



## Woodward Industrial Controls Power Management Products Catalog



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# Woodward Power Management Products Overview

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From the simplest power generation applications to the most complex, Woodward has the power management control to meet your needs. Based on decades of experience with generator control, load/var sharing, synchronization and power protection technologies, Woodward's power management product line is unsurpassed in the world.

Woodward's fully integrated generator set control panels are designed to control, monitor, and protect the complete generator system, including the engine, generator, switchgear, and utility power. This product range spans the full range of generator set applications - from the low-cost easYgen controls for stand-alone or emergency generators, up to the EGCP-3 controls for complex, multiple generator, multiple utility feed systems.

In addition to the protective relaying functions built into the GCP and EGCP generator set controls, Woodward offers a line of multi-function protective relays that protect the generator or utility for numerous ANSI-standard faults in a single, compact and low-cost unit.

Other Woodward analog and digital controls provide discrete functionality, including synchronization, load sharing, generator load sensing and loading, and import/export control.

Regardless of your application, Woodward has a cost-effective control to meet your needs.

For further information please visit our homepage at

<http://www.woodward.com/power/>



## **ATTENTION**

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# Genset Controls

## Overview and Features

Woodward's fully integrated generator set control panels are designed to control, monitor, and protect the complete generator system, including the engine, generator, switchgear, and utility power supply. Our products span the full range of generator set applications - from the simple, low-cost easYgen-300 series controls for stand-alone or emergency generators up to the GCP-30 Series / EGCP-3 controls for complex, multiple generator, multiple utility feed systems.



prod/spec:  
37217

The easY™**gen-300** series is designed for single unit isolated operation applications. The easY**gen-320** offers automatic engine starting, stopping, metering, and generator protection (the easY**gen-350** adds AMF and transfer switching).

The multi purpose 6 digit 7 segment LED offers the ability to display measured values and alarm messages. The CAN bus operation adds the ability to display J1939 messages from an engine ECU.

The isolated J1939 CAN bus permits long distance networks for selected ECU manufacturers. Our sales department can provide information regarding the selected ECU manufacturers.



prod/spec:  
37180

The 2<sup>nd</sup> Generation of the easY™**gen-1500** genset control is designed to be user friendly with an intuitive design and a large graphical display for multiple applications. This trend-setting technology offers a maximum of flexibility for each user. New technologies included are: **FlexApp™** - This intelligent and flexible feature provides the tools to easily configure for multiple applications. **DynamicsLCD™** - The graphical LCD provides softkeys that vary depending on application and operation. **FlexIn™** - The two analog inputs are freely configurable (adaptable for various types of sensors) by the user. **FlexCAN™** - Flexible isolated CAN bus (allows long distance networks) for multiple uses. **LogicsManager™** - A large number of measuring values, inputs, internal states or constant values can be combined logically to operate a relay contact or an internal function. **FlexRange™** - The true RMS voltage-measuring combines both rated 120 Vac and rated 480 Vac, permitting the user to stock only one model. An event recorder with real-time clock (battery backed) can store up to 300 events.



prod/spec:  
03243

The **GCP-20** is also designed for emergency and stand-by power applications, but controls the speed governor and voltage regulator to provide no-break transfer (closed transition) to and from the utility. The GCP-20 monitors the generator and the utility and protects for voltage, current, frequency, active and reverse power, load imbalance, and overload faults. The engine is monitored for speed, temperature and pressure.

The control includes a total of 14 discrete alarm inputs, 4 analog engine signal inputs, 1 switching/magnetic Pickup input, and 4 freely configurable relay outputs. Additional external units interfacing with the control, remote control and analog speed/voltage bias signals are available as options.



prod/spec:  
03243

The **GCP-21** incorporates control and synchronizing logic for one circuit breaker and is well suited for isolated and mains parallel operation in stand-by, Cogeneration, and peak shaving applications. A softloading feature is included in this control unit and it allows load/var sharing for up to 8 units. Additional protection features include phase/vector shift and reduced power faults as well as rapid mains failure detection for permanent operation in parallel with the utility (no separate utility protection device necessary). The **GCP-21** control includes a total of 14 discrete alarm inputs, 4 analog engine signal inputs, 1 switching/magnetic Pickup input, and 4 freely configurable relay outputs. CAN bus communications, remote control and analog speed/voltage bias signals are available as options.



prod'spec:  
03243

The **GCP-22** adds control logic for two circuit breakers, providing mains failure detection, ATS transfer switch control (open transition), no-break transfer (closed transition), and softloading feature for both utility to generator and generator to utility.



prod'spec:  
03240

The most powerful of the new genset control panels - the **GCP-31** and **GCP-32** units - are similar in function to the GCP-21 and GCP-22 controls, but add load sharing and var sharing capabilities for multiple unit operation (up to 14 units). They also incorporate a synchroscope on the front panel.

Standard I/O includes 16 discrete alarm inputs, 7 analog engine or generator signal inputs, 1 switching/magnetic Pickup input, and 7 freely configurable relay outputs.

CAN bus communications, additional inputs/outputs, remote control, and analog speed/voltage bias signals are available as options. A real-time clock and event recorder is also available.



prod'spec:  
03316

The **GCP-31/RPQ+SC08** genset control is designed to provide total control for applications with multiple gensets.

A network of the compact, versatile **GCP-31/RPQ+SC08** controls is capable of controlling up to 8 gensets with automatic sequencing. Load management features include automatic base loading/peak shaving, import/export control and emergency power/back up power generation.

The **GCP-31/RPQ+SC08** has logic for one/two circuit breaker including open/closed transition and soft power transfer.

Fully integrated communication to engine ECUs including [via CAN bus] standard SAE J1939, Deutz EMR, Scania S6, mtu MDEC.



prod'spec:  
03219

The **EGCP-2** is a complete microprocessor based generator control and engine management package. It is designed for use with an automatic voltage regulator and a Woodward or other compatible speed control to automate and protect diesel or gas engine based generator sets. Designed for small to medium size generator sets, the EGCP-2 can be configured to operate as a stand-alone or utility paralleled sets. A network of EGCP-2 controls is capable of controlling up to eight unmanned generator sets for base-load, peak shaving, or backup power generation.






prod'specs:  
03300  
03301  
03302

Designed for medium- and large-sized generators, the **EGCP-3** adds to the powerful EGCP-2 product with advanced IEEE protection algorithms, utility-grade metering, individual control of utility and tiebreakers, added input/output capabilities and backward compatibility with Woodward DSLC/MSLC synchronizers. A network of up to 16 EGCP-3 controls can handle your most sophisticated base-load, peak shaving, or backup power generation applications.

