



## APPLICATIONS

Woodward's MFR 3 Multi function Relay incorporates functions and features for multiple application with up to 14 generators, each with a maximum individual rating of 16MW. Whether isolated or in parallel with the utility this device was designed for generators and switchgear equipment that require independent protection.

The MFR 3 digitally measures true RMS values ensuring measurement accuracy - maintaining integrity against harmonics, transients or power surges. Mains voltage monitoring may be configured as phase-phase or phase-neutral. Front panel push-buttons allow direct control of power circuit breakers, setpoint values, and configuration of the unit. A phase sequence detection prevents a breaker closure in case of mismatching phases.

The MFR 3 is available for one (MFR 31) or two (MFR 32) circuit breakers. Even if the MFR 31 front panel reflects only one circuit breaker, it may operate two.

For utility parallel applications the combined mains and generator breaker protection offer a very compact solution. In addition to protection the MFR 3 offers frequency, voltage, real power and re-active power control allowing load/var sharing.

## DESCRIPTION

### Features

- True RMS 8× voltage (gen/bus/mains)
- True RMS 4× current (gen/mains)
- Battery voltage monitoring
- Phase sequence detection
- kWh/kvarh/oper.hours/start/maintenance counter
- Configurable trip/control set points
- Configurable delays for each alarm
- 12 configurable discrete alarm inputs
- 7 configurable/programmable relays
- 2 conf. analog outputs (20 mA)
- 2 conf. pulse outputs for kWh/kvarh
- Two-line LC display
- Synchroscope
- Push-buttons for direct control
- CAN bus communication
- Language manager (English/German preloaded)
- Multi level password protection

# MFR 3

## Multi Function Relay Mains & Generator Protection & Control

### DESCRIPTION (continued)

| Protection | ANSI # |
|------------|--------|
|------------|--------|

#### Mains

- |                        |         |
|------------------------|---------|
| • Over-/undervoltage   | (59/27) |
| • Over-/underfrequency | (81O/U) |
| • Phase/vector shift   | (78)    |
| • df/dt (ROCOF)        | (81RL)  |

#### Generator

- |  |         |
|--|---------|
| • Over-/undervoltage (2 steps)             | (59/27) |
| • Over-/underfrequency (2 steps)           | (81O/U) |
| • Overload                                 | (32)    |
| • Reverse/reduced power                    | (32R/F) |
| • Unbalanced load                          | (46)    |
| • Loss of excitation                       | (40Q)   |
| • Definite time-overcurrent (TOC)          | (50)    |
| • Inverse time-overc. (incl. volt. restr.) | (51V)   |
| • Calculated earth fault                   | (64)    |

### Controller

- Synchronizer for 1 or 2 breaker/s (gen/mains)
- Isolated operation
- Mains parallel operation
- Softloading
- Speed/frequency/real power
- Voltage/power factor cosphi
- Mains import/export power
- Load/var sharing (up to **14 generators**)
- Remote real power setpoint (0/4 to 20 mA)

### Package PSVX

- Remote power factor setpoint (0/4 to 20 mA)
- 5 analog measuring inputs (1 x 0/4 to 20 mA, 4 x Pt100)
- Event recorder with real time clock

### Option Q

- Discrete raise/lower for n/f/V/P/Q \*
- Analog raise/lower for n/f/V/P/Q \*
- PWM raise/lower for n/f/P \*

\* n = speed; f = frequency; V = voltage;  
P = real power; Q = reactive power

- Complete controller with generator and mains protection, synchronizer, and load/var control in one single digital relay
- True RMS sensing
- Synchronization for one/two circuit breakers
- Load/var sharing for up to **14 participants**
- Counters for kWh, kvarh, engine starts, operating hours, maintenance call
- Freely configurable discrete and analog alarm inputs
- Freely configurable relay and analog outputs
- PC and front panel configurable
- CAN bus based communication
- Microprocessor technology for accurate, repeatable and reliable operation
- Programmable two step threshold set points with individual time delays
- CE marked
- UL/cUL Listed





