





easYgen[™]-3400/3500 Marine

Genset Control for Marine Applications

DESCRIPTION

The easYgen-3400/3500 Marine is an exceptionally versatile genset control and protection device 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. The easYgen can be configured for different application levels and responsibilities:

- · As Load Share Module only
- As Load Share Module with Synchronizer
- As Load Share Module with (or without) Synchronizer interacting with up to 16 external breaker controls (LS-5)
- As Genset Control with load dependent Start / Stop for auxiliary generators
- As Genset Control for Emergency-Run-Generators.

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 flush-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 helps you command your complex application.

FEATURES

- Provides full connectivity to Woodward`s LS-5 breaker protection and control devices to enable complex power control applications with multiple feeder and bus breakers. 16 LS-5 units can be used in total in combination with up to 32 easYgens in one application.
- In case transformers are used in the application, configurable voltages and vector group adjustment is available for the synchronization process.
- Run-up synchronization is available to get several synchronous generators onto the load in a
 very short time. Using the innovative run-up synchronization method allows the generator and
 transformer to build up voltage gradually through the start without producing large in-rush currents.
- Breaker control: Slip frequency / phase matching synchronization, open-close control, breaker monitoring
- Load transfer features: open / closed transition, interchange, soft loading / soft unloading.
- Remote control via communication interface and discrete/analog inputs for adjusting speed, frequency, voltage, power, reactive power, and power factor set points
- Individual configurable engine and generator protections
- Special Scania S6, MTU ADEC, Volvo EMS2 & EDC4, Deutz EMR2, MAN MFR/EDC7 & SaCos, CAT ADEM, SISU EEM, Cummins and Woodward E3 ECU support
- Configurable trip levels / delay timers / alarm classes for monitoring and protective functions
- Clear text display and evaluation of up to 100 J1939 analog values
- Discrete and analog I/O expansion board connectivity (Woodward IKD 1 or Phoenix Contact IL series)
- Multi-lingual capability (English, German, French, Spanish, Chinese, Japanese, Italian, Portuguese, Turkish, Russian, Polish, Slovak)
- Dual/redundant generator breaker feedback monitoring
- PC-Tool with marine application specific pages: System Overview Display, Trending Tool, Load Share Configuration

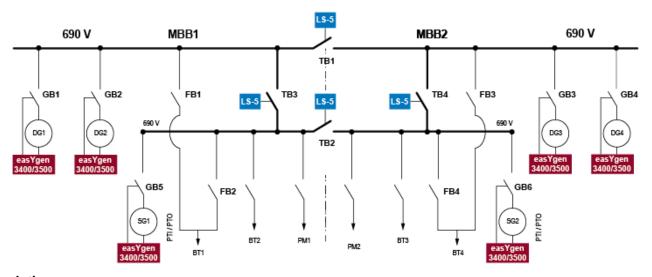
- Load dependent start/stop of up to 32 units
- Isochronous load sharing between units
- Soft load/unload of generator
- Synchronizer and sync-check function
- Engine and generator monitoring
- Configurable start/stop command
- One communication link between PMS and generator set
- Advanced communication (CANopen, J1939)
- Support of up to 16 LS-5
- Event logger
- Capability for remote panel
- Multilingual HMI
- DNV, GL, BV, ABS, and LR marine approved
- Automatic Segment Control
- Stand-by operation
- Open/closed transition

