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Mercury Pre-wired Product Companion

Wiring Convention and Supplemental Guide to
Mercury ProWire™ Power Management Systems



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Introduction

Traditional wiring for access control systems is time consuming and labor intensive. ProWire[™] systems take LifeSafety Power's award-winning Unified Power[™] solutions to a new higher level of service by pre-wiring all lock and system power connections to Authentic Mercury Security[™] terminal strips for easy plug-and-play installation.

Prewired features of ProWire[™] Systems include access control or system power, lock power, auxiliary power distribution, lock control, system communications loop, and optional remote management.

The access control modules are powered from a D8P power distribution module providing a Class 2, Power Limited source with individual protection for each access control board and a dedicated power supply configured for 12VDC. Each D8P module provides eight protected outputs capable of 2.5A per output and a configuration jumper to select which power supply is applied to a specific output in dual voltage systems.

The field connected locks are powered and controlled from either a C8 or M8 lock control module with a separate dedicated power supply typically configured for 24VDC. Each C8 or M8 module provides either jumpers or software programmability to configure each individual output for 12 or 24VDC, FAI operation, and failsafe or failsecure operation of the lock when triggered by the access control.

Optional remote management provides the system with the ability to generate email or SNMP alert messages on a scheduled or event driven basis, monitor and control power remotely, test standby batteries over the network, and maintain a historical record of system performance.

Units from four to sixteen door capacity are available with wire tie or wire duct wire management. **ProWire systems accommodate Mercury EP or LP controllers and Series 2 or 3 downstream boards.**



Standard Conventions

The following section presents the conventions used within this document for board labeling and placement, output usage, and wire coloring.

Mercury Board Numbering

Mercury board locations are numbered as M1, M2, etc. in sequence, from top to bottom, left to right or in a clockwise order, depending on enclosure and available open locations. Controller callouts in this document without an “EP” or “LP” prefix refer to either series. Note that the terminal layout varies between EP4502 and LP4502 controllers.

Configurations using an 1502, 4502, or 2500 controller will always have the controller located in the M1 location.

See Typical Enclosure Configurations starting on page 5 for examples.

LSP Board Numbering

LifeSafety Power board locations are numbered with the board type and a number to indicate individual boards. Locations with multiple designations may have either board or may have both boards stacked, depending on configuration.

FPO-1 Lock Power, or System Power in Single Voltage Systems

FPO-2 System Power in large Dual Voltage Systems

B100 System Power in small Dual Voltage Systems


D8P-1 to D8P-n Power Distribution, Class 2 Power Limited

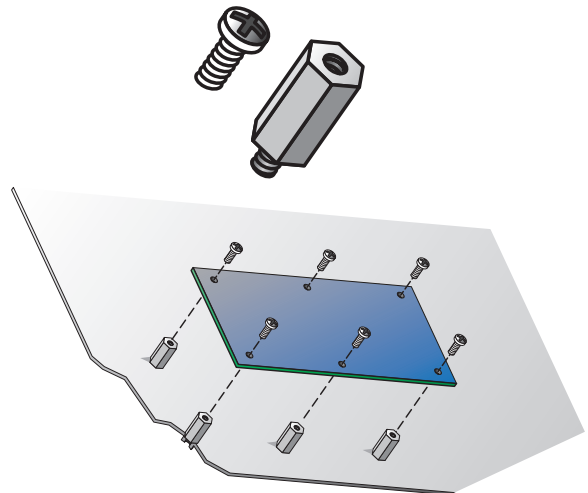
C8-1 / M8-1 Lock Control for locks 1 - 8

C8-2 / M8-2 Lock Control for locks 9 - 16

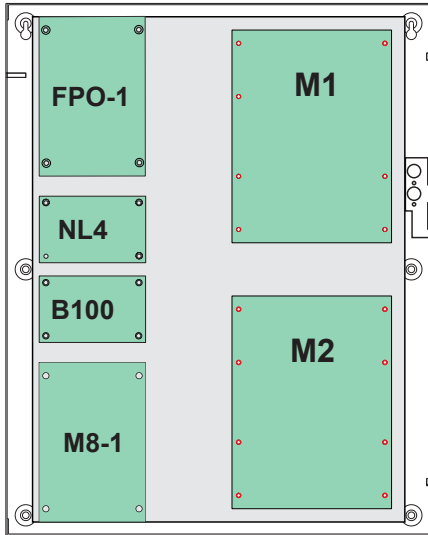
Mercury Board Mounting

Mounting of the Mercury subassemblies are by means of the supplied 6-32 SEMS screws using the preinstalled hex stand-offs.

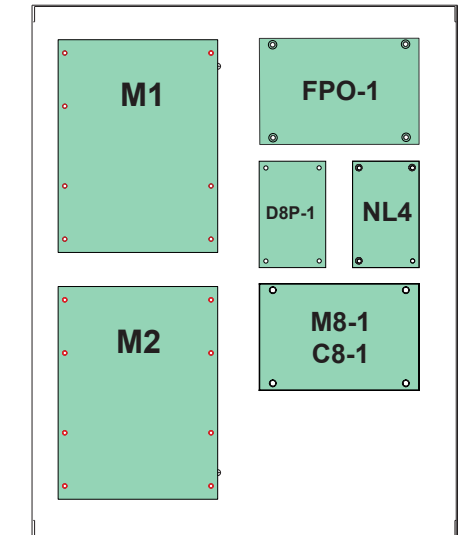
 Do not overtighten the hardware during the install process.



