

PRODUCT CATALOG

IPCS

INTEGRATED PACKAGE CONTROL SOLUTIONS

GENSET CONTROLLERS | SYNCHRONIZERS | PROTECTION RELAYS



GENSET
CONTROLLERS

SYNCHRONIZER &
LOAD SHARE CONTROLLERS

AUTOMATIC TRANSFER
SWITCH CONTROLLERS

TRANSDUCERS

PROTECTION
RELAYS

POWER GENERATION
ENGINE CONTROL PRODUCTS

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IPCS - INTEGRATED PACKAGE CONTROL SOLUTIONS

Each day, we apply our knowledge and our resources to create systems that perform under incredible demands. We solve, improve, and address the challenges our customers face, and ultimately deliver solutions that are an essential part of the technology that is changing the world.



ABOUT WOODWARD

Woodward delivers lasting contributions to energy control, always innovating for a better future. Woodward integrates leading-edge technologies into fuel, combustion, fluid, actuation, and electronic control systems for the aerospace and energy markets. We also convert wind energy into reliable and safe electrical power through converter systems. Our growth is driven by the increasing demand for fuel-efficient, low-emission, and high-performance energy management.

We have a clear vision and follow carefully planned long-term strategies. With multiple locations all over the world, Woodward can respond quickly with solutions tailored to the local demands of our customers. Our leadership in energy control and optimizations solutions is built on a strong foundation, dating back to 1870. We are driven by the needs of our customers and guided by our tradition of integrity, values, and principles.

SERVING ENERGY MARKETS

Woodward enhances the global quality of life and sustainability by optimizing energy use through improved efficiency and lower emissions. Our technologies and services enhance energy conversion of renewable and fossil fuels, energy extraction and distribution, and electric power generation and distribution.

With Woodward's combination of combustion control, motion control, and electronic controls technologies, we enable more responsible energy use by reducing emissions, improving fuel utilization, and enabling power system integration.

SOLUTIONS FOR ELECTRICAL POWER GENERATION

Enabling cleaner, more efficient power: Woodward provides complete engine management systems, genset controllers for the major power generation OEMs worldwide, as well as power converters for CO₂-free renewable energy generation.

Our power management systems for diesel, natural gas, and alternative-fueled engines are key enablers to address the strict EPA emissions regulations while providing reduced overall cost of system ownership.



Woodward has maintained a preferred-supplier position in diesel- and gas-fueled power generation, also in complete plant control systems and wind power generation. Based on decades of experience with generator controls, load sharing, synchronization and power protection technologies, Woodward's power generation product line sets standards worldwide.

SOLUTIONS FOR ELECTRICAL POWER DISTRIBUTION

Woodward designs, manufactures, and supports a complete line of intelligent multifunctional protection and control relays. They are utilized in a wide field of power generation and distribution applications (e.g. utility, industrial, renewable, and generator sets). Our customers appreciate the integrated concept of protection functions in one device tailored to their application needs. This results in a cost-effective solution for reliable state-of-the-art protection systems.

Woodward products are designed based on latest market trends and reflect our long-term expertise in the energy market. We fully understand customer needs for reliable, safe, and robust multifunctional protection relays to provide the highest degree of overall system performance.



ALWAYS INNOVATING FOR A BETTER FUTURE

WOODWARD HISTORY

Amos W. Woodward was dedicated, inventive, and hard-working. He applied those traits, along with outstanding craftsmanship, service, and integrity when he founded what was to become Woodward, Inc. in 1870.

Those very qualities remain the basis of our business philosophy today. Woodward's leadership in energy control and optimization solutions is built on that foundation of strategic vision, quality performance, and core values. We build on our proven successes with technologies that redefine the way our custom-

ers' engines, turbines, and electrical power equipment operate. We are guided by our strong tradition of integrity, and hold fast to our core values and principles. We are driven by the needs of our customers, and aligned by our strategic vision and goals.

We call it the Woodward Way.



WOODWARD SOCIAL RESPONSIBILITY

Woodward promotes an ethical environment that fosters growth, encourages self-development, and provides meaningful work. Through our employees and technology, our goal is to provide the highest value and quality systems, components, and services that contribute to our customers' success.

We believe Woodward does more than provide jobs in the communities in which we operate. We are deeply committed to supporting programs and organizations that ensure our communities are desirable places to live and work. We cultivate a spirit of volunteerism by encouraging our employees to be involved in their communities.

"We are firm in our belief that our employees do with integrity, what is right for the business because the interests of Woodward and our employees are inseparable."

Tom Gendron,
Chairman and CEO



WOODWARD WORLDWIDE

Woodward may have a global presence, but we have a local mindset. That means our customers benefit from prompt support wherever in the world they're located. But they also can count on our understanding of local issues and our commitment to the communities in which we live and work.

Our internal teams are comprised of employees from many locations as well – encouraging fresh ideas, offering a variety of views on how to meet new challenges, and providing our employees the opportunity to make a worldwide impact. Woodward's plants, offices, and service centers span the globe:

North and Central America, South America, Europe, Middle East and Africa, Russia, China, India, ASEAN and Oceania.

Our global presence allows us to respond quickly to the needs of our customers. Customers and the industry at large recognize our people as a competitive advantage through their diverse representation of the global community. Additionally, as a company and as employees, we respond to the needs of our local communities by donating our time, talent, and money.

GENSET CONTROLLERS



Genset Controllers for Your Power Generation Systems

Woodward offers a wide variety of controllers for the generator set market. You will find the right solution regardless of whether you are looking for controllers to run simple none-parallel application or to service multiple generator set applications. If you are faced with complex breaker and load flow conditions where loss of power would be critical to your customers, invested assets or even lives, you can feel safe by using Woodward genset controllers.

Our controllers have undergone detailed and stringent verification and validation processes, so we are proud to say that we offer reliable and proven controllers. Our global application engineering and support teams complement our portfolio in case you need specific support for your application.



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Protection
Relays

Power
Generation Engine
Control Products

EASYGEN-3000™ SERIES

ONE UNIT – INFINITE OPPORTUNITIES

The easYgen-3000 is an exceptionally versatile genset control and protection package with all the flexibility and features needed to fit a wide range of power generation applications. It allows the user to standardize on a single, affordable control for many uses – from stand-alone emergency generators to isochronous parallel operation of up to 32 gensets. Common applications include emergency standby, cogeneration, marine ship/shore power, island prime power or utility paralleling with peak shaving, and import/export control.

YOUR BENEFITS AT A GLANCE

Gain full flexibility with just one control that is suitable for the full range of genset power applications from standard island power plants to highly customized cogeneration units in mains parallel mode.

TWO VERSIONS

- The back-panel-mounted easYgen-3100/3400 has a rugged aluminum chassis for use in harsh environments or confined spaces
- The front-panel-mounted easYgen-3200/3500 has sealed soft keys and a large, easy-to-read backlit LCD multilingual graphical display

FEATURE OVERVIEW

- True RMS voltage and current sensing for generator, bus and mains
- Complete engine/generator protection, metering, mains monitoring
- LogicsManager™ to combine measured values, internal conditions, and I/O states with Boolean operators and programmable timers, allowing for complex controls
- Load share 32 gensets in island mode or paralleled to the utility
- Different load or process-dependent start/stop sequencing with kW/kvar load sharing
- Configurable generator, mains, and generator
- Communication to engine ECUs SCADA, external I/O and RP-3000 remote panel
- Support of CAN open, J1939, Modbus RTU and modem support
- Easy-to-read graphical display
- Selectable display languages (easYgen-3200 / easYgen-3500)

PACKAGES



Package	easYgen-3100		easYgen-3200	
	P1	P2	P1	P2
External discrete inputs/outputs	32/32	32/32	32/32	32/32
External analog inputs/outputs	-	16/4	-	16/4
Part No.				
1 A	8440-2055	8440-2057	8440-2049	8440-2051
5 A	8440-2054	8440-2056	8440-2050	8440-2052

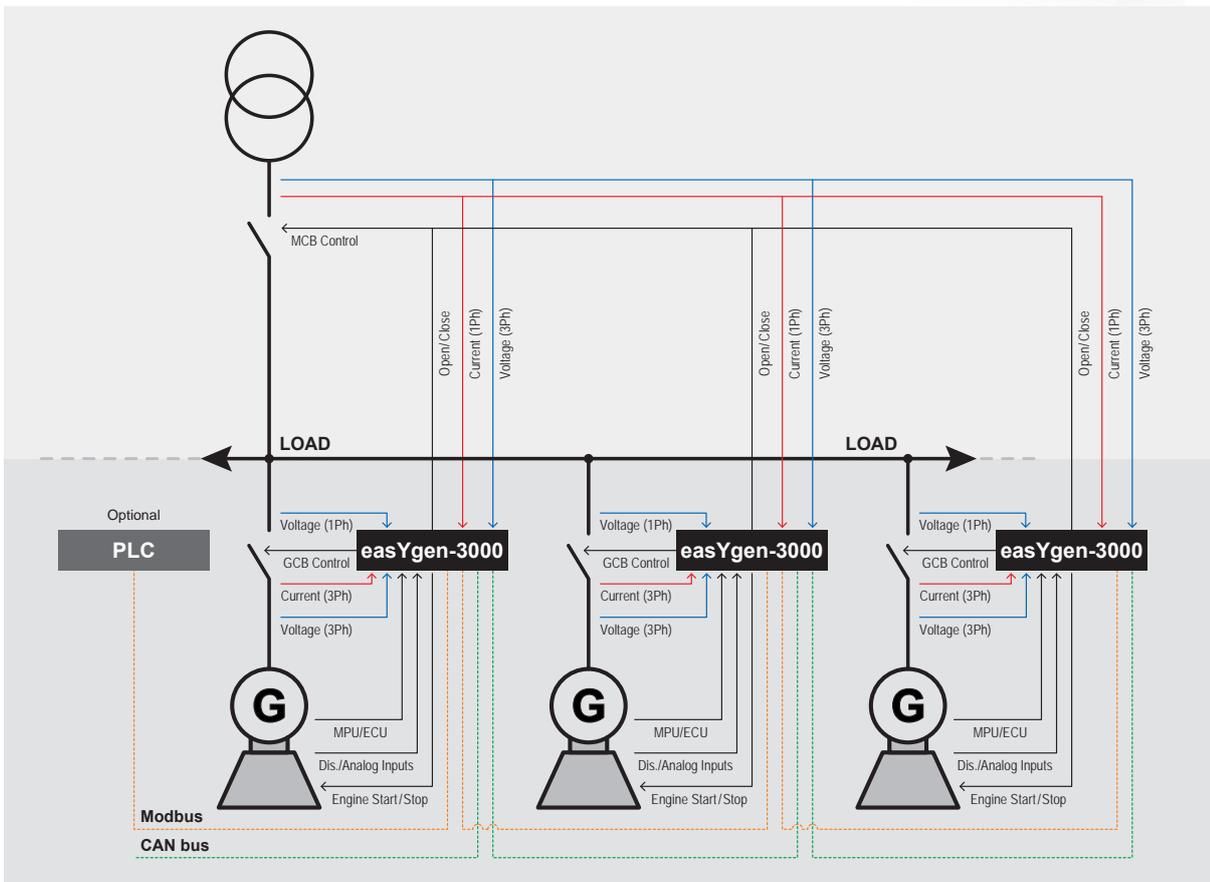
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easYgen-3400

easYgen-3500

APPLICATIONS (EASYGEN-3000 SERIES)



- Genset Controllers
- Synchronizer & Load Share Controllers
- Automatic Transfer Switch Controllers
- Transducers
- Multifunction Relays
- Protection Relays
- Power Generation Engine Control Products

PACKAGES



Package	easYgen-3400			easYgen-3500				
	P1	P2	Marine	P1	P2	Marine	Rental	Asynchron
External discrete inputs/outputs	32/32	16/16	32/32	32/32	16/16	32/32	32/32	16/16
External analog inputs/outputs	16/4	-	16/4	16/4	-	16/4	16/4	-
Part No.								
1 A	8440-1956	8440-2079	8440-2044	8440-1935	8440-1937	8440-2046	8440-2095	-
5 A	8440-1945	8440-2078	8440-2045	8440-1934	8440-1936	8440-2047	8440-2030	8923-2073

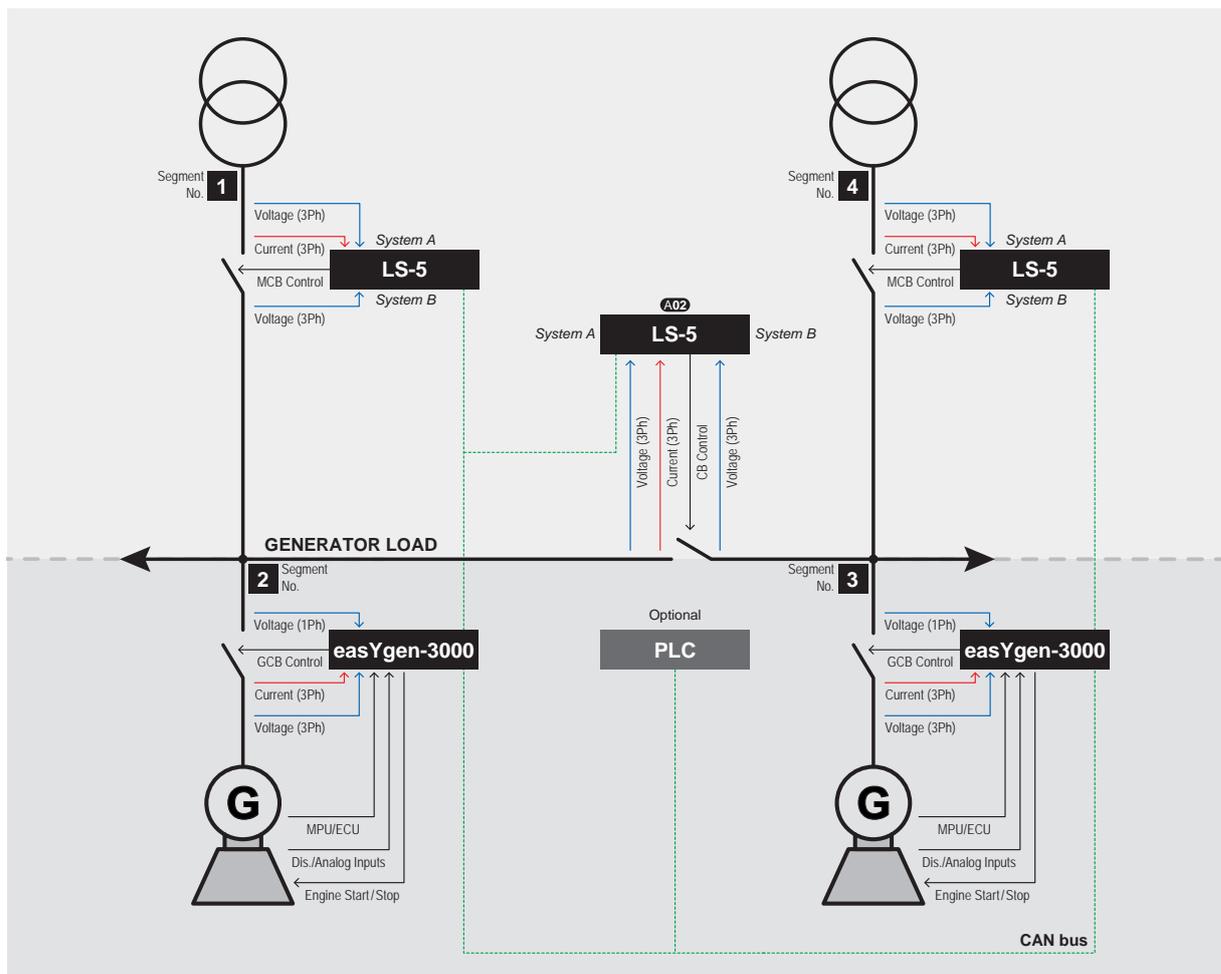
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EASYGEN-3000™ SERIES

ONE UNIT – INFINITE OPPORTUNITIES

The LS-5 circuit breaker control, when used with the easYgen-3400/3500™, enables complex control of distribution systems having multiple mains and bus tie breakers. The integrated LogicsManager™ links internal states and input signals with logical operators and time elements to implement complex control tasks.

APPLICATIONS (EASYGEN-3400/3500 WITH LS-5)





LS-5



easYgen-3500

SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 19 W
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 1
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 1
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)
Relay outputs	Relays, dry contacts

Load (resistive)	2 A at 24 VDC and 250 VAC
Analog inputs	0 to 500 Ohms, 0 to 20 mA
Analog outputs (isolated)	±10 V / ±20 mA / PWM
Housing	
easYgen-3200/3500: Front panel mounting Dimension (WxHxD)	Plastic housing 282 × 217 × 99 mm
easYgen-3100/3400: Back panel mounting Dimension (WxHxD)	Sheet metal housing 250 × 227 × 84 mm
Sealing (front / back)	IP66 / IP20
Weight	approx. 1,850 g (plastic housing) approx. 2,150 g (sheet metal housing)

Related Devices easYgen-3000 Series

- LS-5 Series see page 24
- RP-3000 Remote Panel see page 24
- easYlite-100 Annunciator see page 24
- actiVgen see page 24
- LSG Load Share Gateway see page 24
- Other Related Devices see page 24

Approvals easYgen-3000 Series



detailed product information: easYgen-3200/3100 [product spec.37258](#) | easYgen-3500/3400 [product spec.37523](#)

Related Devices easYgen-3000 Marine

- LS-5 Series see page 24
- RP-3000 Remote Panel see page 24
- easYlite-100 Annunciator see page 24
- actiVgen see page 24
- LSG Load Share Gateway see page 24
- Other Related Devices see page 24

Approvals easYgen-3000 Marine



detailed product information: [product spec.37533](#)

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

EASYGEN-2000™ SERIES

IMPROVING SYSTEM EFFICIENCY

The easYgen-2000 Series is a compact, affordable genset control and protection package for load sharing up to 16 gensets in island operation, or parallel operation of a single unit with a utility. Its integrated load-dependent start/stop programming allows you to define how gensets are brought on- and off-line to support changing load demands. It even works with a mix of different sized engines, so you can maintain the spinning reserve you need while optimizing fuel efficiency.

Advanced interface capability provides communication at the genset control level, up to the system network level, and to your desktop half a world away. The easYgen-2000 Series works with many common industrial interfaces: CANopen for peer-to-peer load sharing; J1939 for engine ECU; Modbus RTU for PLC, HMI, and SCADA; and modem for remote control and programming using Woodward ToolKit software.

YOUR BENEFITS AT A GLANCE

Realize even cost-driven projects with a genset control that gives you maximum flexibility and advanced functionality to fulfill your customers' requirements.

FEATURE OVERVIEW

- Load share 16 gensets in island mode, or parallel a single genset to a utility
- Control of generator, and mains breaker, open or closed transition, synchronization and soft load/unload
- LogicsManager™ Boolean programmability for complex system control
- Process-dependent start/stop logic
- Multilingual capability: selectable display languages
- Complete engine and generator protection and mains monitoring
- Asynchronous (inductive) and synchronous generator support



PACKAGES

Package	easYgen-2200		easYgen-2300		easYgen-2500		
	P1	P2	P1	P2	P1	Rental	Asynchron
MPU input	•	-	-	-	•	•	•
Discrete inputs	8	8	8	8	10	10	10
Relay outputs	6	6	6	6	11	11	11
Analog inputs	3	3	3	3	4	4	4
Analog outputs	1	1	2	2	4	4	4
CAN bus interfaces	1	1	1	2	2	2	2
RS-485 interfaces	-	-	1	-	1	1	1
Part No.							
1 A	8440-1856	8440-1858	-	-	8440-1860	8440-2096	-
5 A	8440-1855	8440-1857	8440-2080	8440-2058	8440-1884	8440-2029	8923-2074

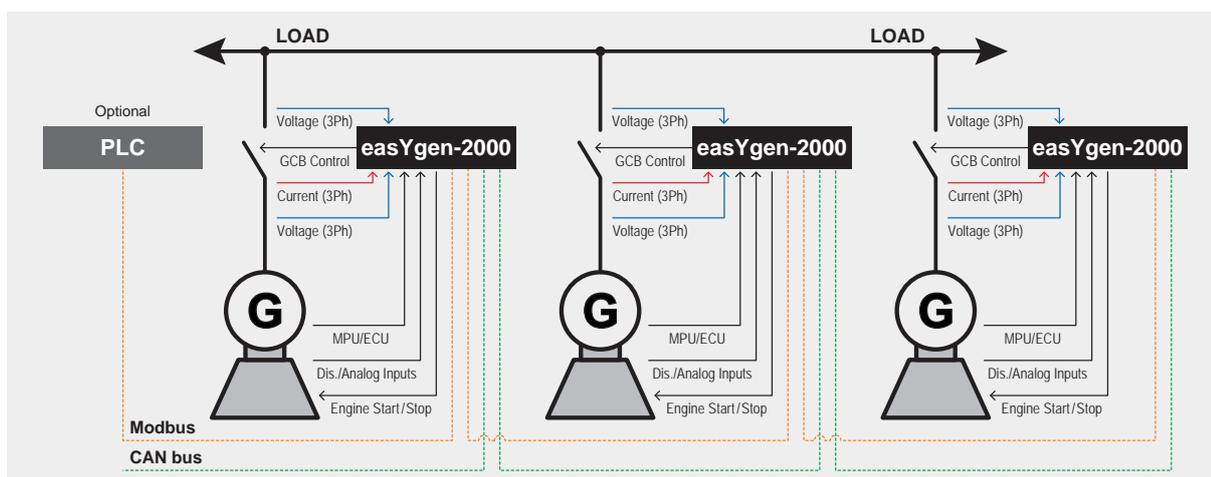
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SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)	Relay outputs	Relays, dry contacts
Consumption	max. 8/12 W (depending on model)	Load (resistive)	2 A at 24 VDC and 250 VAC
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F	Analog inputs	0 to 500 ohms, 0 to 20 mA
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F	Analog outputs (isolated)	±10 V / ±20 mA / PWM
Ambient humidity	95%, non-condensing	Housing	
Voltage AC input	120 VAC and 480 VAC true RMS	Front panel mounting	Plastic housing
Accuracy	Class 1	Dimension easYgen-2200 (WxHxD)	219 x 171 x 61 mm
Current AC input	1 A or 5 A true RMS, isolated	Dimension easYgen-2500 (WxHxD)	219 x 171 x 98 mm
Accuracy iac	Class 1	Sealing (front / back)	IP65 / IP20
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)	Weight	approx. 800 g (easYgen-2200) approx. 1,100 g (easYgen-2500)

APPLICATIONS



Related Devices

- easYlite-100 Annunciator see page 24
- actiVgen see page 24
- LSG Load Share Gateway see page 24
- Other Related Devices see page 24

Approvals



detailed product information: product.spec.37548

EASYGEN-1000™ SERIES FOR SINGLE UNIT APPLICATIONS

The innovative features of the easYgen-1000 Series, including flexible breaker configuration and start/stop logic, real and reactive power sensing, and remote-start capability make it the intelligent choice for specialized mobile power and emergency standby applications.