SPECIFICATIONS

Power supply	12/24 Vdc (8 to 40 Vdc)
Intrinsic consumption	max. 17 W
Ambient temperature (operation)	20 to 70 °C / -4 to 158 °F
Ambient temperature (storage)	30 to 80 °C / -22 to 176 °F
Ambient humidity	95 %, non-condensing
Voltage	
100 Vac [1] Rated (V _{rated})	69/120 Vac
Max. value (V _{max})	86/150 Vac
Rated surge volt.(V _{surge})	2.5 kV
1 1	277/480 Vac
	346/600 Vac
Rated surge volt.(V _{surge})	4.0 kV
Accuracy Measurable alternator windings 3p-3w	Class 1
Measurable alternator windings 3p-3v	v, 3p-4w, 3p-4w OD, 1p-2w, 1p-3w
Setting range primary	
Linear measuring range	1.25×V _{rated}
Measuring frequency	50/60 Hz (40 to 85 Hz)
High Impedance Input; Resistance per I	
Max. power consumption per path	< 0.15 W
Current (Isolated) Rated (Irated)	
Linear measuring range	$I_{gen} = 3.0 \times I_{rated}$
	$I_{mains/ground} = 1.5 \times I_{rated}$
Setting range	1 to 32,000 A
Burden	< 0.15 VA
Rated short-time current (1 s)	[1] 50×I _{rated} , [5] 10×I _{rated}
Power	
Setting range	0.5 to 99,999.9 kW/kvar
Discrete inputs	isolated
Input range	12/24 Vdc (8 to 40 Vdc)
Input resistance	

Relay outputs			isolated
			AgCdO
			2.00 Aac@250 Vac
2.00	Adc@24 Vdc / 0.3	6 Adc@125 V	/dc / 0.18 Adc@250 Vdc
			/dc / 0.10 Adc@250 Vdc
Analog inputs (nor	ne isolated)		freely scalable
Type	,	0 to	500 Ohms / 0 to 20 mA
			11 Bit
			freely scalable
Type			± 10 V / ± 20 mA / PWM
			100 Vac
			500 Vac
			ending on analog output)
± 10 V (scalable)		interr	al resistance ≤1 kOhms
			naximum load 500 Ohms
Housing	Front panel flush	mounting	Plastic housing
Dimensions	WxHxD		282 × 217 × 99 mm
Front cutout	WxH	249	9 [+1.1] × 183 [+1.0] mm
			//plug terminals 2.5 mm ²
Front			insulating surface
Sealing	Front	IP6	66 (with screw fastening)
	Front	IP5	4 (with clamp fastening)
			IP20
Weight			approx. 1,850 g
Housing	Back panel mou	nting	Sheet metal housing
Dimensions			250 × 227 × 84 mm
			//plug terminals 2.5 mm ²
			IP 20
Weight			approx. 2,150 g
			applicable EN guidelines
Listings			UL, cUL, GOST-R, CSA
Marine[onv, GL, BV, LR (Type Approva	al); ABS (Type Approval)

APPLICATION



Description

- The system taken from a real application, guarantees critical power to bow thruster and mains propulsion in case of a genset failure and thus assures continuous power availability.
- easYgens monitor, control, protect and synchronize gensets on the same segment while LS5s synchronize between the two
 segments and control the tie-breakers.
- LS5 feeds the synchronization parameters to easYgen which in turn controls the engine and generator to match those synchronization parameters and releases a command to LS5 to control the breaker.
- All easYgens and LS5s communicate over CAN bus thus making communication fast and reliable.
- Automatic optimization of number of running gensets through active/reactive load sharing is managed by easYgens.
- The module may serve the PMS by providing the relevant data (e.g. breaker status, alarms, measurements, bus bar status, engine status and many more).

