



## LS-5 Series V2

### LS-512/522 2breaker

## Multi-Breaker Control for complex power management applications

### DESCRIPTION

Woodward's LS-5 Series are synchronizer controllers with integrated mains decoupling and protection features. The applications range from independent synch check relay to complex power management relay 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-5x2 relays simplify the applications where load bus is served by a mains circuit breaker (MCB) and a generator group breaker (GGB). It senses voltage and current, quantifies the synchronization parameters and transmits the signals via CAN bus to the easYgen-3400XT/3500XT genset controllers. The two breakers control capability along with mains decoupling and protection features make it a perfect choice for transfer switch control under guidance of an external supervisory control. The LS-5x2 is software selectable to be applied as an LS-5x1 thereby facilitating hardware standardization to OEM switchgear builders, generator packagers, and system integrators.

The LS-5x2 Series is available in two different mounting styles. An LS-522 with a plastic housing and graphic LCD display is designed to be mounted on the cabinet's front door. An LS-512 with an aluminum powder coated housing without display is designed to be back panel mounted.

### FEATURES

- Up to 16 LS-5x2 relays can be operated in one network with up to 32 easYgen-3400XT/3500XT
- Remotely selectable breaker transition modes: Open, Closed (short parallel <100ms), Interchange, Indefinite parallel
- Software selectable to function as one breaker control
- Internal power calculation with option to feed active power from external transducer
- 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
- Breaker open/close failure detection
- Mains decoupling "Test" mode
- Lock keypad feature
- 4 freely configurable alarms
- 8 Freely configurable LED's on the LS-512 back panel mountable device
- Multilingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish

- Designed as a compact solution for complex power management applications
- Control up to 32 breakers on up to 32 bus segments in an application
- Purpose built application modes
- Synch check and mains decoupling in one compact controller
- Utility import/export control
- Accepts utility approved power measurement for loading/unloading
- Automatic and Manual mode
- LS-5 "Stand alone" mode for use without easYgen-3400XT/3500XT System
- LogicsManager functionality for application customization
- Adjustable vector groups for synchronization
- CAN and RS-485 interfaces for remote control and visualization
- True RMS sensing
- Available as cabinet front door mounted or DIN-Rail back panel mounted rugged metal housing
- Freely configurable relay outputs
- Freely configurable discrete inputs
- 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** ..... (  $\Delta$  /  $\Delta$  )  
 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 $\Omega$ , [4] 2.0 M $\Omega$   
**Current (Isolated)** ..... System A/B: 3/1 phase  
 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

**Analog input (isolated)** ..... freely scalable  
 Type ..... 4 to 20 mA  
 Resolution ..... 11 Bit  
 Maximum permissible voltage between genset Ground & PE ..... 100 V  
 Internal load ..... 50  $\Omega$   
 Accuracy ..... Class 1

**Relay outputs** ..... potential free  
 Contact material..... AgCdO  
 Load (GP) ..... AC: 2.00 Aac@250 Vac  
 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-522)** 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 mm<sup>2</sup>  
 Front..... insulating surface  
 Sealing Front..... IP66 (with screw fastening)  
 Front..... IP54 (with clamp fastening)  
 Back ..... IP20

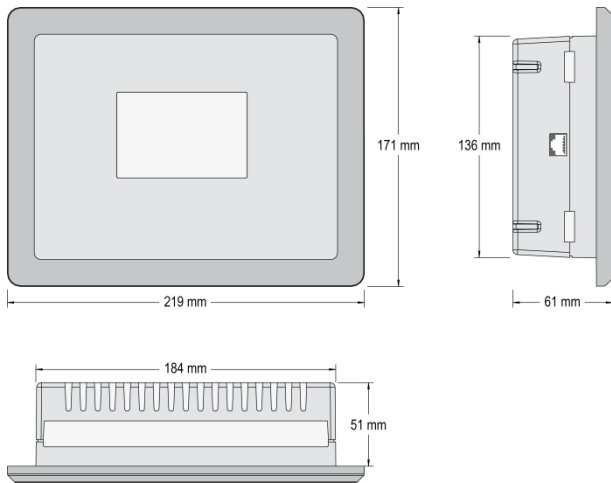
Weight..... approx. 850 g

**Housing (LS-512)** Back panel mounting..... Sheet metal housing  
 Dimensions WxHxD ..... 190 x 167 x 47 mm  
 Connection..... screw/plug terminals 2.5 mm<sup>2</sup>  
 Protection system ..... IP 20  
 Weight (plastic/sheet metal) ..... approx. 850/840 g

