EBIPAX INCORPORATED

Gate2MDLC SPECIFICATION SHEET

Gate2MDLC FEP solution (based on ACE3600) is a state-of-the-art high performance Gateway and/or FEP with exceptional communication capability. This unit is direct replacement for old Motorola IP Gateway, MCP-T, MCP-M and M-OPC. This unit is designed to provide connectivity to SCADA SW by open and/or standard protocols such as MODBUS, DNP3.0, IEC61850 and IEC60870-5 protocols. The unit's rugged design offers compliance for the requirements of most demanding SCADA system environments.

MAIN FEATURES:

- Power PC based processor provides very high performance
- VX-Works based real-time operating system
- Up to three Ethernet ports
- Up to four serial communication ports
- Up to two radio modem ports
- Up to 2 USB ports
- 0,2,3,5,7 or 8 I/O slot wall mount & 19" frames
- Expansion frames allow up to 110 I/O modules in a single unit.
- Redundant CPU and power supply
- Single and double density I/O modules
- Mixed analog input and output modules
- Hot Swap I/O replacement
- Wide operating temperature range -40 to +70 ºC
- OPTIONAL NEMA 4 / IP66 Housing, 40 x 40 cm and 50 x 50 cm
- Two-way/trunking/ digital radio models
- AC and DC controlled power supply
- 6.5 or 10 Ah Backup battery, smart battery charger
- GPS and NTP for time synchronization
- System building tool for configuration and programming
- Remote firmware and program download
- Multiple Protocol Support: Modbus, DNP 3.0, DF1, IEC 60870-5-101, IEC 60870-5-104 and other 3rd party protocols

Gate2MDLC

ULTIMATE MDLC FEP SOLUTION

Gate2MDLC is a powerful Communication Processor providing an advanced data collection and processing unit with the intelligence required to operate in sophisticated SCADA systems. Advanced communication and networking capabilities include data transfer via two-way radio, trunked radio, digital radio, data radio, cellular modems, IP networks, line modem and more.

Gate2MDLC acts as versatile Gateway or FEP providing connectivity to other standard, open or other 3rd party protocols. Gate2MDLC interoperates across wide range of protocols such as IEC60870-5-101, DNP3.0, MODBUS and IEC60870-5-104 protocols, enabling integration of various PLC vendors with Motorola RTUs.

LOCAL INTELLIGENCE
GATE2MDLC is a microprocessor-based unit with large memory capacity that can make control decisions on-site, based on status conditions and values from local and remote sources.

Local intelligence permits control decisions without the need for real-time messages from other supervisory centers; GATE2MDLC can operate in sophisticated control systems.

PROGRAMMABLE
GATE2MDLC uses an advanced symbolic ladder logic application language to develop the data base conditions, values, and unit profile that must exist for each control action, message transmission, etc. to occur. Routines written in 'C' may be executed as a whole or part of the total application.

Powerful applications may easily be defined using industry accepted ladder logic and 'C'. The task is made easier by using the SCADA application development software and a PC-style computer.

PROTOCOLS
GATE2MDLC uses the OSI- based MDLC communication protocol for all data signaling. Third party MODBUS, DNP 3.0 DF1 (Allen Bradley) and IEC 60870-5 protocols are also supported.

MDLC was specifically developed for radio use but is completely applicable to Ethernet, wireline, and other media. It permits large volumes of data to be quickly transferred between units using packet transmission techniques.

The MDLC protocol enables adding the GATE2MDLC easily to existing MOSCAD systems where system expansion is required.

COMMUNICATIONS
GATE2MDLC permits communication to occur unit-to-central and unit-to-unit (peer-to-peer). Communication may occur between individual units or may be broadcast to several units simultaneously.
Store-&-forward may be employed to pass messages unit-to-unit throughout the system. Direct communication, where possible, or repeated messaging over one or multiple communication media, may be intermixed within the system.

UPLOAD/DOWNLOAD
GATE2MDLC, via the MDLC data transfer capability, uploads the data collected and calculated by the application program to a central site. It also receives downloaded changes to the application program and/or to the parameters that control how the application operates.

The process being supervised does not need to be static; operational variables and limits, and the process definition itself, can be easily changed and transmitted to the unit from anywhere in the system's network.

A unique feature of GATE2MDLC, also enables remote firmware safe download from anywhere in the system's network. This allows remote firmware upgrades.

The above features minimize site visits by maintenance personnel after the unit's initial installation.

COMMUNICATION PORTS
Connectors on the various CPU modules permit the connection for local application programming, or connection to other on-site devices to supervise their operation, and to the communication media device.

Multiple connectors, multiple communication types, and variable data speeds allow practically all external data devices to be connected to the CPU module.

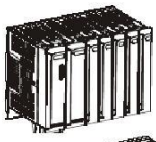
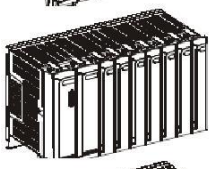
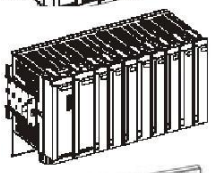
CHASSIS AND ENCLOSURES
GATE2MDLC can be provided on a metal chassis or in a painted steel NEMA 4 (IP66) rated outdoor enclosure that can hold the unit frame, modules, battery and up to two radios (depending on enclosure size). An optional tamper switch can be ordered with the enclosure.

19" RACK MOUNT
GATE2MDLC may be ordered with frame and mounting accessories that permit direct mounting onto standard 19" equipment racks. The frame contains space for power supply, CPU module and up to eight I/O modules. Optionally, a 19" metal back can be ordered for installation of backup battery, accessories and up to two radios.

I/O EXPANSION
The GATE2MDLC unit can be expanded to include up to 110 I/O modules controlled from the CPU. The I/O expansion is based on Ethernet LAN connection between the CPU module and the I/O expansion frames. The I/O expansion frames can be co-located with unit on the main frame (installed in the same 19" rack or cabinet) or distributed in the same site up to 50 meters from the main frame location.

CPU AND POWER SUPPLY REDUNDANCY
The redundant configuration enables installation of two redundant CPUs (CPU3680 only) and two redundant power supply modules to ensure continuous unit operation and voltage.