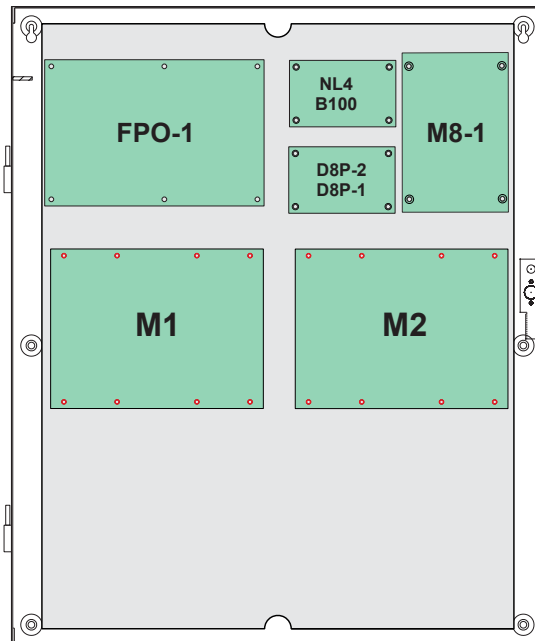
Typical System Configurations



4 Door - E2M
 Wallmount



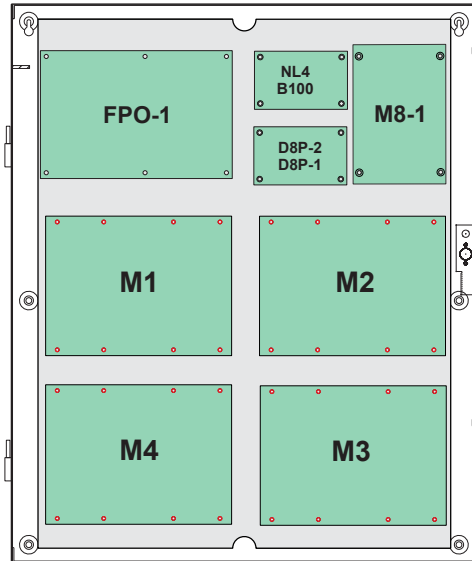
FRONT
 4 Door - RGM
 Rack Mount



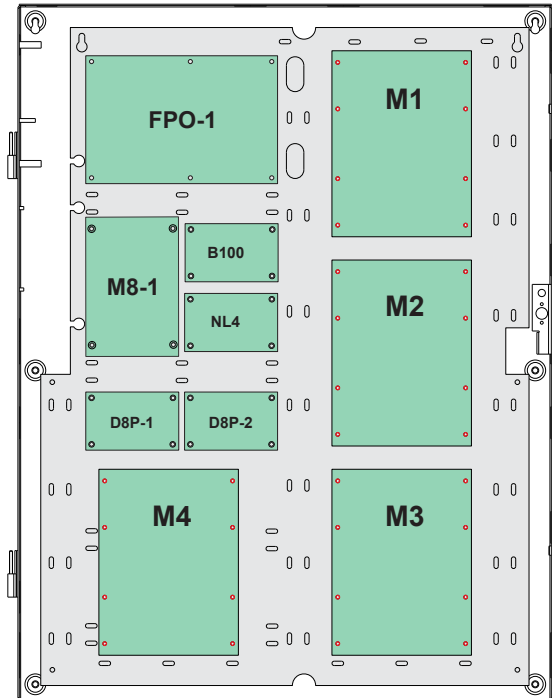
4 Door - E4M



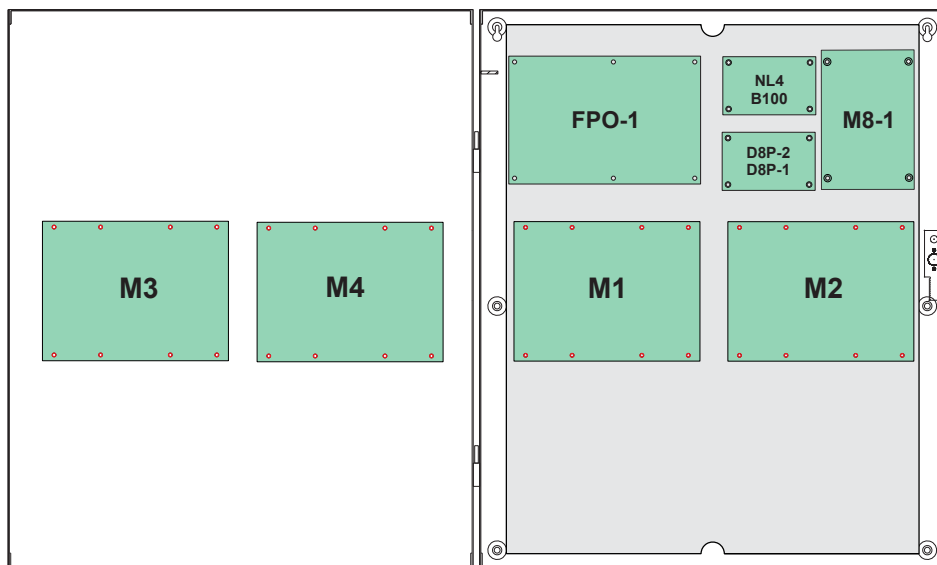
Typical System Configurations



8 Door - E4M

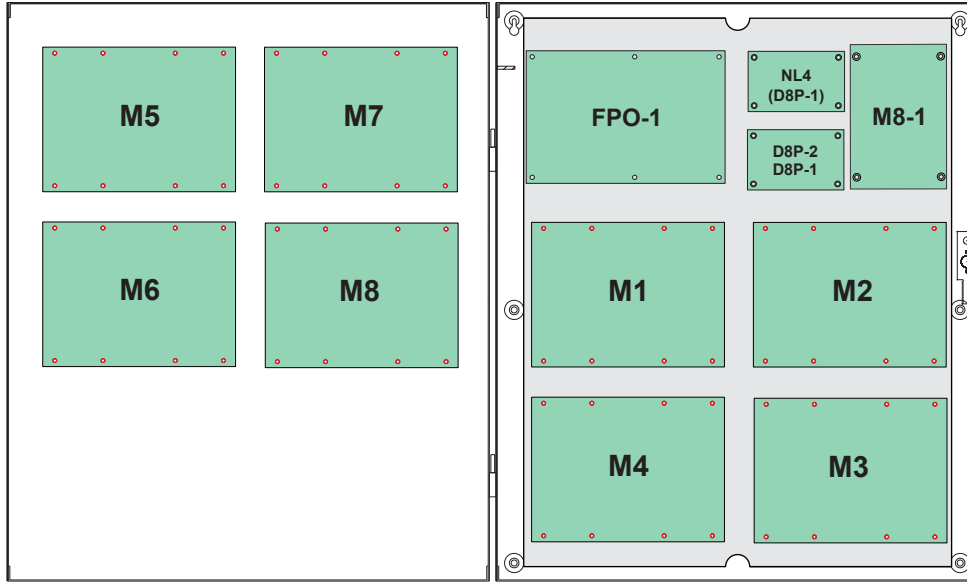


8 Door - E6M

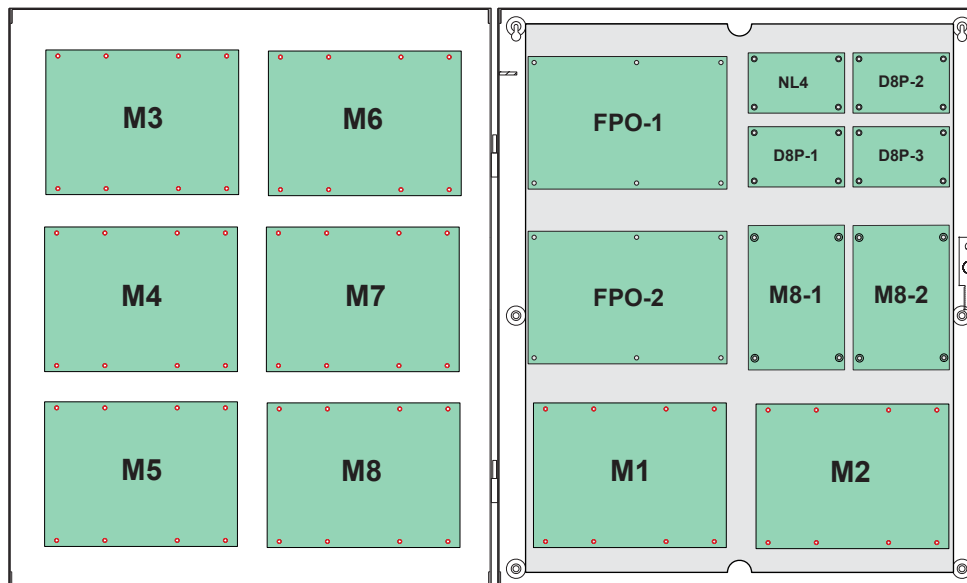


8 Door - E4M1

Typical System Configurations

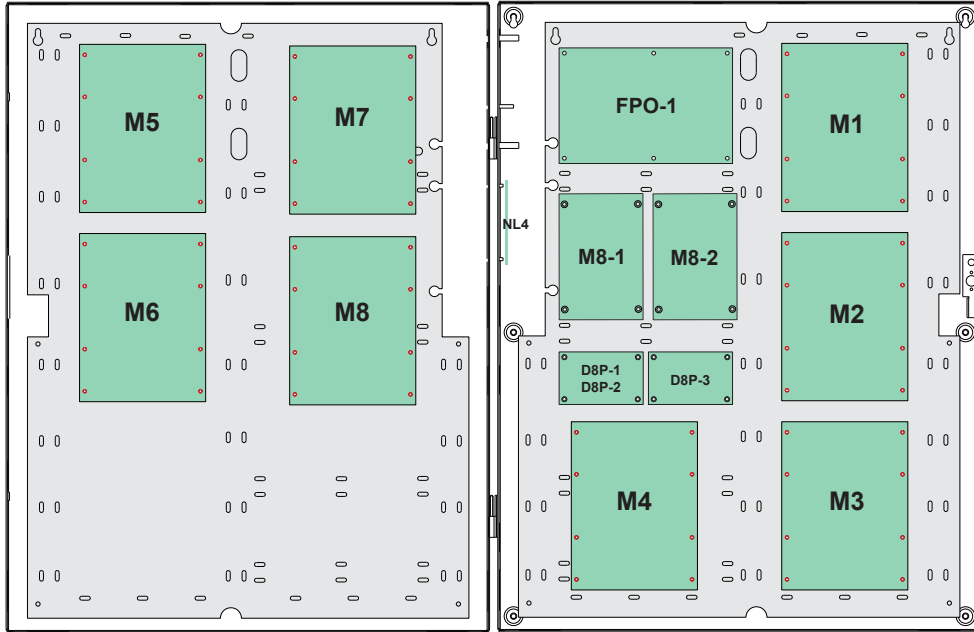


16 Door - E4M1
 Single Voltage

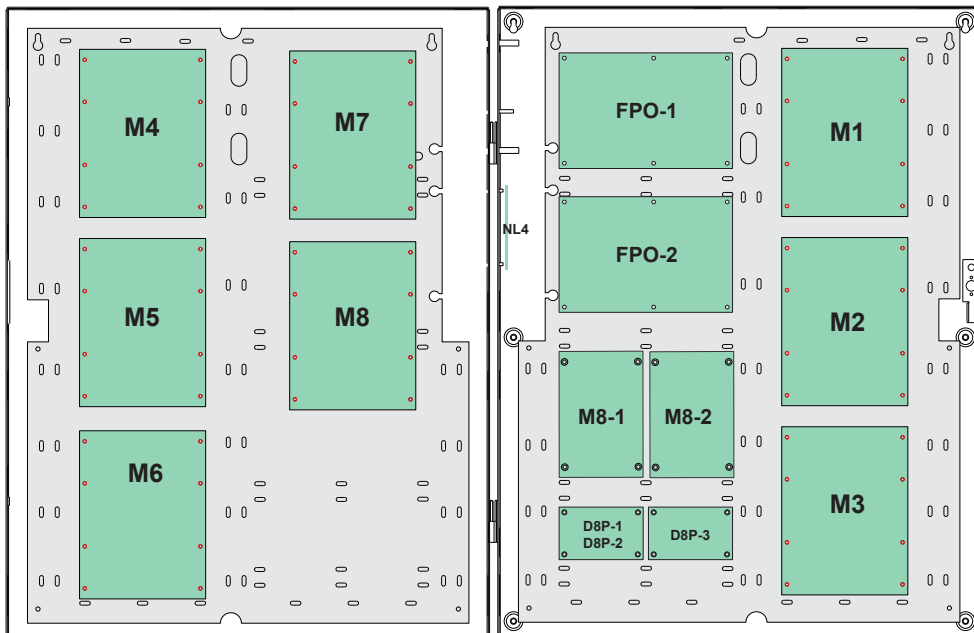


16 Door - E4M1
 Dual Voltage

Typical System Configurations

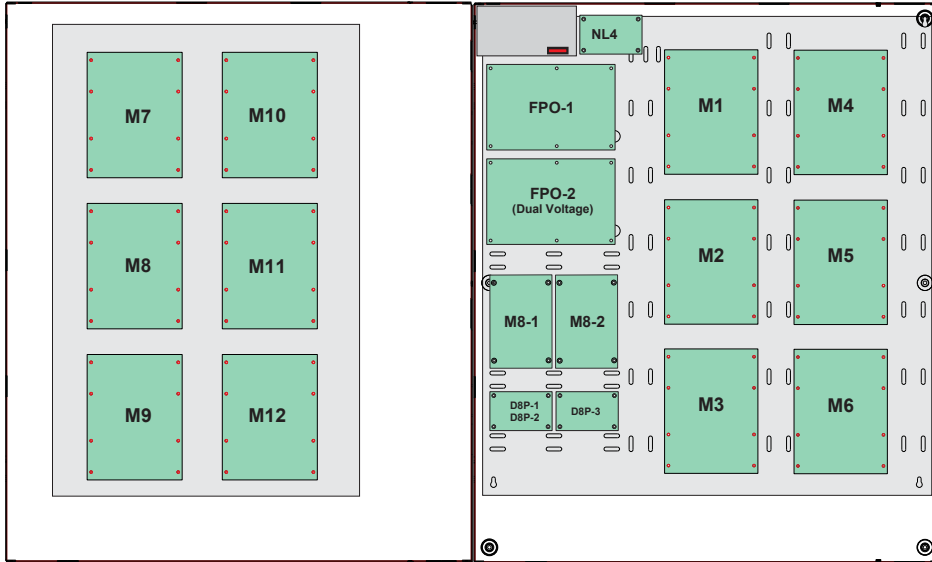


16 Door - E6M1
 Single Voltage

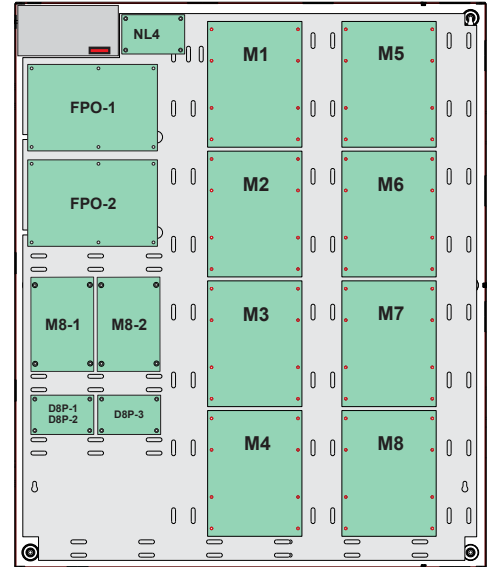


16 Door - E6M1
 Dual Voltage

Typical System Configurations



16 Door - E8M1
 Dual Voltage

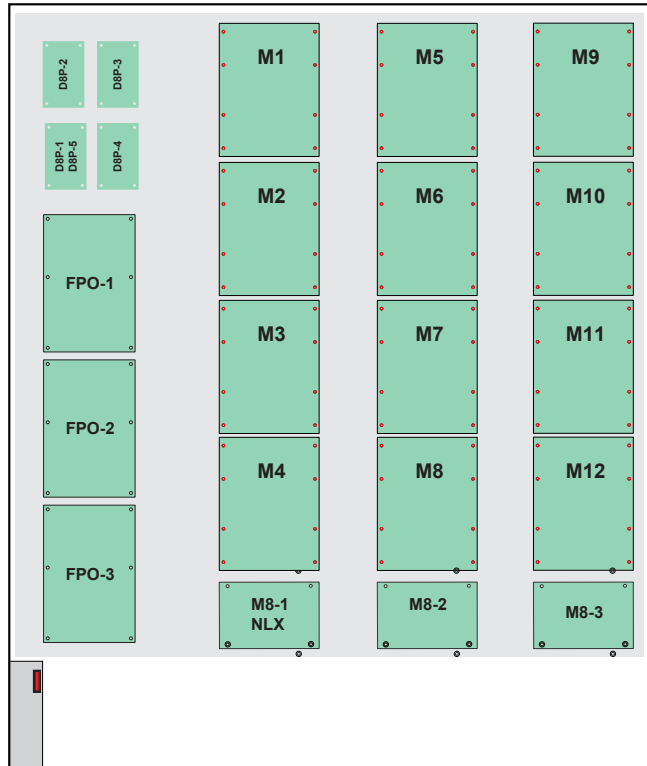


16 Door - E8M2
 Dual Voltage



16 Door - E8M3
 Dual Voltage

Typical System Configurations



24 Door - E12M



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Wiring Conventions

Wiring within the enclosure uses a consistent method and wire coloring as detailed below.

Mercury Board Power Connections

Mercury Board power originates from the 12V supply (FPO-2 or B100) in Dual Voltage systems, or from FPO-1 in Single Voltage systems. Power is supplied to the Mercury boards from D8P-1, providing Class 2 Power Limited outputs, as required by Mercury. Mercury Board M1 is powered from D8P-1 output 1, M2 from D8P-1 output 2, etc. Mercury Power wiring uses twisted 18AWG wire.

Red: +12VDC

Black: Ground (-)

Mercury RS485 Communications

The Mercury RS485 communications wiring is daisy chained from Mercury Board M1, to M2, etc. Mercury RS485 wiring uses jacketed, twisted 20AWG wire with shield.

White: Tr+

