Mercury™ LP1502 Controller

Installation and Specifications

PLT-05244, A.6
August 2024

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Contacts

For technical support, please visit: **https://support.hidglobal.com**.

What's new

Date	Description	Revision
August 2024	Updates to 2.11 Status LEDs	A.6

A complete list of revisions is available in **Revision history**.

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Section 01

Overview

1.1 LP1502 intelligent controller with two reader interfaces

The LP1502 intelligent controller provides decision making, event reporting, and database storage for the Mercury hardware platform. Two reader interfaces provide control for two physical barriers.

Host communication is via the on-board 10-BaseT/100Base-TX Ethernet port, or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

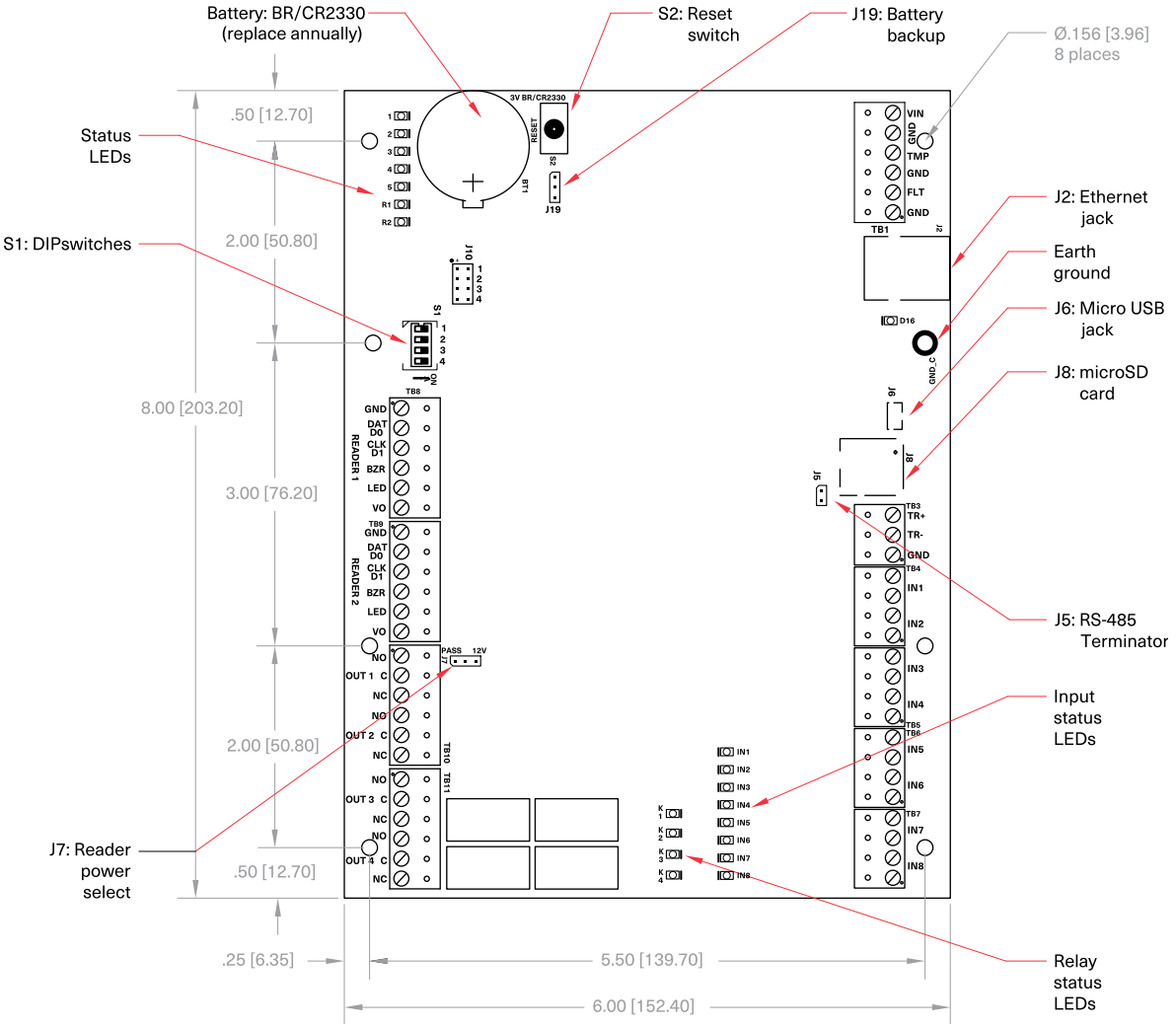
Each reader port can accommodate a reader that uses TTL (D1/D0, Clock/Data), F/2F (standard or supervised), or 2-wire RS-485 device signaling (OSDP reader for example), and also provides tri-state LED control and buzzer control (one wire LED mode only).

