

This document is intended as a reference guide for installing and using a BENDER RCM420-DM series ground fault monitor with analog output. This document includes installation, setup, and usage instructions. For complete details, including installation, setup, settings, and troubleshooting, refer to the RCM420-DM user manual, document number TGH1404en. This document is intended as a supplement and not a replacement to the complete user manual.

Only qualified maintenance personnel shall operate or service this equipment. These instructions should not be viewed as sufficient for those who are not otherwise qualified to operate or service this equipment. This document is intended to provide accurate information only. No responsibility is assumed by BENDER for any consequences arising from use of this document.



Applicable Devices

This document applies to the following devices:

- RCM420-DM (-1 / -2) Analog output only; selectable
- RCM420-DM1C (-1 / -2) 0/4 - 20 mA analog output, 1 relay contact
- RCM420-DM2C (-1 / -2) 0 - 400 μ A analog output, 1 relay contact
- RCM420-DM3C (-1 / -2) 0 - 10 V analog output, 1 relay contact

For standard versions of the RCM420 with no analog output (RCM420-D-1 and RCM420-D-2), consult the RCM420 series installation bulletin, document NAE1048030.

Installation

Mounting

RCM420 series devices may be DIN rail mounted, or screw mounted using the black clips located on the top and bottom of the device. Screw mounting requires an extra black clip (article number B98060008, sold separately).

Wiring - General

Refer to figure 1 for wiring the RCM420. Refer to section "Wiring - Current Transformers" for detailed information regarding connecting current transformers.

When routing the circuit through the current transformer, whether it is single-phase or three-phase, ensure all conductors are routed through, including the neutral if it is being used. Do not place the ground conductor through the CT.

Only the following BENDER current transformers may be used with an RCM420: W0-S20, W1-S35, W2-S70, W3-S105, W4-S140, W5-S210, W20, W35, W60, W120, W210, WR series, WS series. Current transformers with a part number ending in "8000" may not be used. Use AWG 22, shielded cable. The maximum length is 130 feet. Current transformers may be screw mounted with the included mounting feet. Refer to RCM420-DM series user manual for complete technical details.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power before servicing.
- Observe all local, state, and national codes, standards, and regulations.

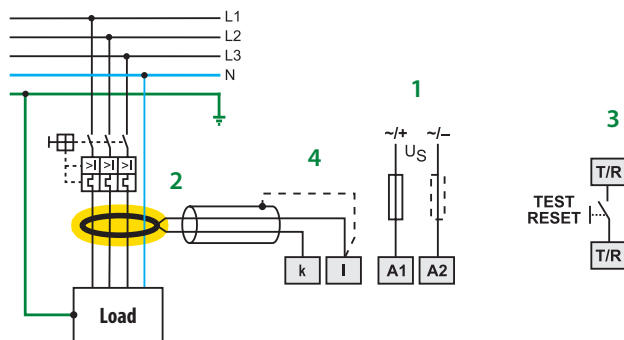


Figure 1 - RCM420-DM wiring diagram for all versions

- External supply voltage; 6A fuse recommended for internal device protection
- Connection to current transformer. All phases, including the neutral if it is being used, must be routed through the CT. Do not route the ground conductor through the CT.
- External test / reset terminal (N/O contact; momentary closure for reset, closure for > 1.5 s for test)
- Connection required for shielded cable

Wiring - Outputs

Available outputs vary by model. Refer to the appropriate wiring diagram below.

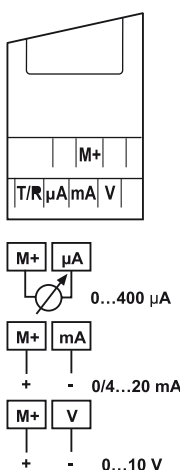


Figure 2 - DM models

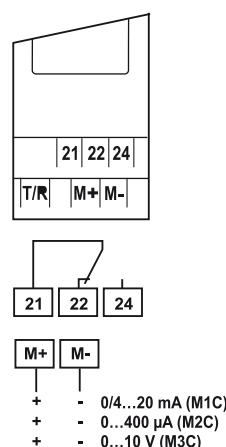


Figure 3 - DM1C, DM2C, and DM3C models

Wiring - Contacts (DM1C, DM2C, and DM3C models only)

Using a normally closed or normally open contact utilizes two factors: wiring out of the proper terminal, and setting the respective contact to normally energized or deenergized operation. Refer to the chart below for relay conditions. For changing the energized state of the contact, refer to "Figure 8 - Contact operation" on the reverse side of this document.

