Power Control Solutions for Marine Applications

MANAGE YOUR POWER REQUIREMENT AT SEA WITH ONE SYSTEM

• Synchronization
• Start/stop
• Engine and generator monitoring
• One set of PTs and CTs for multiple purposes
• Breaker status monitoring

Local/remote control
Front mounting or back panel mounting with remote display available

CAN and ModBus communication link
• Supports Woodward or third-party I/O extensions
• Supports Woodward or third-party displays

Load control strategy by PMS to easYgen
Start/stop command by PMS through easYgen communication link or automatic start/stop based on load demand

Communication with LS-5 for complex network segmentation with feeder/tie breakers
One communication link between PMS and generator set for all engine and generator information leading to less components for the power plant. The easYgens share operating variables with the PMS including:
• breaker status
• active and reactive power, power factor
• voltage, current, and frequency on all three phases
• Engine sensor values like oil pressure, coolant temperature (via CAN J1939)

Load sharing
Same unit can be used for a wide range of engines
Application note available for engine integration with CAT ADEM, MAN SaCos, MTU ADEC, …*

CAN J1939 communication with ECU
External engine-derating

For Switchgear Builders
For Power Management System Designers
For Engine and Generator Set Suppliers
www.woodward.com

PM: mains propulsion // TB: tie breaker // FB: feeder breaker // GB: generator breaker

Meets your DP / DP3 requirements and engine control
Commissioning by a single Woodward trained engineer for the whole power plant

Worldwide support network
• Europe, Middle East, and Africa
• North, Central, and South America
• Russia, China, and India
• ASEAN and Oceania

The most experience in power generation in the marine market
Independent supplier

For Shipyard and Ship Owners

LS-5

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Dependent supplier

WORLDWIDE SUPPORT NETWORK

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*See product specification 37533 on www.woodward.com for more information
Command Your Complex Application

**DESCRIPTION**

- The complex system selected for this application ensures that one power source failure does not result in total loss of power.
- The easYgen and LS-5 system is easily configurable and does not require any expert intervention.
- Modules communicate individually through CAN. They provide CAN/RS485/RS232 communication interfaces for the modules to serve the PMS by providing relevant data (e.g., breaker status, alarms, measurements, bus bar status, engine status, and much more).
- The easYgens guide the generator and serve the generator circuit breaker while LS-5 units control feeder or tie-breakers.
- This application can be implemented with easYgen genset controllers in conjunction with LS-5 circuit breaker control.
- This complex system taken from a real application ensures that one power source failure does not lead to total loss of power.

**APPLIcATIONS FOR MARINE**

- easYgen™-3400/3500 Marine
- LS-511/521 Marine
- RP-3000 Marine

**ACCESSORIES**

- Multilingual HMI (Up to 11 languages)
- Advanced communication (CANopen, J1939)
- Capability for remote panel
- Supporting up to 16 LS-5
- Event logger
- System overview display
- Load-dependent start/stop
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Stand-alone mode without easYgens.
- Applications can be extended to genset control for providing auxiliary power or emergency power.
- Interacting with up to 16 external breaker controls (LS-5). Applications can be extended to genset control for providing auxiliary power or emergency power.
- Common applications include isochronous parallel operation of up to 32 gensets. Common applications include isochronous parallel operation of up to 32 gensets.
- The easYgen-3400/3500 Marine is available in two mounting styles: The back-panel- and panel-mounted easYgen-3400 Marine has sealed soft keys and a large, easy-to-read back-lit display door. The integrated logicsManager links internal states and input references via CAN bus to the easYgen-3400/3500 genset controllers. Wiring eforts are reduced to a minimum, since only one CAN bus connection is required between applications.
- The LS-5 Marine series is available in two mounting styles: The back-panel-mounted LS-511 Marine with sealed soft keys and a convenient, easy-to-read back-lit display door.
- The LS-511/521 Marine is designed to enable complex power management applications especially designed for marine applications by Woodward and can be customized for any specific application.

**RP-3000 Marine**

- Enables convenient commissioning
- Woodward service tool "ToolKit" enables convenient commissioning
- Event logger
- System overview display
- Load-dependent start/stop
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Stand-alone mode without easYgens.

**Additional Features**

- Eight configurable LEDs in back panel variant
- Multilingual HMI (Up to 11 languages)
- Configurable to work as a stand-alone unit
- Configurable breaker reclose timer
- Event logger
- System overview display
- Load-dependent start/stop
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Stand-alone mode without easYgens.

