

# EP4502 Intelligent Controller

with Two Reader Interface

Installation and Specifications:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

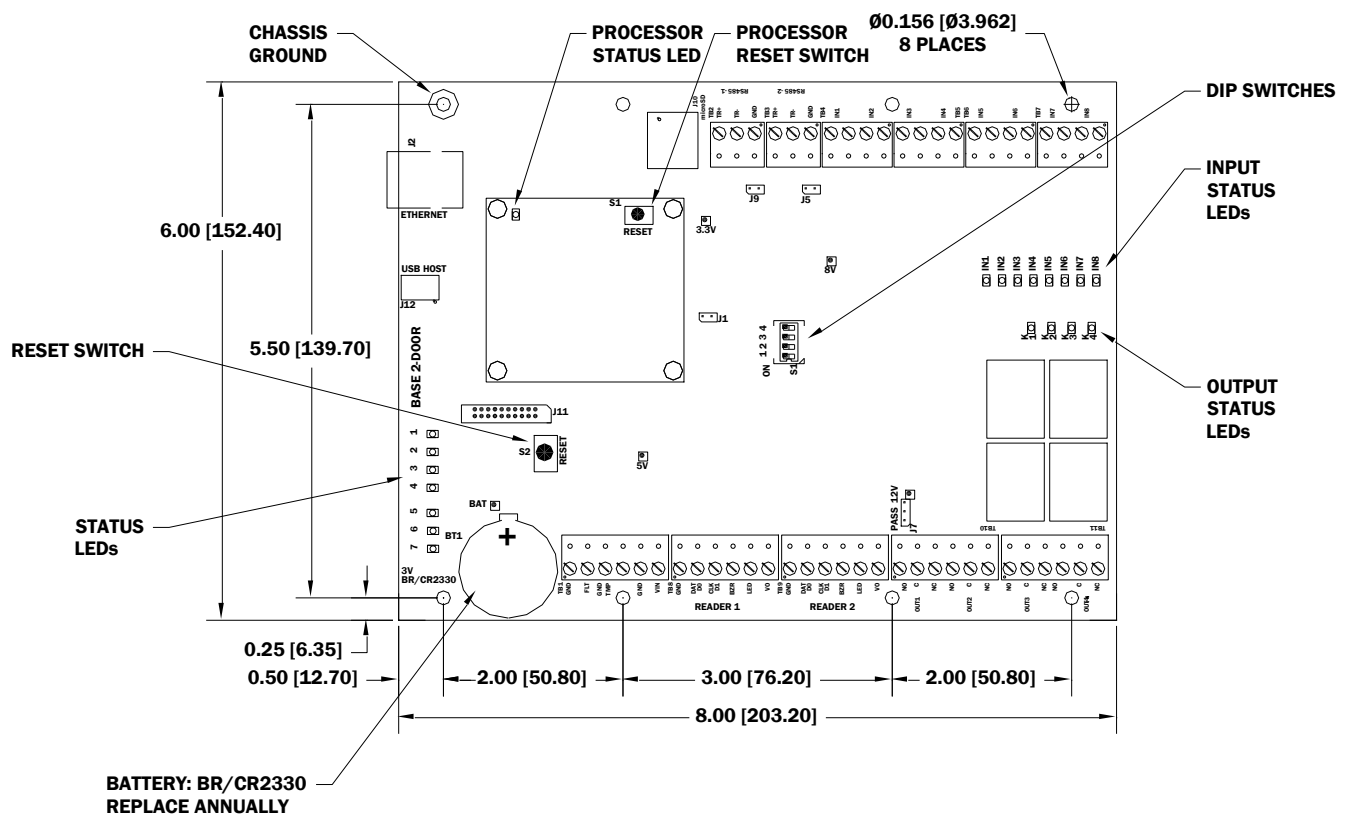
## 1. General

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

The EP4502 communicates with the host via on-board 10Base T/100Base-TX Ethernet port.

