The MULTI 9™ System includes an extensive line of field-installable accessories that enables the system to be used in many applications. Electrical auxiliaries include shunt trip, undervoltage release, auxiliary switch, and alarm switch. Control and display devices include push buttons, motor operators, 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.

NOTE: In many cases, the NC100 series of devices do not use the same accessories as the C60 series.

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 19: Overview of MULTI 9™ System Accessories

1. DC Circuit Breaker (UL 489A)
2. C60N UL 1077 Recognized 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 (availability pending)
9. Ring Tongue Terminal Kit
10. Motor Operator C60N
11. C60N/NC100 Vigi Module
12. Terminal Cover
13. Interphase Barrier
14. Terminal Screw Shield
15. Padlock Attachment (Off Position)
16. Plug-in Base
17. Rotary Handle
18. Spacer
19. Identification System



ELECTRICAL AUXILIARIES

Overview

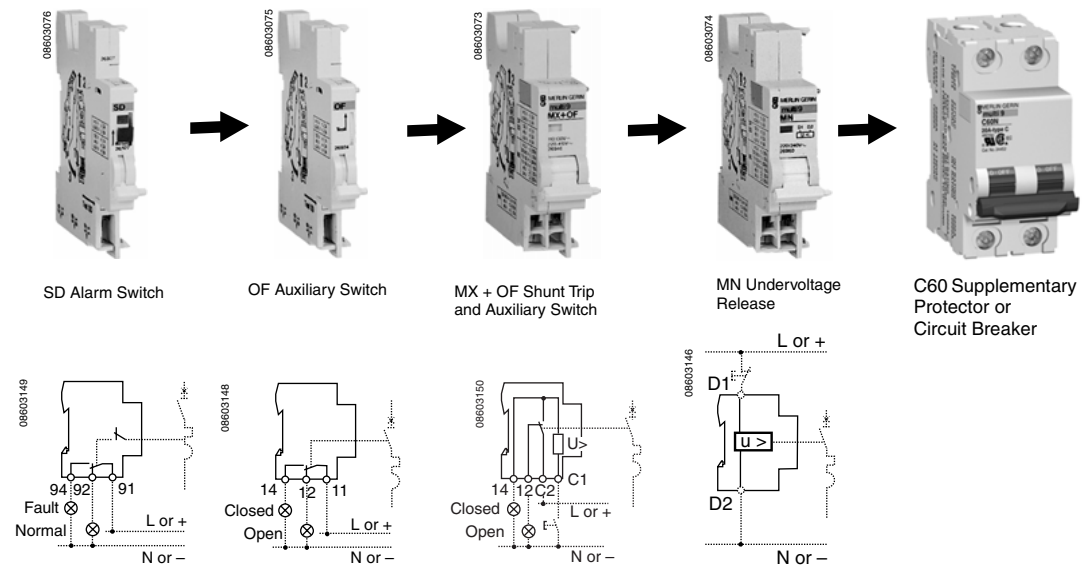
The MULTI 9™ product line includes a variety of electrical auxiliaries for the C60 and NC100 supplementary protectors and circuit breakers. They may be attached to the protective device as needed to fulfill the tripping or monitoring application requirements. They include the following devices.

- MN Undervoltage Release
- MX + OF Shunt Trip and Auxiliary Switch
- OF Auxiliary Switch
- SD Alarm Switch
- TM Motor Operator

NOTE: The MULTI 9 VIGI Module, which adds ground-fault protection, is described in Section 4.

As shown in the figure below, these are mechanically linked to the base C60 or NC100 protective devices.

Figure 20: Possible Auxiliary Combinations



MN Undervoltage Release



The MN Undervoltage Release is used to provide remote tripping of C60 or NC100 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 or NC100 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 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 protective device. Terminal pads for connection of control wiring are provided for either two #16 AWG (1.5 mm²) cables, or one #14 AWG (2.5 mm²) cable.

MN  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 49: Power Consumption of MX and MN Accessories

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

¹ IEC Rated; not UL Recognized

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 circuit breaker or supplementary protector 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 Listed devices.
- CSA and IEC Rated.

OF Auxiliary Switch



The OF Auxiliary Switch communicates the OPEN or CLOSED status of the associated C60 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 Listed for use with UL 489 Listed devices.
- CSA and IEC Rated.

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SD Alarm Switch



The SD Alarm Switch communicates the TRIP status of the associated C60 or NC100 circuit breakers or supplemental protectors via auxiliary contacts. It is mechanically linked to the protective device. (Use the OF Auxiliary Switch for OPEN or CLOSED status.)

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

Locally, it also indicates the TRIPPED-ON-FAULT condition of the protective device with a red indicator flag on the front panel. 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 be reset independently of the protective device with a reset lever on its front panel.

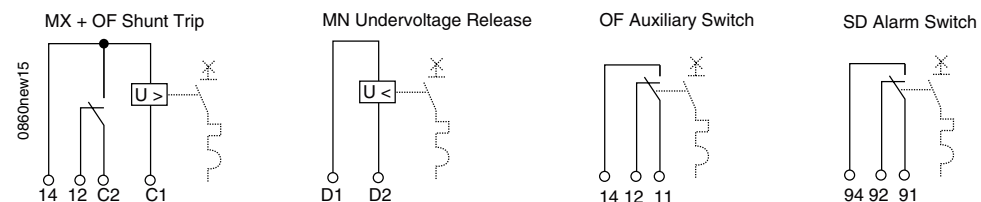
The SD Alarm Switch may show the circuit breaker status, using V Type Signal Lamps, other annunciators, or a control system. It may be used in conjunction with the OF Auxiliary Switch which presents the OPEN or CLOSED status, the MN Undervoltage Release, and/or the MX + OF Shunt Trip.

- UL Recognized for use with UL 1077 Recognized devices and UL Listed for use with UL 489 Listed devices.
- CSA and IEC Rated

Table 50: Catalog Numbers for Electrical Auxiliaries

Device	Control Voltage		Width in Modules	C60		NC100		
	Vac	Vdc		UL/IEC	IEC	UL/IEC	IEC	
MX + OF shunt trip	24	24	2	MG26974	26948	—	—	
	24–48	24–48	2	—	—	MG27130	27138	
	48–130	48	2	MG26973	26947	—	—	
	110–220	110–130	2	—	—	MG27129	27137	
	220–277	110–130	2	MG26972	—	—	—	
	220–277	—	2	—	—	MG27128	—	
	220–415	110–130	2	—	26946	—	—	
	220–415	—	—	—	—	—	27136	
MN undervoltage release	Instantaneous	48	—	2	MG26965	26961	—	—
		110–130	—	2	—	—	MG27126	—
		120	—	2	MG26967	—	—	—
		220–240	—	2	—	—	MG27125	27140
		220–240	220–240	2	—	—	—	27140
		220–277	—	2	MG26964	26960	—	—
	Time delayed	—	24	2	MG26968	—	—	—
		—	48	2	MG26966	26962	—	—
OF auxiliary switch	—	—	1	MG26925	26924	MG27121	27132	
SD alarm switch	—	—	1	MG26928	26927	MG27122	27135	

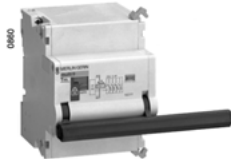
Figure 21: Electrical Auxiliary Schematics



TM Motor Operator



1- or 2-pole



3- or 4-pole

The TM Motor Operator modules allow remote operation of C60 circuit breakers and supplementary protectors. The TM is mechanically linked to the protective device via its handle. This handle can also be used to manually operate the TM and its associated protective device.

The presence of a control voltage in the TM causes the closing of the circuit breaker poles; when this voltage is interrupted, the poles open.

A red indicator is displayed when the TM Motor Operator is energized or being opened; the indicator is gray when it is not energized or is completely opened.

A selector switch on the TM front panel is used to disconnect the motor operator or place it in the AUTO (operational) mode. The open position frees an integral padlocking device to allow physical lockout. (Required 0.28 in. [7 mm] dia. padlock, not included.)

NOTE: Reclosing after a fault should primarily be carried out locally and in manual mode after verification and clearance of the fault. The use of an SD Alarm Switch, wired in series with the control line of the TM Motor Operator, prevents automatic and remote reclosing.

NOTE: The C60 protective device may be manually operated via its handle, even with the TM installed. The TM Motor Operator may also be used in conjunction with the OF Auxiliary Switch to give the OPEN or CLOSED status of the protective device.

IEC Rated; not UL Recognized

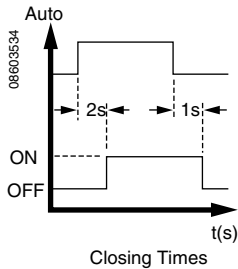


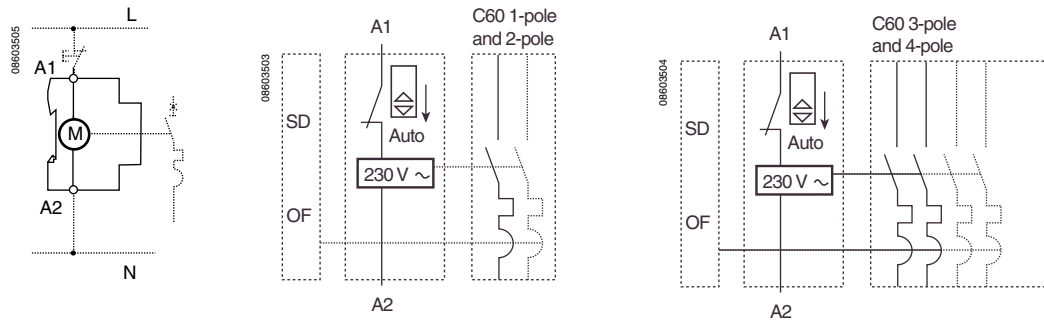
Table 51: IEC Rated C60 TM Motor Operators

Description	US No.	IEC No
TM Remote motor control for C60 1-pole or 2-pole	MG18310	18310
TM Remote motor control for C60 3-pole or 4-pole	MG18311	18311

Table 52: Specifications for IEC Rated C60 TM Motor Operators

<ul style="list-style-type: none"> • Voltage: 230 Vac (-15%, +10%) • Frequency: 50/60 Hz • Response to undervoltage: <ul style="list-style-type: none"> — Mechanical opening of poles (>0.45 sec.) — Reclosing two seconds after power is restored — Insensitive to short-supply interruptions (<0.45 sec.) • Opening time of associated circuit breaker: <ul style="list-style-type: none"> — 0.5 sec. by TM motor operator — 0.05 sec. by shunt trip or undervoltage release • Rate of operation: 15 seconds max. up to 10 operations per day • Width: 7 modules: 2.5 in. (63 mm) 	<ul style="list-style-type: none"> • Closing time: Two seconds • Power consumption: <ul style="list-style-type: none"> — Inrush 28 VA — Holding 2 VA • Status indication: Mechanical indicator flag • Number of operating cycles (O-C): 20,000 for TM motor operator/C60 circuit breaker combination at 104°F (40°C) • Terminals: Tunnel terminals are suitable for #10 AWG (6 mm²) cables
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Figure 22: IEC Rated TM Motor Operator Schematics



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COMB BUS BARS

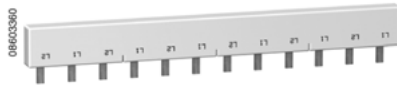
UL Recognized C60 Comb Bus Bars

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 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 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 supplementary protector

Figure 23: UL Recognized C60 3-phase Comb Bus Bar



Refer also to the connector and 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)
- Distance between outgoing poles: 0.71 in. (18 mm)
- Lengths: Fixed length of 12 poles (Consult Square D field office for other sizes.)
- 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 supplementary protector
- UL Recognized (for use with UL 1077 devices only; not CSA Rated)

Table 53: Catalog Numbers for UL Recognized C60 Comb Bus Bars

Description	Length	Type	Cat. No.
12-pole comb bus bar	8.5 in. (216 mm)	1-phase	MG10285
		2-phase	MG10286
		3-phase	MG10287

Tooth Caps for UL Recognized Comb Bus Bars

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.

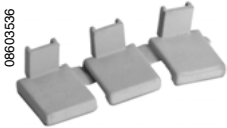


Table 1: Tooth Caps for UL Recognized Comb Bus Bars

Description	Cat. No.
Tooth caps for 0.71 in. (18 mm) comb bus bar (20 pieces)	60488

**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-phases (conductors)
- Distance between outgoing poles: 18 mm (0.71 in.)
- Lengths: 12, 24, or 54-poles; may be cut to desired length
- IEC Rated

Figure 24: IEC Rated C60 Comb Bus Bars and End Caps

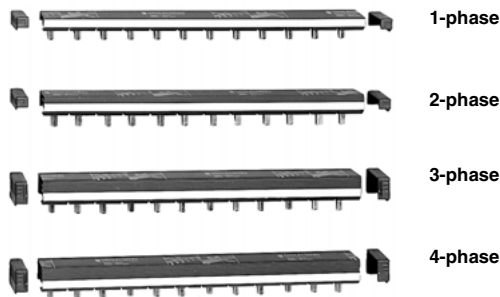


Table 54: Catalog Numbers for IEC Rated C60 Comb Bus Bars

Description	Length	Type	Cat. No.
12-pole comb bus bar	8.5 in. (216 mm)	1-phase	14881
		2-phase	14882
		3-phase	14883
		4-phase	14884
24-pole comb bus bar (package of 2)	17 in. (432 mm)	1-phase	14891
		2-phase	14892
		3-phase	14893
		4-phase	14894
54-pole comb bus bar	39.4 in. (1 m)	1-phase	14801
		2-phase	14802
		3-phase	14803
		4-phase	14804

**End Caps for
 IEC Rated C60
 Comb Bus Bars**

The End Caps are 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.

IEC Rated

Table 55: End Caps for IEC Rated C60 Comb Bus Bars



Description	Type	Cat. No.
End caps for comb bus bar (40 pieces)	1-phase/2-phase	14886
	3-phase/4-phase	14887

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Connector for IEC Rated Comb Bus Bars



The IEC Rated connectors are provided for connecting field wiring to a comb bus bar. These connectors accept up to #2 AWG wiring.

- IEC Rated
- Torque: 22 lb-in (2.5 N•m)

Table 56: IEC Rated C60 Connectors

Description	Wire Size	Cat. No.
Connector (4 pieces)	#4 AWG (25 mm ²)	14888

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 2: Tooth Caps for IEC Rated Comb Bus Bars

Description	Cat. No.
Tooth caps for comb bus bar (40 pieces)	14888

DEVICE SHIELDING

DIN Rail Spacer



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 Recognized

Table 57: IEC Rated DIN Rail Spacer

Description	Width	US No.	IEC No.
Spacer for IEC Rated C60 and NC100 circuit breakers	0.354 in. (9 mm)	MG27062	27062

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 Rating nor with the Ring Lug Terminal kit, since those products already include increased isolation barriers.

IEC Rated; not UL Recognized

Table 58: 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 NC100 protective devices to provide greater insulation of the terminal screws.

IEC Rated; not UL Recognized

Table 59: IEC Rated Terminal Screw Shields

Description	Device	Quantity	Cat. No.
Terminal screw shield	C60	Bag of 2 strips of 4	26981
	NC100	Bag of 2 strips of 4	27152

Terminal Covers



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

- IEC Rated; not UL 1077 Recognized

Table 60: UL Recognized and IEC Rated Terminal Covers

Description	Device	Size	US No.	IEC No.
Terminal cover	C60	1-pole	MG26975	26975
		2-pole	MG26976	26976
		3-pole	MG26975 + MG26976	26975 + 26976
		4-pole	MG26978	26978
Terminal cover	NC100	1-pole	MG26975	26975
		2-pole	MG26976	26976
		3-pole	MG26975 + MG26976	26975 + 26976
		4-pole	MG26978	26978

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 to allow front or rear connection with ring type terminals. The kit allows a UL 1077 Recognized C60N device to retain its rating. It cannot be field-installed on a UL 489 Listed C60 product.

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)

Table 61: UL Recognized Ring Lug Terminal Kit

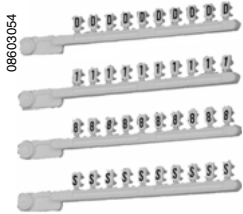
Description	Quantity	Cat. No.
Ring lug terminal kit	Two ring tongue terminals	17400
	Two isolation shrouds	
	Two 5 mm screws	

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IDENTIFICATION SYSTEM

Snap-on Marking Symbols



The Identification System provides marking symbols which can be used on the C60 and NC100 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 Recognized

Table 62: Snap-on Marking Symbols

Marking	Quantity	Cat. No.	Marking	Quantity	Cat. No.
A	Strip of 10	AB1GA	1	Strip of 10	AB1R1
B	Strip of 10	AB1GB	2	Strip of 10	AB1R2
C	Strip of 10	AB1GC	3	Strip of 10	AB1R3
D	Strip of 10	AB1GD	4	Strip of 10	AB1R4
E	Strip of 10	AB1GE	5	Strip of 10	AB1R5
F	Strip of 10	AB1GF	6	Strip of 10	AB1R6
G	Strip of 10	AB1GG	7	Strip of 10	AB1R7
H	Strip of 10	AB1GH	8	Strip of 10	AB1R8
I	Strip of 10	AB1GI	9	Strip of 10	AB1R9
J	Strip of 10	AB1GJ	0	Strip of 10	AB1R0
K	Strip of 10	AB1GK			
L	Strip of 10	AB1GL			
M	Strip of 10	AB1GM	0-9	Strip of 10	AB1R11
N	Strip of 10	AB1GN			
O	Strip of 10	AB1GO			
P	Strip of 10	AB1GP			
Q	Strip of 10	AB1GQ	+	Strip of 10	AB1R12
R	Strip of 10	AB1GR	-	Strip of 10	AB1R13
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	Blank	Strip of 10	AB1RV
X	Strip of 10	AB1GX			
Y	Strip of 10	AB1GY			
Z	Strip of 10	AB1GZ			

Label Holder



Used to identify a 2-, 3-, or 4-pole C60 or NC100 device. Holds label provided by user.

Table 63: Label Holder Catalog Number

Description	Cat. No.
Label Holder (Bag of 10)	27150

OPERATION DEVICES

Rotary Handles

A C60 or NC100 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.

This subassembly can be configured in two ways:

- For front or lateral operation (lateral shown in Figure 64)
- For lateral operation

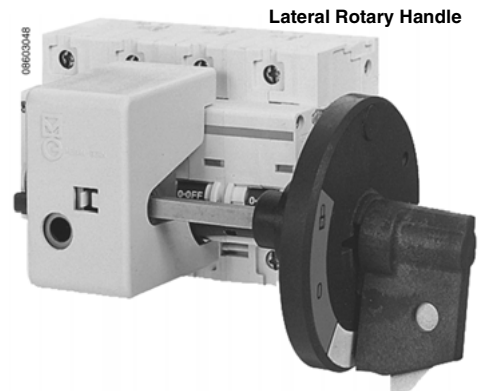
Two versions of the rotary handle are available:

- 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.

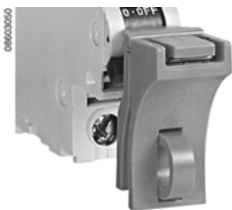
- Minimum depth for drawout is 6.8 in. (174 mm) including circuit breaker.
- Minimum depth for lateral installation is 4.8 in. (122 mm) including circuit breaker.
- IEC Rated; not UL Recognized

Table 64: IEC Rated Rotary Handles

Description	US No.	IEC No.
Operating subassembly for C60 or NC100 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



Padlock Attachments



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 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 NC100 in the ON position will not prevent the device from tripping under overcurrent or ground fault conditions.

IEC Rated; not UL Recognized

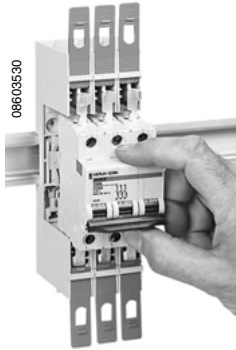
Table 65: IEC Rated Padlock Attachments

Description	Quantity	US No.	IEC No.
Padlock attachment for C60 protection device	Bag of 2	MG26970	26970
Strengthened Padlock Attachment for C60N	Bag of 2	M9PAF	—
Padlock attachment for NC100 protection device	Bag of 4	MG27145	27145

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MOUNTING ACCESSORIES

Plug-in Base



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.

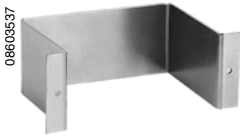
While the circuit breaker is removed, the base can be locked using a 0.32 in. (8 mm) dia. padlock (not provided).

- 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 Recognized

Table 66: IEC Rated Plug-in Base

Description	US No.	IEC No.
Plug-in base for C60 devices	MG26996	26996

Front Mounting Bracket (Kit)



The Front Mounting Bracket provides a convenient way to mount MULTI 9 circuit breakers, supplementary protectors or accessories. Its height is equal to a 1.38 in. (35 mm) DIN rail, and allows the C60 and NC100 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 applications, Cat. No. 26981 (C60) or 27152 (NC100) Terminal Screw Shield should be used for increased isolation between the terminal screws of the MULTI 9™ device and the mounting bracket.

UL Recognized and IEC Rated

Table 67: Front Mounting Bracket

Description	Size	Cat. No.
Front mounting bracket for C60 protective devices	1-pole	MG26983
	2-pole	MG26984
	3-pole	MG26985
	4-pole	MG26989
Front mounting bracket for NC100 protective devices	1-pole	MG26986
	2-pole	MG26987
	3-pole	MG26988
	4-pole	MG26990

NOTE: See dimensional drawings in Section 7.

DIN Rail Mounting Clips

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



Table 68: DIN Rail Mounting Clips

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

MSC Mounting Base

The MULTI 9™ MSC Mounting Base is an integral package that provides DIN mounting of MULTI 9 devices and provides either a 2-phase or 3-phase bus bar for up to 24 poles (in two rows) of C60 devices and accessories. The MSC 27 is used for NC100 products.

The base is rugged, gloss-white, zinc annealed sheet steel with two rows of DIN mounting rails. The heavy-duty base plate allows surface mounting. The single-piece copper bus conductors are insulated and color-coded. Power may be supplied by a reverse-fed C60 circuit breaker, or via the feed-through connections at the end of the bus. The feed lugs are compatible with COMPACT® NS250 molded case circuit breakers and INTERPACT® INS-250 switches.

- Rating: Up to 250 A service
- Insulation voltage: 690 Vac
- Current withstand:
 - Peak: 52.5 kA
 - Short-time: 25 kA for 0.1 sec.
- Phases are color-coded
- Width: Base 8.5 in. (216 mm); see Table 69 for length
- Tested to Australian AS3439-1 and AS3439-3 standards (equivalent to IEC 439)
- IEC Rated; not UL Recognized

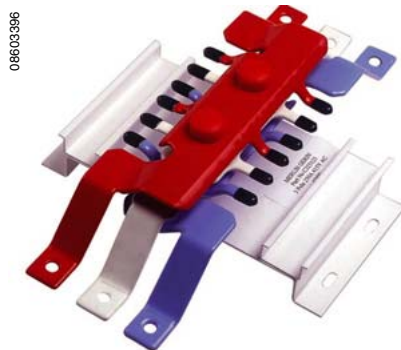
Table 69: IEC Rated MSC Mounting Base for MULTI 9™ Devices

Type	Size	No. of Poles	Base Length ¹ (in./mm)	Cat. No.
MSC DC for C60 protection devices (black, red)	2-phase	12	4.33/110	C3DC123
		16	5.75/146	C3DC163
		20	7.17/182	C3DC203
MSC 18 for C60 protection devices (red, white, blue)	3-phase	12	4.33/110	C325123
		18	6.46/164	C325183
		24	8.58/218	C325243
MSC 27 for NC100 protection devices (red, white, blue)	3-phase	12	9.57/162	C125123
		18	14.35/243	C125183
		24	19.13/324	C125243

¹ For overall length, add approximately 5 in. (127 mm) for bus lugs.

