




Section 4—Ground-Fault Protection Devices

Selection Table

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

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

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

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

Table 21: Overcurrent Protection Required for UL Applications of GFP

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

UL 1053 Listed GFP Ground Fault Protectors



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

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

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

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

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

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

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

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

See Table 20 on page 32 for dimensions and weights.

Standards

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

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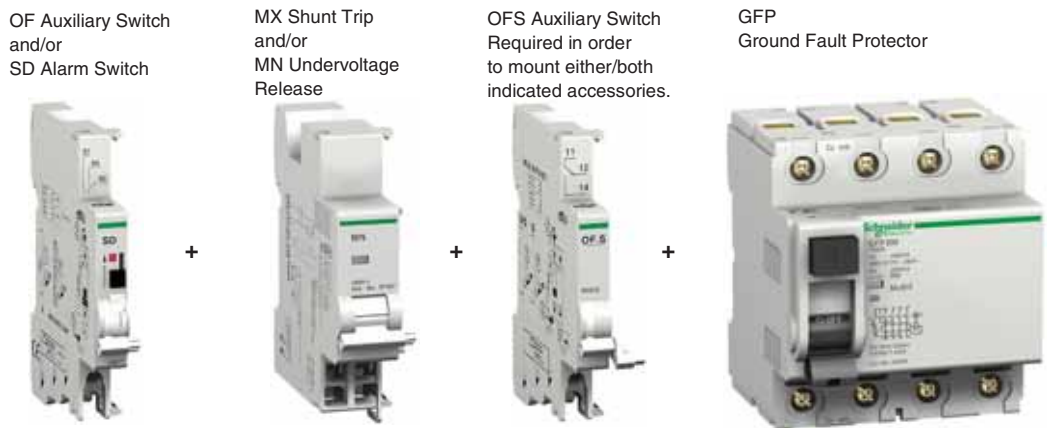
Section 4—Ground-Fault Protection Devices

Catalog Numbers

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

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

Figure 9: Possible Device Combinations



IEC Rated ID Residual Current Switches

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

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

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

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

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

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

Figure 10: IEC Rated ID Residual Current Switches

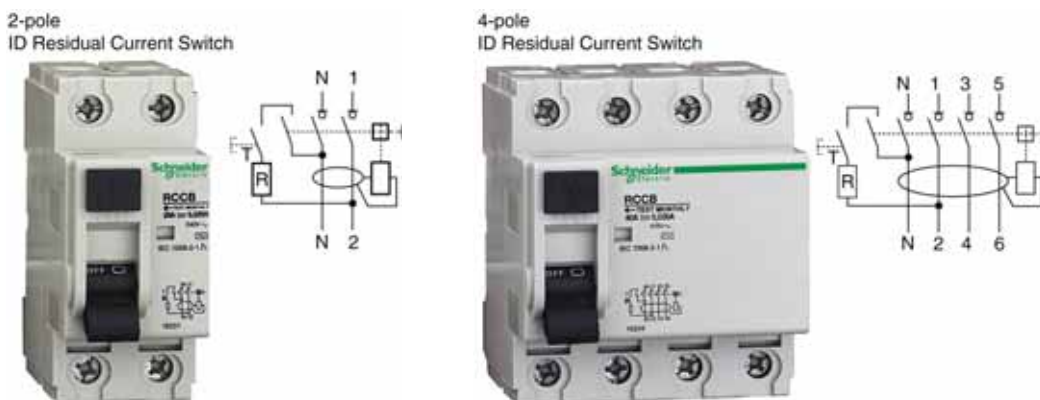


Table 24: Specifications for IEC Rated ID Residual Current Switches

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

See Table 20 for weights, dimensions and interrupting ratings.

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Section 4—Ground-Fault Protection Devices

Standards

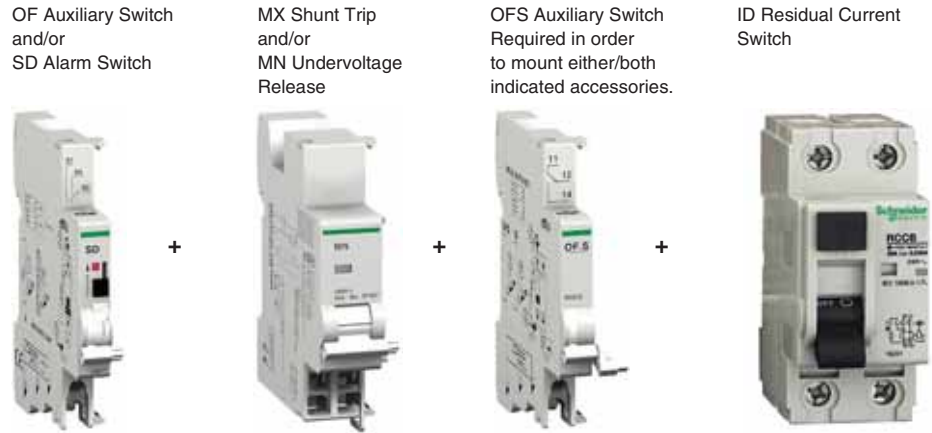
- IEC 61008
- CE Marked

Catalog Numbers

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

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

Figure 11: Possible Device Combinations



IEC Rated C60 Vigi™ Modules for Ground-fault Protection

Figure 12:



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

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

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

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

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

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

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

Figure 13: Example of Residual Current Circuit Breaker



NOTE: Also see the ID Residual Current Switches.

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

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

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

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Accessories

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


Standards

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

- IEC 61009
- EN 61009

Catalog Numbers

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

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


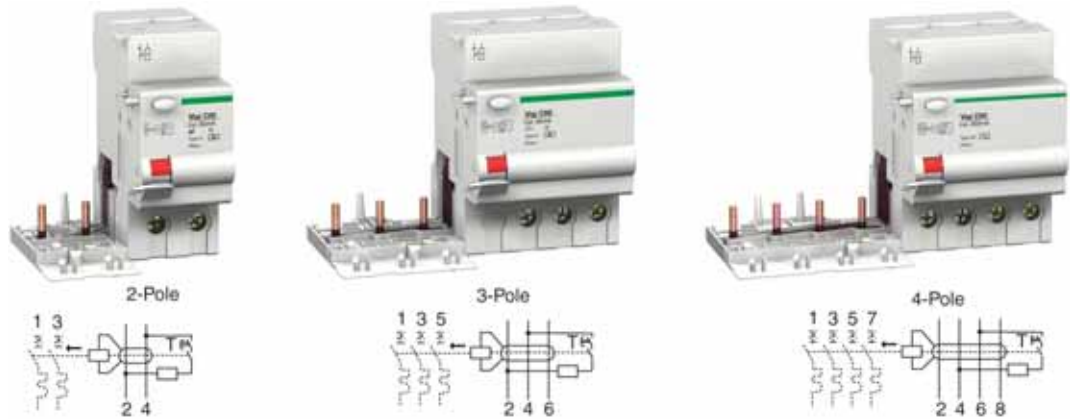
¹  Selective = has non-adjustable time delay to allow selective coordination.

Figure 14: IEC Rated C60 Vigi Modules



IEC Rated C120 Vigi Residual Current Circuit Breakers

Figure 15:



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

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

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

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

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

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

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

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

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

Standards

Complies with IEC 1009 Standard

Catalog Numbers

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

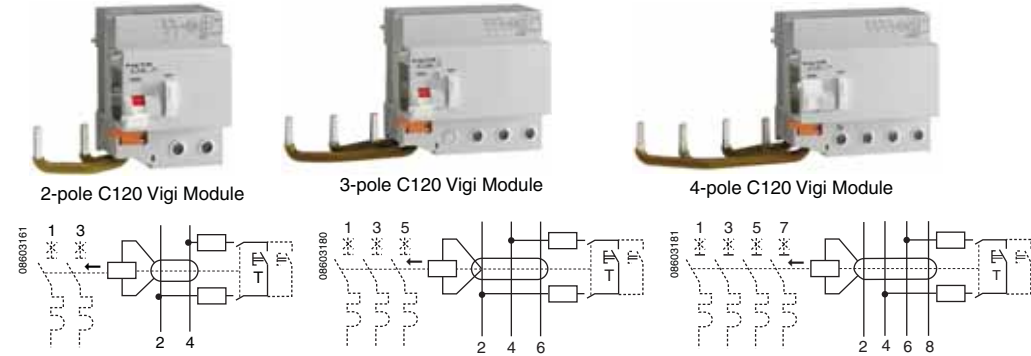
Rating	Voltage	Sensitivity (mA)	2P	3P	4P
125 A	220–415 Vac	30	A9N18591	A9N18594	A9N18597
		300	A9N18592	A9N18595	A9N18598
		300 [S] ¹	A9N18556	A9N18558	A9N18560
		500	—	—	A9N18599
		1000	A9N18557	A9N18559	A9N18561

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

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Section 4—Ground-Fault Protection Devices

Figure 16: IEC Rated C120 Vigi™ Modules



N40 Vigi Residual Current Circuit Breaker

Function



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

Catalog Numbers

Table 30: N40 VIGI Residual Current Circuit Breaker

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

Standards

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