

MRF102

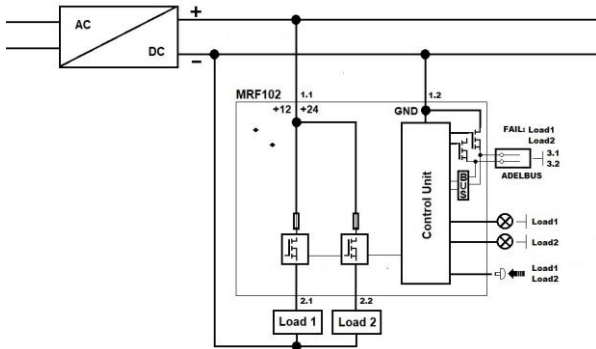
2- Channels Electronic Circuit Breaker

Instruction Manual

Thank you for having chosen one of our products for your work. We are certain that it will give the utmost satisfaction and be a notable help on your job and application.

1 Product Description

The MRF102 2-channel electronic circuit breaker with Din Rail and Wall mounting is designed for current distribution and protection of 12V or 24V load circuits.



2 Safety and warning notes



WARNING – Explosion Hazard Do not disconnect Equipment unless power has been switched off or the area is known to be non-hazardous.

WARNING – Explosion Hazard. Substitution of components may impair suitability for class I, Division 2.

WARNING – Switch off the system before connecting the module. Never work on the machine when it is live. The device must be installed according to EN61010 or EN62368-1. The device must have a suitable isolating facility outside the power supply unit, via which can be switched to idle. Danger of fatal Injury!

WARNING – The device is equipped with an internal fuse. If the internal fuse blows up (fails opens), it is most probable that there is a fault in the device. If this failure occurs, the device must be returned to the factory.

3 How to Install

3.1 Mounting

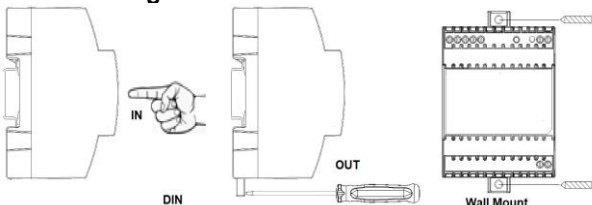


Fig. 1 – Drawing of the MRF102

3.2 Din Rail or Panel Mounting

Fig. 1 shows a dimensional drawing of the MRF102. It is possible to mount the device on Din rail or in panel and fix it by 4 screws 2.9x8-16. There is no limit for the Panel thickness.

3.3 How to Supply MRF102

The MRF102 is supplied directly from the power source which provide power to the load. The device is protected by internal physical fuse, also in worst case situations. The input rating is 8 – 35Vdc.

3.4 Device Connection (Fig.2)

The following cable cross-sections may be used:

	Solid (mm2)	Stranded (mm2)	AWG	Torque (Nm)	Stripping Length
In:	0.2–2.5	0.2–2.5	24 – 14	0.5–0.6	7 mm
Out:	0.2–2.5	0.2–2.5	24–14	0.5–0.6	7 mm
Signal:					AMP Modu II

Connection by the screw, type 2.5 mm2. Wiring terminal shall be marked to indicate the proper connection for the power supply. Use copper cables only, for supply connections, use wires suitable for at least 75°C.