Advanced CAN communication provides control of most common engine ECUs and allows connection to the Woodward IKD 1 module for expansion of the onboard I/O set, and to the easylite-100 remote annunciation panel for NFPA-compliant installations.

FEATURE OVERVIEW

- Configurable for one or two breakers in open transition
- Flexible start/stop logic for diesel and gas engines
- True RMS voltage and current sensing for generator and mains
- Complete engine/generator protection, metering and mains monitoring
- LogicsManager™ to combine measured values, internal conditions, and I/O states with Boolean operators and programmable timers, allowing for complex controls
- Communication to engine ECUs, Programmable Logic Controls (PLC), external terminals (I/O expansion)
- Support of CAN open, J1939, Modbus RTU, and modem connection
- Selectable display languages

PART NUMBERS



easYgen-1000 Series

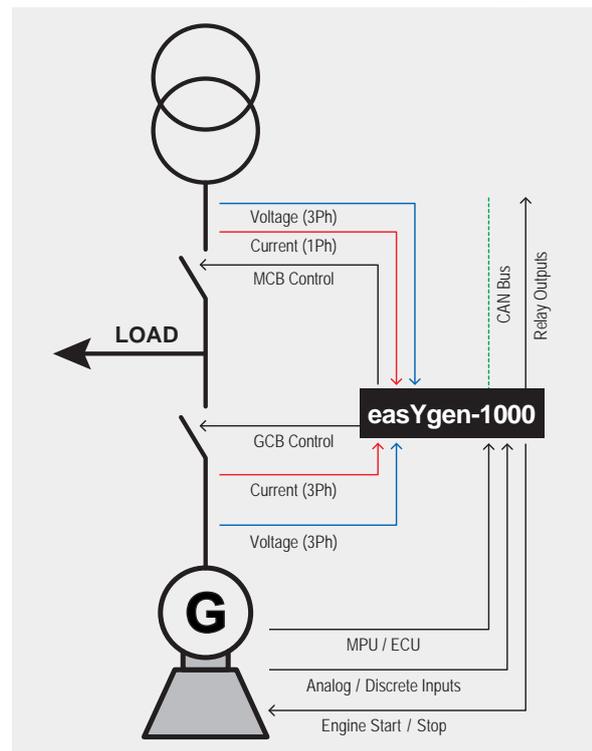
Part No.	
1 A	8440-1810
5 A	8440-1809



SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 15 W
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 1
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 1
Discrete inputs (isolated)	Range: 12/24 VDC (6.5 to 40 VDC)
Relay outputs	Relays, dry contacts
Load (resistive)	2 A at 24 VDC and 250 VAC
Analog inputs	0 to 500 ohms, 0 to 20 mA
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	219 × 171 × 61 mm
Sealing (front / back)	IP65 / IP20
Weight	approx. 800 g

APPLICATIONS



Related Devices

- easYlite-100 Annunciator see page 24
- GW 4 gateway see page 24
- Other Related Devices see page 24

Approvals



detailed product information: product.spec.37180

genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

EASYGEN-300™ SERIES FOR STANDARD SOLUTIONS

The easYgen-300 Series are affordable, value-packed genset controllers for auto-start and transfer switch operations. They provide all the essential functionality for standby diesel genset applications with monitoring, protection, and event recording options common to high-end controls.

A compact, fully enclosed molded housing, removable terminal connectors, and fast, easy PC programmability make it the smart control choice for serial standby genset production.

The easYgen-300 Series has a serial interface for PC configuration and connection with an external modem. Optional CAN bus communication provides monitoring of common J1939 alarms from supported engine ECU's breaker. The easYgen-300 Series is an affordable, value-packed genset controller for auto-start and transfer switch operation. It provides all the essential functionality for standby diesel genset applications with monitoring, protection, and event recording options common to high-end controls. Position inputs are used to interlock the GCB and MCB internally, ensuring that both cannot be closed at the same time and eliminating the need for external relays.

FEATURE OVERVIEW

- Single-breaker or two-breaker options
- Configurable for open-and-close breaker control
- Breaker position monitoring
- 1-phase and 3-phase configurable voltage sensing options
- Generator protection
- CAN option for common J1939 alarms
- Digital display for voltage and frequency measured values, alarm annunciation, and counters
- Password-protected PC and front-face programmability

PACKAGES



	easYgen-320	easYgen-350
Package	X	X
GCB control / MCB control	● / -	● / ●
Generator voltage measuring	3-phase / 4-wire	3-phase / 4-wire
Relay outputs	1	2
CAN bus interfaces	1	1
Part No.	8440-1800	8440-1801

● = Standard



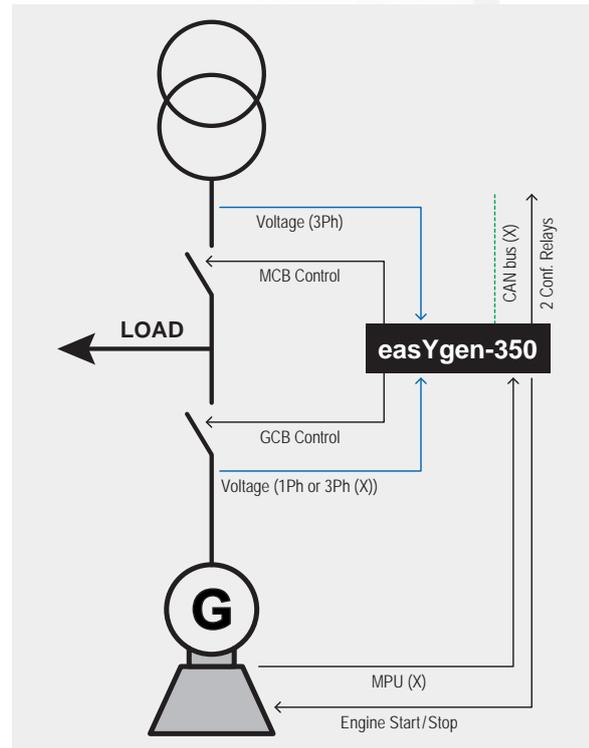
SPECIFICATIONS

Power supply	12/24 VDC (6.5 to 32 VDC)
Consumption	max. 10 W
Ambient temperature (storage)	-20 to 80 °C / -4 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 1
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 1
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)
Relay outputs	Relays, dry contacts
Load (resistive)	2 A at 24 VDC and 250 VAC
Analog inputs	0 to 500 ohms, 0 to 20 mA
Analog outputs (isolated)	±10 V / ±20 mA / PWM
Housing	
Front panel mounting	Plastic housing
Dimensions (WxHxD)	158 × 158 × 40 mm
Sealing (front / back)	IP54 / IP20
Weight	approx. 450 g

Related Devices

- Spare Connector Kit see page 24
- f
- f
- f

APPLICATIONS



Approvals



detailed product information: [product spec.37217](#)

Genset Controllers
 Synchronizer & Load Share Controllers
 Automatic Transfer Switch Controllers
 Transducers
 Multifunction Relays
 Protection Relays
 Power Generation Engine Control Products

LS-5 CIRCUIT BREAKER CONTROL AND PROTECTION

RELATED DEVICES

The LS 5 Series are synchronizer and load share controllers with integrated protective functions. They are designed to enable complex power management applications with multiple incoming mains and bus breakers in combination with easYgen-3400/3500 equipped genset controllers.

The LS 5 devices will manage synchronization, loading, and unloading on each bus segment and send the required voltage and frequency references via CAN bus to the easYgen-3400/3500 genset controllers. LS 5 devices which are located on the incoming mains breakers will automatically detect mains failures and start the corresponding gensets accordingly. Wiring efforts are reduced to a minimum, since only one CAN bus connection is required between all LS 5 and easYgen-3400/3500 controllers. It is not required to wire any AC measurement signals or discrete inputs/outputs between the LS 5 and easYgen-3400/3500 controllers.

Extensive remote control capabilities via discrete inputs or interfaces are provided to easily integrate the LS 5 into each application environment.

The LS 5 Series is available in two different housing versions. The LS 521 with a plastic housing and graphic LCD display is designed to be mounted on the cabinet's front door. The LS 511 with an aluminum powder-coated housing without display is designed to be DIN-rail-mounted on the back panel.

PACKAGES



Versions	LS-511		LS-521	
	P1	Marine	P1	Marine
LCD display	-	-	•	•
Mounting	Back panel	Back panel	Front panel	Front panel
Part No.				
1 A	8440-1951	8440-2076	8440-1952	8440-2074
5 A	8440-1946	8440-2077	8440-1947	8440-2075

• = Standard



FEATURE OVERVIEW

- Up to 16 LS 5 units can be operated in one network with up to 32 easYgen-3400/3500
- Phase match or slip frequency synchronization with voltage matching
- Full protection package (including df/dt (ROCOF), phase shift and mains voltage increasing protection according to new German grid code requirements in VDE-0126-1-1)
- Segment control for the load sharing
- Event log with up to 300 entries
- Automatic date and time synchronization between the LS 5 units and the connected easYgen-3400/3500 controls
- LS 5 stand-alone mode without the easYgen-3400/3500 is possible
- Preconfigured application modes for the most common applications in the field (MCB or MCB/GGB application)
- Automatic and manual mode
- Full remote control via CAN or RS-485 interface
- In case transformers are used in the application, vector group adjustment is available
- Multilingual capability
- Lock keypad feature
- Eight freely configurable LEDs are available on the LS 511 back panel mountable device

SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 5 W (LS-511) / max. 6 W (LS-521)
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing

Housing

Front panel mounting (LS-521)	Plastic housing
Dimension (WxHxD)	219 x 171 x 61 mm
Back panel mounting (LS-511)	Sheet metal housing
Dimension (WxHxD)	190 x 167 x 47 mm
Sealing (front / back)	IP66 / IP10
Weight	approx. 850 g (plastic housing) approx. 840 g (sheet metal housing)

APPLICATIONS (PLEASE SEE PAGE 12)

Approvals LS-5



Approvals LS-5 Marine



detailed product information: product.spec.37522

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

RP-3000 REMOTE PANEL

RELATED DEVICES

The RP-3000 is a remote control and annunciation panel for use with the back-panel mounted easYgen-3100/3400 or door-mounted easYgen-3200/3500 genset controllers. The RP-3000 is an ideal solution for door-mounted applications, providing control from the front panel with greatly reduced wiring to the access door, while keeping high-voltage connections located safely on the back panel. The RP-3000 allows remote control and visualization.

It has the same look and feel as the easYgen-3200 or easYgen-3500 genset controller, enabling user-friendly transition between genset controller sources. Each RP-3000 remote panel communicates with a single easYgen-3000 Series genset controller.

YOUR BENEFITS AT A GLANCE

Provide best remote control and accessibility to your customers genset and a maximum of safety, reducing the wiring of high-power lines in the cabinet.

FEATURE OVERVIEW

- Remote annunciation and remote control of the easYgen-3000 Series generator controls
- Password-protected remote configuration for all parameter settings
- Same look and feel as the easYgen-3200/3500 display
- CAN communication to genset control
- Ready for operation relay output

PART NUMBERS



RP-3000

Accessories		
easYgen-3100/3200	•	-
easYgen-3400/3500	•	-
easYgen-3400/3500 (Marine)	-	•
Part No.		
	8446-1048	8446-1046



SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 12 W
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	282 × 217 × 99 mm
Sealing (front / back)	IP66 / IP10
Weight	approx. 1,300 g (plastic housing)

Remote Panel
RP-3000



¹ Only one easYgen can be connected at once.

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Approvals



detailed product information: product.spec.37446

EASYLITE-100 REMOTE ANNUNCIATOR



RELATED DEVICES

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.

With a standard height and width of 138 mm, the compact design permits easy mounting. The ergonomically designed display allows easy identification of the system status. The easYlite-100 LEDs change their state if the assigned warning / alarm condition occurs or the status conditions change.

FEATURE OVERVIEW

- 14 configurable status displays using red LEDs
- Four preassigned engine alarm LEDs
- Self-diagnostic checks
- One relay output to operate an external horn or alarm
- Panel configuration via PC and RS-232 interface

SPECIFICATIONS

Power supply	12/24 VDC (6.5 to 32 VDC)
Consumption	max. 3 W
Ambient temperature (storage)	-20 to 85 °C / -4 to 185 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	158 × 158 × 40 mm
Sealing	IP54
Weight	approx. 300 g



PACKAGES

Software Version	easYlite-100	
	1.0001	1.0006
Freely configurable LED output display	14	16
Configurable preassigned LED output display	4	2
Fixed LED output display	-	2
Configuration software tool	LeoPC1	ToolKit
Supported genset controller	easYgen-1000 Series	entire easYgen Series (easYgen-1000/2000/3000)
Number of parallel-connected easYlite-100 devices	128	2
Part No.	8446-1006	8446-1023

Approvals



detailed product information: [product spec 37279](#)

IKD 1 I/O EXPANSION BOARD



The IKD 1 is an I/O expansion board. It allows an additional eight discrete inputs and eight relay outputs to be connected via CAN bus to the Woodward generator set controllers series GCP-30 and easYgen. It is possible to connect multiple IKD 1 cards to each of the genset controllers. The IKD1 will be programmed via a PC configuration tool. Configuration of text name for the I/O, alarm classes, Normally Open (NO) and Normally Closed (NC) relay contact configuration and delay timers are possible. The I/O will be displayed in clear text messages on the genset controllers HMI and can be used for further processing.

FEATURE OVERVIEW

- Eight configurable discrete alarm inputs
- Eight configurable relay outputs (dry, two-pole isolated)
- Configurable delays for each input
- CAN bus communication
- PC configurable

SPECIFICATIONS

Power supply	12/24 VDC (6 to 36 VDC)
Consumption	max. 3 W
Ambient temperature	-20 to 70 °C
Ambient humidity	95%, non-condensing
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	168 × 128 × 51 mm
Sealing (front / back)	IP20
Weight	approx. 360 g

PART NUMBER



IKD 1

Part No.

8440-1041

Approvals



detailed product information: [product spec.37171](#)

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

RELATED DEVICES

LSG LOAD SHARE GATEWAY



The Load Share Gateway (LSG) is a communication converter specifically designed to operate the easYgen-2000 / easYgen-3000 Series and any other industrial legacy devices in a load share network. You are able to connect any analog load share controller to the easYgen genset controllers. This feature supports you for retrofit business by expanding your existing load share technology by our genset controller lines. Due to the flexibility in our software you are also able to maintain basic-load-dependent start/stop sequences, if needed.

YOUR BENEFITS AT A GLANCE

Experience an easy way to extend existing power plants with new gensets and state-of-the-art technology and process such projects in minimum time with a maximum of performance.

FEATURE OVERVIEW

- Easy configuration via easYgen-connected genset controller line
- Compatible to most important analog load share line systems
- Status LEDs for CAN and RS-485 communication
- Robust metal housing

SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 3 W
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	60 °C, 95%, non-condensing, five days
Housing	
Back panel mounting	Aluminum
Dimension (WxHxD)	141 × 98.5 × 21 mm
Sealing	IP20
Weight	approx. 280 g



PART NUMBERS

Part No.	LSG
Active power load share gateway (P)	8444-1075
Reactive power load share gateway (Q)	8444-1074

Approvals



detailed product information: [product spec.37451](https://www.woodward.com/product-spec-37451)

Genset
Controllers

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Load Share
Controllers

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Controllers

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Relays

Protection
Relays

Power
Generation Engine
Control Products

SYNCHRONIZER & LOAD SHARE CONTROLLERS



Quality and Reliability for Power Distribution Systems

Woodward offers a wide variety of controllers for the synchronization and load share market. Our basic controllers offer standard features for parallel or load share applications, easy to set up and use. If you need to handle more complex load flows and even protection schemes, we can also offer you products with integrated protection features and communication interfaces to your Supervisory Control and Data Acquisition (SCADA) system.

You will be able to eliminate programming effort in your SCADA, just send our controls a run or stop command and they will take care of the synchronization and load share sequencing across generator, mains- and tie breakers. We offer you decades of experience in connecting and load balancing power generation sources and distribution systems, so use the products and feel safe.

Genset
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ControllersAutomatic
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Controllers

Transducers

Protection
RelaysPower
Generation Engine
Control Products

DSL-2 DIGITAL SYNCHRONIZER AND LOAD CONTROL

The Woodward DSL-2 control is a microprocessor-based synchronizer and load control designed for use on three-phase AC generators. The DSL-2 control combines synchronizer, load sensor, load control, dead bus closing system, var, power factor and process control, all integrated into one powerful package. Applications allow up to 32 generators to be precisely paralleled and controlled. A dedicated Ethernet system provides seamless communications between DSL-2 and MSL-2 units. A second Ethernet port is provided for customer remote control and monitoring capability using Modbus TCP allowing easy DCS and PLC interfacing. Modbus RTU is available through a separate RS-485 port.

Woodward blended the original solid DSL with another decade of application experiences in developing the new DSL-2. The DSL-2 excels in either simple generator or complex generator system applications. The DSL-2 / MSL-2 combination provides multiple unit, segment, utility and intertie breaker control for complex power systems.

FEATURE OVERVIEW

- Synchronizer and load control in one box
- Phase match or slip frequency synchronization with voltage matching
- Applications for up to 32 generators using 32 DSL-2 units and up to 16 MSL-2 controls
- Complex applications with up to 8 bus segments possible
- One Ethernet port for unit to unit communications
- Second Ethernet port for remote control and monitoring via Modbus TCP
- Automatic generator soft loading and unloading for bumpless load transfer
- Process control
- Isochronous load sharing with other DSL-2 equipped sets
- Application range up to 999 MW

PART NUMBERS

Part No.	DSL-2
1 A	8440-1978
5 A	8440-1878

SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 15 W
Ambient temperature (storage)	-40 °C to 85 °C / -40 to 185 °F
Ambient temperature (operation)	-40°C to 70 °C / -40 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 0.5
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 0.5
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)
Relay outputs	Relays, dry contacts
Load (resistive)	2A at 24 VDC and 250 VAC
Analog inputs	0 to 500 ohms, 0 to 20 mA
Analog outputs (isolated)	±10 V / ±20 mA / PWM
Housing	
Back panel mounting	Sheet metal housing
Dimension (WxHxD)	250 × 227 × 84 mm
Sealing	IP20
Weight	approx. 1,900 g





Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

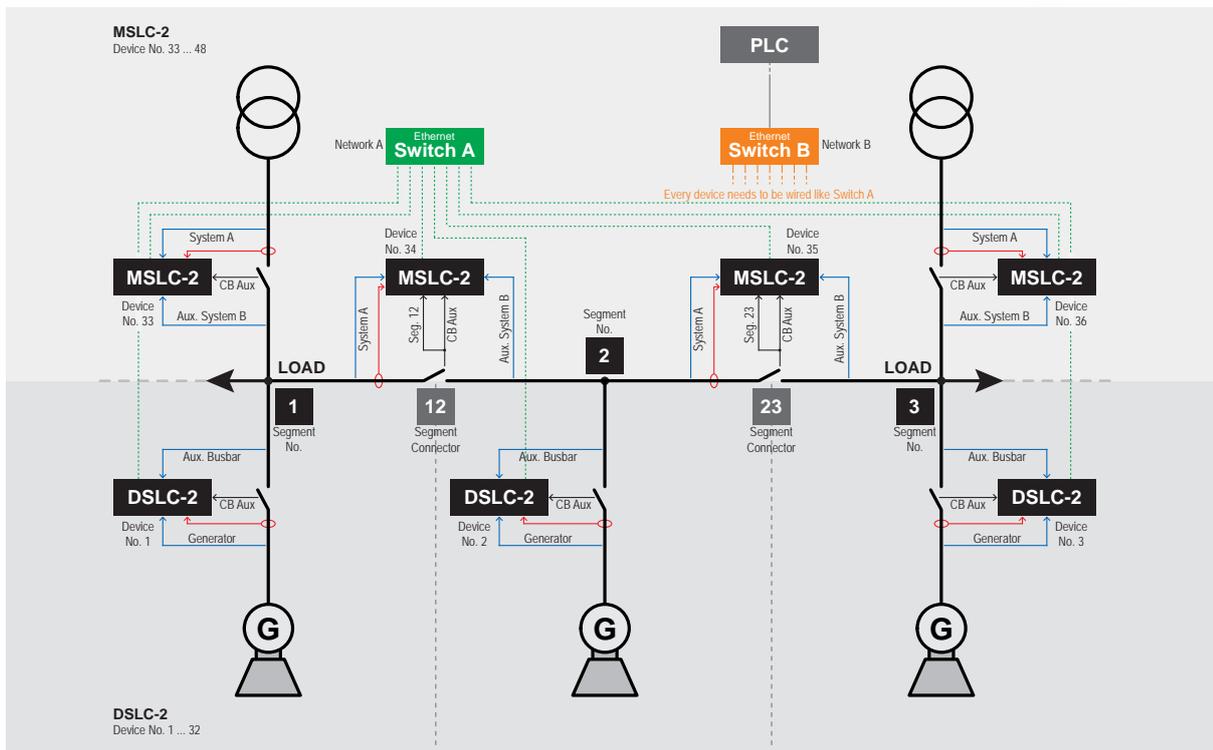
Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

APPLICATIONS



Approvals



detailed product information: product.spec.37493

MSLC-2 MASTER SYNCHRONIZER AND LOAD CONTROL

The Woodward MSLC-2 is a microprocessor-based load control designed for three-phase electric power generation sites equipped with Woodward DSLC-2 Digital Synchronizer and Load Control. The original MSLC has been blended with another decade of application experiences to develop the new MSLC-2. The MSLC-2 is a synchronizer, a utility load sensor, an import/export load level control, a power factor control, and a master process control. Applications include power systems which operate in parallel with the utility with single or multiple utility feeds as well as new capabilities for multiple segment and inertia breaker control.

For utility parallel systems, the MSLC-2 provides either phase matching or slip frequency automatic synchronizing of the local plant bus to the main power grid through one or several main breakers. The MSLC-2's load sensor and load control sense true RMS power and provide bumpless loading and unloading against the power grid. Operating modes can either be base load or import/export/process power levels against the utility. Inertia breakers are controlled and synchronized through individual MSLC-2s actively communicating with the individual DSLC-2s and the other MSLC-2s on the system. For isolated multiple generator systems, the MSLC-2 can be used to operate tie breakers between groups of generators using the DSLC-2 controls.