NOTE: Other options are available by special order, including: lengths up to 48 poles, line feed lugs at one end only, and other variations.

Figure 25: IEC Rated MSC Mounting Base



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Multi-pole Front Mounting Kit

The Multi-pole Front Mounting Kit consists of a transparent, hinged, weatherproof cover with a DIN rail. It allows installation of up to twenty modules (10 poles of C60) of MULTI 9 supplementary protectors and accessories. A DIN rail 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 Recognized



Table 70: IEC Rated Multi-pole Front Mounting Kit

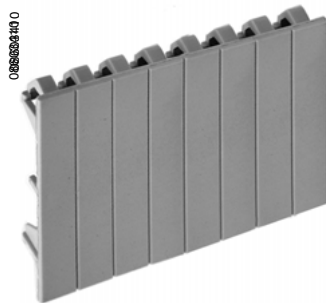
Description	Cat. No.
Multi-pole front mounting kit with transparent hinged cover (Includes a 10-module divisible blanking plate and mounting template)	14210
DIN-rail support	14211

Pole Filler

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 18 mm pole fillers. They may be snapped apart in 9 mm increments.

Table 71: Pole Filler

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



SECTION 6 —ADDITIONAL SYSTEM DEVICES

OVERVIEW

In addition to the C60 and NC100 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 NC100 devices or as stand-alone devices.

These include the following:

- SPD Surge Protection Devices
- CM Selector Switches (Change-over)
- I Isolating Switches
- OFS Auxiliary Switch Adapter (for IEC C32H-DC and ID RCCB devices only)
- V Signal Lamps and BP Push Buttons
- CI Impulse Counters and CH Hour Counters
- IHP Time Switches

NOTE: See Section 4 for IEC Rated 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.

SPD Surge Protective Device



SPD Module

The SPD (Surge Protective Device) offers an ideal solution for protecting equipment from the damaging effects of power surges. These DIN-rail mountable devices include 1-, 2- and 4-pole models that are mounted in parallel with the load to provide up to 80,000 amps of surge protection. They can be used in conjunction with the MULTI 9 family of products to provide a uniform solution for your application and ensure superior OEM design flexibility. This product line is available in most international voltages for both single-phase and three-phase power systems.

Figure 26: SPD Surge Protective Devices

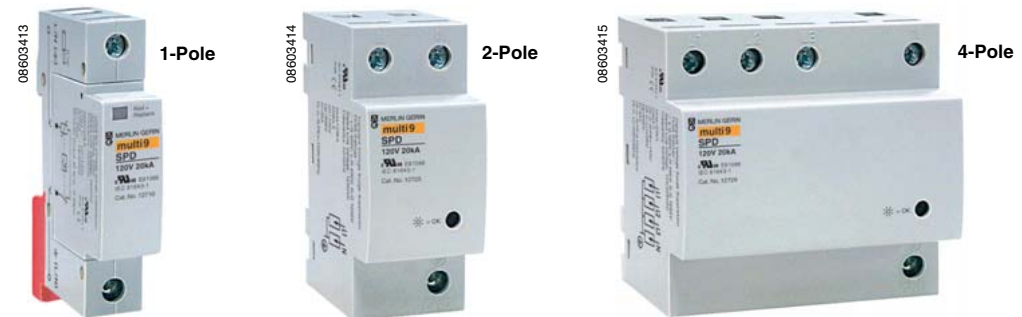
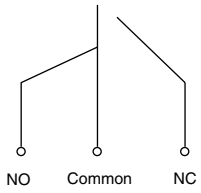


Table 72: Specifications for UL 1449 SPD Surge Protective Devices

Description	Specification
Maximum Surge Current/Phase	20 kA, 45 kA, 65 kA, 80 kA (refer to table)
Service Voltages:	120, 230, 208Y/120, 400Y/230
Operating Frequency	50/60/400 Hz
Poles	1, 2, and 4 poles
Dry Contacts for Remote Status	Available in some models
Termination	#12 to #4 AWG (3–25 mm ²)
Terminal Torque	45 lb-in (5 N•m)
Dimensions (width)	1-pole = 18 mm, 2-pole = 36 mm, 4-pole = 89mm
Housing Rating	Type 1, (IP20)
Operating Temperature	-22 to +160 °F (-30 to +70 °C)
Product Standards	UL 1449 Second Edition and CSA C22.2 No. 0-M91, IEC 6143-1

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Section 6—Additional System Devices



Connector for Remote Monitoring (Refer to Table 73 for Availability)



Table 73: UL Recognized MULTI 9™ SPD Series Transient Voltage Surge Suppressor (TVSS)¹

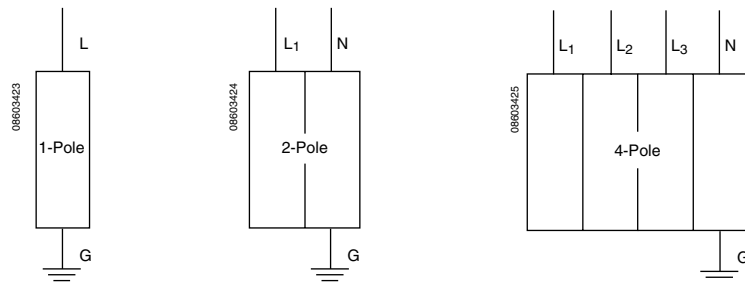
Service Voltage U_N (Vac)	No. of Poles ²	Connector for Remote Monitoring	Max Surge Current/Phase I_{MAX} (kA)	UL Suppressed Voltage Rating (SVR) L-N (Vac)	Cat. No.	Replacement Module Cat. No.
120	1	No	20	500	12710	12710M
230	1	No	20	700	12711	12711M
400	1	No	20	1500	12712	12712M
120	1	No	45	500	12713	12713M
120	1	Yes	45	500	12714	12714M
230	1	No	45	700	12715	12715M
230	1	Yes	45	700	12716	12716M
400	1	No	45	1500	12717	12717M
400	1	Yes	45	1500	12718	12718M
120	1	No	65	400	12719	12719M
120	1	Yes	65	400	12720	12720M
230	1	No	65	700	12721	12721M
230	1	Yes	65	700	12722	12722M
400	1	No	65	1200	12723	12723M
400	1	Yes	65	1200	12724	12724M
120	2	No	20	400	12725	—
230	2	No	20	700	12726	—
120	2	No	45	400	12727	—
230	2	No	45	700	12728	—
208Y/120	4	No	20	400	12729	—
208Y/120	4	Yes	20	400	12730	—
400Y/230	4	No	20	700	12731	—
400Y/230	4	Yes	20	700	12732	—
208Y/120	4	No	45	400	12733	—
208Y/120	4	Yes	45	400	12734	—
400Y/230	4	No	45	700	12735	—
400Y/230	4	Yes	45	700	12736	—
208Y/120	4	No	80	400	12737	—
208Y/120	4	Yes	80	400	12738	—
400Y/230	4	No	80	700	12739	—
400Y/230	4	Yes	80	700	12740	—

¹ Cable Range: #12–#4 AWG (3–25 mm²)

² Widths: 1 pole = 18 mm, 2 poles = 36 mm, 4 poles = 89 mm

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

Figure 27: SPD Surge Protective Devices Wiring Schematics



CM Selector Switches



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.

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 Recognized

Table 74: IEC Rated CM Selector Switches


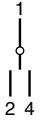

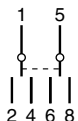
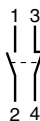
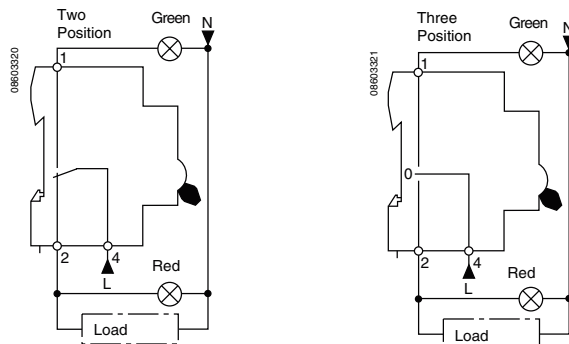
CM Selector Switch Type	No. of Circuits	No. of Positions	Width in Modules	Cat. No.
	1	2	2	15102
	1	3	2	15103
	2	2	4	15129
	2	3	4	15130
	2	2	4	15131

Figure 28: IEC Rated CM Selector Switch Schematics



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Section 6—Additional System Devices

I Isolating Switch



1-pole

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 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 Recognized

Table 75: IEC Rated I Isolating Switches

Rating (A)	1-pole (250 Vac) 2 Modules	2-pole (415 Vac) 2 Modules	2-pole (440 Vac) 4 Modules	3-pole (415 Vac) 4 Modules	3-pole (440 Vac) 6 Modules	4-pole (415 Vac) 4 Modules	4-pole (40 Vac) 8 Modules
20	15005	15006	—	15007	—	15008	—
32	15009	15010	—	15011	—	15012	—
40	15024	—	15020	—	15023	—	15019
63	15013	—	14014	—	15015	—	15016
100	15090	—	15091	—	15092	—	15093
125	15057	—	15058	—	15059	—	15060

Figure 29: I Switches



2-pole



3-pole



4-pole

OFS Auxiliary Switch Adapter (for ID RCD)



The OFS Auxiliary Switch Adapter allows the ID Residual Current Switches (in Section 4) to use the same electrical accessories as the C60 supplementary protectors, including the OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release, and/or MX + OF Shunt Trip.

IEC Rated; not UL Recognized

Table 76: OFS Auxiliary Switch

Description	Cat. No.
OFS auxiliary switch	26923

STATUS, DISPLAY AND CONTROL ACCESSORIES

There are a variety of other accessories which may be used with the C60 or NC100 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
- IHP Time Switches

These accessories may be located adjacent to the C60 or NC100 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 lenses are available in a variety of colors. Bulbs are available for 230 Vac and 12, 24, or 48 Vac/Vdc operation.

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.

NOTE: IEC Rated; not UL Recognized

Table 77: IEC Rated V Signal Lamps and Accessories

Type	Width in Modules	Voltage	Color	Cat. No.
Complete V signal lamp	2	230 Vac	Clear	15106
			Red	15107
			Green	15108
			Yellow	15109
			Blue	15110
V signal lamp without bulb or lens	2			15142
Lens (bag of 5)			Clear	15143
			Red	15144
			Green	15145
			Yellow	15146
			Blue	15141
Accessories		230 Vac	Clear, red, yellow ¹ (1)	15115
			Blue, green (1)	15116
		48 Vac/Vdc	All	15117
		24 Vac/Vdc	All	15118
		12 Vac/Vdc	All	15119

¹ According to lens color.

Figure 30: IEC Rated V Signal Lamps



MULTI 9™ System Catalog

Section 6—Additional System Devices

BP Push Buttons

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.

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 Recognized

Table 78: Catalog Numbers for BP Push Buttons

Type	Type	Width (In Modules)	Voltage	Signal Lamp Color	Push Button Color	Cat. No.
Push buttons without signal lamps	1 O + 1 C	2	—	—	Gray	15104
	1 C	2		—	Red	15136
	1 O	2		—	Green	15137
Push buttons with signal lamps	1 C	—	—	Red	Red	15138
	1 O			Green	Green	15105
Bulb (bag of ten)			230 Vac	Green		15115
				Red		15116
				48 Vac/Vdc	All	15117
				24 Vac/Vdc	All	15118
				12 Vac/Vdc	All	15119
Lens (bag of five)				Green		15143
				Red		15144

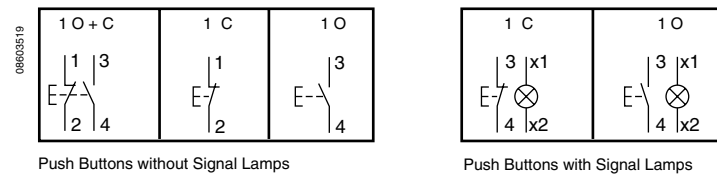


Push Buttons without Signal Lamps



Push Buttons with Signal Lamps

Figure 31: IEC Rated BP Push Button Types



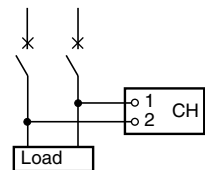
CH Hour Counter

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 Recognized



CI Impulse Counter

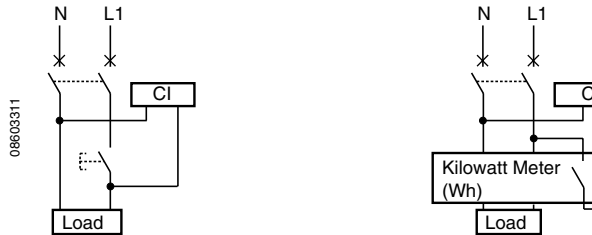


The CI Impulse Counter is an electromechanical counter designed to measure impulses produced by various devices. It displays the running total of metered impulses. The CI Impulse Counter is unaffected by interruptions in the main power supply.

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 32: IEC Rated CI Impulse Counter



NOTE: IEC Rated; Not UL Recognized

Table 79: 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

IHP Time Switch



The IHP Time Switch controls the opening and closing of one or more separate circuits according to the programming set by the user. The sequences are repeated daily (24 hour) or weekly (7 day).

Their compact dimensions, 0.71 in. (18 mm) width, makes them ideal for small enclosures. They may be used to control heating, lighting, watering, or other cyclic processes.

Table 80: IHP Time Switch Specifications

- The IHP Time Switch is programmable through the front panel
- Accuracy: ±1 s per day at 68°F (20°C); quartz time base
- Contact Rating: 10 A, 250 Vac, (cos φ = 0.6)
- Connection: Tunnel terminals for cables up to #10 AWG (6 mm²)
- Power Consumption: 6 VA
- Ambient temperature: 14 to 122°F (-10 to 50°C)
- Complies with Standard EN 60730 and UL

- IEC Rated
- UL Recognized

Table 81: Catalog Numbers for IHP Time Switches

Type	Cycle Period	Min. Time Between Operations	No. of Channels	Voltage	Frequency	Battery	Max. No. of Switching Operations	Standards	Cat. No.
Programmable time switch (IHP)	7 days	1 min.	1	120 Vac ±10%	50/60 Hz	Yes	28 x 7	UL	15830
	7 days	1 min.	2	120 Vac ±10%	50/60 Hz	Yes	42 x 7	UL	15831

MULTI 9™ System Catalog

Section 6—Additional System Devices

KAEDRA™ WEATHERPROOF DIN TYPE ENCLOSURES

Applications

- Extension enclosure for service, industrial, or equipment applications
- Protects against water, dust, and chemical and atmospheric agents
- KAEDRA™ mini-enclosures are designed for small installations (3 to 12 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 solid and liquid bodies
- 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 (key-lock or insert). It complies with IEC 60439-3 Standards.

Construction

- Non-metallic (styrene) modern, 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.



Table 82: Catalog Numbers for KAEDRA™ Weatherproof Mini-Enclosures¹

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; 1 marking kit; Class II plugs

² Enclosure modules are 18 mm wide.

NOTE: The KAEDRA™ Weatherproof enclosures replace the MINI-PRAGMA™ enclosures.

MULTI 9™ System Catalog Section 6—Additional System Devices



KAEDRA™ Weatherproof Enclosure

Table 83: Catalog Numbers for KAEDRA™ Weatherproof Enclosures¹

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 84.

Table 84: 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

MULTI 9™ System Catalog
Section 6—Additional System Devices

MINI PRAGMA™ DIN TYPE ENCLOSURES

- Applications**
- Extension enclosure for individual and institutional housing
 - Sub-distribution enclosure in service sector buildings
 - Rated current: 63 A

- Standard Features**
- Material:
 - Insulating, self-extinguishing material
 - White color
 - Standards:
 - International IEC 439.3
 - French NF C61.910
 - Degree of protection:
 - IP 40 as per IEC 529
 - Mechanical impacts: IK 07 as per EN 50.102
 - Class 2: Total insulation
 - Behavior in fire and abnormal heat as in IEC 695.2.1 in accordance with ERP and IGH (high-rise building) regulations

Construction

Figure 33: Mini PRAGMA™ DIN Type Enclosures



Back with a central hole to simplify installation and two oblong holes for leveling. Punch-out holes on the top, bottom and back surfaces enable cable insertion throughout. Axis placed on the back/front panel parting line ensures easy, neat punch-outs using pliers.

- Metal rail centered at mid-height, and sufficiently far from the back to enable wire insertion
- Rigid, sealable, front panel
- Plain or transparent, rounded and flush door
- A key lock is optional

Table 85: Enclosures (one row with transparent door)

Number of 0.71 in. (18 mm) Modules	Dimensions (in./mm)			Cat. No.
	H	L	D	
4	7.91/201	4.41/112	3.70/94	13326
6	7.91/201	5.83/148	3.70/94	13327
8	7.91/201	7.24/184	3.70/94	13328
12	7.91/201	10.01/256	3.70/94	13329

Accessories

- Sloping terminal block support to simplify cable insertion and improve accessibility on clamping
- Terminal block equipped with guides to simplify cable introduction in tunnels
 - Four holes for 4- and 6-module enclosures:
(2) x 0.016 sq. in. (10 mm²) +
(2) x 0.025 sq. in. (16 mm²)
 - Eight holes for 8- and 12-module enclosures:
(4) x 0.016 sq. in. (10 mm²) +
(4) x 0.025 sq. in. (16 mm²)
- Built-in divisible blanking plate: Two modules
- Identification strip
- Four sealing plugs for wall fastening screws (required for Class 2)

Table 86: Mini PRAGMA Accessories

Accessory	Cat. No.
Sealing kit	13319
Key lock	14180
Extra terminal block for ground or neutral	13576
A strip of ten extra blanking plates dividable per module of 0.35 in. (9 mm)	13229

PRAGMA™ F DIN TYPE ENCLOSURES

Applications

- Indoor enclosures
- Creation of sub-distribution boards for small and medium service sector buildings (hotels, offices, shops) and switchboards for medium and large residential installations
- Switchboard rated current: 160 A

Standard Features

- Material: Metal back, ivory color
- Standards: International IEC 439.3, French NF C61.910
- Degree of protection against mechanical impacts as per IEC 529:
 - Enclosure without door: IP 30
 - Enclosure with door: IP 31D
 - Degree of protection against mechanical shocks as in EN 50 102: IK 08
- Insulation:
 - Class 1: Standard
 - Class 2: Total insulation
 - Fire and abnormal heat withstand in accordance with regulations for buildings open to the public (BOP) and high-rise buildings (HRB)

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Construction

Figure 34: PRAGMA™ F DIN Type Enclosures



- Metal back (fully insulated for Class 2 enclosures), with removable chassis
- One insulated front panel frame
- Insulated modular front plates
- Insulated plates with knockouts

Accessories Included

- One ground/neutral (2) 30-hole terminal blocks:
 - (14) x 0.016 in. sq. (10 mm²) +
 - (15) x 0.025 in. sq. (16 mm²) +
 - (1) x 0.054 in. sq. (35 mm²)
- Terminal block equipped with guides to simplify cable introduction in tunnels
- Eight module divisible blanking plates:
 - Two blanking plates for one, two and three row enclosures
 - Four blanking plates for four, five and six row enclosures
- Label with protective cover for each row

Table 87: PRAGMA™ F Type Enclosures

Rows	Number of Modules ¹	Dimensions (in./mm)			Cat. No.
		H	W	D	
1	24	11.81/300	21.65/550	6.69/170	13811
2	48	17.72/450	21.65/550	6.69/170	13812
3	72	23.62/600	21.65/550	6.69/170	13813
4	96	29.53/750	21.65/550	6.69/170	13814
5	120	35.43/900	21.65/550	6.69/170	13815
6	144	41.34/1050	21.65/550	6.69/170	13816
Blanking Plate for PRAGMA F Type Enclosures (17 in./430 mm)					13430

¹ Enclosure modules are 18 mm wide.

SECTION 7— DIMENSIONS

UL 489 LISTED C60 CIRCUIT BREAKERS

Figure 35: UL 489 C60 Circuit Breaker with Box Lug Terminals (AC or DC)

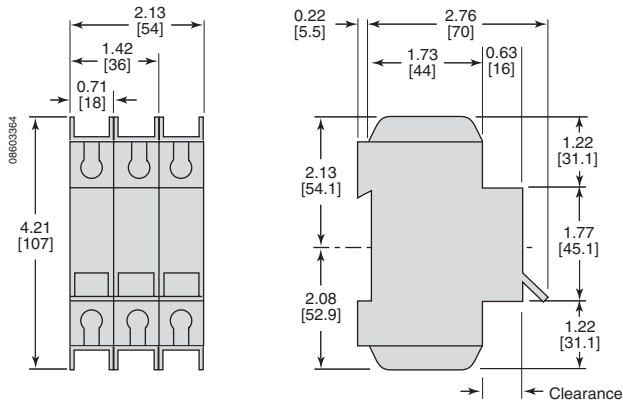
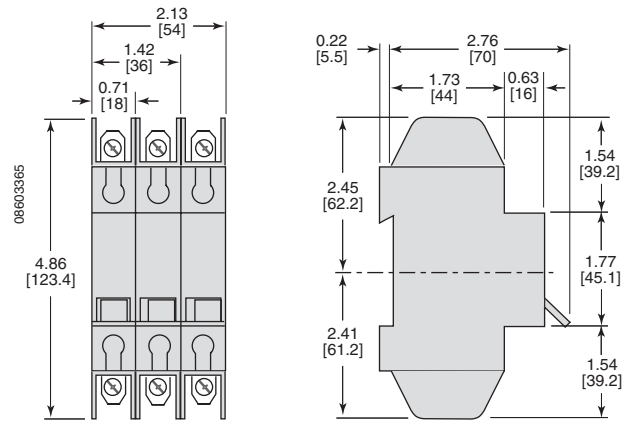
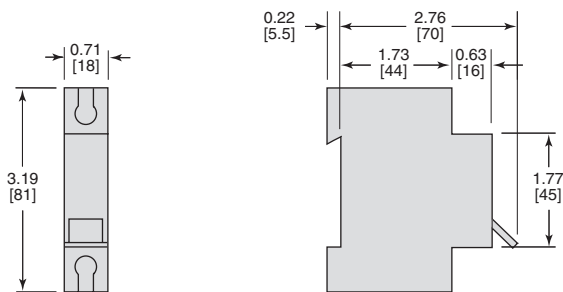


Figure 36: UL 489 C60 Circuit Breaker with Ring Tongue Terminals



UL 489A LISTED CIRCUIT BREAKERS FOR DC TELECOM APPLICATIONS

Figure 37: UL 489A Listed C60 Circuit Breakers for DC Applications



Dimensions: in.
[mm]