Two physical barriers can be controlled with the EP4502. Each reader port can accommodate a read-head that utilizes Wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards and also provides tri-stated LED control, and buzzer control (one wire LED mode only). Four Form-C relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5 A @ 30 Vdc, dry contact configuration. Eight inputs are provided for monitoring the door contacts, exit push buttons and alarm contacts. The EP4502 requires 12 to 24 Vdc for power.

## 2. EP4502 Hardware:



### 3. EP4502 Wiring and Setup:

CONNECTION		
TB8	Reader 1	GND: Ground
		DAT/D0: Data/Data 0/TR-
		CLK/D1: Clock/Data 1/TR+
		BZR: Reader Buzzer
		LED: Reader LED
		VO: Reader Power
TB9	Reader 2	GND: Ground
		DAT/D0: Data/Data 0/TR- (A)
		CLK/D1: Clock/Data 1/TR+ (B)
		BZR: Reader Buzzer
		LED: Reader LED
		VO: Reader Power
TB10	Out 1	NO: Normally Open Contact
		C: Common
		NC: Normally Closed Contact
	Out 2	NO: Normally Open Contact
		C: Common
		NC: Normally Closed Contact
TB11	Out 3	NO: Normally Open Contact
		C: Common
		NC: Normally Closed Contact
	Out 4	NO: Normally Open Contact
		C: Common
		NC: Normally Closed Contact

CONNECTION		
TB1	Cabinet	GND
	Tamper Input	TMP
	Power Fault	GND
	Input	FLT
	Power Input	GND
		VIN: 12 to 24 Vdc
TB2	SIO Port 1	TR+ (B) (2-wire RS-485)
		TR- (A) (2-wire RS-485)
		GND (2-wire RS-485)
TB3	SIO Port 2	TR+ (B) (2-wire RS-485)
		TR- (A) (2-wire RS-485)
		GND (2-wire RS-485)
TB4	Input 1	IN1
		IN1
	Input 2	IN2
		IN2
TB5	Input 3	IN3
		IN3
	Input 4	IN4
		IN4
TB6	Input 5	IN5
		IN5
	Input 6	IN6
		IN6
TB7	Input 7	IN7
		IN7
	Input 8	IN8
		IN8

#### Jumpers:

The EP4502 processor hardware interface is configured using jumpers to setup the port interface and end of line termination.

JUMPERS	SET AT	DESCRIPTION
J1	N/A	Factory Use Only
J2	N/A	10 Base-T/100Base-Tx Ethernet Connection (Port 0)
J5	OFF	Port 2 RS-485 EOL Terminator is Off
	ON	Port 2 RS-485 EOL Terminator is On
J7		Reader Power Select. See Note 1
	12V	12 Vdc at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J8	N/A	Processor connection to Base Board
J9	OFF	Port 1 RS-485 EOL Terminator is Off
	ON	Port 1 RS-485 EOL Terminator is On
J10	N/A	MicroSD – Not supported
J11	N/A	Factory Use Only
J12	N/A	USB – Not supported
JP3	On	On processor board. Factory Use Only – Must be installed


Note 1: The input power (VIN) must be 20 Vdc minimum if the 12 Vdc selection is to be used.

## DIP Switches:

The four switches on S1 DIP switch configure the operating mode of the EP4502 processor. DIP switches are read on power-up except where noted. Pressing reset switch S2 or the processor reset switch S1 (on the processor board) causes the EP4502 to reboot.

1	2	3	4	Definitions
OFF	OFF	OFF	OFF	Normal operating mode.
ON	OFF	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. See IT Security section for additional information
OFF	ON	OFF	OFF	Use factory default communication parameters.
ON	ON	OFF	OFF	Use OEM default communication parameters. Contact system manufacture for details. See Bulk Erase below.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase below.

All other switch settings are unassigned and are reserved for future use.

 In the factory or OEM default modes, downloaded configuration/database is not saved to flash memory.

### Factory Default Communication Parameters:

Network: static IP address: 192.168.0.251

Communication address: 0

Primary Host port: IP server, no encryption, port 3001.

## 4. The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board).
- Update OEM default parameters after OEM code has been changed.
- Recover from database corruption causing EP4502 board to continuously reboot.

If clearing the memory does not correct the initialization problem, contact technical support.