Based on Woodward's powerful GAP™ application programming tools, the EGCP-3 can be easily customized by Woodward, your Woodward distributor or, with a GAP license and minimal training, by OEM customers.

## easYgen-300 - Features Matrix

		easYgen-300			
		320	320/X	350	350/X
					
<b>Measuring</b>					
Generator voltage - true rms	rated 277/480 Vac max. 346/600 Vac	1p-2w	configurable <sup>#1</sup>	1p-2w	configurable <sup>#1</sup>
Mains voltage - true rms	rated 277/480 Vac max. 346/600 Vac			3p-4w	configurable <sup>#1</sup>
<b>Control</b>					
Push-buttons to operate the unit		✓	✓	✓	✓
Isolated single-unit operation		✓	✓	✓	✓
AMF (auto mains failure operation)				✓	✓
Stand-by operation		✓	✓	✓	✓
Open transition (break-before-make)				✓	✓
ATS (automatic transfer switching)				✓	✓
<b>Accessories</b>					
6digit 7segment LED (display of values and alarms)		✓	✓	✓	✓
Global multi-lingual use with customized paper-strip		✓	✓	✓	✓
Start/stop logic for Diesel engines		✓	✓	✓	✓
Operating hours/service hours/start counter		✓	✓	✓	✓
15 entry event logger		✓	✓	✓	✓
Configuration via front panel		✓	✓	✓	✓
Configuration via PC <sup>#2</sup>		✓	✓	✓	✓
<b>Protection</b>					
Engine: over-/underspeed			✓		✓
Generator: voltage/frequency		✓	✓	✓	✓
J1939 DM1 red / amber lamp			✓		✓
<b>I/Os</b>					
MPU input (magnetic/switching; Pickup)			✓		✓
D+ (charge alternator input/output)		✓	✓	✓	✓
Discrete alarm inputs (fixed)		2	2	2	2
Discrete remote start input (fixed)		1	1	1	1
Discrete alarm inputs (configurable) <sup>#3</sup>		2	2	2	2
Relay outputs (fixed)		3	3	4	4
Relay outputs (configurable)		1	1	2	2
CAN bus communication <sup>#4</sup>			✓		✓
<b>Listings/Approvals</b>					
CE marked		✓	✓	✓	✓
UL/cUL listed		✓	✓	✓	✓
Shock and vibration test approvals		✓	✓	✓	✓
<b>Part Numbers P/N</b>					
		8440-1698	8440-1700	8440-1699	8440-1701


<sup>#1</sup> Configurable: 1p-2w, 1p-3w, 3p-3w, 3p-4w

<sup>#3</sup> Only available if breaker replies are not used

<sup>#2</sup> Cable incl. software necessary (DPC = Part Number P/N 5417-557)

<sup>#4</sup> fixed CAN J1939 (selected ECU manufacturers; request information)

## easYgen-1500 - Features Matrix

		easY™gen-1500			
		Configured as ...	{0}	{10}	{10c}
<b>Measuring</b>					
Generator voltage (3phase/4-wire) - true rms - <i>FlexRange™</i>	rated 69/120 Vac max. 86/150 Vac	✓	✓	✓	✓
	rated 277/480 Vac max. 346/600 Vac	✓	✓	✓	✓
Generator current #1 (3phase/4-wire, true RMS)	..1 A or ..15 A	✓	✓	✓	✓
Mains voltage (3phase/4-wire) - true rms - <i>FlexRange™</i>	rated 69/120 Vac max. 86/150 Vac	(✓)#2	(✓)#2	(✓)#2	✓
	rated 277/480 Vac max. 346/600 Vac	(✓)#2	(✓)#2	(✓)#2	✓
Mains current #1 (1phase/2-wire, true RMS)	..1 A or ..15 A	(✓)#2	(✓)#2	(✓)#2	✓
<b>Control</b>					
Breaker control logic	<i>FlexApp™</i>	0	0	1	2
Number of controlled power circuit breakers can be user configured depending on application needs out of 4 Modes	GCB open#3 GCB open/close#3 GCB/ MCB open/close#3		✓	✓	✓
Isolated single-unit operation				✓	✓
AMF (auto mains failure operation)					✓
Stand-by operation					✓
Open transition (break-before-make)					✓
ATS (automatic transfer switching)					✓
<b>Accessories</b>					
Softkeys (advanced LC display)	<i>DynamicsLCD™</i>	✓	✓	✓	✓
Start/stop logic for Diesel/Gas engines		✓	✓	✓	✓
kWh meter, kvarh meter		✓	✓	✓	✓
Operating hours/start/maintenance counter		✓	✓	✓	✓
Configuration via PC #4		✓	✓	✓	✓
Event recorder with real time clock (battery backup)		300	300	300	300
Flush-mounting		✓	✓	✓	✓
<b>Protection</b>					
ANS					
Generator: voltage/frequency	59/27/810/81U	(✓)#6	✓	✓	✓
Generator: overload, reverse/reduced power	32/32R/32F	(✓)#6	✓	✓	✓
Generator: unbalanced load	46	(✓)#6	✓	✓	✓
Generator: definite time-overcurrent	50/51	(✓)#6	✓	✓	✓
Generator: inverse time-overcurrent	IEC255	(✓)#6	✓	✓	✓
Generator: ground fault #5		(✓)#6	✓	✓	✓
<b>I/O's</b>					
Speed input (magnetic/switching; Pickup)		✓	✓	✓	✓
Discrete alarm inputs (configurable)		8	8	7	5
Relay outputs (configurable)	<i>LogicsManager™</i>	8	7	6	4
Analog inputs #7 (configurable)	<i>FlexIn™</i>	2	2	2	2
CAN bus communication #8	<i>FlexCAN™</i>	✓	✓	✓	✓
RS-232 Modbus RTU Slave #9		✓	✓	✓	✓
<b>Listings/Approvals</b>					
UL/cUL Listed		✓	✓	✓	✓
LR, GL Marine Approval pending		✓	✓	✓	✓
CE Marked		✓	✓	✓	✓