Black: Tr-

Shield: GND

Lock Control Input Color Code to C8/M8 from Mercury Outputs

The wiring between the Mercury board output and the C8 or M8 Lock Control board inputs uses twisted 18AWG wire with the following color convention:

Output 1: Brown / Black

Output 2: Red / Black

Output 3: Orange / Black

Output 4: Yellow / Black

Output 5: Green / Black

Output 6: Blue / Black

Output 7: Violet / Black

Output 8: Gray / Black

Wire coloring repeats for inputs 9-16 on C8-2/M8-2

ProWire®

Standard Conventions

Quick Reference

Mercury / Lenel Board Numbering

- M1 ... M2
- M3 ... M4
- M5 ... M6
- M7 ... M8
- Controller location - M1

LSP Board Numbering

- FPO1 - Lock power
- FPO2 - System power
- D8P-1 to D8P-n - D8P power distribution
- C8-1/M8-1 Lock control for locks 1 - 8
- C8-2/M8-2 Lock control for locks 9 - 16

Mercury Board Power

- 12VDC Class 2, Power Limited
- Red +12VDC
- Black GND
- Twisted 18 AWG
- From D8P-1, Class 2, PL source

RS485 Communications

- Daisy chained from M1....Mn
- Jacketed, twisted, with shield, 20 AWG
- White - Tr+
- Black - Tr-
- Shield - GND

Lock Control Input Color Code to C8 /M8 from Access Control

- 1 - Brown / Black twisted 18 AWG
- 2 - Red / Black twisted 18 AWG
- 3 - Orange / Black twisted 18 AWG
- 4 - Yellow / Black twisted 18 AWG
- 5 - Green / Black twisted 18 AWG
- 6 - Blue / Black twisted 18 AWG
- 7 - Violet / Black twisted 18 AWG
- 8 - Gray / Black twisted 18 AWG
- Repeat for inputs 9 - 16 on C8-2/M8-2



System Wiring Example

The following pages show an overview of wiring for a typical prewired system. Details of the wiring for each board are in later sections. All drawings show an “A” configuration (using a 1502 controller). Wiring for other configurations is the same - See page 17 for terminal locations of the 2500 or 4502 controllers.

