LP1502 Intelligent Controller

with Two Reader Interfaces

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.

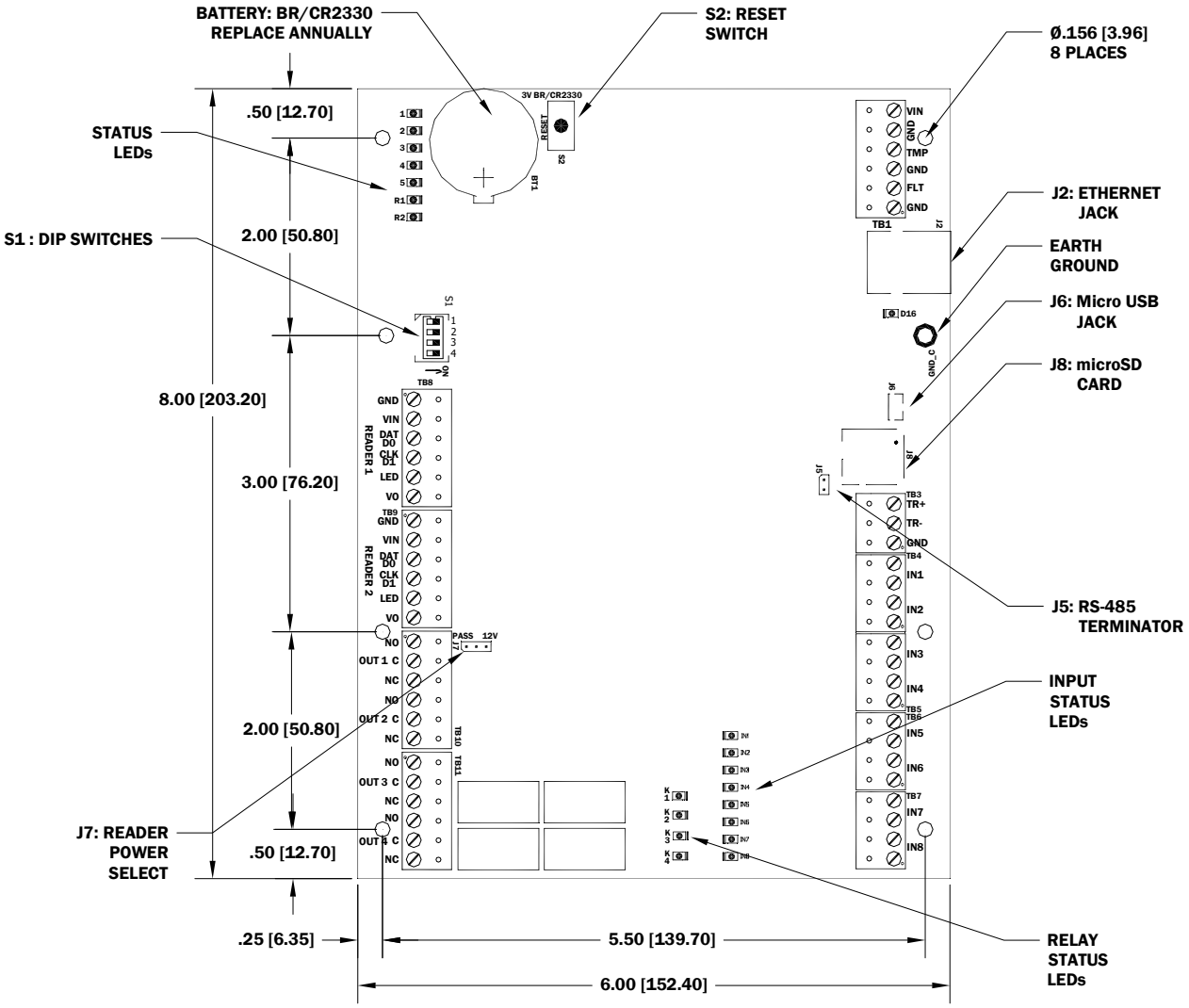
General:

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.