MULTI 9™ System Catalog
Section 7—Dimensions

UL RECOGNIZED SUPPLEMENTARY PROTECTORS AND IEC RATED CIRCUIT BREAKERS

Figure 38: C60 Supplementary Protectors and Circuit Breakers

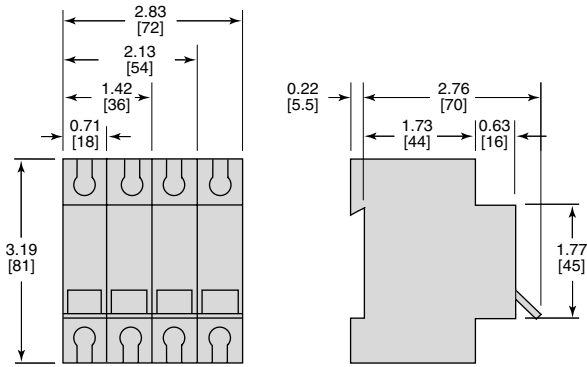


Figure 39: NC100 Supplementary Protectors and Circuit Breakers

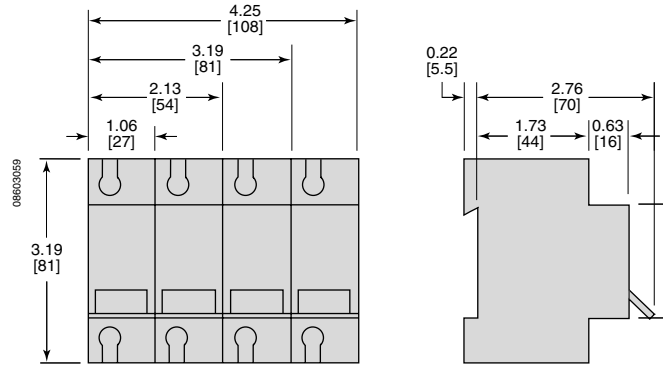


Figure 40: DPN-N Circuit Breaker

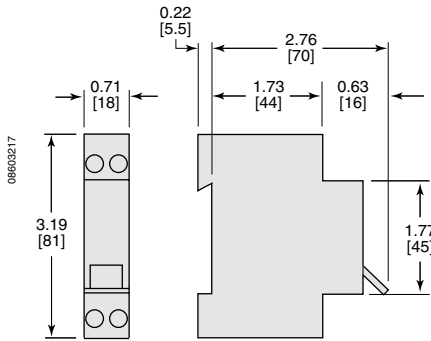
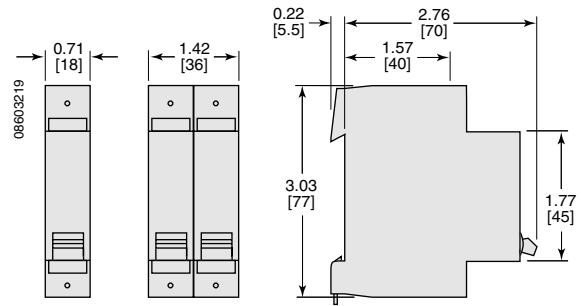


Figure 41: C32H-DC Circuit Breaker



Dimensions: in.
[mm]

IEC RATED GROUND-FAULT PRODUCTS

Figure 42: ID Residual Current Switch

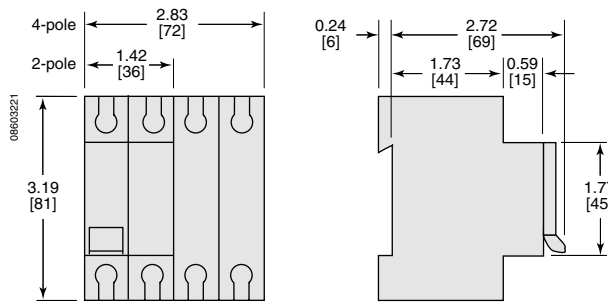


Figure 43: VIGI Ground-fault Module for C60 Devices

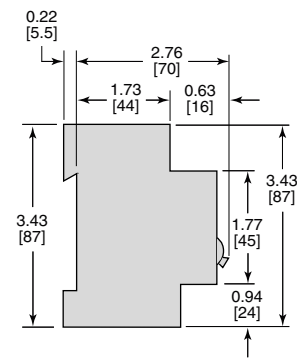
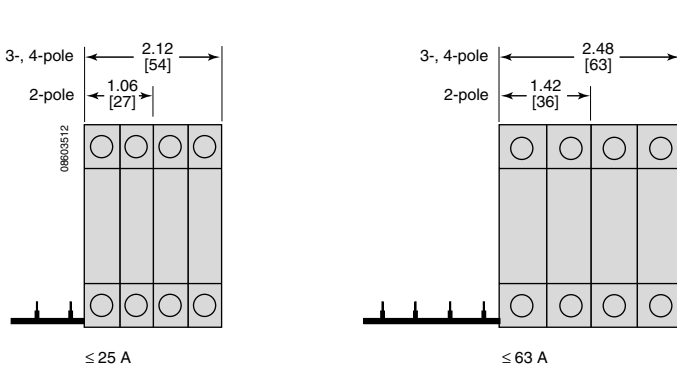


Figure 44: NC100 VIGI Ground-fault Module

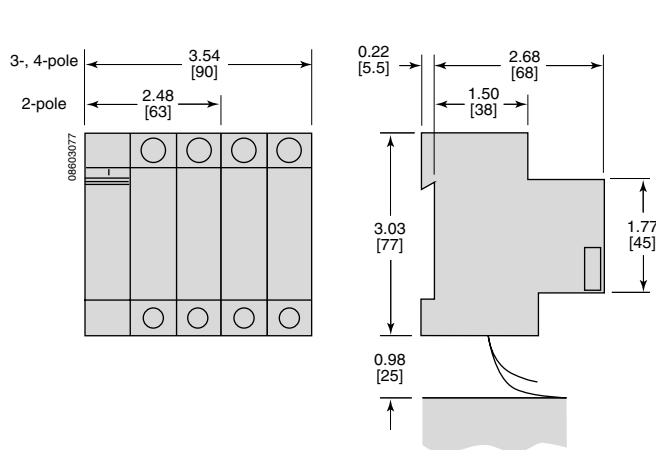
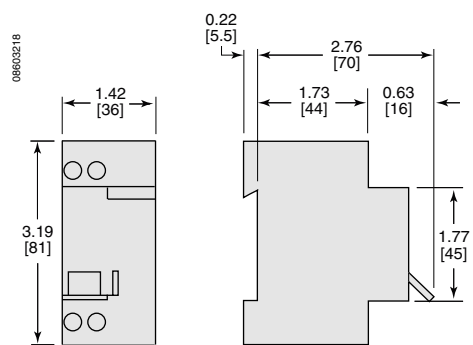


Figure 45: DPN-N VIGI Residual Current Circuit Breaker



Dimensions: in.
[mm]

MULTI 9™ System Catalog
Section 7—Dimensions

ACCESSORY DIMENSIONS

Figure 46: OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release and MX + OF Shunt Trip with Auxiliary Switch (C60)

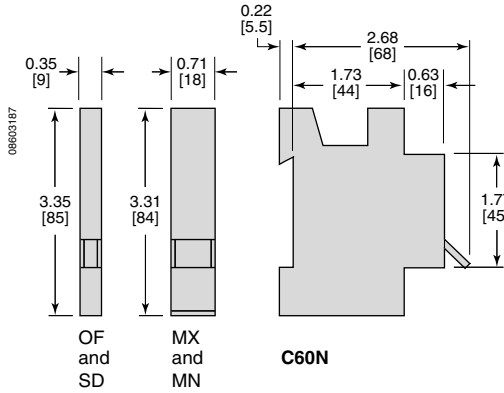


Figure 47: OF Auxiliary Switch, SD Alarm Switch, MN Undervoltage Release and MX + OF Shunt Trip with Auxiliary Switch (NC100)

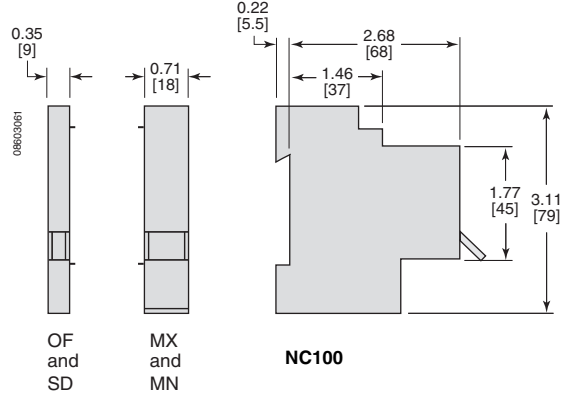


Figure 48: TM Motor Operator for C60 Devices

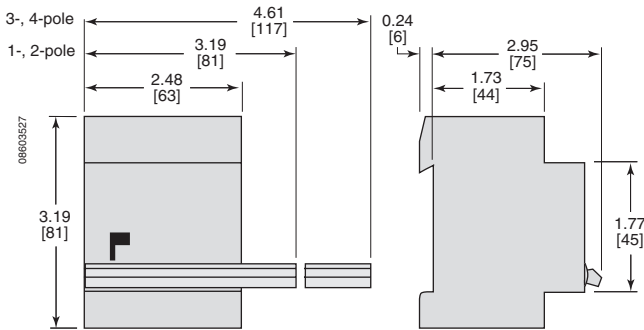


Figure 49: Spacer for C60 and NC100 Devices

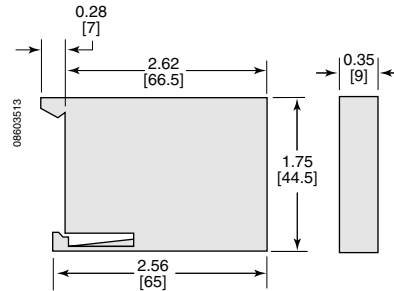
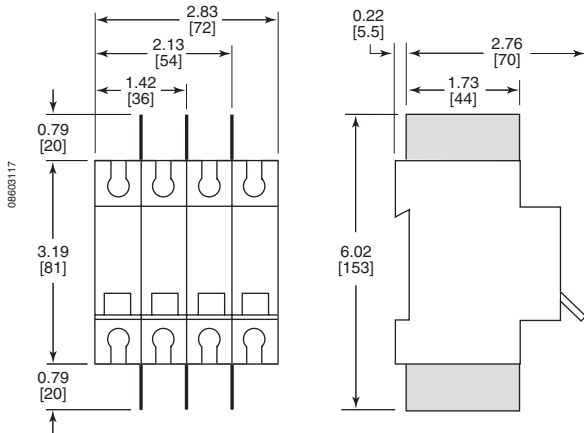


Figure 50: Interphase Barriers for C60 Devices



Dimensions: in.
[mm]

Figure 51: Terminal Screw Shield for C60 Devices

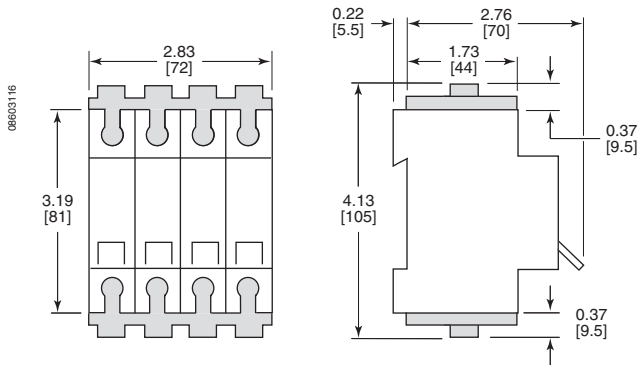


Figure 52: Terminal Screw Shield for NC100 Devices

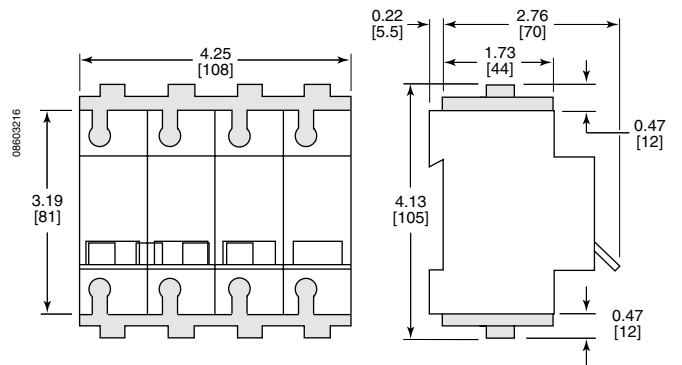


Figure 53: Terminal Cover for C60 Devices

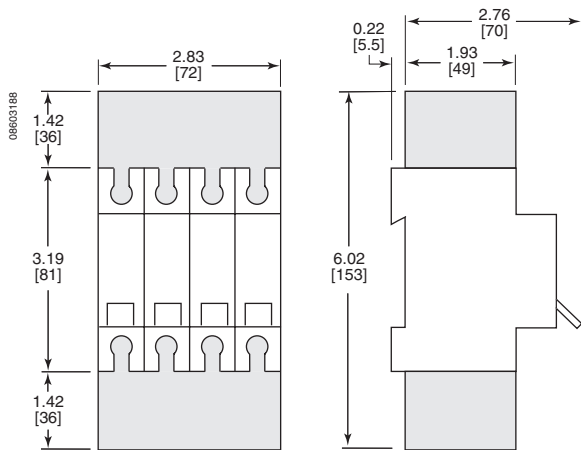


Figure 54: Terminal Cover for NC100 Devices

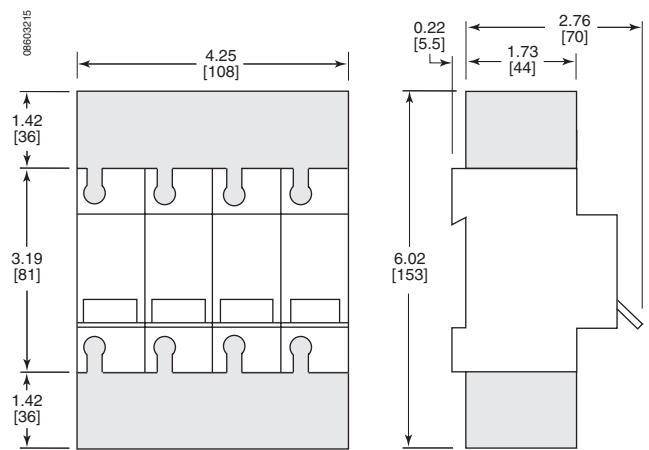
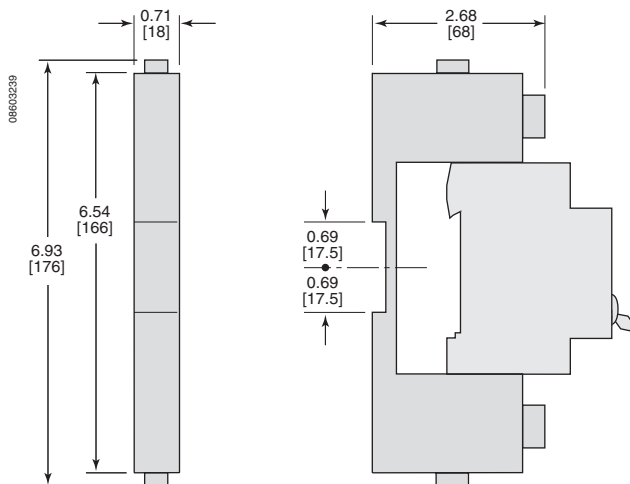


Figure 55: Plug-in Base for C60 Devices



Dimensions: in.
[mm]

MULTI 9™ System Catalog

Section 7—Dimensions

Figure 56: Front Mounting Bracket Kit

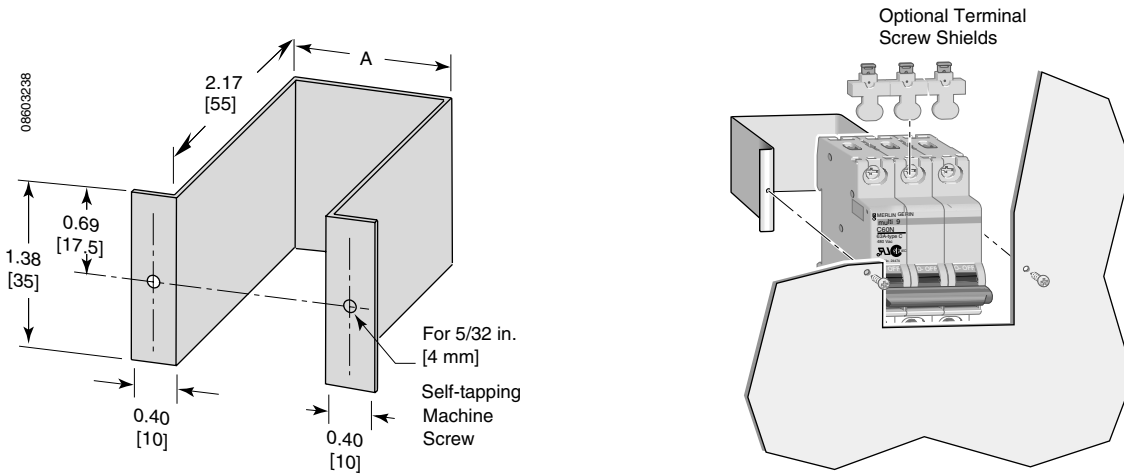
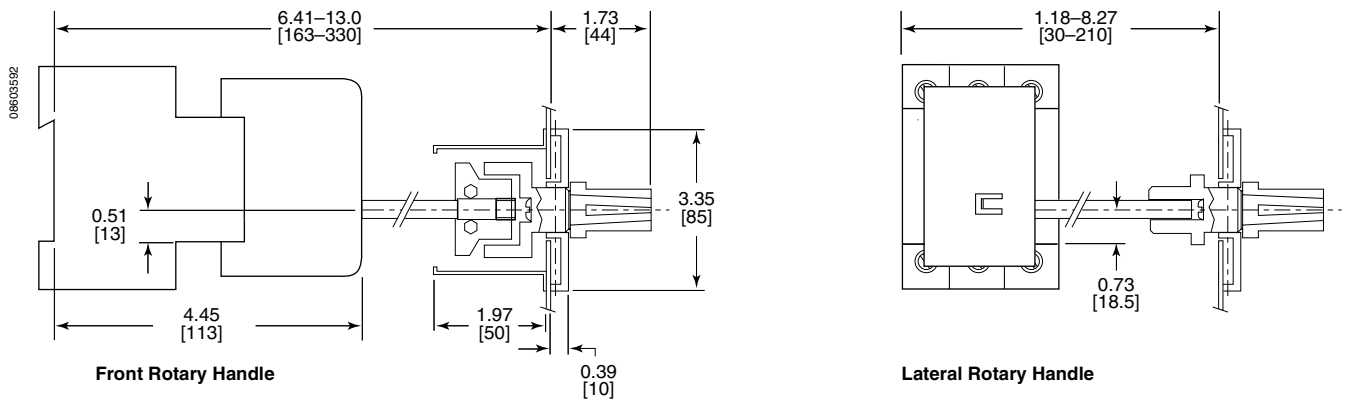


Table 88: Front Mounting Bracket (Dimension A)

No. of Poles	Bracket for 18 mm/pole (C60)		Bracket for 27 mm/pole (NC100)	
	in.	mm	in.	mm
1	0.75	19	1.10	28
2	1.46	37	2.16	55
3	2.32	55	3.23	82
4	2.87	73	4.29	109

Figure 57: Rotary Handle for C60 Devices



Dimensions: in.
[mm]

Figure 58: MSC Chassis for C60 Devices

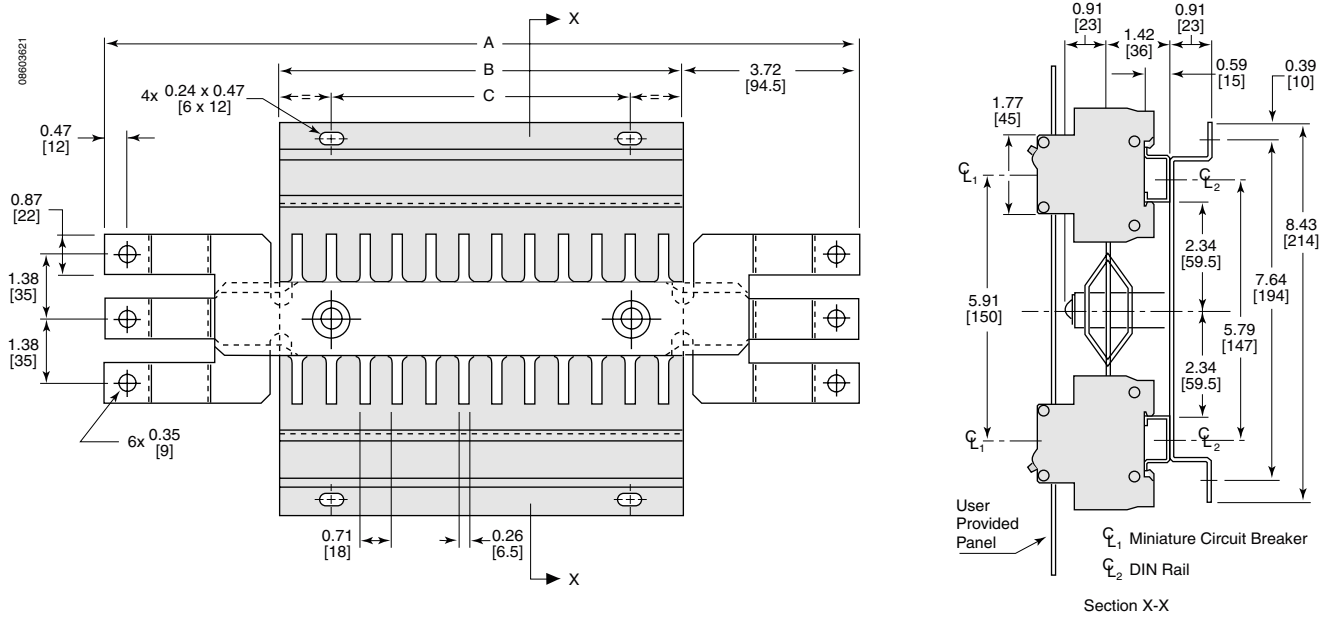
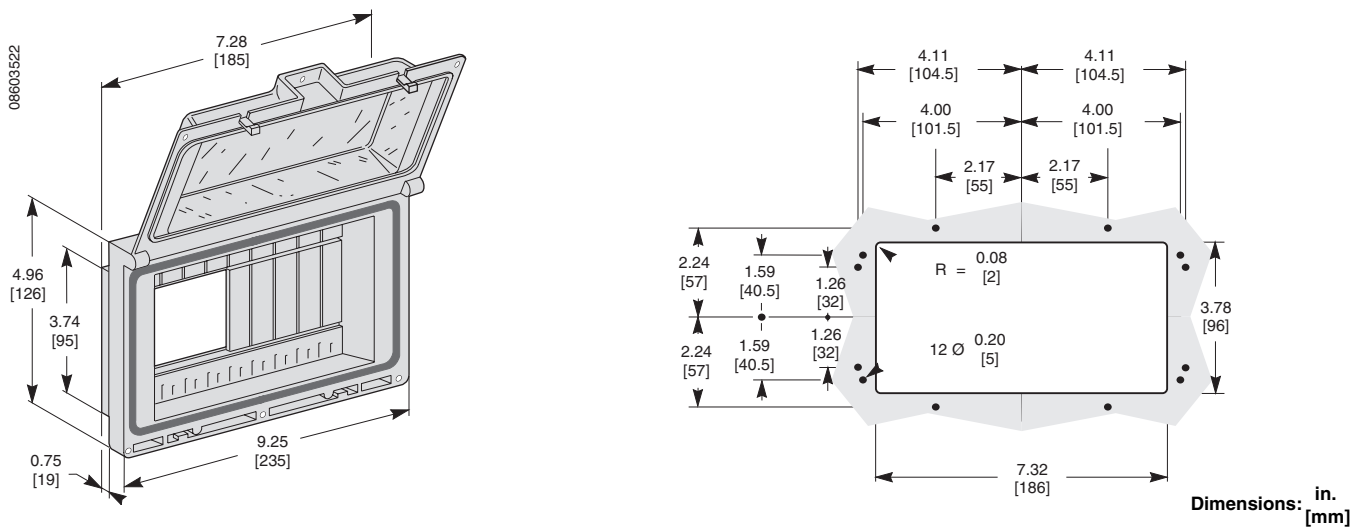


Table 89: MSC Chassis for C60 Devices

Type	No. of Poles	Dimensions					
		A		B		C	
		in.	mm	in.	mm	in.	mm
MSC DC	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	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	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

Figure 59: Multi-pole Front Mounting Kit for C60 and NC100 Devices



MULTI 9™ System Catalog

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Figure 60: M9PF4 Pole Filler