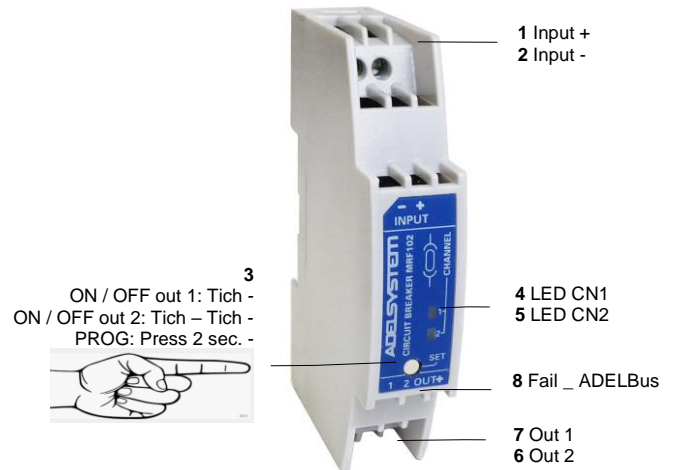


Fig. 2 – Connections to MRF102

3.5 Connection terminal and wiring

Reference	Description
1	+ Input Power
2	- Input Signal
3	Push Button: ON / OFF Channel 1 and 2 / Config.Mode
4	LED Green, Orange, Red: Channel controls / Config.Mode
5	LED Green, Orange, Red: Channel controls / Config.Mode
6	Output 1
7	Output 2
8	Output Fail CN1 and CN2 or ADELBUS connection

4 Drive a Channel

4.1 Turn On Channel

On the first power up, all channels are OFF.

To enable channel 1 (LED Blink Red for short time) push the set button for short time: one time; < 1 sec.

To enable channel 2 (LED Blink Red for short time) push the set button for short time: two times; < 1 sec.

Each channel could be enabled after a Switch off for Overload or Short circuit, (LED Red ON). When the LED Red flash for 3 times, the device is ready to turn ON the channel. If the channel is ON, the device maintains in memory the state also without the power; this function is not enabled if the device is in configuration mode.

4.1 Turn Off Channel

When the channel 1 is ON (LED Blink Green or Orange for short time) push button for short time: one time and the channel turn OFF; < 1 sec.

When the channel 2 is ON (LED Blink Green or Orange for short time) push button for short time: Two times and the channel turn OFF; < 1 sec.

If the channel is OFF, the device maintains in memory the state also without the power.

5 LED indication

- Led RED ON: the channel is in protection due to Overtemperature, Overcurrent, Over/Under voltage (<8.5V or >32.5V). The device could be in this situation for some sec. In this condition it is not possible to turn ON the device.
- Led RED flashes three times for short time: the channel is OFF after switch protection, but is ready to be turned ON. Push the set button to turn ON the device.
- Led RED flashes one for short time, the channel is OFF but ready for turn ON. Push the set button to turn ON the device.
- Led GREEN blinks for short time: the channel is ON and the current through the channel is <80% of the tipping point switch.
- Led ORANGE blinks for short time: the channel is ON and the current through the channel is >80% of the tipping point switch.
- Config. Mode: One Led OFF and the second Led ORANGE blinks, in this condition it is enabled the procedure:
 - Verify the trip current set for each channel
 - Configure the trip current for each channel

6 Control and Programming

6.1 How to verify the trip current sett

Press the set button for more than 2 sec. until LED channel 1 start to blink Orange.

- The number of Orange blink provide the number of Ampere set for the trip current: 1 Blink = 1A ... 10 Blink 10A
- Press the push button for more than 2 sec. until LED channel 2 start to blink Orange.
- The number of Orange blink provide the number of Ampere set for the trip current: 1 Blink = 1A ... 10 Blink 10A
- End the procedure by holding down the button for 2 seconds until the LEDs resume their regular flashing.

If the button is not pressed for 20 seconds, the procedure ends automatically and the LEDs resume their regular flashing.

6.2 How to set the trip Current

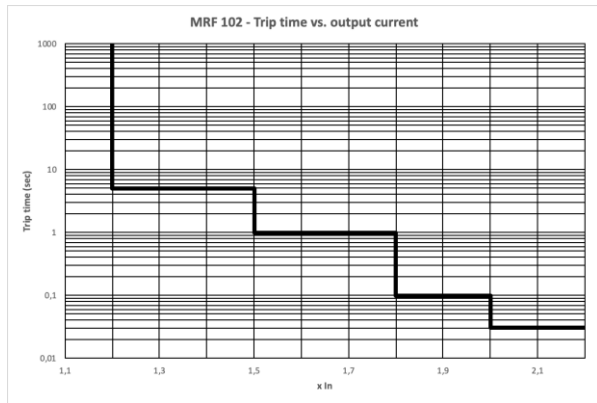
Press the push button for more than 2 sec. until LED channel 1 start to blink Orange.