- Controls plant-wide import/export levels against the utility
- Overall plant power factor control

FEATURE OVERVIEW

- Synchronizer and load control in one box
- Ethernet communication for information exchange between max. 32 DSLC-2 and 16 MSLC-2 controls
- Automatic segment recognition
- Supports and communicates with up to 8 bus segments
- One Ethernet port for unit to unit communication
- Second Ethernet port for remote control and monitoring via Modbus TCP
- Automatic plant loading and unloading for bumpless load transfer to and from the utility

SPECIFICATIONS

Power supply	12/24 VDC (8 to 40 VDC)
Consumption	max. 15 W
Ambient temperature (storage)	-40 °C to 85 °C / -40 to 185 °F
Ambient temperature (operation)	-40 °C to 70 °C / -40 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 0.5
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 0.5
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)
Relay outputs	Relays, dry contacts
Load (resistive)	2 A at 24 VDC and 250 VAC
Analog inputs	0 to 500 ohms, 0 to 20 mA
Analog outputs (isolated)	±10 V / ±20 mA / PWM
Housing	
Back panel mounting	Sheet metal housing
Dimension (WxHxD)	250 × 227 × 84 mm
Sealing	IP20
Weight	approx. 1,900 g



PART NUMBERS

Part No.	MSLC-2
1 A	8440-1977
5 A	8440-1877



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

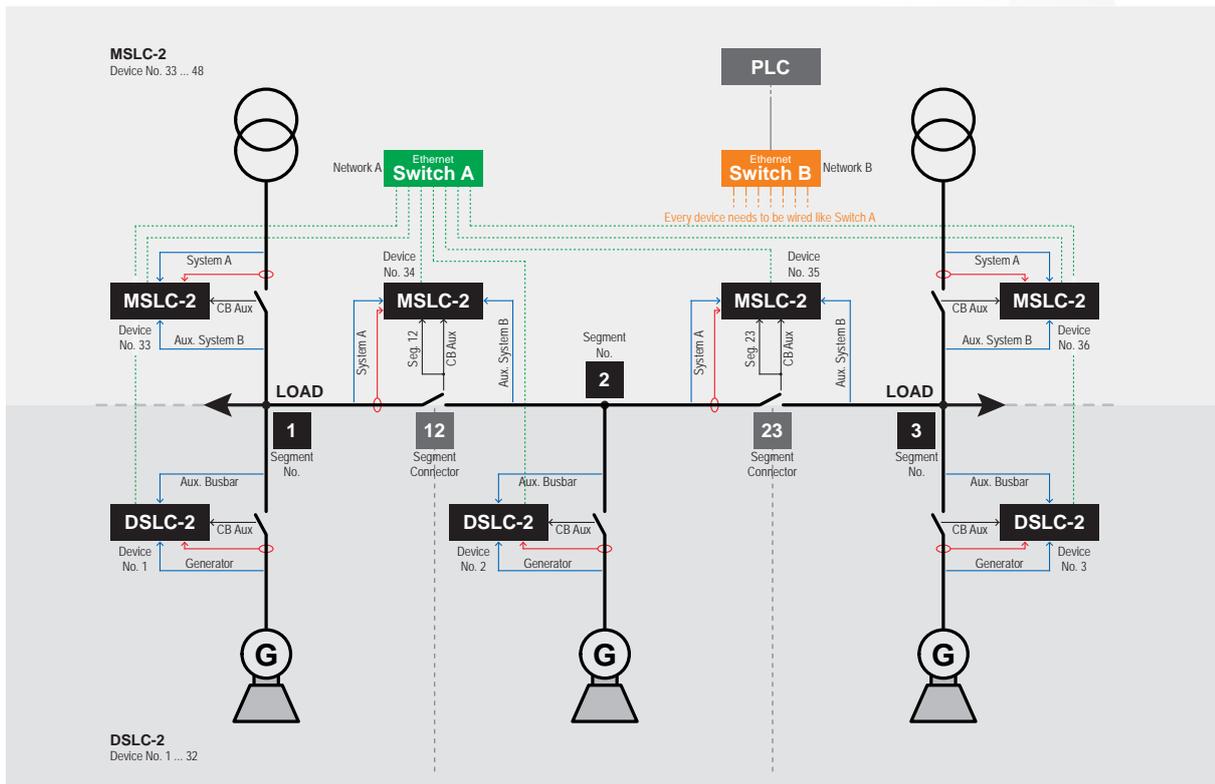
Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

APPLICATIONS



Approvals



detailed product information: product.spec.37494

SPM-D10 SERIES SYNCHRONIZER WITH RELIABILITY

The SPM-D10 Series are microprocessor-based synchronizers designed for use on three-phase AC generators equipped with Woodward or other compatible speed controls and automatic voltage regulators. The SPM-D10 Series synchronizers provide automatic frequency, phase, and voltage matching using either analog or discrete output bias signals.



PACKAGES

	SPM-D10						
Package	-	X	N	XN	HJV	YB	NYB
Generator voltage measuring	1-phase / 2-wire	3-phase / 4-wire	3-phase / 4-wire				
Busbar voltage measuring	1-phase / 2-wire	3-phase / 4-wire	3-phase / 4-wire				
Mains voltage measuring	-	-	-	-	3-phase / 4-wire	-	-
Enhanced deadbus start functionality	-	-	-	-	-	•	•
Mains over-/under-voltage protection	-	-	-	-	•	-	-
Mains over-/under-frequency protection	-	-	-	-	•	-	-
Mains phase / vector shift	-	-	-	-	•	-	-
Three-step controller (voltage bias)	1	1	1	1	1	1	1
Three-step controller (speed bias)	1	1	1	1	1	1	1
Analog controller (voltage bias)	-	1	-	1	-	-	-
Analog controller (speed bias)	-	1	-	1	-	-	-
24 VDC power supply	•	•	-	-	•	•	-
90 to 250 VAC / DC power supply	-	-	•	•	-	-	•
PC configuration – LeoPC 1	•	•	•	•	•	-	-
Part No.							
100 VAC	5448-890	5448-893	8440-1432	8440-1667	8440-1600	5448-906	8440-1434
400 VAC	8440-1019	8440-1301	8440-1433	8440-1668	8440-1458	8440-1021	8440-1435

• = Standard



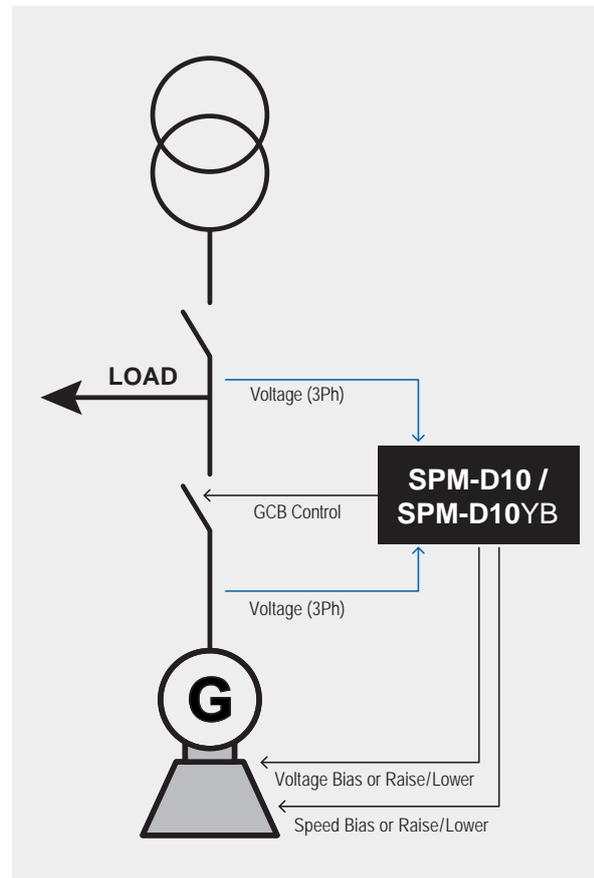
FEATURE OVERVIEW

- Synchronization for one circuit breaker
- Phase match or slip frequency synchronization with voltage matching
- Outputs for speed and voltage bias signals
- Mains protection available in special versions
- Discrete inputs for operating mode selection
- Two-line LCD display for operation, alarm indication, and visualization of measuring values
- LED synchroscope
- Wide range power supply option available
- PC and front panel configurable

SPECIFICATIONS

Power supply	24 VDC ($\pm 25\%$) / 90 to 250 VAC / DC (depending on package)
Consumption	max. 10 W
Ambient temperature	-20 to 70 °C / -20 to 60 °C (depending on package)
Ambient humidity	95%, non-condensing
Voltage AC input	115 VAC or 400 VAC true RMS
Accuracy	Class 1
Discrete inputs (isolated)	Range: max. 250 VAC or DC
Relay outputs	Isolated
Load (resistive)	2 A at 24 VDC and 250 VAC
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	144 × 72 × 122 mm
Sealing (front / back)	IP42 / IP21
Weight	approx. 800 g

APPLICATIONS



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Approvals



detailed product information: SPM-D10 [product spec.37297](#) | SPM-D10YB [product spec.37298](#)

AUTOMATIC TRANSFER SWITCH CONTROLLERS



Load Transfer with Confidence

Our Automatic Transfer Switch (ATS) controllers enable you to reduce complexity in terms of hardware, spacing, and component cost for new builds and retrofits. This is feasible because our configurable software allows running mains-generator, generator-to-generator, and mains-to-mains applications out of one controller. This also includes delayed and closed-transition modes among other typical ATS-specific features.

By using our products you will be able to handle all ATS-relevant features by ordering one single device. This is maximum value for your automatic transfer switch application. For more simple applications we can also offer you a basic version of an ATS controller.

Genset
ControllersSynchronizer &
Load Share
ControllersAutomatic
Transfer Switch
Controllers

Transducers

Protection
RelaysPower
Generation
Engine
Control Products

DTSC-200 ATS CONTROLLER

The DTSC-200 is the ultimate control for new ATS (automatic transfer switch) builds and retrofits. A complete measurement and protection package, it easily configures to utility-to-generator, generator-to-generator, or utility-to-utility systems for open-, delayed- or closed-transition transfer with sync-check to ensure the smoothest possible transfer.

High-end features like transfer inhibit, source priority selection, load shed, motor load disconnect, elevator pre-signal, and engine exerciser timers come standard in this incredibly versatile, cost-effective control.

YOUR BENEFITS AT A GLANCE

The advanced functionality of the DTSC-200 offers you a maximum of performance for ATS applications. This enables you to realize all possible project requirements and to offer the best reliability of your ATS switchgear.

FEATURE OVERVIEW

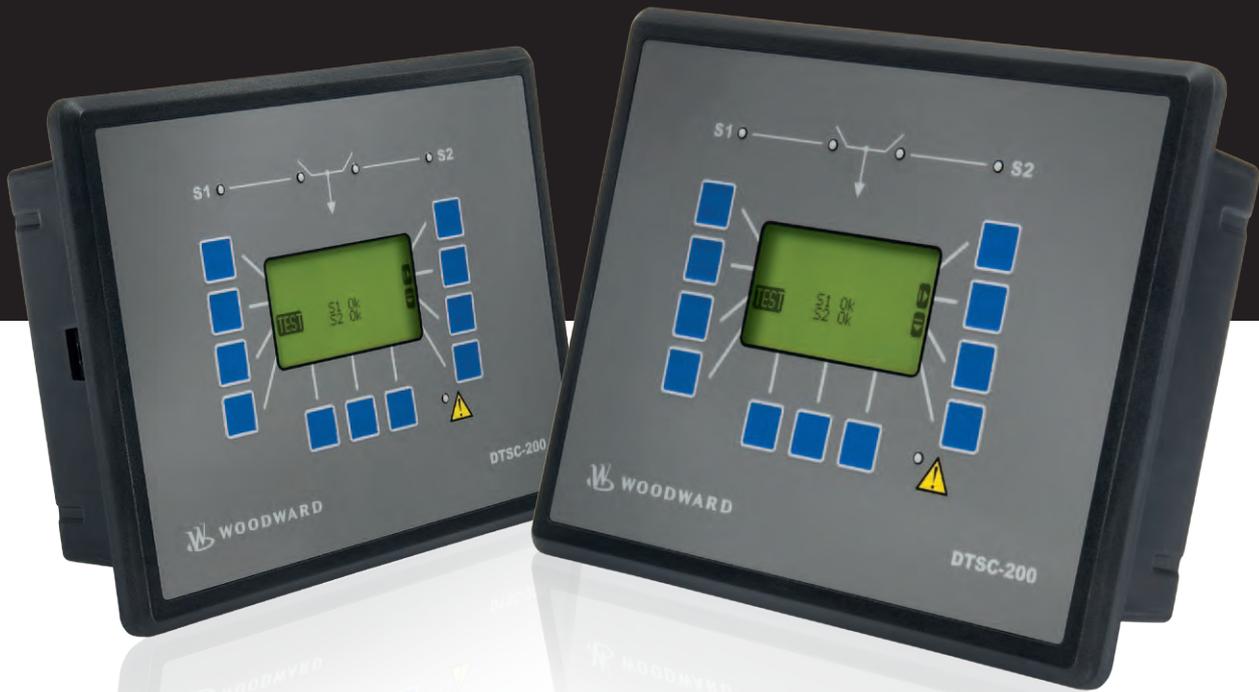
- Configurable for open-, delayed-/closed-transition transfer
- Configurable for utility-to-generator, generator-to-generator, and utility-to-utility applications
- Closed-transition transfers can be accomplished in <100 ms
- In-phase monitoring (sync-check)
- Load / no-load test functionality
- Engine exerciser (load / no-load test) routine with fully adjustable interval

- Peak shaving mode
- Load shedding
- Extended parallel time (for closed-transition transfers that take longer than 100 ms)
- Transfer and/or retransfer inhibit
- Source priority selection
- Elevator pretransfer and motor load disconnect timers
- Event/alarm log system with real-time clock
- Internal breaker interlock utilizing discrete inputs for breaker position detection
- Freely configurable discrete I/O with support for external I/O expansion units (e.g. Woodward IKD 1)
- RS-232, RS-485, and CAN bus interfaces for remote control and visualization purposes
- Supports CANopen and Modbus RTU protocols
- PC and/or front display configuration
- 128 x 64 pixels graphic LCD display
- LogicsManager provides programmable logic functions that eliminate relay logic or PLCs
- True RMS voltage, current, and power sensing
- LEDs for source availability and breaker status

PART NUMBERS



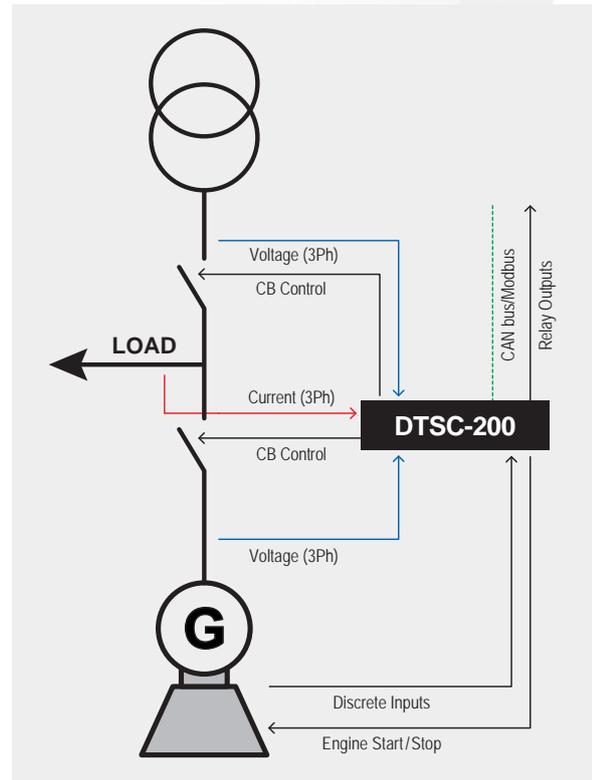
		DTSC-200
Part No.		
1 A		8440-1867
5 A		8440-1868



SPECIFICATIONS

Power supply	12/24 VDC (6.5 to 40 VDC)
Consumption	max. 8 W
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient temperature (operation)	-20 to 60 °C / -4 to 140 °F
Ambient humidity	95%, non-condensing
Voltage AC input	120 VAC and 480 VAC true RMS
Accuracy	Class 1
Current AC input	1 A or 5 A true RMS, isolated
Accuracy iac	Class 1
Discrete inputs (isolated)	Range: 12/24 VDC (8 to 40 VDC)
Relay outputs	Isolated
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	219 × 171 × 61 mm
Sealing (front / back)	IP65 / IP20
Weight	approx. 800 g

APPLICATIONS



Approvals



detailed product information: product.spec.37398

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

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Control Products

DTSC-50 ATS CONTROLLER

The DTSC-50 digital transfer switch controller is an economical controller for open-transition (break before make) automatic transfer switch (ATS) control for emergency standby applications with a single generator. When it detects a utility failure it commands the generator to start and transfers the load to the emergency source. When utility power is restored it performs an open-transition retransfer and allows the engine to cool down before stopping. It can be utilized in 1Ph2W, 1Ph3W, 3Ph3W, and 3Ph4W systems.

The DTSC-50 displays voltage and frequency values for each phase, as well as engine hours, maintenance hours, and number of transfers. Active alarms are annunciated via the seven-segment LED display. Separate LEDs show breaker status and source availability. Sealed soft keys enable the user to start the generator and operate the transfer switch manually.

YOUR BENEFITS AT A GLANCE

Realize ATS applications with a cost-effective controller that provides you a full range of functionality and suits all possible applications.

FEATURE OVERVIEW

- Open-transition transfer
- Utility-to-generator application
- Auto/manual operation
- “Remote start” input
- “Lock in AUTO mode” input
- “Lock in MANUAL mode” input
- Internal breaker interlock utilizing discrete inputs for breaker position detection
- Adjustable timers
- Event/Alarm log system
- Freely configurable discrete I/O
- PC and/or front display configuration
- Six seven-Segment LED display
- True RMS voltage sensing
- LEDs for source availability and breaker status
- Password protection
- Fully enclosed housing
- Removable terminal blocks
- 6.5 to 40.0 VDC powered

PART NUMBER



DTSC-50

Part No.

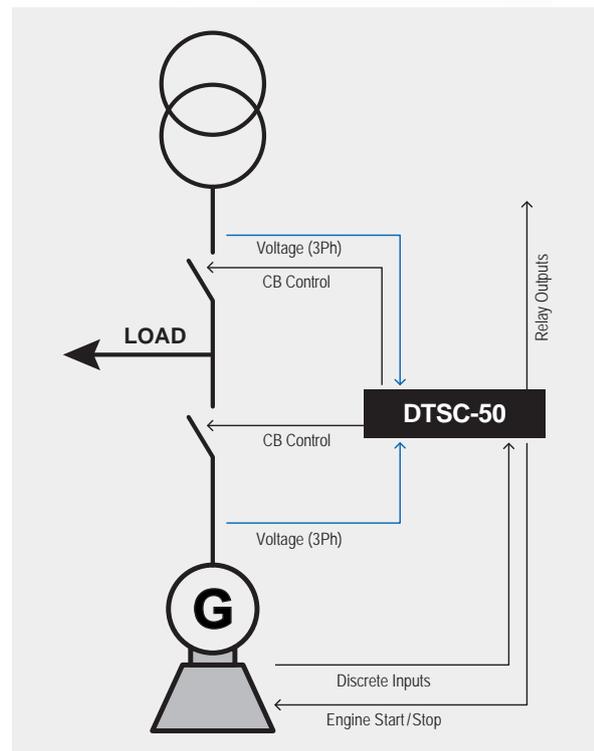
8440-1894



SPECIFICATIONS

Power supply	12/24 VDC (6.5 to 32 VDC)
Consumption	max. 10 W
Ambient temperature (storage)	-30 to 85 °C / -22 to 185 °F
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	480 VAC true RMS
Accuracy	Class 1
Discrete inputs (isolated)	Range: 12/24 VDC (6.5 to 32 VDC)
Relay outputs	Isolated
Load (resistive)	2 A at 24 VDC and 250 VAC
Housing	
Front panel mounting	Plastic housing
Dimension (WxHxD)	158 x 158 x 40 mm
Sealing	IP54
Weight	approx. 450 g

APPLICATIONS



Genset
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Controllers

Transducers

Multifunction
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Relays

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Control Products

Approvals



detailed product information: product.spec.37455

TRANSDUCERS



Information Conversion

Woodward offers transducers to transform measured values into process information. The transformed values can either be issued by analog outputs or via interfaces to a higher level control system (e.g. PLC). Transducers are needed where electrical power, temperatures, pressure, and other process data are needed to feed the upper level control system for monitoring and/or control purposes. For example: transducers are used in turbine or engine generator set applications where the prime mover control needs information about the electrical load of the application.

Woodward also offers specific transducers with integrated monitoring and protection features for renewable energy sources to comply with the latest grid code standards.



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MFR 300 SERIES MEASURING TRANSDUCER

The MFR 300 is a measuring transducer for monitoring single- and three-phase power systems. The MFR 300 has both voltage and current inputs for measuring an electrical power source. A digital processor makes it possible to accurately to measure true RMS values, regardless of harmonics, transients or disturbing pulses. The primary measured and calculated values are transmitted via CANopen / Modbus protocol to a supervisory control system.

The MFR 300 performs monitoring functions for mains decoupling, including four freely configurable time-dependent under-voltage monitoring functions for FRT (fault ride-through). The primary measured values of voltage and current are used to calculate the real, reactive, and apparent power and the power factor (cosphi) values.

