easYgen-3400XT/3500XT

Genset Control for Complex Paralleling Operation

DESCRIPTION

Woodward raised the standard in genset paralleling control and power management system with the easYgen-3000XT Series controllers. These controllers come with standardized software that is simple to configure, yet easily customized for individual applications. Enhanced connectivity enables fast, reliable and secure interfacing to other controls and communications systems while the enhanced hardware is a drop-in replacement for previous generation easYgen-3000 Series Controls.

The easYgen-3500XT with a dedicated CANopen network for connectivity to up to 16 LS-S Circuit Breaker Controls, enables control of complex distribution systems having multiple utility feeds and tie breakers, and parallel load sharing of up to 32 generators on up to 32 different bus segments. Redundant load sharing is selectable using both Ethernet B and C networks for improved reliability. The control combines complete engine-generator control and other controls with advanced, peer-to-peer paralleling functionality and innovative features in a robust, attractive, user-friendly and all-in-one package. The easYgen-3500 XT controls are designed to direct connect up to 690Vac and operate to 4000m above sea level without derating.

The easYgen-3500XT is available in two packages. P1, focused at complex paralleling applications provides redundant Ethernet communication, LS-S connectivity, and standard I/O set, while P2, Co-Gen/CHP model offers expanded onboard I/O set, 3-ph busbar voltage measurement capability and an interface expansion card slot for an additional interface/protocol. These packages also come without a display in a rugged metal housing suitable for back panel installations (easYgen-3400XT-P1 and easYgen-3400XT-P2 respectively). A sophisticated touch screen remote panel (RP-3000XT) complements them as operator control panel. A version of easYgen-3500XT (easYgen-3500XT-P1-LT and easYgen-3500XT-P2-LT) is designed to operate down to -40°C for outdoor applications.

FEATURES

- Full connectivity of up to 32 Generators and 16 LS-S circuit breaker controls in one application
- Run-up synchronization / Dead Field Paralleling to quickly get several synchronous generators onto the load
- Three-phase true RMS power sensing with Class 1 accuracy
- Operation modes: AUTO, STOP, MANUAL, and TEST - accessible through face plate or discrete input
- Breaker control: Slip frequency / phase matching synchronization, open / close control, breaker monitoring
- Load transfer: open / closed transition, interchange, soft loading / unloading, Utility parallel
- Load share and device to device communication over CAN or Ethernet (Redundant possible)
- Remote control via interface (Modbus TCP, Modbus RTU) and via discrete/analogue 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, pressure and / or other process variables
- Direct support to several ECUs: Scania S6, MTU ADEC ECU7/8/9, Volvo EMS2 & EDC4, Deutz EMR2 & EMR3, MAN MFR / EDC7, SISU EEM, Cummins and Woodward EG502 ECU
- Field ECU support and additional I/O expansion board connectivity through sequencer files
- “System Update” function for online troubleshooting and adding / removing generator sets
- Time / Date synchronization over Simple Network Time Protocol (SNTP)
- Cylinder head / exhaust temperature monitoring (Temperatures come from J1939 or CANopen devices)
- Woodward ToolKit™ software for flexible setup from a single connection to the network. The ToolKit can be accessed either via USB, or Ethernet or CAN ports.
- Multi-lingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish, Slovakian, Finnish, Swedish

New Features

- Built-In Redundant Ethernet
- Power Measurement Class 1
- Direct Connect Up to 690 Vac
- AnalogManager & Editable Screens
- Multi-Interface ToolKit connectivity
- New face plate with tactile buttons
- Drop-In replacement

- Premium genset control for complex paralleling applications of up to 32 gensets and up to 16 MCB/GGB/Tie Breakers in
- Prime Power & Cogeneration (CHP)
- Peak shaving operation
- Emergency operation
- Import/Export operation
- Islanded & Utility parallel operation
- Integrated Generator Group Breaker (GGB) control
- Run-Up Synchronization
- Master or Slave control capability
- Complete engine, generator and utility protection
- Up to 9 communication ports: 3xEthernet, 3xCAN (CANopen and J1939), RS-485, USB, Interface expansion card
- Customizable logic, HMI screens, and alarms
- Dedicated low temperature display variants
- UL61010, UL6200, RoHS2 and marine (ABS, LR) compliance
**SPECIFICATIONS**

