

CMGF420

Service entrance ground fault relay



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For grounded AC systems



CMGF420

Features

- UL 1053 listed service entrance relay
- Satisfies requirements of NEC Article 230.95 and CSA C22.1 Section 14-102 when paired with appropriate equipment
- Small form factor, easily integratable into switchgear
- 60 - 1200 A adjustable trip level range
- Supports 600:1 or 1000:1 current transformers
- Digital display with real-time readout
- Real-time readout displays measured current on primary side of current transformer
- Simple connection to N/O shunt trip breaker
- Supports DIN rail mounting, screw mounting, or front panel mounting with optional mounting kit
- Power On LED, LED Alarm 1 / 2
- TEST / RESET button, internal / external
- Password protection
- Sealable transparent cover
- Conforms to RoHS

Approvals



Description

The CMGF420 is a control-powered service entrance relay for use in grounded systems. When combined with an N/O shunt trip breaker, it provides ground fault detection and interruption at the mains entrance of an electrical system. When a fault is detected, the output contacts will cause the connected shunt trip breaker to trip and interrupt power to the system.

The relay supports a pickup range of up to 1200 A when using a compatible current transformer. The CMGF420 supports current transformers with a 600:1 (60 - 1200 A trip range) or 1000:1 ratio (100 - 1200 A trip range).

After entering the proper current transformer ratio into the settings of the device, the value shown on the LCD screen will be the value read on the primary side of the current transformer.

Applications

- Ground fault protection in grounded AC systems
- Service entrance protection per NEC article 230.95 and CSA C22.1 Section 14-102

Additional equipment required

- Compatible current transformer - one sensor required per device
- Associated interruption device, such as an N/O shunt trip breaker or fused switch

Ordering information - CMGF420

Supply Voltage	Type	Ordering No.
AC		
100 - 240 V (15 - 460 Hz)	CMGF420-D-2	B 9306 0015

Ordering information - current transformers

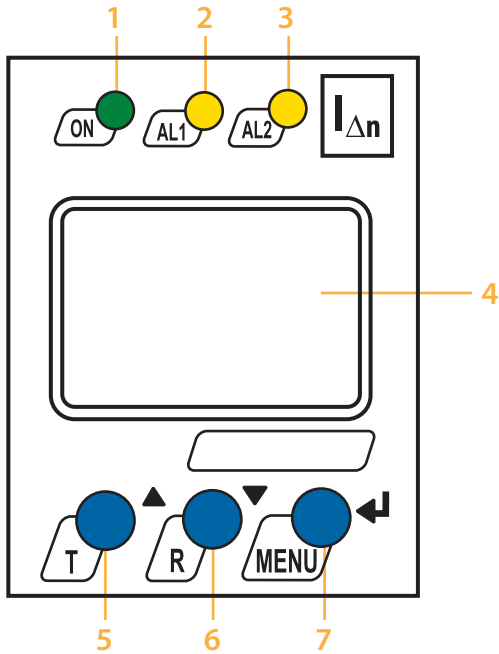
Window Size	Turns Ratio	Type	Ordering No.
9.5" x 24" (241 x 610 mm)	600:1	GFCT-1327	P 1010 1207
9.5" x 27" (241 x 686 mm)	600:1	GFCT-1330	P 1010 1208
10.5" x 21" (267 x 280 mm)	1000:1	GFCT-1021	P 1010 1209
10.5" x 31" (267 x 788 mm)	1000:1	GFCT-1031	P 1010 1210

* For usable window sizes, deduct 1" (25.4 mm) from each side of the listed window size.

Ordering information - accessories

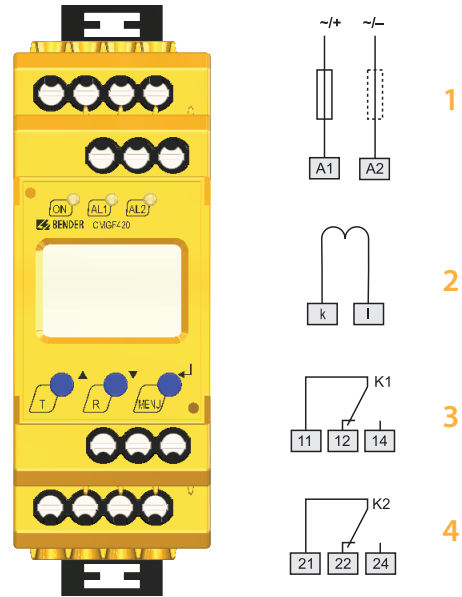
Description	Ordering No.
CMGF420 panel mounting kit	B 5413 00486