FEATURE OVERVIEW

- True RMS sensing
- Class 0.5 accuracy for voltage, frequency and current
- Class 1 accuracy for real and reactive power or energy
- CANopen / Modbus communication
- Configurable measuring system for either single-phase, three-phase or a combination of both

SPECIFICATIONS

Power supply	12/24 VDC (8 to 32 VDC)
Consumption	max. 5 W
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient humidity	95%, non-condensing
Voltage AC input	115 VAC or 400 VAC true RMS
Accuracy	Class 0.5
Current AC input	1 A or 5 A true RMS
Accuracy iac	Class 0.5
Analog outputs (isolated)	-20/0/4 to 20 mA
Housing	
Type Extrusion profile UM122	DIN rail mounting
Dimension (WxHxD)	146 × 128 × 50 mm
Sealing	IP20
Weight	approx. 300 g

PACKAGES



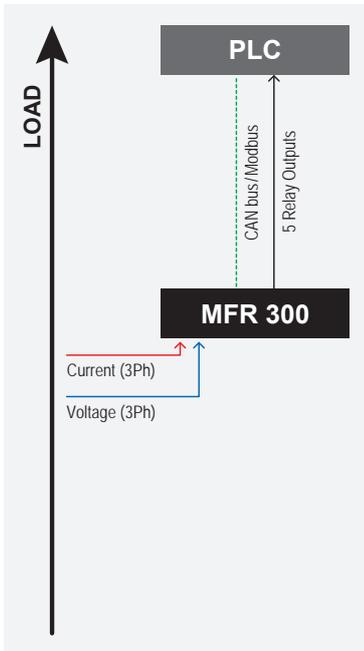
	MFR300					
Package	11M	15M	71M	75M	75M/SU03	75M/K28
Rated PT secondary	100 VAC	100VAC	690 VAC	690 VAC	690 VAC	690 VAC
Rated CT secondary	..1 A	..15 A	..1 A	..15 A	..15 A	..15 A
Mounting	DIN rail					
Part No.	8444-1089	8444-1090	8444-1091	8444-1092	8444-1093	8444-1094

● = Standard

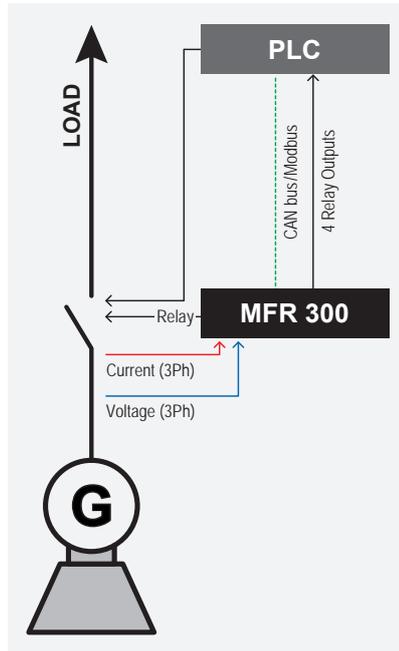


APPLICATIONS

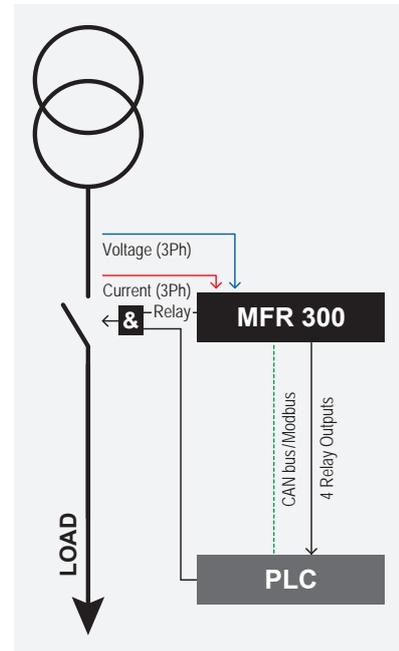
General Application



Generator Application



Mains Application



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Approvals



detailed product information: [product spec.37406](https://www.woodward.com/product-spec-37406)

PROTECTION RELAYS



Find the Right Protection Relay for Your Application

Woodward is an independent supplier of systems and components for the power generation and distribution market. Many decades of experience combined with continuous improvement of our protection relays benefit our customers. The modular design of our product families provide our customers with an array of solutions for interconnection, feeder, motor, transformer, generator, and line protection. Due to our solution-oriented consultancy, our customers find precisely the right products or systems to meet their requirements.

Woodward offers you unsurpassed control and protection system solutions for every type of power generation and distribution application, from the simplest to the most complex.



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
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Multifunction
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Protection
Relays

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Control Products

HighPROTEC PROTECTION MADE SIMPLE

With the HighPROTEC line Woodward offers an outstanding solution for the reliable protection of distribution and generator applications. The innovative device handling and PC tool minimized commissioning and training costs. The all in one protection concept for the different application guaranties a high availability of your electrical GRID and equipment.

SUSTAINABLE TECHNOLOGIES

When developing the HighPROTEC line we reacted to our customers' requirements and the latest standards. The HighPROTEC as a new product line will offer a long term availability to the market. In this process our more than 40 years of experience and the advantages of our existing product lines have been successfully combined.

ALL INCLUSIVE – NO EXTRA CHARGE

As standard, the devices are fully equipped with all functions required by the corresponding application without extra charge.

- All devices in the HighPROTEC Line arrive with a clear manual and few variations (ideal for standardization).
- All current and ground current inputs are designed for 1 A and 5 A.
- All terminals can be easily removed, and the current connections are equipped with automatic short circuiters. The nominal voltage of the voltage inputs and the switching thresholds of the digital inputs can be adjusted via software. The wide range power supply unit covers all standard auxiliary voltages, both for AC and DC. The integrated non-volatile disturbance recorder records up to 120 seconds with 32 samples per cycle.
- Integrated fault simulator for easy maintenance and commissioning, reduced time efforts, and costs.

YOUR BENEFITS

- Simplified planning: You do not have to decide on the rated quantities.
- Short delivery times: Due to the modular design we are able to react far quicker to our customers' enquiries.
- Facilitate your commissioning efforts:
The wide functional range enables you to have fewer different relay types in store, and helps to simplify your planning.
- We have made it easy for your technical engineers: Because the easy operating concept applies to all relay types and to the parameter setting software "Smart view", which is free.

OUR SERVICE

You will become entirely familiar with the HighPROTEC devices in virtually no time – we are convinced of this. But we do not want you to have the feeling it is only technology you are going to buy; you can be sure that you will be well looked after by Woodward. For this purpose a competent team is available for you and will assist you with advice during sales talks or later when you need the aftersales services. In addition, we offer special product training and service engineering.

CERTIFIED QUALITY

All our electronic devices are developed and tested according to current international standards such as the IEC 60255. Production of our products is subject to strict quality regulations. This is proven by the certification acc. to EN IS 09001:2000.



SMART VIEW

Our PC tool offers:

- Menu-controlled parameter setting incl. plausibility checks
- Offline configuration of all relay types
- Reading and evaluating of statistical data and measuring values
- Commissioning support functions
- Device status display
- Fault analysis with event, fault, disturbance, and trend recorder
- Device models can be downloaded from the protective device
- Integrated fault simulator

DATA VISUALIZATION

With the HighPROTEC Line your fault recording becomes transparent and clear:

- Analysis and graphical representation of the integrated fault simulation
- Representation of digital and analog recordings with 32 samples per period
- Immediate evaluation of individual measurements
- Import and export of fault records in the ASCII and COMTRADE formats

APPLICATIONS

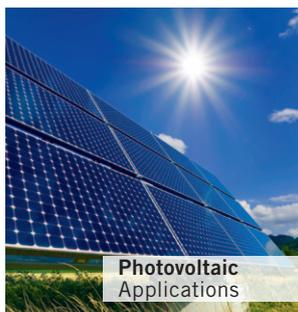
Directional feeder protection	MRA4/MCA4
Overcurrent and earth fault protection OC&EF protection	MRI4
Voltage and frequency protection	MRU4
Transformer differential protection with voltage measurement	MCDTV4
Transformer differential protection	MRDT4

Generator differential protection	MCDGV4
Motor protection	MRM4
Motor protection with voltage	MRMV4
Line differential protection with voltage measurement	*MCDLV4

MR = Protection // MC = Control and protection
* Please ask for availability



Wind Turbine Applications



Photovoltaic Applications



Medium Voltage Applications



Engine Generator Applications

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

HighPROTEC

PROTECTION MADE SIMPLE

		MCA4	MRA4
Protection functions			
Phase current stages (non-directional)	ANSI 50/51		
Phase current stages (non-directional and directional)	50/51/67	6	6
Voltage restrained current protection	51V	•	•
Voltage controlled current function	51C	•	•
Earth current stages (non-directional)	50N/51N		
Earth current stages (non-directional and directional)	50N/51N/67N	•	•
Negative sequence stages (current)	46	2	2
Overload protection with thermal replica	49	•	•
Voltage stages	27/59	6	6
Residual voltage stages	59N	2	2
Frequency stages	81 U/O	6	6
Inrush detection IH2 (2nd harmonic)		•	•
Voltage transformer supervision	60FL	•	•
Current transformer supervision	60L	•	•
Auto reclosing	79	•	•
Negative / positive sequence stages (voltage)	47	6	6
Lockout function	86	•	•
Circuit breaker failure protection	62BF/52BF	•	•
Trip circuit supervision	74TC	•	•
Frequency gradient df/dt (ROCOF)	81R	•	•
Vector surge	78	•	•
Power protection: P, Q, Qr, S, Pr	32F, 37F, 32Q, 37Q, 37QR, 32S, 37S, 37R	6	6
Power factor cos (φ)	55	2	2
QU protection (undervoltage- directional reactive power protection)		•	•
Synchro check	25	•	•
Cold load pick up	37	•	•
Switch onto fault		•	•
LVRT (low voltage ride through)		•	•
Protection parameter sets		4	4
Reverse interlocking		•	•
Event/fault/disturbance recorder		•	•
Start-/trend recorder		•	•
Control			
Control functionality up to 6 switchgears		•	
Control functionality of 1 switchgear			•
Logic (up to 80 equations)		•	•
Measuring functions			
Currents: IL1, IL2, IL3, IE, IO, I1, I2, IL1H2, IL2H2, IL3H2, IEH2		•	•
Overload 9		•	•
Voltages: VL1, VL2, VL3, VL12, VL23, VL31, VE, VO, V1, V2		•	•
Frequency f		•	•
Power: P, Q, S, Pr, PF (cos φ), Wp+, Wp-, Wq+, Wq-		•	•
Hardware			
Number of binary output relays		7	7
Number of optional binary output relays ¹		6/0	6/0
Number of digital inputs		8	8
Number of optional digital inputs ^{1,2}		8/0	8/0
Number of analogue in- and outputs ¹			
Communication			
IEC61850 (RJ45 interface)		o	o
MODBUS RTU (via fibre optic (FO) or RS485)		o	o
IEC60870-5-103 (via fibre optic (FO) or RS485)		o	o
Modbus TCP (RJ45 interface)		o	o
Profibus DP (via LWL or RS485)		o	o
IRIG-B interface (time synchronization)		•	•

for detailed product information go to www.woodward.com/HighPROTEC

	MRI4	MRU4	MRMV4	MRM4
	6		6	6
			•	
			•	
	4		4	4
	2		2	2
	•		•	•
		6	6	
		2	2	
		6	6	
	•			
		•	•	
	•		•	•
	•			
		6	6	
	•	•	•	•
	•	•	•	•
	•	•	•	•
		•	•	
		•		
			6	
			2	
		•		
	•			
	•		•	•
		•		
	4	4	4	4
	•		•	•
	•	•	•	•
	•	•	•	•
	•	•	•	•
	•	•	•	•
	•		•	•
	•		•	•
	•		•	•
		•	•	
		•	•	
			•	
			•	
			•	
	6	6	7	6 ¹ /4 ¹
			6/0	
	8	8	8	8 ¹ /4 ¹
			0/4	0/1 ¹
	o	o	o	o
	o	o	o	o
	o	o	o	o
	o	o	o	o
	o	o	o	o
	•	•	•	•

• = standard o = optional ¹ = depends on type of device ² = information on availability on request

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Protection functions	ANSI	
Generator differential Protection	87G	2
Generator- Transformer differential protection	87GT	2
Transformer differential protection (2 windings)	87T	
Ground differential protection (high stabilized)	87N (64REF)	2
Overexcitation V/Hz	24	•
Loss of excitation	40	•
100% Stator earth fault protection with 3 Harmonics	59TN/27TN	•
Phase current stages (non-directional)	50/51	
Phase current stages (non-directional and directional)	50/51/67	6
Voltage restrained current protection	51V	•
Voltage controlled current function	51C	•
Earth current stages (nondirectional)	50N/51N	
Earth current stages (non-directional and directional)	50N/51N/67N	4
Negative sequence stages (current)	46	2
Overload protection with thermal replica	49	•
Voltage stages / residual voltage stages	27/59 / 59N	6 / 2
Frequency stages	81 U/O	6
Inrush detection IH2 (2nd harmonic)		•
Voltage transformer supervision	60FL	•
Current transformer supervision	60L	•
Auto reclosing	79	
Negative / positive sequence stages (voltage)	47	6
Lockout function	86	•
Circuit breaker failure protection	50 BF	•
Trip circuit supervision	74TC	•
Frequency gradient df/dt (ROCOF)	81R	•
Vector surge	78	•
Power protection: P, Q, Qr, S, Pr	32F, 37F, 32Q, 37Q, 37QR, 32S, 37S, 37R	6
Power factor cos (φ)	55	2
QU protection (undervoltage - directional reactive power protection)		•
Synchrocheck	25	•
Inadvertent energization	50/27	1
Cold load pick up	37	•
Switch onto fault		•
LVRT (low voltage ride through)		•
Protection parameter sets		4
Reverse interlocking		•
Event/fault/disturbance recorder		•
Start-/trend recorder		•
Control		
Control functionality up to 6 switchgears		•
Control functionality of 2 switchgear		
Logic (up to 80 equations)		•
Measuring functions		
Currents: IL1, IL2, IL3, IE, IO, I1, I2, IL1H2, IL2H2, IL3H2, IEH2		•
Overload 9		•
Voltages: VL1, VL2, VL3, VL12, VL23, VL31, VE, VO, V1, V2		•
Frequency f		•
Power: P, Q, S, Pr, PF (cos φ), Wp+, Wp-, Wq+, Wq-		•
Hardware		
Number of binary output relays ¹		11
Number of optional binary output relays ¹		
Number of digital inputs ¹		16 ¹ /8 ¹
Number of optional digital inputs ¹		
Number of analogue inputs and outputs ¹		0 ¹ /2 ¹ +2 ¹
Communication		
IEC61850 (RJ45 interface)		o
MODBUS RTU (via fibre optic (FO) or RS485)		o
IEC60870-5-103 (with fibre optic (FO) or RS485)		o
Modbus TCP (RJ45 interface)		o
Profibus DP (with LWL or RS485)		o
IRIG-B interface (time synchronization)		•

for detailed product information go to www.woodward.com/HighPROTEC

MCA4 DIRECTIONAL FEEDER PROTECTION



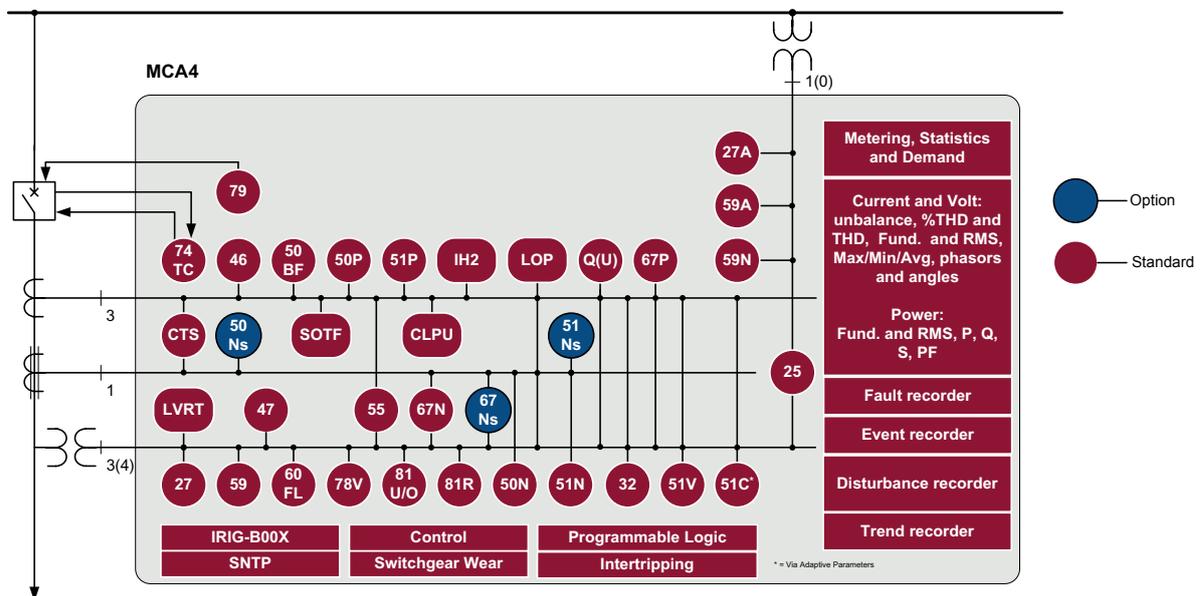
The MCA4 is designed for protection and control of medium voltage feeders and cables. In addition to numerous and easy configurable protection functions the device offers enhanced commissioning and failure analysis tools. The device is also specially designed for the connection of distributed energy resources to the mains.

APPLICATION

The MCA4 is a high precision and reliable protection and control relay. The intuitive setting concept with plausibility test enables reliable and time optimized configuration of the extensive protection function to a variety of applications such as incoming or outgoing feeder protection, network protection and generator protection.

The implemented switchgear supervision time management guaranties an efficient and safe control and supervision up to 6 switchgears.

FUNCTION OVERVIEW IN ANSI FORM



Approvals



* Type tested according to IEC60255-1 and IEC61850

detailed product information: [product spec DOK-FLY-MCA4](#)

MRI4 NON-DIRECTIONAL FEEDER PROTECTION



The MRI4 is a non-directional overcurrent and earth fault relay. The relay is used for incoming and outgoing feeder applications and can also be used as backup protection for differential protection systems.

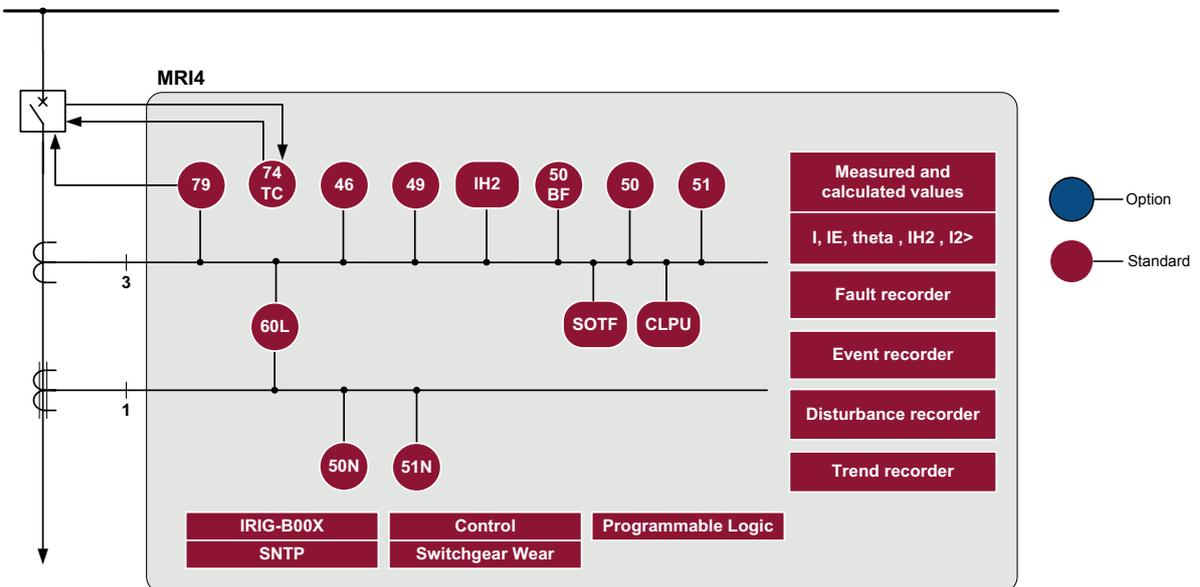
APPLICATION

The MRI4 provides a number of three phase protection elements to safeguard against overcurrent, short-circuit and earth fault, all with inverse time (INV) and definite time (DEFT) tripping characteristics.

The MRI4 is also ideal for the protection of isolated, resonant, resistive and solidly earthed neutral systems. It is designed to

be used in both radial networks and single fed open ring main systems. It can also serve as backup protection for differential protection systems on generators, transformers, bus bars and electrical lines. For overhead line protection the MRI4 offers auto reclosing function.

FUNCTION OVERVIEW IN ANSI FORM



Approvals



* Type tested according to IEC60255-1 and IEC61850

detailed product information: [product spec DOK-FLY-MRI4](#)

MRU4 VOLTAGE AND FREQUENCY SUPERVISION



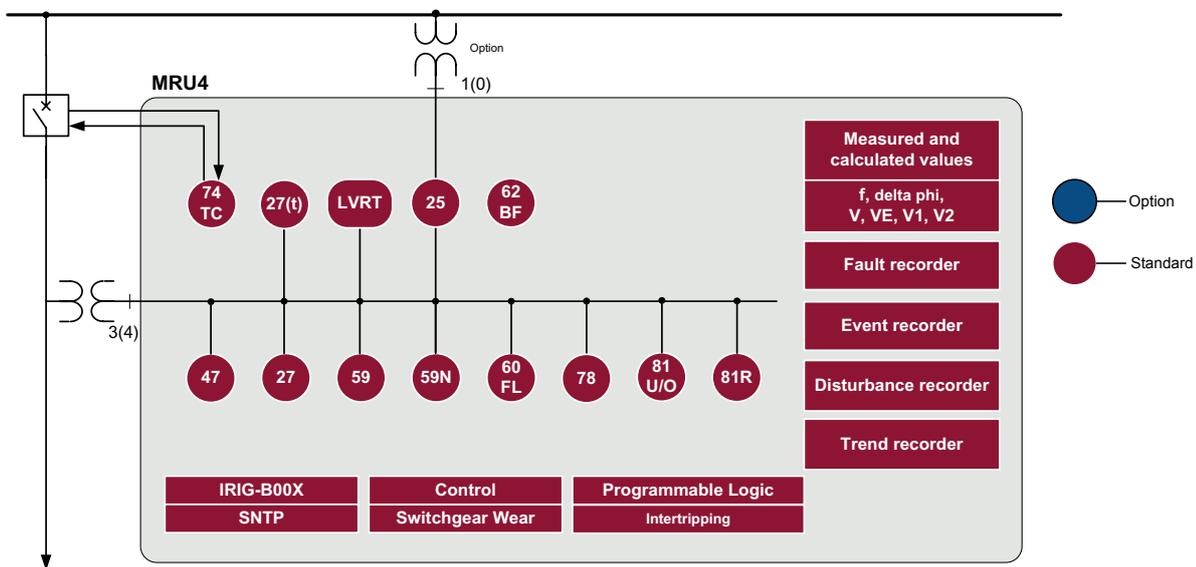
The MRU4 is designed to protect electrical equipment from dangerous voltage and frequency fluctuations, and is used for busbar, generator and feeder protection.

APPLICATION

The MRU4 is mainly designed to protect electrical equipment from dangerous voltage fluctuations. For example protection against under voltages (incl. LVRT/FRT) caused by mains shortcircuits, or overvoltages due to load shedding or failure of a generator voltage controller.

Its compact design makes the MRU4 ideal for installation within the LV terminal compartments of compact SF6-insulated MV systems.