- #1 Selection during order; both ..15 A (standard) or both ..1 A (alternatively);
- #2 the mains are measured and may be displayed, but they will not be evaluated
- #3 dedicated to a fixed relay
- #4 Cable incl. software necessary (DPC = Part Number P/N 5417-557)
- #5 calculated + measured ground current
- #6 possible (not dedicated to a fixed relay)

- #7 selectable during configuration  
VDO (0 to 180 Ohm, 0 to 5 bar, 2-pole)  
VDO (0 to 180 Ohm, 0 to 10 bar, 2-pole)  
VDO (0 to 380 Ohm, 40 to 120°C, 2-pole)  
VDO (0 to 380 Ohm, 50 to 150°C, 2-pole)  
Pt100  
Resistive input (linear 2pt. or free chart 9pt.)  
20 mA (0/4 to 20 mA, freely configurable)
- #8 freely selectable during configuration  
CANopen, CAN (CAL), or J1939; request information
- #9 external electrical isolation required (e.g. DPC cable P/N 5417-557)

Example of the *LogicsManager*



### GCP-20 Series - Features Matrix

GCP-20 Series Genset Control	GCP-20	GCP-21				GCP-22				
	Package	LS	LS	LSB	LSR	LSX	LS	LSB	LSR	LSX
<b>Control</b>										
Breaker control logic	2	1	1	1	1	2	2	2	2	2
Synchronization	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Isolated single-unit operation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AMF (auto mains failure operation)	✓					✓	✓	✓	✓	✓
Stand-by operation	✓					✓	✓	✓	✓	✓
CHP (combined heat & power) operation		✓	✓	✓	✓	✓	✓	✓	✓	✓
Peak load operation (auto start/stop)		✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains parallel operation		✓	✓	✓	✓	✓	✓	✓	✓	✓
Open transition (break-before-make)	✓					✓	✓	✓	✓	✓
Closed transition (make-before-break)	✓					✓	✓	✓	✓	✓
Softloading		✓#1	✓#1	✓#1	✓#1	✓	✓	✓	✓	✓
<b>Accessories</b>										
Start/stop logic for Diesel/Gas engines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
kWh counter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operating hours/start/maintenance counter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Configuration via PC #2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Protection</b>										
Generator: voltage/frequency	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains: volt./freq./phase shift		✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: overload	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: reverse power	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: reduced power		✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: unbalanced load	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: time-overcurrent (TOC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Controller</b>										
Discrete raise/lower: n/f (speed/frequency)	✓	✓				✓				
Discrete raise/lower: V (voltage)	✓	✓		✓		✓		✓		
Discrete raise/lower: P (real power)		✓				✓				
Discrete raise/lower: Q (reactive power)		✓		✓		✓		✓		
Analog raise/lower: n/f (+/-3 Vdc)			✓	✓	✓		✓	✓	✓	✓
Analog raise/lower: V (+/-5 Vdc)			✓		✓		✓		✓	✓
Analog raise/lower: P (+/-3 Vdc)			✓	✓	✓		✓	✓	✓	✓
Analog raise/lower: Q (+/-5 Vdc)			✓		✓		✓		✓	✓
Mains import/export power (current measurement)		✓	✓	✓	✓	✓	✓	✓	✓	✓
Load-dependent start/stop		✓	✓	✓	✓	✓	✓	✓	✓	✓
Real power setpoint value: 0/4 to 20 mA					✓					✓
Load/var sharing		✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>I/Os</b>										
Speed input (magnetic/switching Pickup)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Discrete alarm inputs (configurable)	14	14	14	14	14	14	14	14	14	14
Relay outputs (configurable)	4	4	4	4	4	4	4	4	4	4
Analog inputs (configurable)	2 #3			4 #4	3 #5			4 #4	3 #5	
Analog outp. 0/4 to 20 mA (configurable)					2					2
CAN bus communication #6		✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Listings/Approvals</b>										
CE marked	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UL/cUL listed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Product number P/N</b>										
100 Vac, .../5 A	8440-1581	8440-1586	8440-1541	8440-1346	8440-1587	8440-1590	8440-1103	8440-1052	8440-1591	
400 Vac, .../5 A	5448-918	5448-916	8440-1014	5448-915	8440-1013	5448-914	8440-1012	5448-913	8440-1011	

#1 In isolated parallel operation with min. 2 gensets in parallel  
 #2 Cable incl. software necessary (DPC)  
 #3 [T1] & [T2] = 0/4 to 20 mA  
 #4 [T1]= VDO 0 to 5/10 bar; 0 to 180 Ohm; [T2] = VDO 40 to 120°C; 0 to 380 Ohm; [T3] & [T4] = 0/4 to 20 mA; freely scaleable  
 #5 [T1]= VDO 0 to 5/10 bar; 0 to 180 Ohm; [T2] = VDO 40 to 120°C; 0 to 380 Ohm; [T3] = 0/4 to 20 mA; freely scaleable  
 #6 Remote monitoring, control, configuration (GW 4 could be used for several interfaces)

