MFR 2

Multi Function Relay
Mains & Generator
Protection & Control

APPLICATIONS

Based on micro-controller technology, Woodward's MFR 2 Multi Function Relay incorporates functions and features for multiple applications (e.g. gensets, hydropower, etc.) in isolated or parallel utility operation. The MFR 2 is designed for generators and switchgear equipment that require independent protection.

The ability for the MFR 2 to quickly decouple from the mains when working in parallel with the mains gives complete generator protection for frequency, voltage, and real and re-active power control allowing load/var sharing between as many as eight units.

DESCRIPTION

The Series of MFR 2 Multi Function Relays consists of the model MFR 2S/PSVA.

Features

- Battery voltage monitoring
- kWh/oper.hours/start/maintenance counter
- 4 configurable discrete alarm inputs
- 4 configurable relays
- Two-line LC display
- Synchroscope
- Multi level password protection
- Configuration directly or via PC
- CAN bus communication

DESCRIPTION (continued)

Protection	ANSI #
Mains	
· Over-/undervoltage	(59/27)
· Over-/underfrequency	(81O/U)
· Voltage asymmetry	(47)
· Phase/vector shift (MFR 2S only)	(78)
Generator	
· Over-/undervoltage	(59/27)
· Over-/underfrequency	(81O/U)
· Overload	(32)
· Reverse/reduced power	(32R/F)
· Unbalanced load	(46)
· Re-active power monitoring	
· Loss of excitation	(40Q)
· Time-overcurrent	(50)

Controller

- Synchronizer for 2 CB
- Discrete raise/lower for n/f/V/P/Q
- Speed/frequency/real power
- Voltage/power factor
- Isolated operation
- Mains parallel operation
- Load/var sharing (up to 8 units) (MFR 2S only)
- Dead bus operation

MFR 2S/PSVA

The PSVA package additionally includes:

- df/dt (ROCOF) (81RL)
- 2 conf. analog outputs (20 mA)
- 2 conf. pulse outp. for kWh/kvarh
- Real power set-point input (20 mA)

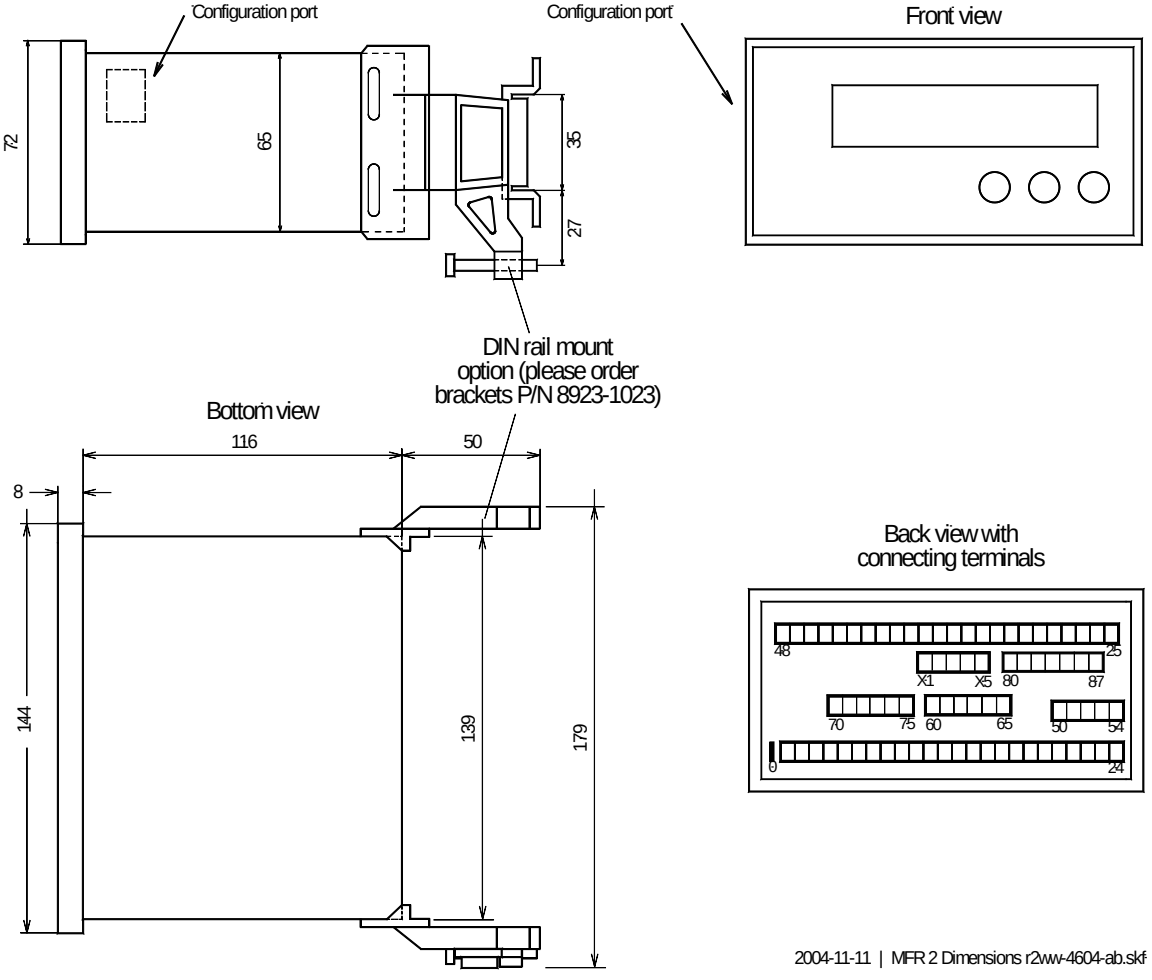
- Generator and mains protection
- Synchronization for two breakers
- Frequency and voltage matching
- Real power control
- Power factor control
- Load/var sharing
- Counters for kWh, operating hours, maintenance call
- Programmable relay outputs
- PC and front panel configurable
- CAN bus based communication
- Microprocessor technology for flexible and reliable operation
- CE marked
- UL/cUL Listed