Bulk Erase Steps: **Do not remove power during steps 1-8.**

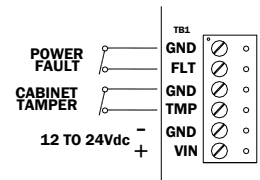
1. Set S1 DIP switches to: 1 & 2 "ON", 3 & 4 "OFF".
2. Apply power to the EP4502 board.
3. Watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds of powering up, change switches 1 or 2 to "OFF". If these switches are not changed, the EP4502 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased.
6. Full memory erase takes up to 60 seconds.
7. When complete, only LEDs 1 & 4 will flash for 8 seconds.
8. The EP4502 Board will reboot 8 seconds after LEDs 1 & 4 stop flashing (no LEDs are on during this time).

## 5. Input Power, Cabinet Tamper and UPS Fault Input Wiring:

The EP4502 requires 12-24 Vdc power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire. **Connect the GND signal to earth ground in ONE LOCATION within the system! Multiple earth ground connections may cause ground loop problems and is not advised.**

**Observe POLARITY on 12-24 Vdc input!**

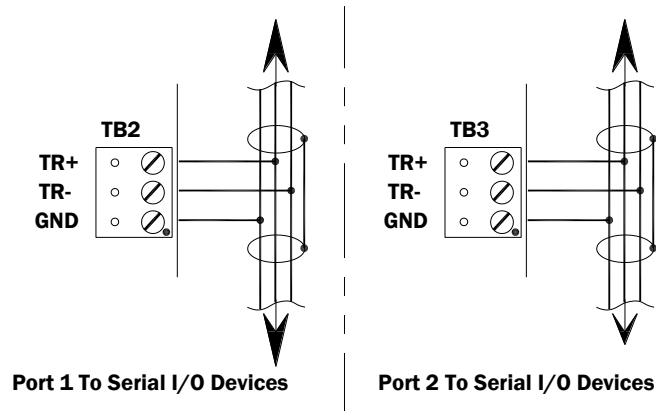
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.



## 6. Communication Wiring:

The EP4502 controller communicates to the host via the on-board 10-BaseT/100Base-TX Ethernet interface (port 0).

The serial I/O device communication ports, TB2 for port 1 and TB3 for port 2, are 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum for communication



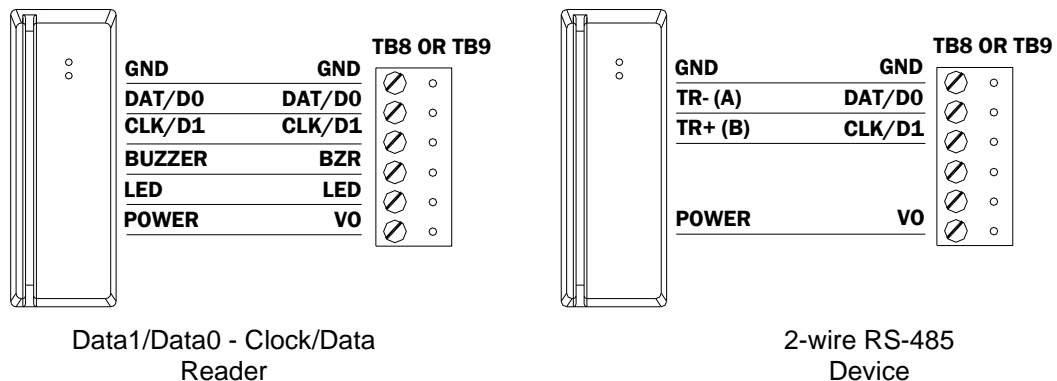
**⚠ IMPORTANT NOTE!** Install the termination jumper **ONLY** on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

## 7. Reader Wiring:

Each reader port supports Wiegand, magnetic stripe, and 2-wire RS-485 electrical interfaces. Power to the reader is selectable: 12 Vdc ( $V_{IN}$  must be greater than 20 Vdc), or power is passed-through (PASS) from the input voltage of the EP4502 (TB1-VIN) and is current limited to 180 mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacture specifications for cabling requirements. In the 2-wire LED mode the Buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