Four Form-C relay outputs can be used for door strike control or alarm signaling.

Eight inputs are provided that can be used for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits can be configured as unsupervised or supervised.

The LP1502 requires 12 to 24 V DC for power.

1.2 LP1502 hardware



Section 02

LP1502 wiring and setup

2.1 LP1502 connections

TB1-1	GND	Power fault input
TB1-2	FLT	
TB1-3	GND	Cabinet
TB1-4	TMP	Tamper input
TB1-5	GND	Power input
TB1-6	VIN: 12 to 24 V DC	

TB2	N/A	Not used

TB3-1	GND	SIO port (2-wire RS-485)
TB3-2	TR- (B)[1]	
TB3-3	TR+ (A)[1]	

TB4-1	IN2	Input 2
TB4-2	IN2	
TB4-3	IN1	Input 1
TB4-4	IN1	

TB5-1	IN4	Input 4
TB5-2	IN4	
TB5-3	IN3	Input 3
TB5-4	IN3	

TB6-1	IN6	Input 6
TB6-2	IN6	
TB6-3	IN5	Input 5
TB6-4	IN5	

TB7-1	IN8	Input 8
TB7-2	IN8	
TB7-3	IN7	Input 7
TB7-4	IN7	

TB8-1	GND	Reader 1 - Ground
TB8-2	DAT/D0	Reader 1 - Data/Data 0/TR- (A)[1]
TB8-3	CLK/D1	Reader 1 - Clock/Data 1/TR+ (B)[1]
TB8-4	BZR	Reader 1 - Buzzer
TB8-5	LED	Reader 1 - LED
TB8-6	VO	Reader power

TB9-1	GND	Reader 2 - Ground
TB9-2	DAT/D0	Reader 2 - Data/Data 0/TR- (A)[1]
TB9-3	CLK/D1	Reader 2 - Clock/Data 1/TR+ (B)[1]
TB9-4	BZR	Reader 2 - Buzzer
TB9-5	LED	Reader 2 - LED
TB9-6	VO	Reader power

TB10-1	NO	Out 1 - Normally open contact
TB10-2	C	Out 1 - Common contact
TB10-3	NC	Out 1 - Normally closed contact

TB10-4	NO	Out 2 - Normally open contact
TB10-5	C	Out 2 - Common contact
TB10-6	NC	Out 2 - Normally closed contact

TB11-1	NO	Out 3 - Normally open contact
TB11-2	C	Out 3 - Common contact
TB11-3	NC	Out 3 - Normally closed contact

TB11-4	NO	Out 4 - Normally open contact
TB11-5	C	Out 4 - Common contact
TB11-6	NC	Out 4 - Normally closed contact

1. Terms (A) and (B) are from the RS-485 standard.

2.1.1 Jumpers and jacks

The LP1502 processor hardware interface is configured using jumpers to setup the reader port power 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)
J3	N/A	Factory use only
J4	N/A	N/A
J5	OFF	RS-485 EOL Terminator is OFF
	ON	RS-485 EOL Terminator is ON
J6	N/A	Micro USB port (2.0)
J7	**Reader power select. See caution below.**	
	12V	12 V DC at reader ports
	PASS	VIN "Pass Through" to reader ports
J8	N/A	microSD card
J10-1	N/A	Remote Status LED #1.[1]
J10-2	N/A	Remote Status LED #2.[1]
J10-3	N/A	Remote Status LED #3.[1]
J10-4	N/A	Remote Status LED #4.[1]
J19	OFF	Backup battery is OFF.
	ON	Backup battery is ON. See Memory and real time clock backup battery

1. Observe polarity connection to LED. External current limiting is not required.

Caution: Install jumper J7 in the 12 V position **ONLY** if the input voltage (VIN) is greater than 20 V DC. Failure to do so may damage the reader or LP1502.