GATE2MDLC GENERAL SPECIFICATIONS

Frames	No I/O slots - PS and CPU modules only, wall mount 117 W x 209 H x 198* D mm (4.61” x 5.30” x 7.80”*), 0.95 Kg (2.1 Lb)	
	2 I/O slots - PS, CPU and 2 I/O modules, wall mount, 194 W x 244 H x 198* D mm (7.64" x 9.61" x 7.80"*), Approx. 1.6 Kg (3.56 lb)	
	3 I/O slots - PS, CPU and up to 3 I/O modules, wall mount 234 W x 244 H x 198* D mm (9.21”x 9.61” x 7.80” *), Approx. 1.9 Kg (4.19 Lb)	
	5 I/O slots - PS, CPU and up to 5 I/O modules, wall mount 314 W x 244 H x 198* D mm (12.36”x 9.61” x 7.80” *), Approx. 2.4 Kg (5.3 Lb)	
	7 I/O slots - PS, CPU and up to 7 I/O modules 391 W x 244 H x 198* D mm (15.39” x 9.61” x 7.80” *), 3. Kg (6.6 Lb)	
	8 I/O slots - PS, CPU and up to 8 I/O modules, wall mount OR 19” rack 435 W x 244 H x 198* D mm (17” x 9.61” x 7.80” *), Approx. 3.3 Kg (7.3 Lb)	
	Redundant CPU and power supply frame - Dual PS, Dual CPU, and 4 I/O modules; wall mount OR 19" rack, 391 W x 244 H x 198* D mm (15.39” x 9.61” x 7.80” *), 3. Kg (6.6 Lb)	
	* Depth including module panel Note: All frames except No I/O Slots can be used for I/O expansion.	
I/O Expansion Frame	Number of I/O slots - 2, 3, 5, 7, or 8 Default power supply - Expansion power supply Compatible power supplies - All except: 10.8-16V DC low-tier power supply	
Metal Chassis	19" frame metal back - for PS, ACE IP Gateway, radio and 6.5 or 10 Ah backup battery, 2 accessory boxes; wall/rack mount, OR PS, CPU, radio and 6.5 or 10 Ah backup battery, 0, 3, 5, or 8 I/O slot frame, up to 2 accessory boxes, wall/rack mount, 434.5 W x 310.4 H x 200* D mm (17.11"x 12.22" x 7.88"*) Large - for PS, CPU and up to 7 I/O slot frame, two radios and 6.5 or 10 Ah backup battery, wall mount, 448 x 468 mm x 200* D mm (17.64” x 18.43” x 7.88”*) Medium - for PS, CPU and up to 3 I/O slot frame, one radio and 6.5 Ah backup battery, wall mount, 335 W x 355 H x 198* D mm (17.64” x 18.43” x 7.80”*) Small - for PS, CPU, 2 I/O slot frame, 1 radio (or 1 accessory box), and 6.5Ah backup battery, wall mount, 264 W x 365 H x 200* D mm (11.02"x 14.17" x 7.88"*). * Depth Including Frame and Module	
Housing	Large NEMA 4/IP66 painted metal - up to 7 I/O slot frame, two radios and 6.5 or 10 Ah, backup battery, 500 W x 500 H x 210 D mm (19.7” x19.7” x 8.26”) Small NEMA 4/IP66 painted metal - up to 3 I/O slot frame one radio and 6.5 Ah backup battery, 380 W x 380 H x 210 D mm (15” x 15” x 8.26”)	

Power Supply	10.8-16 V DC 10.8-16 V DC low-tier 18-72 V DC 18-72 V DC with 12 V smart battery charger 100- 240 V AC, 50-60 Hz 100- 240 V AC, 50-60 Hz, with 12 V smart battery charger
Backup Battery	6.5 Ah - Sealed Lead-Acid 10 Ah - Sealed Lead-Acid
Operating Temperature	-40 ºC to +70 ºC (-40 ºF to 158 ºF) Notes: (1) when using a metal housing option, the maximum operating temp. outside the housing is +60 ºC (140 ºF). (2) Motorola radios and ACT module operating temp. range is: -30 ºC to +60 ºC (-22 ºF to 140 ºF) The full operating temperature range is supported when using redundant 12V power supplies. When using dual AC power supply or dual 18-72 V DC power supply, the maximum ambient operating temperature of the unit is limited to: • 50°C (122°F) - when installed inside a metal chassis or closed cabinet. • 60°C (140°F) - when installed without enclosure or closed cabinet.
Storage Temperature	-55 ºC to +85 ºC (-67 ºF to 185 ºF)
Operating Humidity	5% to 95% RH @ 50 ºC without condensation
Mechanical Vibrations	Per EIA/TIA 603 Base station, Sinusoidal 0.07mm @ 10 to 30 Hz, 0.035 mm @ 30-60 Hz
Operating Altitude	-400m to +4000 meter (-1312 ft to + 13120 ft) above sea level Note:100-240 V AC and 18-72 V DC PS operating altitude is -400m to +3000 meter (-1312 ft to + 6560 ft)

REGULATORY STANDARDS

Safety	UL 60950-1:2001
	CSA 22.2-60950-1
	IEC 60950-1
	AS/NZS 60950
	FM/cFM certified as Nonincendive Class I, Division 2 - standard FM 3611
	(Note: FM approval refers to model F7509 only and most of the GATE2MDLC options.)
Emission	Emission standards per:
	CFR 47 FCC part 15, subpart B (class A)
	EN55022:2003 Class A
	EN61000-3-2
	EN61000-3-3
Immunity	Immunity standards for industrial environments per EN50082-2 /IEC 61000-6-2
	IEC 61000-4-2
	IEC 61000-4-3
	IEC 61000-4-4
	IEC 61000-4-5
	IEC 61000-4-6
	IEC 61000-4-8
	IEC 61000-4-11

COMMUNICATIONS

Communication Ports:	Up to 5 ports per CPU (CPU 3640), up to 8 ports per CPU (CPU 3680/4600)
	Serial - up to 4 x RS-232 ports
	Multi-drop – up to 3 x RS-485 ports
	Ethernet - up to 2 x 10/100 MB ports and 1 x 10 MB port (CPU 3640/3680)
	Two-way radio/analog trunked radio - up to 2 x modem ports
	USB Host for MotoTrbo- up to 2 ports (CPU 3680/4600)
	Internal Ethernet 100 Mb/s port (for redundant CPU configuration) (CPU 3680 only)
Motorola Radio Support	Mobile conventional two-way radios - CM200, CM340, GM3188, EM200, CDM750
	Portable conventional two way radios – HT750, GP320, GP328, PRO5150
	Analog Trunk radios – XTL5000, XTL2500
	Digital Trunk radios – XTL5000, XTL2500, XTS2500, MTM800 (Tetra)
	MotoTrbo radios –XPR4350/4380, DM3400, XiR M8220, DGM4100
Third Party Radio Support	Two way radios, data radios, TETRA radio (PD)
Modem Support	Dial-up modems, cellular modems (dial mode & PD)
Protocols	MDLC, TCP, UDP, IP, PPP, NTP, DHCP
Third Party Protocol Support	MODBUS unit: master & slave on RS-232 / RS-485 / Ethernet
	DF1 (Allen Bradley): master on RS-232
	DNP 3.0 Plus: master & slave on RS-232 / RS-485 / Ethernet
	IEC 60870-5-101: slave on RS-232
User Protocol (user program)	Possible on RS-232, RS-485 and Ethernet ports

CPU 3610*/CPU 3640 MODULES SPECIFICATIONS

Microprocessor	Freescale – Power PC II, MPC8270, 32-bit, extended communication capability, DMA and floating point calculation support
Microprocessor Clock	200 MHz
Memory	Flash: 16 MB /3 MB free for user DRAM: 32 MB /10 MB free for user SRAM plug-in board (optional): 4 MB total /all free for user
Real-Time Clock	Full calendar with leap year support (Year, Month, Day, Hours, Minutes, Seconds) Time drift: max. 2.5 seconds per day (when power is on)
SRAM and RTC Retention	3 V Rechargeable lithium backup battery
Serial Port 1	Configurable RS-232C or RS-485 port: - RS-232C: A synch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s
Serial Port 2	RS-232C, Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface
Ethernet Port 1	10/100 Mb/s (on CPU 3640 only)
Plug-In Port 1	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-wire, up to 230.4 kb/s - Ethernet 10/100 Mb/s
Plug-In Port 2	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s and - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s - Ethernet 10 Mb/s
LEDs Display	4 CPU diagnostics LEDS, port status LEDs and user application LEDs
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Operating Voltage	10. 8 -16 V DC (from the motherboard connector)
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.38 Kg (0.84 Lb)

* The CPU 3610 model has been discontinued.

