



MSLC-2™ Master Synchronizer and Load Control

DESCRIPTION

The Woodward MSLC-2™ is a microprocessor based load control designed for three-phase electric power generation sites equipped with Woodward DSLC-2™ Digital Synchronizer and Load Controls. The original MSLC™ has been blended with another decade of application experiences to develop the new MSLC-2™. The MSLC-2™ is a synchronizer, a utility load sensor, an import/export load level control, a power factor control, and a master process control. Applications include power systems which operate in parallel with the utility with single or multiple utility feeds as well as new capabilities for multiple segment and intertie breaker control.

For utility parallel systems, the MSLC-2™ provides either phase matching or slip frequency automatic synchronizing of the local plant bus to the main power grid through one or several main breakers. The MSLC-2's™ load sensor and load control sense true RMS power and provide bumpless loading and unloading against the power grid. Plant voltage is matched to the utility prior to paralleling. Operating modes can either be base load or import/export/process power levels against the utility. Power factor or VAR levels are precisely controlled. The MSLC-2™ communicates via Ethernet to control real and reactive loading against the utility by DSLC-2™ equipped generators. 32 generators equipped with DSLC-2's™ can be paralleled to the utility with up to eight individual bus segments. Intertie breakers are controlled, and synchronized through individual MSLC-2's™ actively communicating with the individual DSLC-2's™ and the other MSLC-2's™ on the system.

For isolated multiple generator systems, the MSLC-2™ can be used to operate tie breakers between groups of generators using the DSLC-2™ controls.

FEATURES

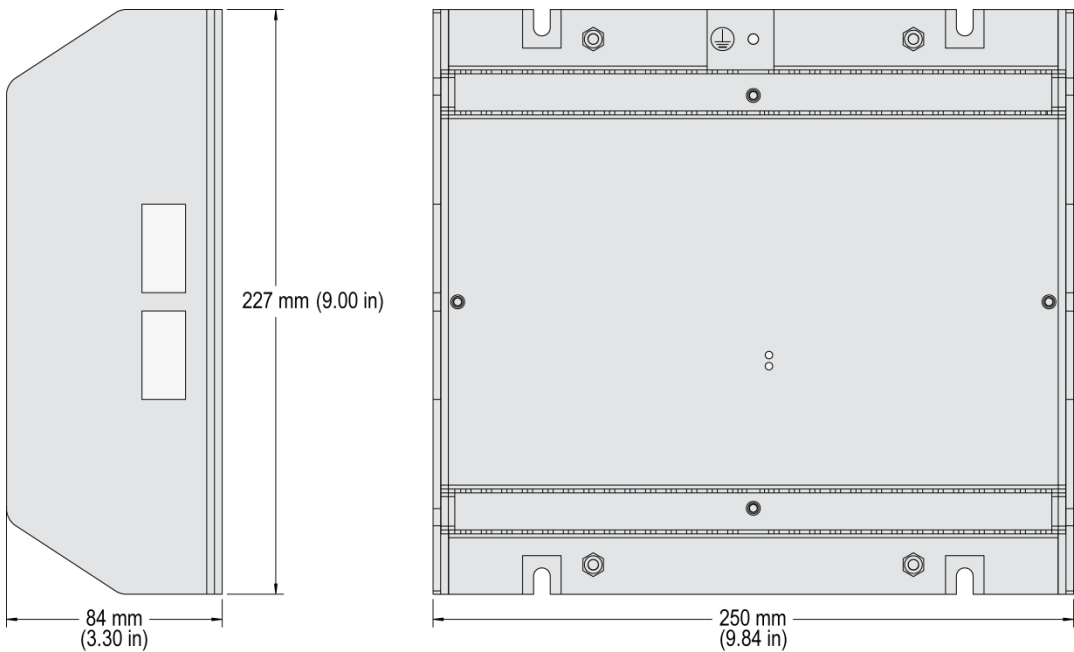
- One MSLC-2™ can provide master control for up to 32 DSLC™ and an additional 15 MSLC-2™ in a system.
- Dedicated Ethernet line for precise system communications between all DSLC-2's™ and MSLC-2's™ on the system.
- Ethernet Modbus TCP for remote control and monitoring by PLC or DCS system.
- Master MSLC-2™ redundancy. Loss of communications with the designated MSLC-2™ master initiates token passing to the next designated MSLC-2™ master.
- One part number (8440-1877) 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.
- Designing complex systems with multiple utility and segment interties is simplified using the DSLC-2™ and MSLC-2™ controls.
- 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.
- Ethernet communication for information exchange between max. 32 DSLC-2™ and 16 MSLC-2™ controls
- PLC and DCS Compatible via Modbus RTU or Modbus TCP
- Automatic segment recognition
- Supports and communicates up to 8 bus segments
- Automatic plant loading and unloading for bumpless load transfer to and from the utility
- Controls plant wide import/export levels against the utility
- Overall plant Power Factor control
- Not compatible with original MSLC™
- UL/cUL & CE Listed