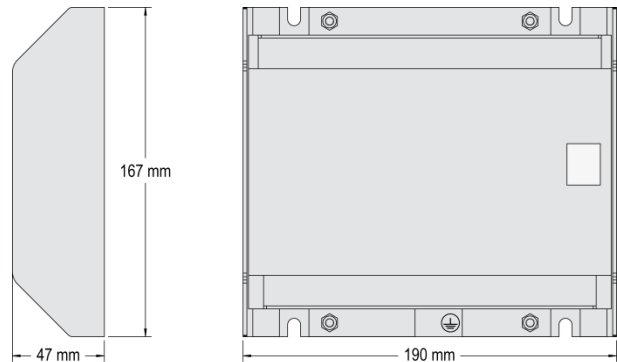
**Disturbance test (CE)** ..... tested according to applicable EN guidelines  
**Listings** ..... CE, UL/cUL, BDEW, VDE AR-N 4105, EAC  
**Marine** ..... Pending: LR, ABS

# DIMENSIONS

**Plastic housing for front panel mounting**

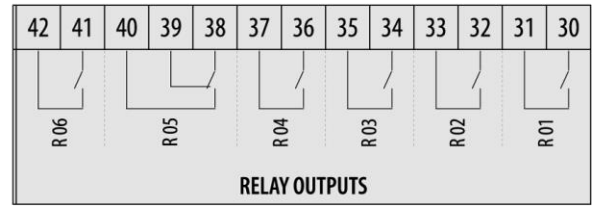


**Metal housing for cabinet mounting**



# TERMINAL DIAGRAM

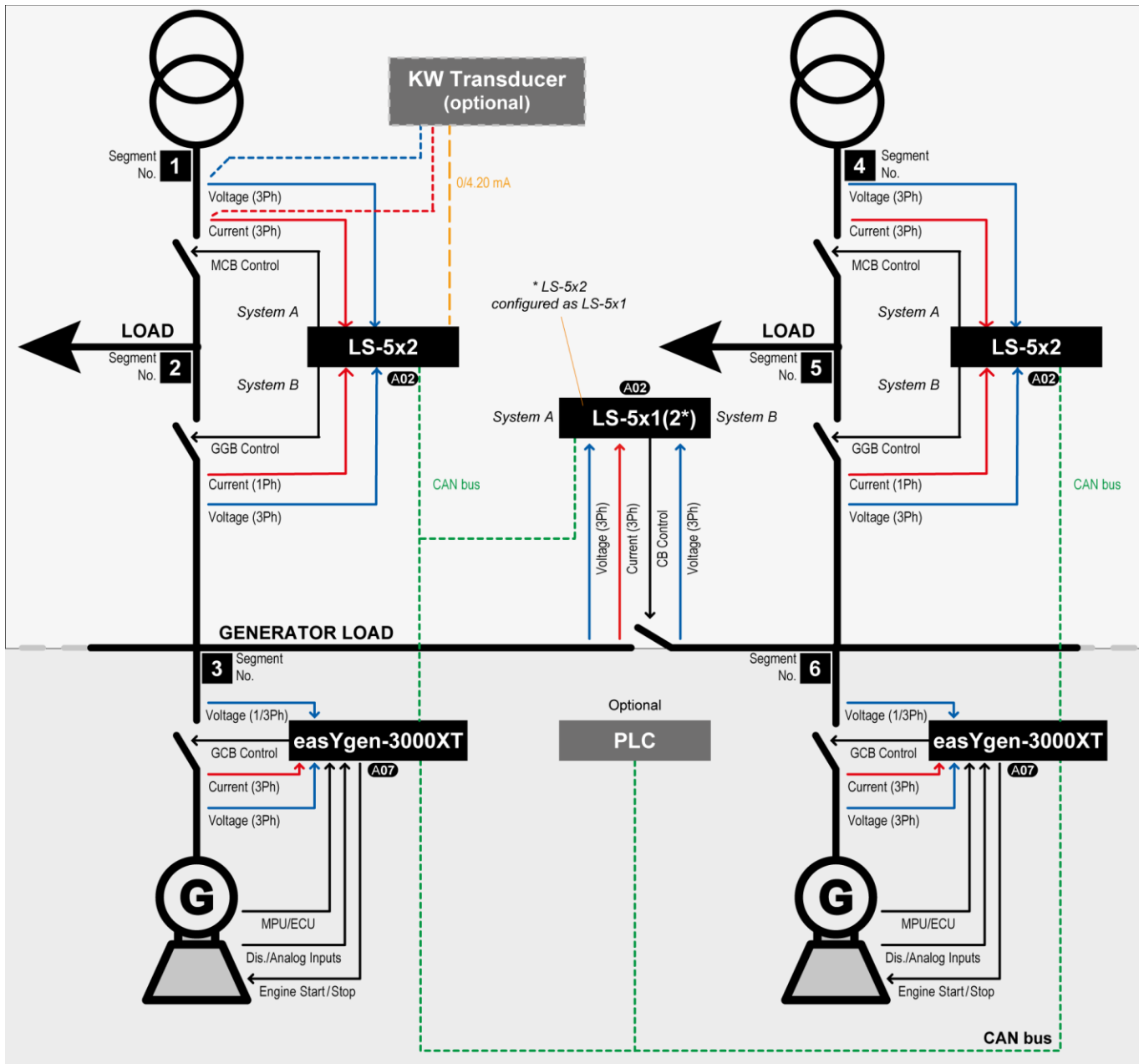
59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
RS-485-A	RS-485-B	CAN-H	CAN-L	No Connection	0 Vdc	12/24 Vdc	No Connection	DI 08	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	COMMON
RS-485		CAN		No Connection	POWER SUPPLY		No Connection	DISCRETE INPUTS								