PASS 12V	READER POWER
<input type="checkbox"/>	12Vdc IS AVAILABLE ON READER PORTS ( $V_{IN} \geq 20Vdc$ )
<input checked="" type="checkbox"/>	VIN POWER IS "PASSED THROUGH" TO READER PORTS

J7 - READER POWER SELECT



## 8. Input Circuit Wiring:

There are 8 inputs that are typically used to monitor door position, request to exit or alarm contacts. Input circuits can be configured as:

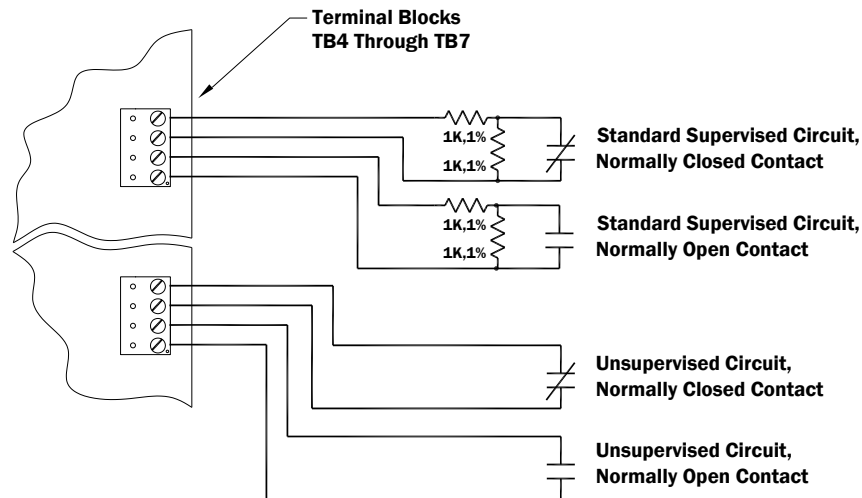
Unsupervised alarm (2 states); reporting as open or closed contact.

Supervised alarm (6 states); reporting as open or closed contact, open circuit, shorted circuit, grounded circuit \*, or foreign voltage\*.

A supervised input circuit requires adding two resistors with value of 1k ohm, 1% to the circuit to facilitate proper reporting and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

\* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

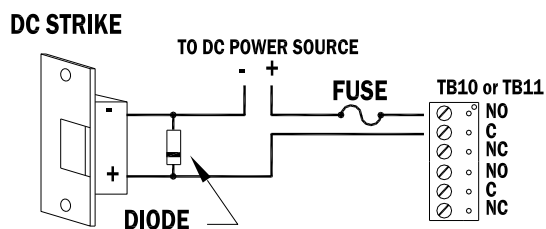
The input circuit wiring configurations shown are supported but may not be typical.



## 9. Relay Circuit Wiring:

Four relays with Form-C contacts are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5 A @ 30 Vdc, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.



### Diode Selection:

Diode current rating: 1x strike current  
 Diode breakdown voltage: 4x strike voltage  
 For 12 Vdc or 24 Vdc strike, diode 1N4002 (100V/1A) typical.

## 10. Memory and Real Time Clock Backup Battery:

The static RAM and the real time clock are backed up by a lithium battery when input power is removed. This battery should be replaced annually. If data in the static RAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased. All configuration data must be re-downloaded. Remove the insulator from the battery holder after installation. Battery type: BR2325, BR2330, or CR2330.

## 11. IT Security:

When installing the EP4502, it is important to ensure that it done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and that all DIP switches are in the off position for the normal operating mode. The EP4502 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the EP4502 is commissioned. It is also highly recommended not to configure the EP4502 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can also be enabled over the host communication port.

## 12. Status LEDs:

**Power-up:** All LED's OFF.

**Initialization:** LED's 1, 2, 3, 4, 5, 6, 7, IN1, IN2, IN3, IN4, IN5, IN6, IN7 and IN8 are flashed once at the beginning of initialization. LED 4 is turned ON for approximately 1 second after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 3 seconds without a card database. Each 10,000 cards will add about 3 seconds to the application initialization. When LED's 1, 2, 3 and 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state.