**RP-3000 Marine**

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- Advanced communication (CANopen, J1939)
- Capability for remote panel
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- Event logger
- System overview display
- Load-dependent start/stop
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- Soft load/unload of generator
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- Stand-alone mode without easYgens.
Complex Application

Command Your

The easYgen and LS-5 system is easily configurable and does not require any expert intervention. Modules communicate individually through CAN. And they provide CAN/RS485/RS232 communication interfaces for the modules may serve the PMS by providing the relevant data (e.g. breaker status, alarms, measurements, bus bar status, engine status, and much more).

This application can be implemented with easYgen genset controllers in conjunction with LS-5 circuit breaker control. This complex system taken from a real application ensures that one power source failure does not lead to total loss of the network.

PM: mains propulsion // TB: tie breaker // FB: feeder breaker // GB: generator breaker

OVERVIEW OF FEATURES

- Multi-language HMI (Up to 11 languages)
- Advanced communication (CANopen, J1939)
- Support of up to 16 LS-5 and easYgen-3400/3500 controllers
- Event logger
- System overview display
- True RMS measurement
- Load-dependent start/stop
- Configurable monitoring
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Multiple segment and bus breakers in combination with easYgen-3400/3500 configuration
- The LS-5 Marine series is available in two mounting styles: The back-panel-mounted LS-511 Marine with aluminum-powder-coated housing for use in harsh environments or confined spaces, while the lush-mounted LS-521 Marine with sealed soft keys and a convenient, easy-to-read back-lit display.

The RPM allows to easily troubleshoot common problems and reduce maintenance costs.

FLEXIBILITY

The low-profile DIN rail kit is available in any mounting style. The remote panel can be mounted on the easYgen-3500 Marine. For an application in marine environments, a sealed version is available. Each panel can be connected to up to 32 gensets or other power sources. The LS-5 devices manage synchronization, loading, and unloading on each bus segment, and send the required voltage and frequency signals with logical operators and time elements to implement complex control tasks. Furthermore, with connectivity to LS-5, it gives you control over circuit protection package with all the flexibility and features needed to fit into a wide range of power generation applications. It allows the user to be centralized on a single, affordable control for many uses – from stand-alone emergency generators to the isochronous parallel operation of up to 32 gensets. Common applications include load share module (LSM), LSM with synchronizer, and LSM with synchronizer interacting with up to 16 external breaker controls (LS-5). Applications can be extended to genset control for providing auxiliary power in emergency power.

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The easYgen and LS-5 system is easily configurable and does not require any expert intervention. Modules communicate individually through CAN, and they provide CAN/RS485/RS232 communication interfaces for the PMS system. The PMS fulfills the supervisory function; monitoring, control, and protection functions are fulfilled by the PMS. The modules may serve the PMS by providing the relevant data (e.g., breaker status, alarms, measurements, bus bar status, engine status, and much more).

The easYgens guide the generator and serve the generator circuit breaker while LS-5 units control feeder or tie-breakers. The remote panel connected to the easYgens helps remote visualization, control, and troubleshooting. This application can be implemented with easYgen genset controllers in conjunction with LS-5 circuit breaker control modules and remote panels (if need be).

This complex system taken from a real application ensures that one power source failure does not lead to total loss of power supply. The LS-511/521 Marine is designed to enable complex power management applications with multiple regions and breakers in combination with synchronous or stepwise-equipped power controllers. The LS-5 devices manage synchroneous function, tripping, and uncleasing on each bus segment, and send phase/voltage, current, and frequency signals via CAN to the appropriate asynchronous power controller. Waveform are reduced to practical limits. Input, output, and control signals are transmitted between all LS-511/521 network nodes in the tie breaker used as a sync-check relay to avoid one single module failure.

### LS-511/521 Marine

**Multilingual HMI (Up to 11 languages)**

**Advanced communication (CANopen, J1939)**

**Capability for remote panel**

**Support of up to 16 LS-5 and easYgen-3400/3500 controllers**

**Event logger**

**System overview display**

**Load-dependent start/stop**

**Synchronizer and sync-check function**

**Soft load/unload of generator**

**Isochronous load sharing (up to 32)**

**Automatic segment control**

**Supports manual breaker closing**

### LS5 Marine

**CE, UL/cUL, CSA, ABS, BV, DNV, GL, LR**

**Conformity and cognizability**

**CE, VDE, IEC, AS, EN, UL**

**ERP**

**For applying established principles and methods for examination**

### EXPANDABILITY

- Eight configurable LEDs in back panel variant
- Multilingual HMI (Up to 11 languages)
- Conﬁgurable to work as a stand-alone unit
- Event logger
- Conﬁgurable to work as a stand-alone unit
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Automatic segment control
- Supports manual breaker closing
- Color display
- Overview of features