The LP1502 communicates with the host via an 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 utilizes 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 may be used for door strike control or alarm signaling. Eight inputs are provided that may be used for monitoring the door contacts, exit push buttons and alarm contacts. Input circuits may be configured as unsupervised or supervised. The LP1502 requires 12 to 24 Vdc for power.

LP1502 Hardware:



LP1502 Layout

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Compatibility:

The LP1502 is only compatible with the following AccessNsite UL Listed Commercial Proprietary Burglar Alarm and Access Control subassemblies:

- E2M — LifeSafety Power 20” x 16” x 4.5” Enclosure
- E4M — LifeSafety Power 24” x 20” x 6.5” Enclosure
- E8M — LifeSafety Power 36” x 30” x 6.5” Enclosure
- FPO75 — LifeSafety Power 6A/12V or 3A/24V 75W Power Supply
- FPO150 — LifeSafety Power 12A/12V or 6A/24V 150W Power Supply
- FPO250 — LifeSafety Power 20A/12V or 10A/24V 250W Power Supply
- C8P — LifeSafety Power, Power Controller Module
- D8P — LifeSafety Power, Power Distribution Module
- MR62e — Mercury OSDP Reader Interface
- MR50 — Mercury Single Reader Interface
- MR52 — Mercury Dual Reader Interface
- MRDT — Display Terminal
- MR16IN — Mercury Input Processor (16 input)
- MR16OUT — Mercury Output Processor (16 output)
- MUX8 — Mercury 8/1 RS-485 Multiplexer

Terminal Blocks:

CONNECTION		
TB1-1	Power Fault	GND
TB1-2	Input	FLT
TB1-3	Cabinet	GND
TB1-4	Tamper Input	TMP
TB1-5	Power Input	GND
TB1-6		VIN: 12 to 24 Vdc
TB2	N/A	Not Used
TB3-1	SIO Port (2-wire RS-485)	GND
TB3-2		TR- (B) See note 1
TB3-3		TR+ (A) See note 1
TB4-1	Input 2	IN2
TB4-2		IN2
TB4-3	Input 1	IN1
TB4-4		IN1
TB5-1	Input 4	IN4
TB5-2		IN4
TB5-3	Input 3	IN3
TB5-4		IN3
TB6-1	Input 6	IN6
TB6-2		IN6
TB6-3	Input 5	IN5
TB6-4		IN5
TB7-1	Input 8	IN8
TB7-2		IN8
TB7-3	Input 7	IN7
TB7-4		IN7

CONNECTION		
TB8-1	Reader 1	GND: Ground
TB8-2		DAT/D0: Data/Data 0/TR- (A) See note 1
TB8-3		CLK/D1: Clock/Data 1/TR+ (B) See note 1
TB8-4		BZR: Reader Buzzer
TB8-5		LED: Reader LED
TB8-6		VO: Reader Power
TB9-1	Reader 2	GND: Ground
TB9-2		DAT/D0: Data/Data 0/TR- (A) See note 1
TB9-3		CLK/D1: Clock/Data 1/TR+ (B) See note 1
TB9-4		BZR: Reader Buzzer
TB9-5		LED: Reader LED
TB9-6		VO: Reader Power
TB10-1	Out 1	NO: Normally Open Contact
TB10-2		C: Common
TB10-3		NC: Normally Closed Contact
TB10-4	Out 2	NO: Normally Open Contact
TB10-5		C: Common
TB10-6		NC: Normally Closed Contact
TB11-1	Out 3	NO: Normally Open Contact
TB11-2		C: Common
TB11-3		NC: Normally Closed Contact
TB11-4	Out 4	NO: Normally Open Contact
TB11-5		C: Common
TB11-6		NC: Normally Closed Contact

Note 1: Terms A & B are from the RS-485 standard

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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 Note 2**	
	12V	12 Vdc at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J8	N/A	microSD Card

Note 2:
Install jumper J7 in the 12V position **ONLY** if the input voltage (VIN) is greater than 20 Vdc! Failure to do so may damage the reader or LP1502!