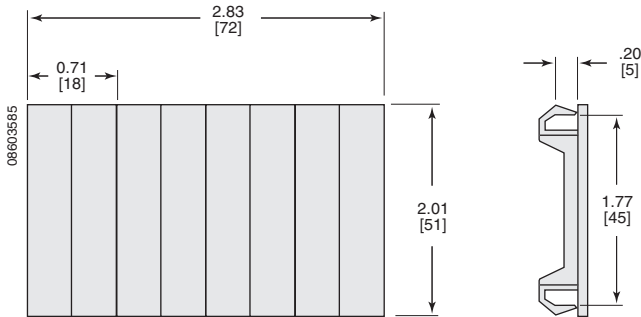


Figure 61: SPD Surge Protectors

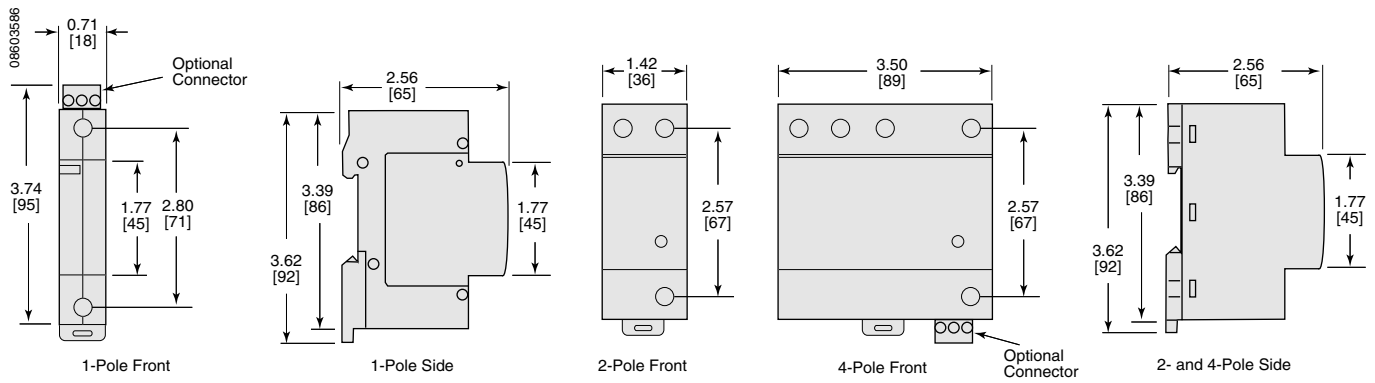
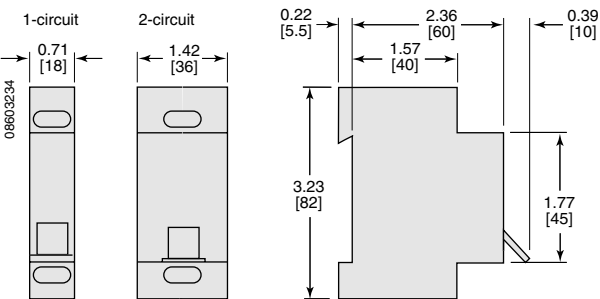


Figure 62: CM Switches



Dimensions: in.
[mm]

Figure 63: I Switch (20–32 A)

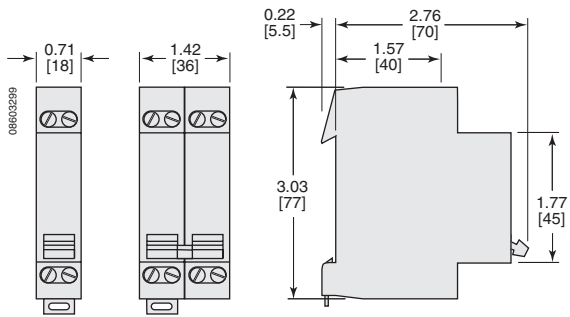


Figure 64: I Switch (40–125 A)

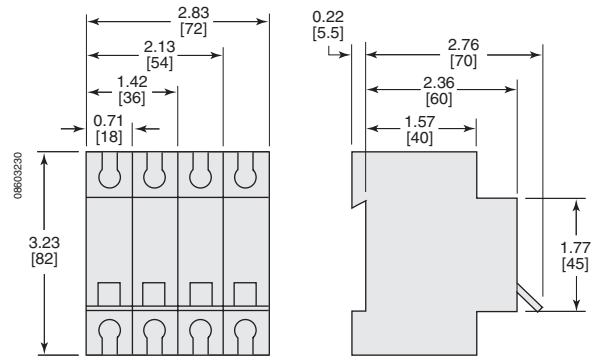


Figure 65: V Signal Lamps

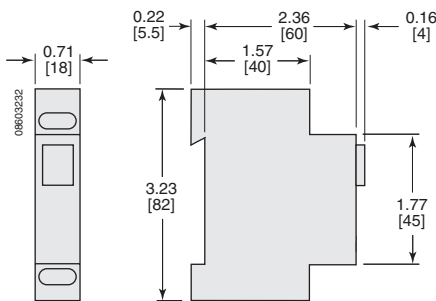


Figure 66: BP Push Buttons

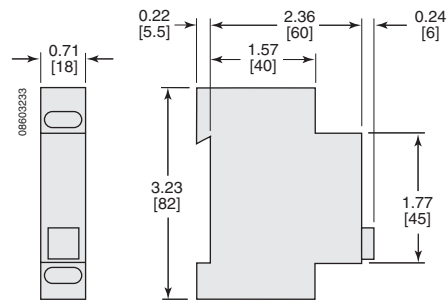


Figure 67: CH Hour Counter

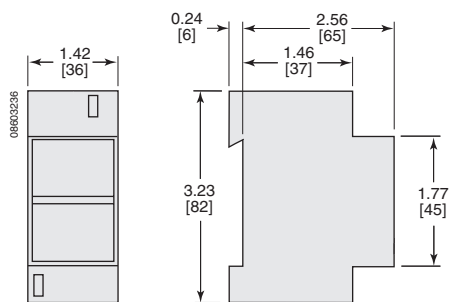


Figure 68: CI Impulse Counter

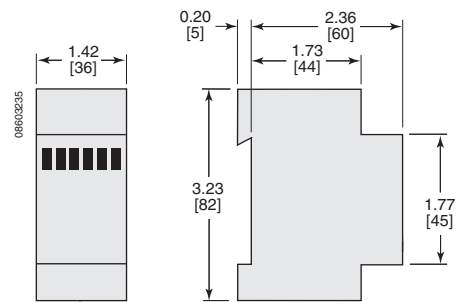
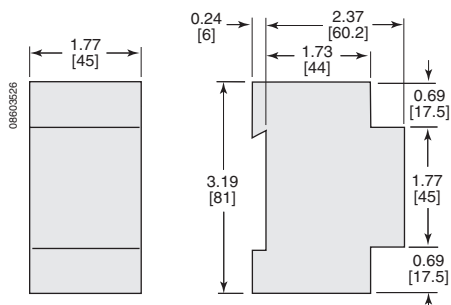


Figure 69: IHP Time Switch



Dimensions: in.
[mm]

MULTI 9™ System Catalog
Section 7—Dimensions

KAEDRA™ WEATHERPROOF MINI-ENCLOSURE DIMENSIONS

Table 90: KAEDRA™ Weatherproof Mini-Enclosure Dimensions

No. of Modules	A		L		H		Weight		Cat. No.
	in	mm	in	mm	in	mm	lbs	grams	
3	—	—	4.1	105	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	3.5	88	7.7	195	7.9	200	1.76	800	13959
12	6.3	160	10.5	267	7.9	200	1.98	900	13960

Figure 70: KAEDRA™ Weatherproof Mini-Enclosures

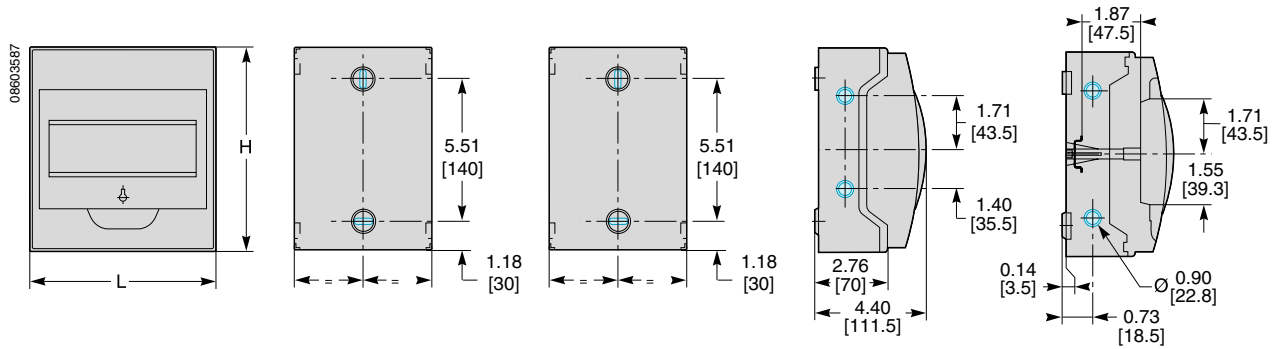
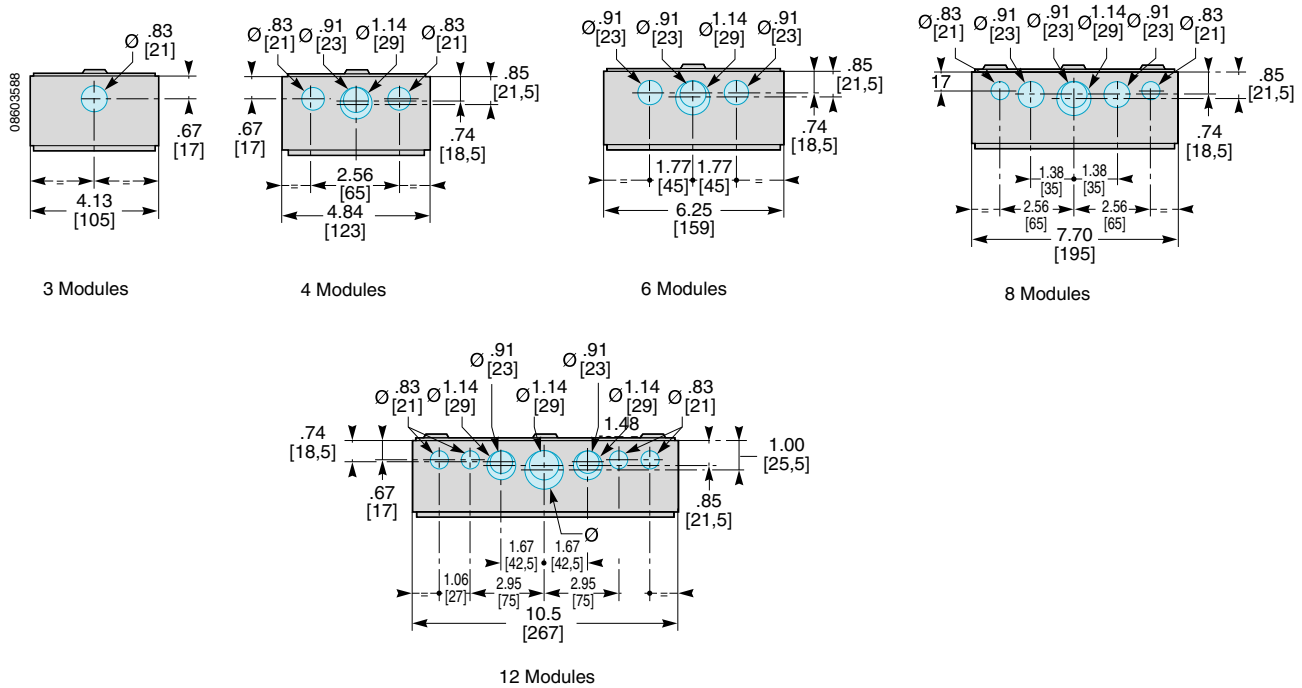


Figure 71: Top View for KAEDRA™ Weatherproof Type Mini Enclosures



Dimensions: in.
[mm]

KAEDRA™ WEATHERPROOF ENCLOSURES

Table 91: 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 72: KAEDRA™ Weatherproof Type Enclosures (12 Module)

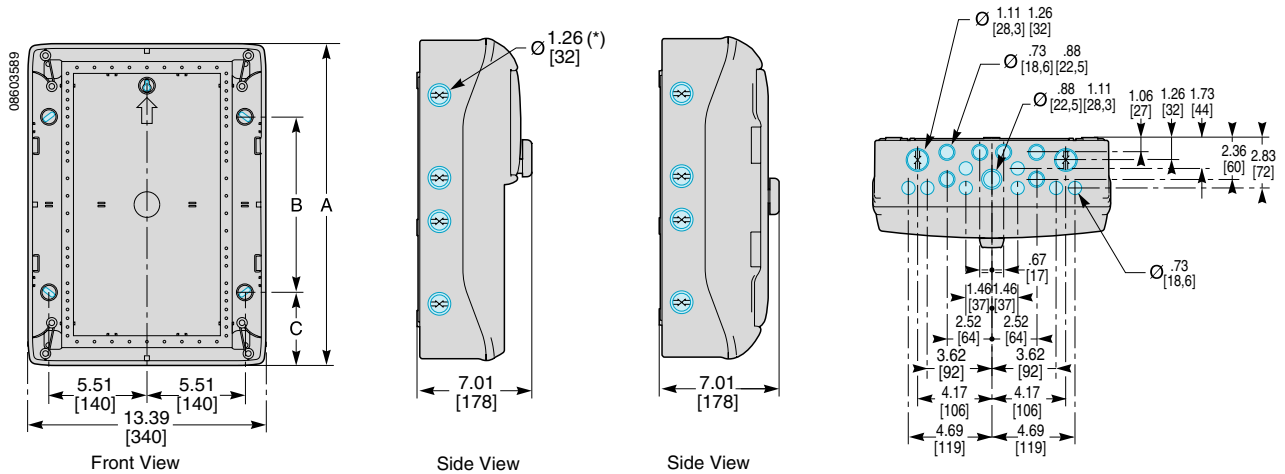
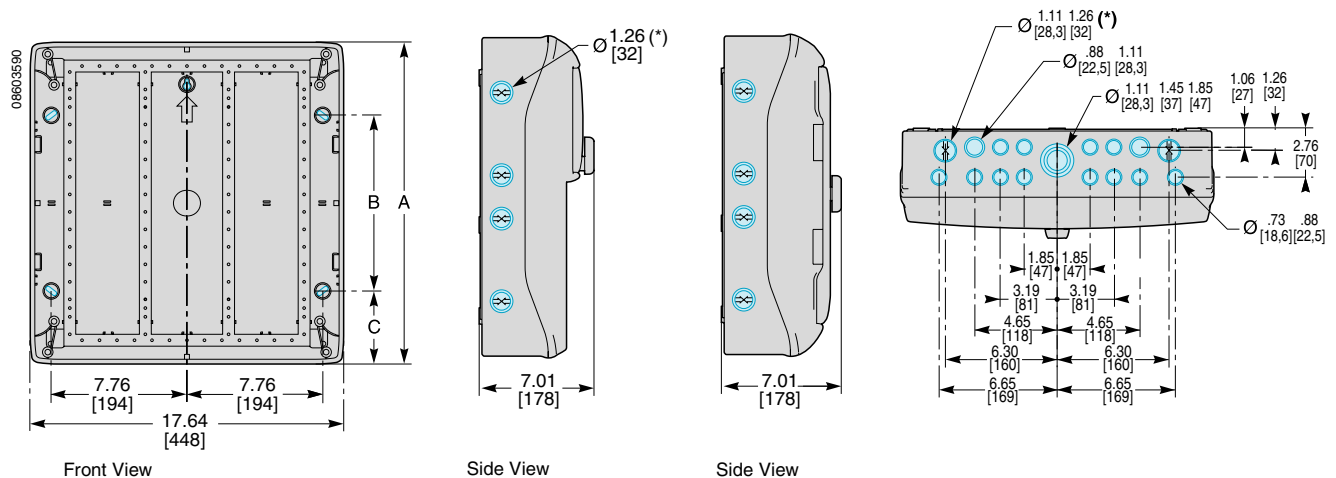


Table 92: KAEDRA™ Weatherproof Enclosure Dimensions (18 Module)

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 73: KAEDRA™ Weatherproof Type Enclosures (18 Module)



Dimensions: in.
[mm]

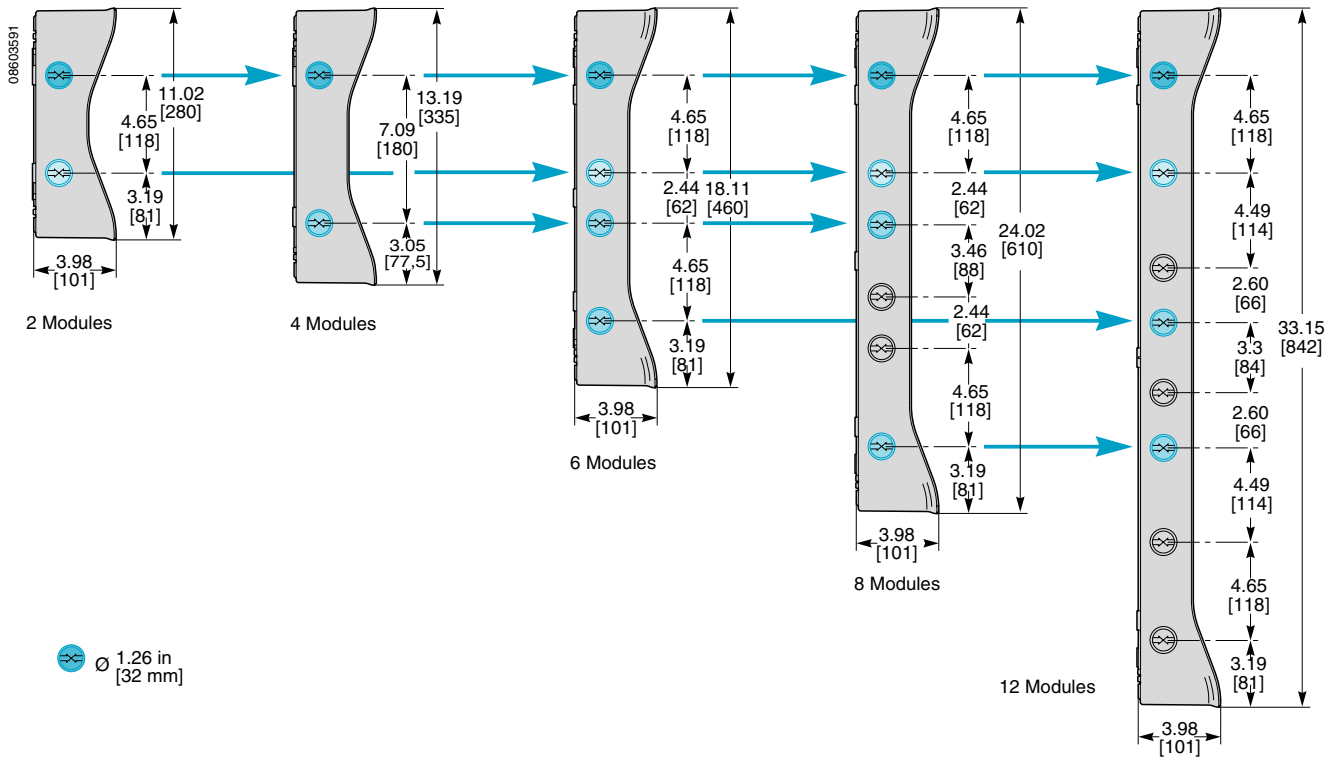
MULTI 9™ System Catalog

Section 7—Dimensions

Table 93: 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 74: KAEDRA™ Horizontal References



Dimensions: in.
[mm]

MINI-PRAGMA™ DIN TYPE ENCLOSURE DIMENSIONS

Figure 75: Front View, Side View and Rail Position for MINI-PRAGMA™ DIN Type Enclosures

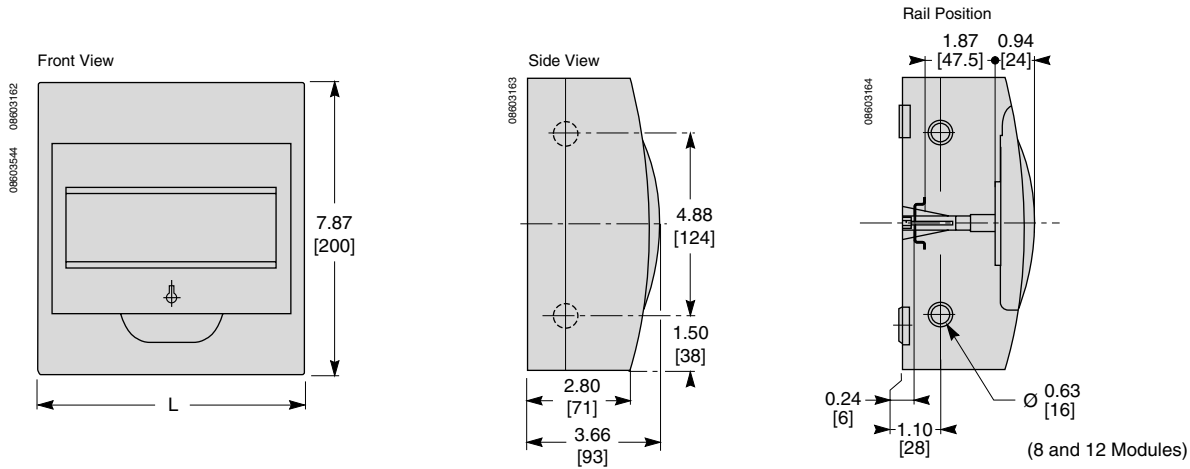


Figure 76: Wall Mounting for MINI-PRAGMA™ DIN Type Enclosures

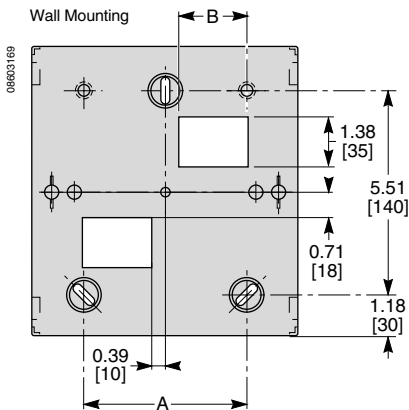
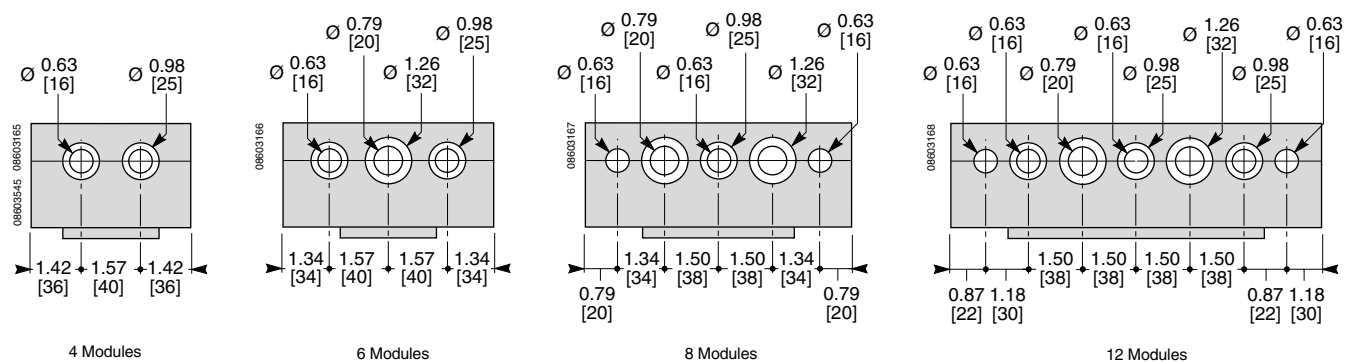


