



## easYgen-3400/3500 Genset Control for Complex Breaker Applications

### DESCRIPTION

The easYgen-3000 Series are control units for genset applications. The numerous inputs and outputs, along with a modular software structure, permit you to use the easYgen-3000 Series for a wide range of applications. This includes stand-by, AMF, peak shaving, import-export, cogeneration or distributed generation, among others. Also the easYgen-3000 Series is compatible for isolated, island parallel, mains parallel and multiple unit mains parallel operations. The easYgen-3000 Series is able to control up to 32 gensets connected in a network with automatic sequencing.

The easYgen-3000 Series is available for simple paralleling as well as for complex paralleling applications. Choose easYgen-3200 should you want to take your fleet of gen-sets parallel to grid or choose easYgen-3500 with LS-5 for multi grid, multi segment applications. These controllers are also available without display, in a rugged metal housing suitable for back panel installation. A remote panel (RP-3000) can be used for visualization/control purpose in this case.

**FlexApp™** – This feature provides the tools to easily configure the number of operated breakers: None, GCB, GCB and MCB, GGB (Generator Group Breaker) and additional modes for Woodward LS-5 device interaction.

**LogicsManager™** – Woodward's LogicsManager enables changes to the operation sequences and adaption to specific needs. The LogicsManager accomplishes this by monitoring a range of measuring values and internal states, which are combined logically with Boolean operators and programmable timers. This enables to create and/or modify control and relay functions.

**DynamicsLCD™** – The adaptive and interactive 5.7", 320x240 pixel color graphical LC display with soft keys and a clear menu structure ensures intuitive user operation and navigation.

### FEATURES

- Full connectivity of up to 32 Generators and 16 LS-5 circuit breaker control devices in one application
- Run-up synchronization to get several synchronous generators onto the load in a very short time. All generators are started with closed generator breakers. At the configured operating speed the voltage regulators are turned on and the voltage increases constantly to rated value. This method allows also to start-up a transformer without producing large in-rush currents.
- Operation modes: Auto, Stop, Manual, and Load/No Load test modes via discrete input possible
- Breaker control: Slip frequency / phase matching synchronization, open-close control, breaker monitoring
- Load transfer features: open / closed transition, interchange, soft loading / soft unloading, mains parallel
- Remote control via interface and discrete/analog inputs for adjusting speed, frequency, voltage, power, reactive power, and power factor set points
- Freely configurable PID controllers for various control purposes, such as heating circuit control (CHP applications), water level, fuel level, or pressure and/or other process values
- Supported ECU: Scania S6, MTU ADEC ECU7/8, Volvo EMS2 & EDC4, Deutz EMR2 & EMR3, MAN MFR/EDC7, SISU EEM, Cummins and Woodward E3 ECU
- Discrete and analog I/O expansion board connectivity (Woodward IKD 1 or Phoenix Contact IL series)
- Multi-lingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish, Slovenian, Finnish, Swedish
- Configurable voltage/frequency control allows manual control of breakers
- Neutral interlocking determines and controls one common neutral in a network of generators
- Cylinder temperature monitoring for in-line and V engines
- Reactive power regulation at the grid interchange point (kvar or PF)

- Provides full connectivity of up to 16 Woodward LS-5 Series controllers for complex power management applications with multiple mains and bus tie breakers
- Integrated Generator Group breaker GGB control
- Run-up Synchronization
- Automatic Segment Control
- Master or Slave control capability
- Peak shaving operation
- AMF operation
- Cogeneration (CHP)
- Islanded & mains parallel operation
- Load sharing and load-dependent start/stop for up to 32 units
- Import/export control
- Open/closed transition
- CANopen / J1939 ECU Control
- Free configurable alarms and texts
- Fast configuration by partial setting files
- Dynamic mains stabilization (as per BDEW)
- Adjustable vector groups for synchronization

