The MFR 1 Series is a family of industrial grade protective relays that offer multiple protective features in a single package.

Using a digital processor to measure true RMS values enables the control to have a high measuring accuracy, regardless of harmonics, transients or disturbing pulses.

The MFR 15 model includes a synchronizer and a load (kW) and power factor (cosphi) controller via discrete outputs to combine protection and control into one unit. Different packages offer additional functionality.

The MFR 15/SY is for single unit applications while the MFR 15/SYN has kW load sharing capability for multiple unit applications.

The compact size and multiple functions of the MFR 15 help to simplify switchgear design. The digital display offers a user-friendly interface to setup the unit as well as monitor the operation and display any alarms.

**Features (all)**
- True RMS voltage (generator/busbar)
- True RMS current (generator)
- Configurable trip/control set points
- Configurable delays for each alarm
- 3 configurable relays
- 3 dedicated control relay outputs
- Two-line LC display

**DESCRIPTION**

### Protection (all) ANSI #
- Over-/undervoltage (59/27)
- Over-/underfrequency (81O/U)
- Voltage asymmetry (47)
- Overload (32)
- Reverse power (32R)
- Reduced power (32F)
- Unbalanced load (46)
- Loss of excitation (40Q)
- Independent time-overcurrent (50/51)

### Package SY
- Synchronizer for 1 CB
  - Isolated operation
  - Mains parallel operation
- Speed/frequency/real power
- Voltage/power factor (cosphi)
- Remote real power set-point (0/4 to 20 mA)
- 3 configurable analog outputs (20 mA)
- Pulse output for kWh

### Package SYN
- Synchronizer for 1 CB
  - Isolated operation
  - Mains parallel operation
- Speed/frequency/real power
- Voltage/power factor (cosphi)
- Remote real power set-point (0/4 to 20 mA)
- 3 configurable analog outputs (20 mA)
- Pulse output for kWh
- Load sharing via 0 to 4 Vdc analog line

### Package SYN-I
- Synchronizer for 1 CB
  - Isolated operation
  - Mains parallel operation
- Speed/frequency/real power
- Voltage/power factor (cosphi)
- Remote real power set-point (0/4 to 20 mA)
- Load sharing via 0 to 4 Vdc analog line
- Interface RS-485/Modbus RTU Slave

- Complete generator protection and controller in one unit
- True RMS sensing
- Synchronization for one breaker
- Load sharing
- Discrete inputs for remote control
- Programmable relay outputs
- PC and front panel configurable
- Microprocessor technology for accurate, repeatable and reliable operation
- Programmable threshold set-points with individual time delays
- CE marked
- UL/cUL Listed
- GL Approval
SPECIFICATIONS

Accuracy .......................................................................................... Class 1
Power supply................................................................................. 24 Vdc (18 to 30 Vdc)
Intrinsic consumption ................................................................. max. 12 W
Ambient temperature ................................................................. -20 to 70 °C
Ambient humidity ........................................................................ 95 %, non-condensing

Voltage ............................................................
Maximum value ($V_{\text{max}}$): [1] 150 Vac or [4] 300 Vac
Rated voltage $V_{\text{in-ground}}$: [1] 150 Vac or [4] 300 Vac
Rated surge voltage: [1] 2.5 kV or [4] 4.0 kV

Linear measuring range up to ....................................................... $1.3 \times V_{\text{rated}}$
Measuring frequency ................................................................. 50/60 Hz (40 to 70 Hz)
Input resistance ................................................................. [1] 0.21 MΩ, [4] 0.7 MΩ
Max. power consumption per path .............................................. < 0.15 W

Current $I_{\text{rated}}$ ................................................................. [1] 1 A or [5] 5 A
Linear measuring range up to ....................................................... $3.0 \times I_{\text{rated}}$
Load ......................................................................................... < 0.15 VA
Rated short-time cur. (1 s) ....................................................... [1] 100.0 $\times I_{\text{rated}}$, [5] 20.0 $\times I_{\text{rated}}$

Discrete inputs ............................................................................ isolated
Input range ..................................................................................... 18 to 250 Vac/dc
Input resistance ......................................................................... approx. 68 kΩ

Pulse outputs ............................................................................. transistor output
Rated gate voltage ................................................................. 24 Vdc
Maximum gate voltage ................................................................. 32 Vdc
Minimum gate current ................................................................. 10 mAdc
Maximum gate current ................................................................. 30 mAdc (0.5 Vdc)

Relay outputs ............................................................................. isolated
Contact material ........................................................................ AgCdO
Load (GP) ................................................................................. 24 Vdc@2 Adc, 250 Vac@2 Aac
Pilot duty (PD) ........................................................................... 24 Vdc@ 1 Adc

Analog output ............................................................................. isolated
Type ......................................................................................... 0/4 to 20 mA, freely scaleable
Resolution .............................................................................. 8/12 Bit (depending on model)
Max. load 0/4 to 20 mA ................................................................. 500 Ω
Insulating voltage ........................................................................ 500 Vdc

Housing ..................................................................................... Type APRANORM DIN 43 700
Dimensions .................................................................................. 96×72×130 mm
Front cutout ................................................................................. 91 [+0.8] × 67 [+0.7] mm
Connection ................................................................................. screw/plug terminals depending on connector 1.5 mm², 2.5 mm² or 4 mm²

Disturbance test (CE) ............................................................... tested according to applicable EN guidelines
Listings ..................................................................................... UL/cUL listed for ordinary locations
Approvals .................................................................................. GL (Germanischer Lloyd)

DIMENSIONS

2005-07-11 | MFR 1 Dimensions rwev-2805-ab.4d
The synchronizing voltage must be connected three-phase if the measuring voltage is connected three-phase (N not connected). If the measuring voltage is connected four-phase (L1-L2-L3-N), the synchronizing voltage may be connected two-phase (L1-L2). L3 is connected only for compensation and is not measured.

**Important note on synch voltage measurement:**

The synchronizing voltage must be connected three-phase if the measuring voltage is connected three-phase (N not connected). If the measuring voltage is connected four-phase (L1-L2-L3-N), the synchronizing voltage may be connected two-phase (L1-L2). L3 is connected only for compensation and is not measured.
TYPICAL APPLICATIONS / FEATURE OVERVIEW

<table>
<thead>
<tr>
<th>ANSI</th>
<th>MFR 15</th>
<th>J5</th>
<th>H5</th>
<th>H5S</th>
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<tr>
<td><strong>Control</strong></td>
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<tr>
<td>Breaker control logic</td>
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* not according to ANSI guidelines (three-step protection instead of inverse time characteristic)
#1 Cable incl. software necessary (DPC, Product Number P/N 5417-557)