



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

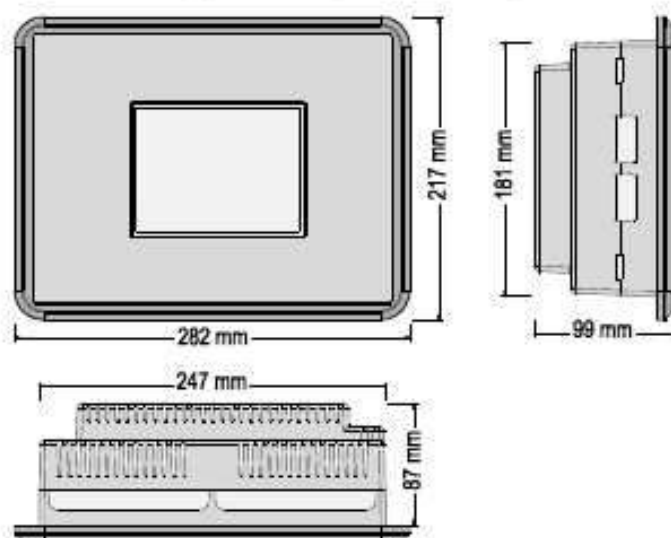
SPECIFICATIONS

Power supply	12/24 V _{DC} (8 to 40 V _{DC})
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
Voltage	($\pm 1\%$)
100 V _{AC} [1]	Rated (V _{rated}) 69/120 V _{AC}
	Max. value (V _{max}) 86/150 V _{AC}
	Rated surge volt. (V _{surge}) 2.5 kV
and 400 V _{AC} [4]	Rated (V _{rated}) 277/480 V _{AC}
	Max. value (V _{max}) 346/600 V _{AC}
	Rated surge volt. (V _{surge}) 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 _{AC}
Linear measuring range	1.25×V _{rated}
Measuring frequency	50/60 Hz (40 to 85 Hz)
High Impedance Input; Resistance per path	[1] 0.498 M Ω , [4] 2.0 M Ω
Max. power consumption per path	< 0.15 W
Current (Isolated)	Rated (I _{rated}) [1] 1 A or [5] 1.5 A
Linear measuring range	I _{gen} = 3.0×I _{rated}
	I _{max} /ground = 1.5×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 V _{DC} (8 to 40 V _{DC})
Input resistance	approx. 20 k Ω ms
Relay outputs	isolated
Contact material	AgCdO
Load (GP)	2.00 A _{AC} @250 V _{AC}
	2.00 A _{DC} @24 V _{DC} / 0.36 A _{DC} @125 V _{DC} / 0.18 A _{DC} @250 V _{DC}
Pilot duty (PD)	
	1.00 A _{DC} @24 V _{DC} / 0.22 A _{DC} @125 V _{DC} / 0.10 A _{DC} @250 V _{DC}

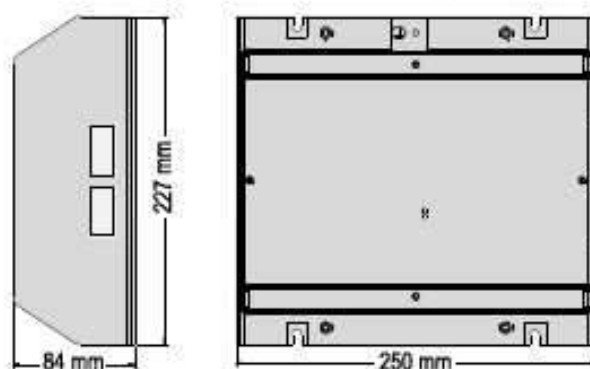
Analog inputs (none isolated)	freely scalable
Type 1	0 to 500 Ohms / 0 to 20 mA
Type 1 resolution	11 Bit
Type 2 (in P2)	0 to 10V / 0 to 20 mA
Type 3 (in P2)	0 to 250 Ohms / 0 to 2500 Ohms
Type 2/3 resolution	12 Bit
Analog outputs (isolated)	freely scalable
Type 1	± 10 V / ± 20 mA / PWM
Insulation voltage (continuously)	100 V _{AC}
Insulation test voltage (1s)	500 V _{AC}
Resolution	11/12 Bit (depending on analog output)
± 10 V (scalable)	internal resistance ≤ 1 k Ω ms
± 20 mA (scalable)	maximum load 500 Ohms
Type 2 (in P2)	0/4 - 20 mA / 0 - 10 V _{AC}
Insulation voltage (continuously)	100 V _{AC}
Insulation test voltage (1s)	500 V _{AC}
Resolution	12 Bit
Output	maximum load 500 Ohm
Housing	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 ²
Front	insulating surface
Sealing	Front IP66 (with screw fastening)
	Front IP54 (with clamp fastening)
	Back IP20
Weight	max. 2,170 g
Housing	Back panel mounting Sheet metal housing
Dimensions	W x H x D 250 × 227 × 84 mm
Connection	screw/plug terminals 2.5 mm ²
Protection system	IP 20
Weight	max. 2,270 g
Disturbance test (CE)	tested according to applicable EN guidelines
Listings	UL, cUL, CSA
Marine	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 (0 to 500 A)		GENERATOR CURRENT						ANALOG INPUTS 0 to 500 Ohm 0.4 to 20 mA						ANALOG OUTPUTS ±10 Vdc ±20mA PPM					
L1	L2	L1	L2	L3				AI 01	AI 02	AI 03				AO 01	AO 02				
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
120 Vac	480 Vac	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