GCP-30 Series - Features Matrix

GCP-30 Series Genset Control	GCP-31					GCP-32					
	Package	BPO	XPB	XPQ	XPQ+SB03	XPQ+SC07	BPO	XPB	XPQ	XPQ+SB03	XPQ+SC07
<b>Control</b>											
Breaker control logic		1	1	1	1	1	2	2	2	2	2
Synchronization		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Isolated single-unit operation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AMF (auto mains failure operation)			✓ #1	✓ #1	✓ #1	✓ #1	✓	✓	✓	✓	✓
Stand-by operation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peak load op. (auto start/stop)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains parallel operation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Open transition (break-before-make)							✓	✓	✓	✓	✓
Closed transition (make-before-break)							✓	✓	✓	✓	✓
Softloading		✓ #2	✓ #2	✓ #2	✓ #2	✓ #2	✓	✓	✓	✓	✓
<b>Accessories</b>											
Start/stop logic for Diesel/Gas engines		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
kWh counter		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operating hours/start/maintenance counter		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Configuration via PC #3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event recorder, real time clock			50	50	50	50		50	50	50	50
Language manager (English/German)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Protection</b>											
Generator: voltage/frequency		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains: volt./freq./phase shift		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: overload/unbalanced load		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: reverse/reduced power		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generator: time-overcurrent (TOC)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Controller</b>											
Discrete raise/lower: n/f & P #4		✓ #5	✓	✓ #5	✓ #5	✓ #5	✓ #5	✓	✓ #5	✓ #5	✓ #5
Discrete raise/lower: V & Q #4		✓ #5	✓	✓ #5	✓ #5	✓ #5	✓ #5	✓	✓ #5	✓ #5	✓ #5
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 via 20 mA			✓	✓	✓	✓		✓	✓	✓	✓
Mains import/export power control		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Load-dependent start/stop		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Active power setpoint 0/4 to 20 mA #6			✓	✓	✓	✓		✓	✓	✓	✓
Load/var sharing for 14 generators		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>I/O's</b>											
Magnetic/switching Pickup		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Discrete alarm inputs (configurable)		16	16	16	16	16	16	16	16	16	16
Relay outputs (configurable)		7	7	7	7	7	7	7	7	7	7
Analog inputs (configurable) #6			7	7	7	7		7	7	7	7
Analog outputs 0/4 to 20 mA (configurable)			2	2	2	2		2	2	2	2
External operation mode selection via DI			✓	✓	✓	✓		✓	✓	✓	✓
CAN bus comm., Guidance level #7		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CAN bus comm., Engine level #8						✓					✓
RS-232 comm., Engine level #9					✓					✓	
LS 4 - Circuit Breaker Control #10			✓	✓	✓	✓					
<b>Listings/Approvals</b>											
CE Marked		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UL/cUL Listed		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Part numbers P/N</b>											
Measuring inputs 100 Vac, ..15 A (8440-		-1609	-1554	-1558	-1562	-1560	-1613	-1570	-1574	-1578	-1576
Measuring inputs 400 Vac, ..15 A (8440-		-1610	-1555	-1559	-1563	-1561	-1614	-1571	-1575	-1579	-1577

#1 External unit LS 4 necessary #2 In isolated parallel operation with min. 2 gensets in parallel  
 #3 Cable incl. software necessary (DPC) #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  
 #6 [T1]-[T3] = 0/4 to 20 mA, [T4]/[T5] = Pt100, [T6] = VDO 0 to 180ohm, [T7] = VDO 0 to 380ohm; function of 20 mA inputs is configurable between alarm input, remote setpoint value for generator real power, mains import/export real power measuring value; others upon request  
 #7 Remote monitoring, control, configuration (GW 4 could be used for several interfaces)  
 #8 CAN bus connection to IKD1, mtu MDEC, Scania EMS/S6, CAN SAE J1939 and/or ST3 (configurable)  
 #9 RS-232 connection via Caterpillar CCM to Caterpillar EMCP-II, and ECM (configurable) (see prod\*spec 37167) #10 External unit LS 4

# Synchronizers

## Overview and Features

Analog and digital synchronizers from Woodward span the full range of synchronizer capabilities, providing precise voltage and phase matching capabilities from the simplest to the most demanding application.



prod'spec:  
 SPM-D10: 37297  
 SPM-D10/YB: 37298  
 SPM-D11: 37292  
 SPM-D21: 37293

The **SPM-D10** digital synchronizer incorporates control logic for one circuit breaker (incl. a two-phase synchronization), display of voltage data on the front panel, a user keypad, a built-in synchroscope, and easy configuration. Also available is built-in utility protection for over-/undervoltage, over-/underfrequency, phase/vector shift, generator protection for over-/undervoltage, over-/under-frequency, reverse/reduce power, and overload.

The **SPM-D10/YB** is a three-phase synchronizer that includes the complete control logic for one power circuit breaker. Additional expanded logic for coupling synchronous networks and two de-energized (dead) bus bars makes this unit a complete and powerful solution.

The **SPM-D11** permits load/var sharing between several units via an analog load sharing line and analog controller outputs.

The **SPM-D21** offers synchronization for a 2nd circuit breaker. Real power and power factor control, as well as a protection for generator (over-/undervoltage/-frequency, reverse power), and mains failure detection (over-/undervoltage/-frequency and phase/vector shift) are added to this package.



prod'spec: 02006

The **DSLCTM** control is a microprocessor-based synchronizer and load control designed for use on three-phase generators equipped with Woodward or other compatible speed controls and compatible automatic voltage regulators. The DSLC control is a synchronizer, load sensor, load control, dead bus closing system, and optionally a VAR/PF and process controller, all integrated into one powerful, yet convenient package.



prod'spec: 02021

The **MSLC** control is a microprocessor-based load control designed for three-phase electric power generation sites equipped with Woodward DSLC Digital Synchronizer and Load Control units which operate in parallel with the utility. The MSLC is a synchronizer, utility load sensor, import/export load level control, power factor controller, and a master process control.

## Multi Function Relays

### Overview and Features

MFR 1 Multi Function Relays provide monitoring and protection for a wide range of power generation and distribution applications. Each of the MFR series protects for the designated faults, monitors and displays the generator or utility voltage signals, includes one ANSI 74 alarm relay and 3 output relays, and is easily configured via the service interface.



prod'spec:  
MFR 11: 03244  
MFR 12: 03249  
MFR 13: 03245

The **MFR 11** provides voltage protection only. Multiple packages are available for different applications.

- [MFR 11/MP package](#) includes protection for over-/undervoltage, over-/underfrequency, and voltage asymmetry faults.
- [MFR 11/NU package](#) adds a wide range power supply to the [MP](#) package.
- [MFR 11/VDEW package](#) provides protection for over-/undervoltage, over-/underfrequency, voltage asymmetry faults and protection for phase/vector shift.
- [MFR 11/G59 package](#) adds protection for  $df/dt$  (ROCOF) faults and five additional relay outputs to the [VDEW](#) package.
- [MFR 11/G59N package](#) adds a wide range power supply to the [G59](#) package.
- [MFR 11/SC package](#) is made for synch-check functions and zero-voltage monitoring.
- [MFR 11/SC+N package](#) adds a wide range power supply to the [SC](#) package.

The **MFR 12** provides current protection only, and different packages are available for different applications.

- [MFR 12/CP package](#) includes protection for time-overcurrent and calculated ground faults.
- [MFR 12/51V package](#) includes protection for time-overcurrent, calculated ground faults, and voltage restraint time overcurrent, and five additional relay outputs.
- [MFR 12/IVIKR package](#) provides protection for ground faults via measurement of the displacement voltage.
- [MFR 12/50-51GN package](#) provides protection for directional ground faults.