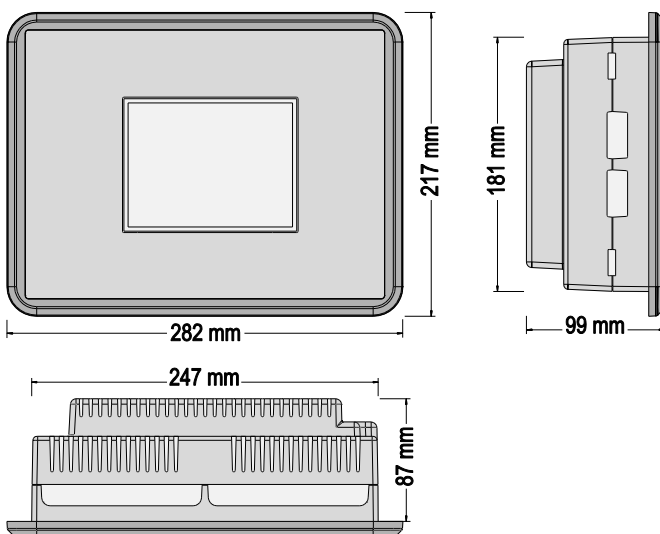
# SPECIFICATIONS

Power supply	12/24 V <sub>DC</sub> (8 to 40 V <sub>DC</sub> )
Intrinsic consumption	max. 19 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
<b>Voltage</b>	( $\sqrt{\Delta}$ )
100 V <sub>AC</sub> [1]	Rated (V <sub>rated</sub> ) ..... 69/120 V <sub>AC</sub>
	Max. value (V <sub>max</sub> ) ..... 86/150 V <sub>AC</sub>
	Rated surge volt. (V <sub>surge</sub> ) ..... 2.5 kV
and 400 V <sub>AC</sub> [4]	Rated (V <sub>rated</sub> ) ..... 277/480 V <sub>AC</sub>
	Max. value (V <sub>max</sub> ) ..... 346/600 V <sub>AC</sub>
	Rated surge volt. (V <sub>surge</sub> ) ..... 4.0 kV
Accuracy	Class 1
Measurable alternator windings	3p-3w, 3p-4w, 3p-4w OD, 1p-2w, 1p-3w
Setting range	primary ..... 50 to 650,000 V <sub>AC</sub>
Linear measuring range	1.25×V <sub>rated</sub>
Measuring frequency	50/60 Hz (40 to 85 Hz)
High Impedance Input; Resistance per path	[1] 0.498 MΩ, [4] 2.0 MΩ
Max. power consumption per path	< 0.15 W
<b>Current (Isolated)</b>	Rated (I <sub>rated</sub> ) ..... [1] ..1 A or [5] ..15 A
Linear measuring range	I <sub>gen</sub> = 3.0×I <sub>rated</sub>
	I <sub>mains/ground</sub> = 1.5×I <sub>rated</sub>
Setting range	1 to 32,000 A
Burden	< 0.15 VA
Rated short-time current (1 s)	[1] 50×I <sub>rated</sub> , [5] 10×I <sub>rated</sub>
<b>Power</b>	
Setting range	0.5 to 99,999.9 kW/kvar
<b>Discrete inputs</b>	isolated
Input range	12/24 V <sub>DC</sub> (8 to 40 V <sub>DC</sub> )
Input resistance	approx. 20 kOhms
<b>Relay outputs</b>	isolated
Contact material	AgCdO
Load (GP)	2.00 A <sub>AC</sub> @250 V <sub>AC</sub>
	2.00 A <sub>DC</sub> @24 V <sub>DC</sub> / 0.36 A <sub>DC</sub> @125 V <sub>DC</sub> / 0.18 A <sub>DC</sub> @250 V <sub>DC</sub>
Pilot duty (PD)	
	1.00 A <sub>DC</sub> @24 V <sub>DC</sub> / 0.22 A <sub>DC</sub> @125 V <sub>DC</sub> / 0.10 A <sub>DC</sub> @250 V <sub>DC</sub>