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

80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
MPU		DI12	DI11	DI10	DI09	DI08	DI07	DI06	DI05	DI04	DI03	DI02	DI01	COMMON	0Vdc	12-24Vdc	Engine Ground		
DISCRETE INPUTS																			

* pin 81)
easYgen-3400: No Connection
easYgen-3500: Protective Earth

additionally: easYgen-3400/3500 P2 only

SINKING OUTPUT 500mA		ANALOG INPUTS 0 to 10 V 0.4 to 20 mA						ANALOG INPUTS 0 to 250 Ohm 0 to 2500 Ohm					
SO1		AI 04	AI 05	AI 06				AI 07	AI 08	AI 09			
81	82	83	84	85	86	87	88	89	90	91	92	93	94

ANALOG INPUTS 0 to 250/2500 Ohm						ANALOG OUTPUTS 0.4 to 20 mA Isolated					
AI 10						AO 04	AO 05	AO 06			
101	102	103	104	105	106	107	108	109	110	111	112

140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121
R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11								
RELAY OUTPUTS																			

160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141
						COMMON	0Vdc	DI23	DI22	DI21	DI20	DI19	DI18	DI17	DI16	DI15	DI14	DI13	DI12
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 AXTC20**)

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For more information contact:

FEATURES OVERVIEW

		easYgen-3000 Series			
		Model Package	3400	3500	
Measuring			P1	P2	
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)			✓	✓	✓
Control					
Breaker control logic (open and closed transition)		FlexApp™	3	3	3
Number of supported Woodward LS-5 units			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
HMI					
Color Display with Softkey operation		DynamicsLCD™	-	-	✓
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
Protection		ANSI#			
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		65	✓	✓	✓
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	✓	✓	✓
I/Os					
Speed input: magnetic / switching; Pickup			✓	✓	✓
Discrete alarm inputs (configurable)			12 (9)	23 (20)	12 (9)
Discrete outputs, configurable		LogicsManager™	max. 12	max. 22	max. 12
External discrete inputs / outputs via CANopen			32 / 32	16 / 16	32 / 32
Analog inputs #1: +/- 20 mA, 0...10 V, 0...250/500/2500 Ω configurable		Flexin™	3	10	3
Analog outputs: +/- 10V, +/- 20mA, PWM; configurable +			2	5	2
External analog inputs / outputs via CANopen			16 / 4	-	16 / 4
Display and evaluation of J1939 analog values, "supported SPNs"			100	100	100
CAN bus communication interfaces #2		FlexCAN™	3	3	3
RS-232/485 Modbus RTU Slave interface(s)			1 / 1	1 / 1	1 / 1
Listings/Approvals					
UL / cUL Listing			✓	✓	✓
CSA			✓	✓	✓
LR & ABS Marine			✓	✓	✓
BDEW / VDE-AR-N 4105			✓	✓	✓
CE Marked			✓	✓	✓
Part Numbers			cabinet back mounting w/o display		front panel mounting w/ display #3
easYgen with 1 A CT inputs			8440-1956	8440-2079	8440-1935
easYgen with 5 A CT inputs			8440-1945	8440-2078	8440-1934
Spare connector kit			8928-7371	8923-1919	8923-1314

#1 selectable sensors: VDD (0 to 180 Ohms, 0 to 5/10 bar), VDD (0 to 380 Ohms, 40 to 120°C or 50 to 150°C), Pt100, Pt1000,

resistive input (one- or two-pole, 2pt. linear or 3pt. 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