SPECIFICATIONS

Accuracy ..... Class 1
Power supply ..... 24 Vdc (+/-30 %)
Intrinsic consumption ..... max. 15 W
Ambient temperature ..... -20 to 70 °C
Ambient humidity ..... 95 %, non-condensing
Voltage ..... Rated value U_n/D: [1] 66/115 Vac or [4] 230/400 Vac
Maximum value (V_{max}): [1] 150 Vac or [4] 300 Vac
Rated voltage $V_{ph\text{-}ground}$: [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 ..... $1.3 \times V_{rated}$
Input resistance ..... [1] 0.21 MW, [4] 0.7 MW
Max. power consumption per path ..... 0.15 W
Current (I_{rated}) ..... [1] ../1 A or [5] ../5 A
Linear measuring range up to ..... $I_{gen} = 3.0 \times I_{rated}$
$I_{mains} = 1.5 \times I_{rated}$
Load ..... < 0.15 VA
Rated short-time current (1 s) ..... [1] $50 \times I_{rated}$, [5] $10 \times I_{rated}$
Discrete inputs ..... isolated
Input range ..... 18 to 250 Vac or dc
Input resistance ..... approx. 68 kW

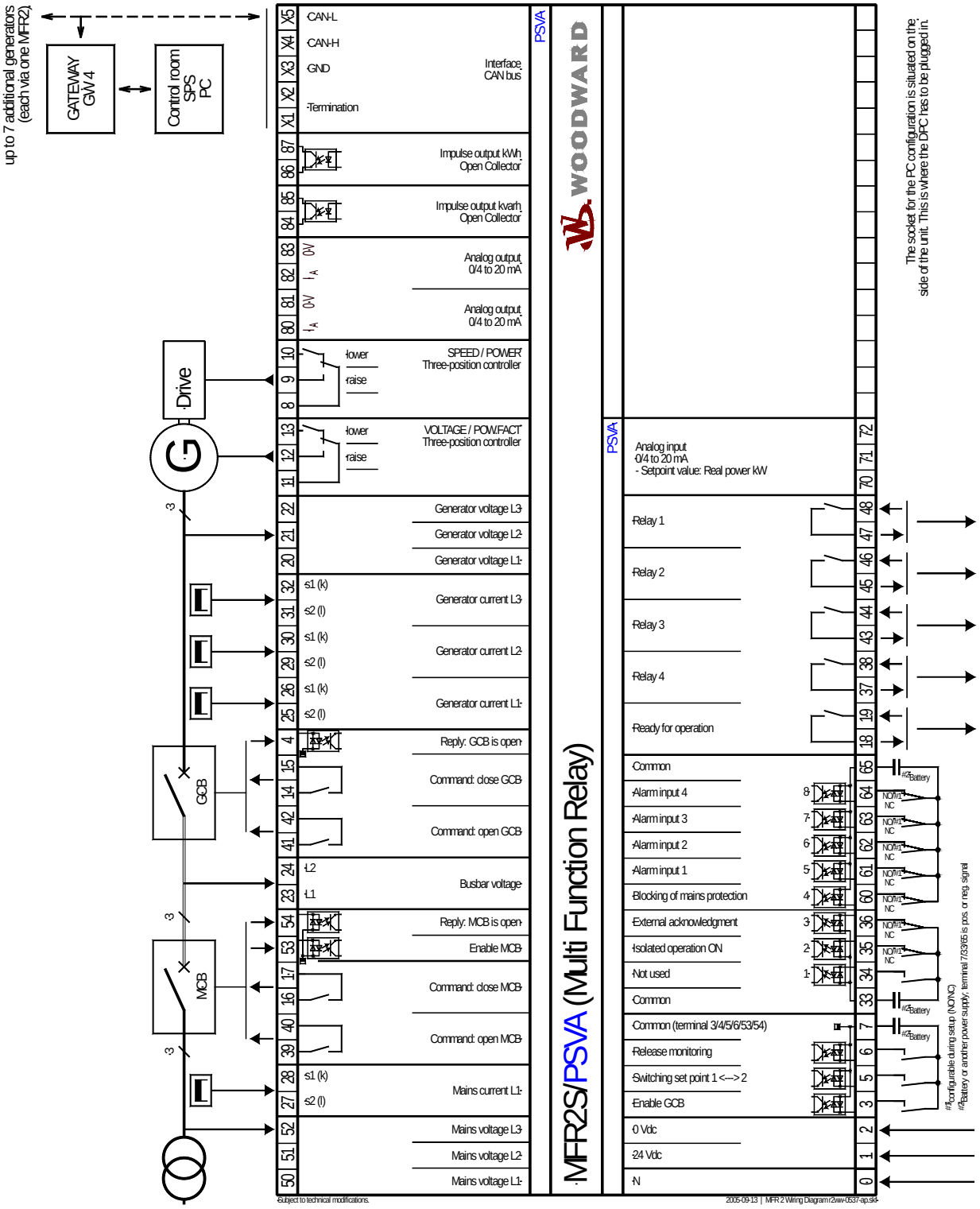
Pulse outputs ..... transistor output
Rated gate voltage ..... 24 Vdc
Maximum gate voltage ..... 32 Vdc
Minimum gate current ..... 10 mAdc
Maximum gate current ..... 30 mAdc (0.5 Vdc)
Relay outputs ..... isolated
Contact material ..... AgCdO
Load (GP) ..... 24 Vdc@2 Adc, 250 Vac@2 Aac
Pilot duty (PD) ..... 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 W
Insulating voltage ..... 3,000 Vdc
Housing ..... Type APRANORM DIN 43 700
Dimensions ..... 144×72×122 mm
Front cutout ..... 138×67 mm
Connection ..... screw/plug terminals depending on connector 1.5 mm² or 2.5 mm²
Front ..... insulating surface
Protection system ..... IP 21
Weight ..... depending on version, approx. 1,000 g
Disturbance test (CE) ..... tested according to applicable EN guidelines
Listings ..... UL/cUL listed for ordinary locations

DIMENSIONS



2004-11-11 | MFR 2 Dimensions r2ww-4604-ab.skf

WIRING DIAGRAM (MFR 2S/PSVA; refer to manual for other units)