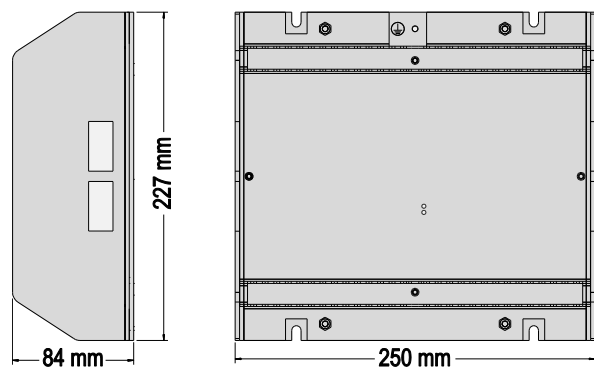
<b>Analog inputs (none isolated)</b>	freely scalable
Type 1	0 to 500 Ohms / 0 to 20 mA
Type 1 resolution	11 Bit
Type 2 (in P2)	0 to 10V / 0 to 20 mA
Type 3 (in P2)	0 to 250 Ohms / 0 to 2500 Ohms
Type 2/3 resolution	12 Bit
<b>Analog outputs (isolated)</b>	freely scalable
Type 1	± 10 V / ± 20 mA / PWM
Insulation voltage (continuously)	100 V <sub>AC</sub>
Insulation test voltage (1s)	500 V <sub>AC</sub>
Resolution	11/12 Bit (depending on analog output)
± 10 V (scalable)	internal resistance ≤ 1 kOhms
± 20 mA (scalable)	maximum load 500 Ohms
Type 2 (in P2)	0/4 - 20 mA / 0 - 10 V <sub>dc</sub>
Insulation voltage (continuously)	100 V <sub>AC</sub>
Insulation test voltage (1s)	500 V <sub>AC</sub>
Resolution	12 Bit
Output	maximum load 500 Ohm
<b>Housing</b>	Front panel flush mounting ..... Plastic housing
Dimensions	WxHxD ..... 282 × 217 × 99 mm
Front cutout	WxH ..... 249 [+1.1] × 183 [+1.0] mm
Connection	screw/plug terminals 2.5 mm <sup>2</sup>
Front	insulating surface
Sealing	Front ..... IP66 (with screw fastening)
	Front ..... IP54 (with clamp fastening)
	Back ..... IP20
Weight	max. 2,170 g
<b>Housing</b>	Back panel mounting ..... Sheet metal housing
Dimensions	W x H x D ..... 250 × 227 × 84 mm
Connection	screw/plug terminals 2.5 mm <sup>2</sup>
Protection system	IP 20
Weight	max. 2,270 g
<b>Disturbance test (CE)</b>	tested according to applicable EN guidelines
<b>Listings</b>	UL, cUL, CSA
<b>Marine</b>	LR (Type Approval), ABS (Type Approval)

# DIMENSIONS

Plastic housing for front panel mounting



Metal housing for cabinet mounting



# TERMINAL DIAGRAM

easYgen-3400/3500 P1 and P2

MAINS CURRENT (OR GROUND L.C.)		GENERATOR CURRENT						ANALOG INPUTS 0 to 500 Ohm   0/4 to 20 mA			ANALOG OUTPUTS ±10 Vdc   ±20mA   PWM								
L1	L2	L1	L2	L3			AI 01	AI 02	AI 03	AO 01	AO 02								
S2	S1*	S2	S1*	S2	S1*	S2	+	+	+	PWM, Vdc	PWM, Vdc								
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20

MAINS VOLTAGE				GENERATOR VOLTAGE				BUSBAR VOLTAGE											
L1	L2	L3	N	L1	L2	L3	N	L1	L2	L3	N								
120 Vac	480 Vac	120 Vac	480 Vac	120 Vac	480 Vac	120 Vac	480 Vac	120 Vac	480 Vac	120 Vac	480 Vac								
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

R12	R11	R10	R09	R08	R07	R06	R05	R04	R03	R02	R01								
60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41