FUNCTION OVERVIEW IN ANSI FORM



Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Approvals



* Type tested according to IEC60255-1

detailed product information: [product spec_DOK-FLY-MRU4](#)

MRDT4 TRANSFORMER DIFF. PROTECTION

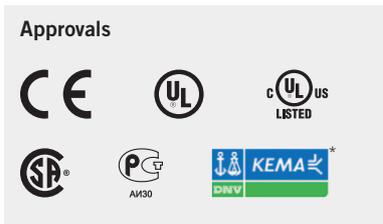
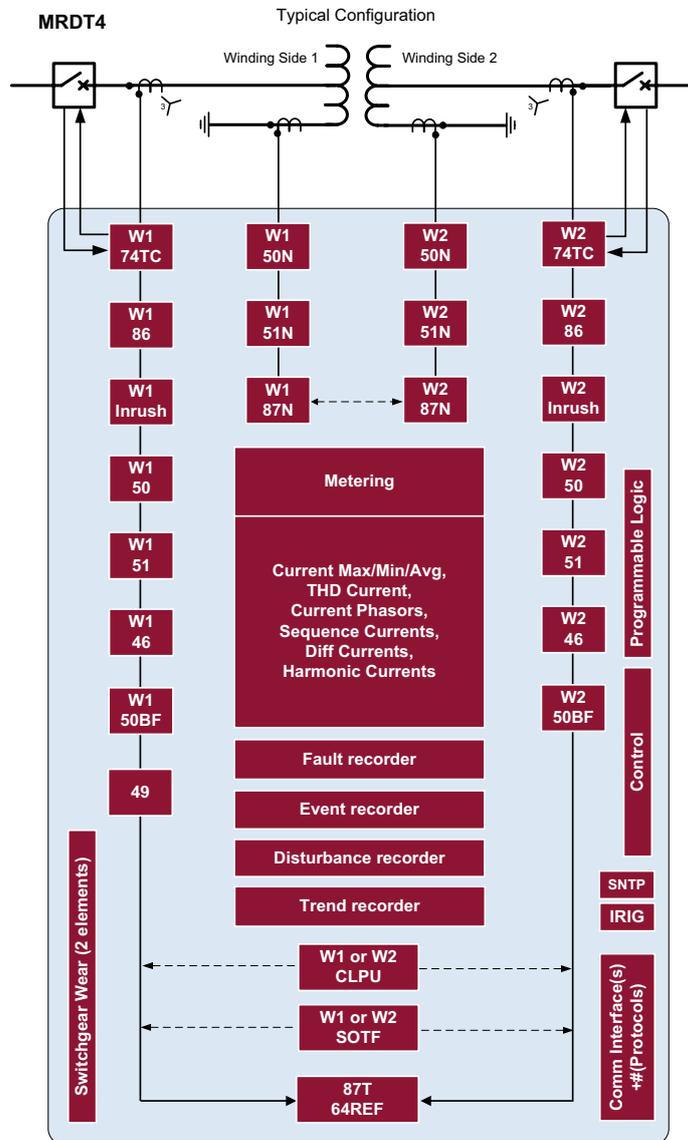


The MRDT4 is a transformer differential relay designed to protect two winding transformers. The relay can also be used as a generator differential protection and also incorporates backup protection functions.

APPLICATION

The various protective functions of the MRDT4 are specifically tailored to the protection of two winding transformers. The device offers in addition to the differential protection various communication and backup protection functions.

FUNCTION OVERVIEW IN ANSI FORM



* Type tested according to IEC60255-1

detailed product information: [product.spec_DOK-FLY-MRDT4](#)

MCDTV4 DIRECTIONAL TRANSFORMER DIFF. PROTECTION



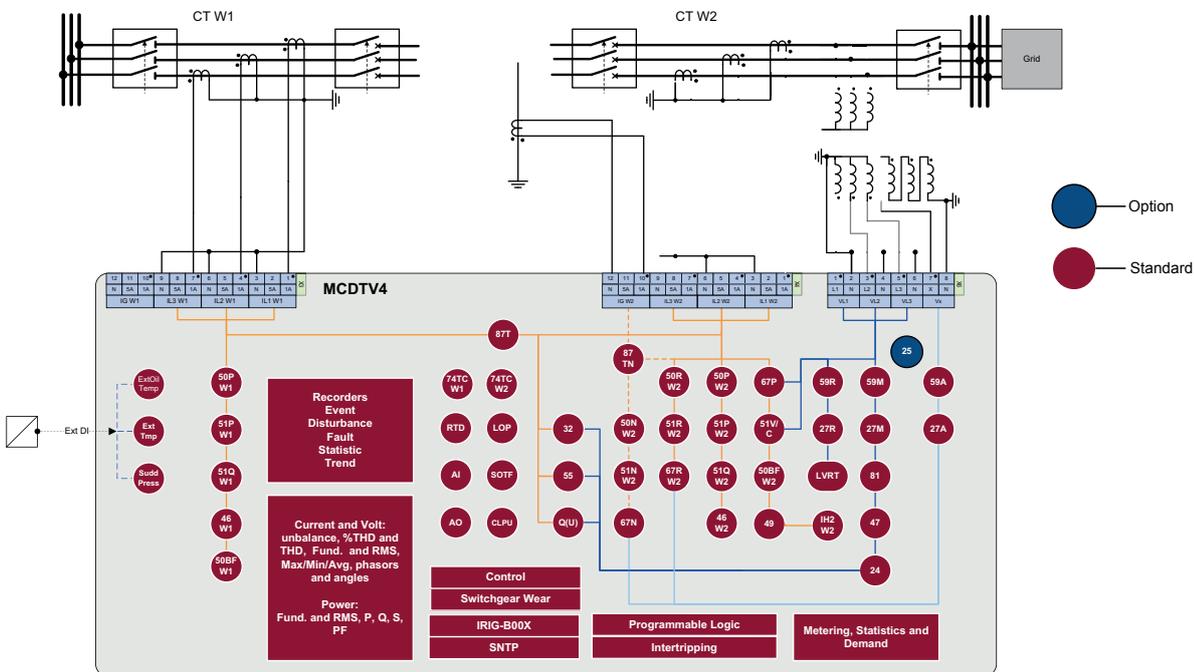
The MCDTV4 is a transformer protection device with phase and earth differential protection and with a large backup protection package. The device is designed to protect middle and big HV / MV / LV transformers in distribution systems. It is additionally equipped with GRID coupling functions for Distributed Energy Resources, especially for generator power plants.

APPLICATION

The MCDTV4 can detect critical operation states based on voltage measurement (e.g. overexcitation). It provides in addition to that an interconnection package. This can be used for mains protection at the point of common coupling (e.g. for directional

reactive power undervoltage protection). The integrated backup protection package enables the MCDTV4 to act as backup protection (e.g. for downstream breakers). Additional features like demand management are available without extra charge.

FUNCTION OVERVIEW IN ANSI FORM



Approvals

detailed product information: [product spec DOK-FLY-MCDTV4](#)

- Genset Controllers
- Synchronizer & Load Share Controllers
- Automatic Transfer Switch Controllers
- Transducers
- Multifunction Relays
- Protection Relays
- Power Generation Engine Control Products

MRM4 MOTOR PROTECTION



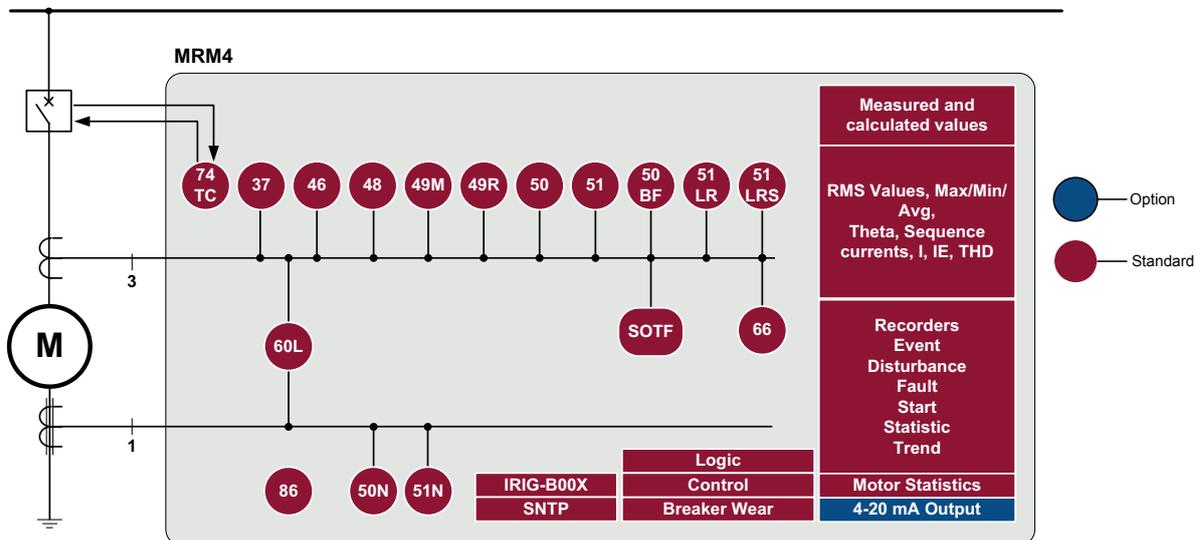
The MRM4 is designed for the protection of motors. All the protection functions based on current, as well as monitoring functions, such as motor start-up and incomplete start-up sequence for motor protection are covered by the MRM4.

APPLICATION

The MRM4 provides all necessary functions to protect low and medium voltage motor at all power levels. The protection functions based on current measurement and supervise all thermal conditions, motor start sequence, stall and locked rotor, under-current and incomplete sequence. Overcurrent functions and

earth fault functions are also available. The motor operation can be monitored by statistic and trending recorders. Start, event, fault, disturbance and trend recorders are tracking all important actions.

FUNCTION OVERVIEW IN ANSI FORM



Approvals



detailed product information: [product spec DOK-FLY-MRM4](#)

MRMV4 MOTOR PROTECTION WITH VOLTAGE / FREQUENCY



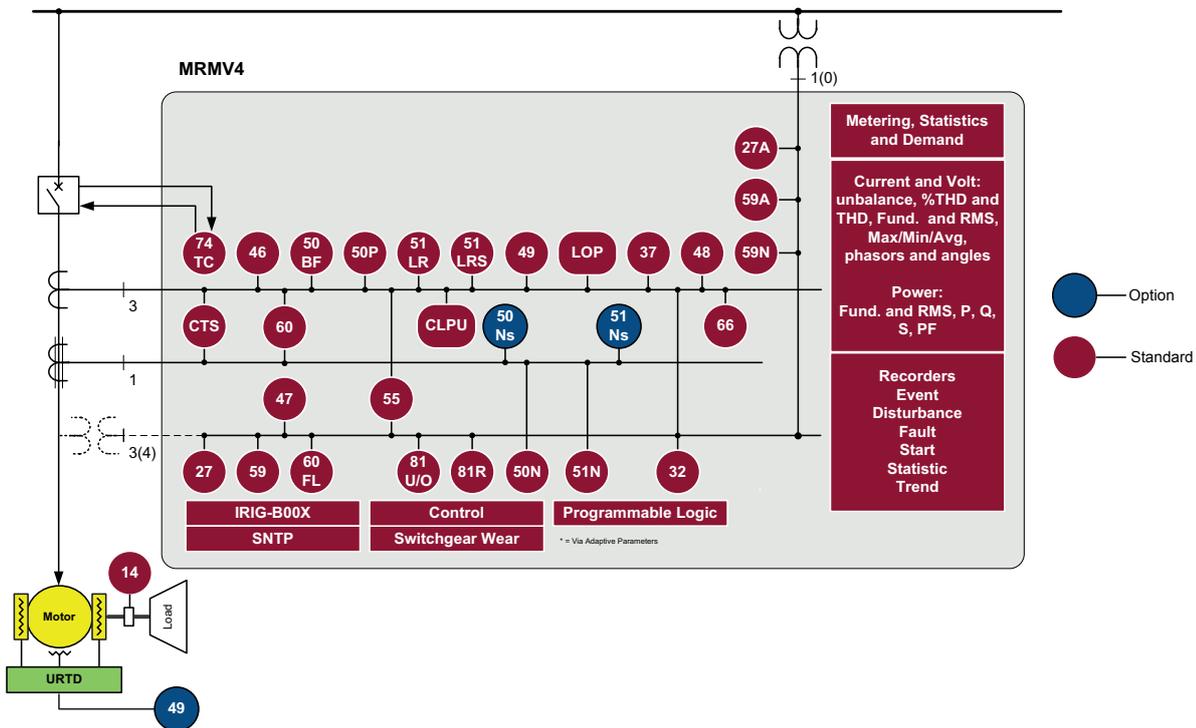
Compared with the MRM4, the MRMV4 also features voltage measurement and is therefore able to monitor power, voltage and frequency.

APPLICATION

The MRMV4 provides all necessary functions to protect low and medium voltage motors at all power levels. The protection functions are based on current and voltage measurement and supervise all thermal conditions, motor start sequence, stall and

locked rotor, undercurrent and incomplete sequence. Overcurrent functions and earth fault functions are also available as power protection, frequency and voltage elements. The motor operation can be monitored by statistic and trending recorders.

FUNCTION OVERVIEW IN ANSI FORM



detailed product information: product.spec.DOK-FLY-MRMV4

- Genset Controllers
- Synchronizer & Load Share Controllers
- Automatic Transfer Switch Controllers
- Transducers
- Multifunction Relays
- Protection Relays
- Power Generation Engine Control Products

MCDGV4 GENERATOR PROTECTION WITH DIFFERENTIAL

The high precision generator differential protection relay MCDGV4 is designed for the protection of medium and large generators. The step-up transformer can be integrated into the protection zone (unit protection). In addition to the differential protection package the device offers a broad interconnection package (FRT, QV, Reconnection Release) as well as full packages for phase, earth, voltage, frequency and power protection and many more.

APPLICATION

The MCDGV4 is a high precision protection for medium and high power generators. The step-up transformer can be integrated into the protection zone (unit protection/ block protection). In addition to the phase and earth differential protection, the device provides a variety of generator-specific protection functions. The package comprises phase, earth current, voltage, frequency and power protection. In addition to that the device

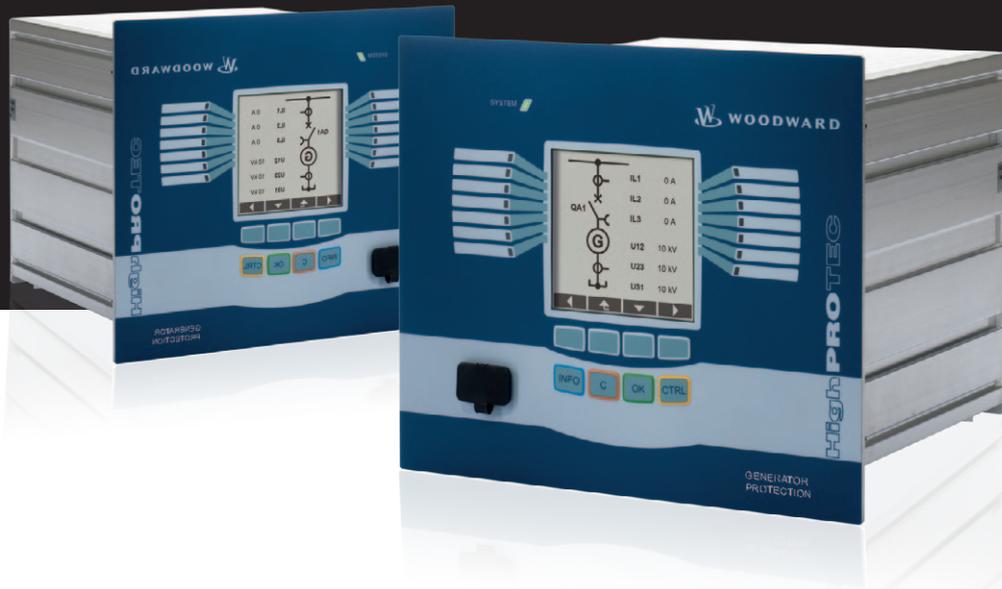
offers an undervoltage directional reactive power protection with reconnection function and an adjustable Fault Ride Through (FRT) with AR detection. The intuitive operating concept with plausibility checks and extensive commissioning functions such as the built-in fault simulator allows a safe and time-optimized maintenance and commissioning.

Approvals

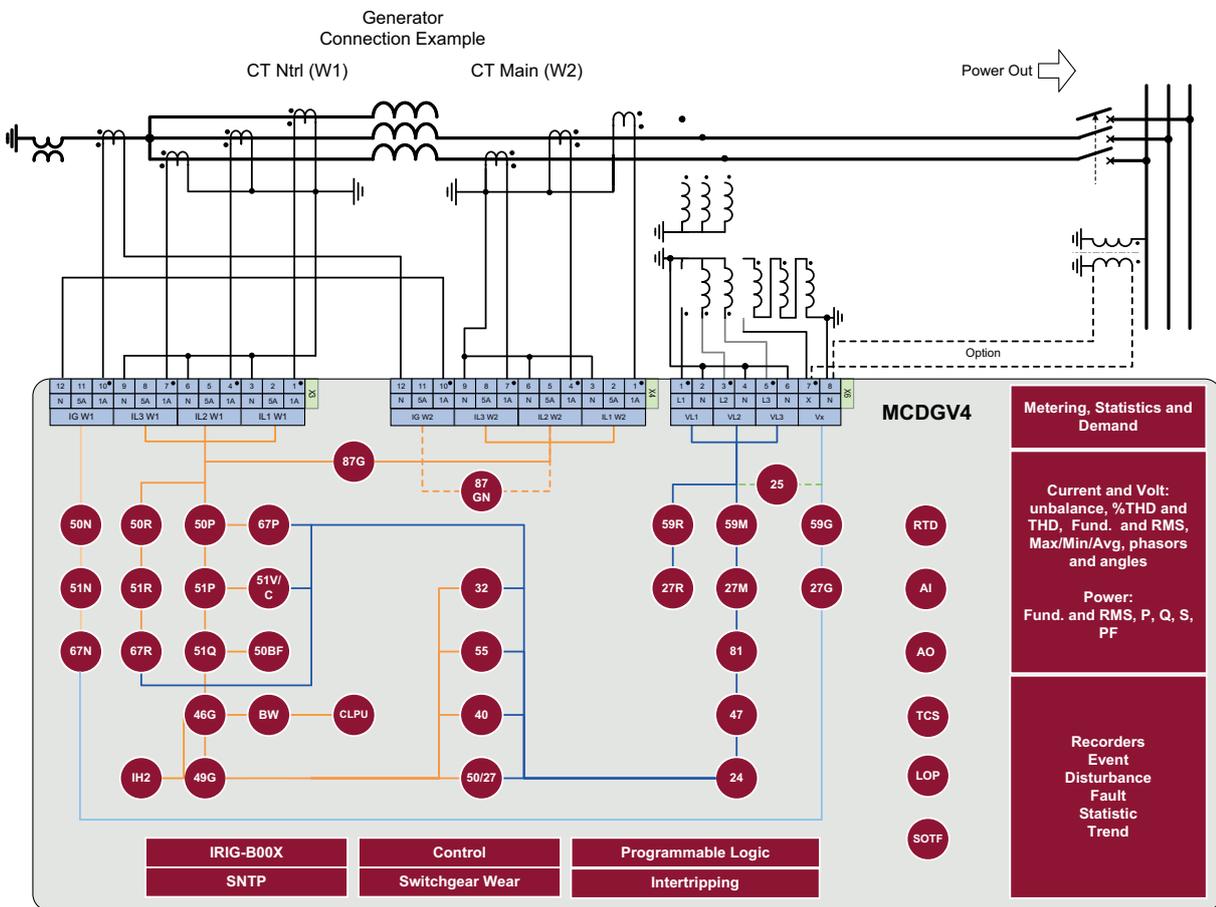


Type tested according to IEC60255-1

detailed product information: [product spec DOK-FLY-MCDGV4](#)



FUNCTION OVERVIEW IN ANSI FORM



● Option

● Standard

GenSet
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

HIGH TECH LINE SAFE, PRECISE, WELL-PROVEN

Modular protection functions are the special features of these devices for low-, medium-, and high-voltage applications. This well-proven, continuously developing line covers everything from basic overcurrent time protection via machine protection right down to high-quality differential protection.

ARRANGEMENTS AS REQUIRED

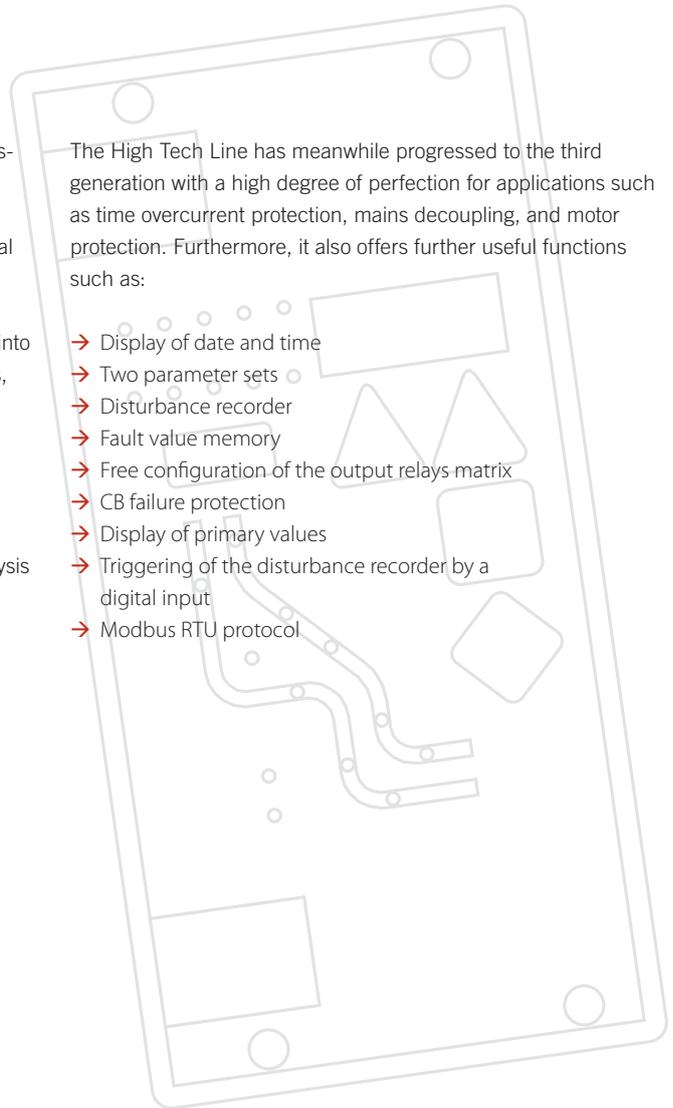
No matter whether you wish to protect grids, generators, transformers, or engines, the Woodward relays with their modular structure and thousand-fold applications will stand up to any task. And it does not matter whether you wish to use individual or combination relays.

Numerous additional functions have already been integrated into these relays and additionally offer you, among other functions, fault analysis and flexible adaptation to changing operating conditions.

The integrated communication interface provides the linkage to the higher-level SCADA system. The additional Woodward software makes parameter setting of the relays and fault analysis much easier.