WOODWARD

International
Woodward
PO Box 1519
Fort Collins CO, USA
80522-1519
1000 East Drake Road
Fort Collins CO 80525
Ph: +1 (970) 498-3634
Fax: +1 (970) 498-3058
email:
SalesPGD_NAandCA@woodward.com

Europe
Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart, Germany
Ph: +49 (0) 711 789 54-510
Fax: +49 (0) 711 789 54-101
email:
SalesPGD_EMEA@woodward.com

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

For more information contact:

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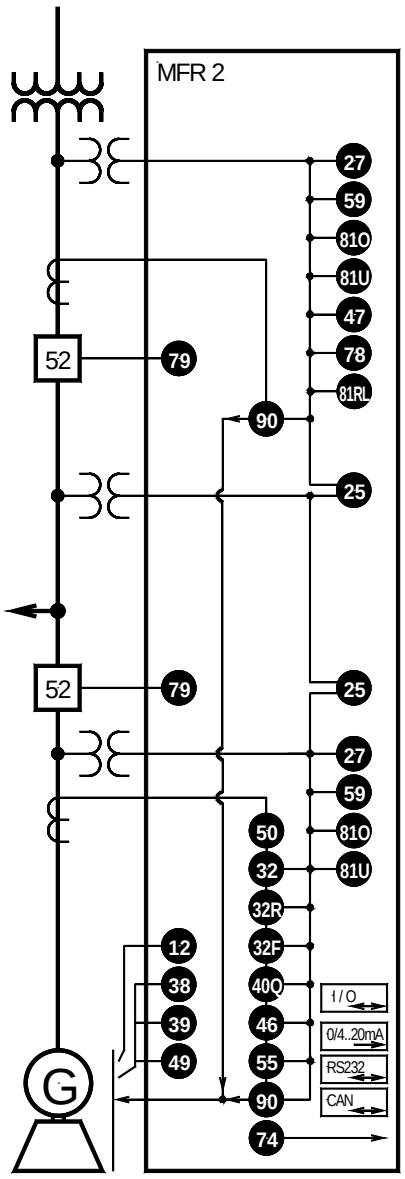
TYPICAL APPLICATIONS



	ANSI	MFR 2S PSVA
Control		
Breaker		2
Synchronization	25	ü
Isolated single-unit operation		ü
Mains parallel operation		ü
Accessories		
kWh counter		ü
kvarh counter		ü
Operat. hours/start/mainten. counter		ü
Configuration via PC #1		ü
Protection		
Gen.: Over-/undervoltage	59/27	ü
Mains: over-/undervoltage	59/27	ü
Gen.: Over-/underfrequency	81O/U	ü
Mains: over-/underfrequency	81O/U	ü
Mains: Voltage asymmetry	47	ü
Mains: phase/vector shift	78	ü
Mains: df/dt (ROCOF)	81RL	ü
Gen.: Overload	32	ü
Gen.: Reverse power	32R	ü
Gen.: Reduced power	32F/37	ü
Gen.: Unbalanced load	46	ü
Gen.: Re-active power		ü
Gen.: Loss of excitation	40Q	ü
Gen.: Time-overcurrent	50/51*	ü
Controller		
Discrete raise/lower: n/f & P		ü
Discrete raise/lower: V & Q		ü
Active power setp.: 0/4 to 20 mA		ü
Load/var sharing		ü
I/O's		
Discrete alarm inputs (config.)		4
Relay outputs (config.)	74	4
Analog inputs 0/4 to 20 mA (conf.)		2
Analog outp. 0/4 to 20 mA (conf.)		2
Impulse output for kWh/kvarh		ü
CAN bus communication #2		ü
Listings/Approvals		
UL/cUL listed		ü

Product Number P/N	Language	
Measuring inputs 100 Vac, ../5 A	English	8440-1287
	German	8440-1733
Measuring inputs 400 Vac, ../5 A	English	8440-1735
	German	8440-1323

* not according to ANSI guidelines (two-step protection instead of inverse time characteristic)
#1 Cable incl. software necessary (DPC, Product Number P/N 5417-557)
#2 Remote monitoring, control, configuration (GW 4 could be used for several interfaces)