RELAY OUTPUTS

MPU	D12	D11	D10	D09	D08	D07	D06	D05	D04	D03	D02	D01	COMMON	Aux. Excitation D+	0 Vdc	12/24 Vdc	Engine Ground	*
80	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61

DISCRETE INPUTS

\* pin 61  
easYgen-3400: No Connection  
easYgen-3500: Protective Earth

additionally: easYgen-3400/3500 P2 only

SINKING OUTPUT	ANALOG INPUTS 0 to 10 V   0/4 to 20 mA			ANALOG INPUTS 0 to 250 Ohm   0 to 2500 Ohm															
S01	AI 04	AI 05	AI 06	AI 07	AI 08	AI 09													
(0/4 to 20 mA)	(0/4 to 20 mA)	(0/4 to 20 mA)	(0/4 to 20 mA)	1	2	3													
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

ANALOG INPUTS 0 to 250/2500 Ohm			ANALOG OUTPUTS 0/4 to 20 mA   isolated																
AI 10	AO 04	AO 05	AO 06																
1	+	+	+																
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120

R22	R21	R20	R19	R18	R17	R16	R15	R14	R13										
140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121

RELAY OUTPUTS

SINKING OUTPUT	COMMON	D123	D122	D121	D120	D119	D118	D117	D116	D115	D114	D113	
154	153	152	151	150	149	148	147	146	145	144	143	142	141

DISCRETE INPUTS

## RELATED PRODUCTS

- Genset Controller **easYgen-3400/3500 Marine** (Product Specification # 37533)
- Genset Controller **easYgen-2000/3000 Rental** (Product Specification # 37553)
- Genset Controller **easYgen Asynchronous KIT** (Product Specification # 37568)
- Circuit Breaker Controller **LS-511/521** (Product Specification # 37522)
- Engine Speed Control **actiVgen** (Product Specification # 03419): P/N 8440-2108
- Remote Panel **RP-3000** (Product Specification # 37446)
- ToolKit (Product Specification # 03366)
- I/O Expansion Board **IKD1** (Product Specification # 37171)
- Load Share Gateway **LSG** (Product Specification # 37451)
- Electronic Pickup Unit **EPU-100** (Product Specification # 37562)
- CANbus based Remote Annunciator (Product Specification # 37279): **easYlite 100** P/N 8446-1023
- Power Generation Learning Module (Product Specification # 03412): P/N 8447-1012
- Profibus Gateway (Application Note # 37577): **ESEPRO** P/N 8445-1046
- Ethernet (Modbus/TCP) Gateway (Application Note # 37576): **ESENET** P/N 8445-1044
- CANbus to Fiber Optic Converter (Application Note # 37598): **DL-CAN** P/N 8445-1049 and **DL-CAN-R** P/N 8445-1048
- Remote Access Gateway (with HMS **Netbiter** EasyConnect **EC250**)
- Analog Expansion Card (**PHOENIX CONTACT** Inline terminal **IB IL**)
- Thermocouple Scanner (**AXIOMATIC AXC20**)