- Option: it is possible count the number of orange blinks according to the number of Ampere set for the trip current: 1 Blink = 1A ... 10 Blinks = 10A
- Press the push button for a number of time equivalent to the desired number of tripping Ampere.
- Verify option: successively press the desired Ampere, the device will return the set number after 2 sec
- Correction option: correction of the current setting by pressing one more time the set button: e.g., 6A + 1A more = 7A. When 10A is reached, the counter restart from 1A.
- To confirm the New Trip Current setting, press the push button for 2 sec. until LED channel 2 start flashing orange.

Set the current limit for channel 2 in the same way as for channel 1.

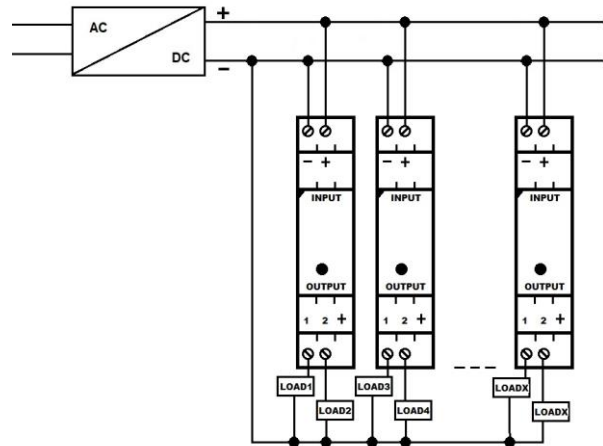
- Confirm the new Trip Current of the channel 2 and finish the Configuration procedure by holding the button for 2 seconds until the LEDs start flashing regularly again.
- **Mandatory:** to ensure the new value is set, the procedure must be completed. If the button is not pressed for 20 seconds, the procedure automatically ends and the LEDs resume flashing regularly. The device retains the old value.

Note: On the first power up the device is programmed at 3A for each channel.

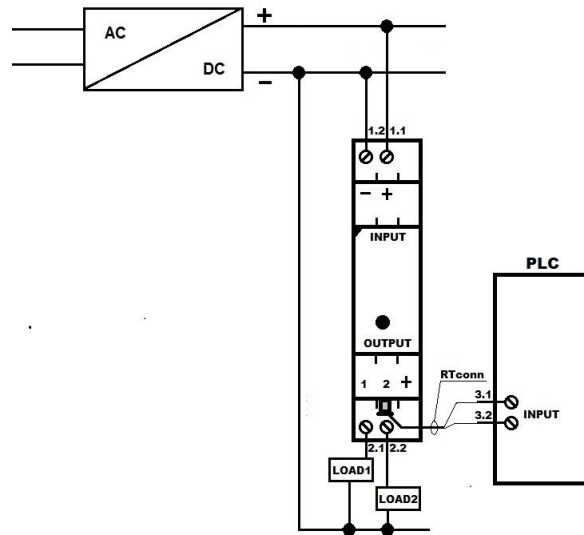


6.3 Connection Diagram

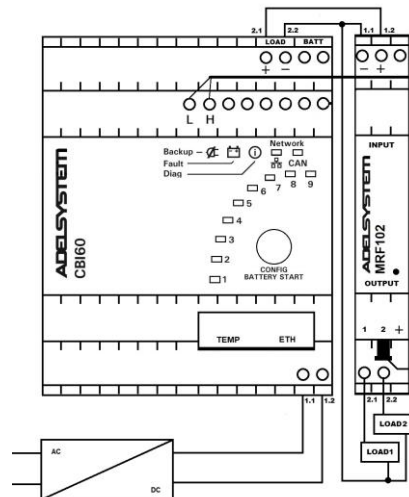
6.3.1 Multiple Devices



6.3.2 PLC Fail Connection



6.3.3 CBI60 – MRF102 Driver



7 Technical data

7.1 Input Data

Supply voltage / at DC / Rated value	12 – 24 V
DC Input Voltage range (Vdc)	8 – 35 V
Overvoltage overload capability	35 V
Input current / at rated input voltage 12 - 24 V / Rated Value	20 A max (30A peak max 10 sec)
Maximum current consumption	10mA (12 VDC) - 10mA (24 VDC)
Required Back Up Fuse	Not required. Integrated failsafe element (internal fuse)
Input Voltage Reset Output	7 ...32 Vdc

