DSLC-2™ Digital Synchronizer and Load Control

DESCRIPTION

Woodward blended the original solid DSLC™ with another decade of application experiences in developing the new DSLC-2. The DSLC-2 excels in either simple generator or complex generator system applications. The DSLC-2/MSLC-2 combination provides multiple unit, segment, utility and intertie breaker control for complex power systems.

The Woodward DSLC-2 control is a microprocessor-based synchronizer and load control designed for use on three-phase AC generators. The DSLC-2 control combines synchronizer, load sensor, load control, dead bus closing system, VAR, power factor and process control, all integrated into one powerful package. Applications allow up to 32 generators to be precisely paralleled and controlled. A dedicated Ethernet system provides seamless communications between DSLC-2 and MSLC-2 units. A second Ethernet port is provided for customer remote control and monitoring capability using Modbus TCP allowing easy DCS and PLC interfacing. Modbus RTU is available through a separate RS-485 port.
A redundant Ethernet network is possible with the two Ethernet ports.

Slip frequency or phase matching automatic synchronizing with or without dead bus closing is selectable.

The DSLC-2 control senses true RMS power and provides soft bump-less loading and unloading functions. It can either base load or set import/export/process power levels against the utility, or accurately share loads on isolated, multiple generator systems.

VAR and power factor control flexibility allows you to either provide a set level of VARs to the utility or to maintain a constant power factor for reliable operation. The VAR/PF control also shares kVARs in an isolated systems, maintaining proportional reactive loads (kVARs) on all machines more accurately than droop or cross-current voltage systems.

FEATURES

- Dedicated Ethernet line for precise system communications between all DSLC-2's and MSLC-2's significantly reduces system wiring.
- Ethernet Modbus TCP for remote control and monitoring.
- Redundant Ethernet communication for enhanced reliability.
- Flexible hardware allows the new DSLC-2 to be used in different applications which previously would have required one of 12 separate DSLC part numbers.
- Integrated DSLC-2 and MSLC-2 system functionality eliminates the need for redundant sensors (like PTs, CTs, and MOPs) that connect to individual modules such as the load sensors and synchronizers.
- Back panel mounting and a reduced size frees up door space and provides easy wiring.
- Eliminates the need for additional relay logic to control dead bus closing.
- Slip frequency paralleling, voltage matching, and speed bias transfer between the synchronizer and load control result in smooth paralleling without the risk of reverse power trips.
- Three-phase true RMS power sensing makes the DSLC-2 control accurate even with unbalanced phase loading and voltage fluctuations.
- Phase angle compensation for GCB eliminates the need for additional deviation correction relay across a transformer.
- The system update function increases the availability of isochronous load sharing.
- The Woodward ToolKit™ software allows flexible setup using the same basic menu tree as the original DSLC plus an overview screen. No hand held programmer is required. Graphical overview of generator and bus bar parameters with trending makes the DSLC-2 commissioning friendly.
- The ToolKit can be accessed either via one of the Ethernet ports or via RS-232 port.

- **Applications for up to 32 generators using 32 DSLC-2 and up to 16 MSLC-2 controls.**
- **Complex applications with up to 8 bus segments**
- **Four communication ports**
- **Ethernet A port for unit to unit communications**
- **Ethernet B port for remote control monitoring via Modbus TCP**
- **Ethernet or RS-485 port for remote control via Modbus RTU**
- **RS-232 port for configuration of device using Woodward ToolKit software**
- **Automatic generator soft loading and unloading for bump-less load transfer**
- **Isochronous load sharing with other DSLC- 2 equipped sets**
- **Process control**
- **VAR or Power Factor control**
- **Dead bus closing**
- **PLC & DCS compatible**
- **One DSLC-2 hardware on-stock is configurable for multiple speed controls, voltage regulators, and potential transformer configurations**
- **Application range up to 999 MW**
- **Not compatible with previous DSLC**
- **UL/cUL & CE Listed**

