



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 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

MFR 3

Multi Function Relay Mains & Generator Protection & Control

DESCRIPTION (continued)

Protection	ANSI #
Mains	
• Over-/undervoltage	(59/27)
• Over-/underfrequency	(810/U)
• Phase/vector shift	(78)
• df/dt (ROCOF)	(81RL)
Generator	
• Over-/undervoltage (2 steps)	(59/27)
• Over-/underfrequency (2 steps)	(810/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 *	

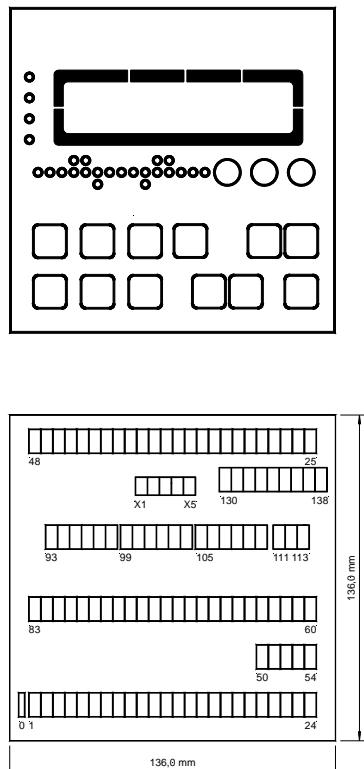
- * n = speed; f = frequency; V = voltage;
P = real power; Q = reactive power

- 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

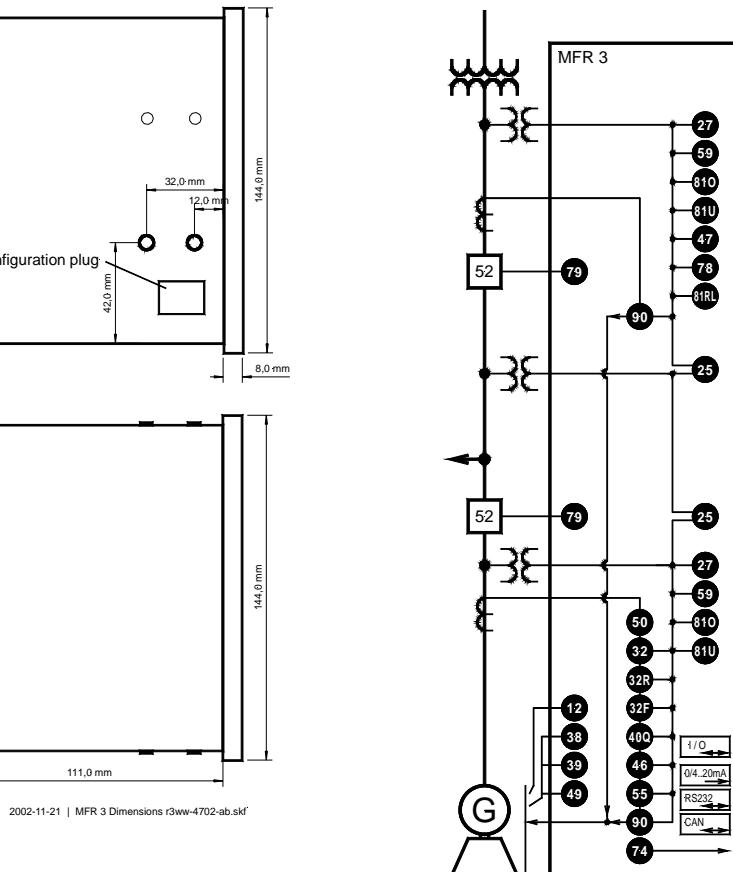
SPECIFICATIONS (for details refer to manual 37107)

Accuracy	Class 1	Relay outputs	isolated
Power supply.....	12/24 Vdc (9.5 to 32 Vdc)	Contact material.....	AgCdO
Intrinsic consumption	max. 15 W	Load (GP).....	2.00 Aac@250 Vac 2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
Ambient temperature.....	-20 to 70 °C	Pilot duty (PD).....	1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc
Ambient humidity.....	95 %, non-condensing	Analog output.....	isolated
Voltage Rated value λ/Δ :	[1] 66/115 Vac or [4] 230/400 Vac	Type	0/4 to 20 mA, freely scaleable
Maximum value (V_{max}):	[1] 150 Vac or [4] 300 Vac	Resolution	8/12 Bit (depending on model)
Rated voltage $V_{ph-ground}$:	[1] 150 Vac or [4] 300 Vac	Max. load 0/4 to 20 mA	500 Ω
Rated surge voltage:	[1] 2.5 kV or [4] 4.0 kV	Insulating voltage	1,500 Vdc
Measuring frequency.....	.50/60 Hz (40 to 70 Hz)	Housing	Type APRANORM DIN 43 700
Linear measuring range up to	$1.3 \times V_{rated}$	Dimensions	144x144x118 mm
Input resistance.....	[1] 0.21 M Ω , [4] 0.7 M Ω	Front cutout	138[+1.0]x138[+1.0] mm
Max. power consumption per path.....	< 0.15 W	Connection	screw/plug terminals depending on connector 1.5 mm ² or 2.5 mm ²
Current (I_{rated})	[5] ..5 A	Front	insulating surface
Linear measuring range up to	$I_{gen} = 3.0 \times I_{rated}$	Protection system.....	with correct installation
Load	$I_{mains} = 1.5 \times I_{rated}$	Front.....	IP42 (sealed IP54; gasket kit = P/N 8923-1039)
Rated short-time current (1 s)	[5] 10 $\times I_{rated}$	Back	IP21
Discrete inputs	isolated	Weight	depending on version, approx. 1,000 g
Input range.....	18 to 250 Vac or dc	Disturbance test (CE).....	tested according to applicable EN guidelines
Input resistance.....	approx. 68 k Ω	Listings	UL/cUL listed (voltages up to 300 Vac)
Analog input	freely scaleable		
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)		