SPECIFICATIONS

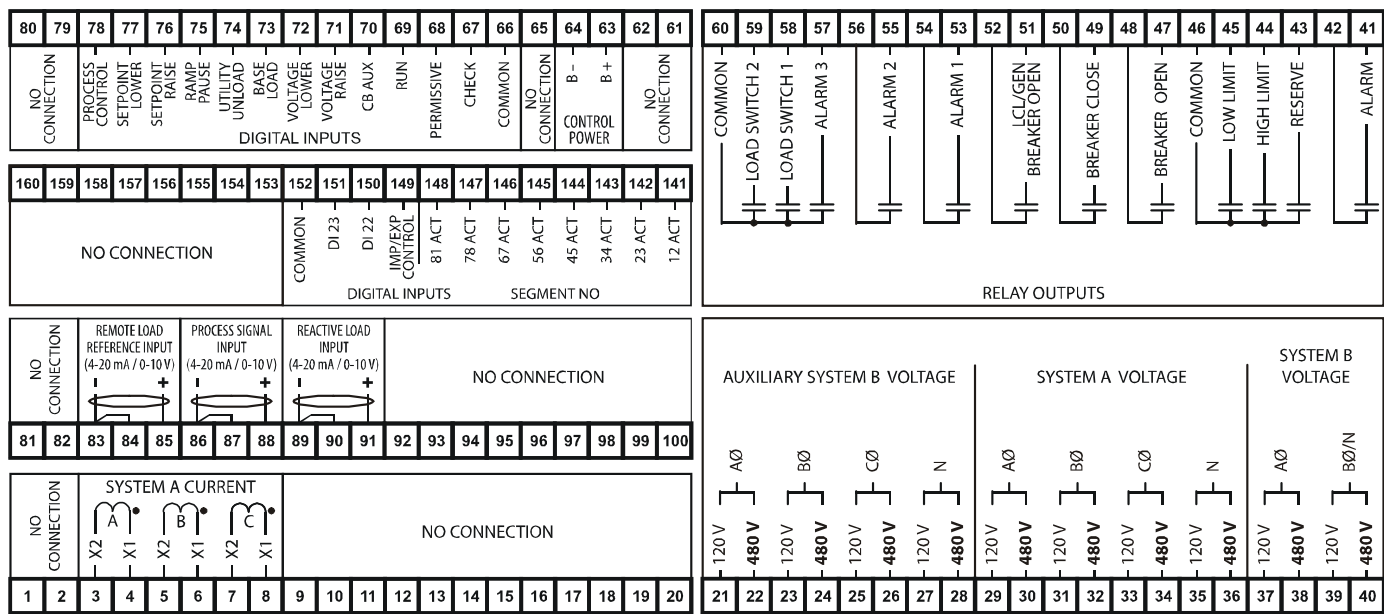
Power supply	12/24 Vdc (8 to 40 Vdc)	Power	
Intrinsic consumption	max. 15 W	Setting range	0.5 to 99,999.9 kW/kvar
Ambient temperature (operation)	-40°C to 70°C / -40 to 158°F	Discrete inputs	isolated
Ambient temperature (storage)	-40°C to 85°C / -40 to 185°F	Input range	12/24 Vdc (8 to 40 Vdc)
Ambient humidity	95 %, non-condensing	Input resistance	approx. 20 kOhms
Voltage	($\sqrt{3}$)	Relay outputs	potential free
120 Vac [1]	Rated (V_{rated}) 69/120 Vac	Contact material	AgCdO
	Max. value (V_{max}) 86/150 Vac	Load (GP)	2.00 Aac@250 Vac
	Rated voltage phase - ground 150 Vac		2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 0.18 Adc@250 Vdc
	Rated surge volt. (V_{surge}) 2.5 kV	Pilot duty (PD)	
and 480 Vac [4]	Rated (V_{rated}) 277/480 Vac		1.00 Adc@24 Vdc / 0.22 Adc@125 Vdc / 0.10 Adc@250 Vdc
	Max. value (V_{max}) 346/600 Vac	Analog inputs (none isolated)	freely scaleable
	Rated voltage phase - ground 300 Vac	Type	0 to 10 V / 0 to 20 mA
	Rated surge volt. (V_{surge}) 4.0 kV	Resolution	11 Bit
Accuracy	Class 0.5	Housing	Switch cabinet back mounting Sheet metal housing
Measurable alternator windings	3p-3w, 3p-4w, 3p-4w OD	Dimensions	WxHxD 250 x 227 x 84 mm (9.84 x 9.00 x 3.30 in)
Setting range	primary 50 to 650,000 Vac	Connection	screw/plug terminals 2.5 mm ²
Linear measuring range	1.25x V_{rated}	Protection system	IP 20
Measuring frequency	50/60 Hz (40 to 85 Hz)	Weight	approx. 1,900 g (4.2 lbs)
High Impedance Input; Resistance per path	[1] 0.498 M Ω , [4] 2.0 M Ω	Disturbance test (CE)	tested according to applicable EN guidelines
Max. power consumption per path	< 0.15 W	Listings	UL, cUL, GOST-R, CSA
Current (Isolated)	Rated (I_{rated}) [1] ..1 A or [5] ..5 A	Marine	LR (Type Approval), ABS (Design Assessment)
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] 50x I_{rated} , [5] 10x I_{rated}		
Accuracy	Class 0.5		