The **MFR 13** provides voltage, current, and power protection. Different packages are available for different applications. The

- [MFR 13/GP package](#) provides protection for over-/undervoltage, over-/underfrequency, voltage asymmetry, time-overcurrent, overload, reduced/reverse load, load imbalance, reactive power (loss of excitation), power factor, calculated ground fault, voltage restraint overcurrent protection, as well as monitoring for zero-voltage.
- [MFR 13/GPX package](#) adds five additional configurable relay outputs and a synch-check relay function (without calculated ground-fault) to the [GP](#) package.
- [MFR 13/GPX-I package](#) adds a Modbus RTU slave interface to the [GPX](#) package.
- [MFR 13/K08 package](#) adds calculated ground fault protection to the [GPX-I](#) package.
- [MFR 13/GPY-I package](#) adds an analog output manager with three - 20/0/4 to 20 mA analog outputs to the [K08](#) package.
- [MFR 13/GPY-I-N package](#) adds a wide range power supply to the [GPY-I](#) package.

Other Woodward multi-function relays - such as the MFR 2/3 and ESDR units - provide specialized protection, synchronization, and monitoring functions.



prod'spec: 03247

The **MFR 15** provides voltage, current and power protection as well as automatic control and synchronization. Multiple packages are available for different applications.

- **MFR 15/SY package** provides protection for over-/undervoltage, over-/underfrequency, voltage asymmetry, time-overcurrent, overload, reduced/reverse power, load imbalance, reactive power (loss of excitation), and power factor. Synchronization for one circuit breaker, automatic control of real power and power factor can be performed as well. A 0/4 to 20 mA analog input can be used for an external power set point value. Three freely configurable analog outputs and a pulse output for kWh complete this package.
- **MFR 15/SYN package** adds-load sharing functionality.
- **MFR 15/SYN-I package** adds a Modbus RTU slave interface.



prod'spec: 03248

The **MFR 2** control combines protection for both the generator and the utility with synchronization logic for two circuit breakers. It controls frequency, voltage, real generator power, power factor, and load/var sharing. It also displays kWh, kvarh, operating hours, number of starts and maintenance calls.

The MFR 2 includes 4 discrete alarm inputs, 4 freely configurable relay outputs, and features a synchroscope on the front panel. Different packages offer flexibility:

- **MFR 2S/PSV package** provides protection for over-/undervoltage, over-/underfrequency, voltage asymmetry, time-overcurrent, overload, reduced/reverse power, load imbalance, reactive power (loss of excitation), and power factor. This control synchronizes two circuit breakers, performs soft loading, and load/var sharing.
- **MFR 2S/PSVA package**: adds 2 analog outputs, remote set point values, impulse outputs, CAN bus communications, and protection for df/dt (ROCOF) faults.
- **MFR 2S/PSVT package**: provides protection for over-/undervoltage, over-/underfrequency, voltage asymmetry, time-overcurrent, overload, reduced/reverse power, load imbalance, reactive power (loss of excitation), and power factor. This control synchronizes two circuit breakers, performs soft loading, and load/var sharing for transformers in block connection.
- **MFR 2A/PSV package**: provides the protection for asynchronous generators.



prod'spec: 37166

The **MFR 3** adds additional I/Os and a softloading feature as well as push buttons for direct control on the front panel.

The MFR 3 includes 12 discrete alarm inputs, 7 freely configurable relay outputs, and features a synchroscope on the front panel.



prod'spec: 03250

The **ESDR 4** and **ESDR 4T** are three-phase current differential protection relays for generators, motors, and transformers in unit connection. The currents flowing into the individual conductors are measured by means of current transformers on both sides of the protection zone.

The ESDR 4 and ESDR 4T recognize any two of the three phases short circuits or ground leakages as fault currents.



prod'spec: 37169

The **TUG 4** is a protection relay for up to 16 measuring inputs with two alarm levels each. Included functions are conversion of measured D.C. signals from from generator/prime mover, protective functions for temperature (two levels of alarm/monitoring), and 4 relay outputs for user configuration.

### MFR 11 - Features Matrix

	ANSI	MFR 11						
		MP	NU	VDEW	G59	G59N	SC	SC+N
<b>Measuring/Display</b>								
Voltage		✓	✓	✓	✓	✓	✓	✓
Voltage (2 <sup>nd</sup> input for synch-check)							✓	✓
<b>Accessories</b>								
Configuration via PC #1		✓	✓	✓	✓	✓	✓	✓
<b>Protection</b>								
Overvoltage	59	✓	✓	✓	✓	✓	✓	✓
Undervoltage	27	✓	✓	✓	✓	✓	✓	✓
Overfrequency	81O	✓	✓	✓	✓	✓	✓	✓
Underfrequency	81U	✓	✓	✓	✓	✓	✓	✓
Voltage asymmetry	47	✓	✓	✓	✓	✓	✓	✓
dφ/dt (phase/vector jump)	78			✓	✓	✓		
df/dt (ROCOF)	81RL				✓	✓		
<b>Function</b>								
Synch-check	25						✓	✓
Black start (close CB to dead busbar)							✓	✓
<b>I/O's</b>								
Output relays (configurable)	74	3	3	3	8	8	3	3
<b>Power Supply</b>								
24 Vdc		✓		✓	✓		✓	
90 to 265 Vac/dc			✓			✓		✓
<b>Listings/Approvals</b>								
CE marked		✓	✓	✓	✓	✓	✓	✓
UL/cUL listed		✓		✓	✓		✓	
GL (Marine)		✓		✓	✓		✓	
<b>Product Number P/N</b>								
Measuring inputs 110 Vac		5448-884	LR20610	8441-1003	5448-885	8441-1004	8441-1005	8441-1110
Measuring inputs 400 Vac		8441-1023	8441-1027	8441-1049	LR20406	8441-1103	8441-1097	8441-1111
Measuring inputs 700 Vac		LR21100			8441-1084			

#1 Cable incl. software necessary (DPC, Product Number P/N 5417-557)