CPU 3680 MODULES SPECIFICATIONS

Microprocessor	Freescale – Power PC II, MPC8270, 32-bit, extended communication capability, DMA and floating point calculation support
Microprocessor Clock	200 MHz
Memory	Flash: 32 MB /19 MB free for user DRAM: 128 MB /100 MB free for user SRAM plug-in board (optional): 4 MB /all free for user
Real-Time Clock	Full calendar with leap year support (Year, Month, Day, Hours, Minutes, Seconds) Time drift: max. 2.5 seconds per day (when power is on)
SRAM and RTC Retention	3 V Rechargeable lithium backup battery
USB Host Port 1, 2	Type A host full speed 12 Mbs ports for MDLC over IP communication via the MotoTrbo digital mode radio system. For MotoTrbo radio only; No other USB devices or USB Hubs are supported.
Serial Port 1	Configurable RS-232C or RS-485 port: - RS-232C: A synch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s
Serial Port 2	RS-232C, Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface
Ethernet Port 1	10/100 Mb/s
Plug-In Port 1	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-wire, up to 230.4 kb/s - Ethernet 10/100 Mb/s
Plug-In Port 2	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s and - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s - Ethernet 10 Mb/s
USB Device Port 1	USB device port, Type B connector (for future use)
LEDs Display	4 CPU diagnostics LEDS, port status LEDs and user application LEDs
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Module Replacement	Hot swap replacement – module extraction/insertion under voltage in redundant systems only.
Operating Voltage	10. 8 -16 V DC (from the motherboard connector)
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.38 Kg (0.84 Lb)

12 V DC POWER SUPPLY MODULE (DEFAULT)

Input Voltage	10.8 - 16 V DC
Outputs	Motherboard connector (to CPU and I/O modules): equal to input voltage, max. 4 A AUX1A/AUX1B: equal to input voltage, max. 8 A, on/off controlled by user program AUX2A/AUX2B (configurable): 3.3, 5, 7.5, 9 V DC ±10%, max. 2.5A, on/off (default) OR equal to AUX1A/AUX1B output voltage max. 8A **Note:** max. 8 A total current consumption from all outputs
No Load power consumption	Max. 50 mA
Diagnostics LEDs	Status LED for: input voltage, AUX1 and AUX2 outputs, 12V control for DO modules
Input Protection	Internal Line Fuse, replaceable
Output Protection	AUX2A/B Short Circuit, automatic recovery on 3.3, 5, 7.5, 9 V
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.43Kg (0.95 Lb)

12 V DC LOW-TIER POWER SUPPLY MODULE

Input Voltage	10.8 - 16 V DC
Outputs	Motherboard connector (to CPU and I/O modules): The same as input voltage / max. 4 A AUX1A/AUX1B: equal to input voltage max. 8A **Note:** max. 8 A total current consumption from all outputs
Input Protection	Internal Line Fuse, replaceable
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.4Kg (0.9 Lb)

18-72 V DC POWER SUPPLY MODULES

Input Voltage	18-72 V DC
Total Power	18-72 V DC: Max. 60 Watt continuous, Max. 105 Watt peak @ 25% duty cycle
Outputs	Motherboard connector (to CPU and I/O modules): 13.2 V DC ±20%, max. 4 A AUX1A/AUX1B: 13.2 V DC ±20%, max. 8 A, on/off controlled by user program AUX2A/AUX2B (configurable): 3.3, 5, 7.5, 9 V DC ±10%, max. 2.5A, on/off (default) OR equal to AUX1A/AUX1B output voltage max. 8A **Note:** max. 8 A total current consumption from all outputs
Battery Charger	12 V Lead-Acid battery charger (in PS model with charger) Automatic charging of 6.5 or 10 Ah backup battery, battery temperature sensing, overcharging protection, battery capacity test and diagnostics, automatic battery switch-over
Diagnostics LEDs	Status LED for: input voltage, AUX1 and AUX2 outputs, 12V control for DO modules and battery
No Load power consumption	Max. 250 mA
Efficiency	80% typical, 76% with full load
In-rush Current	10 A maximum, for 2 mSec. Max, cold start at 25°C
Protection	Internal line input fuse (replaceable), Short Circuit automatic recover
Output Protection	AUX2A/B Short Circuit, automatic recovery on 3.3, 5, 7.5, 9 V
Insulation	Input to case: 500 V DC, input to output: 500 V DC
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 1Kg (2.2 Lb)

AC POWER SUPPLY MODULES

Input Voltage	100-240 V AC, 50/60 Hz
Total Power	Max. 60 Watt continuous, Max. 105 Watt peak @ 25% duty cycle
Outputs	Motherboard connector (to CPU and I/O modules): 13.2 V DC ±20%, max. 4 A AUX1A/AUX1B user connectors: 13.2V DC ±20%, max. 8 A, on/off controlled by user program AUX2A/AUX2B (configurable): 3.3, 5, 7.5, 9 V DC ±10%, max. 2.5A, on/off (default) OR equal to AUX1A/AUX1B output voltage max. 8A **Note:** max. 8 A total current consumption from all outputs
Battery Charger	12 V Lead-Acid battery charger (in PS with charger) Automatic charging of 6.5 or 10 Ah backup battery, battery temperature sensing, overcharging protection, battery capacity test and diagnostics, automatic battery switch-over
Diagnostics LEDs	Status LED for: input voltage, AUX1 and AUX2 outputs, 12V control for DO modules and battery
No Load power consumption	130 mA @ 220 V AC
Efficiency	80% typical @230 V AC, 76% typical @115 V AC (full load)
Inrush Current	25 A maximum, for 2 mSec. Max, cold start at 25°C
Power Factor	0.98 typical at 230 V AC, 0.99 typical at 115 V AC
Protection	Internal Line Fuse, replaceable
Output Protection	AUX2A/B Short Circuit, automatic recovery on 3.3, 5, 7.5, 9 V
Insulation	Input to case: 1500 V AC, input to output: 3000 V AC
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 1Kg (2.2 Lb)

24 V DC PLUG-IN POWER SUPPLY

Input Voltage	10.8-16V (from I/O module)
Output	24V floating, max. 150 mA
Efficiency	75% typical
Protection	Automatic output shut down on over-voltage and over-current
Insulation	Input to output: 1500 V AC
Dimensions	78 mm W x 15 mm H x 68 mm D (3.1“ W x 0.6“ H x 2.7“ D)
Weight	Approx. 0.04 Kg (0.09 Lb)

EXPANSION POWER SUPPLY

See below.