2.2 DIP switches

The four switches on S1 DIP switch configure the operating mode of the LP1502 processor. DIP switches are read on power-up except where noted. Pressing reset switch S2 causes the LP1502 to reboot.

1	2	3	4	Definitions
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, a re-boot is not required. See IT security 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 configuration memory.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk erase configuration memory.
X	X	X	ON	Makes the LP1502 report and function like an EP1502. To be used in situations where the host software has not been updated to support the LP series product line.

Note:
- All other switch settings are unassigned and are reserved for future use.
- X = It doesn't matter if the switch is on or off.

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

2.3 Factory default communication parameters

Interface 1 (NIC1)

Network: static IP address	192.168.0.251
Subnet mask	255.255.0.0
Default gateway	192.168.0.1
DNS server	192.168.0.1
Primary host port	IP server, Data security: TLS if Available, port 3001, communication address: 0
Alternate host port	Disabled

2.4 Bulk erase configuration memory

The bulk erase function can be used for the following:

- Erase all configuration and cardholder database (sanitize board, less third party applications).
- Update OEM default parameters after OEM code has been changed.
- Recover from database corruption causing the LP1502 board to continuously reboot.

Note: If clearing the memory does not correct the initialization problem, contact Tech Support (**TechSupport@Mercury-Security.com**).

2.4.1 Bulk erase steps

1. Set S1 DIP switches 1 and 2 to **ON**, and 3 and 4 to **OFF**.
2. Apply power to the LP1502 board. LED 1 will flash during panel boot up.
3. After bootup is complete, LEDs 1 and 2, and LEDs 3 and 4 start flashing back and forth alternately at a rate of 0.5 seconds. Within 10 seconds of this beginning, change DIP switch 1 to **OFF**.
4. When complete, only LEDs 1 and 4 will flash for about three seconds.
5. The LP1502 board will restart the boot process and be available at the default IP address of 192.168.0.251.

Caution: Do not remove power during the bulk erase process.

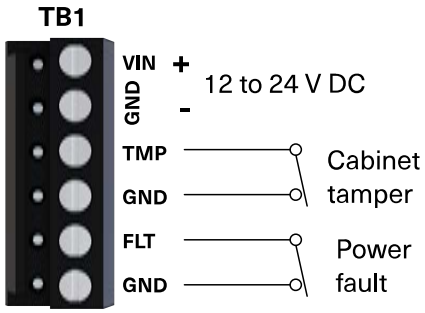
2.5 Input power, cabinet tamper and UPS fault input wiring

The LP1502 requires 12 to 24 V DC 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 to 24 V DC input!

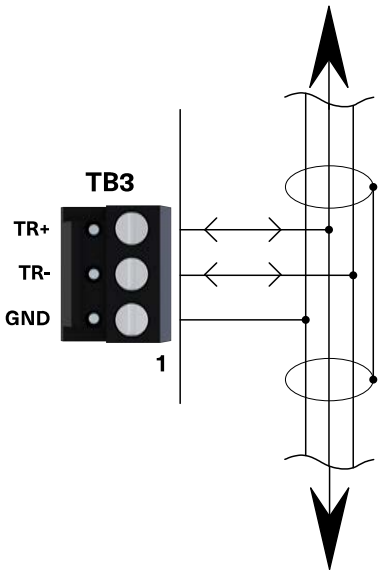
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.



2.6 Communication wiring

The MP1502 controller communicates with the host via the on-board Ethernet 10-BaseT/100Base-TX port, and/or the USB port (2.0) with an optional USB to Ethernet adapter.

The serial I/O device communication port (TB3) is a 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, 120Ω impedance, 24 AWG, 4,000 feet. (1,219 m) maximum for communication.



To serial I/O devices

Caution: 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.

2.7 Reader wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 signaling (OSDP reader for example). Power to the readers is selectable: 12 V DC (VIN must be greater than 20 V DC), or power is passed-through (PASS) from the input voltage of the MP1502 (TB1-VIN), 300 mA maximum per reader port. Readers that require different voltage or have high current requirements must 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.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG).
- F/2F signaling requires a 4-conductor cable.
- RS-485 signaling requires two 2-conductor cables. Use one cable for power (18 AWG) and one cable for communication (24 AWG, with drain wire and shield).