### OVERVIEW OF FEATURES

- Synchronizer and asynchronous function
- 16 configurable inputs (e.g., accelerometers)
- 8 configurable outputs (e.g., valve actuators)
- Configurable tripping voltage levels
- Configurable control function
- Configurable control function
- Knowledgeable that each & 39 & s language
- Error communication @ the required level for easy maintenance
- Displays
- • measurement values
- • alarms
- • trends
- • settings
- • event logger
- • features

### RP-3000 Marine

**The RP-3000 is a remote control and annunciator panel for use in combination with other processors.**

**Features**

- Measurement of voltage, current, frequency, and phase
- Event logger
- System overview display
- Load-dependent start/stop
- Synchronizer and sync-check function
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Automatic segment control
- Supports manual breaker closing
- Color display

**Overview of features**

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The easYgen and LS-5 system is easily configurable and does not require any expert intervention. Modules communicate individually through CAN. And they provide CAN/RS485/RS232 communication interfaces for the network.

The modules may serve the PMS by providing the relevant data (e.g. breaker status, alarms, measurements, bus bar status, engine status, and much more). This application can be implemented with easYgen genset controllers in conjunction with LS-5 circuit breaker control units. This complex system taken from a real application ensures that one power source failure does not lead to total loss of the PMS system. The PMS fulfills the supervisory function; monitoring, control and protection functions are fulfilled by the modules and remote panels (if needed).

The easYgen-3400/3500 Marine is available in two mounting styles: the back-panel-mounted easYgen-3400 Marine has a rugged aluminum chassis for use in harsh environments or confined spaces, while the lush-mounted easYgen-3500 Marine has sealed soft keys and a large, easy-to-read back-lit display. The integrated logicsManager links internal states and input signals with logical operators and time elements to implement complex control tasks. Furthermore, with connectivity to LS-5, it gives you control over circuit breakers configured in various structures.

The back-panel-mounted easYgen-3400 Marine has a back-lit display. The integrated logicsManager links internal states and input signals with logical operators and time elements to implement complex control tasks. Furthermore, with connectivity to LS-5, it gives you control over circuit breakers configured in various structures.

The LS-511/521 Marine is designed to enable complex power management applications especially designed for marine applications by the service engineer. Pages especially designed for marine applications by the service engineer. Pages especially designed for marine applications by the service engineer.

The RP-3000 Marine allows remote control and remote diagnosis. It can be used as a sync-check relay in extended to genset control for providing auxiliary power or emergency power. The RP-3000 Marine allows remote control and remote diagnosis. It can be used as a sync-check relay in extended to genset control for providing auxiliary power or emergency power.

### Overview of Features
- Annunciation one or multiple easYgens
- Configuration of easYgen
- Event logger
- System overview display
- Color display
- Multilingual
- Alarm acknowledged
- Soft load/unload of generator
- Isochronous load sharing (up to 32)
- Synchronizer and sync-check function
- Event logger
- Conﬁgurable breaker reclose timer
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Your Benefits

For Switchgear Builders

- Minimum wiring
- One unit for multiple purposes
  - Synchronization
  - Start/stop
  - Engine and generator monitoring
  - Breaker status monitoring
- Local/remote control
  - Front mounting or back panel mounting with remote display available
  - CAN and ModBus communication link
    - Supports Woodward or third-party I/O extensions
    - Supports Woodward or third-party displays
- CAN and ModBus communication to easYgen
  - Start/stop command by PMS through easYgen communication link or automatic start/stop based on load demand
  - Communication with LS-5 for complex network segmentation with feeder/tie breakers
  - One communication link between PMS and generator set for all engine and generator information leading to less components for the power plant. The easYgens share operating variables with the PMS including:
    - Breaker status
    - Active and reactive power, power factor
    - Voltage, current, and frequency on all three phases
    - Engine sensor values like oil pressure, coolant temperature (via CAN J1939)

For Shipyard and Ship Owners

- Meets your DP/LRC requirements
- Single supplier for generator and switchgear
- Commissioning a single Woodward-based system
- Woodward supplier support
  - For marine propulsion and shaft
  - For Marine and Fixed Offshore
  - For Marine and Onshore
- The most experience in power generation in the naval valve industry
  - Independent supplier

* For Switchgear Builders, Power Management System Designers, and Engine and Generator Set Suppliers

For Engine Owners

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- Woodward supplier support
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FURTHER INFORMATION

Please visit www.woodward.com or contact us for further product-related information.

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<td>Generator Set 3400/3500 Marine</td>
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<td>51458B</td>
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<td>LS-511/521 Marine</td>
<td>37545 37542</td>
<td>51458B</td>
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<tr>
<td>RP-3000</td>
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