DESCRIPTION

The LS-5 Series are synchronizer controllers with integrated protective functions. They are designed to enable complex power management applications with multiple incoming mains and bus breakers in combination with easYgen-3400/3500 equipped genset controllers.

The LS-5 devices will manage synchronization, loading and un-loading on each bus segment and send the required voltage and frequency references via CAN bus to the easYgen-3400/3500 genset controllers. LS-5 devices which are located on the incoming mains breakers will automatically detect mains failures and start the corresponding gensets accordingly. Wiring efforts are reduced to a minimum, since only one CAN bus connection is required between all LS-5 and easYgen-3400/3500 controllers. It is not required to wire any AC measurement signals or discrete inputs/outputs between the LS-5 and easYgen-3400/3500 controllers.

Extensive remote control capabilities via discrete inputs or interfaces are provided to easily integrate the LS-5 into each application environment.

The LS-5 Series is available in two different housing versions. The LS-521 with a plastic housing and graphic LCD display is designed to be mounted on the cabinet’s front door. The LS-511 with an aluminum powder coated housing without display is designed to be back panel DIN Rail mounted.

FEATURES

- Up to 16 LS-5 units can be operated in one network with up to 32 easYgen-3400/3500 controllers
- Phase match or slip frequency synchronization with voltage matching
- Full protection package (including df/dt (ROCOF), phase shift and mains voltage increasing protection according to new German grid code requirements in VDE-0126-1-1)
- Segment control for the load sharing
- Event Log with up to 300 entries
- Automatic date and time synchronization between the LS-5 units and the connected easYgen-3400/3500 controls
- LS-5 “Stand alone” mode without the easYgen-3400/3500 is possible
- Preconfigured application modes for the most common applications in the field (MCB or MCB/GGB application)
- Automatic and Manual mode
- Full remote control via CAN or RS-485 interface
- In case transformers are used in the application, vector group adjustment is available
- Breaker open/close failure detection
- Mains decoupling “Test” mode
- Multilingual capability
- Lock Keypad feature
- 8 Freely configurable LED’s are available on the LS-511 back panel mountable device

- Designed as solution for complex power management applications
- Up to 16 LS-5 units can be utilized in one application
- Up to 32 bus segments are possible
- Synchronization and protection in one compact controller
- Adjustable vector groups for Synchronization
- Automatic mains failure detection
- Automatic and Manual mode
- LS-5 “Stand alone” mode for use without easYgen-3400/3500 System
- LogicsManager functionality
- CAN and RS-485 interfaces for remote control and visualization purposes
- True RMS sensing
- Available as cabinet front door mounted device or DIN-Rail back panel mounted metal housing
- Freely configurable relay outputs
- Freely configurable discrete inputs
- QV monitoring
- Time-dependent voltage monitoring
SPECIFICATIONS

Power supply .......................................................... 12/24 Vdc (6 to 40 Vdc)
Intrinsic consumption .................................................. max. ~ 5 W (LS-511)
................................................................................... max. ~ 6 W (LS-521)
Ambient temperature (operation) ....................... -20 to 70 °C / -4 to 158 °F
Ambient temperature (storage) ........................ -30 to 85 °C / -22 to 185 °F
Ambient humidity ............................................... 95 %, non-condensing
Voltage ................................................................. (V, A/L)
120 Vac [1]  Rated (V_{rated}) ........................................ 69/120 Vac
Max. value (V_{max}) ............................................. 86/150 Vac
Rated voltage phase – ground ....................... 150 Vac
Surge volt (V_{surge}) ........................................... 2.5 kV
and 480 Vac [4]  Rated (V_{rated}) ................................... 277/480 Vac
Max. value (V_{max}) ............................................. 346/600 Vac
Rated voltage phase – ground ....................... 300 Vac
Surge volt (V_{surge}) ........................................... 4.0 kV

Accuracy ................................................................. Class 1
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 MΩ, [4] 2.0 MΩ
Max. power consumption per path .............. < 0.15 W

Current (Isolated) ..................................................... [1] 1 A or [5] 0.5 A
Linear measuring range ........................................... I_{gen} = 1.5×I_{rated}
Burden ................................................................. < 0.15 VA
Rated short-time current (1 s) ...................... [1] 50×I_{rated}, [5] 10×I_{rated}
Discrete inputs ............................................................ Isolated
Input range ............................................................... 12/24 Vdc (8 to 40 Vdc)
Input resistance ........................................................ appro. 20 kΩ

Relay outputs ................................................................ potential free
Contact material ........................................................... AgCdO
Load (GP) ................................................................. 2.00 Aac@250 Vac
2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
Pilot duty (PD) ........................................................... 1.00 Aac@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc

Housing (LS-521)  Front door mounting .................. Plastic housing
Dimensions WxHxD ............................................... 219 × 171 × 61 mm
Front cutout WxH ...................................................... 186 [+1.1] × 138 [+1.0] mm
Connection ........................................................... screw/plug terminals 2.5 mm²
Front ................................................................. insulating surface
Sealing ................................................................. IP65 (with screw fastening)
Front ................................................................. IP54 (with clamp fastening)
Back ................................................................. IP20
Weight ................................................................. appro. 850 g