16/32 DI FAST 24 V MODULES

Total Number of Inputs	16 DI 32 DI
Input Arrangement	Isolated groups of 16 inputs with shared common
Fast Counter Inputs	Inputs that can be used as fast counters: - All inputs in 16 DI module - First 20 inputs in 32 DI module
AC Input Frequency	45 – 65 Hz
AC Input Delay	Maximum 0.2 mS
Fast Counter Input Frequency	0 - 12.5 KHz, minimum pulse width 40 µS
Max. DC Input Voltage	Max. ±40 V DC (relative to input common)
“ON” DC Voltage Range	+9 to +30 V DC, -30 to -9 V DC
“OFF” DC Voltage Range	-3 to +3 V DC
“ON” AC Voltage Range	10 to 27 V AC (RMS)
“OFF” AC Voltage Range	0 to 5 V AC (RMS)
Input Current	Max. 3.5 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps)
Counter Input Filtering	0 to 12.75 mS (Programmable in 0.05 mSec steps for inputs configured as high speed counters)
24 V DC Output	Supports optional isolated 24 V plug-in “Wetting” Power Supply (One in 16 DI, two in 32 DI)
Diagnostics LEDs	Status LED per each input, module error LED, Plug-In 24V status LED
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 or 40 Wire cable with Terminal Block Holder connector, 26 AWG wires
Module Replacement	Hot swap replacement – module extraction/insertion under voltage
Input Isolation	2.5 k V RMS between input and module logic per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	16 DI: approx. 0.28 Kg (0.62 Lb), 32 DI: approx. 0.29 Kg (0.63 Lb)

16/32 DIGITAL INPUT FAST 24 V IEC 61131-2 TYPE II MODULES

Total Number of Inputs	16 DI 32 DI
Input Arrangement	Isolated Groups of 16 inputs with shared common
Fast Counter Inputs	Inputs that can be used as fast counters: - All inputs in 16 DI - First 20 inputs in 32 DI
Fast Counter Input Frequency	0 - 10 KHz, minimum pulse width 50 µS
Max. DC Input Voltage	Max. ±40 V DC
“ON” DC Voltage Range	+11 to +30 V DC, -30 to -11 V DC
“OFF” DC Voltage Range	-5 to +5 V DC
Input Current	6-10 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps)
Counter Input Filtering	0 to 12.75 mS (Programmable in 0.05 mSec steps for inputs used as high speed counters)
24 V DC Output	Supports isolated 24 V plug-in “Wetting” Power Supply (one in 16 DI, two in 32 DI)
Diagnostics LEDs	LED per each input status, module error LED, 24V Plug-In status LED
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 or 40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input Isolation	2.5 kV RMS between input and module logic per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	16 DI: approx. 0.28 Kg (0.62 Lb), 32 DI: approx. 0.29 Kg (0.63 Lb)

32 DIGITAL INPUT FAST 48 V MODULES

Total Number of Inputs	32 DI
Input Arrangement	Isolated Groups of 16 inputs with shared common
Fast Counter Inputs	Inputs that can be used as fast counters: First 20 inputs in 32 DI
Fast Counter Input Frequency	2.0 KHz (minimum pulse width 250 µS)
Max. DC Input Voltage	Max. ±72 V DC
“ON” DC Voltage Range	+36 to +60 V DC
“OFF” DC Voltage Range	0 to +6 V DC
Input Current	Max. 3 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps)
Counter Input Filtering	0 to 12.75 mS (Programmable in 0.05 mSec steps for inputs used as high speed counters)
Diagnostics LEDs	LED per each input status, module error LED
User Connection	4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input Isolation	2.5 kV RMS between input and module logic per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	16 DI: approx. 0.28 Kg (0.62 Lb), 32 DI: approx. 0.29 Kg (0.63 Lb)

16 DIGITAL INPUT 120/230V MODULE

Total Number of Inputs	16 DI
Input Characteristics	IEC 61131-2 Type 1
Input Arrangement	Two isolated groups of 6 inputs and one isolated group of 4 inputs.
AC Input Frequency	47 - 63 Hz
AC Input Delay	Maximum 25.0 mS
Max. DC Input Voltage	Max. ±264 V DC (relative to input common)
“ON” DC Voltage Range	+79.0 V DC to +264.0 V DC, -79.0 V DC to -264.0 V DC
“OFF” DC Voltage Range	-40 to +40 V DC
“ON” AC Voltage Range	79.0 to 264.0 V AC (RMS)
“OFF” AC Voltage Range	0 to +40 V AC (RMS)
Input Current	At 110VDC 1.0 to 3.0 mA At 230VDC 0.4 to 2.0 mA At 110VAC > 2.0 mA RMS At 230VAC > 3.0 mA RMS
Input Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps), minimum effective filter value - 7.0 msec.
Diagnostics LEDs	LED per each input status, module error LED
User Connection	3 Terminal Blocks (5.00mm pitch), Maximum 14 AWG
Cable & TB Holder	30 Wire Cable with Terminal Block Holder connector, 20 AWG wires
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input Isolation	2.5 kV RMS between input and module logic per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC
Operating Voltage	10.8 -16 V DC and 3.3 V DC ±10% (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	approx. 0.367 Kg (0.80 Lb)

8/16 RELAY OUTPUT MODULES

Total Number of Outputs	8 EE relay outputs 16 EE relay outputs 8 ML relay outputs 16 ML relay outputs
Output Arrangement	8 DO: 3 X Form C (SPDT) and 5 X Form A (SPST) 16 DO: 6 X Form C (SPDT) and 10 X Form A (SPST)
Contact Voltage Ratings	Max. 60 V DC, or 30 V AC RMS (42.4 V peak).
Contact Power Ratings	2A @ 30 V DC, 0.6A @ 60V DC or 0.6A @ 30V AC (resistive load)
Relay Back Indication	Contact position - hardware back indication
DO Frequency	Max. 10 Hz
Diagnostics LEDs	LED per each output status, module error LED
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 or 40 Wire Cable with Terminal Block Holder connector, 26 AWG
Fail State	Configurable relay state on CPU fail: On, Off or 'last value'
All Relays Disable/Enable	Selectable per module, controlled from the power supply
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Output Isolation	Between open contacts: 1kV, between contact and coil: 1.5 kV, between contact sets: 1.5 kV
Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC60255-5, Insulation impulse 1.5 kV per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5" W x 8.7" H x 7.1" D)
Weight	8 DO: approx. 0.29 Kg (0.64 Lb), 16 DO: approx. 0.32 Kg (0.7 Lb)

8 SBO RELAY OUTPUT MODULES

Total Number of Outputs	8 EE relay outputs
Output Arrangement	2 X Form A (SPST) - (two Normally Open contacts per DO)
Contact Voltage Ratings	Max. 60 V DC, or 30 V AC RMS (42.4 V peak).
Contact Power Ratings	2A @ 30 V DC, 0.6A @ 60V DC or 0.6A @ 30V AC (resistive load)
Relay Back Indication	Contact Back Indication: Indicating contact position
Relay Select Back Indication	Indicating relay selection before relay activation
DO Frequency	Max. 10 Hz
Diagnostics LEDs	LED per each output status, module error LED
User Connection	4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	40 Wire Cable with Terminal Block Holder connector, 26 AWG
Fail State	Configurable relay state on CPU fail: On, Off or 'last value'
All Relays Disable/Enable	Selectable per module, controlled from the power supply
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Output Isolation	Between open contacts: 1kV, between contact and coil: 1.5 kV, between contact sets: 1.5 kV
Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC60255-5, Insulation impulse 1.5 kV per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5" W x 8.7" H x 7.1" D)
Weight	Approx. 0.29 Kg (0.64 Lb)

