WOODWARD

MSLC-2

Product Specification
37494E

MSLC-2™ Master Synchronizer and Load Control

DESCRIPTION

Woodward's MSLC-2™ functions with the DSLC-2™ control to provide synchronization and load control across Utility and Intertie breakers. The MSLC-2/DSLC-2 combination operates over an Ethernet communication network to control simple or complex generator system applications. This combination, 32 DSLC-2's and 16 MSLC-2's, provide multiple unit, multiple segment, utility and intertie power management for complex power systems. Controls plant wide Import / Export levels while always providing bump-less load transfers with utility.

The MSLC-2 control combines synchronization, dead bus closing, utility/intertie load sensor, base-load control, import/export control, VAR, power factor, and a master process control in one powerful package.

The MSLC-2 provides phase matching or slip frequency synchronization, with voltage matching, across a utility or intertie breaker. The MSLC-2/DSLC-2 combination can handle multiple utility connections with a maximum of 8 bus segments in one application.

The MSLC-2's load sensor and load control sense true RMS power and provide a bump-less loading and unloading against a utility grid. Baseload, import/export, process, and utility unload modes control the KW power between different power sources at the same time controlling the reactive power, VAR and power factor. Reactive power is also ramped on and off for the smoothest load transactions between power grids.

The MSLC-2 communicates via Ethernet, with redundant Ethernet now available, to control real and reactive loading against the utility by DSLC-2 equipped generators.

The tie breaker mode allows synchronization between multiple generator systems. Segments are connected and power can be measured across an intertie, but no load control is functional when in Tie breaker operation.

.FEATURES

- One MSLC-2 can provide master control for up to 32 DSLC and an additional 15 MSLC-2 in a system.
- Two dedicated Ethernet lines for precise system communications between all DSLC-2's and MSLC-2's on the system.
- Ethernet Modbus TCP for remote control and monitoring by PLC or DCS system.
- Redundant Ethernet communications for enhanced reliability.
- Master MSLC-2 redundancy, loss of communications with the designated MSLC-2 master initiates control hand off to the next designated MSLC-2 master.
- The MSLC-2 hardware is adjustable for multiple applications.
- Slip frequency or voltage phase matching synchronizing fully selectable with dead bus option in both directions provide full flexibility for intertie and main-tie-main applications.
- Having functions integrated into one box eliminates the need for redundant sensors (like PTs, CTs, and MOPs) that connect to individual modules such as the load sensor and synchronizer.
- Digital signal processing makes the MSLC-2 resistant to power line distortions and harmonics.
- Three-phase true RMS power sensing provides accurate readings even with unbalanced phase loading and voltage fluctuations.
- Export/import control over multiple utility MSLC-2's in same segment.
- The Woodward ToolKit™ software allows flexible setup using the same basic menu tree as the original MSLC plus an overview screen. No hand held programmer is required. Graphical overview of generators and bus bar parameters with trending makes the MSLC-2 commissioning friendly.
- The Toolkit can be accessed either via one of the Ethernet ports or via RS-232 port.
- Phase angle compensation provides adjustment for additional deviation correction across a transformer.
- The system update feature allows for system reconfiguration.

- **Applications for up to 32 generators with 16 mains and/or tie breakers**
- **Configurable for mains and tie breaker applications**
- **Complex applications with up to 8 bus segments**
- **Automatic segment recognition**
- **Redundant Ethernet communication for enhanced reliability**
- **The "system update" feature allows for system reconfiguration**
- **PLC and DCS compatible via Modbus RTU or Modbus TCP**
- **Automatic plant loading and unloading for bump-less load transfer to and from the utility**
- **Controls plant wide import/export levels against the utility**
- **Overall plant Power Factor control**
- **Ethernet or RS-232 port for configuration of device using Woodward ToolKit software**
- **UL/cUL & CE Listed**

