



LS-5 Series V2

**LS-511/521
1breaker**

Circuit Breaker Control & Protection

New Features

- ✓ Two breaker control variants
- ✓ Separate incoming and outgoing current inputs per phase
- ✓ German grid code compliance (VDE AR-N 4105 & BDEW)
- ✓ Enhanced diagnostics and visualization

DESCRIPTION

Woodward's LS-5 Series relays are synchronizer controllers with integrated mains decoupling and protection features. The applications range from independent synch check relay to complex power management with multiple utility feeds, bus tie-breakers and group breakers in combination with Woodward's easYgen-3400XT/3500XT equipped genset controllers. Wiring efforts are reduced to a minimum, since only one CAN bus connection is required between all LS-5 and easYgen controllers to transmit AC measurement signals, I/O states, flags, etc.

The LS-5x1 devices manage synchronization, loading and un-loading on each bus segment and send the required voltage, frequency and phase angle references via CAN bus to the easYgen-3400XT/3500XT genset controllers. When serving an incoming mains breaker it automatically detects mains failure, performs mains decoupling and sends the start signal to the easYgen. The LS-5x1 is software selectable to be applied as an independent synch check relay, mains circuit breaker control or bus tie-breaker control thereby providing exceptional versatility and value for OEM switchgear builders, generator packagers, and system integrators.

The LS-5x1 Series is available in two different mounting styles. An LS-521 with a plastic housing and graphic LCD display is designed to be mounted on the cabinet's front door. An LS-511 with an aluminum powder coated housing without display is designed to be back panel mounted.

FEATURES

- Up to 16 LS-5 units can be operated in one network with up to 32 easYgen-3400XT/3500XT
- 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)
- 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-3400XT/3500XT controls
- LS-5 "Stand alone" mode without the easYgen-3400XT/3500XT is possible
- Preconfigured application modes that simplify the configuration process for complex multi-breaker applications
- AUTOMATIC and MANUAL mode
- Full remote control via CAN or RS-485 interface
- Vector group adjustment in case transformers are used in the application
- Breaker open/close failure detection
- Mains decoupling "Test" mode
- Lock keypad feature
- 4 freely configurable alarms
- 8 Freely configurable LED's on the LS-511 back panel mountable device
- Multi-lingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish
- Designed as a compact 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
- Synch check and mains decoupling in one compact controller
- Adjustable vector groups for synchronization
- Utility import/export control
- Automatic and Manual mode
- LS-5 "Stand alone" mode for use without easYgen-3400XT/3500XT System
- LogicsManager functionality for application customization
- 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
- RoHS2, BDEW and VDE AR-N 4105 compliant

SPECIFICATIONS

Power supply..... 12/24 Vdc (8 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 80 °C / -22 to 176 °F
 Ambient humidity..... 95 %, non-condensing

Voltage (Δ / Δ)

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 $1.25 \times V_{rated}$
 Measuring frequency..... 50/60 Hz (30 to 85 Hz)
 High Impedance Input; Resistance per path..... [1] 0.498 M Ω , [4] 2.0 M Ω

Current (Isolated) Rated (I_{rated})..... [1] ..1 A or [5] ..1/5 A
 Linear measuring range $I_{gen} = 1.5 \times I_{rated}$
 Burden..... < 0.15 VA
 Rated short-time current (1 s)..... [1] $50 \times I_{rated}$, [5] $10 \times I_{rated}$

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

Relay outputs potential free
 Contact material..... AgCdO
 Load (GP) AC: 2.00 Aac@250 Vdc
 DC: 2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
 Pilot duty (PD)..... AC: B300
 DC: 1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc

Housing (LS-521) Front door mounting..... Plastic housing
 Dimensions WxHxD..... 219 x 171 x 61 mm
 Front cutout WxH 186 [+1.1] x 138 [+1.0] mm
 Connection..... screw/plug terminals 2.5 mm²
 Front..... insulating surface
 Sealing Front..... IP66 (with screw fastening)
 Front..... IP54 (with clamp fastening)
 Back IP20

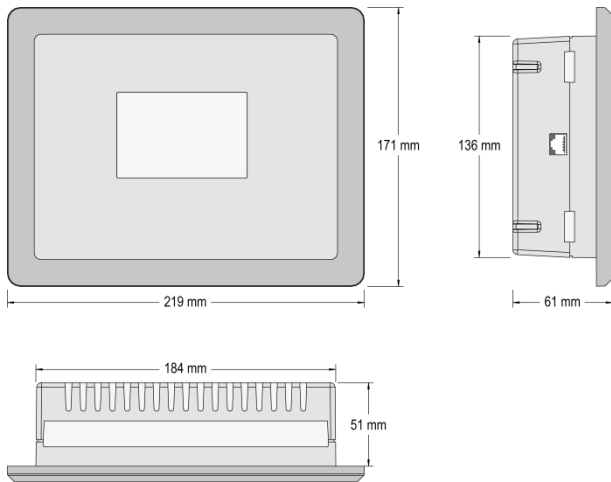
Weight..... approx. 850 g

Housing (LS-511) Back panel mounting..... Sheet metal housing
 Dimensions WxHxD..... 190 x 167 x 47 mm
 Connection..... screw/plug terminals 2.5 mm²
 Protection system IP 20
 Weight (plastic/sheet metal) approx. 850/840 g