SYSTEM CURRENT			
SYSTEM A		SYSTEM B	
S <sub>2</sub> L1	S <sub>1</sub> •	S <sub>2</sub> L2	S <sub>1</sub> •
01	02	05	06
SEE MANUAL			

ANALOG INPUT 0 to 20 mA			SYSTEM A VOLTAGE				SYSTEM B VOLTAGE				
- (GND)	+ [AI 01]	No connection	120 Vac L1	480 Vac L2	120 Vac L3	480 Vac N	120 Vac L1	480 Vac L2	120 Vac L3	480 Vac N	
10	11	12	14	15	16	17	18	19	20	21	
			22	23	24	25	26	27	28	29	

# EXAMPLE APPLICATION



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For more information contact:

	LS-512	LS-522
<b>I/Os</b>		
Display	No	Yes
Configurable LEDs on Faceplate	Yes	No
System A/B voltage measurement	3-Phases + Neutral	3-Phases + Neutral
System A/B current measurement	3-Phase / 1-Phase	3-Phase / 1-Phase
Discrete inputs	8	8
Relay outputs	6	6
0/4-20mA Input (Optional power system A/B)	1	1
CAN Interface	1	1
RS-485 Interface	1	1
<b>Control</b>		
Automatic and Manual operating modes	✓	✓
Breaker synchronization ( +/- slip frequency / phase matching)	✓	✓
Vector group adjustment for synchronization	✓	✓
Configurable dead bus closure direction	✓	✓
<b>HMI</b>		
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	✓	✓
<b>Protection</b>		
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)	✓	✓
<b>Monitoring</b>		
Breaker open/close monitoring	✓	✓
Synchronization time out monitoring	✓	✓
Voltage Plausibility	✓	✓
Freely configurable alarms	4	4
<b>Counter</b>		
Circuit breaker closure counter	✓	✓
Energy Counters	✓	✓
<b>Listings/Approvals</b>		
UL / cUL / EAC / CE Marked	✓	✓
Pending: LR & ABS Marine	✓	✓
<b>Part Numbers</b>	Metal housing	Plastic housing with display
LS-512 (1A / 5A)	<b>8440-2181 / 8440-2153</b>	---
LS-522 (1A / 5A)	---	<b>8440-2179 / 8440-2151</b>
DIN-Rail mounting Kit for LS-511	<b>8923-1746</b>	---
DPC-RS-232 direct configuration cable	<b>5417-557</b>	
DPC-USB direct configuration cable	<b>5417-1251</b>	
Spare parts: Plug set containing all terminal plugs	<b>8928-7544</b>	<b>8928-7545</b>

## RELATED PRODUCTS

- Single breakers control **LS-511/521** (Product Specification # 37661)
- **easYgen-3400XT/3500XT** (Product Specification # 37583)
- Automatic Transfer Switch Control **DTSC-200** (Product Specification # 37398)
- **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**)