SPECIFICATIONS

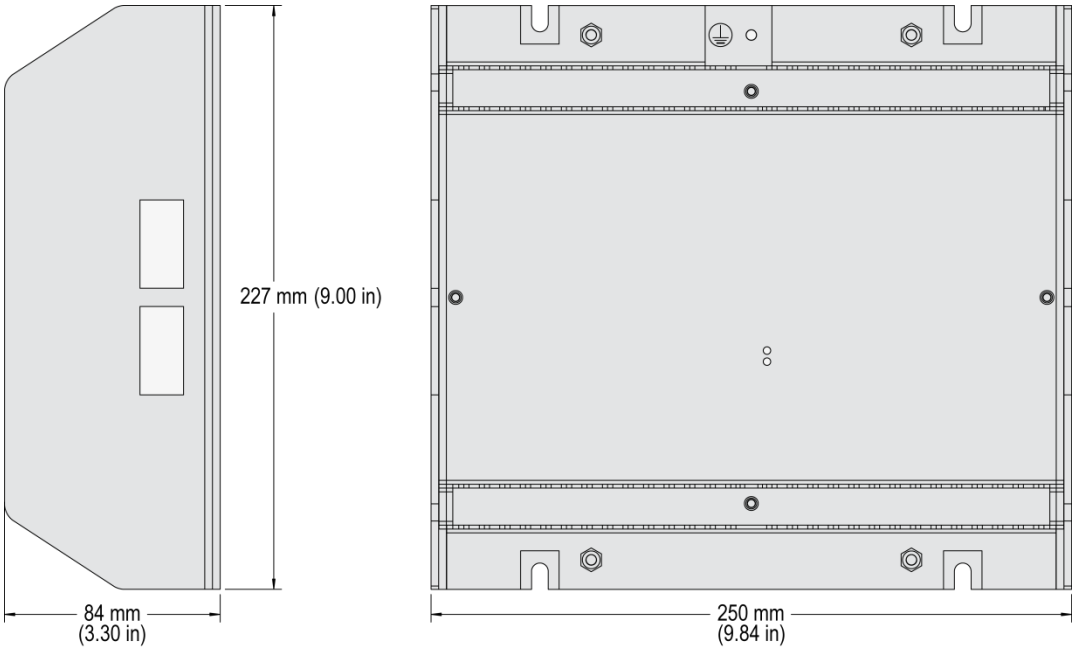
Power supply ..... 12/24 Vdc (8 to 40 Vdc)
Intrinsic consumption ..... max. 15 W
Ambient temperature (operation) ..... -40°C to 70°C / -40 to 158°F
Ambient temperature (storage) ..... -40°C to 85°C / -40 to 185°F
Ambient humidity ..... 95 %, non-condensing
Voltage ..... (⅄/Δ)
120 Vac [1] Rated (V_{rated}) ..... 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 (galvanically 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 .....

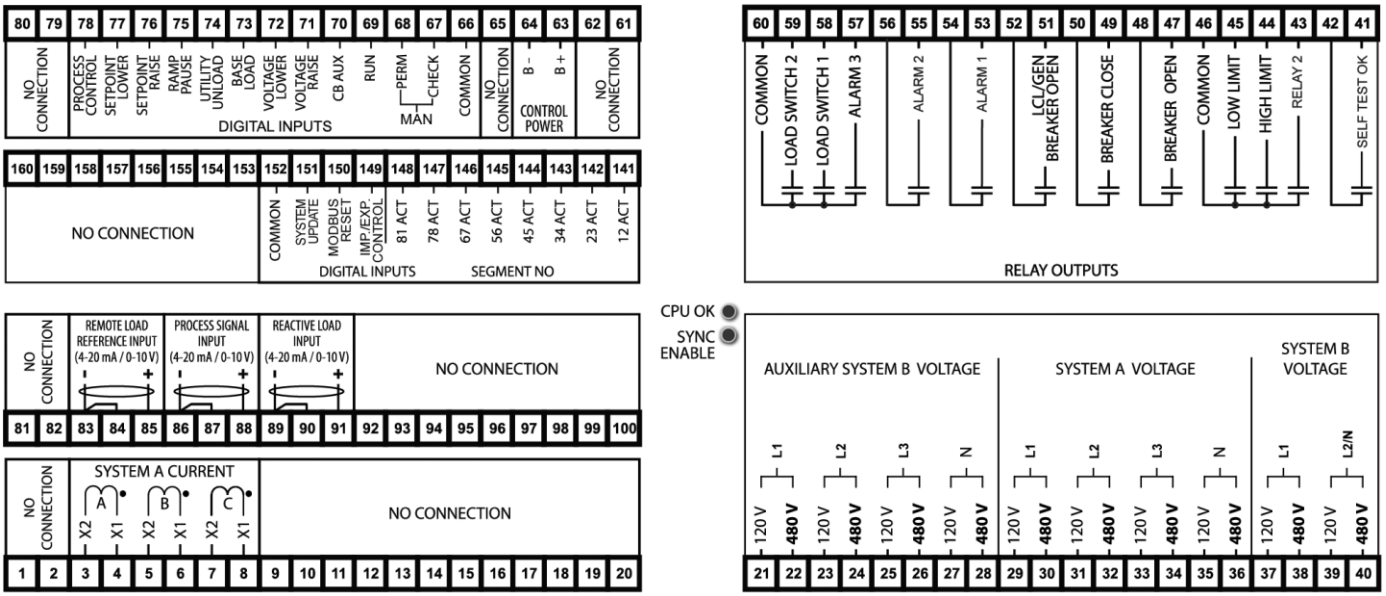
Setting range ..... 0.0 to 999,999.9 MW/kvar
Discrete inputs ..... galvanically isolated
Input range ..... 12/24 Vdc (8 to 40 Vdc)
Input resistance ..... approx. 20 kOhms
Relay outputs ..... galvanically isolated / potential free
Contact material ..... AgCdO
Load (GP) ..... 2.00 Aac@250 Vac
2.00 Adc@24 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 (not isolated) ..... freely scalable
Type ..... 0 to 10 V / 0 to 20 mA
Resolution ..... 11 Bit
Housing ..... Powder coated aluminum for back panel mounting
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