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# FEATURE OVERVIEW

|  |        | MFR 31 | MFR 32 |
|--|--------|--------|--------|
|  | ANSI   | PSVX+Q | PSVX+Q |
| <b>Control</b>                                 |        |        |        |
| Breaker control logic                          |        | 1      | 2      |
| Synchronization                                | 25     | ✓      | ✓      |
| Isolated single-unit operation                 |        | ✓      | ✓      |
| Mains parallel operation                       |        | ✓      | ✓      |
| Softloading                                    |        |        | ✓      |
| <b>Accessories</b>                             |        |        |        |
| kWh counter                                    |        | ✓      | ✓      |
| kvarh counter                                  |        | ✓      | ✓      |
| Operation hrs./start/maintenance counter       |        | ✓      | ✓      |
| Configuration via PC #1                        |        | ✓      | ✓      |
| Event recorder, real time clock                |        | 50     | 50     |
| <b>Protection</b>                              |        |        |        |
| Mains: over-/undervoltage                      | 59/27  | ✓      | ✓      |
| Mains: over-/underfrequency                    | 81O/U  | ✓      | ✓      |
| Mains: df/dt (ROCOF)                           | 81RL   | ✓      | ✓      |
| Mains: dφ/dt (phase/vector jump)               | 78     | ✓      | ✓      |
| Gen.: Over-/undervoltage                       | 59/27  | ✓      | ✓      |
| Gen.: Over-/underfrequency                     | 81O/U  | ✓      | ✓      |
| Gen.: Overload                                 | 32     | ✓      | ✓      |
| Gen.: Reverse power                            | 32R    | ✓      | ✓      |
| Gen.: Reduced power                            | 32F/37 | ✓      | ✓      |
| Gen.: Unbalanced load                          | 46     | ✓      | ✓      |
| Gen.: Loss of excitation                       | 40Q    | ✓      | ✓      |
| Gen.: Definite time-overcurrent (TOC)          | 50     | ✓      | ✓      |
| Gen.: Inverse time-overc. (incl. volt. restr.) | 51V*   | ✓      | ✓      |
| Gen.: Calculated earth fault                   | 64     | ✓      | ✓      |
| <b>Controller</b>                              |        |        |        |
| Discrete raise/lower: n/f & P #4               |        | ✓ #4   | ✓ #4   |
| Discrete raise/lower: V & Q #4                 |        | ✓ #4   | ✓ #4   |
| Analog raise/lower: n/f & P #4/5               |        | ✓      | ✓      |
| Analog raise/lower: V & Q #4/5                 |        | ✓      | ✓      |
| PWM raise/lower: n/f & P #4/5                  |        | ✓      | ✓      |
| Mains import/export power control              |        | ✓      | ✓      |
| Real power setpoint 0/4 to 20 mA               |        | ✓      | ✓      |
| Power factor setpoint 0/4 to 20 mA             |        | ✓      | ✓      |
| Load/var sharing for 14 participants           |        | ✓      | ✓      |
| <b>I/O's</b>                                   |        |        |        |
| Discrete alarm inputs (configurable)           |        | 12     | 12     |
| Relay outputs (configurable)                   | 74     | 7      | 7      |
| Analog inputs (configurable)                   |        | 5 #2   | 5 #2   |
| Analog outputs 0/4 to 20 mA (configurab.)      |        | 2      | 2      |
| Impulse output for kWh/kvarh                   |        | ✓      | ✓      |
| CAN bus communication #3                       |        | ✓      | ✓      |
| <b>Listings/Approvals</b>                      |        |        |        |
| CE Marked                                      |        | ✓      | ✓      |
| UL/cUL listed                                  |        | ✓      | ✓      |
| <b>Part numbers P/N</b>                        |        |        |        |
| Measuring inputs 100 Vac, .. /5 A (8440-       |        | -1631  | -1633  |
| Measuring inputs 400 Vac, .. /5 A (8440-       |        | -1632  | -1634  |

\* according to IEC guidelines  
 #1 Cable incl. software necessary (DPC)  
 #2 [T3] = 0/4-20 mA, [T4]-[T7] = Pt100  
 #3 Remote monitoring, control, configuration (GW 4 could be used for several interfaces)  
 #4 n = speed; f = frequency; V = voltage, P = real power; Q = reactive power  
 #5 +/-20 mA and +/-10 Vdc and PWM signal (type and range configurable); bias/discrete setpoint via relay manager