LifeSafety Power Board, Fault, and Tamper Switch Wiring

The LifeSafety Power boards are prewired for power, Fault, and FlexIO. FPO-1 is wired to the B1 buss, and FPO-2 is wired to the B2 buss. FlexIO daisychains between all of the LSP boards to provide fault and FAI throughout the system. Fault wiring uses the FPO’s NO contacts for System and AC fault and connects to the M1 fault input. See AN-19 for more information on the Dual Buss architecture used for accessory power.





System Wiring Example

Mercury Board Power Wiring

The Mercury controllers are prewired for power to D8P-1. Mercury board M1 is wired to output 1, M2 to output 2, etc. Wiring is red/black twisted pair. All drawings show an “A” configuration (using the 1502 controller). Wiring for other configurations is the same - See page 17 for terminal locations of the 2500 or 4502 controller.



System Wiring Example

Mercury Board Communication Wiring

The Mercury controller RS485 communication between boards is prewired from M1 in order to the last board in the chain. Wiring is jacketed and twisted with shield. Black and white wires are for Tx+ and Tx-, while the shield is used for GND. All drawings show an “A” configuration (using the 1502 controller). Wiring for other configurations is the same - See page 17 for terminal locations of the 2500 or 4502 controller.





System Wiring Example

Mercury Board Output Relay Wiring

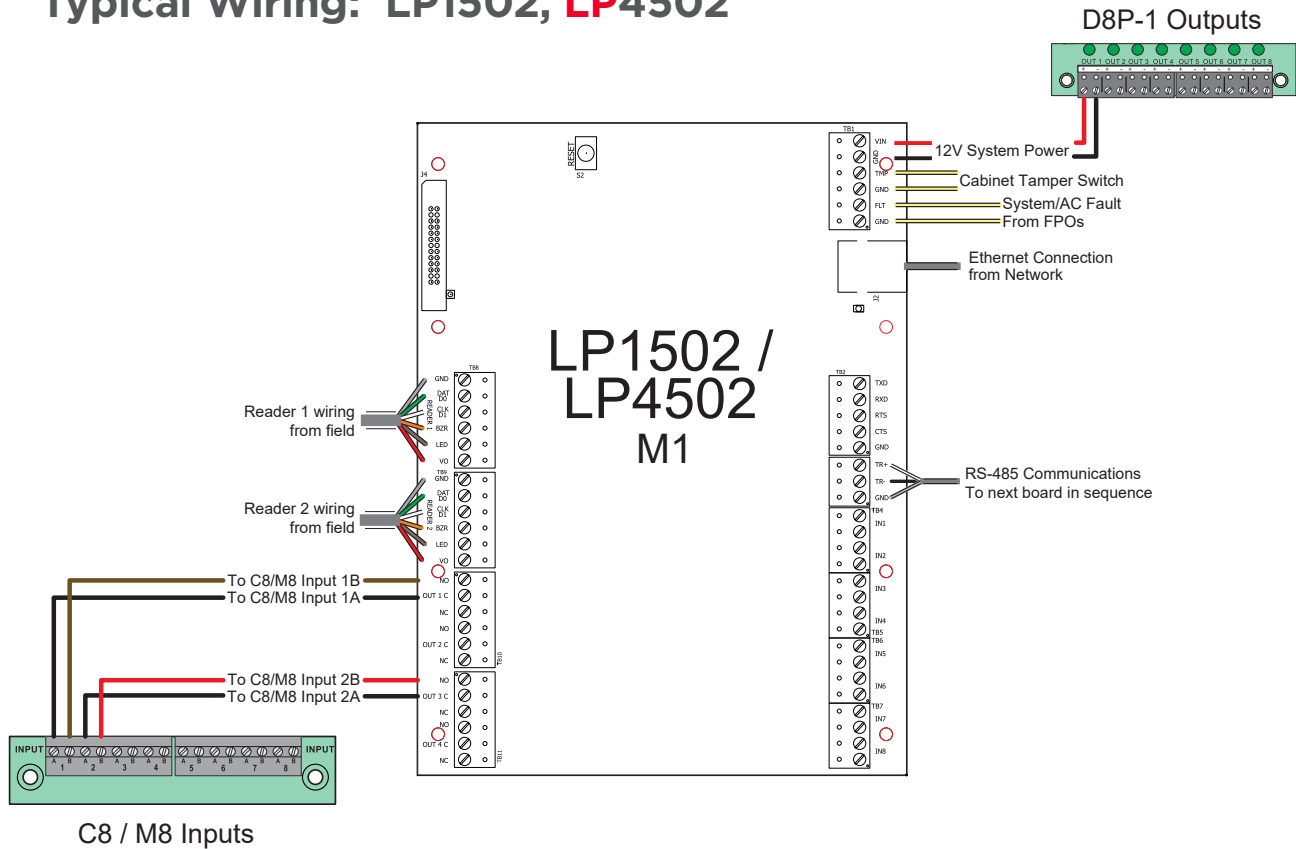
The output lock relays of the Mercury controllers are prewired to the inputs of the C8 or M8 lock control boards. Wiring is twisted pair and is color coded. All drawings show an “A” configuration (using the 1502 controller). Wiring for other configurations is the same - See page 17 for terminal locations of the 2500 or 4502 controller.

NOTE: Mercury ProWire systems use a 3-terminal connection at the Mercury Board for lock outputs. This allows the installer to connect to the relay being used, as lock vs. auxiliary relay usage varies among Mercury resellers. Additional 3-pin terminals are provided for the auxiliary relay outputs.





Typical Wiring: LP1502, LP4502



The LP1502 / LP4502 intelligent controllers provide decision making, event reporting, and database storage for the Mercury hardware platform. Two reader interfaces provide control for two doors.

Communication between connected boards is by means of Port 2 (RS485).

Two physical barriers can be controlled with the LP1502 or LP4502. Each reader port can accommodate a read-head that utilizes Wiegand, magnetic stripe, or 2-wire RS485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only).

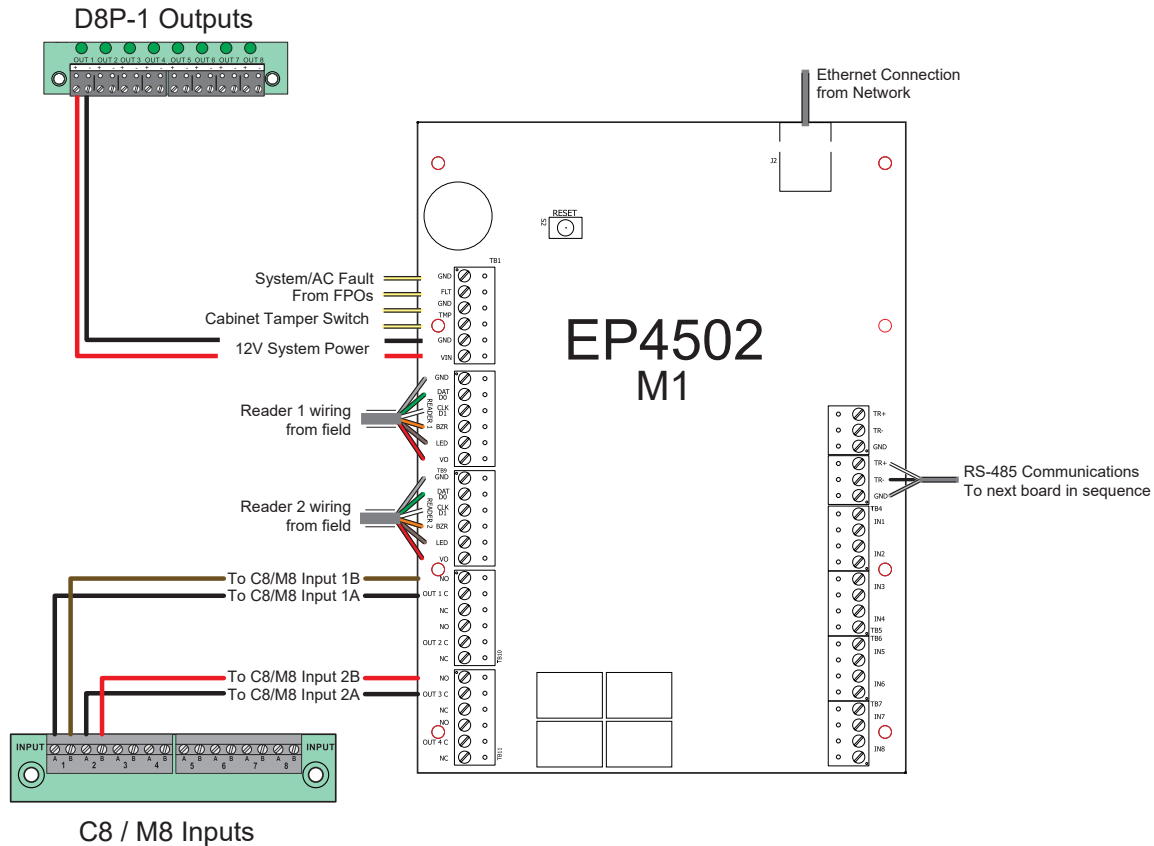
The relay outputs are used to interface with the C8 or M8 lock control board input terminals. These wires are color coded to denote the specific input connection.