12 RELAY OUTPUT 120/230V MODULES

Total Number of Outputs	12 EE relay outputs 12 ML relay outputs
Output Arrangement	12 x 1 Form A
Contact Power Ratings	3A @ 250 V AC, 3A @ 30 V DC, or 0.20A @ 125 V DC (resistive load).
Minimum Contact Load Current	10.0 mA @+5.00 V DC.
Maximum Switching Current	3.00 A
Relay Back Indication	Contact position - hardware back indication
DO Frequency	Max. 10 Hz (resistive load)
Diagnostics LEDs	LED per each output status, module error LED
User Connection	3 Terminal Blocks (5.00mm pitch), Maximum 14 AWG
Cable & TB Holder	30 Wire Cable with Terminal Block Holder connector, 20 AWG wires
Fail State	Configurable relay state on CPU fail: On, Off or 'last value'
All Relays Disable/Enable	Selectable per module, controlled from the power supply
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Output Isolation	Between output and module logic: 2.5 kV, per IEC60255-5
Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC60255-5, Insulation impulse 5 kV per IEC60255-5
Operating Voltage	10.8 -16 V DC and 3.3 V DC ±10% (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5" W x 8.7" H x 7.1" D)
Weight	approx. 0.423 Kg (0.90 Lb)

8/16 ANALOG INPUT MODULES

Total Number of Inputs	8 AI, ±20 mA 16 AI, ±20 mA 8 AI, ±5 V 16 AI, ±5 V
Input Configuration	Isolated (floating) analog inputs
A to D Resolution	16 Bit (including sign)
Input Accuracy	±0.1% of full scale
Input Sampling Time	10 mSec @ 50 Hz filtering 8.33 mSec @ 60 Hz filtering
Smoothing	Selectable input averaging: 1, 2, 4, 8, 16, 320, 64 or 128 samples (x10 mS)
Permitted potential between Inputs	75 V DC, 60 V AC (RMS)
Input Impedance	±20 mA input: Rin < 250 Ω ±5 V input: Rin > 1 MΩ
Crosstalk Rejection	Better than 80 dB between any pair of inputs
Temperature Stability	Better than ±25 PPM/ºC
Interference Suppression	Selectable 50 or 60 Hz filtering, Common mode rejection > 100 dB, Differential mode rejection > 50 dB
24 V DC Output	Supports optional isolated 24V Plug-in Power Supply (one in 8 DI, two in 16 DI)
Diagnostics LEDs	Overflow and Underflow LED per each input, module error LED, 24V Plug-In status LED The module Overflow and Underflow levels can be configured to: Current inputs: ±20mA/4-20 mA Voltage inputs: ±5 V/0-5 V/1-5 V
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 or 40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input Isolation	1.5 kV RMS between input and module logic, per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-5
Operating voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	8 AI: approx. 0.32 Kg (0.71 Lb), 16 AI: approx. 0.34 Kg (0.75 Lb)

4 ANALOG OUTPUT MODULE

Total Number of Outputs	4
Output Configuration	Isolated floating channels, each channel can be connected as 0 -20 mA or 0-10 V DC voltage
D to A Resolution	14 Bit
Output Accuracy	±0.1% of full scale @25°C
Temperature Stability	Better than ±25 PPM/°C
Internal Settling Time	Max. 1 ms
Output Load	Voltage: > 1.0 kΩ, < 1.0 µf, Current: < 750 Ω (internal power source)
Crosstalk Rejection	Better than 50 dB between any pair of outputs
Interference Suppression	Common Mode Rejection: > 60 dB
Output protection	Voltage output: short-circuit current, max. 30 mA Current output: No-load voltage max. 22 V DC
Diagnostics LEDs	Module Error LED. Voltage mode LED, Current mode LED, Calibration LED per channel
User Connection	2 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Isolation	1.5 kV between output and module logic
Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-5
Operating voltage	10.8 -16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	0.29 Kg (0.64 Lb)

MIXED 4 ANALOG OUTPUT 8 ANALOG INPUT MODULES	
Total Number of I/Os	4 AO + 8 AI (AI: ±20 mA or ±5 V DC)
I/O Arrangement	AO - each channel can be connected as 0 -20 mA or 0-10 V, AI - Isolated (floating) analog
AO D to A Resolution	inputs 14 Bit
AO Accuracy	±0.1% of full scale @25°C
AO Temperature	Better than ±25 PPM/°C
Stability AO Internal	Max. 1 ms
Settling Time AO Load	Voltage: > 1.0 kΩ, < 1.0 µf, Current: < 750 Ω
AO Crosstalk Rejection	Better than 50 dB between any pair of
AO Interference Suppression	outputs Common Mode Rejection: > 60 dB
AO Voltage Output Protection	Short-circuits protection, max. 30 mA (all other operating channels remain fully
AO Current output no-load	functional) Max. 22 V DC
voltage AO Isolation	1.5 kV between output and module logic
AO Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-
AI A to D Resolution	5 16 Bit (including sign)
AI Accuracy	±0.1% of full scale @ -40ºC to +70ºC
AI Sampling Time	10 mSec @ 50 Hz filtering 8.33 mSec @ 60 Hz filtering
AI Smoothing	Selectable input averaging: 1, 2, 4, 8, 16, 32, 64 or 128 samples (x10 mS)
Permitted Potential between	75 V DC, 60 V AC (RMS)
Inputs AI Input Impedance	±20 mA input: Rin < 250 Ω ±5 V input: Rin > 1 MΩ
AI Crosstalk Rejection	Better than 80 dB between any pair of inputs
AI Temperature Stability	Better than ±25 PPM/ºC
AI Interference Suppression	Selectable 50 or 60 Hz filtering, Common mode rejection > 100 dB, Differential mode rejection > 50 dB
24 V DC Output	Supports one optional isolated 24V Plug-in Power Supply
Diagnostics LEDs	AO - Voltage mode LED, Current mode LED, Calibration LED per channel AI - Overflow and Underflow LED per each input, 24V Plug-in status LED The module Overflow and Underflow levels can be configured to: ±20mA/4-20 mA or ±5 V/0-5 V/1-5 V General - Module error LED
AI Input Isolation	1.5 kV between input and module logic
AI Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC60255-
User Connection	5 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under
Operating Voltage	voltage 10.5-16 V DC and 3.3 V DC (from the motherboard
Power Consumption	connector) See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.34 Kg (0.75 Lb)

16/32 DIGITAL OUTPUT/DIGITAL INPUT MODULES (16/32 DO/DI)

Total Number of Inputs/Outputs	16/32
I/O Arrangement	2/4 groups of 8 I/Os with shared common Each group can be configured to function as FET DO or dry contact DI
Counter Inputs	20 first inputs can be used as counter inputs
Counter Input Frequency	0 - 1 KHz, minimum pulse width 500 µS
Max. DC Input Voltage	Max. 30 V DC (relative to input common)
Input “ON” Resistance	0-4 kΩ
Input “OFF” Resistance	≥50 kΩ
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Current	Max. 0.3 mA (when the input is shorted)
Input Filtering	0 to 50.8 mS (programmable in 0.2 mSec steps) Not relevant, minimum allowed is 1mSec
Counter Input Filtering	0 to 12.75 mS (programmable in 0.05 mSec steps) Not relevant, minimum allowed is 1mSec
Output Type	MOSFET
Output Voltage Range	5-30 V DC (user-supplied voltage)
DO Frequency	Max. 1 KHz (resistive load)
DO Output current	Max. 500 mA sink current (resistive load)
Output Fail State	Configurable output state on CPU fail: On, Off or ‘last value’
Diagnostics LEDs	LED per each input/output status, module error LED
User Connection	4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	20 or 40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input/Output Isolation	1.5 kV between input/output and module logic
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC60255-5
Operating Voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.25 Kg (0.55 Lb)