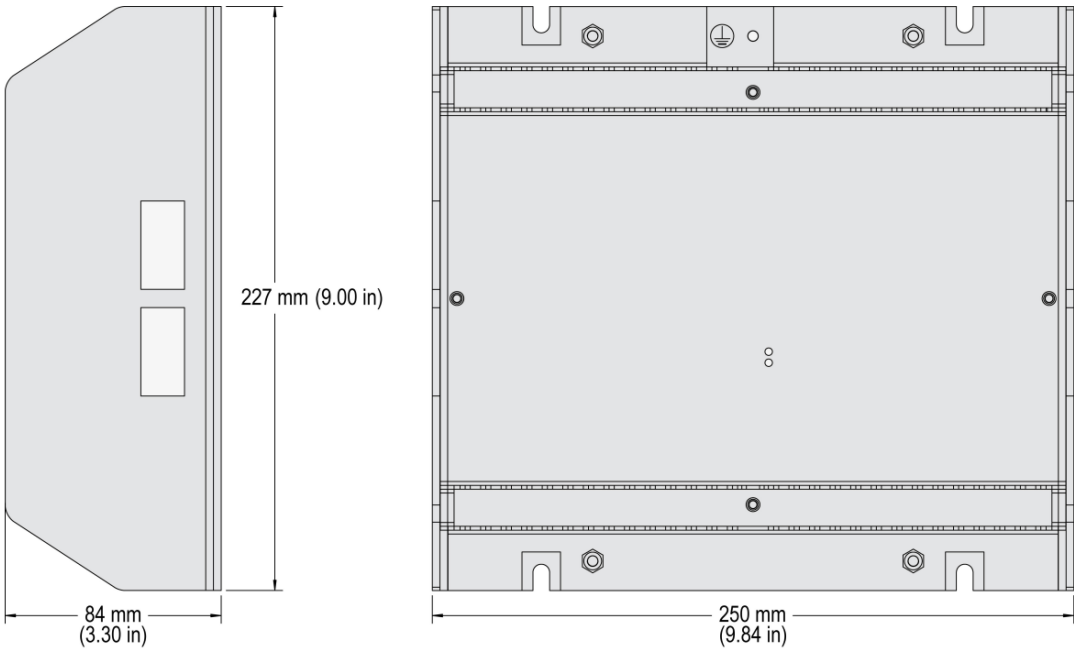
SPECIFICATIONS

Power supply ..... 12/24 Vdc (8 to 40 Vdc)
Intrinsic consumption ..... max. 15 W
Ambient temperature (operation) ..... -40°C to 70°C / -40 to 158°F
Ambient temperature (storage) ..... -40°C to 85°C / -40 to 185°F
Ambient humidity ..... 95%, non-condensing
Voltage ..... (⅄/Δ)
120 Vac [1] Rated (V_{rated}) ..... 69/120 Vac
Max. value (V_{max}) ..... 86/150 Vac
Rated voltage phase - ground ..... 150 Vac
Rated 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
Rated surge volt.(V_{surge}) ..... 4.0 kV
Accuracy ..... Class 0.5
Measurable alternator windings ..... 3p-3w, 3p-4w, 3p-4w OD
Setting range ..... primary ..... 50 to 650,000 Vac
Linear measuring range ..... $1.25 \times V_{rated}$
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) Rated (I_{rated}) ..... [1] ../1 A or [5] ../5 A
Linear measuring range ..... $I_{gen} = 3.0 \times I_{rated}$
$I_{mains/ground} = 1.5 \times I_{rated}$
Setting range ..... 1 to 32,000 A
Burden ..... < 0.15 VA
Rated short-time current (1 s) ..... [1] $50 \times I_{rated}$, [5] $10 \times I_{rated}$
Accuracy ..... Class 0.5