The LP1502 / LP4502 require 12-24VDC for power and are connected to 12VDC supplied from an LSP D8P power distribution module which is a Class 2 Power Limited source.

Mechanical mounting is by eight, supplied, 1/2" metal standoffs threaded into the enclosure backplate with the board secured to the standoffs with eight 6-32 x 3/8" machine screws.

For electrical connection, remove the appropriate terminal strips from the board and replace with the supplied, pre-wired and identified terminal strips.

Typical Wiring: EP4502



The EP4502 intelligent controllers provide decision making, event reporting, and database storage for the Mercury hardware platform. Two reader interfaces provide control for two doors.

Communication between connected boards is by means of Port 2 (RS485).

Two physical barriers can be controlled with the 4502. Each reader port can accommodate a read-head that utilizes Wiegand, magnetic stripe, or 2-wire RS485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only).

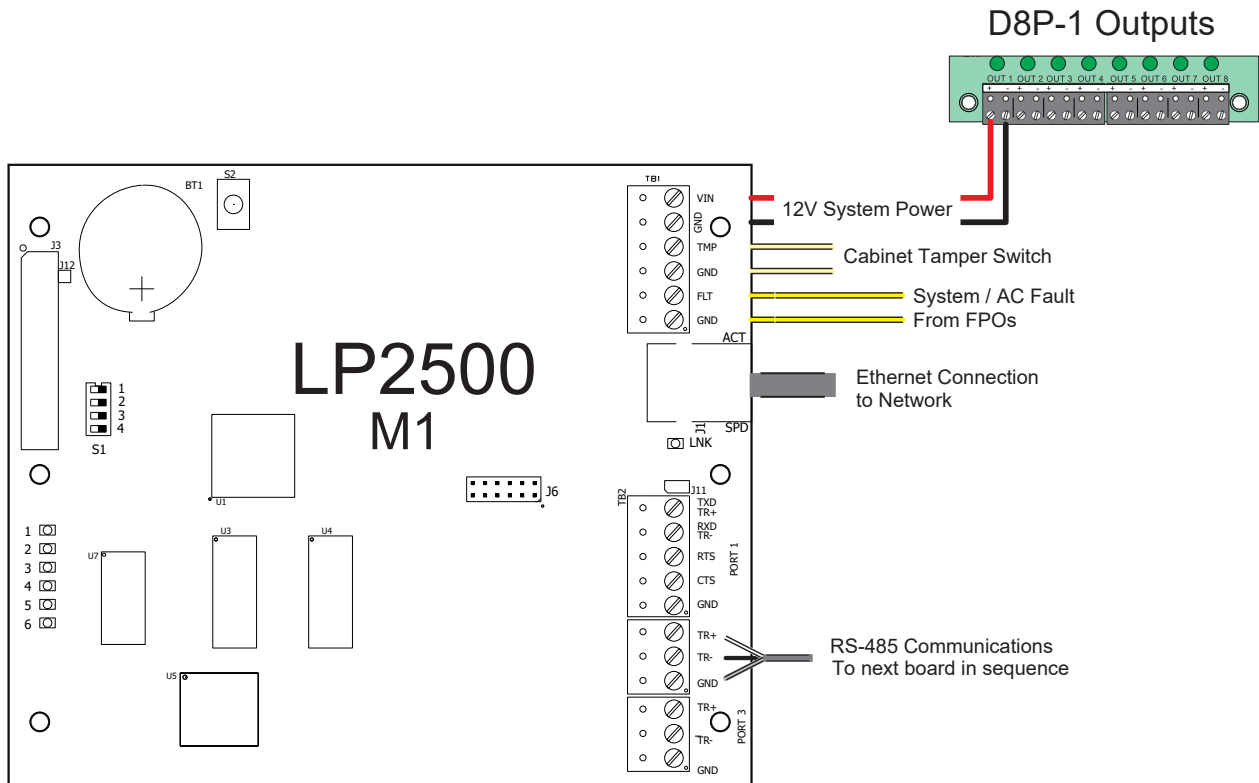
The relay outputs are used to interface with the C8 or M8 lock control board input terminals. These wires are color coded to denote the specific input connection.

The 4502 requires 12-24VDC for power and is connected to 12VDC supplied from an LSP D8P power distribution module which is a Class 2 Power Limited source.

Mechanical mounting is by eight, supplied, 1/2" metal standoffs threaded into the enclosure backplate with the board secured to the standoffs with eight 6-32 x 3/8" machine screws.

For electrical connection, remove the appropriate terminal strips from the board and replace with the supplied, pre-wired and identified terminal strips.

Typical Wiring: LP2500



The 2500 intelligent controllers provide decision making, event reporting, and database storage for the Mercury hardware platform.

It communicates with the host via on-board 10BASE-T / 100BASE-TX Ethernet port or Port 1. Port 1 may be set up as RS-232, 2-Wire RS485, or an optional 10BASE-T / 100BASE-TX using a Lantronix Micro100 interface daughter board.

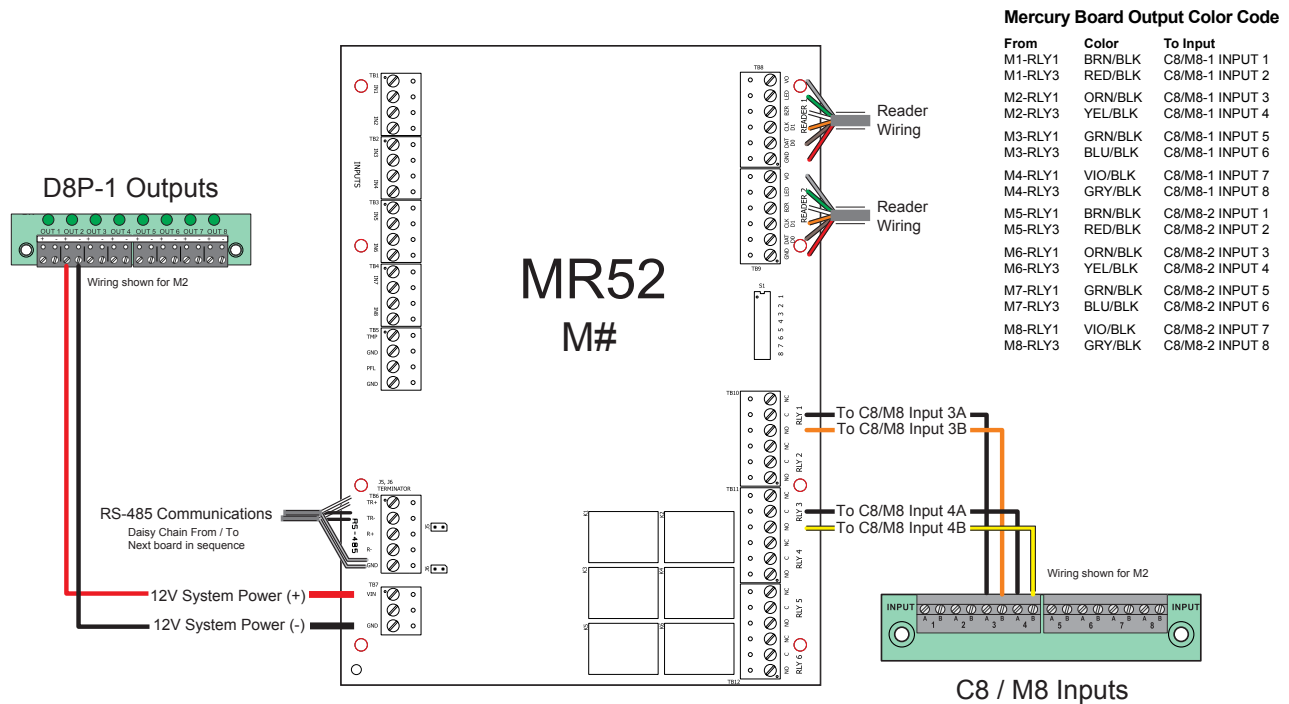
Subcontrollers are connected via Ports 2 and 3 using 2-Wire RS485.

The 2500 requires 12-24VDC for power and is connected to 12VDC supplied from an LSP D8P power distribution module which is a Class 2, Power Limited Source.

The 2500 is mounted on six supplied 1/2" metal standoffs threaded into the enclosure backplate with the board secured to the standoffs with six 6-32 x 3/8" machine screws.

For electrical connection, remove the appropriate terminal strips front the board and replace with the supplied, pre-wired and identified terminal strips.