MIXED I/O 16DI + 4DO + 4AI MODULES

Total Number of Inputs/Outputs	16 Digital Inputs + 4 EE Relay Outputs + 4 Analog Inputs, ±20 mA 16 Digital Inputs + 4 ML Relay Outputs + 4 Analog Inputs, ±20 mA
I/O Arrangement	1 group of 16 DIs with shared common, 4 relay outputs - Form C, 4 isolated analog inputs
DI Counter Inputs	The first 12 inputs can be configured as fast counters.
DI Frequency	0 - 1 KHz
DI Fast Counter Frequency	0 - 5 KHz minimum pulse width 100 µS
DI Max. DC Voltage	Max. 40 V DC
DI “ON” DC Voltage Range	+11 to +30 V DC, -30 to -11 V DC
DI “OFF” DC Voltage Range	-5 to +5 V DC
DI Current	6-10 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
DI Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps)
DI Counter Filtering	0 to 12.75 mS (programmable in 0.05 mSec steps for inputs configured as high speed counters)
DO Contact Voltage Ratings	Max. 60 V DC or 30 V AC RMS (42.4 V peak).
DO Contact Power Ratings	2A @ 30 V DC, 0.6A @ 60V DC or 0.6A @ 30V AC (resistive load)
DO Relay Back Indication	Contact position - hardware back indication
DO Fail State	Configurable relay state on CPU fail: On, Off or ‘last value’
AI Resolution	16 Bit (including sign)
AI Accuracy	±0.1% @ -40ºC to +70ºC
AI Sampling time	10 mSec @ 50 Hz filtering, 8.33 mSec @ 60 Hz filtering
AI Smoothing	Selectable input averaging: 1, 2,4,8, 16, 32, 64 or 128 samples (x10 mS)
AI max. Potential between AIs	75 V DC, 60 V AC (RMS)
AI Impedance	Rin < 250 Ω
AI Crosstalk Rejection	Better than 80 dB between any pair of inputs
AI Temperature Stability	Better than ±25 PPM/ºC
AI Interference Suppression	Selectable 50 or 60 Hz filtering, common mode rejection > 100 dB, differential mode rejection > 50 dB
Diagnostics LEDs	LED per each input/output status, module error LED, 24V Plug-in status LED
24 V DC Output	Supports one isolated 24V plug-in ”Wetting” Power Supply
User Connection	4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable & TB Holder	40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input / Output Isolation	DI: 2.5 kV RMS between input and module logic per IEC60255-5 DO: Between open contacts: 1kV, between output and module logic: 1.5 kV, per IEC60255-5 AI: 1.5 kV between input and module logic per IEC60255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC60255-5
Operating Voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption	See GATE2MDLC Maximum Power Ratings below. EE Relay on : 0.2 W typical (15 mA @ 13.8 V DC at PS) (Not including 24 V Plug-in Power Supply)
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.31 Kg (0.68 Lb)

EXPANSION POWER SUPPLY MODULE

Input Voltage	DC 10.8-16 V
Outputs	To Motherboard connector – +10.80 to +16.00 VDC, max. 4A To cascaded expansion power supply - +10.80 to +16.00 VDC, max. 8A
Over Current Protection	4.0 A (Slow blow fuse), protecting the expansion frame 8.0 A (Slow blow fuse), protecting the cascaded expansion power supply
Maximum Current via Power IN/OUT circuit	8.0 A (Slow blow fuse)
Over Voltage Protection	+17.00 ±1 VDC (protecting the expansion frame)
Absolute Maximum Voltage	+18.00 VDC
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2" W x 8.7" H x 7.1" D)
Weight	Approx. 0.43Kg (0.94 Lb)

EXPANSION MODULE

Microprocessor	Freescale – Power PC II, MPC8270, 32-bit
Microprocessor Clock	200 MHz
Serial Port	RS232C Asynch, Full Flow Control port, up to 230.4 kb/s; used for STS only
Ethernet Port	10/100 Mb/s – connection to the main frame
LAN Cable	Category 5E shielded (FTP), up to 50 meter
LEDs Display	4 CPU diagnostic LEDs, Port status LEDs and Expansion Address LEDs
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Operating Voltage	10.8-16 V DC (from the motherboard connector)
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2" W x 8.7" H x 7.1" D)
Weight	Approx. 0.38 Kg (0.84 Lb)

EXPANSION LAN SWITCH

Ethernet Port 1-8	8 on board 10/100 Mb/s Ethernet ports (Auto crossover)
LEDs Display	Error LED, Port status LEDs
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Module Replacement	Hot swap replacement – module extraction/insertion under voltage
Operating Voltage (from the motherboard connector)	10.8-16 V DC, 3.30 VDC +/-10%
User Connection (Ethernet Ports)	8 shielded RJ45 connectors
LAN Cable	Category 5E shielded (FTP), up to 50 meter
Operating Voltage	10.8-16 V DC (from the motherboard connector)
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5" W x 8.7" H x 7.1" D)
Weight	Approx 0.32 Kg (0.7 Lb)

ACE IP GATEWAY (CPU 4600) MODULE

Microprocessor	Freescale – Power PC II, MPC8270, 32-bit, extended communication capability, DMA and floating point calculation support
Microprocessor Clock	200 MHz
Memory	Flash: 32 MB DRAM: 128 MB
Real-Time Clock	Full calendar with leap year support (Year, Month, Day, Hours, Minutes, Seconds) Time drift: max. 2.5 seconds per day (when power is on)
SRAM and RTC Retention	3 V Rechargeable lithium backup battery
USB Host Port 1, 2	Type A host full speed 12 Mbs ports for MDLC over IP communication via the MotoTrbo digital mode radio system. For MotoTrbo radio only; No other USB devices or USB Hubs are supported.
Serial Port 1	Configurable RS-232C or RS-485 port: - RS-232C: A synch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s
Serial Port 2	RS-232C, Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface
Ethernet Port 1	10/100 Mb/s
Plug-In Port 1	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-wire, up to 230.4 kb/s - Ethernet 10/100 Mb/s
Plug-In Port 2	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2 / 1.8 / 2.4 kb/s, DFM 2.4/3.6/4.8 kb/s and - RS-232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS-485, multi-drop 2-Wire up to 230.4 kb/s - Ethernet 10 Mb/s
USB Device Port 1	USB device port, Type B connector (for future use)
LEDs Display	4 CPU diagnostics LEDS, port status LEDs and user application LEDs
Power Consumption	See GATE2MDLC Maximum Power Ratings below.
Operating Voltage	10. 8 -16 V DC (from the motherboard connector)
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2“ W x 8.7“ H x 7.1“ D)
Weight	Approx. 0.38 Kg (0.84 Lb)

GATE2MDLC MAXIMUM POWER RATINGS

The tables below list the typical maximum power consumption (at room temperature) for each of the GATE2MDLC unit building blocks (CPU, Power Supply, I/O modules, radios, etc.) and the maximum peak power allowed for a fully loaded unit, based on the housing type. The values in the tables below are derived by using the power supply (AC: 100 to 240 VAC or DC: 18 to 72 VDC and 13.8 VDC) and have the power supply efficiency factor included in them.

