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

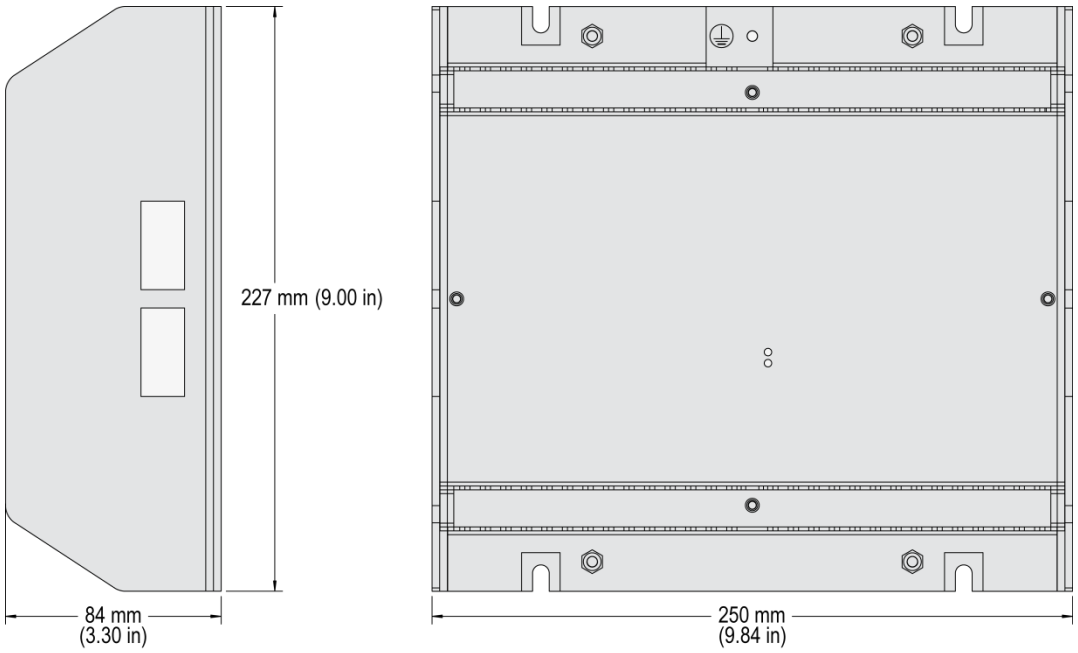
SPECIFICATIONS

Power supply ..... 12/24 Vdc (8 to 40 Vdc)
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

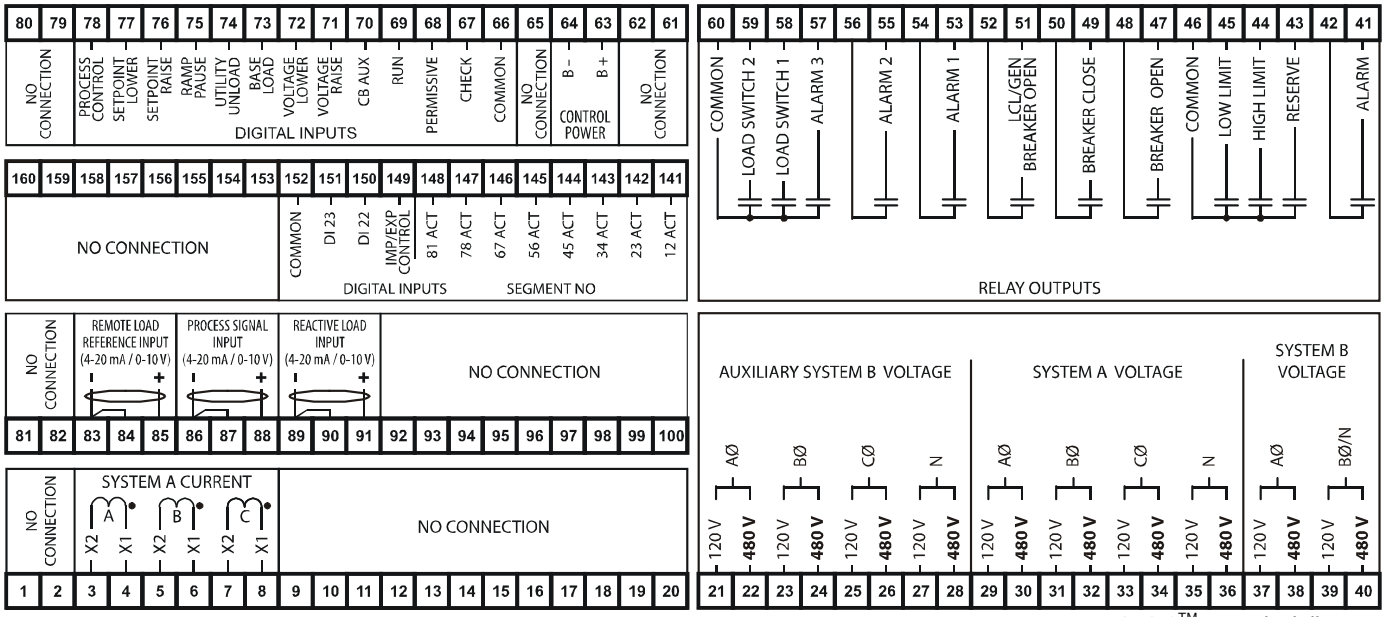
Power .....
Setting range ..... 0.5 to 99,999.9 kW/kvar
Discrete inputs ..... isolated
Input range ..... 12/24 Vdc (8 to 40 Vdc)
Input resistance ..... approx. 20 kOhms
Relay outputs ..... potential free
Contact material ..... AgCdO
Load (GP) ..... 2.00 Aac@250 Vac
2.00 Adc@24 Vdc / 0.36 Adc@125 Vdc / 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 scaleable
Type ..... 0 to 10 V / 0 to 20 mA
Resolution ..... 11 Bit
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 (Design Assessment)