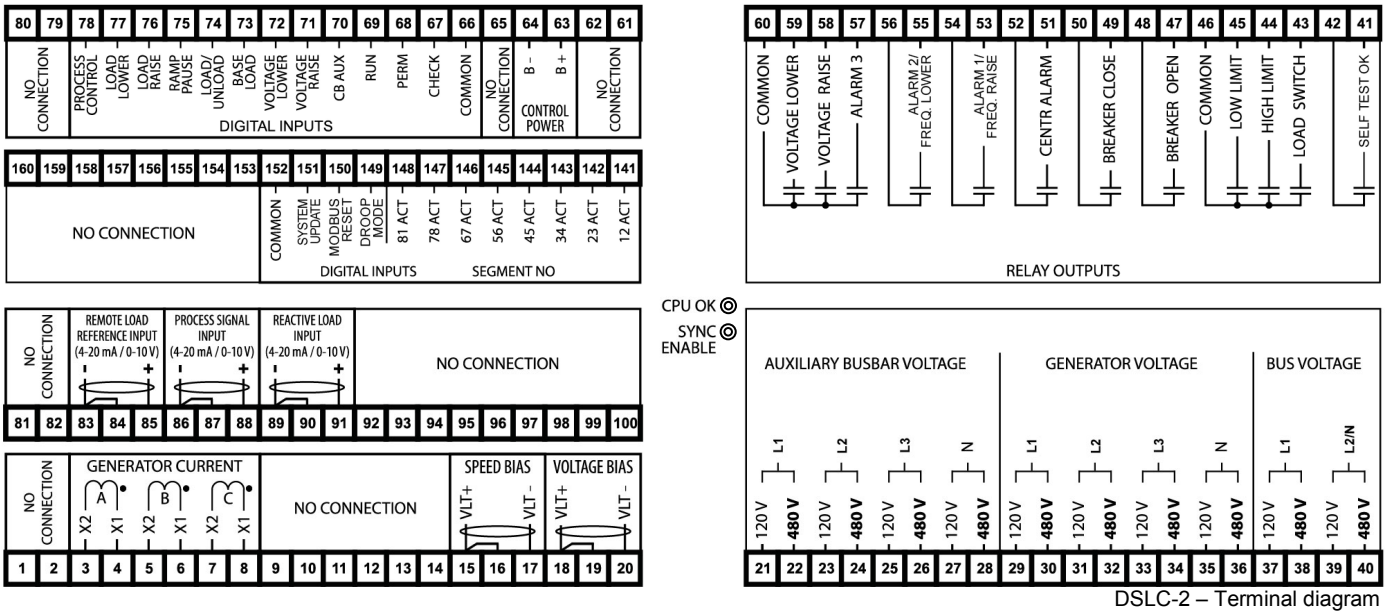
Power .....
Setting range ..... 0.5 to 99,999.9 kW/kvar
Discrete inputs ..... isolated
Input range ..... 12/24 Vdc (8 to 40 Vdc)
Input resistance ..... approx. 20 kOhms
Relay outputs ..... potential free
Contact material ..... AgCdO
Load (GP) ..... 2.00 Aac@250 Vac
2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
Pilot duty (PD) .....
1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc
Analog inputs (none isolated) ..... freely scalable
Type ..... 0 to 10 V / 0 to 20 mA
Resolution ..... 11 Bit
Analog outputs (isolated) ..... freely scalable
Type ..... ± 10 V / ± 20 mA / PWM
Insulation voltage (continuously) ..... 100 Vac
Insulation test voltage (1s) ..... 500 Vac
Resolution ..... 11/12 Bit (depending on analog output)
± 10 V (scalable) ..... internal resistance approx.500 Ohms
± 20 mA (scalable) ..... maximum load 500 Ohms
Housing Switch cabinet back mounting ..... Sheet metal housing
Dimensions WxHxD ..... 250 × 227 × 84 mm (9.84 × 9.00 × 3.30 in)
Connection ..... screw/plug terminals 2.5 mm²
Protection system ..... IP 20
Weight ..... approx. 1,900 g (4.2 lbs)
Disturbance test (CE) ..... tested according to applicable EN guidelines
Listings ..... UL, cUL, GOST-R, CSA
Marine ..... LR (Type Approval), ABS (Type Approval)