Table 94: Enclosure Dimensions (in./mm)

No. of Modules	A		B		L	
	in.	mm	in.	mm	in.	mm
34	—	—	0.8	20	4.4	112
6	—	—	1.4	35	5.8	148
8	3.5	88	2.0	50	7.2	184
12	6.3	160	3.0	75	10.1	256

Figure 77: Top Views for MINI-PRAGMA™ DIN Type Enclosures



Dimensions: in.
[mm]

MULTI 9™ System Catalog
Section 7—Dimensions

PRAGMA™ F DIN TYPE ENCLOSURES

Figure 78: Surface Mounting Enclosures

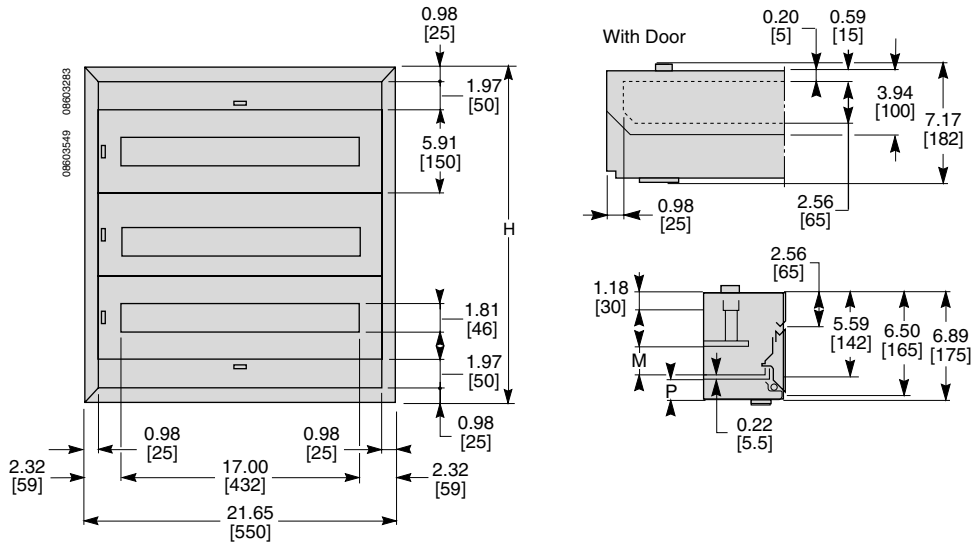


Table 3: Enclosure Dimensions

Dimension		Length	
		in	mm
M	Min.	1.85	47
	Max.	3.82	97
P	Plain door	1.10	28
	Transparent door	1.30	33

Dimensions: in.
[mm]

SECTION 8— TIME/CURRENT CURVES

UL 489 LISTED CIRCUIT BREAKERS¹

Figure 79: UL Listed C60N—C Curve (0.5–35 A) AC & DC

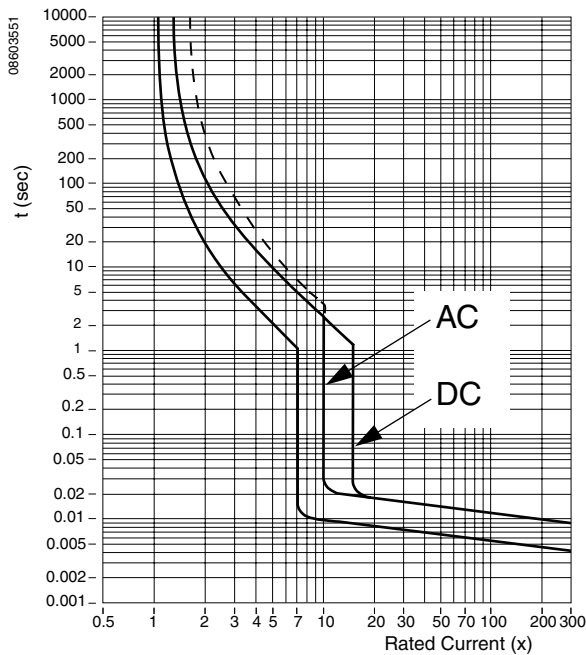
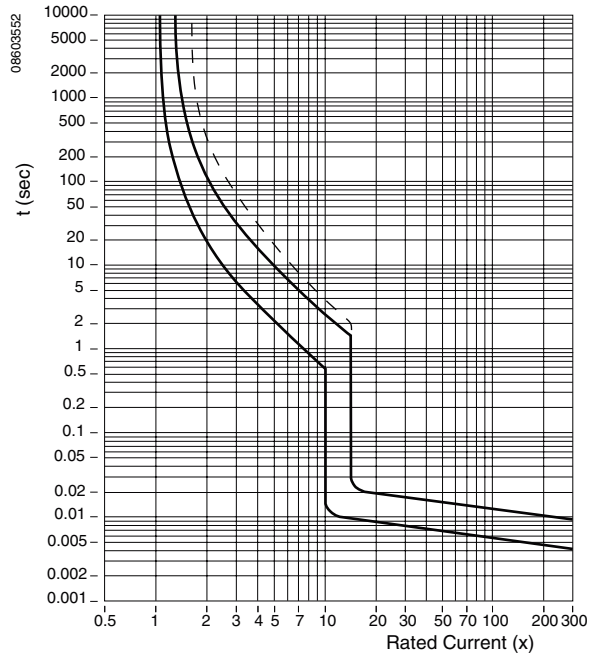
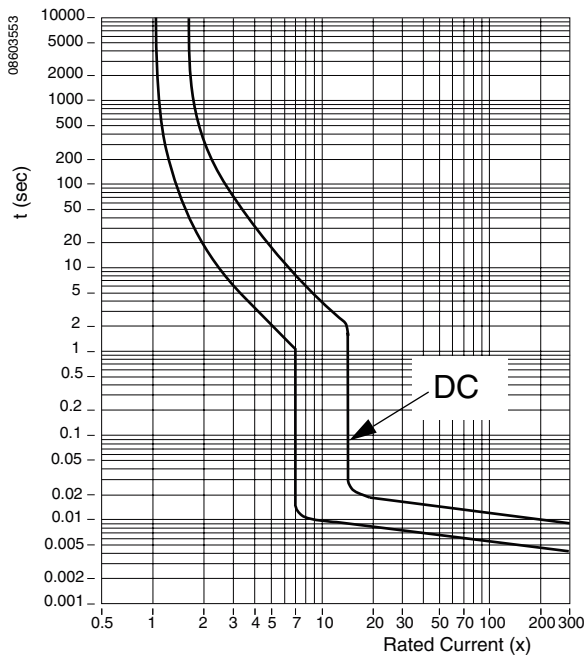


Figure 80: UL Listed C60N—D Curve (0.5–35 A)



UL 489A LISTED CIRCUIT BREAKERS

Figure 81: UL Listed C60N—C Curve (0.5–63 A) AC & DC



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

UL 1077 RECOGNIZED SUPPLEMENTARY PROTECTORS¹

Figure 82: UL Recognized C60N—B Curve (1–63 A)

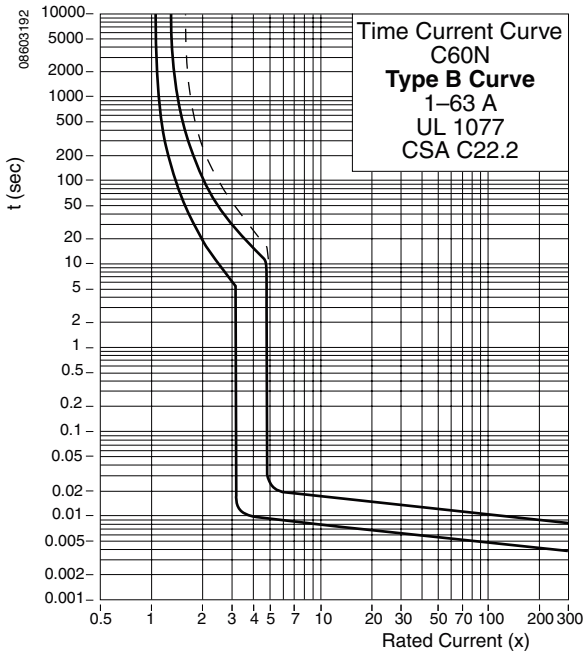


Figure 83: UL Recognized C60N—C Curve (1–63 A)

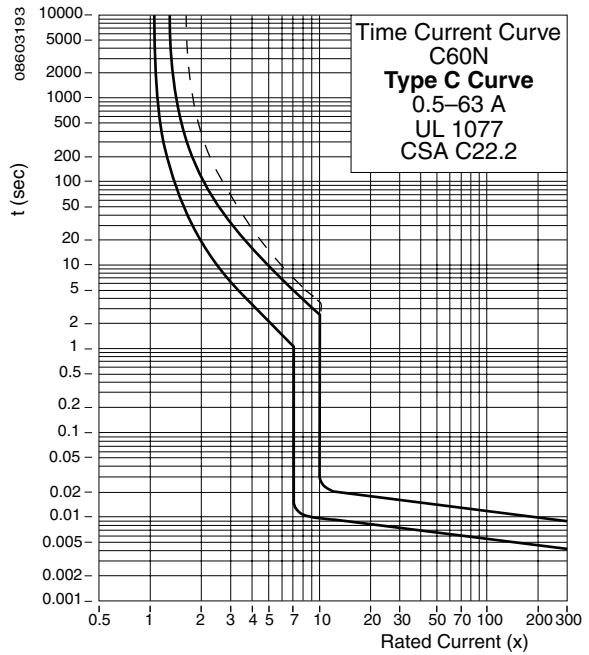
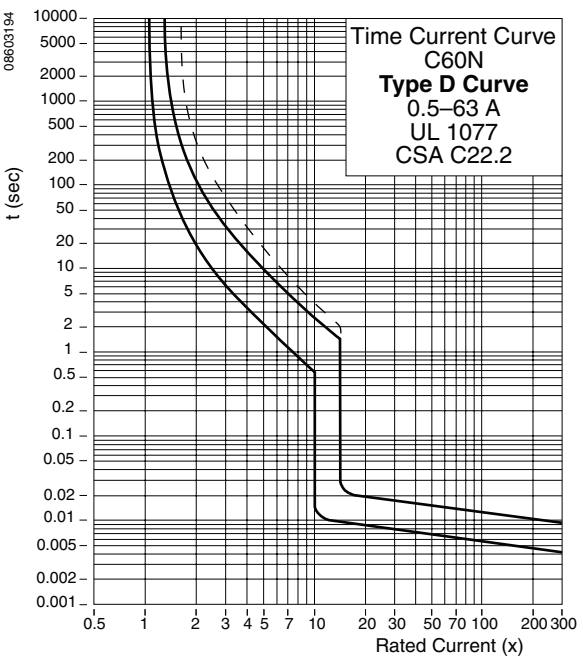


Figure 84: UL Recognized C60N—D Curve (1–63 A)



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

Figure 85: UL Recognized NC100—B Curve (50–80 A)

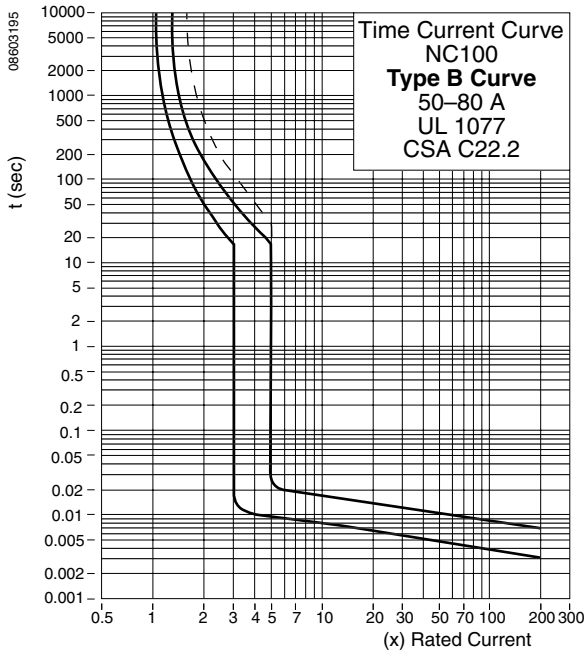


Figure 86: UL Recognized NC100—C Curve (10–40 A)

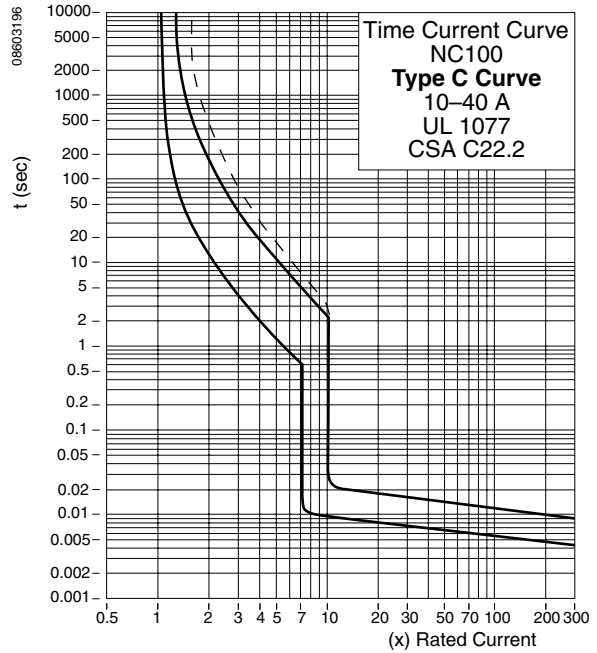


Figure 87: UL Recognized NC100—C Curve (50–80 A)

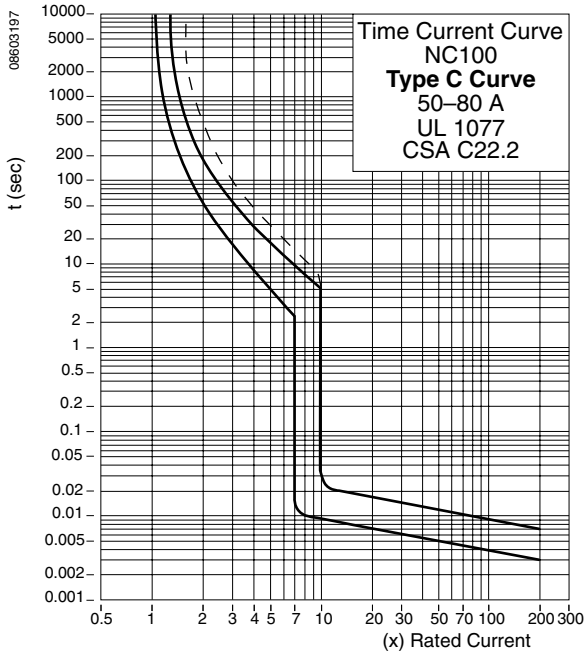
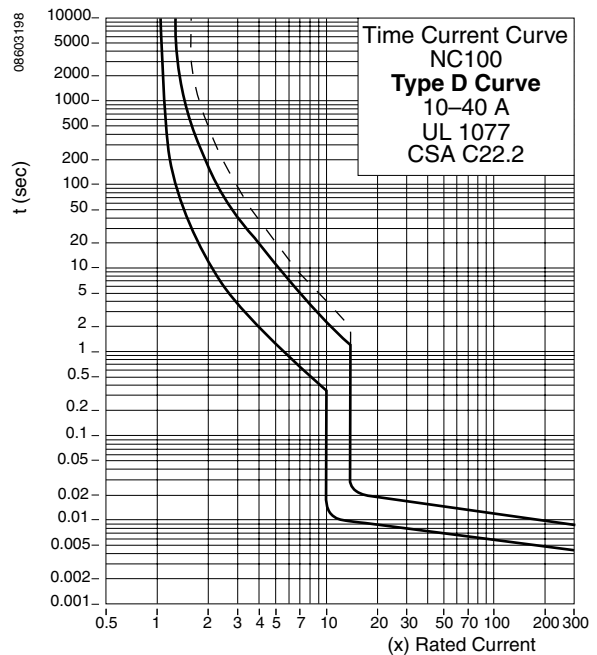


Figure 88: UL Recognized NC100—D Curve (10–40 A)



NOTE: The above time/current curves show the cold thermal tripping limits when the poles are charged and show the electromagnetic tripping limits with two charged poles.

IEC 60947-2 RATED DPN-N AND DPN-N VIGI CIRCUIT BREAKERS

Figure 89: IEC Rated DPN-N—B Curve

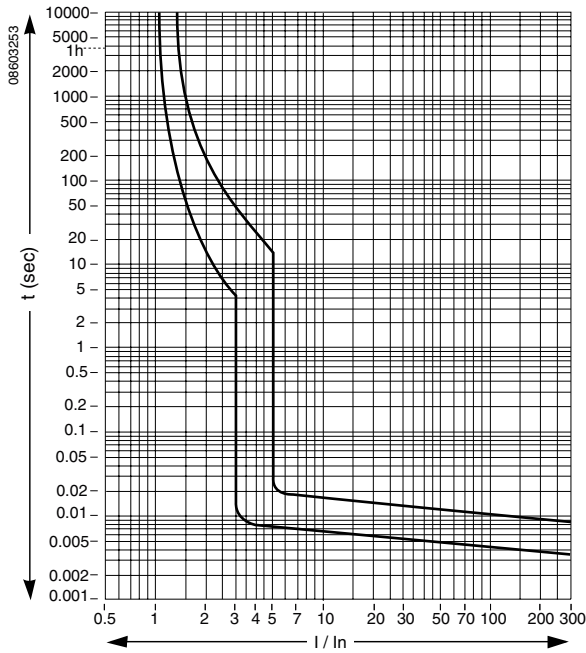
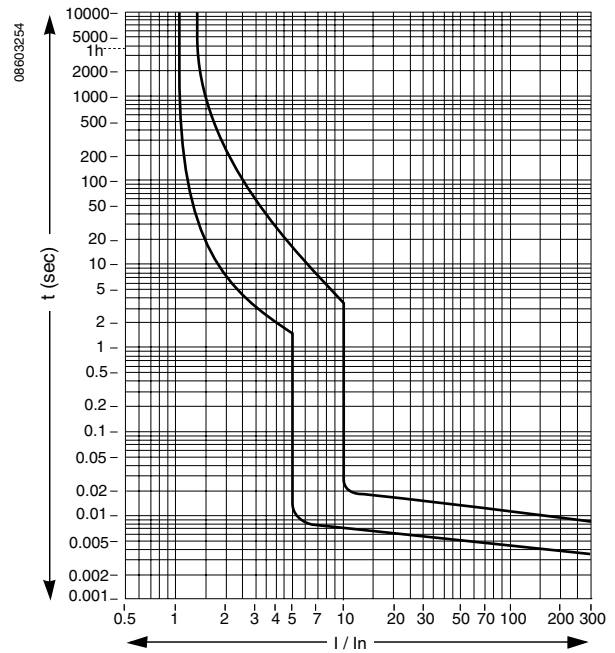


Figure 90: IEC Rated DPN-N—C Curve



IEC 60947-2 RATED CIRCUIT BREAKERS

Figure 91: IEC Rated C60N/H/L—B Curve

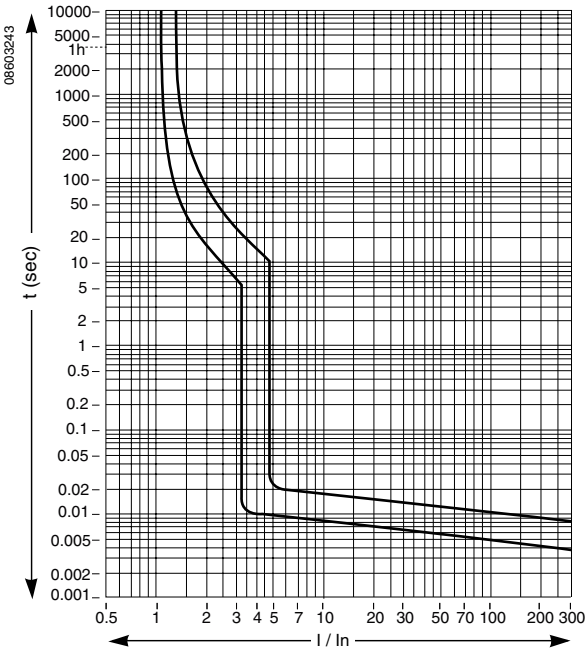
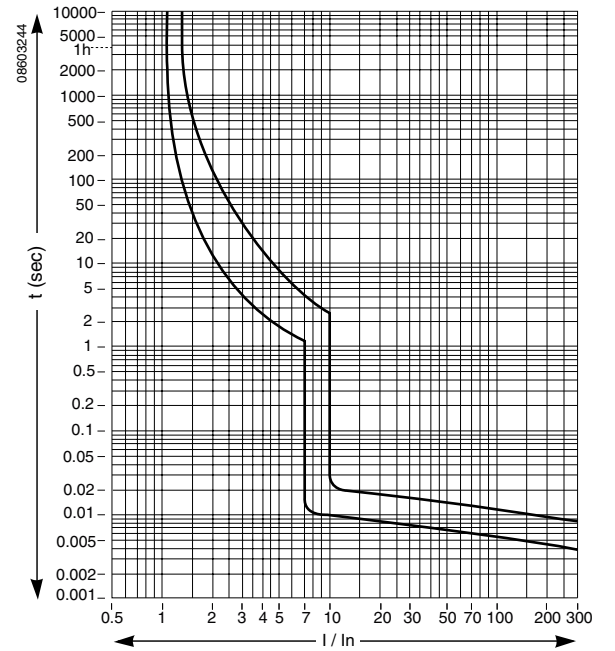


Figure 92: IEC Rated C60N/H/L—C Curve



NOTE: The above time/current curves show the cold thermal tripping limits when the poles are charged and show the electromagnetic tripping limits with two charged poles.

