MFR 13
Multi Function Relay
Protection

APPLICATIONS

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 13 model is a complete generator protection unit packaged into one compact device. Typical applications are generators and switchgear equipment that require independent protection architecture. Different packages offer additional functionality.

The MFR 13/GP is for generator protection use while the MFR 13/GPX adds synch-check functionality for one breaker. A MOD bus RTU Slave interface for communication is added for the MFR 13/GPX-I package.

The compact size and multiple functions of the MFR 13 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.

DESCRIPTION

Features (all)
- True RMS generator voltage measuring
- True RMS generator current measuring
- Configurable trip/control set points
- Configurable delays for each alarm
- Two-line LC display
- Programmable relay outputs to annunciate alarms
- kWh metering
- Front panel and PC configurable
- Multi level password protection
- Language manager (English/German switchable)
- 12/24 Vdc power supply

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

Package GP
- 3 configurable relays
- Ground fault (calculated) (50GS/51 #1GS)

Package GPX
- 8 configurable relays
- True RMS busbar voltage measuring
- Synch-check

Package GPX-I
- 8 configurable relays
- True RMS busbar voltage measuring
- Synch-check
- RS485/MOD bus RTU slave interface

Package K08
Same as Package GPX-I plus
- Ground fault (calculated) a2 (50GS/51 #1GS)

Package GPY-I
Same as Package GPX-I plus
- 3 analog outputs -20/0/4 to 20 mA (configurable)
- Impulse output

Package GPY-I-N
Same as Package GPY-I but
- 75 to 265 Vac & 90 to 300 Vdc power supply (no 24 Vdc)

- Complete generator protection in one unit
- True RMS sensing
- Synch-check
- Discrete inputs for enabling and 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

a2 not according to ANSI guidelines
(a three-step protection instead of inverse time characteristic)

9 no GL approval
### SPECIFICATIONS

**Accuracy** ................................................................. Class 1

**Power supply** .......................................................... 24 Vdc (18 to 32 Vdc)

**Intrinsic consumption** ............................................. max. 12 W

**Ambient temperature** ................................................ -20 to 70 °C

**Ambient humidity** .................................................... 95 %, non-condensing

**Voltage**
- **Rated:** [1] 57/100(120) Vac or [4] 230/400 Vac
- **V_L:** [1] max. 150 Vac or [4] max. 300 Vac
- **Setting range:** [1] 50 to 125 Vac or [4] 200 to 440 Vac
- **Measuring frequency:** 50/60 Hz (40 to 70 Hz)
- **Linear measuring range up to:** 1.3×Vrated
- **Input resistance:** [1] 0.21 MΩ, [4] 0.7 MΩ
- **Max. power consumption per path:** < 0.15 W

**Current**
- **Current carrying capacity:** [1] 1 A or [4] 5 A
- **Load:** < 0.15 VA

**Discrete inputs** ............................................................ isolated

**Input range** .............................................................. 18 to 250 Vac/dc

**Input resistance** ....................................................... approx. 68 kΩ

**Relay outputs** ........................................................... isolated

**Contact material** ....................................................... AgCdO

**Load (GP):** ............................................................. 24 Vdc@2 A, 250 Vac@2 A

**Pilot duty (PD):** .......................................................... 24 Vdc@1 A

**Housing** ................................................................. Type APRANORM DIN 43 700

**Dimensions** ............................................................... 96 × 72 × 130 mm

**Front cutout** ............................................................. 91 [+1.0] × 67 [+1.0] mm

**Connection** ............................................................. screw/plug terminals depending on connector 1.5 mm², 2.5 mm² or 4 mm²

**Protection system** ....................................................... insulating surface

**Listings** ................................................................. UL/cUL listed for ordinary locations (note: max. voltages apply)

**Approvals** .............................................................. GL (Germanischer Lloyd)

### DIMENSIONS

[Diagram showing the dimensions and configuration ports with labels for Front view, Back view, and Bottom view.]
## FEATURE OVERVIEW

<table>
<thead>
<tr>
<th>Measuring/Display</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>kWh meter</td>
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<tr>
<td>Configuration via PC</td>
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### Protection

<table>
<thead>
<tr>
<th>Protection</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage</td>
<td>59</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Undervoltage</td>
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<tr>
<td>Overfrequency</td>
<td>81O</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Underfrequency</td>
<td>81U</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Voltage asymmetry</td>
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<td>✓</td>
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<tr>
<td>Zero voltage</td>
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<td>Overload</td>
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<tr>
<td>Reduced power</td>
<td>32F/37</td>
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<tr>
<td>Reverse power</td>
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<tr>
<td>Unbalanced load</td>
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<tr>
<td>Re-active power</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Loss of excitation</td>
<td>50/51*</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Time-overcurrent</td>
<td>50/51*</td>
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<td>✓</td>
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<tr>
<td>Ground fault, calculated</td>
<td>50GS/51*GS</td>
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<td>✓</td>
<td>✓</td>
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### Function

<table>
<thead>
<tr>
<th>Function</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
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</thead>
<tbody>
<tr>
<td>Synch-check</td>
<td>25</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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### I/O's

<table>
<thead>
<tr>
<th>I/O's</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output relays (config.)</td>
<td>74</td>
<td>3</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Analog outp. -200/4 to 20mA</td>
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<td>3</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Impulse output</td>
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<tr>
<td>RS485/MODbus RTU slv.</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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### Power supply

<table>
<thead>
<tr>
<th>Power supply</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
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</thead>
<tbody>
<tr>
<td>24 Vdc</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>75 to 265 Vac &amp; 90 to 300 Vdc</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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### Listings/Approvals

<table>
<thead>
<tr>
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<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
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<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE marked</td>
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<tr>
<td>UL/cUL listed</td>
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<td>✓</td>
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<tr>
<td>GL (Marine)</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</table>

### Part numbers P/N

<table>
<thead>
<tr>
<th>Part numbers P/N</th>
<th>ANSI</th>
<th>GP</th>
<th>GPX</th>
<th>GPX-I</th>
<th>K08</th>
<th>GPY-I</th>
<th>GPY-I-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring inputs 120 Vac: /1 A</td>
<td>5441-1086</td>
<td>8441-1083</td>
<td>8441-1075</td>
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<td>Measuring inputs 120 Vac: /5 A</td>
<td>5448-886</td>
<td>5448-896</td>
<td>8441-1009</td>
<td>8441-1087</td>
<td>8441-1086</td>
<td>8441-1092</td>
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<tr>
<td>Measuring inputs 400 Vac: /1 A</td>
<td>8441-1114</td>
<td>8441-1108</td>
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<tr>
<td>Measuring inputs 400 Vac: /5 A</td>
<td>LR21035</td>
<td>8441-1033</td>
<td>8441-1104</td>
<td>8441-1099</td>
<td>8441-1095</td>
<td>8441-1119</td>
<td></td>
</tr>
</tbody>
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* not according to ANSI guidelines (three-step protection instead of inverse time characteristic)  
#1 Cable incl. software necessary (DPC)