DIMENSIONS

Sheet metal housing for cabinet mounting

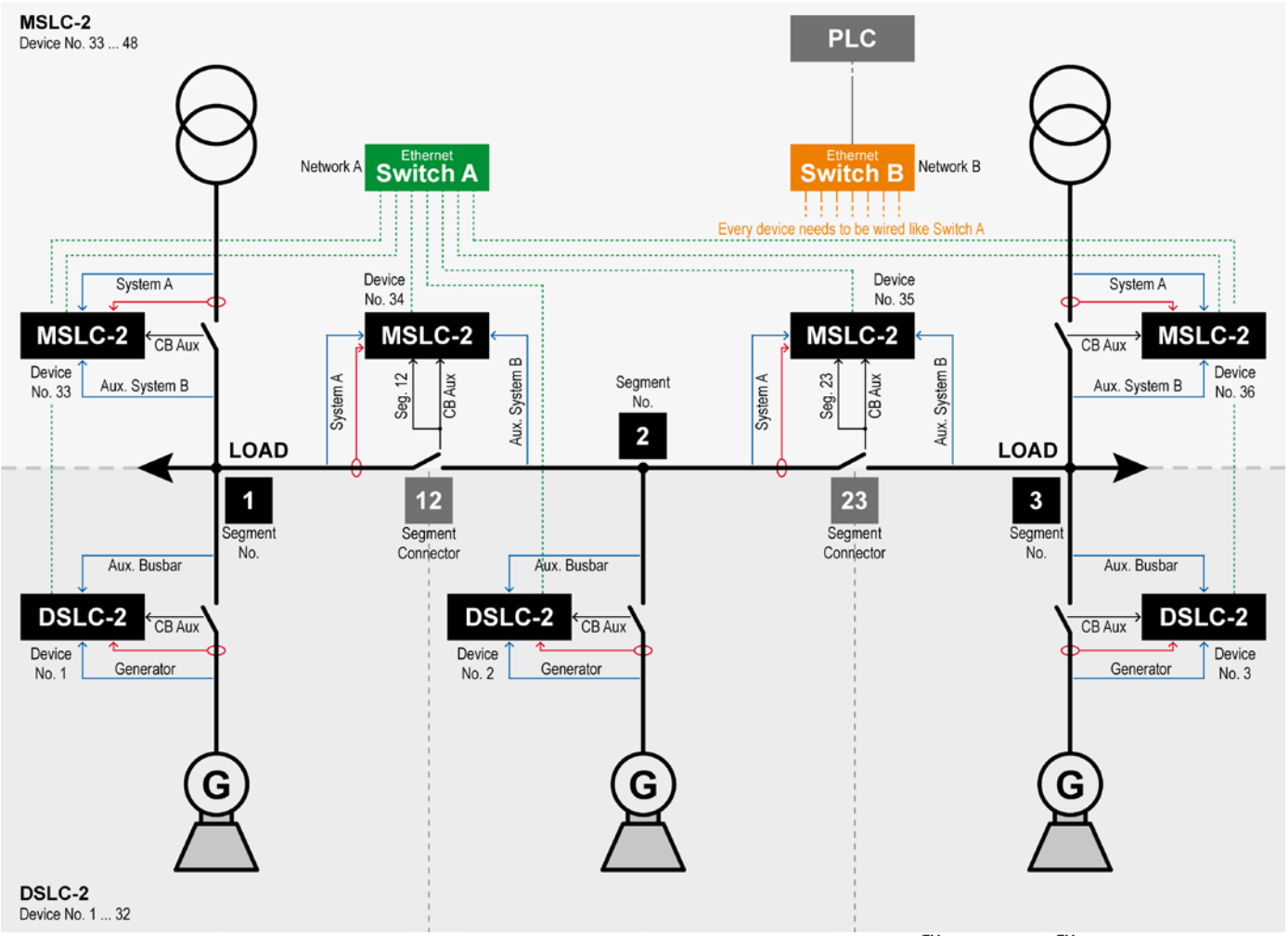


TERMINAL DIAGRAM



MSLC-2™ – terminal diagram

TYPICAL CONFIGURATION



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

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Distributors & Service
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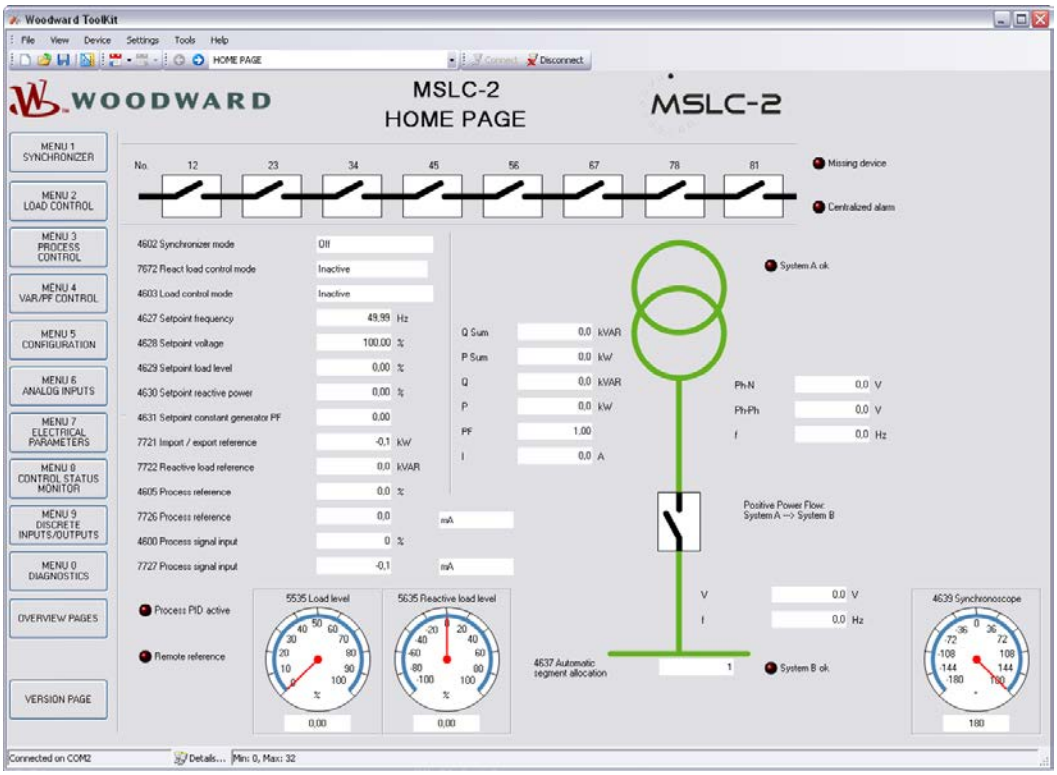
TOOLKIT CONFIGURATION SOFTWARE

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 overview 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	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	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		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			