Device Relay Conditions			
Relay Operation Setting	Device Alarm State	K1 STATE	K2 STATE
Normally deenergized mode (N/D) Non-failsafe mode "N/O" in device settings menu	Power ON, normal state (no alarms)	11-12 CLOSED 11-14 OPEN	21-22 CLOSED 21-24 OPEN
	Power OFF	11-12 CLOSED 11-14 OPEN	21-22 CLOSED 21-24 OPEN
Energized in the alarm state Relay will switch when the alarm is activated.	Power ON, alarm state	11-12 OPEN 11-14 CLOSED	21-22 OPEN 21-24 CLOSED
	Power OFF	11-12 CLOSED 11-14 OPEN	21-22 CLOSED 21-24 OPEN
Normally energized mode (N/E) Failsafe mode "N/C" in device settings menu	Power ON, normal state (no alarms)	11-12 OPEN 11-14 CLOSED	21-22 OPEN 21-24 CLOSED
	Power OFF	11-12 CLOSED 11-14 OPEN	21-22 CLOSED 21-24 OPEN
Energized in the normal state Relay will switch when the alarm is activated, or when supply voltage to the device is lost.	Power ON, alarm state	11-12 CLOSED 11-14 OPEN	21-22 CLOSED 21-24 OPEN
	Power OFF	11-12 OPEN 11-14 CLOSED	21-22 OPEN 21-24 CLOSED

Analog Outputs

DM models feature a selectable analog output. DM1C, DM2C, and DM3C models feature a fixed analog output. All models are source devices - they provide the analog signal, proportional to the read value. Refer to the appropriate equation below. For DM and DM1C models, refer to figures 6 and 7 on the reverse side of this document for information on related settings.

0 - 20 mA output (DM and DM1C models)

$$\% = 5 \times I_{out}$$

% Percent of measured fault current relative to setpoint
I_{out} Analog output (mA)

4 - 20 mA output (DM and DM1C models)

$$\% = 6.25 \times (I_{out} - 4)$$

% Percent of measured fault current relative to setpoint
I_{out} Analog output (mA)

0 - 400 μ A output (DM and DM2C models)

$$\% = 0.25 \times I_{out}$$

% Percent of measured fault current relative to setpoint
I_{out} Analog output (μ A)

0 - 10 V output (DM and DM3C models)

$$\% = 10 \times V_{out}$$

% Percent of measured fault current relative to setpoint
V_{out} Analog output (V)

Front Panel Display

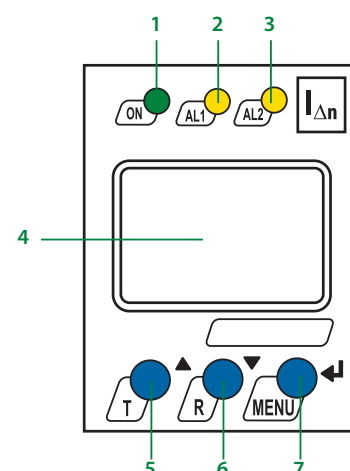


Figure 4 - RCM420 front display

- LED "ON" (green): Illuminates when power is applied to the device. Flashes when the CT connection alarm is active.
- LED "AL1" (yellow): Illuminates when the prealarm is activated. Flashes when the CT connection alarm is active.
- LED "AL2" (yellow): Illuminates when the main alarm is activated. Flashes when the CT connection alarm is active.
- Backlit LCD display
- TEST / UP button: Activates self-test / scrolls up inside main menu.
- RESET / DOWN button: Resets device / scrolls down inside main menu.
- MENU / ENTER button: Activates main menu / Confirms (momentary push) or goes back a step (held > 1.5 s) inside main menu.

Menu Flow Chart for Common Settings

Figures 5 through 8 above contain flow charts for modifying commonly used features and settings in the RCM420-DM's main menu. Not all available features are listed in this document. For more information, consult the RCM420-DM user manual.