7.2 Output Data

Voltage curve / at output	Controlled DC voltage
Drop Out	0.2 V
Number of outputs	2
Output current / up to 60 °C / per output / rated value	10 A
Adjustable switch Off out current	1 ...10A
Type of response value setting	via Blink code Led
Parallel switching of outputs	Yes
Bridging of equipment's	No
Start Up	< 0.5 sec.
Surge voltage shutdown load circuit	>32 Vdc
Max Capacitive Load	50.000 uF
Rated Surge Voltage	0.5 KV

7.3 Efficiency

Efficiency	97%
Power loss [W] (max)	1.5W (Nominal Operation)
Power dissipation	0.9 W (No Load operation)

7.4 Switching - off per output

I _{out} = 1.0 ...1.5 x set value	switch-off after approx. 5 s
I _{out} = 1.5 ...1.8 x set value	switch-off after approx. 1 s
I _{out} = 1.2 ...2 x set value	switch-off after approx. 0,1 s
I _{out} > 2 x set value	switch-off after approx. 0,03 s
I _{out} > set value and Vin < 15% (24V); (12V)	switch-off after approx. 0,03 s
Turn On Output after Switch Off	- Manual Reset - By Press Button
Waiting time after switch off Out	- 5 sec max. (Hover load / Short Circuit)

7.5 Protection and Monitoring

Internal Fuse protection type	16A per output (not replaceable)
Dielectric strength	Max 32 Vdc (on Load Circuit)
Display version	Three-color LED per output: - green LED for "Output switched through" - Red LED for "Output switched off manually" - Red LED Blink for "Output switched off due to overcurrent" - Orange LED: Verify and Config
Connection for monitoring device:	AUX1: connection 2 pin AMP
Configuration Aux1	1: as ADELBus for Driving, Monitoring, Configuring 2: Out Alarm for For SwitchOff Output
Diagnosis	- Common Signaling for disconnection Last Output - Single Channel: Current, set current threshold, Status On/Off - Reason of Output disconnection

7.6 Connection

Input 12 or 24V	1 Screw Type	0.2 - 2.5 mm ²
Input 0V	1 Screw Type	(24 – 12 AWG);
Outputs	1 Screw Type	0.6 - 0.8 Nm
Signal Output:	AUX1: connection 2 pin AMP	

7.7 Ambient Conditions

Nominal Temperature operation	-25 up to +60°C (>60°derating 2.5%°C)
Ambient Temperature operation	-25 up to +70 °C
Ambient Temperature Storage	-40 up to +85 °C
Humidity at 25 °C, no condensation	95 % to 25 °C (acc. to IEC 60721)
Vibration (operation) IEC 60068-2-6	<15 Hz, amplitude ± 2.5mm <15Hz-150Hz, 2.3G 90 min.
Altitude: 0 to 2 000m - 6560 to 20 000ft	No restrictions

7.8 General Data

Protection Class (EN/IEC 60529)	IP20
Reliability: MTBF IEC 61709	> 700.000 h (Automatically Switch Off Beck Light after 30 sec)
Protection class	III
Housing material	Polycarbonate
Foot latch material	Plastic POM
Screw type connection	0.2 - 2.5 mm ² (24 – 12 AWG) 0.6 - 0.8 Nm
Dimension (w-h-d) mm	18 x 90 x 61
Weight	0.1 kg approx.

8 Norms

8.1 Immunity and Emission

The CE mark in conformity to EMC 2014/30/EU: Electromagnetic Compatibility Directive; 2014/35/EU: Low Voltage Directive; ROHS 2011/65/EU: Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS), as amended by 2015/863/EU

- EMC Immunity: EN61000-6-2
- EMC Emission: EN61000-6-3, EN 55022 ClassB

8.2 Electrical Safety for mounting

According to:

- Electrical Equipment for Machinery EN 60204
- Electrical safety (of information technology equipment) IEC/EN EN62368-1.
- Safety requirements for electrical equipment for measurement, control and Laboratory use IEC/EN 61010

9 Accessory

- RTConn: connector cable for the connection to AUX1. It is possible drive the device through the ADELBus network.