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, 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.
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.

All other switch settings for unassigned and are reserved for future use. X = don't care.

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

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

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Bulk Erase Configuration Memory:

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

- 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 LP1502 board to continuously reboot

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

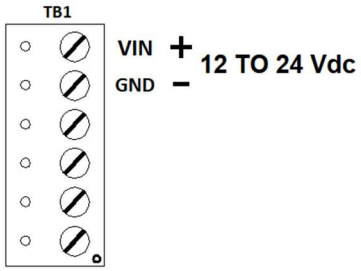
Bulk Erase Steps: **Do not remove power during steps 1-8.**

1. Set S1 DIP switches to: 1 & 2 "ON", 3 & 4 "OFF".
2. Apply power to the LP1502 board. LED 1 on for about 15 seconds while LP1502 boots up.
3. After the LP1502 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF". If these switches are not changed, the LP1502 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, usually a lot less.
7. When complete, only LEDs 1 & 4 will flash for about 3 seconds.
8. The LP1502 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

Board Installation and Power:

A qualified service person, complying with all applicable codes, should perform all required hardware installation. For UL installations, install the unit in accordance with National Electrical Code NFPA 70 and install the board in a UL 294/1076 listed enclosure. If installing in Canada, install the unit according to Part 1 of the Canadian Electrical code CSA C22.1. It is recommended that the LP1502 be mounted 0.50” above any conductive surface. The LP1502 accepts 12 to 24Vdc for power. The power source must be filtered. Locate the power source as close to the unit as possible. Connect power with a minimum of 18AWG wire. Keep a minimum of ¼” spacing between power limited outputs and non-power limited wiring. **Connect the GND signal to earth ground in only ONE LOCATION within the System. Multiple earth ground connections may cause ground loop problems and is not advised. Observe POLARITY on the 12-24Vdc input.**

UL Note: The LP1502 module has been evaluated for use with the LifeSafety Power FPO75, FPO150, and FPO250 power supplies or any UL Listed Power Supply evaluated to UL 603 (Power Supplies for use with Burglar –Alarm Systems). It must be a power limited power supply of suitable ratings, with a minimum of 4 hours of standby power



Cable Routing and Connection:

All low power input cables (sensor input cables, controller communication cables, etc.) should be shielded and should preferably be run in grounded conduit or be run at least two feet from AC power, fluorescent lights, or other high energy sources. If conduit is used, do not run data cables in the same conduit as power cables.

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Communication Wiring:

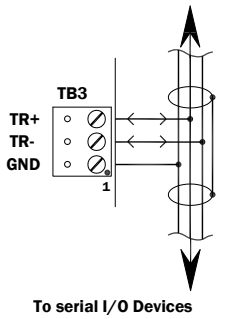
The LP1502 controller communicates to the host via an on-board Ethernet 10-BaseT/100Base-TX port and/or the USB port (2.0) with an optional Micro USB to Ethernet adapter. The LP1502 communicates downstream to subcontrollers using RS-485.

Ethernet Host Connection:

An on-board 8P8C (RJ45) modular jack is available for an Ethernet connection. The cable used for the connection should be no longer than 328 feet. To configure the LP1502 for first time use on the network, refer to the Controller Web Configuration Tool manual for information about how to setup the LP1502 to communicate on the network.

RS-485 Subcontroller Connection:

The LP1502 communicates to Mercury Security sub-controllers (MR52 for example) via a half-duplex multi-drop 2-wire RS-485 interface. The total cable length is limited to 4,000 feet (1,219 meters). Use shielded twisted pair cable (minimum 24 AWG) with a drain wire and a characteristic impedance of 120 ohm. The last device on each end of the communication line should have the terminator installed (install jumper J5).

