



Mains Power Filter

970MF10
970MF20



Installation Instructions

Table of Contents

1.0 Warnings	3
2.0 Introduction	3
3.0 Quick Installation Overview	3
4.0 Typical Installations	3
5.0 Protection Concepts	5
6.0 Mounting	5
7.0 Configuration and Protection Modes	5
8.0 Conductor Termination	6
9.0 Fusing and Isolation	6
10.0 Three Phase Systems	6
11.0 Maintenance and Testing	6
12.0 Facility Protection	7
13.0 Specifications	7
14.0 Extended Warranty	8

1.0 Warnings

- The 970MF10 and 970MF20 are only intended for use with the Clipsal 970 Series Surge Arrestor(s). The Mains Power Filter (MPF) should not be installed without a 970 Series Surge Arrestor upstream.
- RCD must be mounted on the right hand side of the MPF to avoid nuisance tripping.
- The MPF is designed to operate at a nominal operating voltage of 240V~ at 50Hz.
- Hazardous voltages may exist internally to the MPF modules. MPFs should be installed (and replaced) only by qualified personnel in accordance with all relevant Electrical Safety Standards.
- The Earth terminal must be connected to a low impedance Earth (<10Ω) for correct operation.
- MPFs must be installed in an enclosure or panel. Ensure this does not cause the MPFs environmental ratings to be exceeded.
- **Do not “Megger” or “Flash Test” circuits with MPFs installed, refer to 970 Series Surge Arrestor Instructions.**
- All instructions must be followed to ensure correct and safe operation.
- Diagrams are illustrative only, and should not be relied on in isolation.

2.0 Introduction

This installation manual details the preferred procedure for the installation of Clipsal Power Filters 970MF10 and 970MF20.

These products are designed to be installed with the Clipsal 970 Series Surge Diverters; to provide additional protection and filtering. For convenience, the provision of two sets of each terminal on the MPF allows input and output wiring to be configured, at will, to either top or bottom terminals. Only one of each of the terminals is required to be connected.

These units are packaged in “DIN 43 880” profile enclosures, for simple installation onto switchboard DIN rails. They can be selected for use with distribution systems, with maximum RMS voltages of 275V (L-N) at frequencies of 50/60Hz.

3.0 Quick Installation Overview

Install in the following manner:

1. ensure that power is removed from the area and circuits to be connected
2. snap lock the MPF and 970 to the DIN rail
3. install the appropriate upstream overcurrent protection
4. connect wiring to the indicated terminals
5. test circuit and apply power.

4.0 Typical Installations

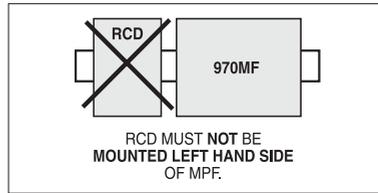
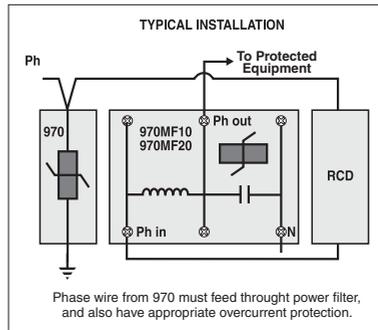
The MPF should be installed downstream, but in the same switchboard as the 970 Surge Arrestor.

Although it is technically preferable to install the MPF prior to the RCD, this decision is generally best based on which is most convenient and simplest to install. As per the installation instructions supplied with the 970 Surge Arrestor, this should be installed before the RCD. It may be possible that for some installations the RCD will be installed between the Surge Arrestor and the MPF.

For convenience two “Phase In”, two “Phase Out” and two “Neutral” terminals are provided. Only one of each of the terminals is required to be connected, allowing the installer to configure, at will, to either top or bottom terminals.

Connection of Phase Terminals

- The phase conductor must be passed through the MPF via one “Phase In” and one “Phase Out” terminal.

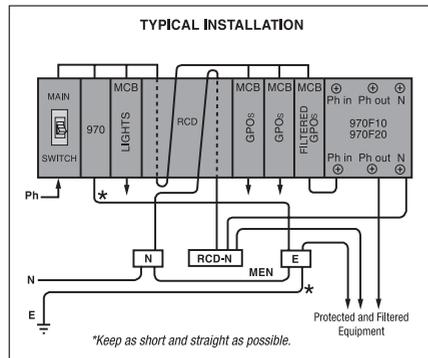
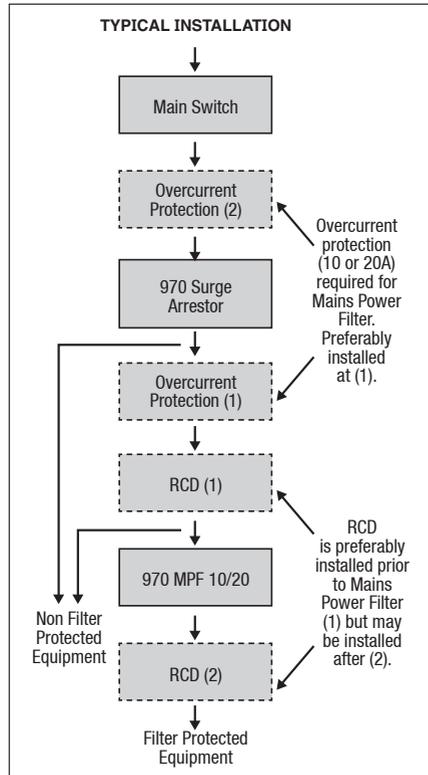


Connection of Neutral Terminal

- At least one of the MPF “Neutral” terminals must be connected to Neutral. A short direct connection is required.
- Alternatively, if allowable by local regulation, the Neutral to the protected equipment can be passed through the MPF, in either “Neutral” terminal and out the other. This improves device performance.

Overcurrent Protection

- As detailed on page 6 (9. Fusing and Isolation) overcurrent protection is required to be installed upstream of the MPF to ensure it is not overloaded.

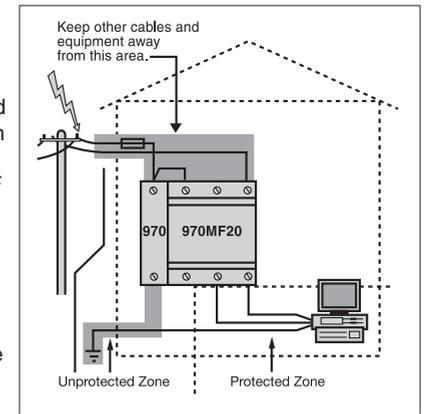


5.0 Protection Concepts

To optimise effectiveness of installed protection, a concept of “Unprotected” and “Protected” wiring should be followed.

Wiring from the incoming mains to the MPF should be considered “Unprotected” and kept remote from all other wiring (approximately 300mm) where possible. Wiring on the equipment side of the MPF should be considered “Protected”.

The separation of “Protected” from “Unprotected” wiring is recommended, in order to minimise the risk of transients conducted on “Unprotected” wiring cross coupling onto “Protected” circuits, thus compromising the level of protection available from the MPF.



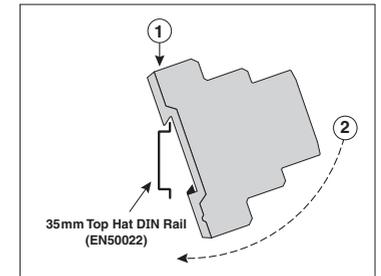
6.0 Mounting

MPFs are designed to clip to 35mm top hat DIN rails. Unless otherwise mechanically restrained, use horizontal DIN rails with the MPF fixing clips to the bottom, (ie. label text the correct way up).

Units must be installed in an enclosure or panel, to provide the appropriate degree of electrical and environmental protection.

Only use enclosures that:

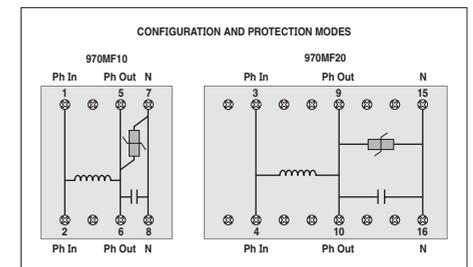
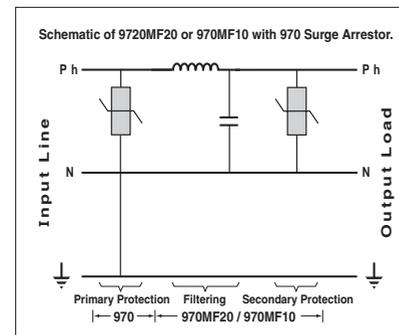
- do not cause the MPF temperature to exceed 55°C
- provide adequate electrical and safety protection
- prevent the ingress of moisture and water.



7.0 Configuration and Protection Modes

The MPF products, when connected with the 970 Surge Arrester, provide a protection mode optimised for the protection of sensitive electronic equipment in an Australian/New Zealand MEN distribution system (the TN-C-S system).

The 970 Surge Arrester Instructions recommend the 970 be installed from Line to Earth, while the MPF provides the filtering and secondary protection between Phase and Neutral.



8.0 Conductor Termination

Each MPF terminal is designed to accept wire sizes from 1.5mm² to 6mm² solid or stranded conductor. Insulation should be stripped back 8mm before terminating into the tunnel terminal.

Do not use excessive force when tightening the terminal.

Where two wires may need to be terminated into one terminal, the maximum permissible size is 4mm² each.

9.0 Fusing and Isolation

Overcurrent and short circuit protection must be installed upstream of every MPF, to provide protection to the unit itself, the load and the wiring in case of fault situations. This also provides a means of isolating the MPF. This is an important safety consideration and is required in the event that any future maintenance or testing is needed.

Overcurrent protection by HRC or circuit breaker must be fitted in the upstream circuit. The rating used should be the smallest of:

- current rating of MPF
- current rating of wiring.

Overcurrent protection can be installed either before or after the 970 Surge Arrestor.

Australian wiring regulations AS/NZS 3000 specifies the following upstream protection for two common wire sizes.

Cable Size	HRC Fuse or CB	Rewirable Fuse
1.5mm ²	16A	12A
2.5mm ²	20A	16A

For example 1.5mm² wire is rated to carry up to 16A, however if a 10A MPF were installed in a circuit with this wiring, a 10A overcurrent device must be installed upstream to protect the MPF from inadvertent overload. If 1.5mm² wire were used to connect to a 20A MPF, as the wiring is rated to a maximum of 16A, the overcurrent protection would have to be a 16A HRC fuse or CB to protect the wiring against overload.

10.0 Three Phase Systems

Three phase circuits can be protected by appropriately installing three separate 970/MPF combinations.

Do not disconnect upstream Earth or Neutral connections supplying the MPFs while power is still applied to the MPF, as this may damage the MPF and/or load.

11.0 Maintenance and Testing

Before removing any unit from service, ensure that power to the device is isolated. Replacement of any MPF units should only be undertaken in accordance with all relevant Electrical and Safety Standards, by suitably qualified personnel.

Units cannot be serviced, they must be replaced.

MPF units should be replaced or inspected if the 970 Surge Arrestor requires replacement, indicated by the red flag in the window. The MPF should be:

- visually checked for any damage
- resistance checked, between any “Ph In” and “Ph Out” terminals. This should be less than 0.5Ω.

With a low voltage Insulation Tester (<250V), insulation between any “Ph Out” and “N” terminal should be above 10MΩ after one minute.

Do not attempt to open or tamper with the MPF units in any way, as this may compromise performance and will void warranty.

Do not “Megger” or perform other types of electrical tests that apply voltages greater than the nominal operating voltage between Phase and Neutral. The MPF will attempt to limit these voltages thereby affecting the test result. Where these tests must be performed, first remove the MPF from circuit.

12.0 Facility Protection

Power filters form an important part of the much larger lightning, surge and transient protection philosophy.

Protection may be required for communication circuits, equipotential bonding and also the protection of the structure of facility from direct lightning strikes.

The level of protection and the degree of attention dedicated to each of the points will require careful consideration for each site. The degree of protection required is determined by the individual site location/exposure with the aid of risk management principles.

13.0 Specifications

		970MF10	970MF20
Maximum Continuous Operating Voltage	U _c	275Vrms	275Vrms
Load Current	I _{LOAD}	10A	20A
Operating Temperature		0-55 deg C	0-55 deg C
Conductor CSA		1.5 - 6mm ²	1.5 - 6mm ²
Degree of Protection		IP20	IP20
Mounting		35mm DIN rail	35mm DIN rail
Cut-off Frequency	f _c	<20KHz	<20KHz

Typical Performance with 970 Surge Arrestor

Maximum Discharge Current	I _{MAX}	40kA 8/20μs	40kA 8/20μs
Nominal Discharge Current	I _n	15kA 8/20μs	15kA 8/20μs
Let-through at 3kA 8/20μs		<800V	<720V
Rate of Voltage Rise at 3kA 8/20μs		<100V/μs	<50V/μs
Let-through at 20kA 8/20μs		<820V	<770V
Rate of Voltage Rise at 20kA 8/20μs		<120V/μs	<100V/μs

14.0 Extended Warranty

1. The benefits conferred herein are in addition to, and in no way shall be deemed to derogate; either expressly or by implication, any or all other rights and remedies in respect to this Clipsal Product, which the consumer has under the Commonwealth Trade Practices Act or any other similar State or Territorial laws.
2. The Warrantor is Clipsal Australia Pty Ltd, 33 - 37 Port Wakefield Road, Gepps Cross, South Australia, 5094. With registered offices in all Australian States. Call 1300 2025 25.
3. This Clipsal Product is guaranteed against faulty workmanship and materials for a period of two (2) years from the date of installation.
4. Clipsal Australia Pty Ltd reserves the right, at its discretion, to either repair free of parts and labour charges, replace or offer refund in respect to any article found to be faulty due to materials, parts or workmanship.
5. This warranty is expressly subject to the Clipsal Product being installed, wired, tested, operated and used in accordance with the manufacturer's instructions.
6. All costs of a claim shall be met by Clipsal Australia Pty Ltd, however, should the product that is the subject of the claim be found to be in good working order, all such costs shall be met by the claimant.
7. When making a claim the consumer shall forward the Clipsal Product to the nearest office of Clipsal Australia Pty Ltd together with adequate particulars of the defect within 28 days of the fault occurring.

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