### MFR 12 - Features Matrix

		MFR 12			
	ANSI	CP	51V	IVKR	50-51GN
<b>Measuring/Display</b>					
Voltage			✓		
Current		✓	✓	✓	✓
<b>Accessories</b>					
Configuration via PC #1		✓	✓	✓	✓
<b>Protection</b>					
Time-overcurrent (TOC)	50/51*	✓	✓		
Ground fault, calculated	50GS/51*GS	✓	✓		
Ground fault, measured #2	64G			✓	
Voltage restraint time-overcurrent #2	51V		✓		
Directional ground fault	50/51GN				✓
<b>I/O's</b>					
Output relays (configurable)	74	3	8	8	3
<b>Listings/Approvals</b>					
CE marked		✓	✓	✓	✓
UL/cUL listed		✓	✓	-	✓
GL (Marine)		✓	✓	✓	✓
<b>Part Numbers P/N</b>					
Measuring inputs 110 Vac				8441-1007	
Measuring inputs ../1 A		8441-1106			8441-1132
Measuring inputs ../5 A		5448-883			8441-1008
Measuring inputs 110 Vac, ../1 A			8441-1082		
Measuring inputs 110 Vac, ../5 A			8441-1006		

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

#1 Cable incl. software necessary (DPC)

#2 Measured using 110 Vac measuring input

### MFR 13 - Features Matrix

		MFR 13					
ANSI		GP	GPX	GPX-I	GPY-I	GPY-I-N	K08
<b>Measuring/Display</b>							
Voltage		✓	✓	✓	✓	✓	✓
Current		✓	✓	✓	✓	✓	✓
<b>Accessories</b>							
kWh counter		✓	✓	✓	✓	✓	✓
Configuration via PC #1		✓	✓	✓	✓	✓	✓
<b>Protection</b>							
Overvoltage	59	✓	✓	✓	✓	✓	✓
Undervoltage	27	✓	✓	✓	✓	✓	✓
Overfrequency	81O	✓	✓	✓	✓	✓	✓
Underfrequency	81U	✓	✓	✓	✓	✓	✓
Voltage asymmetry	47	✓	✓	✓	✓	✓	✓
Zero voltage		✓	✓	✓	✓	✓	✓
Overload	32	✓	✓	✓	✓	✓	✓
Reduced power	32F/37	✓	✓	✓	✓	✓	✓
Reverse power	32R	✓	✓	✓	✓	✓	✓
Unbalanced load	46	✓	✓	✓	✓	✓	✓
Re-active power		✓	✓	✓	✓	✓	✓
Loss of excitation	40Q	✓	✓	✓	✓	✓	✓
Time-overcurrent	50/51*	✓	✓	✓	✓	✓	✓
Voltage restraint time-o/c	51V	✓	✓	✓	✓	✓	✓
Ground fault, calculated	50GS/51*GS	✓					✓
<b>Function</b>							
Synch-check	25		✓	✓	✓	✓	✓
<b>I/O's</b>							
Output relays (config.)	74	3	8	8	8	8	8
Analog outp. -20/0/4 to 20mA					3	3	
Pulse output for kWh					✓	✓	
RS-485/Modbus RTU Slave				✓	✓	✓	✓
<b>Power supply</b>							
24 Vdc		✓	✓	✓	✓		✓
90 to 265 Vac/dc						✓	
<b>Listings/Approvals</b>							
CE marked		✓	✓	✓	✓	✓	✓
UL/cUL listed		✓	✓	✓	✓		✓
GL (Marine)		✓	✓	✓	✓	✓	
<b>Part numbers P/N</b>							
Measuring inputs 100 Vac; ..1 A		-	8441-1083	8441-1075	-	-	-
Measuring inputs 100 Vac; ../5 A	5448-886	5448-898	8441-1009	8441-1086	8441-1092	8441-1087	
Measuring inputs 400 Vac; ..1 A		-	8441-1108	-	-	-	-
Measuring inputs 400 Vac; ../5 A	LR21035	8441-1033	8441-1104	8441-1095	-	-	

\* not according to ANSI guidelines (three-step protection instead of inverse time characteristic)  
 #1 Cable incl. software necessary (DPC)

### MFR 15-2-3 - Features Matrix

	ANSI	MFR 15			MFR 2S			2A	MFR 31	MFR 31
		SY	SYN	SYN-H	PSV	PSVA	PSVT	PSV	PSVX+Q	PSVX+Q
<b>Control</b>										
Breaker control logic		1	1	1	2	2	1	1	1	2
Synchronization	25	✓	✓	✓	✓	✓	✓		✓	✓
Isolated single-unit operation		✓	✓	✓	✓	✓	✓		✓	✓
Mains parallel operation		✓	✓	✓	✓	✓	✓	✓	✓	✓
Softloading										✓
<b>Accessories</b>										
kWh counter		✓	✓	✓	✓	✓	✓	✓	✓	✓
kvarh counter					✓	✓	✓	✓	✓	✓
Operat. hours/start/mainten. counter					✓	✓	✓	✓	✓	✓
Configuration via PC #1		✓	✓	✓	✓	✓	✓	✓	✓	✓
Event recorder, real time clock									50	50
<b>Protection</b>										
Gen.: Over-/undervoltage	59/27	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains: over-/undervoltage	59/27				✓	✓	✓	✓	✓	✓
Gen.: Over-/underfrequency	81O/U	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains: over-/underfrequency	81O/U				✓	✓	✓	✓	✓	✓
Voltage asymmetry	47	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mains: dφ/dt (phase/vector jump)	78				✓	✓	✓		✓	✓
Mains: df/dt (ROCOF)	81RL					✓			✓	✓
Gen.: Overload	32	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.: Reverse power	32R	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.: Reduced power	32F/37	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.: Unbalanced load	46	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.: Re-active power					✓	✓	✓	✓	✓	✓
Gen.: Loss of excitation	40Q	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.: Time-overcurrent (TOC)	50/51*	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Controller</b>										
Discrete raise/lower: n/f & P #2		✓	✓	✓	✓	✓	✓	✓	✓	✓
Discrete raise/lower: V & Q #2		✓	✓	✓	✓	✓	✓		✓	✓
Mains import/export power									✓	✓
Remote real power via 0/4 to 20 mA		✓	✓	✓		✓			✓	✓
Load sharing (0 to 4 Vdc)			✓	✓	✓	✓	✓	✓	✓	✓
var sharing					✓	✓	✓		✓	✓
<b>I/Os</b>										
Discrete alarm inputs (config.)					4	4	4	4	12	12
Relay outputs (configurable)	74	3	3	3	4	4	4	4	7	7
Analog inputs (conf.; see prod'spec)									5	5
Analog outputs 0/4 to 20 mA (conf.)		3	3			2			2	2
Pulse output for kWh		✓	✓			✓			✓	✓
Pulse output for kvarh						✓			✓	✓
RS-485 Modbus RTU Slave				✓						
CAN bus communication #3					✓	✓	✓	✓	✓	✓
<b>Listings/Approvals</b>										
UL/cUL listed		✓	✓	✓	✓	✓	✓	✓	✓	✓
CE marked		✓	✓	✓	✓	✓	✓	✓	✓	✓
GL (Marine)		✓	✓	✓						✓