The High Tech Line has meanwhile progressed to the third generation with a high degree of perfection for applications such as time overcurrent protection, mains decoupling, and motor protection. Furthermore, it also offers further useful functions such as:

- Display of date and time
- Two parameter sets
- Disturbance recorder
- Fault value memory
- Free configuration of the output relays matrix
- CB failure protection
- Display of primary values
- Triggering of the disturbance recorder by a digital input
- Modbus RTU protocol





SPECIFICATIONS

Power supply	19 to 270 VAC / 19 to 360 VDC
Ambient temperature in storage	-25 °C to 70 °C
Ambient temperature in operation	-10 °C to 55 °C
Voltage AC input	100 VAC and 400 VAC, 0 to 2 xUn
Current AC input	1 A or 5 A
Current DC input	0 to 20 A
Isolation measurement input	1 kohm to 500 kohm
Discrete inputs (isolated)	19 to 270 VAC (9 to 360 VDC)
Relay outputs	250 VAC 6 A, 250 VDC 0.3 A, 24 VDC 6 A
Housing (D-Housing)	
Dimension (WxHxD)	147 x 72 x 265 mm
Sealing	IP54
Weight	approx. 2,000 g

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

Power
Generation Engine
Control Products

Approvals



* Not valid for all part numbers

for detailed product information go to www.woodward.com/HighTechLine

HIGH TECH LINE SAFE, PRECISE, WELL-PROVEN

The intuitive operation of the High Tech Line relays deserves five stars for comfort. Thanks to its functional design, five keys, LEDs, and alphanumerical displays, it offers you a lot of flexibility in a minimum space. The simple operating surface combines functionality with comfort, with the integrated four-digit display serving as a clear text display for measured, fault, and adjustment values. The LEDs guide you intuitively through the adjustment process or signal the actual status of the relay.

The Woodward microprocessor technology and the highly integrated electronics, which guarantee top precision and reliability, will be as efficient as your speed of acquiring operating and parameter setting skills. Sophisticated solutions are, for example, offered by the double functions of the SELECT/RESET button. It allows you to call up all measured and adjustment values one after the other and to acknowledge fault signals. This is possible even when the housing lid is closed or sealed.

Fast fault detection: If a protective function is triggered, the display level changes to the trigger level. Here the measured values at the moment of triggering can be seen, which makes fault diagnosis simpler.

The compact housing technology is the result of the 19"-compatible rack-mounting feature consistently used for rack installation. But we also offer you separate housings for flush mounting.

Compact and functional: Although the High Tech Line features numerous functions, the design of this series is compact. You get precision in a minimum of space. All units are designed for modular housing structures, based on 19" systems. Each relay is of plug-type design and therefore suited for front installation or installing on a mounting plate.

The High Tech Line with its extensive protection functions, numerous additional functions, intuitive operation, and its compact housing design guarantees high-tech protection wherever power is generated, converted, or distributed.



PROTECTION FUNCTIONS AND FEATURES



		High Tech Line 3	
		MR	IR
Individual functions	ANSI		
Phase current (nondirectional)	50/51	I ¹	
Phase current (directional)	50/51/67	I ¹	
Earth fault (nondirectional)	50N/51N	I ¹	I ¹
Earth fault (directional)	67N	I ¹	
Circuit breaker failure protection	BF	I ¹	
Negative sequence (current)	46	S	
Voltage	27/59	U ¹	U ¹
Residual voltage	59N	U ¹	U ¹
DC voltage	27DC/39DC		U ¹
Phase balance (voltage)	47	U ¹	
Frequency	81	F3	
Power	32	P	
Differential protection	87	D ¹	
Rotor earth fault (DC)	64	R	
Auto reclosing	79	K	
Lockout function	86	L	
Field failure (Impedance)	40	Q	
Exciter failure (DC)	40/76	R	
Trip circuit supervision	74 TC	T	
Phase sequence	47	U ¹	
Combinations			
Phase current and earth current (directional or nondirectional)	50/51/67 50N/51N/67N	I ¹	
Phase current and earth current and CB failure and AR (nondirectional)	50/51/50N/ 51N/BF/79	IK	
Phase current and earth current and thermal replica (nondirectional)	50/51/50N/ 51N/49	IT ¹	
Mains decoupling (U/f/vector)	27/59/81/78	N3 ¹	
Mains decoupling (U/f/df/dt)	27/59/81	N3 ¹	
Motor protection (various functions)	37/46/48/49/50/51	M ¹	
Generator protection	27/59/81/78/ 50/51/50N/51N/BF	G ¹	
Line features			
Housing technology 19" flush mounting		•	•
Panel mounting		○	○
Display (measuring values and parameters)		•	
Indication of primary measuring values		• ²	
Interface		•	
Setting via buttons		•	
Setting via DIP-switches			•
Fault recorder		•	
Disturbance recorder, clock, 2 parameter sets		• ²	
Number of output relays		5	1 or 2
Password protection		•	

• = Standard ○ = Optional ¹ Various types with this prefix ² with High Tech Line 3 devices type MR_3 only

Genset
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Multifunction
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Protection
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Control Products

HIGH TECH LINE

SAFE, PRECISE, WELL-PROVEN

	MR13IRE	MR13IRER	MR13IRXR	MR13IE	MR13IX	MR13IXR	MR13E	MR13ITE	MR13IHE	Time Overcurrent
Current transformer inputs	4	4	4	4	4	4	1	4	4	
Voltage transformer inputs	3	3	3	-	-	3	-	-	-	
Binary inputs	2	2	2	2	2	2	2	2	2	
Output relays	4	4	4	4	4	4	4	4	4	
Watchdog relay	1	1	1	1	1	1	1	1	1	
Protection Functions										
Time overcurrent protection [50/51]	•	•	•	•	•	•	-	•	•	
Inrush stabilization (2nd harmonic)	-	-	-	-	-	-	-	-	•	
Directional time overcurrent protection [67]	•	•	•	-	-	-	-	-	-	
Earth fault protection standard [50N/51N]	•	•	-	•	-	-	•	•	•	
Sensitive EF isolated/compensated	-	-	•	-	•	•	-	-	-	
Resistance earthed / solidly earthed [50N/51N]	-	-	-	-	-	-	-	-	-	
Earth fault directional feature [67N]	-	•	•	-	-	•	-	-	-	
Thermal replica [49]	-	-	-	-	-	-	-	•	-	
Circuit breaker failure protection [50BF]	•	•	•	•	•	•	•	•	•	
Voltage protection [27/59]	-	-	-	-	-	-	-	-	-	
Residual voltage [59N]	-	-	-	-	-	-	-	-	-	
Phase balance [47]	-	-	-	-	-	-	-	-	-	
Frequency protection [810/U]	-	-	-	-	-	-	-	-	-	
Frequency gradient [81ROCOF]	-	-	-	-	-	-	-	-	-	
Vector surge [78]	-	-	-	-	-	-	-	-	-	
Active power direction [32/37]	-	-	-	-	-	-	-	-	-	
Rotor earth fault [64N], exciter current protection [40/76], diode failure	-	-	-	-	-	-	-	-	-	
Negative sequence protection [46]	-	-	-	-	-	-	-	-	-	
Field failure protection [40]	-	-	-	-	-	-	-	-	-	
Locked rotor [51], incomplete start [48], max. number of starts [66], undercurrent [37]	-	-	-	-	-	-	-	-	-	
Special and Additional Functions										
Auto reclosing	-	-	-	-	-	-	-	-	-	
Reset/Blocking	•	•	•	•	•	•	•	•	•	
Voltage-dependent function	-	-	-	-	-	-	-	-	-	
Time and date	•	•	•	•	•	•	•	•	•	
Parameter sets	2	2	2	2	2	2	2	2	2	
Fault recorder (non-volatile)	•	•	•	•	•	•	•	•	•	
Disturbance recorder	•	•	•	•	•	•	•	•	•	
Output relay matrix	•	•	•	•	•	•	•	•	•	
Communication RS-485										
RS-485 open data protocol	•	•	•	•	•	•	•	•	•	
Modbus RTU protocol	o	o	o	o	o	o	o	o	o	

for detailed product information go to www.woodward.com/HighTechLine

PROFESSIONAL LINE THE DIN RAIL TRENDSETTER

Here you will find all common protective functions for low and medium voltage in individual or combined units. The special feature of the Professional Line products is their attractive price in conjunction with their intelligent DIN-rail design which is limited to essentials.

Small but efficient – fast and safe. These units manufactured using SMD technology and with universal architecture are used for grid, generator, and motor protection. Microprocessor technology used with our larger models ensures top precision and reliability. Especially important, too, the relays can process complex measured values, which include: the effective values, real power measuring, and communication capability in addition to characteristic curves.

Flexible adaptation: With the voltage and frequency relays you can easily select rated voltages and rated frequencies as well as some additional protective functions by means of a DIP switch. The current relays, for example, have a great number of standard characteristic curves which can be used to fit the individual application.





UNIVERSAL SUPPLY

The protection relays can be operated with alternating or direct voltage, thanks to a wide-range power pack. This way you can have an electrical supply from the measured value itself or any other power source and therefore the product can be integrated into almost any operating environment.

Not only can important rated values be easily adjusted on the unit, but there is no need for a huge variety of associated equipment, which therefore optimizes logistics and warehousing. This underlines the cost efficiency of this product line.

Easy adjustment: DIP switches and potentiometers enable you to adjust the protective functions and tripping values quickly and safely. If you prefer to use a PC or a Notebook for this purpose, we offer you – as an option – an interface adapter plus the appropriate software. Active protection against changes in the settings is ensured by front covers that can be sealed and through adjustments using the software.

Compact design: The Professional Line protection relays are in many ways unique on the market. For example, the standard

SPECIFICATIONS X-TYPE

Power supply	36 to 275 VAC / 19 to 390 VDC
Ambient temperature (storage)	-40 °C to 85 °C
(operation)	-20 °C to 70 °C
Voltage AC input	100 VAC, 110 VAC, 230 VAC, 400 VAC
Current AC input	1 A or 5 A
Discrete inputs (isolated)	19 to 270 VAC / 19 to 360 VDC
Relay outputs	250 VAC 5 A, 250 VDC 0.1 A, 24 VDC 5 A
Housing (DIN-Rail mount.)	
Dimension (WxHxD)	75 x 65 x 110 mm
Sealing	IP40
Weight	approx. 500 g

SPECIFICATIONS XR-TYPE

Power supply	19 to 270 VAC / 19 to 360 VDC
Ambient temperature (storage)	-20 °C to 70 °C
(operation)	-10 °C to 55 °C
Voltage AC input	100 VAC and 400 VAC, 0 to 2 xUn
Current AC input	1 A or 5 A
Discrete inputs (isolated)	19 to 270 VAC / 19 to 360 VDC
Relay outputs	250 VAC 6 A, 250 VDC 0.3 A, 24 VDC 6 A
Housing (DIN-Rail mount.)	
Dimension (WxHxD)	75 x 255 x 110 mm
Sealing	IP40
Weight	approx. 1,800 g

Approvals



* Not valid for all part numbers

for detailed product information go to www.woodward.com/ProfessionalLine

Genset
Controllers

Synchronizer &
Load Share
Controllers

Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

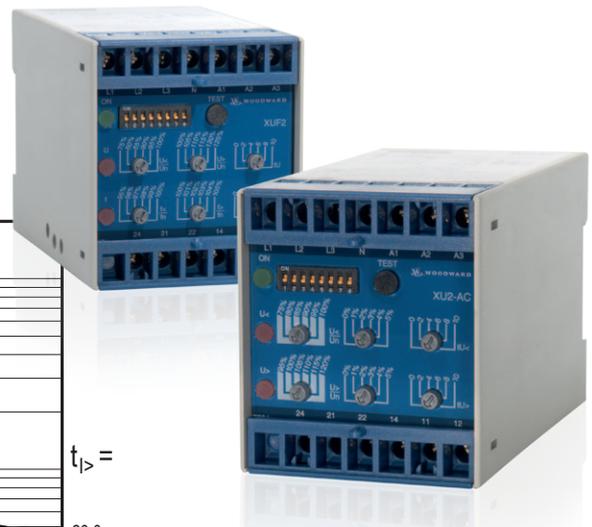
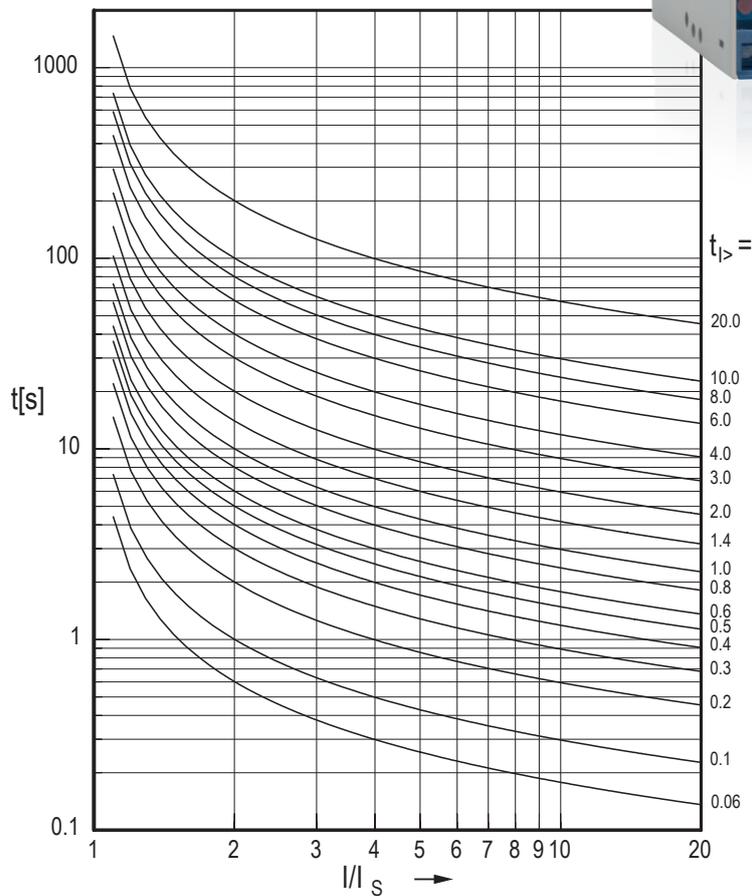
Power
Generation Engine
Control Products

PROFESSIONAL LINE THE DIN RAIL TRENDSETTER

DIN-rail-mounted housings allow fast installation at an optimum cost. They have LV and MV practice-oriented terminals which are easily accessible and are suited for easy installation on DIN rails. They have a terminal cross section which is especially designed for the connected CTs so that they are first choice for those who are not obliged to use door installation.

Variety of applications: Woodward Professional Line devices not only prove themselves in the most varied stationary applications – such as in type-tested energy supply systems – but also in mobile applications: in construction site systems, container systems,

and in supply systems for trains. Woodward units fulfill the most stringent testing conditions. They are resistant to vibration and climate, and fulfill all requirements of IEC 60255.



The current relays of the Professional Line offer you a large number of selectable definite time inverse tripping characteristics.



Professional Line

Individual Functions	ANSI	
Phase current	50/51	XI*
Phase current (directional)	67	XRI
Earth current	50N/51N	XI*
Earth current (directional)	67N	XI*
Circuit breaker failure protection	BF	-
Overcurrent voltage dependent	51V	-
Negative sequence (current)	46	XS
Voltage	27/59	XU*
Residual voltage	59N	XU*
DC voltage	27DC/59DC	XU*
Phase balance (voltage)	47	XA
Frequency	81	XF
Vector surge	78	XG
Power	32	XP
Differential protection	87	XD*
Rotor earth fault (DC)	64	XR
Exciter failure (DC)	37/40/64/76	XE
Phase sequence	47	XU*
Combinations	ANSI	
Earth current (directional)	50N/51N/67N	XRI1-ER
Phase current, CB failure (directional)	50/51/67/50BF	XRI1-IR
Phase current and earth current, CB failure (nondirectional)	50/51/50N/51N/50BF	XRI1-IE
Voltage and frequency	27/59/81	XUF
Voltage and negative sequence	27/59/47	XUA
Mains decoupling (U/f/vector/df/dt)	27/59/81/78/81ROCOF	XRW XRN XN*
Motor protection (various functions)	37/46/48/49/50/51	XM
Line Features		
DIN rail mounting		•
Panel mounting		only XRN XRW XRI
Display (measuring values and parameters)		only XRN XRW XRI
Interface		○
Setting via buttons		only XRN XRW XRI
Setting via potentiometer		•
setting via DIP switches		•
Fault memory		XRW XRI
Number of output relays		2/5
Password protection		with software
Parameter software HTL / PLSoft4		○

* = Various types with this code ○ = Option ● = Standard

Genset
Controllers

Synchronizer &
Load Share
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Automatic
Transfer Switch
Controllers

Transducers

Multifunction
Relays

Protection
Relays

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PROFESSIONAL LINE

THE DIN RAIL TRENDSETTER

	Time Overcurrent Protection							
	X11I	X11E	X11S	X11R	X11SR	XR11R	XR11E	XR11ER
Current transformer inputs	3	1	1	1	1	3	4	1
Voltage transformer inputs	-	-	-	1	1	3	-	3
Binary inputs	-	-	-	-	-	2	2	2
Output relay	2	2	2	-	2	4	4	2
Watchdog relay	-	-	-	-	-	1	1	1
Protection Functions								
Time overcurrent protection [50/51]	•	-	-	-	-	•	•	-
Directional time overcurrent protection [67]	-	-	-	-	-	•	-	-
Earth fault protection standard [50N/51N]	-	•	-	•	-	-	•	•
Resistance earthed / solidly earthed [50N/51N]	-	-	•	-	•	-	-	-
Earth fault directional feature [67N]	-	-	-	•	•	-	-	•
Circuit breaker failure protection [50BF]	-	-	-	-	-	•	•	-
Voltage protection [27/59]	-	-	-	-	-	-	-	-
Residual voltage [59N]	-	-	-	-	-	-	-	-
Phase balance [47]	-	-	-	-	-	-	-	-
Frequency protection [810/U]	-	-	-	-	-	-	-	-
Frequency gradient [78]	-	-	-	-	-	-	-	-
Vector surge [78]	-	-	-	-	-	-	-	-
Directional power [32/37]	-	-	-	-	-	-	-	-
Rotor earth fault [64]	-	-	-	-	-	-	-	-
Negative sequence protection [46]	-	-	-	-	-	-	-	-
Underexcitation protection[40]	-	-	-	-	-	-	-	-
Motor protection: locked rotor [51], thermal protection [49], undercurrent [37]	-	-	-	-	-	-	-	-
Differential protection [87T/87G/87L]	-	-	-	-	-	-	-	-
Special and Additional Functions								
Reset/Blocking	-	-	-	-	-	•	•	•
Voltage-dependent function	-	-	-	-	-	-	-	-
Parameter sets	-	-	-	-	-	1	-	1
Fault memory (non-volatile)	-	-	-	-	-	•	•	-
Open Data								
RS-485 open data protocol	o	o	o	o	o	•	•	•
RS-485 Modbus RTU	-	-	-	-	-	o	o	o
Housing								
75 x 65 x 110 mm (HxWxD)	•	•	•	•	•	-	-	-
75 x 224.7 x 110 mm (HxWxD)	-	-	-	-	-	•	•	•

for detailed product information go to www.woodward.com/ProfessionalLine

WI LINE TRIPPING WITHOUT AUXILIARY VOLTAGE

Customer-oriented design: The protection relays we introduce to you in this line were developed in close cooperation with our customers. This cooperation has resulted in products which will match any circuit breaker commonly available on the market. Because these relays work independent of auxiliary voltage, they are well-suited for self-sustaining transfer and distribution stations, ring main units, and transformer stations.

ALWAYS LIVE AND CLEVERLY

All the WI Line products are overcurrent time relays. The tripping characteristics range from the two-step independent time overcurrent protection (DEFT), dependent (INV) right down to specialist characteristic curves. As further options, we offer some relays with integrated earth current protection.

Expensive connection via interposing transformers is therefore not necessary. The operating mode, which is independent from auxiliary voltage, guarantees you the greatest flexibility when it comes to using the devices. Of course, we also offer you solutions where standard 1 A or 5 A current transformers are required, or where specialist transformers in compact switch-gears are used.

CLEVERLY SOURCED

The WI protection relays receive their power supply from the measured current of the current transformers. By using the right combination of current transformer, low-power tripping coil (<0.5 Ws) and the appropriate protective device, you can gain enormous cost savings. Our contribution to this has been the development of a low-energy tripping principle which can be found in all WI devices. This low-energy tripping principle consists of an energy storage system which is integrated into the WI devices, and which considerably reduces the current transformer power.

Since we know how valuable and cost-intensive building space is, we are especially proud of the fact that our WI Line devices can be supplied even with smaller transformers.

FOR HARSH ENVIRONMENT

Day in, day out – even under the roughest environmental conditions – the WI Line relays prove their reliability. For over 25 years more than 120.000 WI relays have been installed and neither dirt, greatly fluctuating temperatures, nor high humidity have had any adverse effect on them.

If you wish to employ superior technology even under the most unfavorable conditions, then the WI Line is the right choice for you.





		WIP1	WIC1	WIB1
Single Functions				
	ANSI			
Phase overcurrent (multi-characteristic)	50/51	●	●	●
Short-circuit protection	50/51	●	●	●
Number of overcurrent elements		2	2	2
Earth overcurrent	50N/51N	●	●	●
Number of earth overcurrent elements		2	1	2
Line Features				
DIN-rail-mounting		●	-	-
Panel mounting		●	●	●
Display (measuring values and parameters)		●	-	-
Setting via buttons		●	-	-
Setting via hex switches		-	○	-
Setting via DIP switches		-	○	●
Standard CT (1 A / 5 A)		1 A	-	-
Special CT (secondary rated current)		-	wide range	wide range
LED pickup		●	○*	●
LED trip indicator		●	-	-
Flag-indicator output		●	●	2
Rated frequency Hz		50/60	50/60	50/60
Fault memory		●	●	●
Clock		●	-	-
Password protection		●	●	●
Electro-impulse / Relay contact output		both	E	E
Number of output relays (W = c.o. contacts)		3 W	2**	2**
Input remote tripping		●	●	●
Interface		○	●	●
RS-485 interface with pro open data protocol		○	-	-
RS-485 interface with Modbus protocol		○	-	-
Additional power supply		○	-	-

● = Standard ○ = Option * not WIC1-1 ** via WI1S25

DID YOU KNOW ...

... that the WIP, flagship of the WI Line offers additional functions, which you would not normally expect from a current transformer powered relay? An optional, redundant voltage supply allows you to have the following additional features, regardless whether a primary current is flowing:

- Display of up-to-date measuring values
- Earth fault protection ($I_{Es} \geq 0.05 \times I_N$)
- Free configuration of the output signals
- Communication via RS-485

The communication interface allows you to set parameters online with WI-Soft, reading of the fault value memory, and connection to the SCADA system via the Modbus RTU protocol. One of our latest developments is the WIC1, which is used in compact ring main units – a device reduced to the essentials with an excellent price/performance ratio.