			Serial #2 RS-485 isolated (Interface #2)	3 D	Serial #1 RS-232 isolated (Interface #1)		
	39 40	480 Vac Bus	bar voltage (system 1) L2 N	WAF	Relay [R 01] isolated "1 Fixed to "Ready for operation"	[R 01]	42 41
	38		Busbar voltage (system 1) L1		Relay [R 02] isolated "1 Preconfigured to "Centralized alarm" Relay [R 03] isolated "1	[R 02]	43
	36 37	120 Vac 480 Vac	Consessor vallege N	00	Preconfigured to "Starter" Relay [R 04] isolated 1 Preconfigured to "Fuel solenoid / gas valve"	[R 03]	45 44
	34 35	120 Vac 480 Vac	Generator voltage N	>		530000000	47 46
	33 3	120 Vac	Generator voltage L3	B	Relay [R 05] isolated *1 Preconfigured to "Preglow"	[R 05]	48 4
	31 32	480 Vac 120 Vac	Generator voltage L2		Relay [R 06] isolated "1 Fixed to "Command: close GCB" if GCB activated	[R 06]	50 49
	30	480 Vac	Generator voltage L1	:	Relay [R 07] isolated "1 Fixed to "Command: open GCB" if GCB activated otherwise preconfigured to "Mains decoupling"	[R 07]	51
	28 29	120 Vac 480 Vac	Mains voltage N		Relay [R 08] isolated *1	[R 08]	53 52
	26 27	120 Vac 480 Vac			Fixed to "Command: close MCB" if MCB activated Relay [R 09] isolated *1		55 54
	24 25	120 Vac 480 Vac	Mains voltage L3	-	Fixed to "Command: open MCB" if MCB activated otherwise configured to "Mains decoupling" Relay [R 10] isolated "1	[R 09]	2 56
	23 2	120 Vac	Mains voltage L2		Fixed to "Command: close GGB" if GGB activated otherwise preconfigured to "Auxiliary services" Relay [R 11] isolated "1 Fixed to "Command: open GGB" if GGB activated	[R 11]	58 57
PVVM DC voltage DC current	21 22	480 Vac 120 Vac	Mains voltage L1		otherwise preconfigured to "Alarm class A or B" Relay [R 12] isolated "1 Preconfigured to "Alarm class C, D, E or F"	[R 12]	60 29
8 + 8 + 8 + -	20	-			Protective earth PE *2		61
M S S S	19	[AO 02]			Engine ground	4	62
	17 18	÷/	Analog outputs +/-10 Vdc +/-20 mA PWM		Power supply 8 to 40 Vdc	12/24 Vdc	64 63
MW S S S S			isolated			0 Vdc	9
	5 16	[AO 01]	isolated	į.	Auxiliary excitation isolated	D+	65
	14 15 16	+	isolated				
	13 14 15	+ + [Al 03]	isolated		Common (terminals 67 to 78) Discrete input [DI 01] isolated *1	D+ [DI 02] ***	99 29 89
	14 15	+	Analog inputs 0 to 500 Ohms 0 to 20 mA		Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto	D+	99 29 29
	10 11 12 13 14 15	+	Analog inputs	ne b.orr	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Slart in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1	D+ [DI 01] *** [DI 02] *** [DI 03] *** [DI 04] *** [DI 05] ***	71 70 69 68 67 66 65
	11 12 13 14 15	+ [AI 03] - [AI 02] - +	Analog inputs	arin configured to ,c	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open	D+ [DI 01] **** [DI 02] *** [DI 03] *** [DI 04] ***	70 69 68 67 66 65