**Power supply** ..................................................12/24 Vdc (8 to 40 Vdc)
Intrinsic consumption .................................. max. 22 W (LT: max. 32 W)
Ambient temperature (operation) .................. -20 to 70 °C (LT: -40 to 70 °C)
Ambient temperature (storage) .................. -30 to 80 °C / -22 to 176 °F
Ambient humidity ...........................................95%, non-condensing

**Voltage (software configurable)** ............... (V/bit)
100 Vdc .................................. Rated (Vmeter) .............. 69/120 VVac
Max. value (Vmax) .................................. 86/150 VVac

and 400/600 Vdc Rated (Vrange) ................. 400/690 VVac
Max. value (Vmax) .................................. 520/897 VVac
Rated surge volt. (Vsurge) ......................... 600 V

Accuracy ........................................... Class 0.5
Measurable alternator windings: 3p-3w, 3p-4w, 3p-4w OD, 1p-2w, 1p-3w
Setting range .................................. primary ............. 50 to 650,000 VVac
Linear measuring range .................. 1.25×Vrated
Measuring frequency .................. 50/60 Hz (30 to 85 Hz)
High Impedance Input; Resistance per path ................. 2.5 MΩ
Max. power consumption per path ............. < 0.15 W

**Current (isolated, software configurable)** 
Rated (IAcc) .......................... 1A or 5A
Linear measuring range .................. 1.5×Irated
Setting range .................................. 1 to 32,000 A
Burden .......................................... < 0.1 VA
Accuracy ........................................... Class 0.5

**Power**
Setting range .................................. 0.5 to 99,999 kW/kvar
Accuracy ........................................... Class 1.0

**Discrete inputs** ........................................... isolated
Input range ..................................... 12/24 Vdc (8 to 40 Vdc)
Input resistance ........................................ approx. 20 kOhms

**Transistor outputs (P2 only)** ............... isolated
Rated switching voltage .................. max. 24 Vdc
Maximum switching current .... 40 VA
Maximum switching current .... 300 mA DC
Isolation Test voltage (<1s) .............. 500 VVac
Isolation voltage (continuously) ........ 100 VACdC

**Relay outputs** ........................................... isolated
Contact material .................................. AgCdO
Load (GP) ....................................... 2.0 Acc@250 VVac
2.0 Acc@24 Vdc / 0.36 Acc@125 Vdc / 0.18 Acc@250 Vdc

**Analog inputs (isolated)** .................. freely scalable
Type 1 ........................................... 0 to 1 V / 0 to 2000 Ohms / 0 to 20 mA
Resolution ........................................... 16 Bit
Maximum permissible voltage against genset Ground ........... 9 V
Maximum permissible voltage between genset Ground & PE ...... 100 V
Type 2 (P2 only) .................................. 0 to 10 V / 0 to 20 mA
Resolution ........................................... 14 Bit
Maximum permissible voltage against PE (Ground) ............. 100 V
Maximum differential voltage to other DC Analog Inputs ........ 15 V
Type 3 (P2 only) .................................. 0 to 250 Ohms / 0 to 2500 Ohms
Resolution ........................................... 14 Bit
Maximum permissible voltage against PE (Ground) ............. 100 V
Maximum differential voltage to other DC Analog Inputs ........ 10 V

**Analog outputs (isolated)** .................. freely scalable
Type 1 ........................................... ± 10 V / ± 20 mA / PWM
Basic insulation voltage (continuously, AVRout) ............. 500 VVac
Reinforced insulation voltage (continuously, AVRout) ....... 300 VVac
Insulation voltage (continuously, Genv) .................. 100 VVac
Resolution ........................................... 12 Bit
Output ± 10 V (scalable) .................................. internal resistance
Output ± 20 mA (scalable) .................................. maximum load 500 Ohms
Type 2 (P2 only) .................................. 0/4 to 20 mA
Insulation voltage (continuously) .................. 100 VVac
Insulation voltage (test; >2 s) .................. 1700 VVac
Resolution ........................................... 12 Bit
Output ........................................... maximum load 500 Ohms

**Housing**
Front panel flush mounting .................. Plastic housing
Dimensions W×HxD .................................. 282 × 216 × 96 mm
Front cutout W×H .................................. 249 [+1.1] × 183 [+1.0] mm
Connection ........................................... screw/plug terminals 2.5 mm²
Front ........................................... insulating surface
Sealing ........................................... Front: IP66 (with screw fastening)
Front ........................................... Front: IP54 (with clamp fastening)
Back ........................................... Back: IP20
Weight ........................................... approx. 1,850 g