Typical Wiring: MR52, MR52-S3



The MR52 reader interface provides a solution to the OEM system integrator for interfacing to TTL/Wiegand/RS485 type readers and door hardware. The MR52 can accept data from readers with clock/data, Wiegand or RS485 signaling, provide a tri-stated LED control and buzzer control.

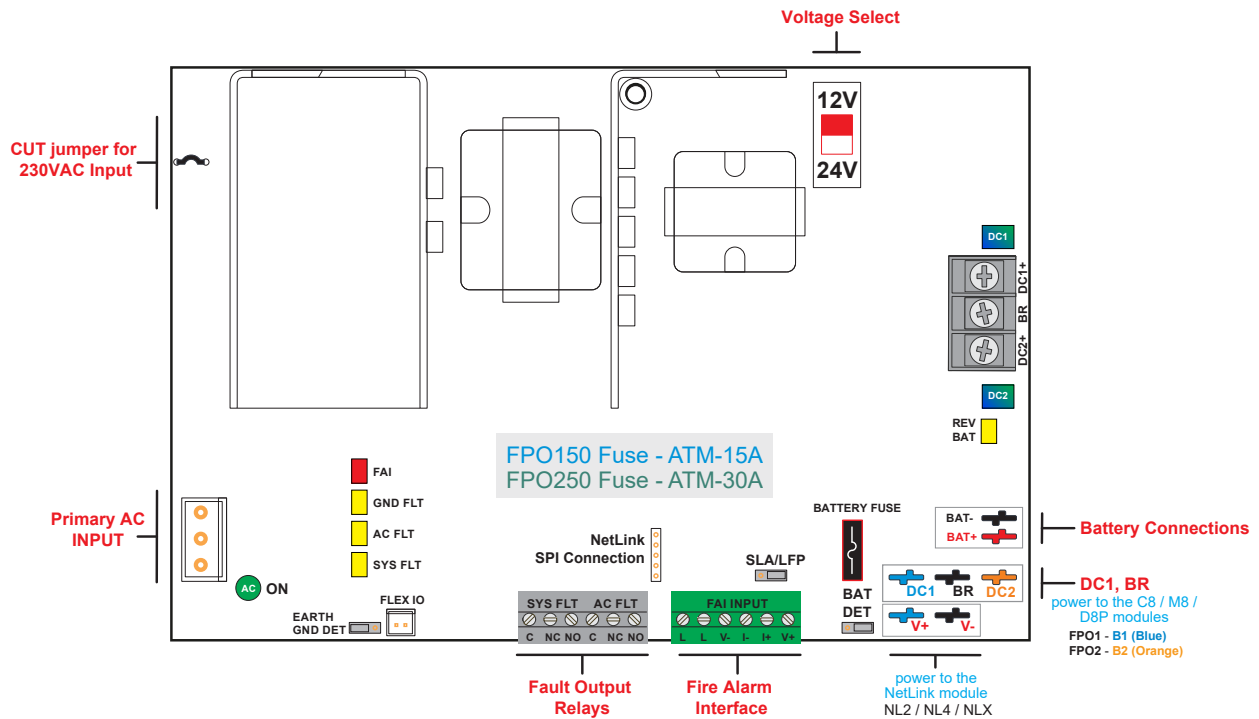
Six form-C relay outputs may be used for door control or alarm signaling. Eight supervised inputs are provided for monitoring the door contact, exit push button and alarm contacts.

Communication to the MR52 is accomplished via a 2-wire RS485 interface.

The MR52 requires 12 to 24Vdc for power and is connected to 12VDC supplied from an LSP D8P power distribution module which is a Class 2, Power Limited source.

The lock outputs of the MR52 are connected to the C8/M8 inputs such that the MR52 activates the C8/M8 lock control board and the C8/M8 activates the lock. This method adds another layer of control to the lock and protection for the Mercury hardware.

Typical Wiring: FPO150, FPO250



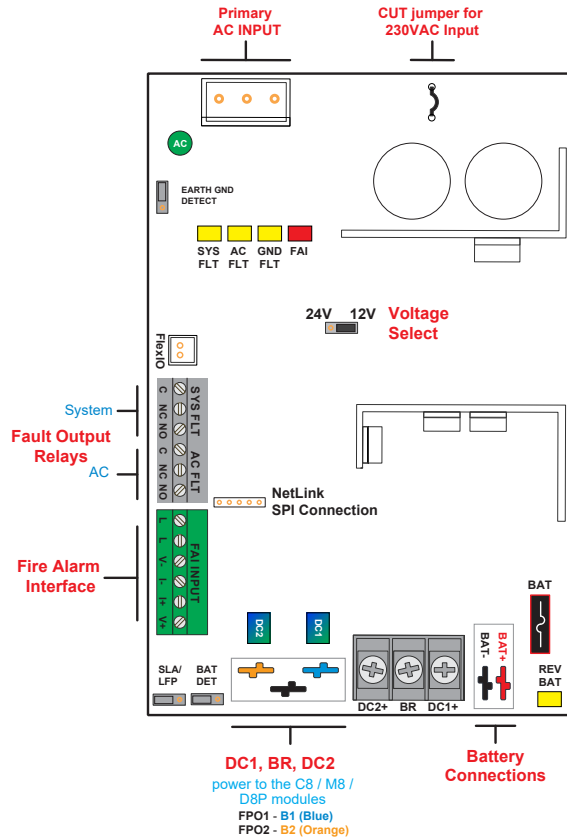
The FPO150 will provide 12V @ 12A or 24V @ 6A and the FPO250 will provide 12V @ 20A or 24V @ 10A. The output voltage is selectable by the slide switch in the upper right corner of the unit. Either unit will charge 4 to 80 Ah of battery capacity.

Voltage from this device is available throughout the system from the C8/M8 lock control boards and the D8 power distribution boards.

AC and System Fault output relays of the FPO are wired to the Mercury hardware, and a fire alarm interface is available for lock over ride in the event of a fire condition. The fire over ride is applied to the C8/M8 lock control boards as needed and programmed.

See the supplied FPO manual for more information.

Typical Wiring: FPO75



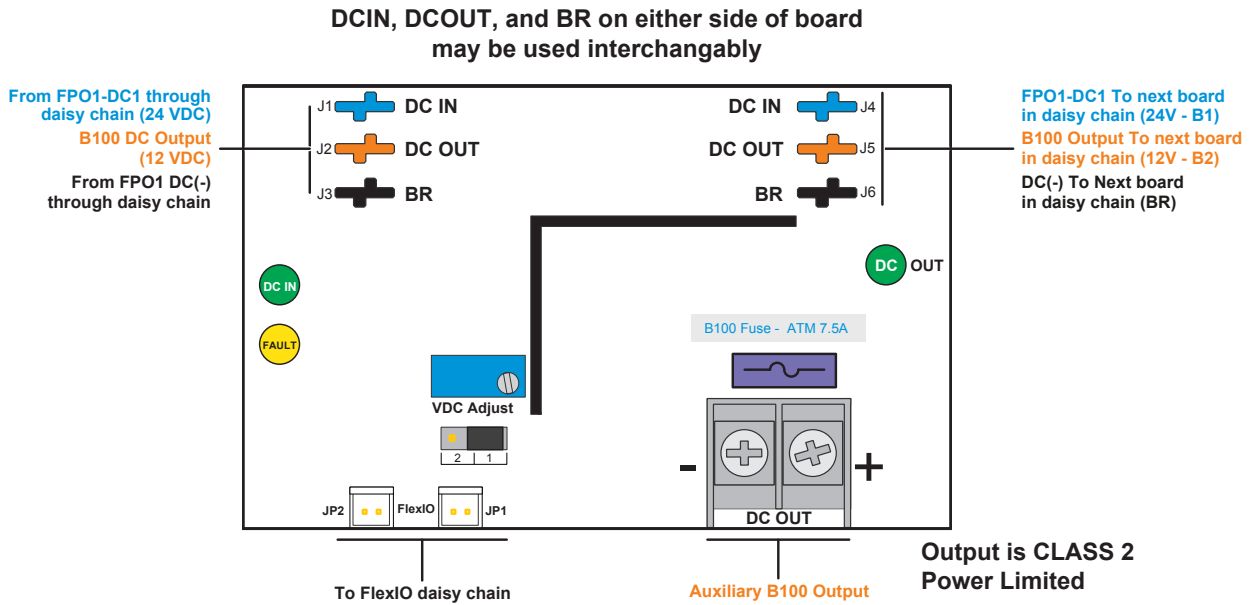
The FPO75 will provide 12V @ 6A or 24V @ 3A. The output voltage is selectable by the two position jumper in the center of the unit. The FPO75 will charge 4 to 40 Ah of battery capacity.

Voltage from this device is available throughout the system from the C8/M8 lock control boards and the D8P power distribution boards.