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

#1 Cable incl. software necessary

#2 n (speed), f (frequency), P (real power), V (voltage), Q (power factor)

#3 Remote monitoring, control, configuration (GW 4 could be used for several interfaces)

# Discrete-Function Controls and Accessories

## Overview and Features

To complete your power management system, Woodward offers the most complete range of analog and digital controls available in the industry.



prod'spec: 37170

The **GW 4** is an extension to many of the GCP and easYgen generator control units, providing a communications interface from the CAN bus network to a variety of external buses. Available communication protocols include RS-232, RS-485, Modbus, Profibus, the Leonhard-Data-Protocol and even an external modem. The secondary communication bus sends/receives data to/from the GCP and easYgen Series Guidance Level CAN bus network.



prod'spec: 37167

The **LS 4** is a power circuit breaker control for complex applications where multiple utility/tie breakers exist. The LS 4 controls the measured value logging and "closure order" for the circuit breaker. The synchronization set point values are transmitted from the LS 4 to the GCP controller via the CAN bus.



prod'spec: 37168

The **UMT 1** is a digital multi-channel measuring transducer. that displays true rms values via three-phase measuring of voltage and current. The analog output manager and three analog -20/0/4 to 20 mA outputs offer the flexibility to transmit every measured and calculated value. The pulse output can be configured to transmit kWh/h or kvarh/h.



prod'spec: 37171

The **IKD 1** is an external I/O expansion board. A generator control does not have enough discrete inputs and outputs, 8 discrete inputs and outputs can be connected via the CAN bus with this extension card. Up to two IKD 1 expansion boards may be connected in parallel via the CAN bus to a controller.



prod'spec: 37279

The **easYlite-100** is designed to remotely display the status of a generator control system through a CAN bus Interface. The easYlite-100 may be used where an additional status display is required, which is directly controlled by the generator control unit.

The system is able to provide 18 individual status displays using red LEDs. The user may assign 14 of the status displays and 4 are pre-assigned to engine alarms.

The CAN bus interfaces with other Woodward generator set control systems without requiring a PLC or any other device provide higher reliability and robust control in an economical package.



prod'spec: 37185

The **SYNCONpanel** is a remote synchronizing panel that transmits the measured potential between two voltage systems via CAN bus to the **GCP-31/RPQ+SC08** (P/N 8440-1764) generator controller. Please refer to the Product Specification 37316 for more details about this unit.

For maintenance of switchgear, it may be necessary to de-energize and isolate certain components of the system. This control makes it possible to use mobile generator sets to synchronize to and feed/back feed the systems to be isolated. If only a disconnection switch and not a circuit breaker is available, the "zero-angle-control" feature will be required for that connection point.

prod'spec:  
02012  
82011

The **Real Power Sensor** is a solid-state electronic device housed in a metal chassis intended for installation in a prime mover control cabinet. The unit contains its own power supply and is powered separately from the speed control. The Real Power Sensor constantly monitors the generator output voltage and current with transformers. The potential transformers are selected to provide secondary voltage of 115 Vac or 230 Vac at nominal generator voltage. The current transformers are selected to provide a 5-amp secondary current at full generator output. The Real Power Sensor provides a signal to the speed control that is proportional to the output power of the generator. The Real Power Sensor is used with Woodward speed controls to measure generator output power and provide a kilowatt signal to the speed control.



prod'spec: 03218

The **Digital Reference Unit** generates a precise voltage that may be used wherever a very accurate reference signal is required. Typical use combines the Digital Reference Unit with other Woodward controls for regulation of speed or load. This device provides precise electronic control of the reference-signal voltage. The level of the reference signal can be manually or automatically selected from maximum to minimum with an additional adjustable intermediate set point.



prod'spec: 82314

The **Generator Load Sensor** adds droop or isochronous load sharing for paralleling generator sets having Woodward speed control systems. It has an SPM-A Synchronizer input and shares load with all other Woodward load-sharing systems. This unit is used with the EPG system and the Woodward 2301A and 701 Speed Controls. The Generator Load Sensor uses paralleling lines to ensure proportional load sharing when generators are isochronously paralleled.



prod'spec: 02013

**Woodward Process and Import/ Export Controls**, with Woodward load or speed controls, give you process control of an engine system. Process controls will control any process where the controlled parameter is determined by the load or speed of an engine and where the controlled parameter can be monitored as a 1 to 5Vdc, +/-5 Vdc, 4 to 20 mA or +/-20 mA input signal, depending on your specific process control needs. A process input signal of 0 to 10Vdc is optional if you use an external control-point potentiometer. Process and Import/ Export controls are available for a wide range of process configurations. This control compares process transducer input signals to operator-set references. The difference between each input and the reference setting is sent to a speed or load control circuit as an operating voltage. The load or speed control then changes or maintains the engine load or speed and in turn, maintains a constant process setting.



prod'spec: 82047

Here's the do-it-all control for use in power generation with diesel, gas or gasoline engine driven generator sets. The **2301A Load Share and Speed Control** is available in forward- or reverse-acting systems and in several speed ranges for applications requiring either droop or isochronous speed control. Models are available with either accelerating or decelerating ramps. This tough unit can stand up particularly well to harsh environments. Built-in protections guard against Electromagnetic Interference/ Radio Frequency Interference (EMI/ RFI), humidity, salt spray, dust and vibration.



prod'spec: 03204

The **2301D Load Share and Speed Control** is a digital version of the 2301A. It incorporates all of the capabilities of the 2301A but adds the speed and precision of digital electronics. Additionally, all settings are made in the software (no pots to adjust) and changes are made quickly and easily.

## Woodward Services

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### How to Contact Woodward

For assistance, call one of the following international Woodward facilities. You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website ([www.woodward.com](http://www.woodward.com)) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, including full address, phone, fax, and e-mail information, go to [www.woodward.com/corp/locations/locations.cfm](http://www.woodward.com/corp/locations/locations.cfm).]