The WIC protects mains transformers against overcurrent and short circuits, in compact switchboards (ring main units) containing integrated circuit breakers. The DMT and IDMT tripping

Approvals



* WIB1 (NOC159)

for detailed product information go to www.woodward.com/WILine

Genset
Controllers

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Multifunction
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WI LINE TRIPPING WITHOUT AUXILIARY VOLTAGE

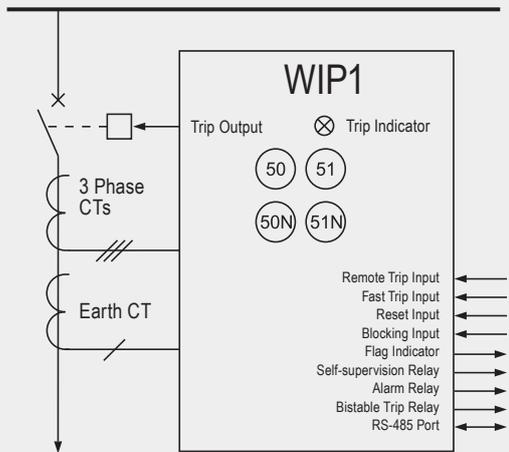
elements with their multi-characteristics allow you flexibility with your application. The WIC is also optionally available with integrated earth current supervision.

You will see that the WIC has benefits to offer even in the planning stage. Your work can be reduced so that you only need to select one of our four wide-range current transformers with secondary current adapted to the relay. In conjunction with these wide-range current transformers the WIC relay forms a system with an extremely wide operating-current range from 8–996 A. The complete system of transformer and relay has a primary short-circuit resistance of 62.5/25 kA 1 sec or respectively 52.5/21 kA 3 sec.

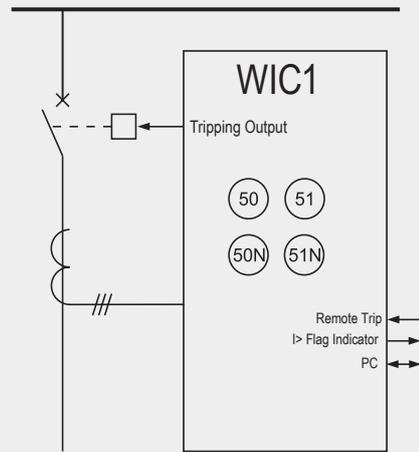
Its dimensions 170x40x125 mm make the WIC particularly suitable for installation in compact switchboards. The WIC system provides safe planning. As the system is universally applicable, the varieties you have in stock can be reduced to a minimum.

The choice is yours when it comes to parameter setting. Depending on the type, the WIC parameters can be set either by way of the communication interface via PC or simply via a DIP or HEX switch. Either supported by software or with a simple turn, you can simply adjust the tripping and excitation values as well as the tripping characteristic. The WIC is equipped with an integrated fault value memory which you can read via the communication interface. By means of the WIC Test Unit the processor's functions can be checked without any further auxiliary material.

When it comes to servicing and commissioning, additional test



Principle diagram WIP1

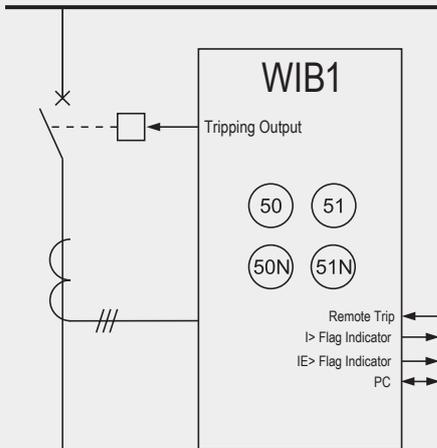


Principle diagram WIC1

bushings on the top of the device make the direct secondary current testing of the complete converter much easier. Once put into operation, the WIC will remain maintenance-free for 25 years.

BIG SELECTION

Hopefully you will find the protection relay to suit your requirements whilst browsing. In case you do not find a relay, please contact us. Chances are that we would be able to launch another member of the WI Line in a joint effort.



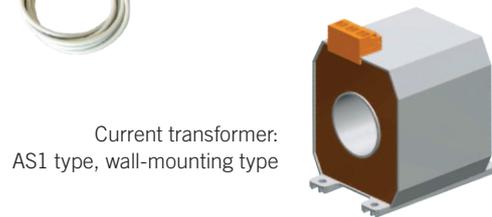
Principle diagram WIB1

CURRENT AND SETTING RANGES

WIP1	ct... / 1 A
$I_{>} = 0.5-2.5 \text{ A}$	$I_{>>} = 1-35 \times I_n$
$t_{>} = 0.06-300 \text{ s}$	$t_{>>} = 0.06-2 \text{ s}$
$I_{E>} = 0.05-2 \times I_n$	$I_{E>>} = 0.1-9 \times I_n$
$t_{IE>} = 0.06-300 \text{ s}$	$t_{IE>>} = 0.06-2 \text{ s}$
WIC1	8 to 996 A
$I_{>} = 0.9-2.5 \times I_s$	$I_{>>} = 1.0-20 \times I_s$
$t_{>} = 0.01-300 \text{ s}$	$t_{>>} = 0.04-3 \text{ s}$
$I_{E>} = 0.2-2.5 \times I_s$	-
$t_{IE>} = 0.1-20 \text{ s}$	-
WIB1	8 to 480 A
$I_{>} = 0.9-2.5 \times I_s$	$I_{>>} = 1.0-20 \times I_s$
$t_{>} = 0.1-2.0 \text{ s}$	$t_{>>} = 0.04-3.0 \text{ s}$
$I_{E>} = 0.2-2.5 \times I_s$	$I_{E>} = 1.0-7 \times I_s$
$t_{IE>} = 0.1-2 \text{ s}$	$t_{IE>>} = 0.1 \text{ s}$



Accessory: WIC1TU,
suitable for on-site diagnostics



Current transformer:
AS1 type, wall-mounting type



Accessory: WIC1PC3,
needed for PC communication via USB port

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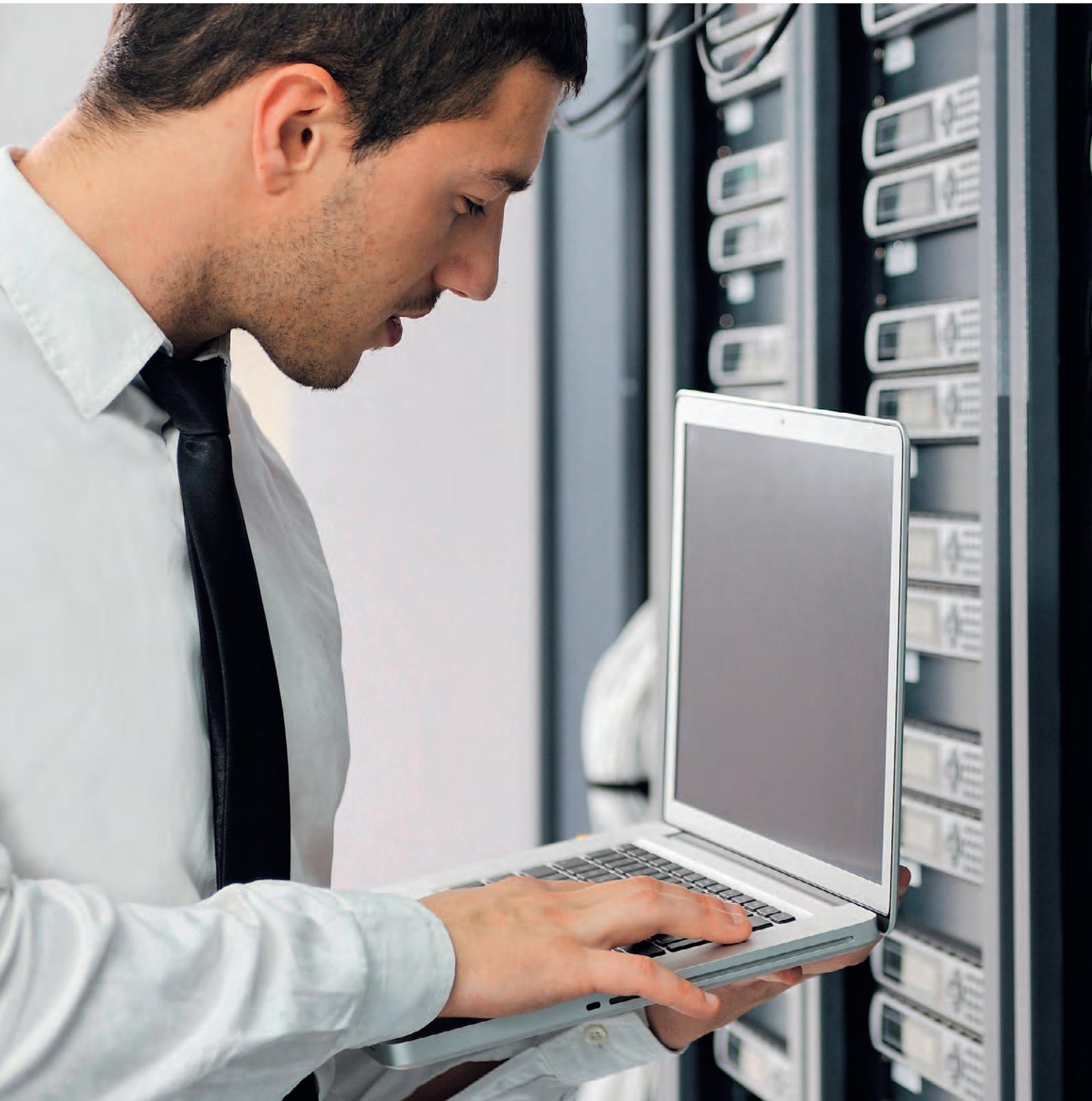
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POWER GENERATION ENGINE CONTROL PRODUCTS



Optimizing Emissions, Efficiency, Reliability, Performance, and Value

Decades of experience managing and controlling engines of virtually every size, type, and application enables Woodward to offer a wide range of innovative control system solutions and rapid development tools for engines and engine-powered equipment.

Based on a systems-level approach to your control needs, Woodward systems comprise electronic control modules, software, actuators, valves, fuel delivery systems, and sensors that meet OEM requirements for emissions, efficiency, reliability, cost, and performance.



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SOLENOIDS HIGH-PERFORMANCE CONTROL COMPONENTS

From operating engine run/stop levers, throttles, chokes, valves, and clutches to protecting expensive diesel engines from overspeed, low lube pressure, and high temperature, you can rely on Woodward solenoids to meet the ever-changing technical demands of modern industry.



1500 SERIES

Models 1502, 1502ES, and 1504
Pull force range: 10–12 lbs (44–53 N)
Hold force range: 19–28 lbs (85–125 N)



1750 SERIES

Models 1751, 1751ES, 1753, and 1753ES
Pull force range: 19–25 lbs (85–111 N)
Hold force range: 38–43 lbs (169–191 N)



1750 PUSH SERIES

Models 1756ES, 1756ESDB, 1757ES, and 1757ESDB
Push force range: 16–26 lbs (71–116 N)
Hold force range: 35–37 lbs (156–165 N)



FEATURES

- Dual-coil design for higher pull force in a smaller package than similar size single-coil solenoid
- Customer-specified option to switch from high-current “pull” operation to low-current “hold” operation with internal mechanical switch or external electronic switch
- Hold coil provides continuous duty operation
- Hard chrome-plated plunger and brass liner for smooth, reliable, wear-resistant operation, tested in one million cycles
- Corrosion-resistant plated steel housing and mounting base/flange
- Choice of flange, threaded, or base mountings
- Electrical connections available with choice of screw or spade terminals, or wire/connectors
- Two boot types available: bellows boot is tapered to eliminate expansion in tight spots; constant-volume boot has no breather hole and so provides contaminant protection of the plunger and bore



2000 SERIES

Models 2001, 2001ES, 2003, and 2003ES
 Pull force range: 21–29 lbs (93–129 N)
 Hold force range: 41–51 lbs (182–227 N)

2370 SERIES

Models 2370 and 2370ES
 Pull force range: 37–39 lbs (165–173 N)
 Hold force range: 88–92 lbs (391–409 N)

CABLE SOLENOIDS

Remote cable link solenoid can be used for throttle advance or shutdown requirements. Ideal for applications with space restrictions, extremely hot environments, or excessive vibration.

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SOLENOID CONTROL ELECTRONICS

INTERNAL AND EXTERNAL ELECTRONICS

Woodward's extensive line of solenoid protection products features either external or internal electronics. Coil Commanders™ and pull coil timer modules (PCTMs) are externally attached to the solenoid to prevent overheating of the pull coil. ICE (Integrated Coil Electronics) and AICE (Advanced ICE) solenoids have built-in electronics that prevent overheating of the pull coil.

INTERNAL ELECTRONICS

Ideal for custom applications, Woodward's Integrated Coil Electronics (ICE) and advanced ICE solenoids have built-in electronics that prevent

overheating of the pull coil. The electronics on both products are totally encapsulated onto the solenoid to ensure reliability in the harshest environ-

ments. Both feature reverse-polarity protection.



INTEGRATED COIL ELECTRONICS (ICE)

A printed circuit board mounted onto a dual-coil solenoid provides a timer circuit for the pull coil. The PCB functions as an internal timer that switches the pull coil ON and OFF so that the solenoid does not burn itself out.



ADVANCED INTEGRATED COIL ELECTRONICS (AICE)

Electronics integrated into a single-coil solenoid control the solenoid's current to provide high initial starting force and a constant hold force. The microprocessor encapsulated onto the solenoid calculates the pull time and then generates a pulse-width-modulated signal to create the hold-coil function for single-coil solenoids. Under this reduced current, the hold force of the plunger is held constant over input voltage and temperature ranges.



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EXTERNAL ELECTRONICS

Dual-coil solenoids are constructed of two wound coils. The pull coil operates at high currents in order to provide maximum pull or push force. The hold coil

retains the plunger in place after it has completed its stroke. After energizing, the pull coil must be turned off as soon as possible to prevent burnout. The pro-

tection modules energize the solenoid pull coil for approximately one second.



COIL COMMANDERS™

Coil Commanders time out a solenoid's high amperage pull coil within approximately 1.5 seconds. The in-line cylindrical tube design comes in 5-, 6-, and 7-wire SSR configurations.



PCTM PROTECTION SYSTEMS

Pull-coil timer modules protect externally switched solenoids by limiting the pull coil ON time to 0.5 second. Use of a PCTM enhances solenoid performance by providing functionality of an internally switched solenoid but with greater durability and reliability.

SPEED SWITCHES AND SENSORS

SPEED MONITORING AND ENGINE PROTECTION OPERATIONS

Woodward speed switches protect your engine or equipment against the damaging and dangerous conditions of overspeed and underspeed. Our speed switches offer many choices – from single-channel, manually adjustable models to multiple-channel, software-configurable models.



DSS-2

Two-channel electronic speed switch:

DSS-2 combines the convenience of manual adjustments with the flexibility of a computer-based calibration tool. This compact device is a powerful performer in speed-switch applications such as overspeed protection, underspeed protection, load control, or auto-start. The unit is fully potted for harsh environments and comes with Eurostyle connectors for easy installation. The DSS-2 universal input accommodates both 12 V and 24 V systems.

As an integrated sub-system for construction/commercial and industrial engine systems by OEMs and industrial plants, DSS-2 is well-suited for compressors, generator sets, construction machinery, and farm vehicles.



EPS 1000

Engine/equipment protection system:

This compact, lightweight module performs a variety of functions simultaneously. With one speed signal input, the EPS 1000 can control up to three onboard relays, or channels. The three channels can be configured independently to set and reset at various speeds. All features are easily configured with calibration software.

Its three-channel capability makes the EPS 1000 ideally suited for engine/equipment protection and unattended engine starting using autocrank and glow plug functions. It can also be used in sequenced operations and critical timing applications. Patented, reversible frame makes EPS 1000 easily adaptable for base or panel mounting.



ESSE

Single-channel and dual-channel speed switches:

ESSE switches monitor and control critical speed functions such as crank disconnect or overspeed protection, transmission shift inhibiting, and PTO protection. The switches are adaptive to most speed-related switching functions on diesel and gas engines and other rotating machinery.

Both single and dual setpoint models are potted for protection against harsh environments and have proven to be reliable and rugged as well as flexible and cost-effective.

In addition to generator sets, starter motors, and engines, ESSE switches are also used on diverse equipment such as conveyor belts, bus doors, and magnetic brake retarders.



MAGNETIC PICKUPS

Magnetic pickups and proximity switches for electronic controls: Magnetic speed pickups (MPUs) are speed sensors that detect the speed of a prime mover, typically an engine or turbine. Used in conjunction with an engine ring gear or some other notched rotating wheel, an alternating voltage is developed. The frequency of this voltage is translated by the speed control into a signal that accurately depicts the speed of the prime mover.

Woodward's magnetic pickups can be used with most electronic speed controls, and models are available for hazardous location installation.



MINI-GEN® SIGNAL GENERATORS

Woodward's Mini-Gen Signal Generator develops an AC sine wave that can be used to measure the speed of rotating machinery or engine RPM. Most notably, the Mini-Gen is used on over-the-road vehicles where the input is sent to either a tachometer or a speedometer for determining vehicle speed.

- Mount on standard SAE 7/8-18, and E1 and E2 DIN 75 532 tachometer outputs
- Compact, only 1-3/4" in diameter
- Long, reliable life under continuous speeds as high as 4,000 rpm
- Usable signal at speeds below 20 rpm (10 Hz)
- Output signal frequency half of shaft rpm
- Rugged zinc diecast construction
- Plated for protection against moisture, salt, and dirt
- Optional connectors available

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ELECTRIC GOVERNING SYSTEMS ACTUATORS AND CONTROLLERS

Woodward's worldwide reputation as a leading manufacturer of governor systems is enhanced by a full line of actuators and controllers for small industrial engines. These APECS (Advanced Proportional Engine Controls System) products provide isochronous or multispeed engine governing through a wide speed range. The complete APECS system consists of a powerful microprocessor-based controller driving a precision proportional actuator, which is connected to the engine's throttle or fuel pump speed lever to precisely control engine speed. APECS controller models are available for isochronous governing of generator sets or compressors, in single- or two-speed control. Other models provide single- or multispeed governing for construction and other industrial applications. They are readily configured using the APECS software calibration tool.

APECS LINEAR ACTUATORS

Woodward APECS linear actuators provide proportional fuel control for construction, industrial, and agricultural equipment, forming the foundation of full electronic governing systems. These actuators are suitable for speed govern-

ing on generator sets, forklifts, pump sets, wood chippers, pleasure boats, and many types of off-road vehicles.

→ Ball bearing design for reduced friction and more precise engine control

→ Designed to minimize heat buildup, resulting in consistent force and improved position repeatability

- Push or pull actuation
- Spring return to minimum fuel
- Mount in any position



APECS 0175

This diameter spring-return actuator provides proportional fuel control for construction, industrial, and agricultural equipment.

- Net force / 17.8 N (4.0 lbf)
- Stroke / 20.3 mm (0.8") max.



APECS 0225

Ball bearing design of the APECS 0225 linear actuator reduces friction and delivers more precise engine control.

- Net force / 28.9 N (6.5 lbf)
- Stroke / 26.03 mm (1.02") max.



APECS 0275

APECS 0275 linear actuators provide precision fuel control of diesel, gasoline, or natural gas engines.

- Net force / 57.8 N (13.0 lbf)
- Stroke / 26.03 mm (1.02") max.

	Direction		Force ⁺		Torque			Work		Travel	Controller
	Linear	Rotary	N	lbf	N-m	Lb-ft	Oz-in	J	Ft-lb		
APECS 0175	•	-	17.8	4.0	-	-	-	0.4	0.3	0.8" 20.32 mm	All *
APECS 0225	•	All *	28.9	5.6	-	-	-	0.34	0.25	1"	All *
APECS 0275	•	-	57.8	9.7	-	-	-	0.68	0.5	25.4 mm	

• = Standard + = Force at 25 °C, nominal voltage, maximum recommended operating travel * = Except EPG controllers



APECS ROTARY ACTUATORS

Woodward's DYNA line of rotary actuators for engines offers many choices of torque ranges – from 0.066 Nm of the small GBA actuator to 7.3 Nm of the large DYNA 8400 actuator. All

DYNA actuators are unidirectional (electrically driven in one direction and spring-returned in the opposite direction) and are available in clockwise and counterclockwise rotations.

EPG ROTARY ACTUATORS

Electrically powered governor systems are designed for precise speed control of diesel, gas, gasoline engines, and gas turbines.



DYNA 7000

The DYNA 7000 actuator is suitable for gasoline, natural gas, and diesel engines. On carbureted and throttle body applications, a direct connection between actuator shaft and butterfly shaft is possible, thus eliminating external linkage.

DYNA 8000 SERIES

Paired with a Woodward controller, DYNA 8000 actuators ensure precise isochronous or droop speed control of medium-sized engines depending on the type of fuel system used. Applications: speed and power control of piston, gas turbine engines, steam and water turbines.

GBA (Golf ball actuators)

The GBA is a laminated, electric actuator that accurately controls fuel flow in diesel, gasoline, propane, and natural gas engines. Roughly the diameter of a golf ball, it is suitable for power generation (stationary and mobile gensets) and industrial equipment applications.

EPG SERIES

EPG systems are typically used with linkage connecting them to a throttle or fuel pump and come in three basic output torques: 0.5, 1.7, and 4.0 ft-lbs. The three-component systems include an actuator, an electronic speed control, and a magnetic pickup.

	Direction		Force ⁺		Torque			Work		Travel	Controller
	Linear	Rotary	N	lbf	N-m	Lb-ft	Oz-in	J	Ft-lb		
Dyna 7000	-	•	-	-	0.169	0.12	-	-	-	70°	All *
Dyna 8000	-	•	-	-	1.4	1.0	-	1.2	0.9	35°	All *
Dyna 8200	-	•	-	-	4.07	3.0	-	2.85	2.10	45°	All *
Dyna 8400	-	•	-	-	7.3	5.4	-	5.8	4.3	46°	All *
GBA	-	•	-	-	0.066	-	9.4	-	-	65°	All *
EPG 512/524	-	•	-	-	-	-	-	0.7/1.0	0.5/0.75	30°	EPG
EPG 1712/1724	-	•	-	-	-	-	-	2.0/2.3	1.5/1.7	35°	EPG

• = Standard + = Force at 25 °C, nominal voltage, maximum recommended operating travel * = Except EPG controllers

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ELECTRIC GOVERNING SYSTEMS ACTUATORS AND CONTROLLERS

APECS CONTROLLERS

APECS controllers manage engine speed by adjusting the fuel control lever with an actuator. The core of the system is a powerful microprocessor-based controller that processes the signal received from a speed sensor and compares it to the desired speed setting. These con-

trollers are well-suited for generator sets, compressors/pumps, utility vehicles, and construction equipment

- Compatible with magnetic pickup, coil ignition, magneto ignition, and Hall-effect sensors
- CAN/J1939 bus interface

- Can be used for diesel, gasoline, propane, and CNG
- Compatible with Woodward and other PWM actuators
- Provides engine protection by monitoring engine coolant and oil pressure



APECS 500

The APECS 500 controller combines the convenience of manual adjustments with the flexibility of a computer-based calibration tool. For most applications, APECS 500 can be connected and adjusted with simple hand tools. The APECS 500 single-speed controller is designed to meet the needs of the small genset market where simplicity, ease of operation, and low cost are key features.