AC and System Fault output relays of the FPO are wired to the Mercury hardware, and a fire alarm interface is available for lock over ride in the event of a fire condition. The fire over ride is applied to the C8/M8 lock control boards as needed and programmed.

See the supplied FPO manual for more information.

Typical Wiring: B100



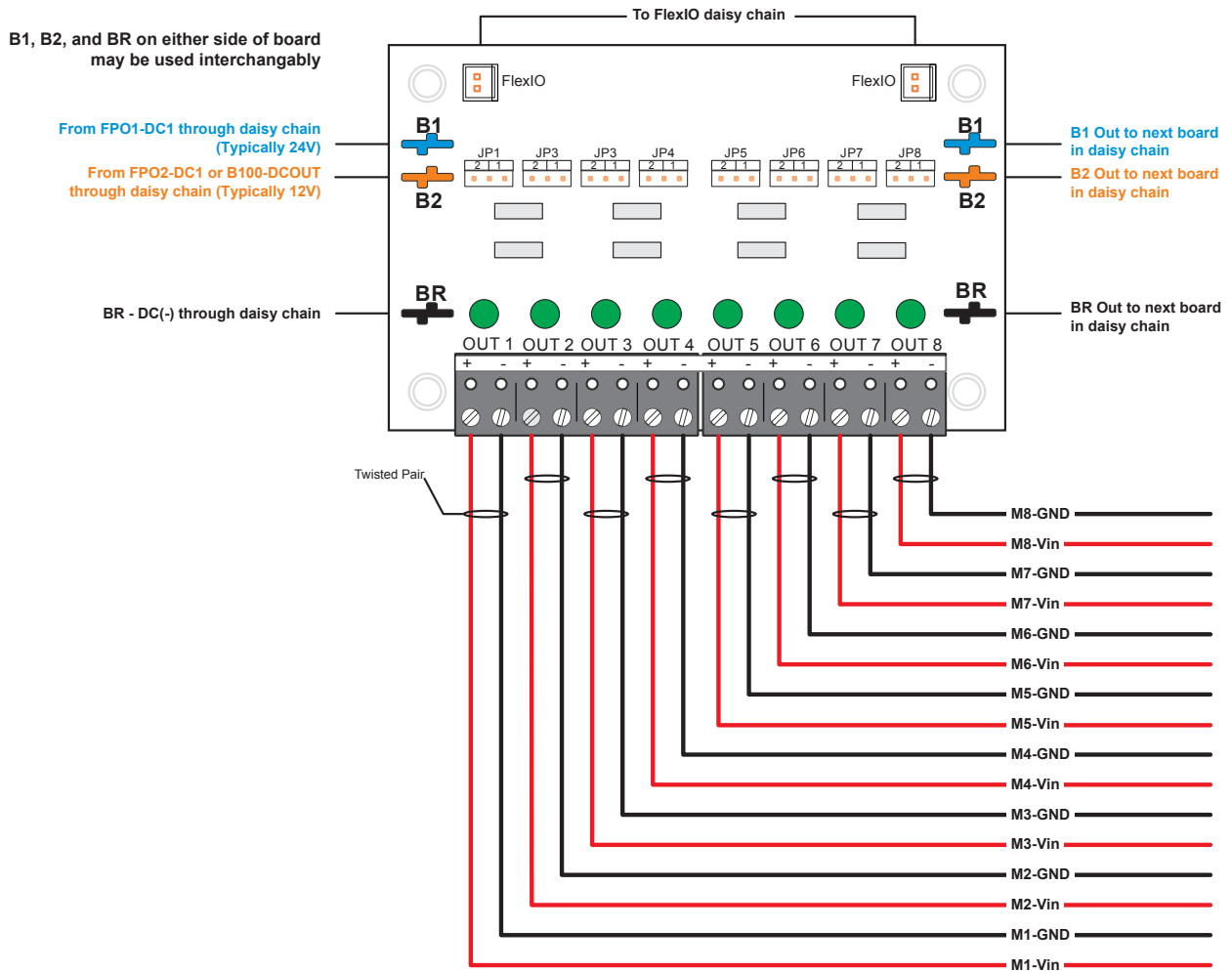
The B100 is used to provide 12V system power when the necessary current is less than 4A. The advantages of using the B100 over an FPO are that the B100 is physically smaller for more effective space utilization, more economical, and does not require a separate standby battery for 12V backup. Input power for the B100 is derived from FPO-1, which is set for 24V, rather than the AC line.

The B100 provides onboard visual indication of an operational or output fault and will transmit that fault condition to the host FPO in the system for activation of the FPO system fault relay. A system fault alert will be provided by the NL4 if installed in the system.

The B100 is rated as a Low Voltage, Class 2, power Limited unit.

For more information see the B100 Installation manual and Application Note AN-07.

Typical Wiring: D8P



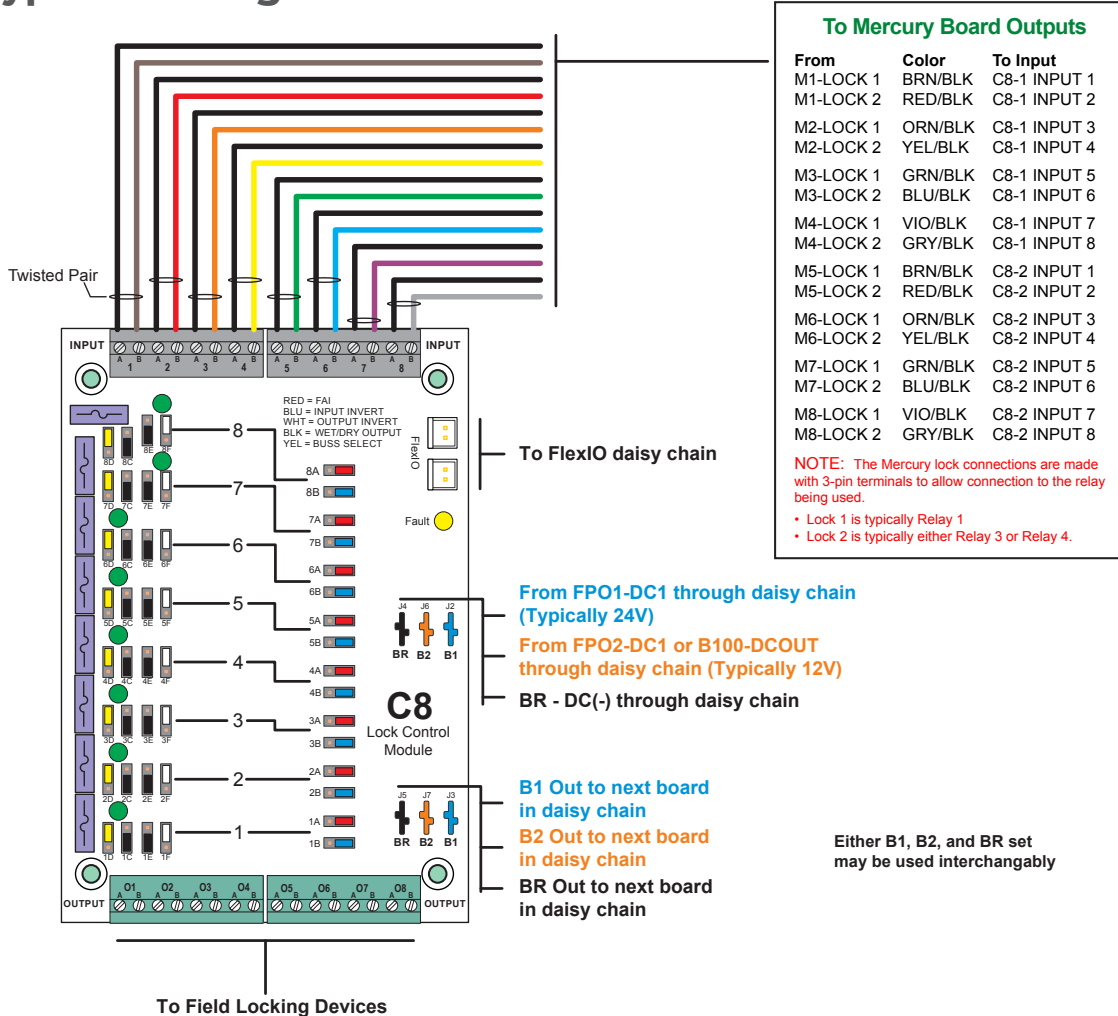
The D8P provides continuous auxiliary outputs. D8P-1 is prewired for power to the Mercury controllers. One or more additional D8P boards may be provided for external auxiliary power. The terminal strips on these additional D8P boards will be empty.

Jumpers JP1 through JP8 are used to select the output voltage for each output in dual voltage systems. Position 1 selects the voltage connected to the B1 buss, while position 2 selects the voltage on the B2 buss. Single voltage systems should leave these jumpers in position 1.