Note:

- For OSDP cable lengths greater than 200 ft (61 m) or EMF interference, install 120Ω +/- 2Ω resistor across RS-485 termination ends.
- Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

J7 – Reader power select

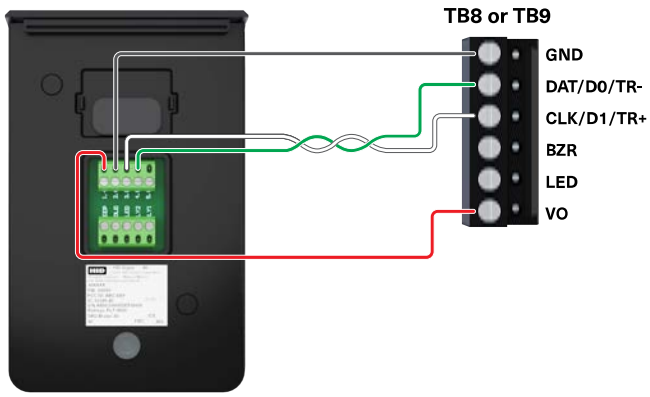
12V PASS	Reader power
	12 V DC is available on reader ports (VIN > 20 V DC)
	VIN power is "passed through" to reader ports

Caution: If the input voltage to the MP1502 is 12 V DC, jumper J7 **MUST** be in the **PASS** position.

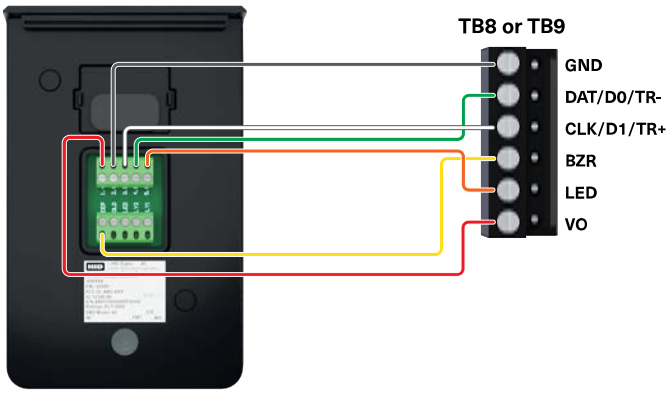
Input power	Reader power select	Reader output	Notes
24 V DC	Pass-through	24 V DC	
24 V DC	12 V DC	12 V DC	
12 V DC	Pass-through	12 V DC	
12 V DC	12 V DC	0 V DC	**Caution:** Do not use

2.7.1 Reader wiring diagrams

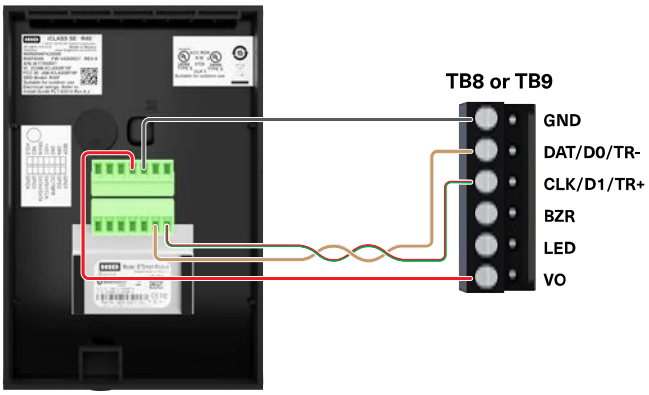
Typical reader 1 (OSDP installation)



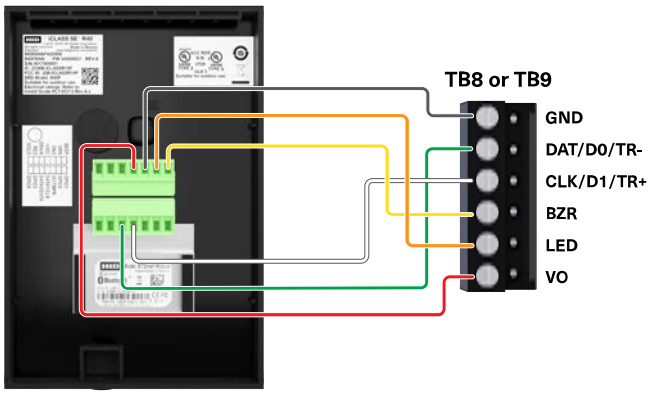
Typical reader 1 (Wiegand or Clock/Data installation)