DIMENSIONS

Sheet metal housing for cabinet mounting

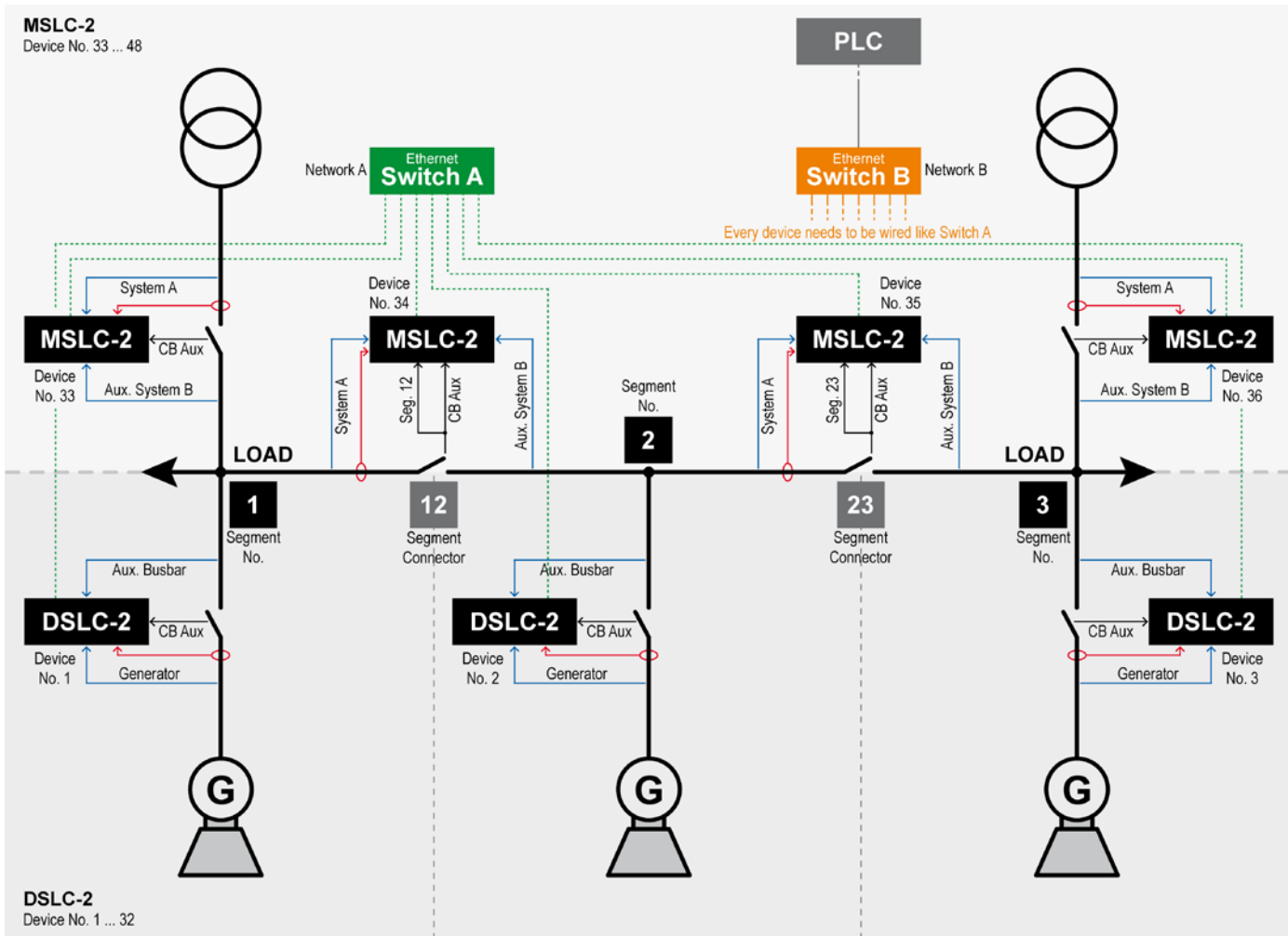


TERMINAL DIAGRAM



MSLC-2™ – terminal diagram

TYPICAL CONFIGURATION



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TOOLKIT CONFIGURATION SOFTWARE

Woodward's ToolKit Software provides the MSLC-2™ Home Page shown below. ToolKit provides user friendly configuration, commissioning assistance, displays all operating modes, and the over-view pages show what other controls the MSLC-2™ is communicating with.

Note: The menu tree illustrated on the left side is similar to the original MSLC™ structure.



FEATURES OVERVIEW

	MSLC-2	DSL-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	CPU OK
LED 2	Sync Enable	Sync Enable
Listings/Approvals		
UL / cUL Listing	✓	✓
GOST-R & CSA	✓	✓
LR & ABS Marine	✓	✓
CE Marked	✓	✓

PART NUMBERS

MSLC-2		DSL-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			