	07 08 09 10 11 12 13 14 15	+ [AI 03] - [AI 02] - [AI 01] - [AI 01]	Analog inputs 0 to 500 Ohms 0 to 20 mA	00 Marin 4128 must be configured to 4	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open Discrete input [DI 08] isolated Reply: MCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 09] isolated	D+ [D1 01] **** [D1 02] *** [D1 03] *** [D1 04] *** [D1 05] *** [D1 06] ***	74 73 72 71 70 69 68 67 66 65
	08 09 10 11 12 13 14 15	+ [AI 03] - [AI 02] - [AI 01] - [AI 01] - 13 - 14	Analog inputs	/3500 Marin	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 09] isolated Reply: GCB open Discrete input [DI 09] isolated Reply: GCB open Isolated '15 Fixed to "GSB open" if GGB control activated Discrete input [DI 10] isolated '10 Fixed to "Coad busbar is dead" if GGB control act.	D+ [DI 01] **** [DI 02] *** [DI 03] *** [DI 04] *** [DI 05] *** [DI 06] *** [DI 07] *** [DI 08] *** [DI 08] ***	73 72 71 70 69 68 67 66 65
	06 07 08 09 10 11 12 13 14 15	+	Analog inputs 0 to 500 Ohms 0 to 20 mA	400/3500 Marin	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 09] isolated '1 Fixed to "GGB open' if GGB control activated Discrete input [DI 10] isolated '16	D+ [D1 01] X4 [D1 02] X4 [D1 03] X4 [D1 04] X4 [D1 05] X4 [D1 06] X4 [D1 07] X4 [D1 08] X4 [D1 09] X4	75 74 73 72 71 70 69 68 67 66 65
	02 03 04 05 06 07 08 09 10 11 12 13 14 15	+	Analog inputs 0 to 500 Ohms 0 to 20 mA	400/3500 Marin	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 08] isolated Reply: GCB open Discrete input [DI 09] isolated '1 Fixed to _GGB open' if GGB control activated Discrete input [DI 10] isolated '10 Fixed to _GGB open' is dead' if GGB control act. Discrete input [DI 11] isolated '14 Reply: GCB closed	D+ [DI 01] X A A A A A A A A A A A A A A A A A A	79 78 77 76 75 74 73 72 71 70 69 68 67 66 65
	03 04 05 06 07 08 09 10 11 12 13 14 15	+	Analog inputs 0 to 500 Ohms 0 to 20 mA Generator current isolated	00/3500 Marin	isolated Common (terminals 67 to 78) Discrete input [DI 01] isolated '1 Emergency stop Discrete input [DI 02] isolated '1 Start in Auto Discrete input [DI 03] isolated '1 Low oil pressure Discrete input [DI 04] isolated '1 Coolant temp. Discrete input [DI 05] isolated '1 Alarm acknowledge Discrete input [DI 06] isolated '1 Enable MCB Discrete input [DI 07] isolated Reply: MCB open Discrete input [DI 08] isolated 'Reply: MCB open Discrete input [DI 08] isolated '1 Fixed to _GCB open' if GGB control activated Discrete input [DI 10] isolated '10 Fixed to _GCB open' is dead' if GGB control act. Discrete input [DI 11] isolated '14 Reply: GCB closed Discrete input [DI 11] isolated '14 Reply: GCB closed Discrete input [DI 12] isolated '14	D+ [DI 01] X A A A A A A A A A A A A A A A A A A	78 77 76 75 74 73 72 71 70 69 68 67 66 65