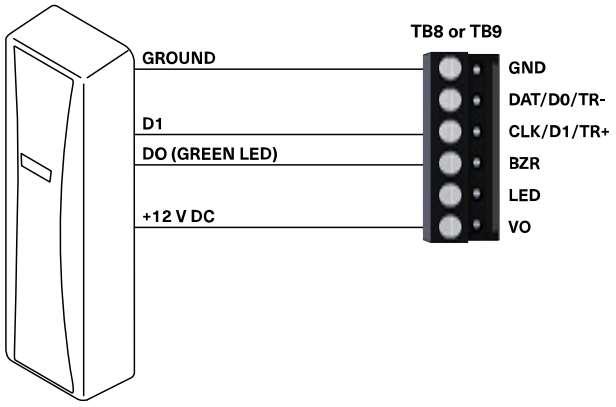
Typical reader 2 (OSDP installation)



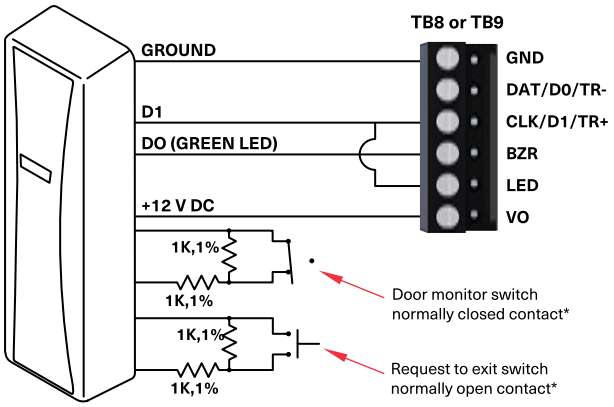
Typical reader 2 (Wiegand or Clock/Data installation)



Typical unsupervised F/2F reader



Typical supervised F/2F reader



Jumper D1 to LED on supervised F/2F reader

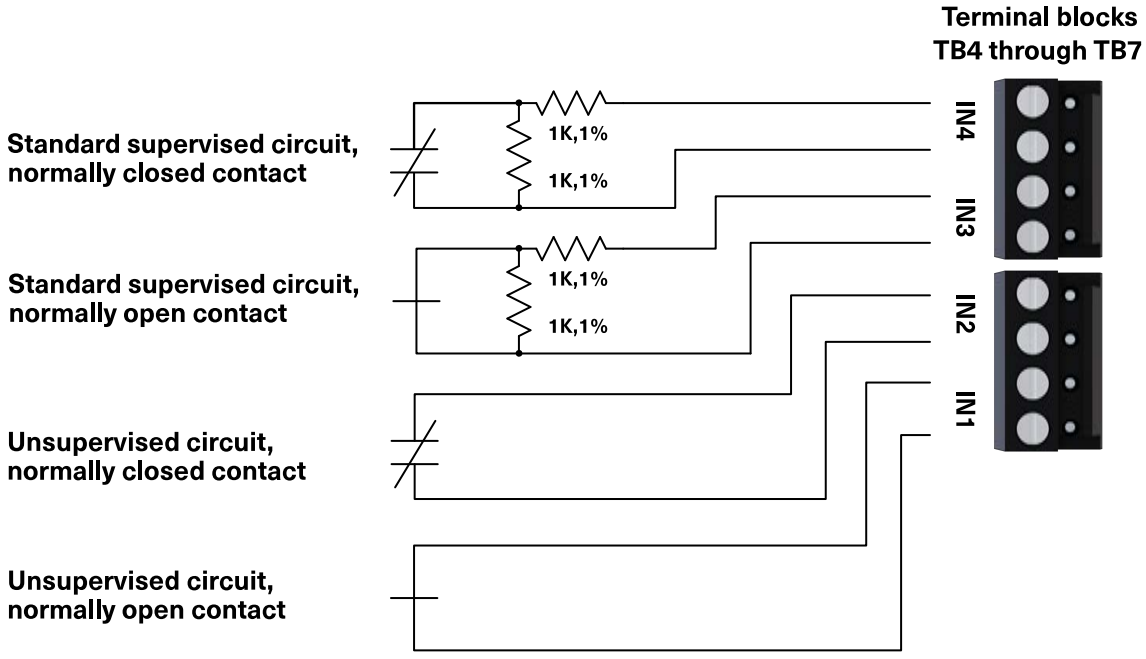
*Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