Menu Legend

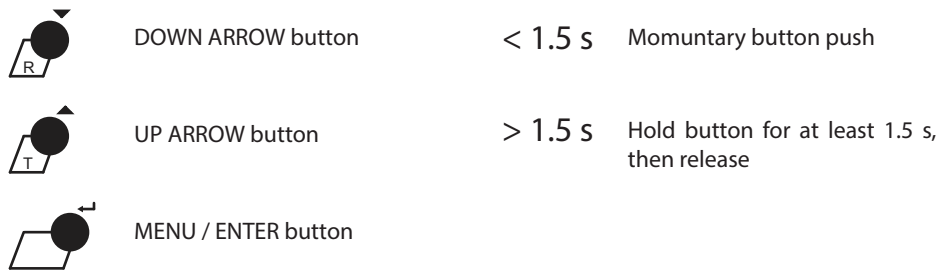


Figure 5 - Setting main alarm trip value

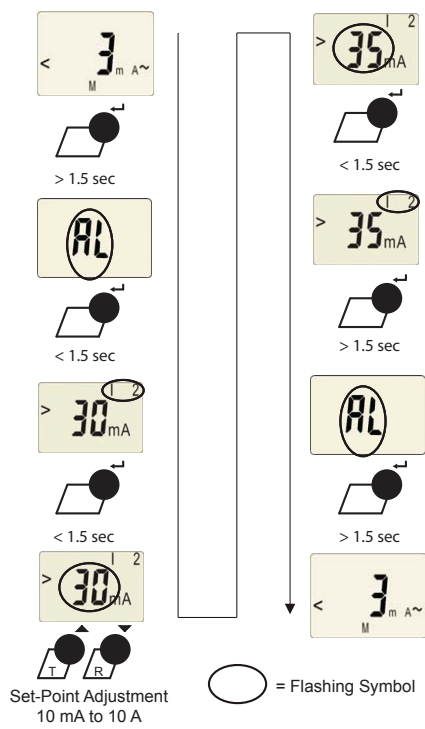


Figure 6 - Changing analog output type (DM and DM1C models only)

On DM models, use this setting to change the analog output to 0-20 mA, 4-20 mA, 0-400 μ A, or 0-10 V. On DM1C models, use this setting to change the analog output to either 0-20 mA or 4-20 mA. All other types have fixed analog outputs and do not have this option.

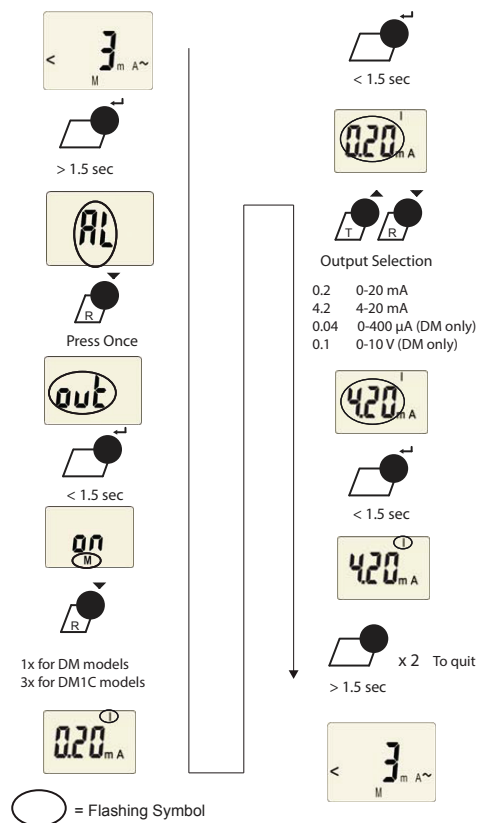


Figure 7 - Changing analog output scale

By default, the analog output is a 0-100% scale based on the main alarm trip level. If desired, the scale of the analog output may be changed from the main alarm level to a different, arbitrary value. This entered value is used as the 100% point. Use the steps below to make this change.

This setting is particularly desirable for DM1C, DM2C, and DM3C models, where the available relay contact may trip on the alarm level, but the analog output must be set to a different scale.