APECS 3000

APECS 3000 controllers are isochronous engine governors that control and limit engine speed by adjusting the fuel control lever with a proportional actuator. They are configurable for operation at up to four different speeds. There are no manual adjustments; all features are software configured with the APECS Calibration Tool.



APECS 4500

Advanced electronics in APECS 4500 provide maximum control and optimal engine performance. Adaptive features include autocrank, droop governing, glowplug control, and analog input (remote speed pot). CAN/J1939 bus interface allows communication and diagnostics among engine components. The APECS 4500 controller is integrated into commercial and construction vehicles, and industrial engine systems and compressors by OEMs and industrial plants.

	Position Request / Driver		Speed Signal Input				Terminals			Actuator			
	PWM	CAN	0-5 VDC	4-20 mA	Magnetic Pickup	Igni-tion	Mag-neto	Hall Effect	Screw	Wire Leads	Connec-tor Kit	Rotary*	Linear
APECS 500	•	-	-	-	•	-	-	-	•	-	-	•	•
APECS 3100	•	-	-	-	•	-	-	-	-	•	-	•	•
APECS 3200	•	-	-	-	-	•	-	-	-	•	-	•	•
APECS 3300	•	-	-	-	-	-	•	-	-	•	-	•	•
APECS 3400	•	-	-	-	-	-	-	•	-	•	-	•	•
APECS 4500	•	•	-	-	•	•	•	•	-	-	•	•	•

• = Standard * = Except EPG, L-Series, and F-Series actuators



APECS DPG CONTROLLERS

Woodward DPG digital controllers for diesel- or gas-fueled engines perform across a wide speed range and allow adjustment of set speed and gain with a built-in user interface. Independent programmable proportional, integral, and derivative gains provide custom governor response to

diverse engine applications.

The COMM port provides access to all other controller settings, allowing adaptation to each application during service and initial configuration. Internal FAILSAFE reacts instantly to loss of

engine speed signal and allows the actuator to return to minimum fuel.



DPG 2100

Isochronous engine control: DPG 2100 controllers offer exceptional performance in an economical package. All are fully digital and software configurable and permit manual speed and gain pot adjustments. Connector options are 7-wire Euro or 12-pin Molex. Speed sensor options are magnetic pickup or ignition sensor.



DPG 2200

Isochronous or droop control: All adjustments on DPG 2200 controllers may be either software programmable or manually adjusted. Droop speed control, two discrete speeds, and a dedicated input for isochronous load sharing are available on all models in the series. Analog signal input on Model 2223 allows variable speed adjustment. Connections are 13-wire Euro.



DPG 2300

Off-highway applications: DPG 2300 controllers combine analog signal input and two discrete speeds into one unit. Pedal hold feature locks in desired speed of analog signal. Connections are 13-wire Euro. Speed sensor options are magnetic pickup or ignition sensor.

	Position Request / Driver		Speed Signal Input				Terminals		Actuator				
	PWM	CAN	0-5 VDC	4-20 mA	Magnetic Pickup	Ignition	Magneto	Hall Effect	Screw	Wire Leads	Connector Kit	Rotary*	Linear
DPG 2101	•	-	-	-	•	-	-	-	•	-	-	•	•
DPG 2145	•	-	-	-	-	•	-	-	-	•	-	•	•
DPG 2146	•	-	-	-	-	•	-	-	•	-	-	•	•
DPG 2155	•	-	-	-	•	-	-	-	-	•	-	•	•
DPG 2201	•	-	-	-	•	-	-	-	•	-	-	•	•
DPG 2223	•	-	-	-	•	-	-	-	•	-	-	•	•
DPG 2302	•	-	-	-	•	-	-	-	•	-	-	•	•
DPG 2345	•	-	-	-	-	•	-	-	•	-	-	•	•

• = Standard * = Except EPG, L-Series, and F-Series actuators

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INTEGRATED ELECTRONIC GOVERNORS ROTARY BIDIRECTIONAL LAT ACTUATORS

Woodward's rugged L-Series, F-Series, and ProAct electronic actuators have the onboard software and intelligence to control and monitor many engine functions. These actuators are high-speed actuators based on the limited angle torque actuation technology. These Woodward actuators have no gear train and few moving parts. The L-Series, F-Series, and ProAct actuators are extremely durable, smart actuators that can be used in a variety of engine-mounted applications. They can be controlled by a variety of signal inputs, including CAN protocols, PWM, mA, and voltage inputs.



F-SERIES

The F-Series modular actuator is a robust, bidirectional, electrical actuator with integral drive. It is designed to be engine-mounted for various position control functions on reciprocating engines used in industrial and on-highway service. Due to the minimal number of moving parts, the actuator provides long-life performance and withstands high vibration.

Position control application examples can include:

- Fuel rack positioning
- Throttle valve positioning
- Active waste-gate valve positioning
- Compressor bypass valve positioning
- Compressor recirculation valve positioning
- Other engine position control functions



PROACT (PISC)

The ProAct™ Integrated Speed Control (PISC) is an electric actuator with an integrated electronic driver capable of diesel or gas engine speed control or positioning tasks. It can be mounted on-engine to control a diesel fuel rack, gas throttle, compressor bypass, or compressor recirculation via integrated throttle body.

The PISC control accepts a speed input from an MPU and can accept a position command signal from another device in the system such as an engine control module.



L-SERIES

These rotary bidirectional actuators are fully integrated actuators available in three versions: a basic positioner, speed control, and process control. Commonly used by both OEMs and aftermarket, its many built-in features using digital, analog, and sensor inputs allow implementation in a wide variety of engine control strategies. It is easily programmable with a PC and downloadable software.

L-Series offers speed control with software-selectable speed set-points, multiple dynamics including five-point dynamic curves, fuel limiting, and start-stop behavior. Besides the traditional bracket mount using external linkage, the L-Series speed control

is available in a variety of mechanical configurations, including one integrated into a rotary diesel fuel pump, one integrated with a throttle body or a throttle body-mixer combination and one as a gas fuel trim valve. The externally mounted systems can be configured for clockwise or counter-clockwise (standard) shaft rotation for increasing fuel.

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HYDRAULIC-MECHANICAL GOVERNORS FOR ENGINES

Woodward hydraulic-mechanical governors provide reliable and precise control of engine speed and output in virtually every type of engine application. Available in work output ratings from 10.8 in-lbs up to 500 ft-lbs, Woodward governors are used in power generation, marine, pump, compression, and vehicle applications.



UG-25+ GOVERNOR

The universal governor UG-25+ is a microprocessor-controlled, mechanical-hydraulic amplified governor for controlling diesel, gas, or dual-fuel engines, and steam turbines. The governor offers enhanced control capabilities, such as start fuel and boost limiting schemes. The additional transient fuel limiting (jump rate) improves the engine load acceptance and reduces transient emissions significantly.

The UG-25+ offers a fast-acting and high-work-output governor without the need for any auxiliary devices such as a start booster.



PSG GOVERNOR

The PSG governor is a pressure compensated, speed-droop or isochronous governor for controlling the speed of small diesel, gas, and gasoline engines, or small steam or industrial gas turbines. The governor is used to control engines or turbines driving alternators, DC generators, pumps, or compressors.

The PSG governor provides hydraulic-powered travel in the increase-fuel direction only. A return spring is used to provide travel in the decrease-fuel direction. The standard PSG cover provides for a vertical return spring in the governor. Governor models are available with horizontal return springs, or the governor can be fitted with a customer-supplied external return spring.



SG GOVERNOR

The SG governor is a hydraulic speed droop type governor used on small diesel, gas, or gasoline engines where isochronous (constant speed) control is not required. The design of the speed droop governor is such that the governor operates at a slower speed as engine load increases. It is through this characteristic that stability of the governed system is achieved, and division of load between paralleled units made possible.

SG governors are available with 10.8 or 21.7 in-lbs (1.2 or 2.5 J) of work capacity over 36° of terminal shaft (output) travel.



EGB GOVERNOR

The EGB governor/actuator is used with Woodward analog or digital electronic controls that provide a proportional 20–160 mA signal to control dual-fuel, diesel, and gasoline engines, and gas and steam turbines driving electrical or mechanical loads.

The governor/actuator is available for outputs of 1, 2, 10, 13, 29, 35, 58, 200, and 300 ft-lbs (1.4, 2.7, 14, 18, 39, 47, 79, 271, and 407 J) work capacity to position fuel racks or linkage. The self-contained hydraulic oil supply makes the governor easy to maintain in almost any installation environment.

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ELECTRONIC CONTROLS ENGINE, GAS AND DIESEL

Woodward is a market and technology leader in the manufacture of prime mover controls from high-quality analog controllers to custom programmed or pre-programmed digital controllers. Our controllers are used in power generation, gas compression, marine propulsion, locomotives, and mobile and industrial equipment.

ANALOG

Long established as one of Woodward's most successful speed control options, the 2301A and 2301A LSSC products

control the speed and load of diesel or gas engines, or steam or gas turbines. For OEM applications, consider the

advantages of modern digital technology, including the 2301D controls.



2301A SPEED CONTROL

The 2301A speed control manages the speed or load of diesel or gas engines, or steam or gas turbines. The unit provides control in the isochronous mode, with droop available through an externally wired potentiometer. The isochronous mode is used for constant speed of the controlled prime mover as long as it is able to provide power to satisfy the load.



2301A LOAD SHARING AND SPEED CONTROL (LSSC)

Woodward's 2301A load sharing and speed controls are designed for use in electric generator systems where multi-unit load sharing is desired. 2301A controls may be used with diesel, gas, or gasoline engines, and steam or gas turbines.

Automatic, adjustable start fuel limiting regulates the maximum fuel setting while the engine is starting. This helps decrease emissions and engine wear. Each 2301A control has a self-contained load sensor. Most models provide a 0–200 mA output signal, designed to control Woodward EG, EGB, PB, TM, and 2301 actuators. 0–20 mA output is available for special applications. The output signal is proportional to the fuel setting needed to attain the desired speed/load. Position feedback from the actuator is not required.



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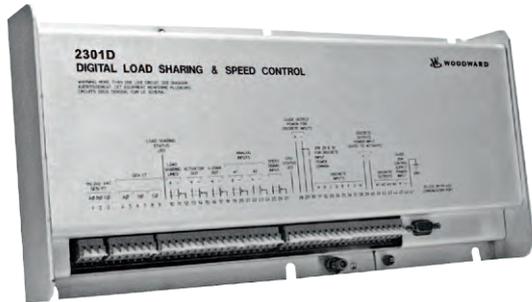
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PRE-PROGRAMMED

Woodward offers a variety of speed, speed/load, and detonation detection controls for use on electric generator systems, pumps, and off-highway vehicles.

PROGRAMMABLE

Woodward's programmable digital controls are used to develop and deploy customer-specific control strategies with a Windows-based, block-oriented software program.



2301D / 2301D-EC DIGITAL LOAD SHARING AND SPEED CONTROLS

The 2301D digital load sharing and speed control is used in electric generator systems for which load sharing is desired. It can be used with diesel or gas engines, or steam or gas turbines and is compatible with all Woodward electronic controls. This control utilizes a 376 processor-based speed control and provides a single serial port for PC communications. The digital design eliminates the use of potentiometers for tuning and load control.

The 2301D-EC is capable of communicating using a Modbus® RTU protocol, functioning as a Modbus slave device, via RS-232 or RS-422 drivers.

® Modbus is a trademark of Schneider Automation Inc.

723PLUS DIGITAL CONTROLS

The 723PLUS digital control manages and controls reciprocating engines (gas, diesel, or dual-fuel) used in power generation, marine propulsion, and industrial engine and process markets. Standard application software is available which provides a variety of off-the-shelf control solutions for these markets.

Custom programming of the 723PLUS can provide specialized functions in process, generator plant, engine, and marine applications. The custom version may be a variation of standard control software or totally new. The custom version may be used as a unit control or as a system control for such things as sequencing, load shedding, heat recovery management, and system monitoring and alarming.

THROTTLE AND MIXER SYSTEMS

INTEGRATED THROTTLE BODY (ITB) ACTUATORS

Woodward's integrated throttle body actuators for gas engines are a direct combination of F-Series, L-Series, or ProAct actuators with a diecast aluminum throttle body. The integration of throttle and actuator results in excellent transient response and stability, and requires no hydraulics, pneumatics, or gear train. The ITB offers an efficient, long-lasting, and easily installed throttle option.



L-SERIES ITB

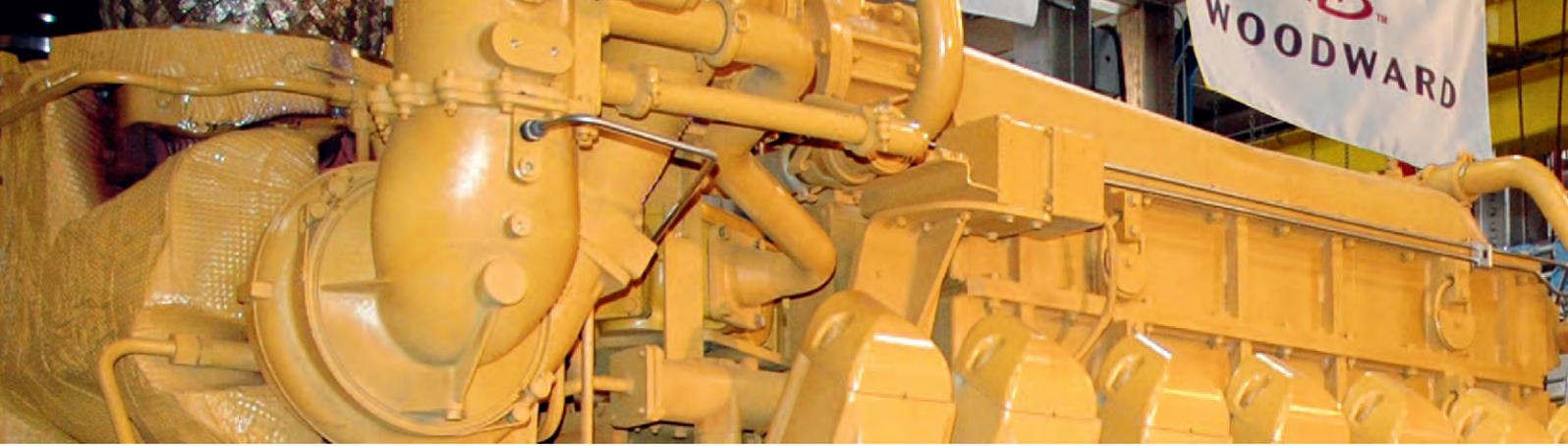
L-Series ITBs integrate an L-Series actuator with a throttle body of 25 mm, 30 mm, 36 mm, 43 mm, or 50 mm bore size. Versions are available for speed control, position control, and air-fuel control. L-Series ITBs are designed for use in generator sets, welders, portable refrigeration units, irrigation pumps, chipper shredders, and mobile industrial gas or gasoline reciprocating engines.



LC-50 MIXERS

The LC-50 integrates a gas mixer and throttle body with the L-Series speed control. The venturi mixer is available as an open-throat or crossbar throat design in sizes of 25 mm, 30 mm, 36 mm, 43 mm, or 50 mm. The LC-50 is designed for use on gas-fueled industrial engines between 5 and 100 kW (7 and 134 hp).

Applications include power generation, refrigeration units, pumps, irrigation, and mobile industrial equipment. The mixer can be used with propane and natural gas and requires a zero pressure regulator. The LC-50 can be programmed via the RS-232 port of a PC or laptop to a variety of configurations.



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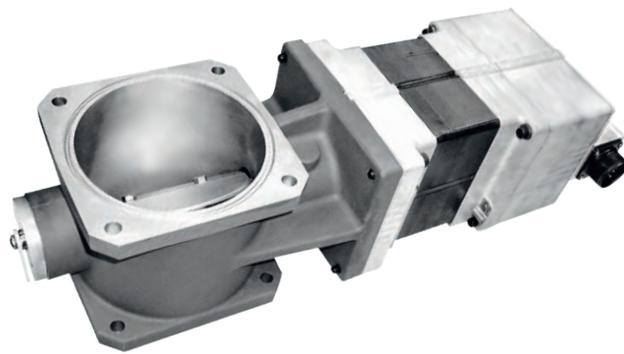
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F-SERIES ITB

F-Series ITBs integrate an F-Series actuator with a throttle body of 48 mm, 60 mm, or 68 mm bore size to cover a wide range of engines. F-Series ITBs are designed to operate on air and gases ranging from pipeline quality natural gas to specialty gas (such as landfill, digester, or other biogases). Long-lasting, small size, easy to install throttle option.

The F-Series ITBs are butterfly valves electrically actuated by an F-Series actuator to control flow output. Flow is a function of inlet and outlet pressure, throttle size, and throttle position. Throttle position is proportional to the position demand. The actuator drives the 0–70 degree output shaft to the demanded position based on an internal shaft position sensor.



PROACT ITB

ProAct Integrated Throttle Bodies (ProAct ITBs) are butterfly valves electrically actuated by ProAct Analog and ProAct Digital Plus actuators to control flow output. With bore sizes ranging from 85 mm to 180 mm, these ITBs are designed for use with engines in the 1 to 2 MW range. The ProAct actuators are electromagnetic, 75 degree-of-travel devices, and therefore alleviate the problems associated with linkages on gas engines (such as setup, non-linearity, and wear). This direct combination of throttle and actuator results in excellent stability and transient characteristics, and requires no hydraulics, pneumatics, or governor gear train.

The ProAct ITB is designed to throttle air or air/fuel for gas engines. This system is designed for direct replacement of traditional throttle valves and requires no linkage between valve and actuator.

AIR-FUEL CONTROLS OPTIMIZING EMISSIONS, EFFICIENCY, RELIABILITY, PERFORMANCE, AND VALUE

Woodward air-fuel ratio control solutions range from the L-Series A/F control working in conjunction with a three-way catalyst to the E3 systems comprised of an E3 controller, inlet air throttle, fuel trim valve, and oxygen sensor for all-encompassing engine and emissions control. Woodward's air-fuel ratio control solutions accommodate either small to medium-sized gas engines using single-point, mixture-charged gas admission technology or large gas engines depending on port inlet gas admission valves.



L-SERIES A/F RATIO CONTROL

This control is a microprocessor-based air/fuel ratio control for four-stroke, gas-fueled engines operating with a near-stoichiometric air-fuel ratio. It is designed to work in conjunction with a three-way catalytic converter to efficiently reduce exhaust emissions.

The L-Series A/F with an LC-50 mixer with standard production (stoichiometric) fuel hole sizes will allow closed-loop stoichiometric operation with gaseous fuels from low-quality pipeline natural gas to HD-5 lpg (propane). The A/F Ratio Control and standard LC-50 configurations for mixer sizes 25 mm, 30 mm, 36 mm, 43 mm, and 50 mm will accommodate the full range of fuel types and fuel qualities.

- Fully integrated control and trim valve
- Reduced wiring and installation time
- Compatible with natural gas or propane or both
- Does not use vacuum hoses
- Easy setup and tuning using PC-based service tool
- Tamper-resistant
- Discrete output for fault indication
- Voltage output for position indication
- Configurable I/O



E3 SYSTEMS

Woodward E3 systems (all-encompassing engine and emissions control) accurately control the air-fuel ratio to achieve and maintain high engine efficiency and low emissions levels.

Key applications are:

→ Full-authority, mass flow metering air-fuel ratio control, including the blending of two different gas fuels

- Rich- and lean-burn air-fuel ratio trim systems
- Engine retrofit program provides customers with installation, service, and support of engine control system



E3 RICH-BURN

The E3 rich-burn trim control system is designed for the most popular engines used in gas compression and many power generation or irrigation pump applications, where the energy quality of the fuel supply is stable.

The system analyzes and controls all of the functions of an engine and catalyst, and optimizes the amount of time the engine is in compliance. If the engine falls out of compliance the system has the ability to shut down or notify the user of the condition.

E3 LEAN-BURN

The E3 lean-burn trim control system is designed to control lean-burn industrial gas engines used in many power generation, pumping, and other stationary applications ranging from 300 kW to 2,000 kW (400–2,700 hp).

The highly accurate, closed-loop control system helps customers meet regulated emissions levels, while maintaining engine performance over a very large range of fuel qualities.

E3 FULL AUTHORITY

The E3 full authority system is a fully integrated engine control solution with full authority over spark, fuel, and air. Additionally, diagnostics such as detonation and misfire, as well as other health monitoring, are integrated into the system. This fully integrated approach permits precise governing and air-fuel ratio control while remaining flexible enough for large variations in fuel quality.

The system is designed for gas engines used in applications where the energy quality of the fuel supply is variable – such as engines used in landfills, wastewater treatment plants, or bio-gas recovery plants.

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GAS ENGINE IGNITION SYSTEMS

IGNITION CONTROLLERS WITH SERVLINK

Woodward's ignition systems offer a solution for all types of modern gas engines. They meet today's requirements for modern gas engines, ranging from smart inductive coil to high-energy AC ignition systems. The IC-920 CD (Capacitive Discharge) and IC-922 ignition systems provide the essential high-energy spark needed for lean-burn engines that operate at higher mean effective pressures and with larger cylinder bore sizes.



IC-920 / IC-922 CONTROLLERS

The IC-920 and IC-922 are state-of-the-art capacitive discharge ignition system controllers especially designed for spark-ignited engines used in gas compression, electric power generation, and other industrial applications. The IC-920 controller provides standard-strike energy for up to 20 ignition coils, with an option for up to 24 coils available.

The IC-922 controller provides “big-strike” energy for up to 20 (or optionally 24) coils. The big-strike capability is well-suited for high-BMEP or other engines that are prone to misfire.

The IC-920 and IC-922 ignition controllers feature user-controlled energy levels, advanced diagnostics, and an RS-232 ServLink interface for easy programming with a Windows-based

service tool. The controller system consists of a 16-bit CPU, sensor signal conditioning circuitry, a high-voltage power supply, and 20 (or optionally 24) outputs. The system can be configured from two cylinders to 20 (or 24) cylinders. The unit software can be configured for any type of industrial engine.

KEY

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Imprint

Publisher

Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart, Germany
Phone: +49 711 7 89 54 0
Fax: +49 711 7 89 54 100

Woodward Kempen GmbH
Krefelder Weg 47
47906 Kempen, Germany
Phone: +49 2152 145 1
Fax: +49 2152 200

www.woodward.com

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CONTACT INFORMATION

Region	Phone	E-Mail
North & Central America	+1 970 962 7331	SalesPGD_NAandCA@woodward.com
South America	+55 19 3708 4800	SalesPGD_SA@woodward.com
Europe Kempen	+49 2152 145 331	SalesPGD_EUROPE@woodward.com
Stuttgart	+49 711 78954 510	
Middle East & Africa	+971 2 6275185	SalesPGD_MEA@woodward.com
Russia	+7 812 319 3007	SalesPGD_RUSSIA@woodward.com
China	+86 512 8818 5515	SalesPGD_CHINA@woodward.com
India	+91 124 4399 500	SalesPGD_INDIA@woodward.com
ASEAN & Oceania	+49 711 78954 510	SalesPGD_ASEAN@woodward.com

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