2.8 Input circuit wiring

There are eight inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1kΩ, 1% resistors 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

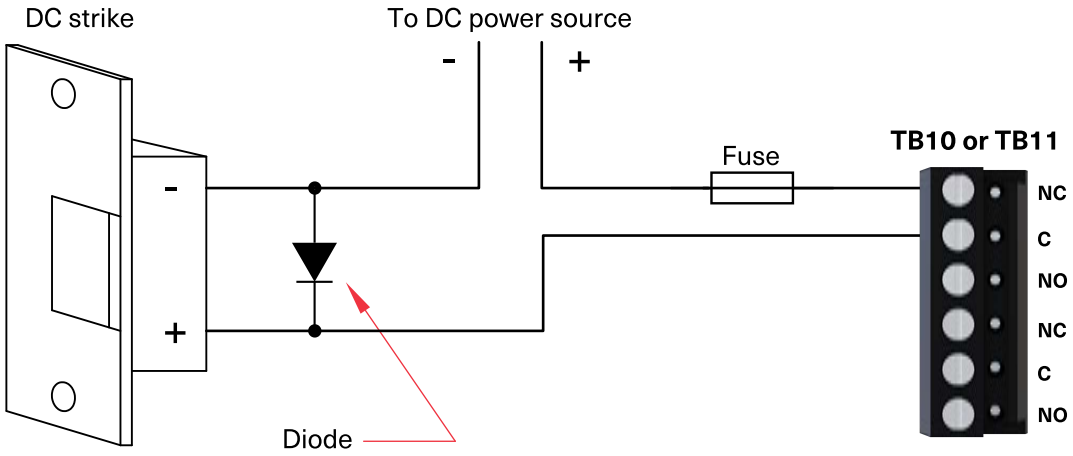
The input circuit wiring configurations shown are supported but may not be typical:



2.9 Relay circuit wiring

Four relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. Each relay has a Common pole (**C**), a Normally Open pole (**NO**) and a Normally Closed pole (**NC**). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are typically 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 and affect the operation of the LP1502. It is recommended that a diode is 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 V DC or 24 V DC strike, diode 1N4002 (100V/1A) typical.

2.10 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.

During installation and while the unit is not powered, change the jumper position (J19) from OFF to ON to enable thebattery backup.

Battery type: BR2330 or CR2330.

2.11 Status LEDs

2.11.1 Power-up

- 1.x firmware - All LEDs are off.
- 2.x firmware - NIC LED blinks and all other LEDs are off.

2.11.2 Initialization

The initialization process has several stages. Each stage is represented by a different LED pattern in the following sequence after power is applied or reset switch is pushed:

1.x firmware: -

- LED 1 is on for about 15 seconds.
- Then LEDs 2, 3, 4, 5, R1, R2, IN1, IN2, IN3, IN4, IN5, IN6, IN7 and IN8 are flashed once at the beginning of initialization.
- LEDs 3 and 4 are then on for approximately 1 second after the hardware initialization has completed, then the application code is initialized.

2.x firmware: -

- All LEDs are off for about 10 seconds.
- LED 2 is on for 25 seconds.
- LED 3 flashes slowly for 15 seconds.
- LED 3 flashes quickly for 1 second. LED 3 may continue flashing for an additional 60 seconds if the controller firmware is being updated.
- LED 1, LED 2, and LED 3 are off as the application starts.
- LED 4 is then on for 15 seconds indicating a successful initialization.

The amount of time the application takes to initialize depends on the size of the database, about 1 second without a card database. Each 10,000 cards will add about 2 seconds to the application initialization. When LEDs 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. If the sequence stops or repeats, perform the bulk erase procedure, see Bulk erase configuration memory.