For assistance outside North America, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

<u>Facility</u>	<u>Phone Number</u>
Brazil (Campinas)	+55 (19) 3708 4800
China (Suzhou)	+86 (512) 6762 6727
China (Tianjin)	+86 (22) 2621 3120/1/2
Germany (Stuttgart)	+49 (711) 78954-0
India (Ballabgarh)	+91 (129) 230 7111
Japan (Tomisato)	+81 (476) 93-4661
The Netherlands (Hoofddorp)	+31 (23) 5661111
United Kingdom (Cheltenham)	+44 (0) 1242 277000
United States (Fort Collins)	+1 (970) 482-5811 OR (800) 523-2831

### Engineering Services

Woodward Industrial Controls Engineering Services offers the following after-sales support for Woodward products. For these services, you can contact us by telephone, by e-mail, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Use the contact information above (How to Contact Woodward) or below (under Sales Support), or visit the Woodward website ([www.woodward.com](http://www.woodward.com)).

**Technical Support** is available through our many worldwide locations or our authorized distributors, depending upon the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical support, please contact us via telephone, e-mail us, or use our website and reference *Customer Services* and then *Technical Support*.

**Product Training** is available at many of our worldwide locations (standard classes). We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via telephone, e-mail us, or use our website and reference *Customer Services* and then *Product Training*.

Customer Services has also created the first of several planned CBT (computer based training) modules, available on CD-ROM from Woodward or from any Woodward authorized Distributor. Currently available is part number 8928-358, **Basic Governing and Control Theory**. Further information is also available in product specification 03221.

**Field Service** engineering on-site support is available, depending on the product and location, from one of our many worldwide locations or from one of our authorized distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface. For field service engineering assistance, please contact us via telephone, e-mail us, or use our website and reference *Customer Services* and then *Technical Support*.

## Sales Support

To request sales assistance (order status, price & delivery, order entry, including 24-hour emergency support), please contact the Woodward agency listed for your area.

### North America

Woodward  
PO Box 1519  
1000 East Drake Rd  
Fort Collins CO 80522-1519, USA  
Phone +1 (970) 482-5811 (24 hours a day)  
Toll-free +1 (800) 523-2831 (North America)  
Fax +1 (970) 498-3058  
E-mail [icinfo@woodward.com](mailto:icinfo@woodward.com)  
Website [www.woodward.com](http://www.woodward.com)

Woodward  
6250 West Howard Street  
Niles IL 60714-3433, USA  
Phone— +1 (847) 967-7730  
Fax— +1 (847) 967-7832

**South America**

Woodward  
Rua Joaquim Norberto, 284  
JD Santa Genebra, Caixa Postal 6599  
CEP 13080-150, Campinas, SP, Brazil  
Phone +55 (19) 3708 4800  
Fax +55 (19) 3708 4748  
E-mail [wmanto@woodward.com](mailto:wmanto@woodward.com)

**Europe/Africa/Middle East/western Asia**

Woodward  
PO Box 34 (Hoofdweg 601)  
2130 AA Hoofddorp, The Netherlands  
Phone +31 (23) 5661111  
Fax +31 (23) 5636529  
E-mail [info\\_nl@woodward.com](mailto:info_nl@woodward.com)

**Europe/Africa/Middle East/western Asia**

Woodward  
Handwerkstraße 29  
70565 Stuttgart, Germany  
Phone +49 (711) 78954-0  
Fax +49 (711) 78954-100  
E-mail [sales-stuttgart@woodward.com](mailto:sales-stuttgart@woodward.com)

**Central South Asia**

Woodward  
23/6 Mathura Road  
Ballabgarh, Haryana 121004, India  
Phone— +91 (129) 230 7111  
Fax— +91 (129) 230 7123  
E-mail— [woodward@woodward-india.com](mailto:woodward@woodward-india.com)

**Eastern/Southern Asia & North Pacific**

Woodward  
Tomisato PO Box 1  
251-1, Nakazawa, Tomisato-machi  
Inba-gun, Chiba, 286-0291, Japan  
Phone +81 (476) 93-4661  
Fax +81 (476) 93-7939  
E-mail [tomsal@woodward.com](mailto:tomsal@woodward.com)

**South Pacific**

Woodward  
PO Box 319, Unit 1 – 1 Wirega Avenue  
Kingsgrove, New South Wales 2208, Australia  
Phone +61 (2) 9758 2322  
Fax +61 (2) 9750 6272  
E-mail [sydney@woodward.com](mailto:sydney@woodward.com)

For fastest service, contact your local distributor or office. But if all else fails, contact the Industrial Controls 24-hour emergency number (for emergency and/or down situations to provide delivery of available parts or technical assistance): 800-523-2831 (toll-free in North America) or +1-970-482-5811.

## Repair Services

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see “How to Contact Woodward” later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

## Replacement/Exchange

Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is also a flat rate structured program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Woodward facility as explained below (see “Returning Equipment for Repair” later in this chapter)

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned to Woodward within 60 days, Woodward will issue a credit for the core charge. [The core charge is the average difference between the flat rate replacement/exchange charge and the current list price of a new unit.]

**Return Shipment Authorization Label.** To ensure prompt receipt of the core, and avoid additional charges, the package must be properly marked. A return authorization label is included with every Replacement/Exchange unit that leaves Woodward. The core should be repackaged and the return authorization label affixed to the outside of the package. Without the authorization label, receipt of the returned core could be delayed and cause additional charges to be applied.

## Flat Rate Repair

Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

## Flat Rate Remanufacture

Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

## Technical Publications

Woodward technical product specifications and technical manuals are available in PDF (electronic) format on our website ([www.woodward.com](http://www.woodward.com), click on *Sitemap* at the bottom, then click on *Industrial Controls Publications* near the top of the page).

## Woodward Distributor Network

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Woodward service and sales are available throughout the world from Woodward plants and offices, from Woodward Distributors, and from other Woodward authorized agents. The latest listing of every Woodward location, including address, phone, fax, and e-mail, is contained in our worldwide directory, which is available on the Woodward website (<http://www.woodward.com/pdf/ic/25225.pdf>).

We appreciate your comments about the content of our publications.

Send comments to: [stgt-documentation@woodward.com](mailto:stgt-documentation@woodward.com)

Please include the manual number from the front cover of this publication.



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**Home Page:** <http://www.woodward.com/smart-power>

Woodward has company-owned plants, subsidiaries, and branches,  
as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address/phone/fax/e-mail information for all locations is available on our website.