Figure 93: IEC Rated C60N/H—D Curve

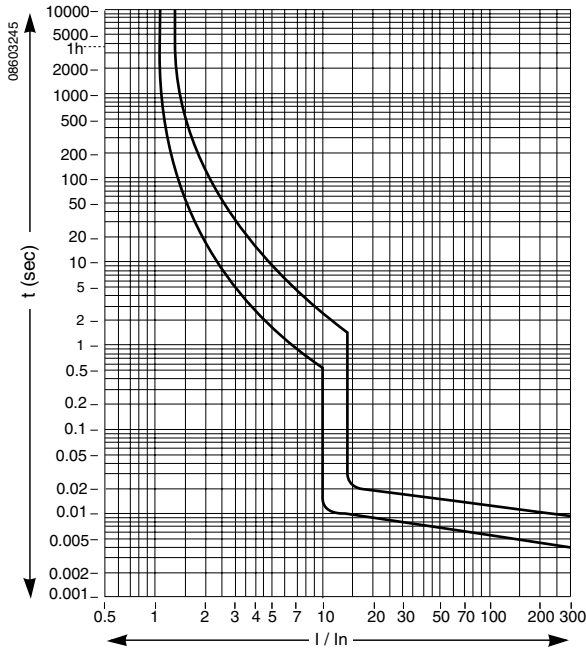


Figure 94: IEC Rated C60L—K Curve

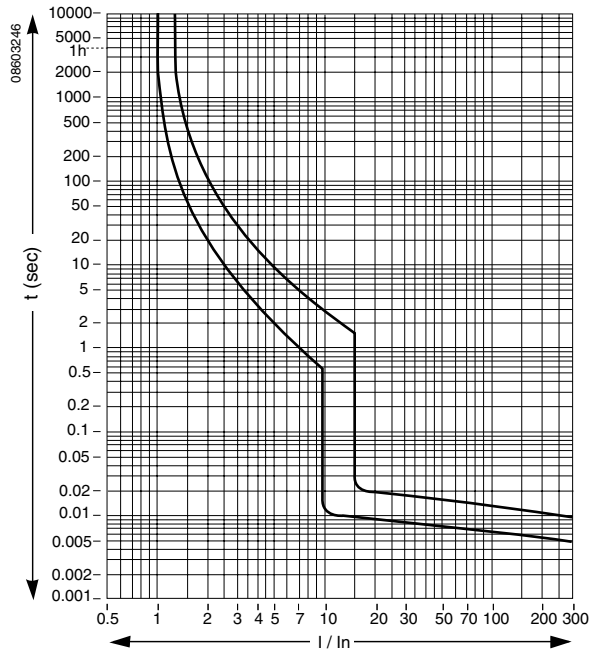


Figure 95: IEC Rated C60L—MA—MA Curve

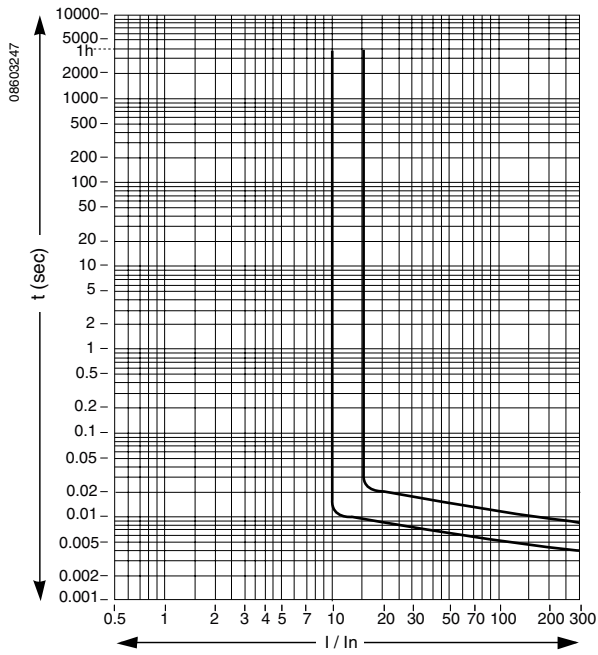
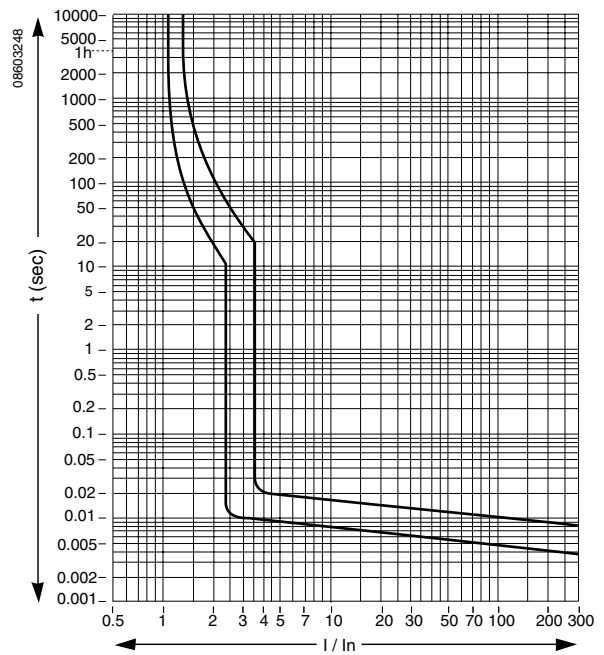


Figure 96: IEC Rated C60L—Z Curve



NOTE: The above time/current curves show the cold thermal tripping limits when the poles are charged and show the electromagnetic tripping limits with two charged poles.

MULTI 9™ System Catalog
Section 8—Time/Current Curves

Figure 97: IEC Rated NC100—B Curve

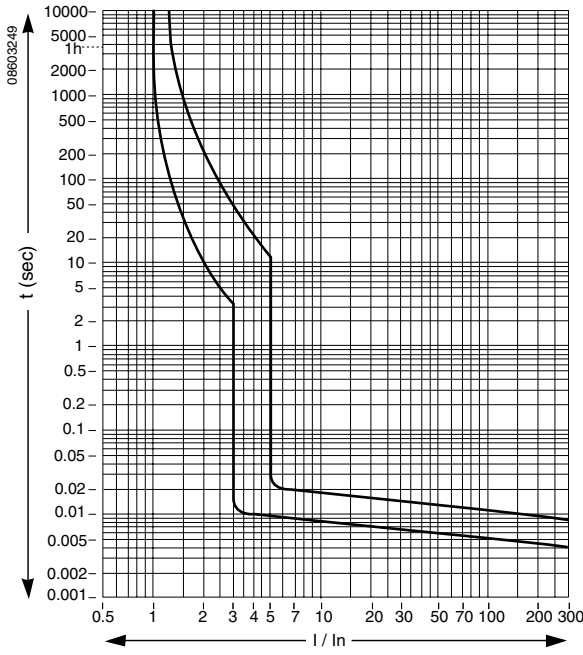


Figure 98: IEC Rated NC100—C Curve

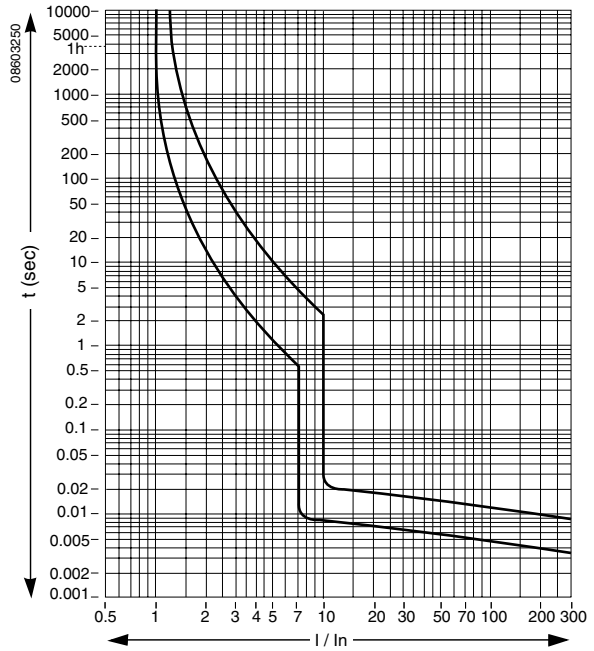
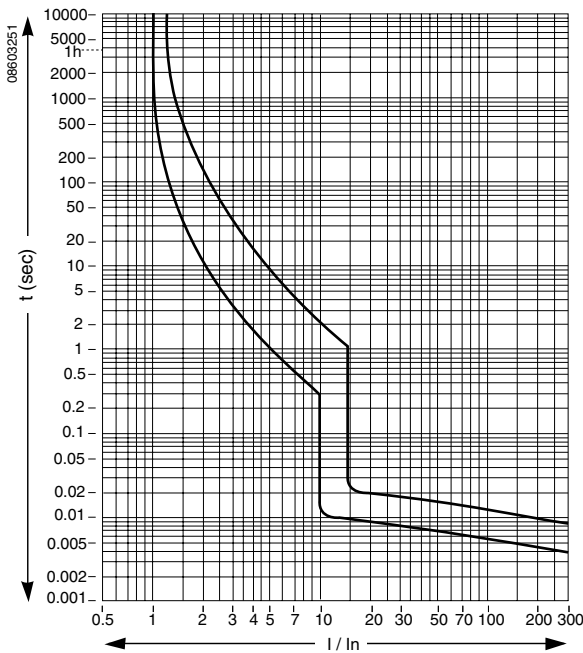


Figure 99: IEC Rated NC100—D Curve



NOTE: The above time/current curves show the cold thermal tripping limits when the poles are charged and show the electromagnetic tripping limits with two charged poles.

SECTION 9—CURRENT LIMITING CURVES

UL LISTED AND UL RECOGNIZED SUPPLEMENTARY PROTECTORS

Figure 100: UL 489/489A Listed and UL 1077 Recognized C60N 1-pole (240 Vac) Max Let-through Peak Current

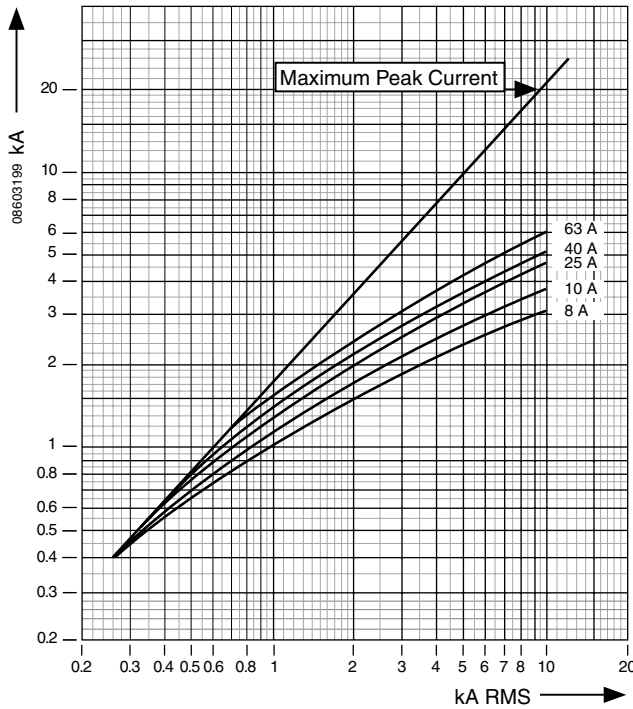


Figure 101: UL 489 Listed and UL 1077 Recognized C60N 2-, 3-, and 4-pole (240 Vac) Max Let-through Peak Current

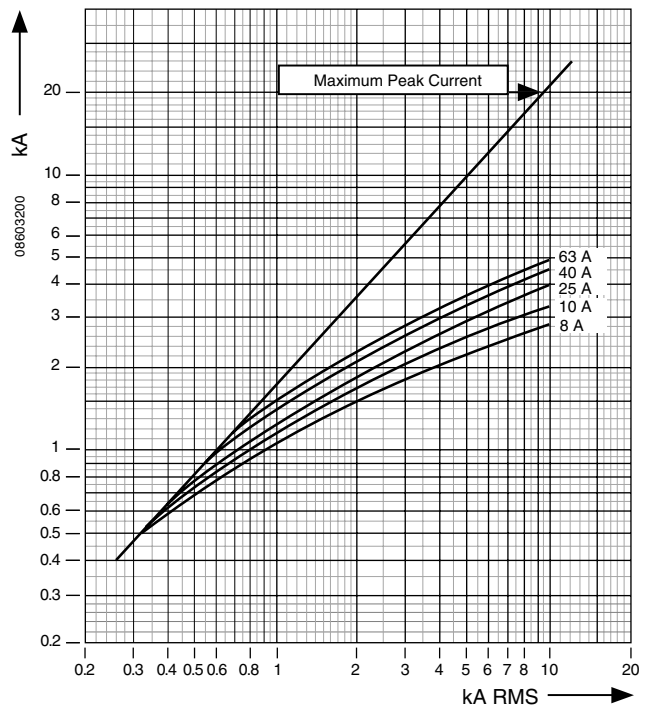


Figure 102: UL 489/489A Listed and UL 1077 Recognized C60N 1-pole (240 Vac) Max Let-through Peak

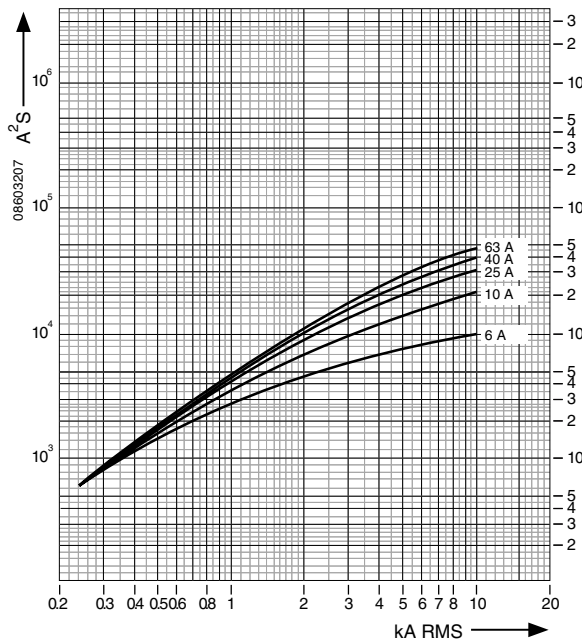
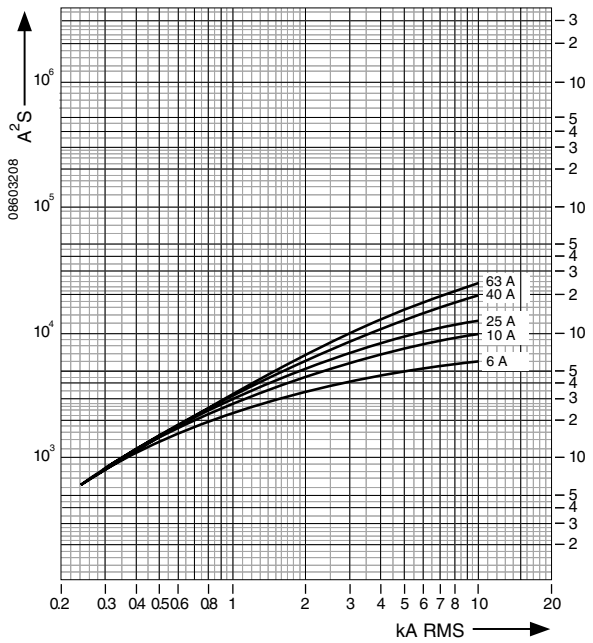


Figure 103: UL 489 Listed and UL 1077 Recognized C60N 2-, 3-, and 4-pole (240 Vac) Max Let-through Peak Current



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Figure 104: UL 489 Listed and UL 1077 Recognized C60 1-pole (277 Vac) Maximum Let-through Peak Current

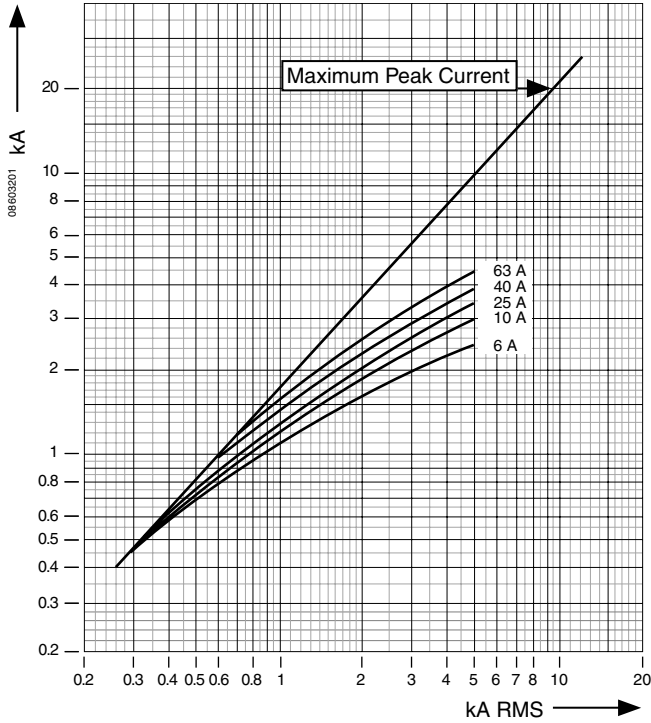


Figure 105: UL 1077 Recognized C60 2-, 3-, and 4-pole (480Y/277 Vac) Maximum Let-through Peak Current

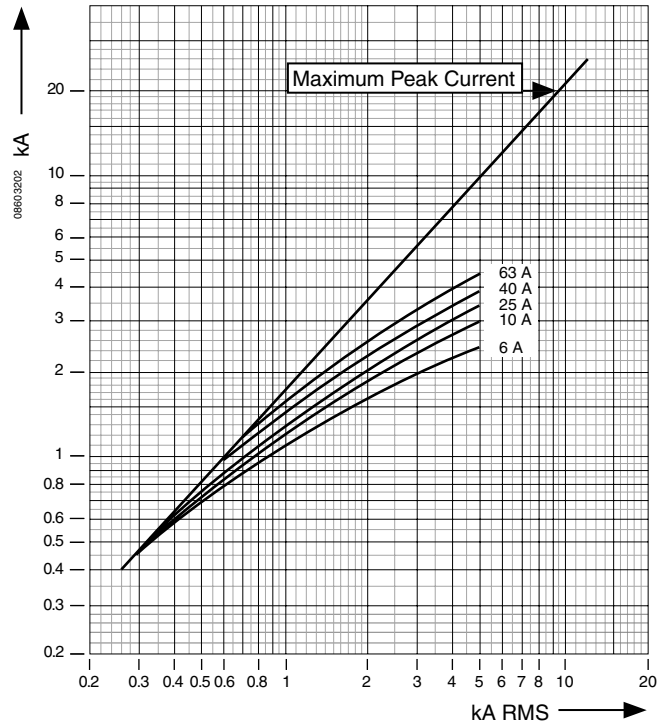


Figure 106: UL 489 Listed and UL 1077 Recognized C60 1-pole (277 Vac) Maximum Let-through I²t Current

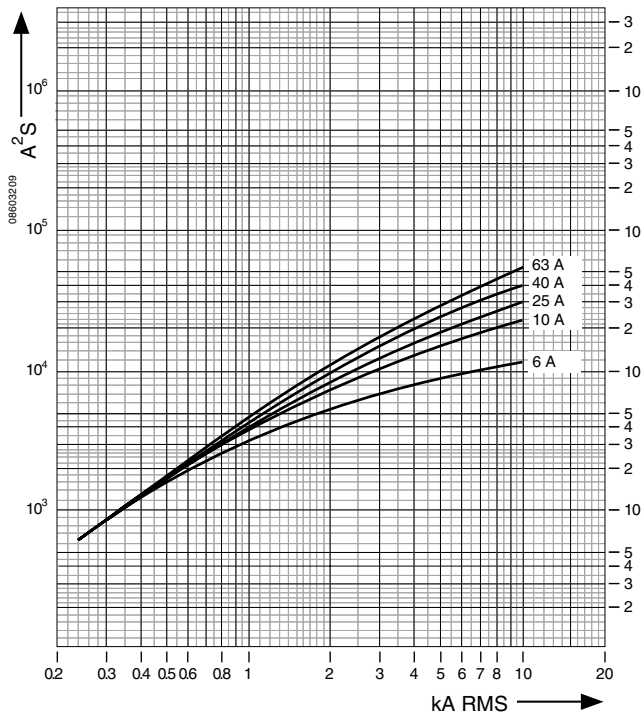
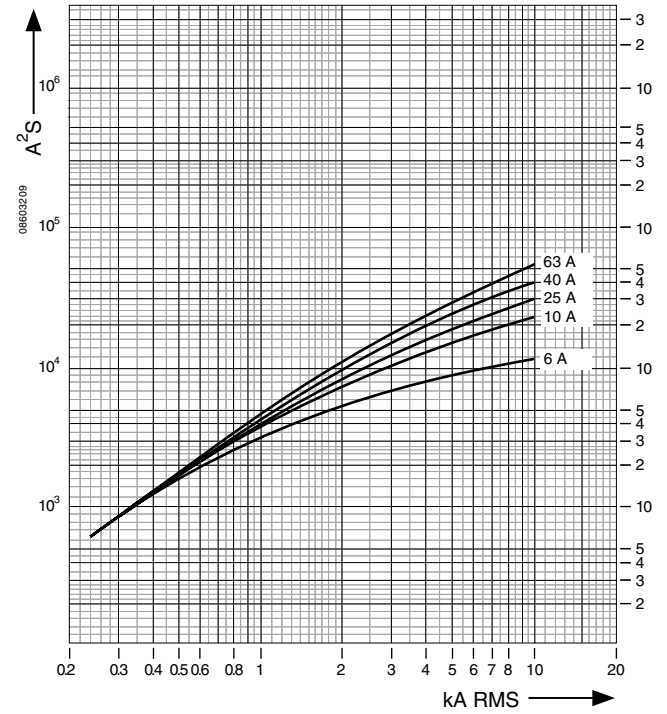


Figure 107: UL 1077 Recognized C60 2-, 3-, and 4-pole (480Y/277 Vac) Maximum Let-through I²t Current



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Figure 108: UL Recognized NC100 1-pole (240 Vac) Maximum Let-through Peak Current

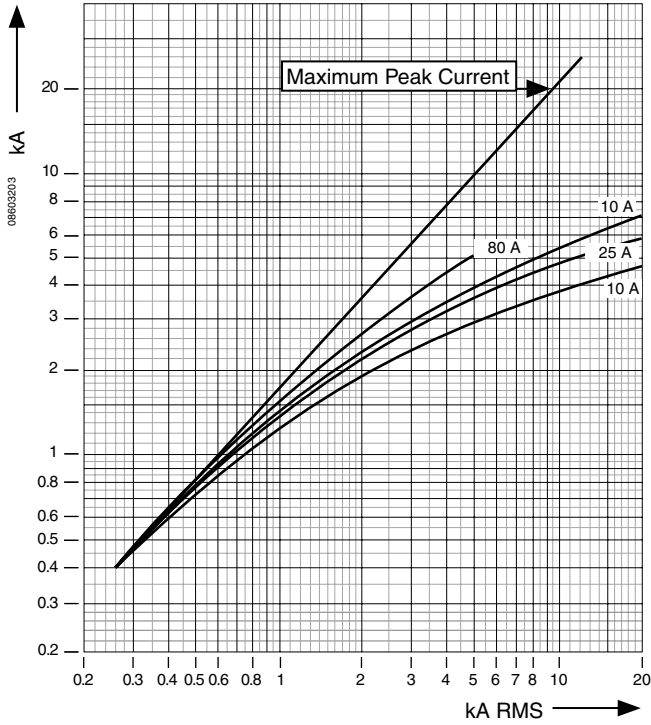


Figure 109: UL Recognized NC100 2-, 3- and 4-pole (240 Vac) Maximum Let-through Peak Current