# FEATURES OVERVIEW

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EASY GEN 3000	Model Package	easYgen-3000 Series			
		3400		3500	
		P1	P2	P1	P2
<b>Measuring</b>					
Generator voltage (3-phase/4-wire)		✓	✓	✓	✓
Generator current (3x true r.m.s.)		✓	✓	✓	✓
Mains voltage (3-phase/4-wire)		✓	✓	✓	✓
Mains or ground current (1x true r.m.s.; mains or ground current selectable)		✓	✓	✓	✓
Busbar voltage (1-phase/2-wire)		✓	✓	✓	✓
<b>Control</b>					
Breaker control logic (open and closed transition)	<i>FlexApp™</i>	3	3	3	3
Number of supported Woodward LS-5 units		16	16	16	16
Automatic, Manual, Stop, and test operating modes		✓	✓	✓	✓
Single and multiple-unit operation		✓	✓	✓	✓
Mains parallel multiple-unit operation (up to 32 units)		✓	✓	✓	✓
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		✓	✓	✓	✓
Import / export control (kW and kvar)		✓	✓	✓	✓
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	3	3
<b>HMI</b>					
Color Display with Softkey operation	<i>DynamicsLCD™</i>	-	-	✓	✓
Start/stop logic for diesel / gas engines		✓	✓	✓	✓
Counters for operating hours / starts / maintenance / active/reactive energy		✓	✓	✓	✓
Configuration via PC (serial connection and ToolKit software (included))		✓	✓	✓	✓
Event recorder entries with real time clock (battery backup)		300	300	300	300
<b>Protection</b>					
	ANS#				
Generator: voltage / frequency	59 / 27 / 810 / 81U	✓	✓	✓	✓
Generator: overload, reverse/reduced power	32 / 32R / 32F	✓	✓	✓	✓
Generator: unbalanced load	46	✓	✓	✓	✓
Generator: instantaneous overcurrent	50	✓	✓	✓	✓
Generator: time-overcurrent (IEC 255 compliant)	51 / 51V	✓	✓	✓	✓
Generator: ground fault (measured ground current)	50G	✓	✓	✓	✓
Generator: power factor	55	✓	✓	✓	✓
Generator: rotation field		✓	✓	✓	✓
Engine: overspeed / underspeed	12 / 14	✓	✓	✓	✓
Engine: speed / frequency mismatch		✓	✓	✓	✓
Engine: D+ auxiliary excitation failure		✓	✓	✓	✓
Engine: Cylinder temperature		✓	✓	✓	✓
Mains: voltage / frequency	59 / 27 / 810 / 81U	✓	✓	✓	✓
Mains: phase shift / rotation field / df/dt (ROCOF)	78	✓	✓	✓	✓
<b>I/Os</b>					
Speed input: magnetic / switching; Pickup		✓	✓	✓	✓
Discrete alarm inputs (configurable)		12 (9)	23 (20)	12 (9)	23 (20)
Discrete outputs, configurable	<i>LogicsManager™</i>	max. 12	max. 22	max. 12	max. 22
External discrete inputs / outputs via CANopen		32 / 32	16 / 16	32 / 32	16 / 16
Analog inputs #1: +/- 20 mA, 0..10 V, 0..250/500/2500 Ω configurable	<i>FlexIn™</i>	3	10	3	10
Analog outputs: +/- 10V, +/- 20mA, PWM; configurable +		2	5	2	5
External analog inputs / outputs via CANopen		16 / 4	-	16 / 4	-
Display and evaluation of J1939 analog values, "supported SPNs"		100	100	100	100
CAN bus communication interfaces #2	<i>FlexCAN™</i>	3	3	3	3
RS-232/485 Modbus RTU Slave interface(s)		1 / 1	1 / 1	1 / 1	1 / 1
<b>Listings/Approvals</b>					
UL / cUL Listing		✓	✓	✓	✓
CSA		✓	✓	✓	✓
LR & ABS Marine		✓	✓	✓	✓
BDEW / VDE-AR-N 4105		✓	✓	✓	✓
CE Marked		✓	✓	✓	✓
<b>Part Numbers</b>					
		cabinet back mounting w/o display		front panel mounting with display #3	
easYgen with 1 A CT inputs		8440-1956	8440-2079	8440-1935	8440-1937
easYgen with 5 A CT inputs		8440-1945	8440-2078	8440-1934	8440-1936
Spare connector kit		8928-7371	8923-1919	8923-1314	8923-1918

#1 selectable senders: VDO (0 to 180 Ohms, 0 to 5/10 bar), VDO (0 to 380 Ohms, 40 to 120°C or 50 to 150°C), Pt100, Pt1000, resistive input (one- or two-pole, 2pt. linear or 9pt. user defined)  
 #2 freely selectable during configuration between CANopen or J1939; request information  
 #3 a screw and a clamp kit are delivered with the unit for fastening