**Housing**
Back panel mounting ............... Powder Coated Sheet metal housing
Dimensions W×HxD P1: .................................. 250 × 228 × 50 mm
P2: .................................. 250 × 228 × 84 mm
Connection ........................................... screw/plug terminals 2.5 mm²
Protection system .................................. IP 20
Weight ........................................... approx. 1,750 g

**Disturbance test (CE)** tested according to applicable IEC standards

**Listings** ......................................... CE, UL, EAC, VDE, BDEW; pending: CSA

**Marine** ......................................... LR (Type Approval), pending: ABS (Type Approval)

* 3 phase 3 wire Δ constellations are limited to 600 Vac system
DIMENSIONS

Plastic housing for front panel mounting

Metal housing for cabinet mounting

TERMINAL DIAGRAM

P1: 96mm

P1: 50mm

P1 is more compact (note depth/height in blue)

RELATED PRODUCTS

- Circuit Breaker Controller LS-511/521 (Product Specification # 37522)
- Remote Panel RP-3000XT (Product Specification # 37592)
- ToolKit (Product Specification # 03366)
- I/O Expansion Board KD1 (Product Specification # 37171)
- Engine Speed Control actiVgen (Product Specification # 03419): P/N 8440-2100
- 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 8447-1046
- Proflibus 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 Converters (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 and EC350)
- Thermocouple Scanner (AXIOMATIC AXTC20)
- WAGO expansion CAN Couplers

P2: pins 01-160 as shown above; P1: pins 01-80 only!

* easYgen-3400XT: No connection
easYgen-3500XT: Protective earth
### easYgen-3000XT Series