Powder coated aluminum for back panel mounting

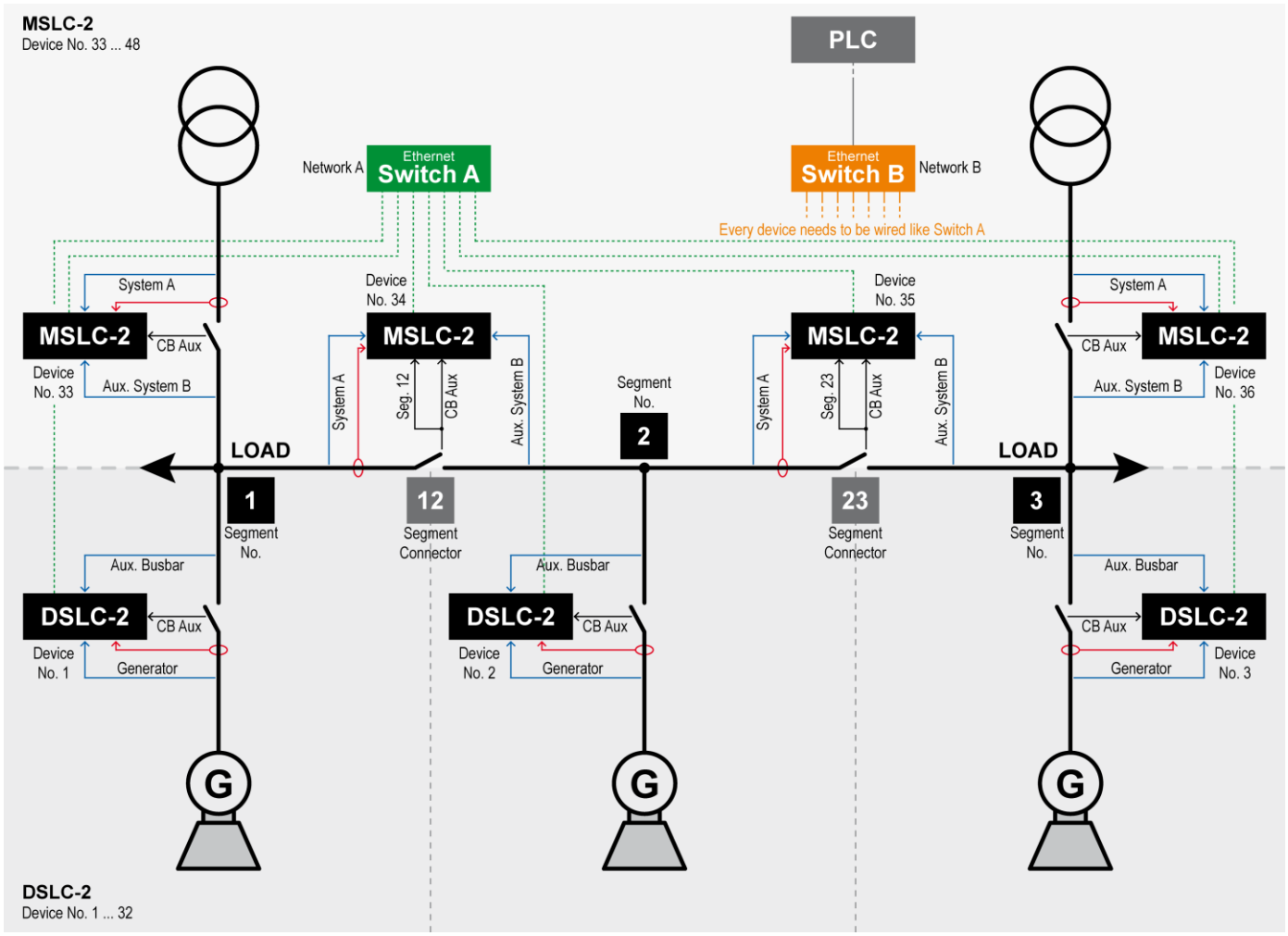


TERMINAL DIAGRAM



MSLC-2 – terminal diagram

TYPICAL CONFIGURATION



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

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