**Running:** After initialization is complete, the LEDs have the following meanings:

LED	DESCRIPTION
1	Off-Line / On-Line and Battery Status
	Off-Line = 20% ON, On-Line = 80% ON
	Double Flash if Battery is Low
2	Host Communication Activity (Ethernet)
3	Internal SIO Communication Activity
4	External SIO Communication Activity (Port 1)
5	External SIO Communication Activity (Port 2)
6	Reader 1: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
7	Reader 2: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity

LED	DESCRIPTION
IN1	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN2	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN3	Input IN3 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN4	Input IN4 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN5	Input IN5 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN6	Input IN6 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN7	Input IN7 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
IN8	Input IN8 Status: OFF = Inactive, ON = Active, Flash = Trouble. See Note 1.
K1	Relay K1: ON = Energized
K2	Relay K2: ON = Energized
K3	Relay K3: ON = Energized
K4	Relay K4: ON = Energized

Note 1: If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is off.

### 13. Specifications:

The EP4502 is for use in low voltage, Class 2 Circuits only

The installation of this device must comply with all local fire and electrical codes

Primary Power: 12 to 24 Vdc  $\pm$  10 %, 500 mA maximum (reader current not included)

Memory and Clock

Backup Battery: 3 Volt Lithium, type BR2325, BR2330 or CR2330

Host Communication: Ethernet: 10Base T/100Base-TX

SIO Communication Two each, 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit

Inputs: Two dedicated for tamper and UPS fault monitoring  
Eight for door position monitoring, request to exit or alarm contacts

Relays: Four each: Form-C, 5 A @ 30 Vdc, resistive

Reader Interface:

Reader Power: 12 Vdc  $\pm$  10 % regulated, current limited to 180 mA for each reader (jumper selectable) or  
12 to 24 Vdc  $\pm$  10% (input voltage passed through) current limited to 180 mA for each reader

Data Inputs: TTL compatible inputs, magnetic stripe and Wiegand standards supported. Maximum cable length: 500 ft. (152 m)

RS-485 Mode: 9,600 to 38,400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 ft. (609.6 m)

LED Output: TTL levels, high >3 V, Low <0.5 V, 5 mA source/sink maximum

Buzzer Output: TTL levels, high >3 V, Low <0.5 V, Low=Active, 5 mA source/sink maximum

Cable requirements:

Power and Relays: 1 twisted pair, 18 to 16 AWG

Ethernet: CAT-5, minimum

TTL Reader: 22 to 16 AWG, depending on length and requirements

RS-485:

(I/O Device Ports): 1 twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum

(Reader Port): 1 twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 2,000 ft. (609.6 m) maximum

Alarm Input: 1 twisted pair, 30 ohms maximum, typically 22 AWG @ 1000 ft. (304.8 m)

Environmental:

Temperature: Storage -55 to +85 °C  
Operating 0 to +70 °C

Humidity: 5 to 95 % RHNC

Mechanical:

Dimension: W 8.0 in. (203.2 mm)  
L 6.0 in. (152.4 mm)  
H 0.78 in. (20 mm)

Weight: 10.65 oz. (302 g) nominal

**Warranty**

Mercury Security warrants the product is free from defects in material and workmanship under normal use and service with proper maintenance for one year from the date of factory shipment. Mercury Security assumes no responsibility for products damaged by improper handling or installation. This warranty is limited to the repair or replacement of the defective unit.

There are no expressed warranties other than set forth herein. Mercury Security does not make, nor intends, nor does it authorize any agent or representative to make any other warranties, or implied warranties, and expressly excludes and disclaims all implied warranties of merchantability or fitness for a particular purpose.

Returns must be accompanied by a Return Material Authorization (RMA) number obtained from customer service, and prepaid postage and insurance.

**Liability**

The Interface should only be used to control exits from areas where an alternative method for exit is available. This product is not intended for, nor is rated for operation in life-critical control applications. Mercury Security is not liable under any circumstances for loss or damage caused by or partially caused by the misapplication or malfunction of the product. Mercury Security's liability does not extend beyond the purchase price of the product.