Before deploying your unit, add up the power consumption of all components of your system to verify that it is within the maximum peak power for your housing type. In systems with I/O expansion, consider all modules which consume power from their respective AC/DC main power sources when calculating the required power requirements.

Maximum Peak Power Allowed for Fully Loaded unit

Housing Type Description	Maximum Input Power into Power Supply Module (Watts)
19" Rack (w/out metal enclosure)	100
Large NEMA metal housing (50x50 cm)	120*
Small NEMA metal housing (40x40 cm)	105*

Power Consumption per unit Module

Module Name	Self Power Consumption, no active I/O (Watts)	Maximum Power Consumption, per Active I/O (Watts)	Self Power Consumption, no active I/O (Watts)	Maximum Power Consumption, per Active I/O (Watts)	Maximum Power Consumption, all I/Os, LEDs Active (Watts)
	AC: 100 to 240 VAC DC: 18 to 72 VDC		Vin = +13.8 VDC		
Power Supply (maximum)	12.60	N/A	2.20 (156 mA) (12 VDC Power Supply Module ONLY)	N/A	N/A
Power Supply (Expansion)	0.0	N/A	0.0	N/A	N/A
CPU (3640/3610)	5.20	N/A	4.20 (304 mA)	N/A	4.00 (290 mA)
Expansion Module	5.20	N/A	4.20 (304 mA)	N/A	4.00 (290 mA)
Expansion LAN Switch	1.50	0.220	1.20 (87 mA)	0.176 (12.75 mA)	3.10 (225 mA) (x8 ports ON)
Digital Input Fast 24V (x16/x32)	0.100	0.100 (powered by internal 24V PS)	0.080 (5.8 mA)	0.100 (7 mA) (powered by internal 24V PS)	3.50 (254 mA) (x32 inputs ON powered by x1 internal 24V PS)
Digital Input Fast 24V IEC Type 2 (x16/x32)	0.100	0.230 (powered by internal 24V PS)	0.080 (5.8 mA)	0.230 (17 mA) (powered by internal 24V PS)	8.20 (594 mA) (x32 inputs ON powered by x2 internal 24V PS)
Digital Input Fast 48V	0.100	0.100	0.080 (5.8 mA)	0.100 (7 mA)	3.50 (254 mA) (x32 inputs ON)
Digital Input 120/230V	0.100	0.015	0.080 (5.8 mA)	0.012 (1 mA)	0.524 (38 mA) (x16 inputs ON)
Digital Output ML Relay (x8/x16)	0.120	0.010	0.100 (7.2 mA)	0.008 (0.5 mA)	0.483 (35 mA) (x16 relays ON)
Digital Output EE Relay (x8/x16)	0.170	0.200	0.136 (10 mA)	0.160 (11.6 mA)	3.26 (236 mA) (x16 relays ON)
Digital Output SBO EE Relay (x8)	0.170	0.400	0.136 (10 mA)	0.320 (23.6 mA)	3.26 (236 mA) (x8 relays ON)

Module Name	Self Power Consumption, no active I/O (Watts)	Maximum Power Consumption, per Active I/O (Watts)	Self Power Consumption, no active I/O (Watts)	Maximum Power Consumption, per Active I/O (Watts)	Maximum Power Consumption, all I/Os, LEDs Active (Watts)
	AC: 100 to 240 VAC DC: 18 to 72 VDC		**Vin = +13.8 VDC**		
Digital Output ML Relay 120/230V	0.200	0.006	0.160 (11.6 mA)	0.005 (0.4 mA)	0.248 (18.0 mA) (x12 relays ON)
Digital Output EE Relay 120/230V	0.290	0.260	0.232 (17 mA)	0.210 (0.15 mA)	3.12 (226 mA) (x12 relays ON)
FET Digital Output/Digital Input	0.120	DI = 0.014 (per input channel) DO = 0.014 (per output channel)	0.100 (7.2 mA)	DI = 0.011 (per input channel) DO = 0.011 (per output channel)	0.552 (40 mA) (x32 LEDs/ inputs ON)
Mixed I/O (DO ML +DI IEC Type 2)	0.480	DI = 0.250 (powered by internal 24V PS) DO = 0.010	0.384 (28 mA)	DI = 0.250 (powered by internal 24V PS) DO = 0.008	4.70 (341 mA) (x4 relays ON, x16 inputs ON, x4 AI ON, powered by internal 24V PS)
Mixed I/O (DO EE + DI IEC Type 2)	0.480	DI = 0.250 (powered by internal 24V PS) DO = 0.200	0.384 (28 mA)	DI = 0.250 (powered by internal 24V PS) DO = 0.160	5.50 (400 mA) (x4 relays ON, x16 inputs ON, x4 AI ON, powered by internal 24V PS)
Analog Output	1.10	0.600 (per output channel @20.0 mA)	0.880 (64 mA)	0.480 (35 mA) (per output channel @20.0 mA)	3.33 (241 mA) (x4 outputs sourcing 20.0 mA)
Mixed Analog Current/Voltage	1.40	0.600 (per output channel @20.0 mA)	1.12 (81 mA)	0.480 (35 mA) (per output channel @20.0 mA)	3.61 (261 mA) (x4 outputs sourcing 20.0 mA)
Analog Input Current/Voltage (x8/x16)	0.530	N/A	0.440 (32.0 mA)	N/A	0.870 (63.0 mA)
24V Floating Plug-In Power Supply (No load)	0.410	N/A	0.328 (24 mA)	N/A	N/A
24V Floating Plug-In Power Supply (externally loaded 150 mA)	4.80	N/A	3.84 (278 mA)	N/A	N/A

Ordering Information

Note: For detailed ordering information, refer to the GATE2MDLC Catalog.

GATE2MDLC MODELS

All unit models include no I/O slots frame, 10.8-15.5 V DC PS and CPU 3640. All radio models require Metal Chassis or Housing option.

No Radio Model

• GATE2MDLC Basic Model No Radio	F7509

Conventional VHF Radio Models

• GATE2MDLC CM200/CM140/EM200/GM3188 VHF	F7573
• GATE2MDLC with CDM750 136-174 MHz	F7563
• GATE2MDLC with HT750/GP320/GP328 /PRO5150 VHF	F7553

Conventional UHF Radio Models

• GATE2MDLC with CM200/CM140/EM200/GM3188 UHF	F7574
• GATE2MDLC with CDM750 403-512 MHz	F7564
• GATE2MDLC with HT750/GP320/GP328 /PRO5150 UHF	F7554

Analog Trunked VHF Radio Models

• GATE2MDLC with XTL2500 136-174 MHz Analog	F7533
• GATE2MDLC with XTL2500 136-174 MHz Digital	F7593
• GATE2MDLC with XTS2500 136-174 MHz Digital	F7543

Trunked UHF Radio Models

• GATE2MDLC with XTL2500 380-520 MHz Analog	F7534
• GATE2MDLC with XTL2500 380-520 MHz Digital	F7594
• GATE2MDLC with XTS2500 380-520 MHz Digital	F7544