Operating and display elements



- 1 - Power "ON" LED (green): Illuminates when power is received to the unit.
- 2 - Alarm LED "AL1" (yellow): Alarm 1, illuminates when the pre-alarm is active.
- 3 - Alarm LED "AL2" (yellow): Alarm 2, illuminates when the main alarm is active.
- 4 - Multi-functional LCD display
- 5 - TEST button: Activates self-test
Arrow up key: Scrolls up inside device's menu
- 6 - RESET button: Resets device
Arrow down key: Scrolls down inside device's menu
- 7 - MENU key: Activates device's internal menu
Enter key: Confirm change inside device's menu
Escape key (held > 1.5 s): Goes back a step inside menu

Wiring diagram



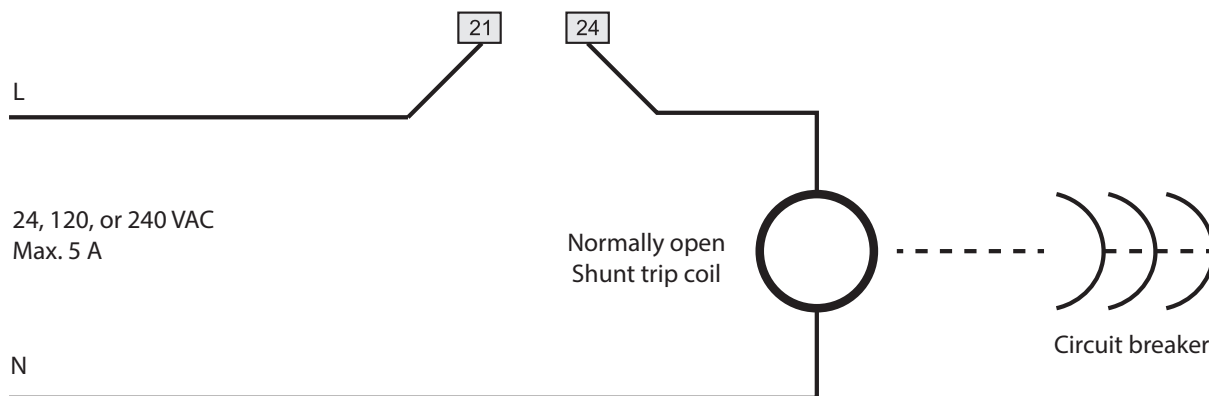
- 1 - Connection to external supply voltage (100 - 120 VAC, 60 Hz)
Fuse required (Recommended - 0.5 A MDL time delay fuse)
- 2 - Connection to external current transformer. All system conductors, including the neutral if it is used, are routed centrally through the opening. Do not route the ground conductor through the opening.
- 3 - Relay K1, form C contact - output contact for pre-alarm. Contact changes state when the pre-warning alarm is activated.
- 4 - Relay K2, form C contact - output contact for main pickup alarm. Contact changes state when the main alarm is activated.

Note: Do not route the ground conductor through the current transformer.

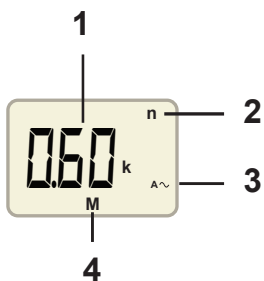
Typical wiring diagram - connecting to shunt trip breaker coil

The wiring diagram shown below is a typical diagram for connecting the CMGF420 to a shunt trip breaker. The following specifications are typical for connected shunt trip devices and are assumed for the purposes of this wiring diagram (contact Bender for assistance with different applications):

- Operates normally open (the coil is open when the circuit is in the normal state, and closes in the alarm state to interrupt circuit)
- Operates normally de-energized (the coil of the interruption device only energizes when the device is in the alarm state)
- Operates on 24, 120, or 240 VAC with a maximum current rating of 5 A