Housing (LS-511)  Back panel mounting ................. Sheet metal housing
Dimensions WxHxD ............................................... 190 × 167 × 47 mm
Connection ........................................................... screw/plug terminals 2.5 mm²
Protection system ........................................................ IP 20
Weight ................................................................. approx. 840 g

Disturbance test (CE) ................................................. tested according to applicable EN guidelines
Listings ................................................................. UL/cUL, GOST-R
Marine ................................................................. LR (Type Approval), ABS (Design Assessment)

DIMENSIONS

Plastic housing for front panel mounting

Metal housing for cabinet mounting
TERMINAL DIAGRAM

LS-5 Series – Terminal diagram

Service Port (USB/RS-232)

Connect only with Woodward DPC cable

480 Vac
120 Vac
480 Vac
120 Vac
480 Vac
System B voltage N
120 Vac
480 Vac
System B voltage L3
120 Vac
480 Vac
System B voltage L2
120 Vac
480 Vac
System B voltage L1
120 Vac
480 Vac
System A voltage N
120 Vac
480 Vac
System A voltage L3
120 Vac
480 Vac
System A voltage L2
120 Vac
480 Vac
System A voltage L1
120 Vac

Relay [R 1] isolated *
Fixed to „Ready for operation“

Relay [R 2] isolated *
Preconfigured to „Horn“

Relay [R 3] isolated *
Preconfigured to „System B not OK“

Relay [R 4] isolated *
Preconfigured to „System A not OK“

Relay [R 5] isolated
Fixed to „Open CB A“

Relay [R 6] isolated
Fixed to „Close CB A“
in [CB A: Two relay] mode otherwise preconfigured to „All alarm classes“

Common (terminals 44 to 51)

Discrete input [DI 01] isolated *
Lock monitoring

Discrete input [DI 02] isolated *
Remote acknowledge

Discrete input [DI 03] isolated *
Enable decoupling

Discrete input [DI 04] isolated *
Immediate open CB A

Discrete input [DI 05] isolated *
Reply: Isolation switch is open

Discrete input [DI 06] isolated *
Open CB A

Discrete input [DI 07] isolated *
Enable to close CB A

Discrete input [DI 08] isolated
Reply: CB A is open

Power supply
12/24 Vdc
8 to 40 Vdc
0 Vdc

Function earth

CAN bus
isolated
CAN-L
CAN-H

RS-485 interface
isolated
RS-485-B
RS-485-A

System A current
isolated

LS Series

L3
L2
L1
GND

Subject to technical modifications.

* = configurable via LogiSoftManager
EXAMPLE APPLICATION

FEATURES OVERVIEW

<table>
<thead>
<tr>
<th></th>
<th>LS-511</th>
<th>LS-521</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I/Os</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Configurable LEDs on Faceplate</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>System A/B voltage measurement</td>
<td>3-Phase + Neutral</td>
<td>3-Phase + Neutral</td>
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<tr>
<td>System A current measurement</td>
<td>3-Phase</td>
<td>3-Phase</td>
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<td>Discrete inputs</td>
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<td>Relay outputs</td>
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<tr>
<td>CAN Interface</td>
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<tr>
<td>RS-485 Interface</td>
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<td>1</td>
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<tr>
<td><strong>Control</strong></td>
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<tr>
<td>Automatic and Manual operating modes</td>
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<td>✓</td>
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<tr>
<td>Breaker synchronization (slip synchronization/phase matching)</td>
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<td>✓</td>
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<tr>
<td>Vector group adjustment for synchronization</td>
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<tr>
<td>Configurable dead bus closure direction</td>
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<tr>
<td><strong>HMI</strong></td>
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<tr>
<td>Configuration via HMI and PC</td>
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<tr>
<td>Event recorder with real time clock (battery backup)</td>
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<td>Date and Time Synchronization between LS-5 units and easYgen-3400/3500-P1</td>
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<tr>
<td><strong>Protection</strong></td>
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<td>Over-/undervoltage (59/27)</td>
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<tr>
<td>Over-/underfrequency (81O/U)</td>
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<td>Voltage asymmetry (47)</td>
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<td>Phase shift (78)</td>
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<tr>
<td>df/dt (ROCOF) (81)</td>
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<td>QV monitoring</td>
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<tr>
<td>Time-dependent voltage</td>
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<td>✓</td>
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<td>Mains voltage increase (accord. to VDE-AR-N-4105)</td>
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<td><strong>Monitoring</strong></td>
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<td>Breaker open/close monitoring</td>
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<td>Synchronization time out monitoring</td>
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<tr>
<td><strong>Counter</strong></td>
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<td>Circuit breaker closure counter</td>
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<tr>
<td><strong>Part Numbers</strong></td>
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<tr>
<td>LS-511 (1A / 5A)</td>
<td>8440-1951 / 8440-1946</td>
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<tr>
<td>LS-521 (1A / 5A)</td>
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<td>8440-1952 / 8440-1947</td>
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<td>DIN-Rail mounting Kit for LS-511</td>
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<td>DPC-RS-232 direct configuration cable</td>
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<tr>
<td>DPC-USB direct configuration cable</td>
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