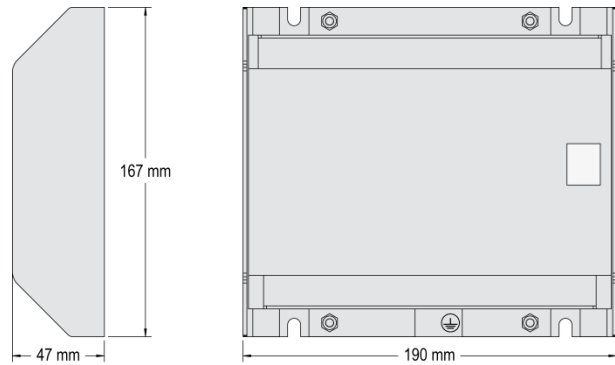
Disturbance test (CE) tested according to applicable EN guidelines
Listings CE, UL/cUL, BDEW, VDE AR-N 4105, EAC
Marine Pending: LR, ABS

DIMENSIONS

Plastic housing for front panel mounting




Metal housing for cabinet mounting



TERMINAL DIAGRAM

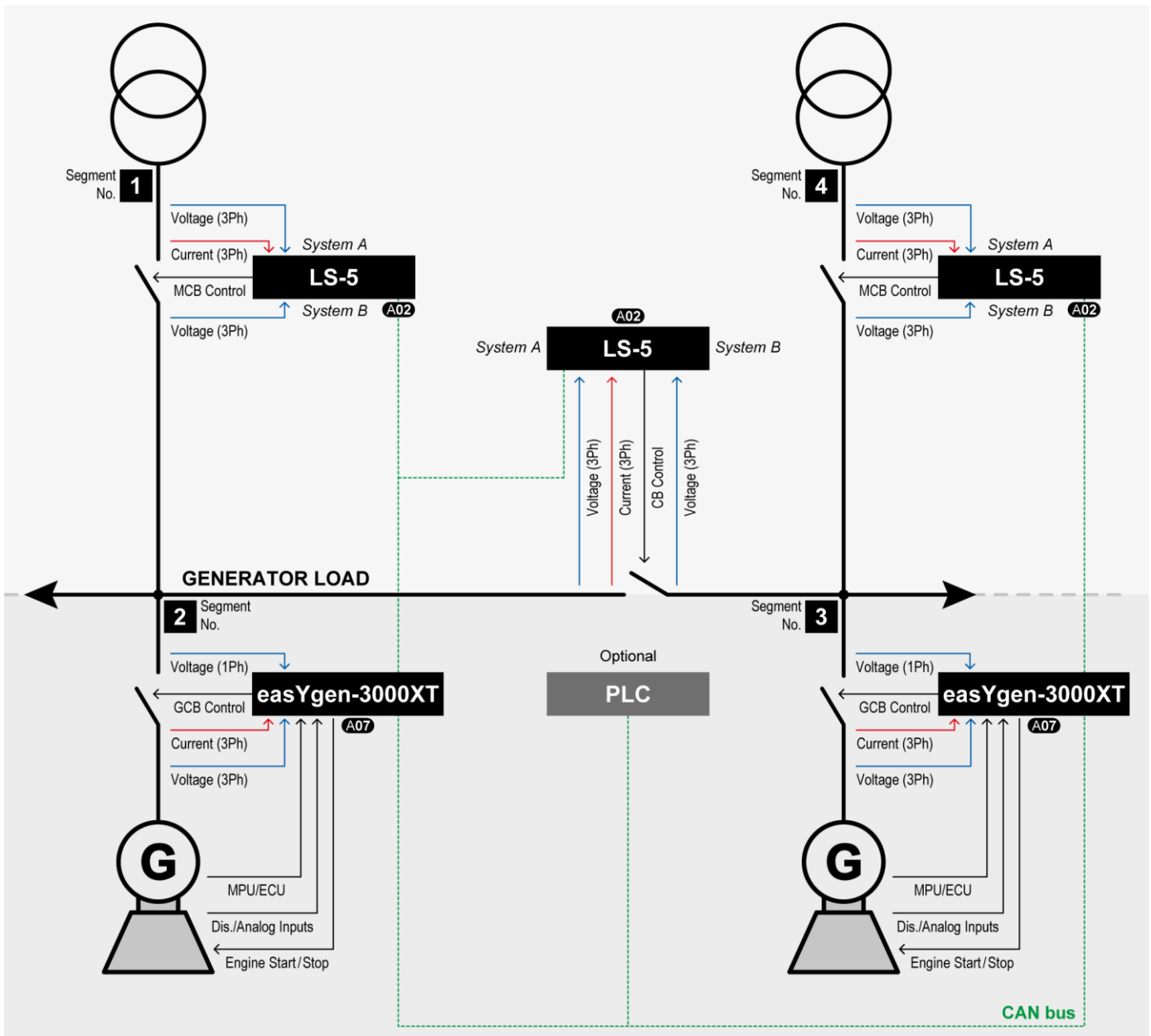
59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
RS-485-A	RS-485-B	CAN-H	CAN-L	No Connection	0 Vdc	12/24 Vdc	No Connection	DI08	DI07	DI06	DI05	DI04	DI03	DI02	DI01	COMMON
RS-485		CAN			POWER SUPPLY			DISCRETE INPUTS								

