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 reactive power control allowing load/var sharing.

**DESCRIPTION**

**Features**
- True RMS 8x voltage (gen/bus/mains)
- True RMS 4x 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

**Protection ANSI #**
- Over-/undervoltage (59/27)
- Over-/underfrequency (81O/U)
- Phase/vector shift (78)
- df/dt (ROCOF) (81RL)
- 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 participants)
- 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

**DESCRIPTION (continued)**

**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 reactive power control allowing load/var sharing.

**DESCRIPTION**

**Features**
- True RMS 8x voltage (gen/bus/mains)
- True RMS 4x 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

**Protection ANSI #**
- Over-/undervoltage (59/27)
- Over-/underfrequency (81O/U)
- Phase/vector shift (78)
- df/dt (ROCOF) (81RL)
- 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 participants)
- 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
SPECSIFICATIONS (for details refer to manual 37107)

Accuracy .............................................................................................................. Class 1
Power supply................................................................................................. 12/24 Vdc (9.5 to 32 Vdc)
Intrinsic consumption ...................................................................................... max. 15 W
Ambient temperature ...................................................................................... -20 to 70 °C
Ambient humidity ........................................................................................... 95 %, non-condensing

Voltage ............................................................... Rated value V\textsubscript{max}: [1] 1066/115 Vac or [4] 230/400 Vac
Maximum value (V\textsubscript{max}): [1] 150 Vac or [4] 300 Vac
Rated voltage V\textsubscript{rh-ground}: [1] 150 Vac or [4] 300 Vac
Rated surge voltage: [1] 2.5 kV or [4] 4.0 kV
Measuring frequency ...................................................................................... 50/60 Hz (40 to 70 Hz)
Linear measuring range up to ...................................................................... 1.3×V\textsubscript{rated}
Input resistance .............................................................................................. approx. 68 kΩ
Max. power consumption per path .................................................................. < 0.15 W
Current (I\textsubscript{max}) ................................................................................ [5] 10×I\textsubscript{rated}
Linear measuring range up to ...................................................................... I\textsubscript{max} = 3.0×I\textsubscript{rated}

Load ................................................................................................................... < 0.15 VA
Rated short-time current (1 s) ...................................................................... [5] 10×I\textsubscript{rated}
Discrete inputs .............................................................................................. isolated
Input range ....................................................................................................... 18 to 250 Vac or dc
Input resistance .............................................................................................. approx. 68 kΩ
Analog input ................................................................................................... freely scalable
Type .............................................................................................................. 0/4 to 20 mA, Pt100
Resolution ..................................................................................................... 10 Bit
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) ................................................................................................. 2.00 Aac@250 Vac
2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
Pilot duty (PD) ............................................................................................ 1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc

Analog output .................................................................................................. isolated
Type .............................................................................................................. 0/4 to 20 mA, freely scalable
Resolution ..................................................................................................... 8/12 Bit (depending on model)
Max. load 0/4 to 20 mA .................................................................................. 500 Ω
Insulating voltage .......................................................................................... 1,500 Vdc
Housing ........................................................................................................ Type AFRANORM DIN 43 700
Dimensions .............................................................................................. 144×144×118 mm
Front cutout ............................................................................................ 138[+1.0] mm
Connection .................................................................................................. screw/plug terminals depending on connector 1.5 mm\textsuperscript{2} or 2.5 mm\textsuperscript{2}
Front .............................................................................................................. insulating surface
Protection system .......................................................................................... with correct installation
Front (sealed IP54; gasket kit = P/N 8923-1039)
Back .............................................................................................................. IP21
Weight .......................................................................................................... depending on version, approx. 1,000 g
Disturbance test (CE) .................................................................................. tested according to applicable EN guidelines
Listings .......................................................................................................... UL/CUL listed (voltages up to 300 Vac)

DIMENSIONS

APPLICATION
### FEATURE OVERVIEW

<table>
<thead>
<tr>
<th>MFR 31</th>
<th>MFR 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI</td>
<td>PSVX-Q</td>
</tr>
</tbody>
</table>

#### Control
- Breaker control logic: 1, 2
- Synchronization: 25
- Isolated single-unit operation
- Mains parallel operation
- Softloading

#### Accessories
- kWh counter
- kvarh counter
- Operation hrs./start/maintenance counter
- Configuration via PC
- Event recorder, real time clock: 50, 50

#### Protection
- 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

#### Controller
- Discrete raise/lower: n/f & P: #4
- Discrete raise/lower: V & Q: #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

#### I/O’s
- Discrete alarm inputs (configurable): 12
- Relay outputs (configurable): 7
- Analog inputs (configurable): 5
- Analog outputs 0/4 to 20 mA (configurable): 2
- Impulse output for kWh/kvarh
- CAN bus communication: 3

#### Listings/Approvals
- CE Marked: ✓
- UL/cUL listed: ✓

#### Part numbers P/N
- 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