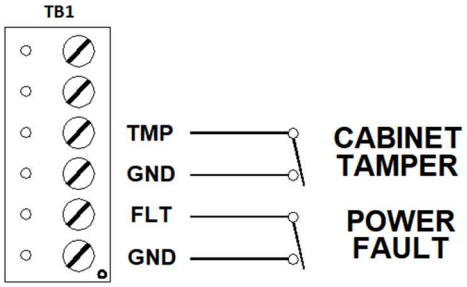


<u>IMPORTANT NOTE!</u> Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

Cabinet Tamper and UPS Fault Input Wiring:

Inputs TMP and FLT are used for monitoring cabinet tamper and power failure, respectively, with normally closed contacts. These two inputs are for contact closure monitoring only and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicate a safe condition.

For UL Applications a listed UL 634 Tamper Switch must be employed to monitor the door of the enclosure containing the LP1502. Wire the tamper switch to the tamper input of the LP1502.



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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 Vdc (VIN must be greater than 20 Vdc), or power is passed-through (PASS) from the input voltage of the LP1502 (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.

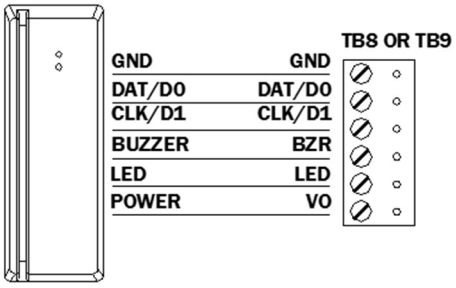
To fully utilize each reader port:

- 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)

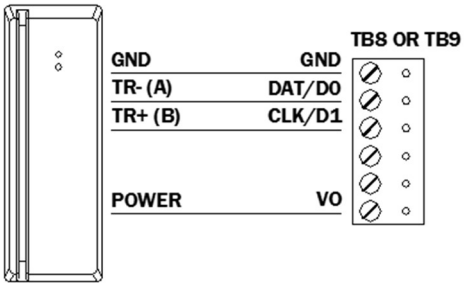
12V PASS	READER POWER
■ ▪	12 Vdc IS AVAILABLE ON READER PORTS (VIN>20 Vdc)
▪ ■	VIN POWER IS "PASSED THROUGH" TO READER PORTS

J7 – Reader Power Select

⚠ If the input voltage to the LP1502 is 12 Vdc, jumper J7 **MUST** be in the PASS position.

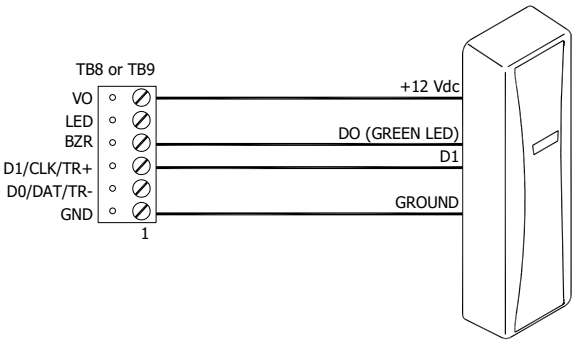


Typical D1/D0 or Clock/Data Reader

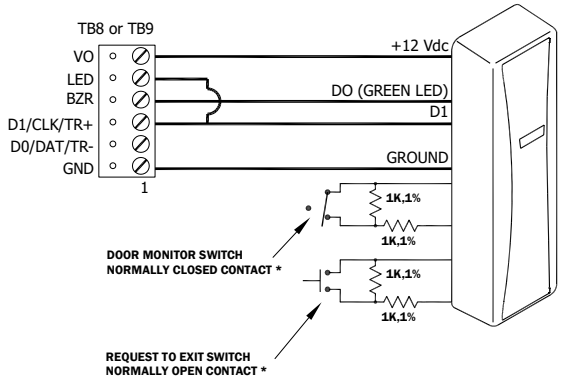


Typical 2-wire RS-485 Device (OSDP Reader for Example)