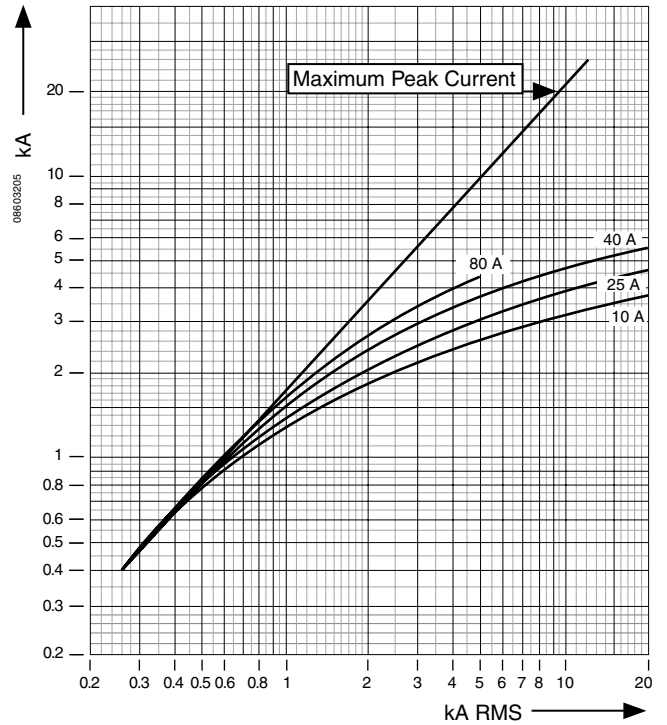


Figure 110: UL Recognized NC100 1-pole (240 Vac) Maximum Let-through I²t Current

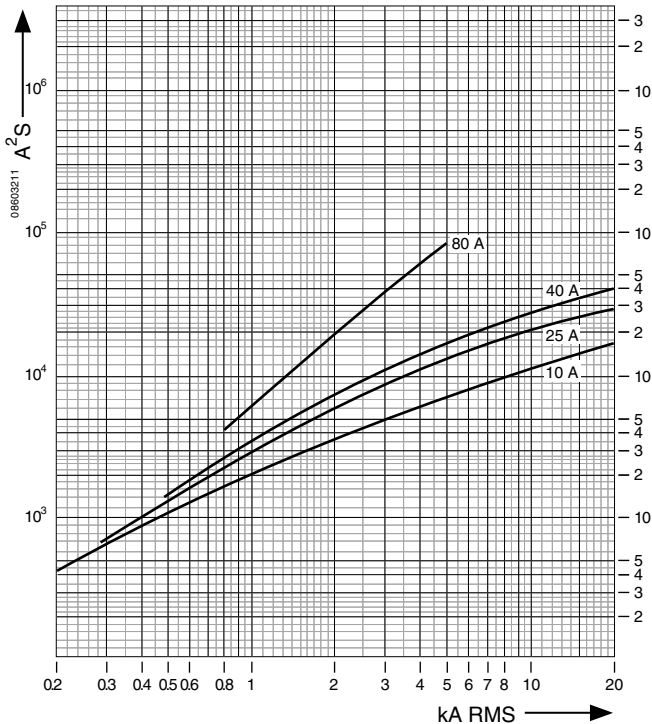
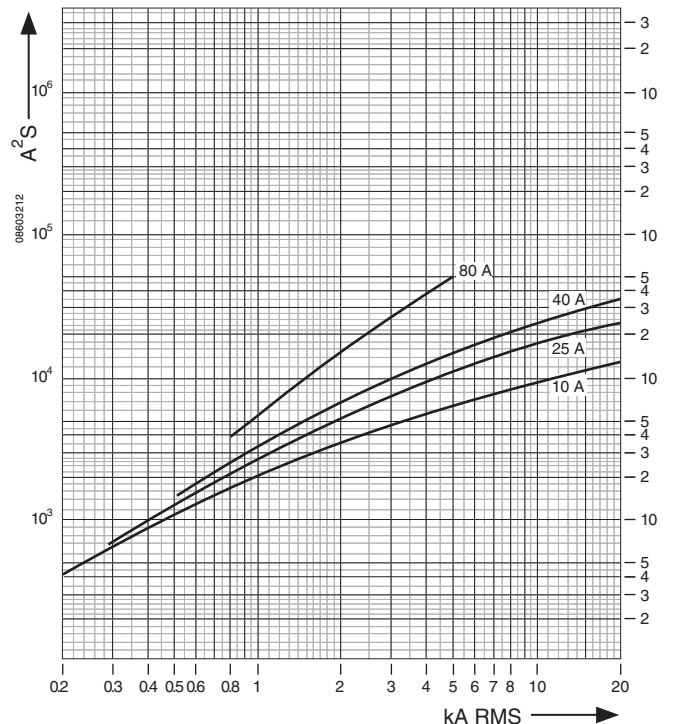


Figure 111: UL Recognized NC100 2-, 3- and 4-pole (240 Vac) Maximum Let-through I²t Current



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Figure 112: UL Recognized NC100H 1-pole (277 Vac) Maximum Let-through Peak Current

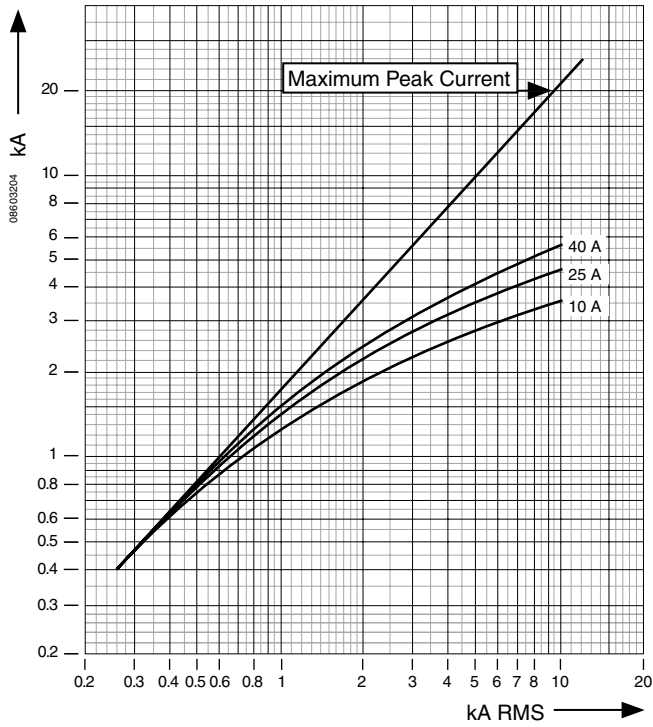


Figure 113: UL Recognized NC100H 2, 3- and 4-pole (480Y/277 Vac) Maximum Let-through Peak Current

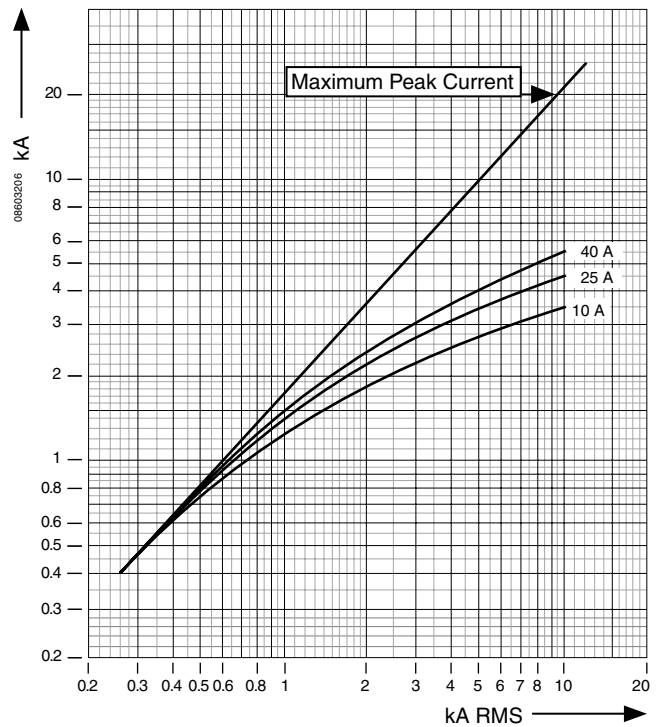


Figure 114: UL Recognized NC100H 1-pole (277 Vac) Maximum Let-through I²t Current

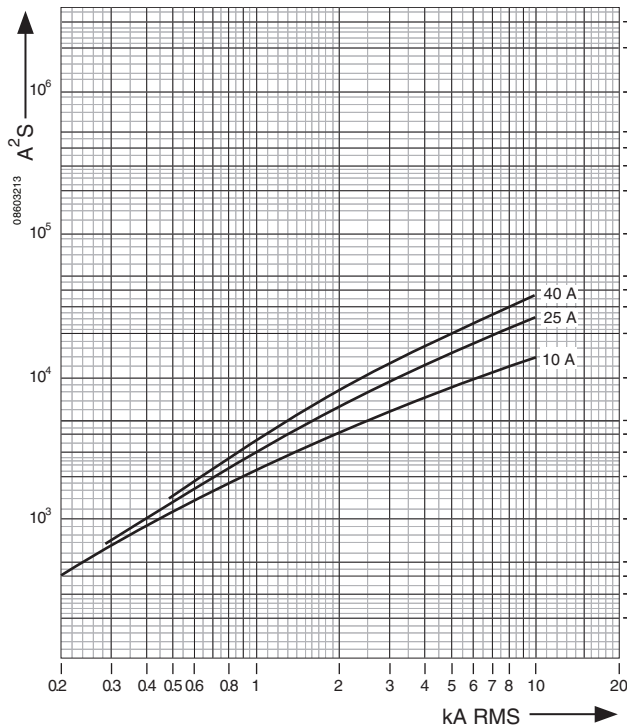
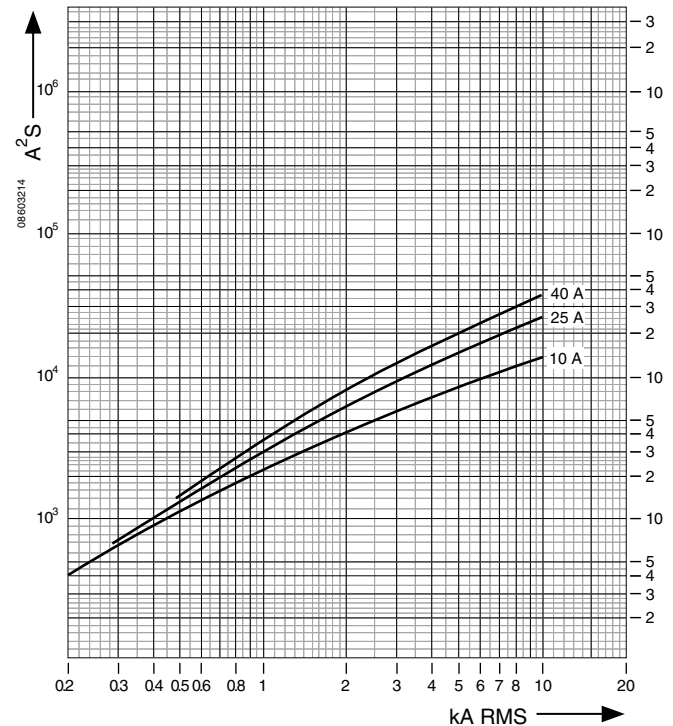


Figure 115: UL Recognized NC100H 2, 3- and 4-pole (480Y/277 Vac) Maximum Let-through I²t Current



IEC 60947-2 RATED CIRCUIT BREAKERS

Figure 116: IEC Rated DPN-N (230/240 Vac) Maximum Let-through Peak Current

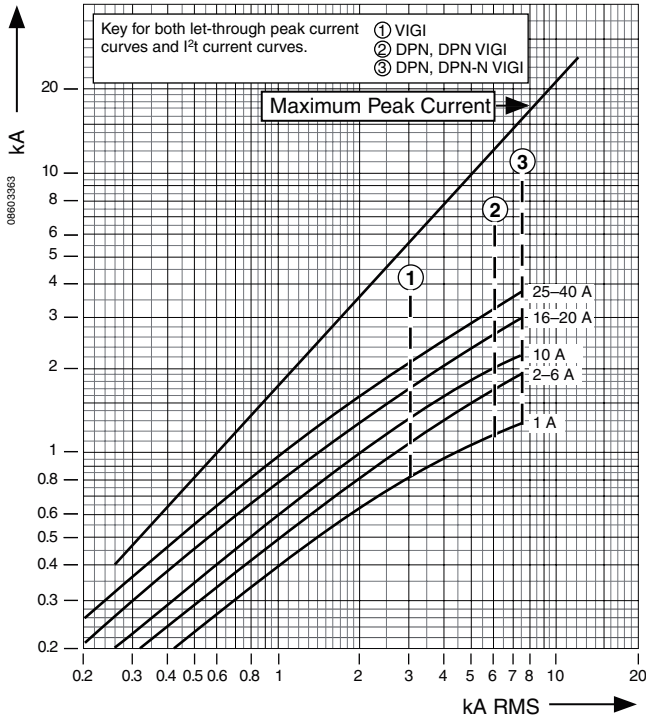


Figure 117: IEC Rated DPN-N (277 Vac) Maximum Let-through I²t Current

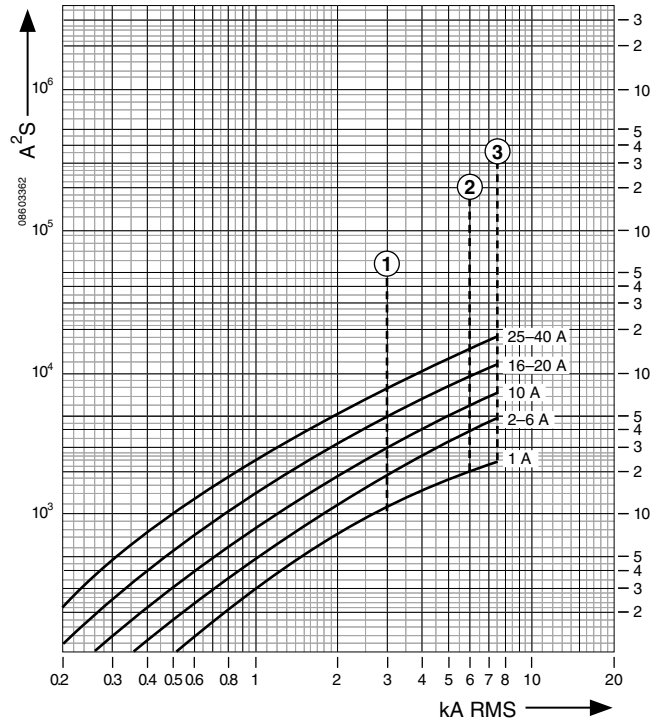


Figure 118: IEC Rated C60 1-pole (277 Vac) Maximum Let-through Peak Current

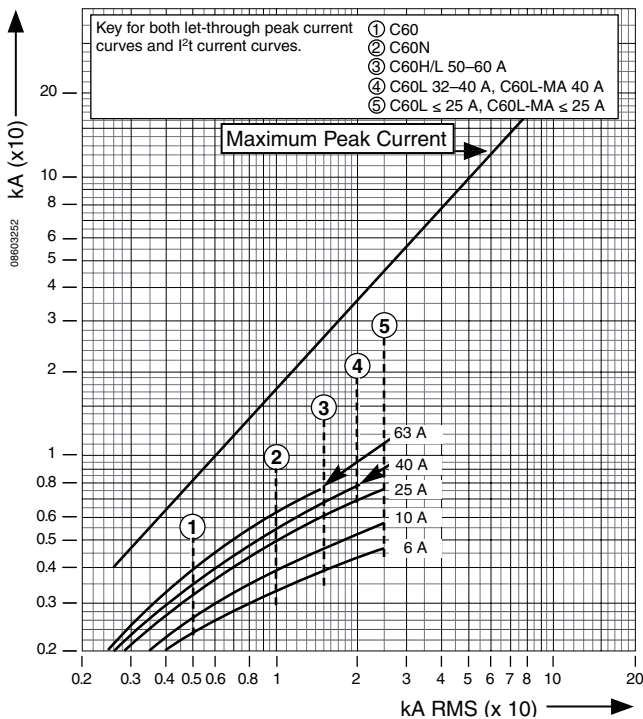
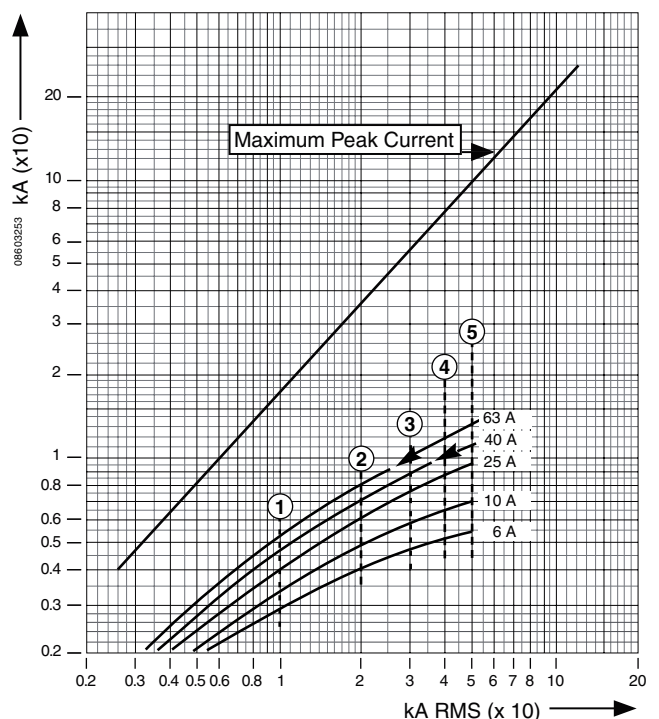


Figure 119: IEC Rated C60 2-, 3- and 4-pole (277 Vac) Maximum Let-through Peak Current



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Figure 120: IEC Rated C60 1-pole (230/240 Vac) Maximum Let-through I²t Current

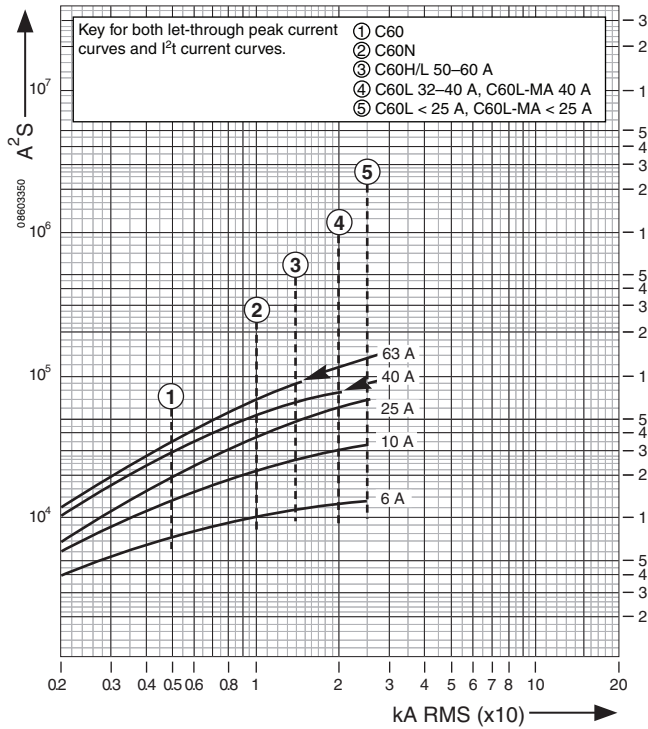


Figure 121: IEC Rated C60 2-, 3- and 4-pole (230/240 Vac) Maximum Let-through I²t Current

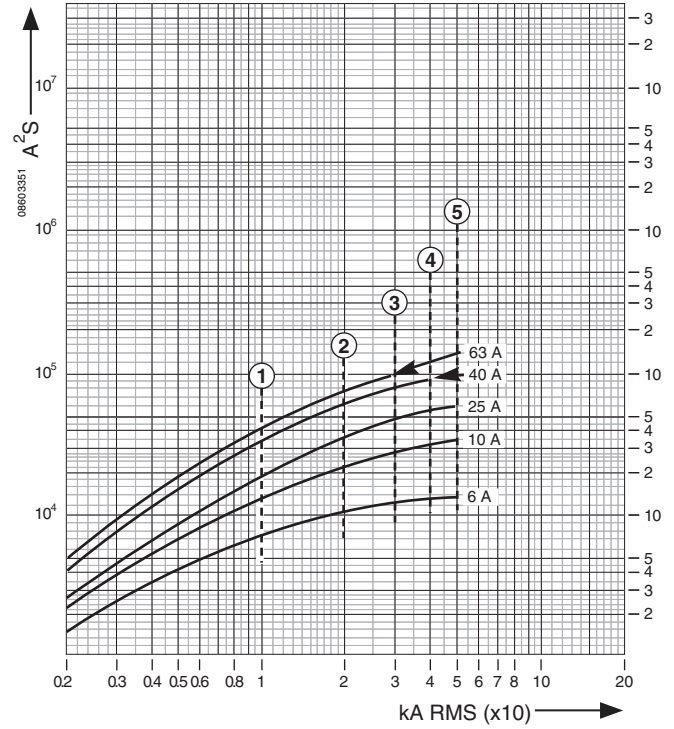


Figure 122: IEC Rated C60 2-, 3- and 4-pole (400/415 Vac) Maximum Let-through Peak Current

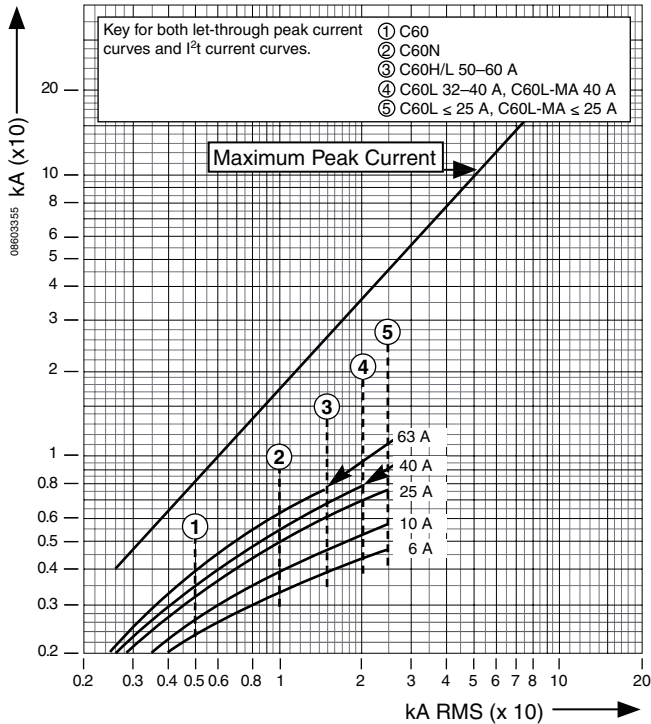
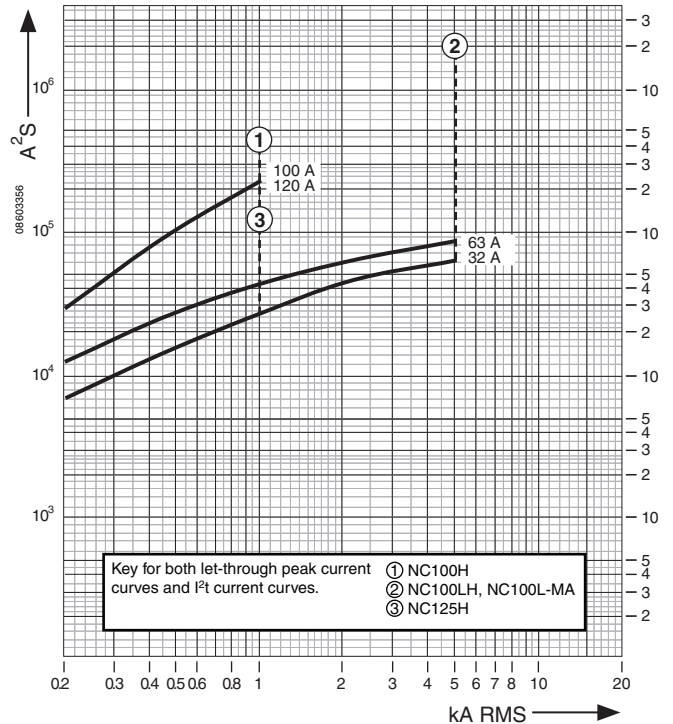


Figure 123: IEC Rated C60 2-, 3- and 4-pole (400/415 Vac) Maximum Let-through I²t Current



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Figure 124: IEC Rated NC100/125 1-pole (230/240 Vac) Maximum Let-through Peak Current