In dual voltage systems, B1 is 24V and B2 is 12V, as set from the factory.

See the D8P Installation manual for more information.

Typical Wiring: C8



The C8 provides a protective and operational buffer between the access control boards and field induced problems or issues.

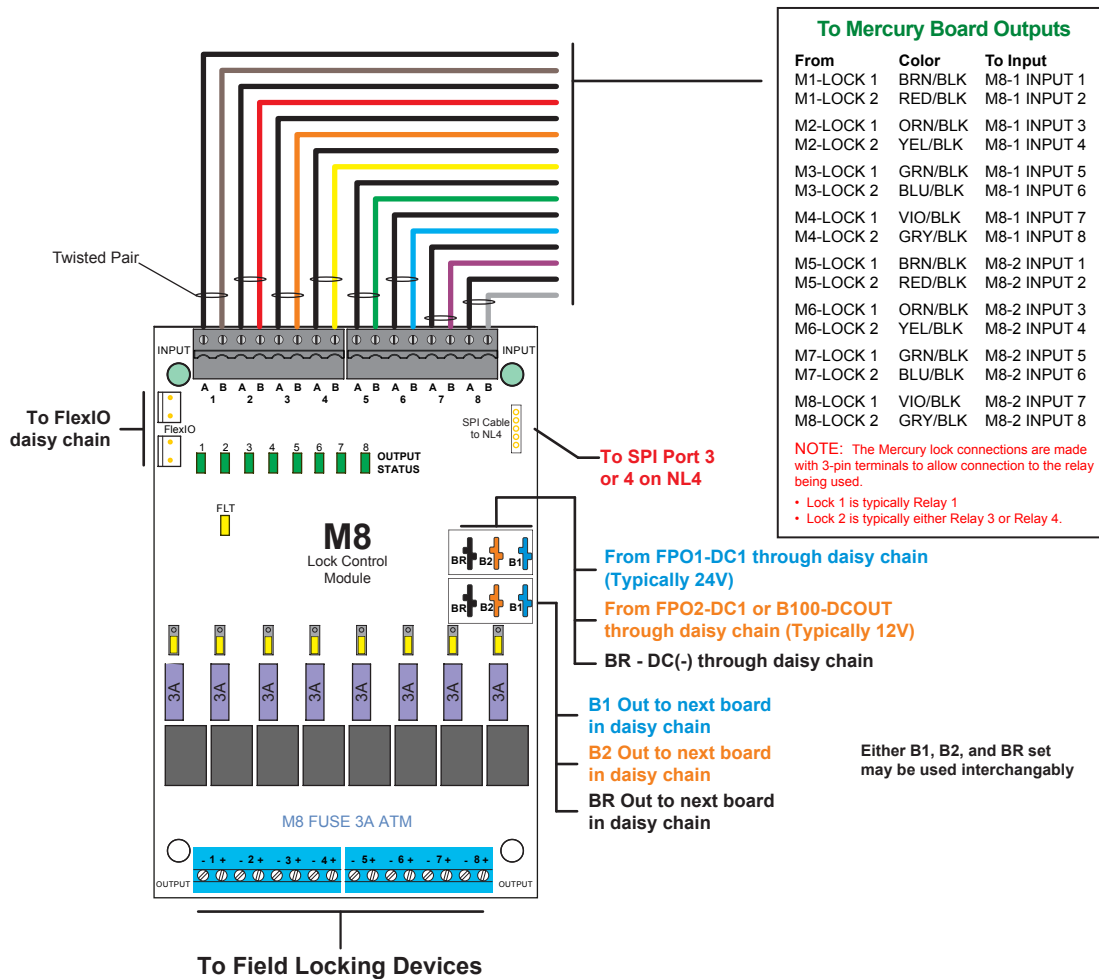
Eight trigger inputs are pre-wired to the access control lock outputs with color-coded, twisted-pair wires and eight relay controlled outputs are provided for lock control. Each output is capable of 3A of current and is selectable for either voltage in dual voltage systems.

The blue and black jumpers are pre-set from the factory. The jumpers below need to be set by the installer.

See the C8 Installation manual and Application Note AN-29 for more information.

Color	Function	Position 1	Position 2
Red	FAI	Enabled	Disabled
Yellow	Voltage Select	B1	B2
White	Lock Type	Maglock (Fail Safe)	Strike (Fail Secure)

Typical Wiring: M8



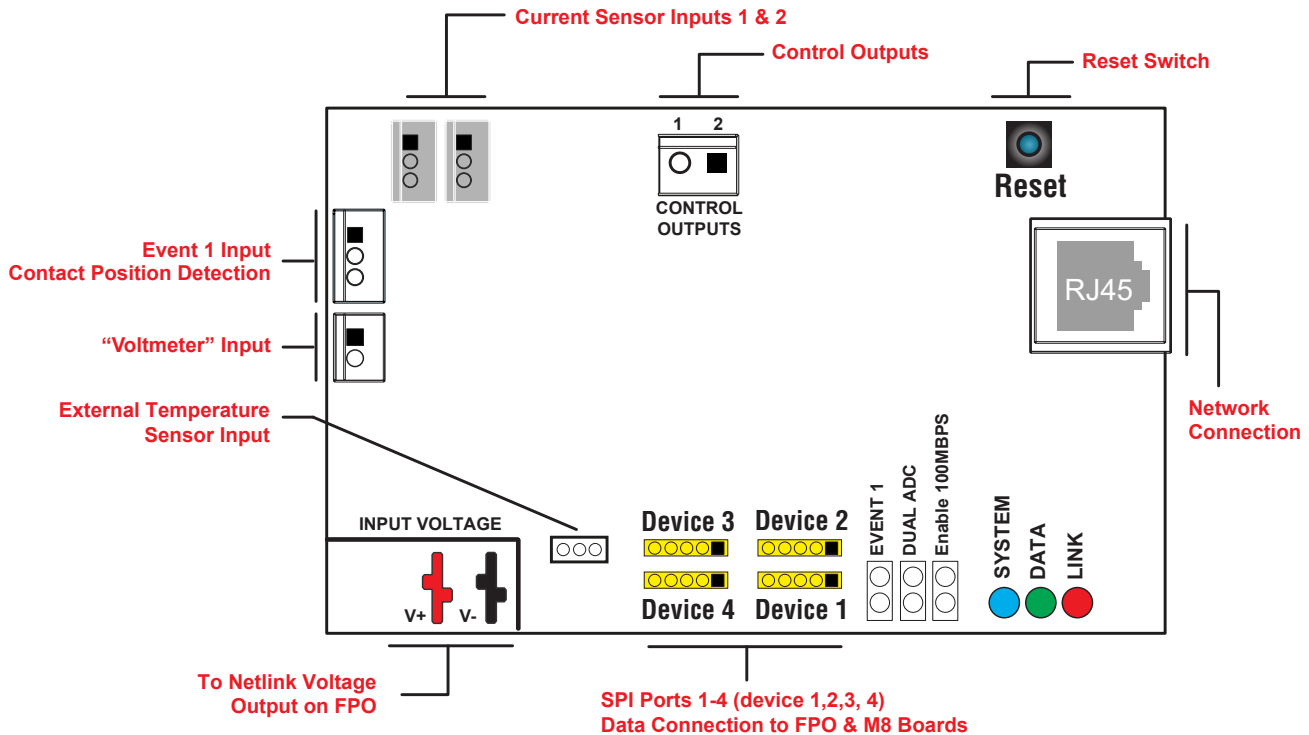
The M8 provides a protective and operational buffer between the access control boards and field induced problems or issues. This unit is used for lock control when a network managed system is desired with remote control, reporting, and diagnostics.

Eight trigger inputs are pre-wired to the access control lock outputs with color-coded, twisted-pair wires and eight relay controlled outputs are provided for lock control. Each output is capable of 3A of current and is selectable for either voltage in dual voltage systems.

System configuration, FAI Operation, and lock operation are selectable through the embedded browser interface of the required NL4. One jumper per zone is provided for voltage selection in dual voltage systems.

See the M8 and NL4 Installation manuals for more information.

Typical Wiring: NL4



The NL4 is a network module that allows status communication and power control over a local or wide area network. The NL4 provides four device ports for connection to other FlexPower devices. Data monitored includes fault status, power supply output voltage, battery voltage and charging current, and FAI status. When used with an M8 output board, the NL4 allows control of each individual output, along with the ability to view voltage and current for each output.

In addition to the four device ports, the NL4 also includes two current sensors, a voltmeter input, an external temperature sensor, and a contact monitor input. Upper and lower limits can be set for these inputs to provide an alert if the sensor goes out of range.

A 1000 point history data log updates at the selected interval and is emailed on a status change. The data log can also be set to send on a selected schedule.

See the NL4 Installation manual and Application notes AN-20, AN-23, AN-24, and AN-25.



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