2.11.3 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 or Micro USB port)
3	Internal SIO communication activity
4	External SIO communication activity
5	Unassigned

LED	Description
R1	**Reader 1:** Clock/Data or D1/D0 mode: Flashes when data is received, either input F/2F mode: Flashes when data/acknowledgment is received RS-485 mode: Flashes when transmitting data
R2	**Reader 2:** Clock/Data or D1/D0 mode: Flashes when data is received, either input F/2F mode: Flashes when data/acknowledgment is received RS-485 mode = Flashes when transmitting data
D16	Flashes with Ethernet traffic
YEL	Ethernet speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF = No link, ON = Good link, Flashing = Ethernet activity
IN1	Input IN1 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN2	Input IN2 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN3	Input IN3 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN4	Input IN4 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN5	Input IN5 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN6	Input IN6 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN7	Input IN7 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
IN8	Input IN8 status: OFF = Inactive, ON = Active, Flash = Fault.[1]
K1	Relay K1: ON = Energized
K2	Relay K2: ON = Energized
K3	Relay K3: ON = Energized
K4	Relay K4: ON = Energized

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.

2.12 IT security

Ensure that the LP1502 is installed securely. Create user accounts to the web configuration page using secure passwords.

Ensure all DIP switches are to be in the **OFF** position for the normal operating mode.

The LP1502 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from **OFF** to **ON** (See **DIP switches**). The default login user name (admin) and password (password) will be available for five minutes once the DIP switch is toggled. It is therefore important that at least one user account is defined, and the DIP switches are set to **OFF** before the LP1502 is commissioned.

Configuring the LP1502 with an IP address that is accessible from the public is **not** recommended.

The following options are available for enhanced network security:

- Disable SNMP.
- Zeroconf discovery.
- The web configuration module.
- Enable data encryption over the host communication port.

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Section 03

Specifications

3.1 LP1502 controller specifications

The interface 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 V DC ± 10%, 500 mA maximum (reader and USB ports not included)
Reader ports	600 mA maximum (add 600 mA to primary power current)
Micro USB port	5 V DC, 500 mA maximum (add 270 mA to primary power current)
Memory and clock backup battery	3 Volt Lithium, type BR2330 or CR2330
microSD card	Format: microSD or microSDHC; 2GB to 8GB
Host communication	Ethernet: 10-BaseT/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O device	One 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	Eight unsupervised/supervised, standard EOL: 1k/1kΩ, 1%, ¼ watt
	Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Outputs	Four relays, Form-C with dry contacts: Normally open contact (NO) contact: 5 A @ 30 V DC resistive Normally closed contact (NC) contact: 3 A @ 30 V DC resistive
READER INTERFACE	
Power (jumper selectable)	12 V DC ± 10% regulated, 300 mA maximum each reader (input voltage (VIN) must be greater than 20 V DC)
	or
	12 to 24 V DC ±10 % (input voltage (VIN) passed through), 300 mA maximum each reader
Data inputs	TTL compatible, F/2F or 2-wire RS-485
RS-485 Mode	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 feet. (609.6 m)
LED output	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer output	Open collector, 12 V DC open circuit maximum, 40 mA sink maximum
CABLE REQUIREMENTS	
Power and relays	1 twisted pair, 18 to 16 AWG
Ethernet	CAT-5, minimum
RS-485	
I/O Device port	1 twisted pair, shielded, 120Ω impedance, 24 AWG, 4,000 feet. (1,219 m) max.
Reader port	1 twisted pair, shielded, 120Ω impedance, 24 AWG, 2,000 feet. (610 m) max.
Alarm input	1 twisted pair, 30Ω maximum

ENVIRONMENTAL	
Storage temperature	-55 to +85°C
Operating temperature	0 to +70°C
Humidity	5 to 95% RHNC
MECHANICAL	
Dimension	8 inches (203.2 mm) W x 6 inches (152.4 mm) L x 1 inches (25 mm) H
Weight	9 oz. (255 g) nominal, board only

These specifications are subject to change without notice.

UL294, 6th edition Performance Levels

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

3.2 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.

3.3 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.

3.4 Regulatory

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.

Revision history

Date	Description	Revision
August 2024	Updates to 2.11 Status LEDs	A.6
May 2024	Updated 1.1 Bulk erase configuration memory. Updated to new Mercury Branding.	A.5
August 2022	New branding.	A.4
June 2021	Minor updates	A.3
April 2021	Added reader power select table in 2.7 Reader wiring	A.2
January 2021	Add J19: Battery backup call out to the hardware diagram.	A.1
October 2020	Initial release.	A.0

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PLT-05244, Rev. A.6

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For technical support, please visit: https://support.hidglobal.com