Trunked 800 MHz Radio Models

• GATE2MDLC with XTL2500 800 MHz Analog	F7538
• GATE2MDLC with XTL2500 800 MHz Digital	F7598
• GATE2MDLC with XTS2500 800 MHz Digital	F7548

MotoTrbo Digital Models

• GATE2MDLC with XPR4350/ XPR4380/DM3400/XiR M8220/DGM4100 VHF	F7583
• GATE2MDLC with XPR4350/ XPR4380/DM3400/XiR M8220/DGM4100 UHF	F7584
• GATE2MDLC with XPR4380 800 MHZ	F7588

I/O Expansion

• GATE2MDLC Expansion Frame Unit	F7510

Other Models

• CPU 3640	F7502
• GATE2MDLC IP Gateway CPU 4600	F7507
• GATE2MDLC CPU 3680	F7508

Software Tools

• GATE2MDLC System Tools Suite (STS)	F7500
• GATE2MDLC C Toolkit (CTK)	F7600
• GATE2MDLC Enhanced PID	FVN5680

STS Add-on Software

- GATE2MDLC AGA 3+8 CD FVN5809
- GATE2MDLC AGA 7+8 CD FVN5510
- AGA History Upload Tool FVN5810
- GATE2MDLC DNP 3.0 Plus Master Drivers CD FVN5511
- GATE2MDLC DNP 3.0 Plus Slave Drivers CD FVN5512
- GATE2MDLC IEC60870-5-101 Slave driver CD FVN5513

GATE2MDLC
OPTIONS

Regional Radio Options

CM200/CM140/EM200/CM3188

One of the following options must be ordered for models F7573 and F7574:

• CM200	V851
• CM140	V852
• GM3188	V853
• EM200	V854

XPR4350/XPR4380/DM3400/XiR M8220/DGM4100

• XPR4350/XPR4380	V751
• DM3400	V752
• XiR M8220	V753
• DGM4100	V754

HT750/GP320/GP328/PRO5150

One of the following options must be ordered for models F7553 and F7554.

• HT750	V951
• GP320	V952
• GP328	V953
• PRO5150	V954

Frames

• 2 I/O slots frame	V102
• 3 I/O slots frame	V103
• 5 I/O slots frame	V105
• 7 I/O slot frame	V107
• 8 I/O slots frame	V108
• 19" rack adjustable installation brackets	V051

Metal Chassis

• 48 x 48 cm Metal Chassis (up to 7 I/O slots)	V056
• 38 x 38 cm Metal Chassis (up to 3 I/O slots)	V214
• 28 x 36 cm Metal Chassis (up to 2 I/O slots)	V229
• 8 I/O (Expanded 19”) Metal Chassis	V269
• 19" Frame Metal Back	V120

Housing

• 50 x 50 cm Metal Housing (up to 7 I/O slots)	V228
• 50 x 50 cm Metal Housing with padlock accessory	VA00405
• 40 x 40 cm Metal Housing (up to 3 I/O slots)	V276
• 40 x 40 cm Metal Housing with padlock accessory	VA00406
• Housing Tamper Switch	V224

Power Supply, Battery Charger and Backup Battery

Note: The default PS is 10.8-16 V DC input

• AC Power Supply 100-240 V	V346
• AC PS 100-240 V with Battery charger	V261
• DC Power Supply 18-72 V	V251
• DC PS 18-72 V with Battery charger	V367
• DC Low Tier PS 10.8 -16 V	V149
• 6.5 Ah Backup Battery	V114
• 10 Ah Backup Battery	V328

CPU Upgrade

Note: The default CPU is CPU 3640 except for MotoTrbo models F7573/F7574 and Expansion Frame model F7510

• Plug-in 4 MB SRAM	V447
• GATE2MDLC CPU 3680	V448
• ACE IP Gateway CPU 4600	V449

CPU Plug-in Ports

• Plug-in RS-232 Port	V184
• Plug-in RS 485 Port	V440
• Plug-in Ethernet 10 M Port	V204
• Plug-in Ethernet 10/100 M Port	V212
• Plug-in Radio Port	VA00362
•	

Digital Input Modules

• 16 DI FAST 24V DC	V265
• 32 DI FAST 24V DC	V379
• 16 DI FAST 24V IEC TP2	V117
• 32 DI FAST 24V IEC TP2	V959
• 32 DI FAST 48V	V474AB
• 16 DI 120/230V	VA00331AA

Relay Output Modules

• 8 DO EE relay 2A	V508
• 16 DO EE relay 2A	V616
• 8 DO ML relay 2A	V314
• 16 DO ML relay 2A	V516
• 12 DO EE 120/230V	VA00348
• 12 DO ML 120/230V	VA00332
• 8 SBO DO 2 FormA EE relay 2A	VA00343AB

Analog Modules

• 8 AI ±20 mA	V318
• 16AI ±20 mA	V463
• 8 AI ±5 V	V741
• 16AI ±5 V	V742
• 4 AO	V118
• 4 AO / 8 AI (AI = ±20 mA)	V562
• 4 AO / 8 AI (AI = ±5 V)	V460

Mixed Input/Output Modules

• 16 DI/DO FET	V480
• 32 DI/DO FET	V481
• 16 DI 4 DO EE 4 AI, ±20 mA	V245
• 16 DI 4 DO ML 4 AI, ±20 mA	V453

I/O Modules Cables and Accessories

• 20 wire cable with TB holder 3 m	V253
• 30 wire cable with TB holder 3 m	V202
• 40 wire cable with TB holder 3 m	V358
• 20 pin TB holder kit	V158
• 30 pin TB Holder kit	V203
• 40 pin TB holder kit	V153
• Blank I/O module	V20

I/O Expansion

• Expansion LAN Switch	VA00226
• LAN Cable 60cm length	V529
• LAN Cable 2m length	V648
• LAN Cable 3m length	V666
• LAN Cross Cable	V665

CPU and PS Redundancy

• GATE2MDLC Redundancy	VA00433
• Secondary DC PS 10.5-15.5V	V275
• Secondary CPU Plug-In RS-232 Port	V185
• Secondary CPU Plug-In Ethernet 10M Port	V205
• Secondary CPU Plug-In Ethernet 10/100 M Port	V215
• Secondary CPU Plug-In RS 485 Port	V441AF
• Secondary CPU Plug-In Radio Port	VA00364
• Secondary CPU Plug-In 4 MB SRAM	V444

Communications Interface

• RS-485 Junction Box	V186

Radio Installation Kits

• CM200/CM140/EM200/GM3188 Installation kit	V148
• CDM750 Installation kit	V143
• HT750/GP320/GP328 /PRO5150 Installation kit	V154
• XTL5000/XTL2500 Digital Installation kit	V681
• XTL5000/XTL2500 Analog Installation kit	V157
• XTS2500 Digital Installation kit	V156
• MDS X710/9810 installation kit	V152
• MDS iNET900/Transnet Installation kit	V680
• XTL5000/2500 Digital Installation kit	V681
• XPR4350/4380/DM3400/XiR M8220/DGM4100 Installation kit	V682
• Transnet 900 OEM Installation kit	VA00225

Software License (unit options)

• 3rd Party Protocol License (ModBus, DF1)	V377
• AGA License	V284
• DNP3 License master/slave - unit	V283
• IEC 60870-5 License	V242