DIMENSIONS

Sheet metal housing for cabinet mounting

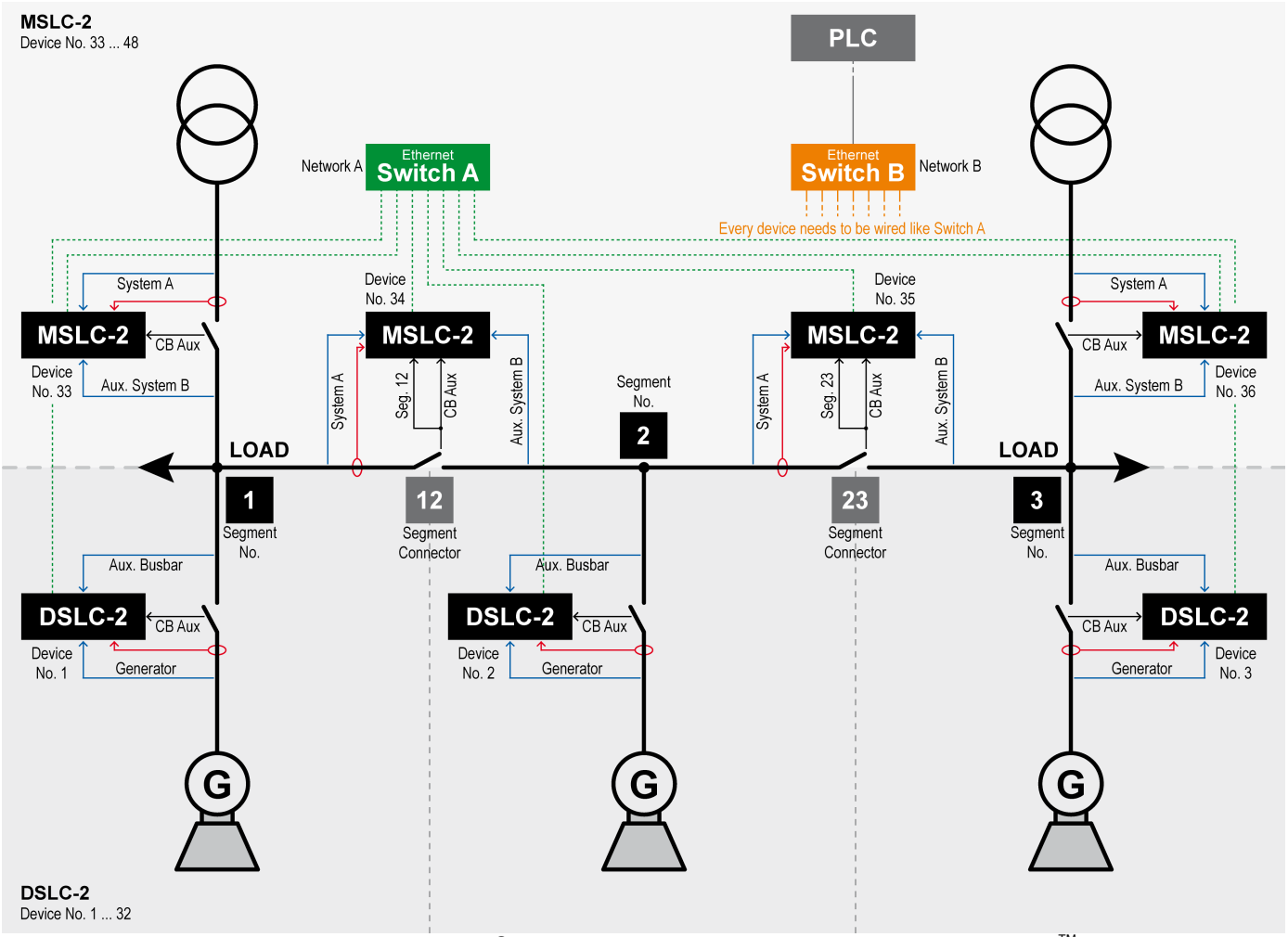


TERMINAL DIAGRAM



DSLC-2 – Terminal diagram

TYPICAL CONFIGURATION



Configuration of a typical application using DSLC-2 und MSLC-2™ devices in combination