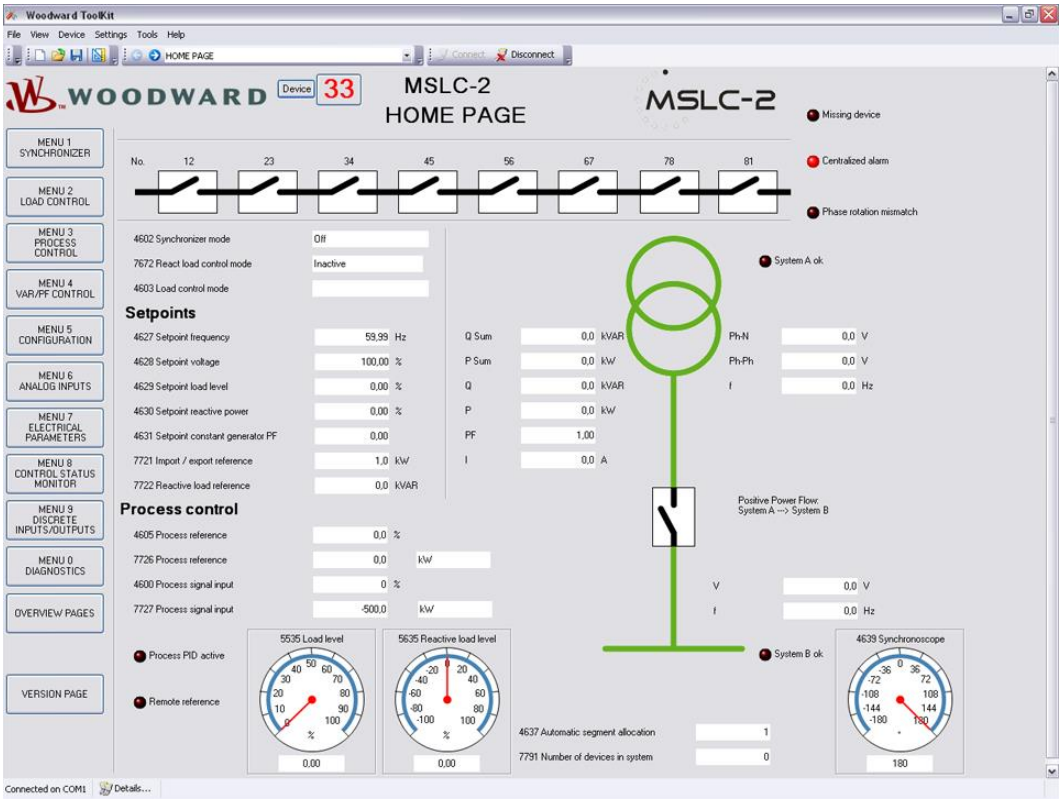
TOOLKIT CONFIGURATION SOFTWARE

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



FEATURES OVERVIEW

	MSLC-2	DSLC-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

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