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



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader

⚠ Jumper D1 to LED on supervised F/2F readers

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Input Circuit Wiring:

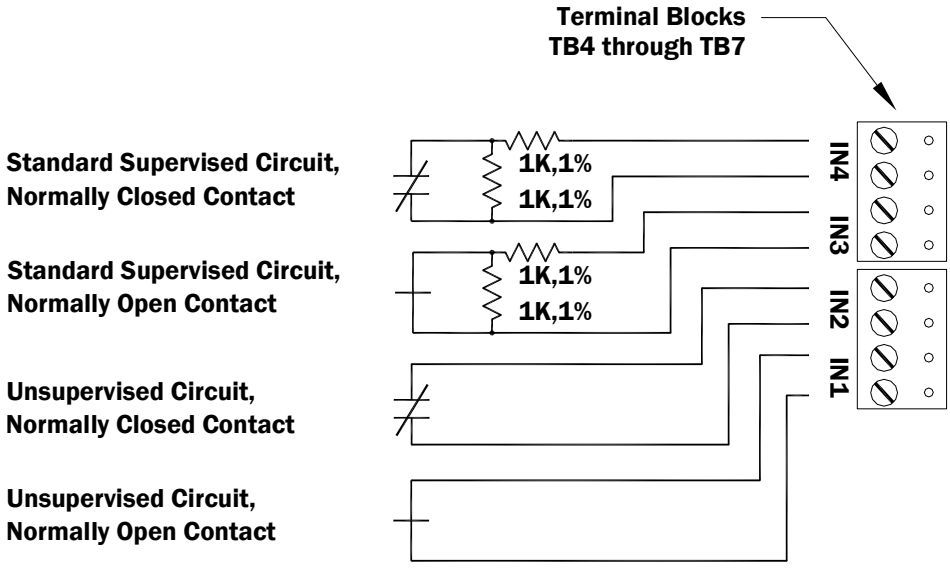
The LP1502 offers eight inputs which are located on terminal blocks TB4 through TB7. Four of the inputs are typically used for door contact and Request-To-Exit (REX) monitoring for each door. The remaining inputs are often used for monitoring miscellaneous inputs such as motion detectors, panic switches, or door contacts that have no associated reader.

The inputs can be configured as unsupervised or supervised. When using unsupervised circuits, reporting consists of only the open or closed states. Supervised circuits are used to provide greater protection against circuit tampering. A supervised input circuit requires two end-of-line (EOL) resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. The resistor network provides a different input resistance to the LP1502 board for four different possible circuit states. This is sometimes referred to as four-state supervision.

Consider the "Standard Supervised Circuit, Normally Open Contact" circuit shown in the figure below. When the monitored contact changes to the closed state, the LP1502 board sees a 1k Ohm resistance because one of the resistors is shorted out. This would be reported by the access control system as the secure state. When the monitored contact opens, the LP1502 board sees a 2k Ohm resistance because current then flows through both resistors. This would be reported by the access control system as an alarm condition. If someone were to tamper with the cable by shorting the wires somewhere between the resistor network and the LP1502 board this would be reported by the access control system as a short circuit alarm condition. Finally, if someone were to tamper with the cable by cutting one or both of the wires somewhere between the resistor network and the LP1502 board this would be reported by the access control system as an open circuit alarm condition. Two other conditions that can be reported are grounded*, and foreign voltage*.

Custom EOL resistances may be configured via the host software. For UL, circuits must be supervised using only 1k ohm, 1% listed accessory EOL resistors.