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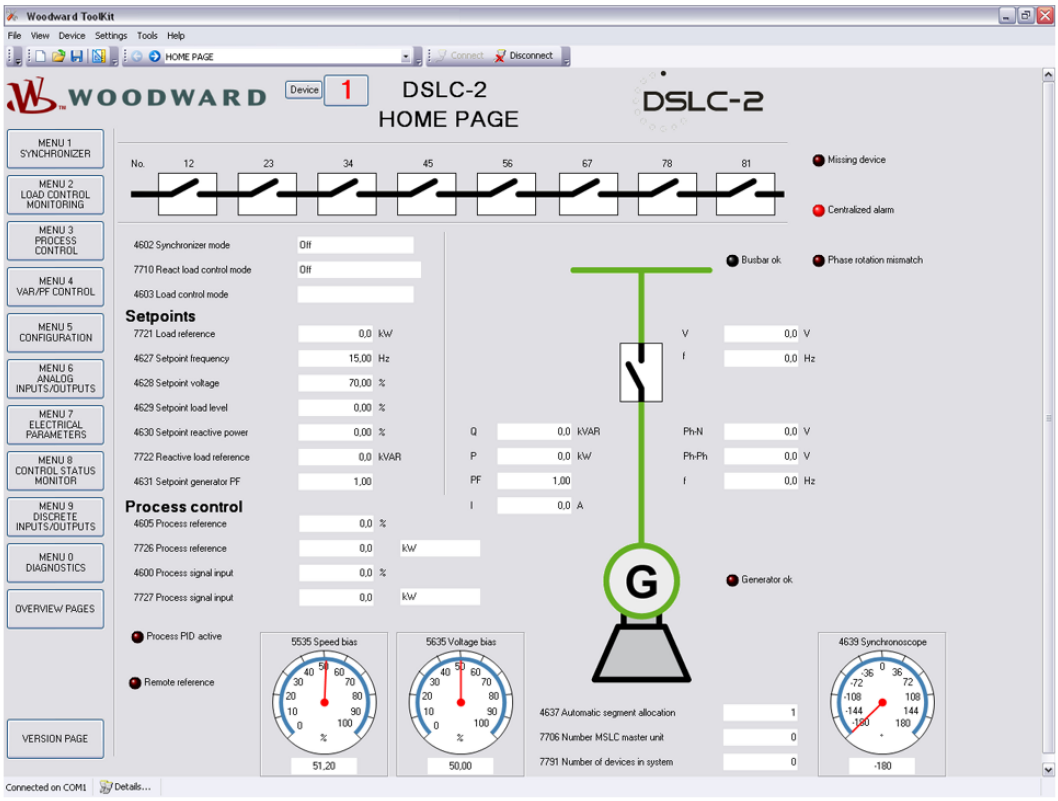
TOOLKIT CONFIGURATION SOFTWARE

Woodward's ToolKit provides user friendly configuration, commissioning assistance, displays all operating modes, and the overview pages show what other controls the DSLC-2 is communicating with. The DSLC-2 Home Page is shown below.
Note: *The menu tree illustrated on the left side is similar to the original DSLC™ structure.*



FEATURES OVERVIEW

	DSLC-2	MSLC-2
I/Os		
Discrete inputs	23	23
Relay outputs	12	12
Analog inputs	3	3
Analog outputs	2	-
RS-232 Interface	1	1
RS-485 Interface	1	1
Ethernet Interfaces (10/100 Mbit/s)	2	2
LED 1 "CPU OK"	Off / not ready / ready / system update active	Off / not ready / ready / system update active
LED 2 "Sync Enable"	Off / ready / not OK	Off / ready / not OK
Listings/Approvals		
UL / cUL Listing	✓	✓
GOST-R & CSA	✓	✓
LR & ABS Marine	✓	✓
CE Marked	✓	✓

PART NUMBERS

DSLC-2		MSLC-2	
1A CT inputs	5A CT inputs	1A CT inputs	5A CT inputs
P/N 8440-1978	P/N 8440-1878	P/N 8440-1977	P/N 8440-1877
Accessories			
Spare connector kit - P/N 8923-1806			