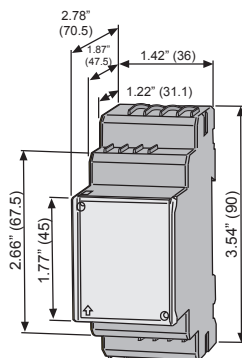
Normal display



- 1 - Measured ground fault current, displayed in real-time. Value is the measurement on the primary side of the current transformer.
- 2 - Indicates a current transformer ratio is entered.
- 3 - Indicates AC current is monitored by the device.
- 4 - Indicates latching operation is enabled

Dimensions

Dimensions in inches (mm)



Technical data

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	250 V
Rated impulse voltage / pollution degree	2.5 kV / III
Protective separation (reinforced insulation) between (A1, A2) - (k / I, T / R) - (11, 12, 14) - (21, 22, 24)	
Voltage test according to IEC 61010-1	2.1 kV

Supply voltage

Voltage rating	100 - 240 VAC
Voltage tolerance	± 20 %
Frequency rating	42- 460 Hz
Power consumption	≤ 3 VA

Direct connection current ratings

Rating	AC 0.05 - 15 A
Overload capability, continuous	17.6 A
Overload capability, < 1 s	40 A
Overload capability, instantaneous	50 kA
Operating range, f_n	± 5 %

Pickup values

Transformation ratio n	600, 1000 (600)*
Relative percentage error (50 / 60 Hz)	± 3 % / ± 2 digits
Hysteresis	1 - 40% (15%)

Ground fault pickup, n = 600

Pickup value range	60 - 1200 A (60)*
Pickup value increment, 60 - 600 A range	6 A
Pickup value increment, 600 - 1200 A range	60 A

Ground fault pickup, n = 600

Pickup value range	60 - 1200 A (60)*
Pickup value increment, 60 - 600 A range	6 A
Pickup value increment, 600 - 1200 A range	60 A

Ground fault pickup, n = 1000

Pickup value range	100 - 1200 A
Pickup value increment, 100 - 1000 A range	10 A
Pickup value increment, 1000 - 1200 A range	100 A

Time delays

Starting delay t	100 ms
Response delay t_{on2} (alarm)	100 - 900 ms (100 ms)*
Response delay t_{on1} (prewarning)	100 - 900 ms (100 ms)*
Delay on release t_{off}	0 - 300 s (1 s)*
Operating time t_{ae}	≤ 70 ms
Response time t_{an}	$t_{ae} + t_{on1} / 2$
Recovery time t_b	≤ 300 ms
Number of restart cycles	0 - 100 (0)*

Displays, memory

Display range, measuring value	AC 0.01 x 6 A x n
Operating error (50 / 60 Hz)	± 3 % / ± 2 digits
Alarm value memory	Stores last recorded alarm (volatile memory)
Password	off / 0 - 999 (off)*
Alarm latching operation	on (latching)

Switching elements

Number of switching elements	2 SPDT contacts
Operating principle	normally de-energized operation
Electrical service life under rated operating conditions	10,000 cycles
Contact data acc. to IEC 60947-5-1	
Utilization category	AC-13 AC-14 DC-12 DC-12 DC-12
Rated operational voltage	230 V 30 V 24 V 110 V 220 V
Rated operational current	5 A 3 A 1 A 0.2 A 0.1 A
Minimum contact load	1 mA at AC / DC ≥ 10 V

Environment / EMC

EMC	IEC 61326
Operating temperature	-13 °F to 131 °F (-25 °C to 55 °F)
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-time storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

Connection type	screw terminals
Wiring ratings, rigid	AWG 24-14 (0.2 - 2.5 mm ²)
Wiring ratings, flexible w/o ferrules	AWG 24-14 (0.2 - 2.5 mm ²)
Wiring ratings, flexible with ferrules	AWG 24-16 (0.2 - 1.5 mm ²)
Stripping length	0.3" (8 mm)
Tightening torque	4 - 5 lb-in (0.5 - 0.6 N-m)
Test opening, diameter	0.1" (2.1 mm)

General data

Operating mode	continuous operation
Mounting position	display-oriented



USA, Mexico, and Central America
Exton, PA • 800-356-4266 / 610-383-9200
info@bender.org • www.bender.org

Canada • Mississauga, ON • 800-243-2438 / 905-602-9990
info@bender-ca.com • www.bender-ca.com

South America • Santiago de Chile • +56 2 2933 4211
info@bender-latinamerica.com • www.bender-latinamerica.com



Your local contact: