



*Under and overfrequency protection  
in AC systems.*

### Features and Benefits

- Frequency metering and last trip data
- Part of a modular system
- Independent 2" modules
- 1/8 standard 19" rack cases available
- 3 digit display and reset button

### Applications

- AC systems
- Load shedding and restoration

### Protection and Control

- Under and overfrequency
- Undervoltage inhibit setting



## Description

MFF relays are microprocessor based relays that provide protection against frequency variations in AC systems.

MFF relays perform the following functions:

- protection against frequency variations
- frequency measurement
- register of the frequency and operation time of the last trip, as well as the setting level that has tripped

MFF relays have two setting levels that can be programmed as follows:

- two maximum frequency settings
- two minimum frequency settings
- one maximum and one minimum frequency settings.

The operation time is independent for each level, and it is adjustable from 0 to 10 sec, the minimum tripping response being between 3 and 5 cycles.

When a quick frequency variation occurs, if the second setting is reached before the first setting's operation time is finished, the first setting will trip before finishing its time. The relay blocks when the network voltage falls under an inhibition value, adjustable between 40 and 100% of the nominal voltage. MFF relays are digital and modular, mounted in a 1/8 rack case.

## Applications

The minimum frequency function of the MFF is designed specifically to be applied in load shedding systems, where the accuracy and repeatability of the measurements are very important. If as a consequence of a disturbance in the system there is a loss of the generator's capacity, so that the load exceeds the generation, the system can collapse.

The first indication is the fall of frequency, as a consequence of the generator's loss of speed. The

MFFs distributed around the system detect this condition and trip in order to disconnect the loads in a controlled way. This action must be fast and strong enough to allow the system recovering. In order to avoid the complete breakdown of the system, the loads will be restored using the maximum frequency function.

## Construction

- accurate and reliable, with low power consumption
- drawout, 1/8 19" rack case
- LED indicating lamps: In service (green LED) Level 1 trip (red LED) Level 2 trip (red LED)
- three-digit display, showing the following data:
  - F0. status of the equipment
  - F1. frequency measurement
  - F2. last trip level (1 or 2)
  - F3. last trip frequency
  - F4. last trip time
- fire resistant, shock resistant, sealable plastic cover, with external indicator resets

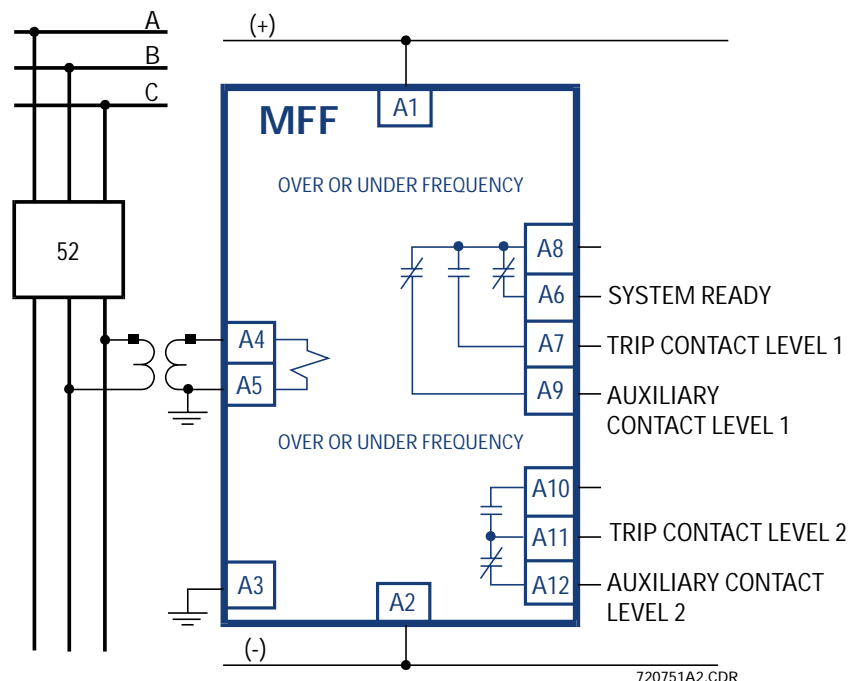
- output unit with high seismic rating
- high reliability solid state components
- micro-processor based system

Fig. 1. Face plate characteristics



## Typical Wiring

Fig. 2. MFF external connections



720751A2.CDR

## MFF Technical Specifications

### MONITORING

The settings are adjusted using the three push-buttons on the front of the relay:  
ENTER, +, -. The chosen setting value will be shown on the display.

#### Available Ranges:

#### Frequency Setting (independently for units 1 and 2):

Type Selection: maximum or minimum  
Frequency: 42.0 to 67.5 Hz in steps of 0.1 Hz

#### Timing setting (independently for units 1 and 2):

0.00 to 10 sec in steps of 0.05 sec

Inhibition Voltage Setting: 40 to 100%  $V_n$  in steps of 10%

### OUTPUTS

The MFF basic model provides two auxiliary tripping relays (1 per level) with a type C contact:

Closing Capacity: 3000 W resistive during 0.2 sec. with a max of 30 A and 300 VDC

Breaking Capacity: 50 W resistive with a maximum of 2 A and 300 VDC

Make and Carry: 5 A

There is also an auxiliary equipment alarm relay with an NC contact:

Closing Capacity: 5 A during 30 sec and 250 VDC max

Breaking Capacity: 25 W inductive and 250 VDC max

Make and Carry: 3 A

### INPUTS

Nominal Frequency: 50 or 60 Hz

Nominal Voltage: 110 VAC

Auxiliary Voltage: 48-125 VAC/VDC  
110-220 VAC, 110-240 VDC

Consumption: less than 1.5 W for all voltages

Accuracy:  $\pm 0.005$  Hz

Repeatability: 0.01 Hz

Permanently Admissible Max Voltage: 220V

### TYPE TESTS

Isolation Test Voltage: 2 kV, 50/60 Hz, 1 min  
Surge Test Voltage: 5 kV peak, 0.5 J  
Interference: Class III according to CEI 255-22-1  
Class IV according to CEI 255-22-2  
Electrostatic Discharge: Class III according to CEI 255-22-3  
Class IV according to CEI 255-22-4  
Radio Interference: Class II according to CEI 255-21-1  
Fast Transient: Class I according to CEI-225-21-2  
Sinusoidal Vibration: Class I according to CEI-225-21-2  
Shock: According to CEI 41B (Sec.) 81 and EN55022 class B  
Radio Frequency Emission: According to CEI 41B (Sec.) 81 and EN55022 class B  
Emissivity according to EN50081-2  
Susceptibility according to EN50082-2

CE :

### ENVIRONMENTAL

Temperature:  
Operation: -10°C to +55°C  
Storage: -40°C to +70°C  
Ambient Humidity: Up to 95% without condensation

### PACKAGING

Approximate Weight:  
Net: 5.06 lbs (2.3 kg)  
Packaged: 5.5 lbs (2.5 kg)

### APPROVALS

CE Compliant UL - UL listed for USA and Canada

\*Specifications subject to change without notice.

## Ordering

To order select the basic model and the desired features from the Selection Guide below.

| MFF 1000 | A000 | * | 00C                                   |
|----------|------|---|---------------------------------------|
| MFF 1000 |      |   | Digital frequency relay               |
|          | F    |   | 24-48 VDC power supply                |
|          | G    |   | 48-125 VDC/VAC power supply           |
|          | H    |   | 110-220 VCA, 110-240 VDC power supply |

There is also a possibility to supply special models with different ranges.