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



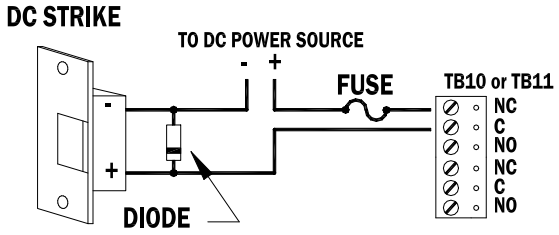
Relay Circuit Wiring:

Four relays with Form-C contacts are provided for controlling door lock mechanisms or alarm signaling devices. The relay contacts are rated at 5A @ 30Vdc, 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 an electric strike, the Normally Open and Common poles are used. When you are momentarily removing power

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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 electromagnetic feedback to the relay circuit that can cause damage and premature failure of the relay and affect the operation of the LP1502. For this reason, it is recommended that either a diode be used to protect the relay when using DC power for the lock or an MOV (metal oxide varistor) be used when using AC power for the lock. Locate the protection circuit as close to the load as possible (within 12 inches [30 cm]), as the effectiveness of the circuit will decrease if it is located further away. 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.

UL Note: Door strike wiring has only been evaluated for DC strikes. AC strike wiring has not been evaluated by UL. The DC Source must be a UL Listed Power Supply evaluated to UL 603 (Power Supplies for use with Burglar –Alarm Systems). It must be a UL listed class 2 power supply of suitable ratings with a minimum of 4 hours of standby power. The relay shall be wired to enforce fail safe operation.

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: BR2330 or CR2330.

IT Security

When installing the LP1502, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and all DIP switches should 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. 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 LP1502 is commissioned. It is also highly recommended not to configure the LP1502 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.

Refer to the Controller Web Configuration Tool manual for instructions on how to configure the controller.

Status LEDs:

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

Initialization: After power is applied or reset switch pushed, LED 1 is ON for about 15 seconds, then LED's 2, 3, 4, 5, 6, R1, R2, IN1, IN2, IN3, IN4, IN5, IN6, IN7 and IN8 are flashed once at the beginning of initialization. LEDs 3 and 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 1 second without a card database. Each 10,000 cards will add about 2 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

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to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform the bulk erase procedure, see section 4.

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
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. See Note 3.
IN2	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN3	Input IN3 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN4	Input IN4 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN5	Input IN5 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN6	Input IN6 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN7	Input IN7 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
IN8	Input IN8 Status: OFF = Inactive, ON = Active, Flash = Fault. See Note 3.
K1	Relay K1: ON = Energized
K2	Relay K2: ON = Energized
K3	Relay K3: ON = Energized
K4	Relay K4: ON = Energized

Note 3: 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.

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 Vdc ± 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 Vdc, 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

Information Subject to Change Without Notice

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/1k ohm, 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 Vdc resistive Normally closed contact (NC) contact: 3 A @ 30 Vdc resistive
Reader Interface:	
Power: (jumper selectable)	12 Vdc ± 10 % regulated, 300 mA maximum each reader (input voltage (VIN) must be greater than 20 Vdc) or 12 to 24 Vdc ± 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 ft. (609.6 m)
LED Output:	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 Vdc 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, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) max.
(Reader Port):	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) max.
Alarm Input:	1 twisted pair, 30 ohms maximum
Environmental:	
Temperature:	-55 to +85 °C, storage 0 to +70 °C, operating
Humidity:	5 to 95 % RHNC
Mechanical:	
Dimension:	8 in. (203.2 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	9 oz. (255 g) nominal, board only

UL294, 6th edition Performance Levels:

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

These specifications are subject to change without notice.

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Warranty

AccessNsite warrants the product is free from defects in material and workmanship under normal use and service with proper maintenance for one year (30 days for repaired or replaced products) from the date of shipment. AccessNsite assumes no responsibility for products damaged by improper handling or installation. This warranty is limited to the repair or replacement of the defective unit. Returns must be accompanied by a Return Material Authorization (RMA) number obtained from customer service, and prepaid postage and insurance. AccessNsite's obligation under this warranty shall not arise until Buyer returns the defective product to AccessNsite's facility or another specified location.

There are no expressed warranties other than set forth herein. AccessNsite 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.

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. AccessNsite is not liable under any circumstances for loss or damage caused by or partially caused by the misapplication or malfunction of the product. AccessNsite’s liability does not extend beyond the purchase price of the product.

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