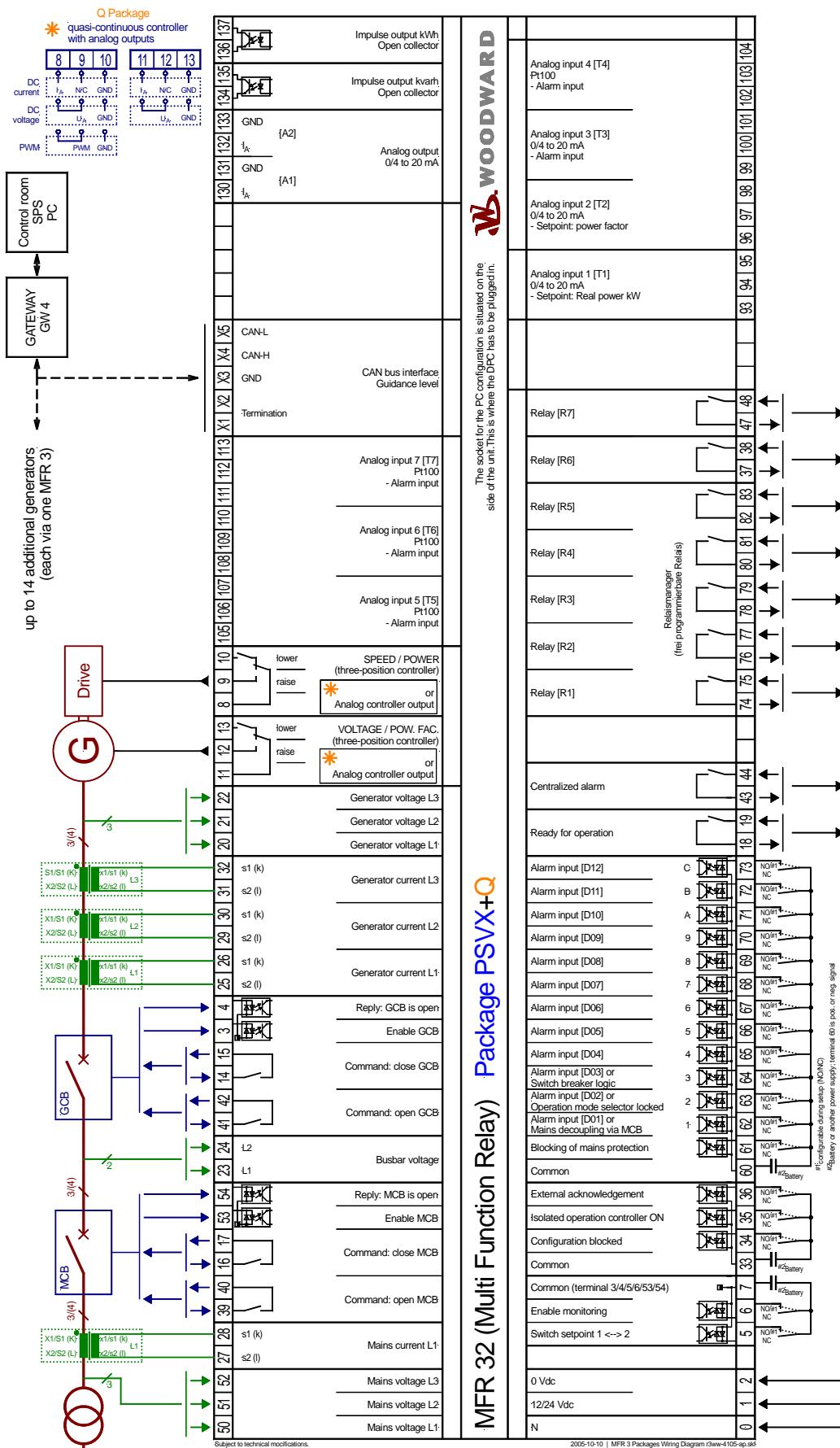
DIMENSIONS



APPLICATION



WIRING DIAGRAM (example: MFR 32; for MFR 31 refer to manual 37107)



Subject to technical modifications.

International
 Woodward
 PO Box 1519
 Fort Collins CO, USA
 80522-1519
 1000 East Drake Road
 Fort Collins CO 80525
 Ph: +1 (970) 482-5811
 Fax: +1 (970) 498-3058

Europe
 Woodward Governor Company
 Leonhard-Reglerbau GmbH
 Handwerkstrasse 29
 70565 Stuttgart, Germany
 Ph: +49 (0) 711 789 54-0
 Fax: +49 (0) 711 789 54-100

Distributors & Service
 Woodward has an international network of distributors and service facilities. For your nearest representative, call the Fort Collins plant or see the Worldwide Directory on our website.

Corporate Headquarters
 Rockford IL, USA
 Ph: +1 (815) 877-7441

www.woodward.com/power

For more information contact:

Subject to technical modifications.

This document is distributed for informational purposes only. It is not to be construed as creating or becoming part of any Woodward Governor Company contractual or warranty obligation unless expressly stated in a written sales contract.

We appreciate your comments about the content of our publications. Please send comments including the document number below to
 slgt-doc@woodward.com

© Woodward Governor Company

All Rights Reserved

FEATURE OVERVIEW

	ANSI	MFR 31 PSVX+Q	MFR 32 PSVX+Q
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 #1		✓	✓
Event recorder, real time clock	50	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		✓ #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		✓	✓
I/O's			
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		✓	✓
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