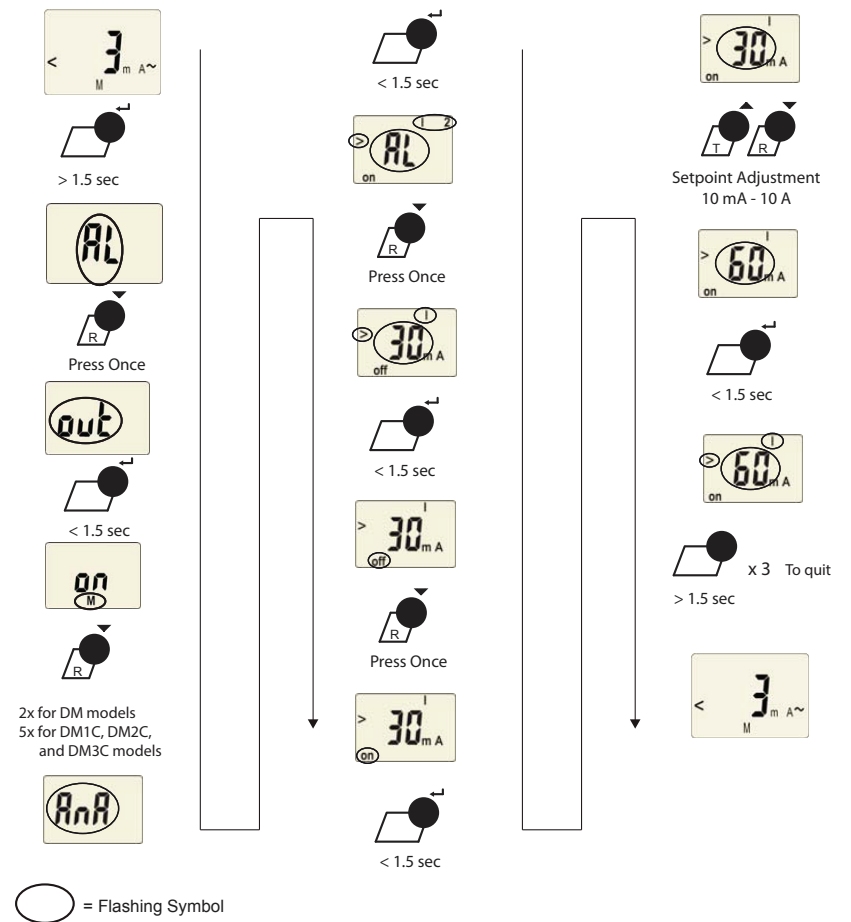
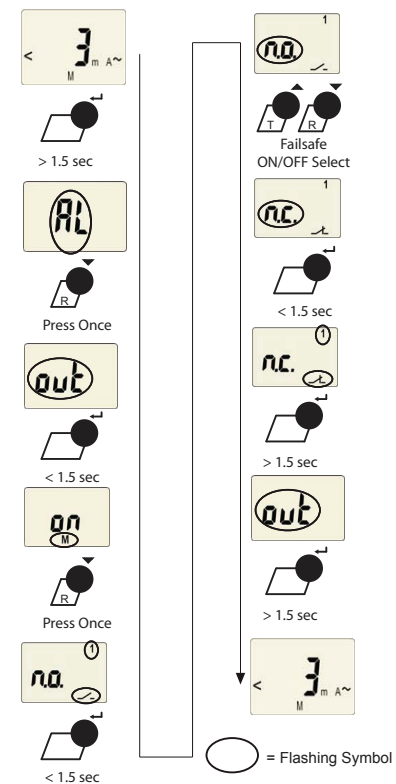


Figure 8 - Contact operation (DM1C, DM2C, and DM3C models only)

Use this option to change the behavior of the contacts between normally deenergized (non-failsafe) mode and normally energized (failsafe) mode. The two SPDT contacts may be changed individually. Note that the RCM420 labels normally deenergized operation as "N/O" and normally energized operation as "N/C"; utilizing a normally open or normally closed contact only depends on which contact output is wired.



Dimensions

Dimensions in inches (mm).