<table>
<thead>
<tr>
<th>Model</th>
<th>Package</th>
<th>3400XT</th>
<th>3500XT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1</td>
<td>P2</td>
<td>P1(-LT)</td>
</tr>
<tr>
<td>Measuring</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Generator voltage</td>
<td>(up to 690 V ac)</td>
<td>3-phil</td>
<td>3-phil</td>
</tr>
<tr>
<td>Generator current</td>
<td>(1 A or 5 A software selectable)</td>
<td>3-phil</td>
<td>3-phil</td>
</tr>
<tr>
<td>Mains voltage</td>
<td>(up to 690 V ac)</td>
<td>3-phil</td>
<td>3-phil</td>
</tr>
<tr>
<td>Mains or ground current</td>
<td>(1 A or 5 A software selectable)</td>
<td>1-phil</td>
<td>1-phil</td>
</tr>
<tr>
<td>Busbar voltage</td>
<td>(up to 690 V ac)</td>
<td>1-phil</td>
<td>3-phil</td>
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<tr>
<td>Control</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Breaker control logic (open and closed transition)</td>
<td>FlexApp*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Number of supported Woodward LS-5 unit</td>
<td>16</td>
<td></td>
<td></td>
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<tr>
<td>Automatic, Manual, Stop, and test operating modes</td>
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<td></td>
<td></td>
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<tr>
<td>Single and multiple-unit operation</td>
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<tr>
<td>Mains parallel multiple-unit operation (up to 32 units)</td>
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<tr>
<td>AMF (auto mains failure) and stand-by operation</td>
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<tr>
<td>Critical mode operation</td>
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<tr>
<td>GCB and MCB synchronization (slipping / phase matching)</td>
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<tr>
<td>GGB (Generator Group Breaker) Control</td>
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<tr>
<td>Import / export control (kW and kVar)</td>
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<tr>
<td>Load-dependent start/stop</td>
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<tr>
<td>n/f, V, P, Q, and PF control via analog input or interface</td>
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<tr>
<td>Load/var sharing for up to 32 gensets</td>
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<tr>
<td>Freely configurable PID controllers</td>
<td>3</td>
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<tr>
<td>HMI</td>
<td></td>
<td></td>
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<tr>
<td>Color Display with Softkey operation</td>
<td>DynamicsLCD*</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Start/stop logic for diesel / gas engines</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Counters for operating hours / starts / maintenance / active/reactive energy</td>
<td></td>
<td>✓</td>
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<tr>
<td>Configuration via PC (USB serial connection &amp; ToolKit software (included))</td>
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<tr>
<td>Event recorder entries with real time clock (battery backup)</td>
<td>300</td>
<td></td>
<td></td>
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<tr>
<td>Operating Temperature</td>
<td>-40 to 70 °C</td>
<td></td>
<td>(-40)-20 to 70 °C</td>
</tr>
<tr>
<td>Protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator: voltage / frequency</td>
<td>59 / 27 / 610 / 81U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator: overload, reverse/reduced power</td>
<td>32 / 32R / 32F</td>
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<td></td>
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<tr>
<td>Generator: Synch Check</td>
<td>23</td>
<td></td>
<td></td>
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<tr>
<td>Generator: unbalanced load</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator: instantaneous overcurrent</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator: time-overcurrent (IEC 255 compliant)</td>
<td>51 / 51 V</td>
<td></td>
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<tr>
<td>Generator: ground fault (measured ground current)</td>
<td>50G</td>
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<tr>
<td>Generator: power factor</td>
<td>55</td>
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<td></td>
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<tr>
<td>Generator: rotation field</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine: overspeed / underspeed</td>
<td>12 / 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine: speed / frequency mismatch</td>
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<td></td>
<td></td>
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<tr>
<td>Engine: D* auxiliary excitation failure</td>
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<tr>
<td>Engine: Cylinder temperature</td>
<td></td>
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</tr>
<tr>
<td>Mains: voltage / frequency / synch check</td>
<td>59 / 27 / 810 / 81U / 25</td>
<td></td>
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<tr>
<td>Mains: phase shift / rotation field / ROCOF (d/dt)</td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Busbar: voltage / frequency / Phase Rotation</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>I/Os</td>
<td></td>
<td></td>
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<tr>
<td>Speed input: magnetic / switching; Pickup</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Discrete alarm inputs (configurable)</td>
<td>LogicsManager**</td>
<td>12 (9)</td>
<td>23 (20)</td>
</tr>
<tr>
<td>Discrete outputs, configurable</td>
<td>FlexIn*</td>
<td>max. 12</td>
<td>max. 22</td>
</tr>
<tr>
<td>External discrete inputs / outputs via CANopen</td>
<td>32</td>
<td>32</td>
<td></td>
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<tr>
<td>Analog inputs: 1 configurable</td>
<td>FlexIn*</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Analog outputs: ± 10 V, ± 20mA, PWM; configurable</td>
<td>AnalogManager**</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Analog outputs: 0 to 20 mA (0 to 10 V with external 500 Ohm resistor)</td>
<td>-</td>
<td>4</td>
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<tr>
<td>External analog inputs / outputs via CANopen</td>
<td>16/64</td>
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<tr>
<td>Display and evaluation of J1939 analog values, “supported SPNs”</td>
<td>100</td>
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<tr>
<td>CAN bus communication interfaces</td>
<td>FlexCAN**</td>
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<tr>
<td>Ethernet Modbus TCP Slave interface</td>
<td>3</td>
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<tr>
<td>USB Serial interface</td>
<td>1</td>
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<td>RS-485 Modbus RTU Slave interface</td>
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<tr>
<td>Interface Expansion Capability</td>
<td>-</td>
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<tr>
<td>Listings/Approvals</td>
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<tr>
<td>UL / cUL Listing (61010 8200), pending: CSA (USA and Canada), BDEW, VDE, EAC, CE Marked</td>
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<td>✓</td>
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<tr>
<td>LR, pending: ABS (TA)</td>
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<tr>
<td>Part Numbers</td>
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<tr>
<td>Front panel mounting with display</td>
<td>-</td>
<td></td>
<td>8440-2085</td>
</tr>
<tr>
<td>(… and enhanced operating temperature range)</td>
<td>-</td>
<td></td>
<td>(8440-2086)</td>
</tr>
<tr>
<td>Cabinet back mounting w/o display</td>
<td>8440-2084</td>
<td>8440-2087</td>
<td>-</td>
</tr>
</tbody>
</table>

* Selectable senders: VDO (0 to 180 Ohm, 0 to 5 bar), VO (0 to 180 Ohm, 0 to 10 bar), VDO (0 to 380 Ohm, 40 to 120°C), VDO (0 to 380 Ohm, 50 to 150°C), Pt100, Pt1000, resistive input (one- or two-pole, 2pt. linear or 9pt. user defined)

** CAN2 freely selectable during connection between CANopen or J1939; please feel free to request more information

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Subject to alterations, errors excepted.
Subject to technical modifications.

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37583 - 2016/06/Stuttgart