42	41	40	39	38	37	36	35	34	33	32	31	30
R06		R05		R04		R03		R02		R01		
RELAY OUTPUTS												

SYSTEM A CURRENT						No Connection	
							
S ₂ L1	S ₁ L1	S ₂ L2	S ₁ L2	S ₂ L3	S ₁ L3		
01	02	03	04	05	06	07	08

NO CONNECTION				SYSTEM A VOLTAGE								SYSTEM B 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				
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

EXAMPLE APPLICATION



CONTACT

North & Central America

Tel.: +1 970 962 7331
 ✉ SalesPGD_NAandCA@woodward.com

South America

Tel.: +55 19 3708 4800
 ✉ SalesPGD_SA@woodward.com

Europe

Tel. Stuttgart: +49 711 78954 510
 Tel. Kempen: +49 2152 145 331
 ✉ SalesPGD_EMEA@woodward.com

Middle East & Africa

Tel.: +971 4 430 8744
 ✉ SalesPGD_EMEA@woodward.com

Russia

Tel.: +49 711 78954 515
 ✉ SalesPGD_RUSSIA@woodward.com

China

Tel.: +86 512 8818 5515
 ✉ SalesPGD_CHINA@woodward.com

India

Tel.: +91 124 4399 500
 ✉ SalesPGD_INDIA@woodward.com

ASEAN & Oceania

Tel.: +49 711 78954 510
 ✉ SalesPGD_ASEAN@woodward.com

www.woodward.com

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For more information contact:

	LS-511	LS-521
I/Os		
Display	No	Yes
Configurable LEDs on Faceplate	Yes	No
System A/B voltage measurement	3-Phases + Neutral	3-Phases + Neutral
System A current measurement	3-Phase	3-Phase
Discrete inputs	8	8
Relay outputs	6	6
CAN Interface	1	1
RS-485 Interface	1	1
Control		
Automatic and Manual operating modes	✓	✓
Breaker synchronization (± slip frequency/phase matching)	✓	✓
Vector group adjustment for synchronization	✓	✓
Configurable dead bus closure direction	✓	✓
HMI		
Configuration via HMI and PC	✓	✓
Event recorder with real time clock (battery backup)	✓	✓
Date and Time Synchronization between LS-5 units and easYgen-3400XT/3500XT	✓	✓
Protection		
Over-/undervoltage (59/27)	✓	✓
Over-/underfrequency (81O/U)	✓	✓
Voltage asymmetry (47)	✓	✓
Phase shift (78)	✓	✓
df/dt (ROCOF) (81)	✓	✓
QV monitoring	✓	✓
Time-dependent voltage	✓	✓
Mains voltage increase (accord. to VDE-AR-N-4105)	✓	✓
Monitoring		
Breaker open/close monitoring	✓	✓
Synchronization time out monitoring	✓	✓
Voltage plausibility	✓	✓
Freely configurable alarms	4	4
Counter		
Circuit breaker closure counter	✓	✓
Energy counters	✓	✓
Listings/Approvals		
UL / cUL / EAC / CE Marked	✓	✓
Pending: LR & ABS Marine	✓	✓
Part Numbers		
	Metal housing	Plastic housing with display
LS-511 (1A / 5A)	8440-2180 / 8440-2152	---
LS-521 (1A / 5A)	---	8440-2178 / 8440-2150
DIN-Rail mounting Kit for LS-511	8923-1746	---
DPC-RS-232 direct configuration cable	5417-557	
DPC-USB direct configuration cable	5417-1251	
Spare parts: Plug set containing all terminal plugs	8928-7544	8928-7545

RELATED PRODUCTS

- Two breakers control **LS-512/522** (Product Specification # 37665)
- **easYgen-3400XT/3500XT** (Product Specification # 37583)
- **ToolKit** (Product Specification # 03366)
- **Power Generation Learning Module** (Product Specification # 03412): P/N 8447-1012
- Profibus Gateway **ESEPRO** (Application Note # 37577): P/N 8445-1046
- Ethernet (Modbus/TCP) Gateway **ESENET** (Application Note # 37576): 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**)