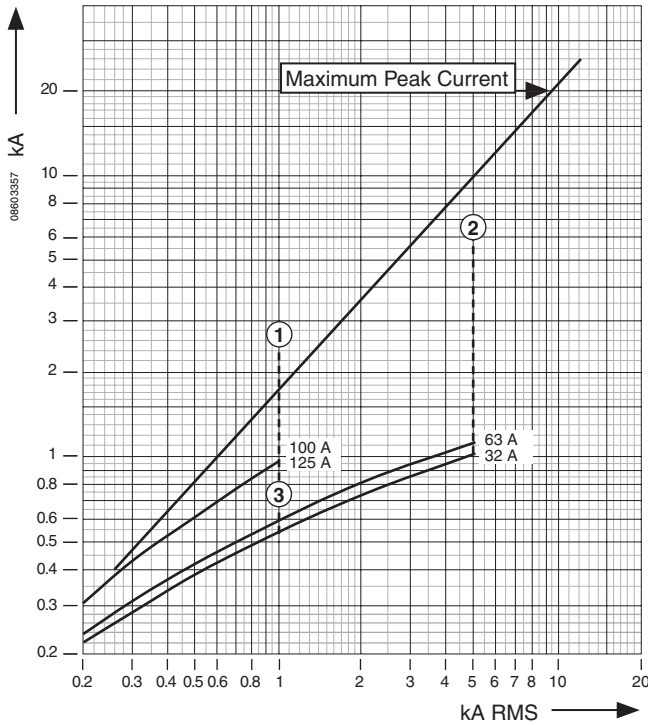


Figure 125: IEC Rated NC100/125 2-, 3- and 4-pole (230/240 Vac) Maximum Let-through Peak Current

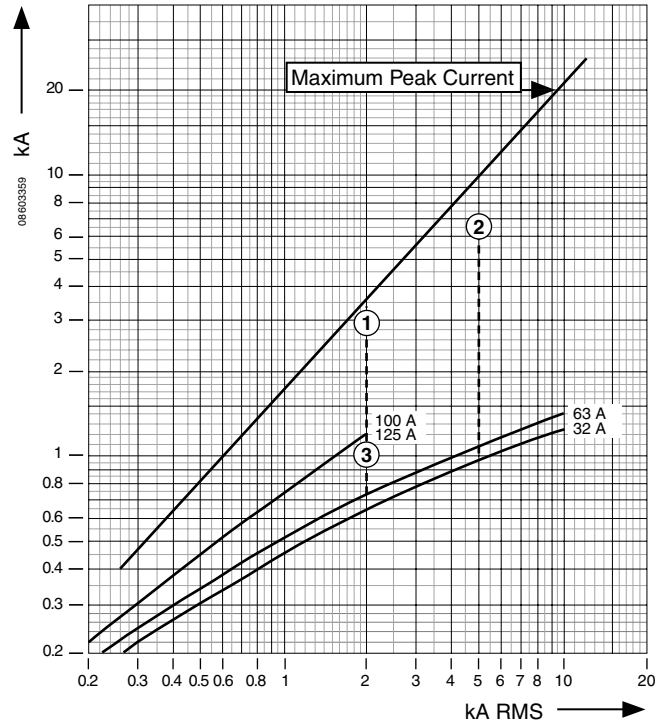


Figure 126: IEC Rated NC100/125 1-pole (230/240 Vac) Maximum Let-through I²t Current

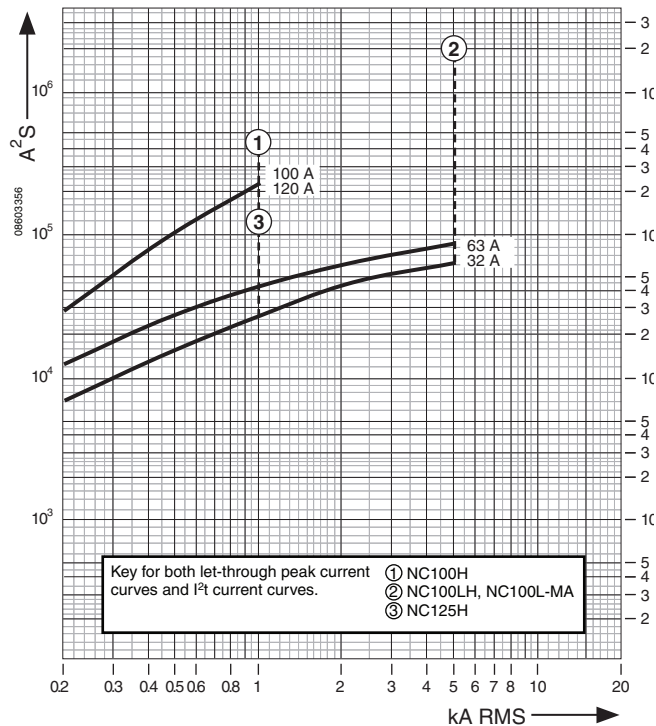
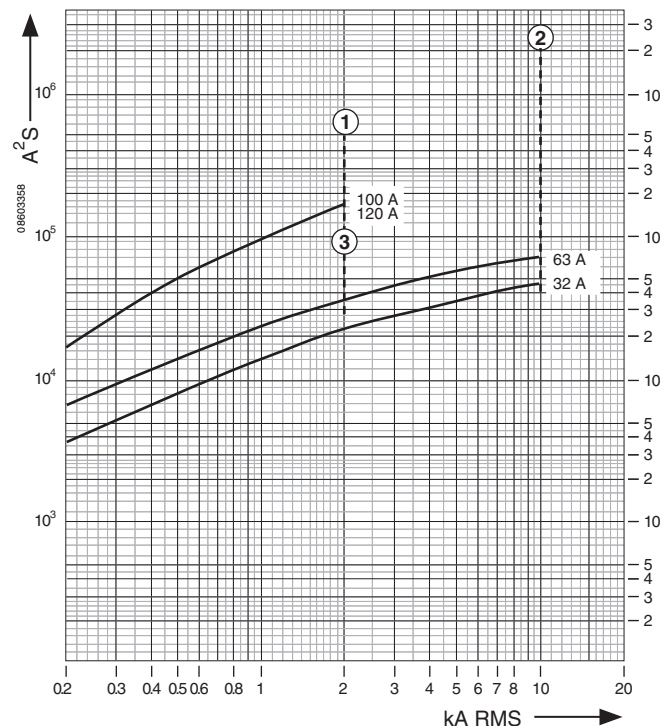


Figure 127: IEC Rated NC100/125 2-, 3- and 4-pole (230/240 Vac) Maximum Let-through I²t Current



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Figure 128: IEC Rated NC100/125 2-, 3- and 4-pole (400/415 Vac) Maximum Let-through Peak Current

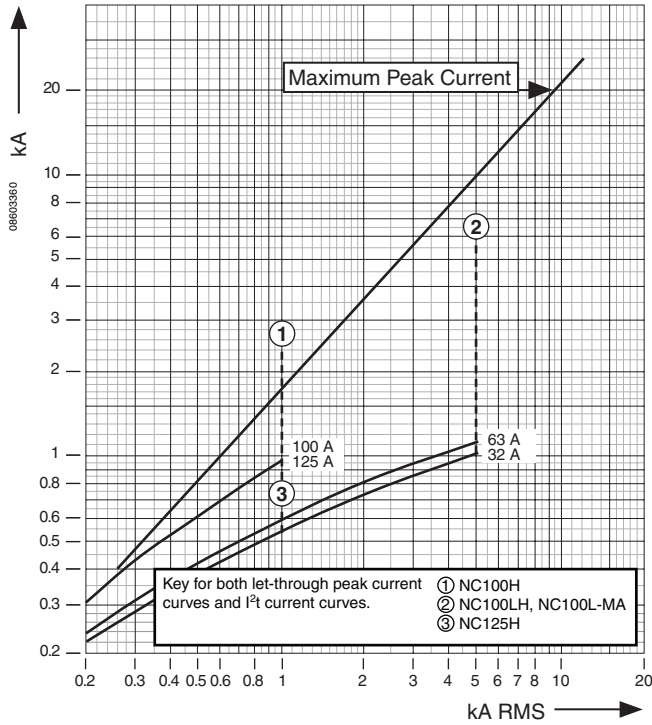
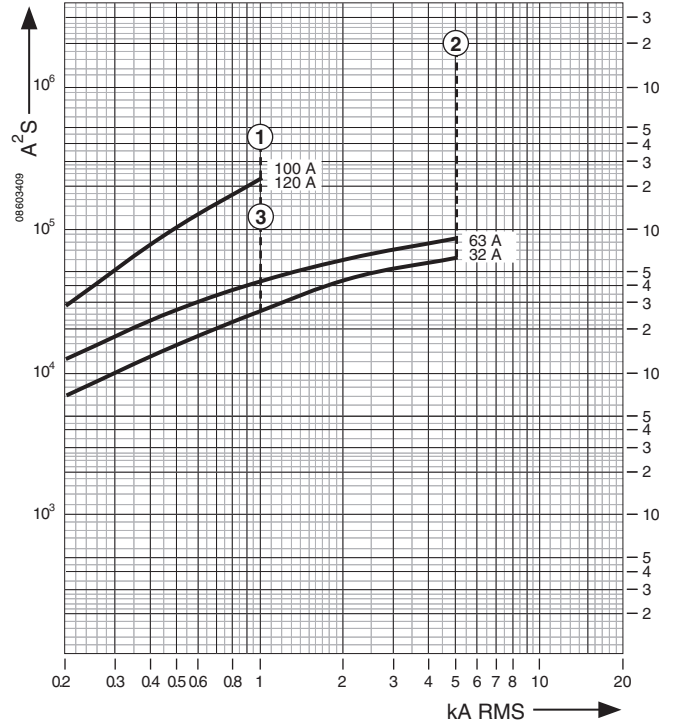


Figure 129: IEC Rated NC100/125 2-, 3- and 4-pole (400/415 Vac) Maximum Let-through I^2t Current



SECTION 10—APPLICATIONS

DEGREE OF PROTECTION (IP)

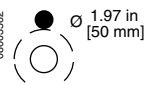

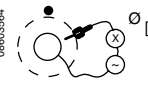

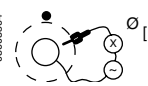

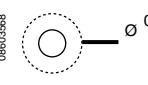




Overview

The IEC 529 Standard publication or the European EN60.529 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 60.529 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 95: Explanation of IP Degree of Protection Digits¹

First Digit Solid Body Protection		Second Digit Liquid Protection		Third Digit Mechanical Protection	
IP	Tests	IP	Tests	IP	IK
0	No protection	0	No protection	0	No protection
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
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
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
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
5	Protected against dust (no harmful deposit)	5	 Protected against water splashes from all directions by jet pipes	9	Impact energy 20.00 joules
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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Vibrations

Table 96: Vibrations as per IEC 68.2.6 Standard¹

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 Shocks (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 NC100 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 97: 400 Hz Circuits

Type	No. of Poles	Interrupting Ratings (Vac)		
		240	277	480Y/277
C60N (0.5–63 A)	1-pole	4,000	3,000	—
	2-, 3- and 4-pole	4,000	—	3,000
NC100H (50–80 A)	1-pole	3,000	—	—
	2-, 3- and 4-pole	3,000	—	—
NC100H (10–40 A)	1-pole	5,000	4,000	—
	2-, 3- and 4-pole	5,000	—	4,000

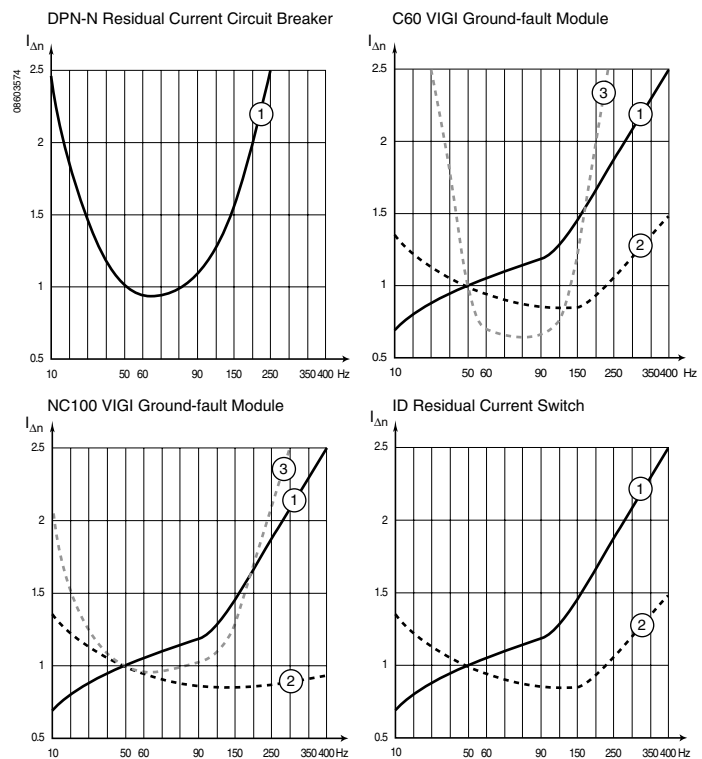
- Thermal: No variation
- Magnetic increase in thresholds multiplier:
 - DPN-N: 1.50
 - C60N: 1.48
 - NC100H: 1.40

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

Table 98: Curve Sensitivity

Class	Rating (A)	Curve No. Sensitivity (mA)			
		10	30	100	300
DPN-N 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	—
2-, 3-, 4-pole 220/415 V, 50 Hz VIGI C60					
AC	≤ 25	②	①	①	—
	≤ 63	—	②	①	—
AC	☐	—	③	②	②
NC100 VIGI Ground-fault Module					
AC	≤ 100	—	③	—	①
AC	☐	—	②	②	②
ID Residual Current Switch					
	25	②	①	—	①
AC	25–40	—	①	①	①
	63–80–100	—	②	①	①
AC	☐	63–80–100	—	—	②

Figure 130: Protection of 400 Hz Circuits



TEMPERATURE RATING

Circuit breakers with uncompensated thermal tripping elements have a tripping-current level that depends on the surrounding temperature. If the circuit breaker is installed in an enclosure, or in a hot location (boiler room, etc.), the current required to trip the circuit breaker on overload will be reduced. When the ambient temperature exceeds the circuit breaker reference temperature, the supplementary protector or circuit breaker will be “de-rated.” For this reason, circuit breaker manufacturers provide tables which indicate factors to apply at temperatures different from the supplementary protector or circuit breaker reference temperature. It should be noted from typical examples of such tables that an ambient temperature lower temperature than the rated temperature produces an “up-rating” of the supplementary protector or circuit breaker.

When several simultaneously operating circuit breakers are mounted side-by-side in a small enclosure, the temperature rise in the enclosure causes a reduction in current rating. Mutual heating generally requires an additional de-rating coefficient of 0.8.

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Table 99: Rated Temperatures for UL Listed Circuit Breakers and UL Recognized C60N Supplementary Protectors

Ampere Ratings	-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	1.02	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	0.97	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 Listed MULTI 9 C60N circuit breakers are calibrated at 77°F (25°C), unlike some other UL 489 circuit breakers which are calibrated at 104°F (40°C). Depending on the operating environment, you may need to rerate according to the tables on page 81 to determine the appropriate handle rating.

NOTE: UL 489 Listed circuit breakers should be loaded to no more than 80% if used with continuous loads; that is unlike UL 1077 recognized supplementary protectors, which may be operated at 100% of rating.

Table 100: Rated Temperatures for UL Recognized NC100H Supplementary Protectors

Ampere Ratings	-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
10	1.36	1.33	1.30	1.27	1.24	1.21	1.18	1.14	1.11	1.07	1.04	1.00	0.96	0.88	0.78	0.68	0.56
15	1.36	1.33	1.30	1.27	1.24	1.21	1.18	1.14	1.11	1.07	1.04	1.00	0.96	0.88	0.78	0.68	0.55
16	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
20	1.32	1.29	1.26	1.24	1.21	1.18	1.15	1.13	1.10	1.06	1.03	1.00	0.97	0.89	0.82	0.73	0.63
25	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
30	1.35	1.32	1.29	1.26	1.23	1.20	1.17	1.14	1.11	1.07	1.04	1.00	0.96	0.88	0.79	0.69	0.58
32	1.34	1.31	1.28	1.25	1.22	1.19	1.16	1.13	1.10	1.07	1.04	1.00	0.96	0.89	0.80	0.71	0.60
35	1.26	1.24	1.22	1.19	1.17	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.97	0.92	0.86	0.79	0.72
40	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
50	1.41	1.38	1.35	1.31	1.28	1.24	1.21	1.17	1.13	1.09	1.04	1.00	0.95	0.85	0.74	0.60	0.43
60	1.41	1.38	1.35	1.31	1.28	1.24	1.21	1.17	1.13	1.09	1.04	1.00	0.95	0.85	0.74	0.60	0.43
63	1.38	1.35	1.32	1.29	1.26	1.22	1.19	1.15	1.12	1.08	1.04	1.00	0.96	0.87	0.76	0.65	0.50
80	1.35	1.32	1.29	1.26	1.23	1.20	1.17	1.14	1.11	1.07	1.04	1.00	0.96	0.88	0.76	0.69	0.58

Table 101: Rated Temperatures for IEC Rated DPN-N 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	0.98	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

Table 102: 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 103: Rated Temperatures for IEC Rated C60N (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

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Table 104: Rated Temperatures for IEC Rated C32H-DC Circuit Breakers

Ampere Rating	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	1.10	1.00	1.00	1.00	0.95	0.90	0.90	0.90
2	1.10	1.10	1.05	1.05	1.00	0.98	0.95	0.90	0.85
3	1.10	1.10	1.07	1.03	1.00	0.97	0.93	0.90	0.87
4	1.10	1.08	1.05	1.02	1.00	0.97	0.95	0.92	0.88
6	1.10	1.07	1.05	1.03	1.00	0.97	0.95	0.90	0.85
10	1.10	1.09	1.06	1.03	1.00	0.96	0.94	0.90	0.87
16	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.90
20	1.10	1.08	1.04	1.02	1.00	0.96	0.94	0.92	0.88
25	1.09	1.09	1.06	1.03	1.00	0.97	0.94	0.91	0.88
32	1.11	1.09	1.06	1.03	1.00	0.96	0.93	0.90	0.85

Table 105: Rated Temperatures for IEC Rated NC100 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

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

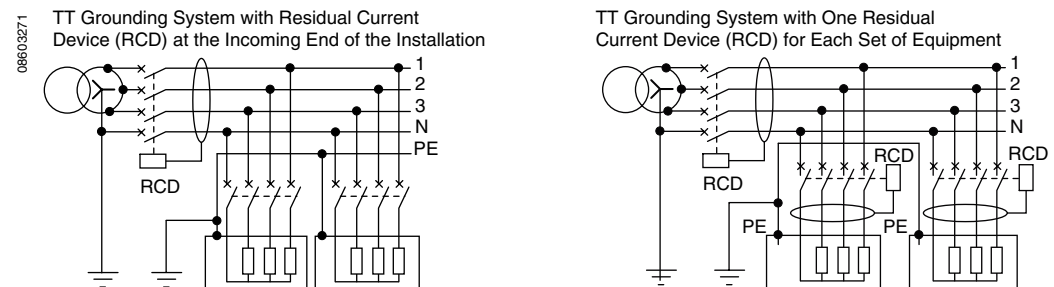
This “directly-grounded neutral” system is the easiest to install, monitor and use. Main features are:

- 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 131: TT Grounding Systems



The IT Grounding System

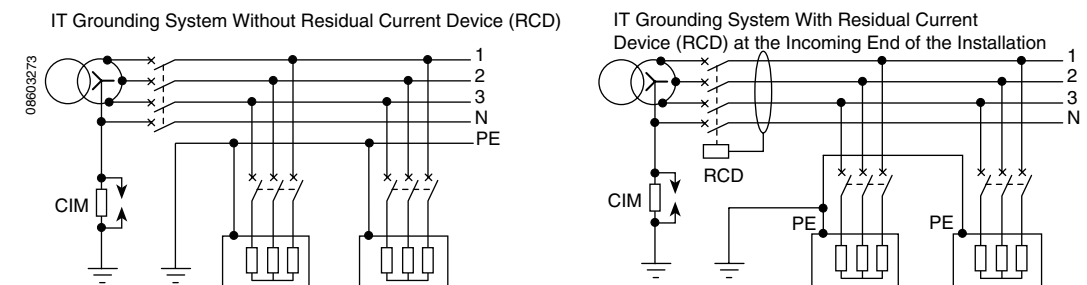
This “ungrounded neutral” system has the following main features:

- 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 132: IT Grounding Systems



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The TN-S Grounding System

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

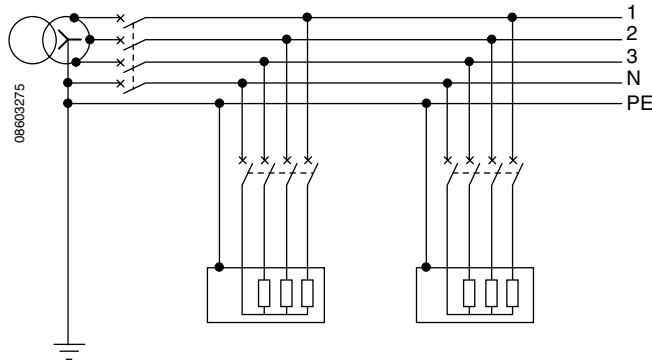
- The neutral point of the distribution transformer is grounded.
- All installation frames are grounded by a PE protective conductor.
- The PE protective conductors and the N neutral conductor are separate.

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 133: TN-S Grounding System



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Numerics

1271054	12710M54	1271154	12711M54	1271254	12712M54	1271354	12713M54	1271454	12714M54	1271554	12715M54	1271654	12716M54	1271754	12717M54	1271854	12718M54	1271954	12719M54	1272054	12720M54	1272154	12721M54	1272254	12722M54	1272354	12723M54	1272454	12724M54	1272554	1272654	1272754	1272854	1272954	1273054	1273154	1273254	1273354	1273454	1273554	1273654	1273754	1273854	1273954	1274054	1322963	1331963	1332662	1332762	1332862	1332962	1343064	1357663	1381164	1381264	1381364	1381464	1381564	1381664	1393461	1394061	1394461	1394561	1394761	1394861	1395660, 74	1395760, 74	1395860, 74	1395960, 74	1396060, 74	1396261, 75	1396361, 75	1396461, 75	1396561, 75	1396661	1396761, 75	1396861, 75	1401456	1418063	1421052	1421152	1480145	1480245	1480345	1480445	1488145	1488245	1488345	1488445	1488546	1488645	1488745	1488846	1489145	1489245	1489345	1489445	1500556	1500656	1500756	1500856	1500956	1501056	1501156	1501256	1501356	1501556	1501656	1501956	1502056	1502356	1502456	1505756	1505856	1505956	1506056	1509056	1509156	1509256	1509356	1510255	1510355	1510458	1510558	1510657	1510757	1510857	1510957	1511057	1511557, 58	1511657, 58	1511757, 58	1511857, 58	1511957, 58	1512955	1513055	1513155	1513658	1513758	1513858	1514157	1514257	1514357, 58	1514457, 58	1514557	1514657	1533059	1544059	1544359	1583159	1620033	1620133	1620433	1620833	1621233	1625133	1625433	1625833	1626533	1626633	1740047	1831043	1831143	1924924	1925024	1925224	1925424	1925524	1925624	1925724	1925824	1926024	1926124	1926324	1926424	1926624	1926824	1926924	1927024	1927124	1927224	1965037	1965137	1965337	1965537	1965637	1965737	1965837	1965937	1966137	1966337	1966537	1966637	1966737	1966837	1966937	1967037	1967137	1967337	1967537	1967637	1967737	1967837	1967937	1968137	1968337	1968537	1968637	1968737	1968837	1968937	2053128	2053228	2053328	2053428	2053528	2053628	2053728	2053828	2053928	2054028	2054128	2054228	2054328	2054428	2054528	2054628	2054728	2054828	2054928	2055028	2302833	2303233	2303433	2303533	2305933	2404526	2404626	2404726	2404826	2404926	2405026	2405126	2405226	2405326	2405426	2405526	2405626	2405726	2406726	2406826	2406926	2407026	2407126	2407226	2407326	2407426	2407526	2407626	2407726	2407826	2407926	2408026	2408126	2408226	2408326	2408426	2408526	2408626	2408726	2408826	2408926	2409026	2409126	2409226	2409326	2409426	2409526	2409626	2409726	2409826	2409926	2410026	2410126	2410226	2410326	2410426	2410526	2410626	2410726	2410826	2410926
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