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This document 37533F - 2014/09/Stuttgart

The related manual 37531

FEATURES OVERVIEW

Model Package Measuring Generator voltage (3-phase/4-wire) Generator current (3x true r.m.s.) Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) #1 Busbar voltage (1-phase/2-wire)	P1	3500 Marine
Measuring Generator voltage (3-phase/4-wire) Generator current (3x true r.m.s.) Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) *1	P1	3000 IVIALITIE
Measuring Generator voltage (3-phase/4-wire) Generator current (3x true r.m.s.) Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) *1	·	D1
Generator voltage (3-phase/4-wire) Generator current (3x true r.m.s.) Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) *1	T /	P1
Generator current (3x true r.m.s.) Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) *1		
Mains/Feeder voltage (3-phase/4-wire) Mains or ground current (1x true r.m.s.) *1	✓	√
Mains or ground current (1x true r.m.s.) #1	V ✓	√
	, 	· ·
IDUSUAL VOIIAGE LI-DUASEZZ-WITET	√	· ✓
Control	<u>.</u>	-
Breaker control logic (open and closed transition) FlexApp TM	2	2
Number of supported Woodward LS-5 units	16	16
Automatic, Manual, Stop, and test operating modes	√ ·	√ ·
Single and multiple-unit operation	✓	✓
Paralleling operation (up to 32 units)#2	✓	✓
AMF (auto mains failure) and stand-by operation	✓	✓
Critical mode operation	✓	✓
GCB and MCB synchronization (slipping / phase matching)	✓	✓
GGB (Generator group breaker) control	✓	√
Run-up synchronization	✓	√
Interchange (import / export control)	√	√
Load-dependent start/stop	√	√
n/f, V, P, Q, and PF remote control via analog input or interface	√	√
Load/var sharing for up to 32 gensets	√	√
Freely configurable PID controllers	3	3
HMI		
Color Display with Soft key operation DynamicsLCD™ Chart to be less in first the second of the s		√
Start/stop logic for diesel / gas engines	✓	√
Counters for operating hours / starts / maintenance / active/reactive energy Configuration via PC #3	∨ ✓	▼
Event recorder entries with real time clock (battery backup)	300	300
		300
Protection ANSI Generator: voltage / frequency 59 / 27 / 810 / 81U		✓
Generator: voltage / frequency 59 / 27 / 810 / 810 Generator: overload, reverse/reduced power 32 / 32R / 32F		√
Generator: unbalanced load 46		· ·
Generator: instantaneous overcurrent 50		· ✓
Generator: time-overcurrent (IEC 255 compliant) 51		✓
Generator: ground fault #4 50G	✓	✓
Generator: power factor 55	✓	✓
Generator: rotation field	✓	✓
Engine: overspeed / underspeed 12 / 14	√	✓
Engine: speed / frequency mismatch	✓	✓
Engine: D+ auxiliary excitation failure	✓	✓
Mains/Feeder: voltage / frequency 59 / 27 / 810 / 81U		√
Mains/Feeder: phase shift / rotation field / df/dt 78	✓	√
I/Os		
Speed input (magnetic / switching; Pickup)	√ 10	√ 10
Discrete alarm inputs (configurable)	10	10
Discrete outputs (configurable) LogicsManager™ External discrete inputs (outputs via CAManan (maximum))		max. 12
External discrete inputs / outputs via CANopen (maximum) Analog inputs *5 (configurable) FlexIn TM	32 / 32	32 / 32
Analog outputs (+/- 10V, +/- 20mA, PWM; configurable)	2	2
	16 / 4	16/4
	100	100
External analog inputs / outputs via CANopen (maximum)		3
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs)	3	1/1
External analog inputs / outputs via CANopen (maximum)	1/1	
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s)	1/1	Front panel mounting #7
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s) Part Numbers	1 / 1 Cabinet back mounting	Front panel mounting #7
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s) Part Numbers easYgen-3400 Marine (1A / 5A)	1/1	-
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External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s) Part Numbers easYgen-3400 Marine (1A / 5A) easYgen-3500 Marine (1A / 5A) Spare connector kit	1 / 1 Cabinet back mounting 8440-2044 / 8440-2045 - 8928-7371	8440-2046 / 8440-2047 8923-1314
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s) Part Numbers easYgen-3400 Marine (1A / 5A) easYgen-3500 Marine (1A / 5A) Spare connector kit CANbus based Remote Annunciator: easYlite (Product Spec. # 37279)	1 / 1 Cabinet back mounting 8440-2044 / 8440-2045	8440-2046 / 8440-2047 8923-1314
External analog inputs / outputs via CANopen (maximum) Display and evaluation of J1939 analog values (supported SPNs) CAN bus communication interfaces *6 FlexCAN** RS-232/485 Modbus RTU Slave interface(s) Part Numbers easYgen-3400 Marine (1A / 5A) easYgen-3500 Marine (1A / 5A) Spare connector kit	1 / 1 Cabinet back mounting 8440-2044 / 8440-2045 - 8928-7371 8446-	- 8440-2046 / 8440-2047 8923-1314 1023 1046

- refer to the Manual for applications with more than 8
- parallel gensets because of bus load limits via serial connection and ToolKit software (included) #6
 - measured ground current
- (0 to 380 Ohm, 40 to 120°C), VDO (0 to 380 Ohm, 50 to 150°C), Pt100, Resistive input (one- or two-pole, 2pt.
- linear or 9pt. user defined), or 20 mA (0/4 to 20 mA, freely configurable) freely selectable during configuration between CANopen or J1939; request information
- #7 a screw and a clamp kit are delivered with the unit for fastening

APPROVALS

















