PIM400-1501 User Guide

Installation and operating instructions for Schlage PIM400-1501

Contents

To comply with FCC and Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20 cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter.

This product is a UL-294 & ULC-S319 Listed Class 1 equipment. This product's UL & ULC compliance would be invalidated through the use of any add-on, expansion, memory or other module that has not yet been evaluated for compatibility for use with this product, in accordance with the requirements of the Standards set forth in UL-294 & ULC-S319.

UL294 Access Control Levels tested to: Destructive Attack - Level 1; Line Security - Level 1; Endurance - Level 4; Standby Power - Level 1.

Overview

The Schlage **PIM400-1501** combines the Schlage PIM400-485 and EP-1501 Access Platform into a single product.

The Schlage **PIM400-1501-LC** provides the Schlage PIM400-485 in an enclosure designed to receive an EP-1501 board.

ⓘ   **Please refer to the PIM400-1501-LC instructions for further information on completing the installation of the EP-1501 board (see instruction sheet number P516-781). Once the EP-1501 board is installed, the PIM400-1501-LC operates as the PIM400-1501 as described in this guide.**

ⓘ   **For UL installations, the PIM400-1501-LC must be used with an EP-1501 board that is UL294 listed.**

The PIM400-1501 communicates over Ethernet to host software, and by wireless transmission with up to 16 AD-Series Wireless Access Point Modules (WAPMs). WAPMs compatible with the PIM400-1501 include the Schlage AD-400 locks, WRI400 and WPR400.

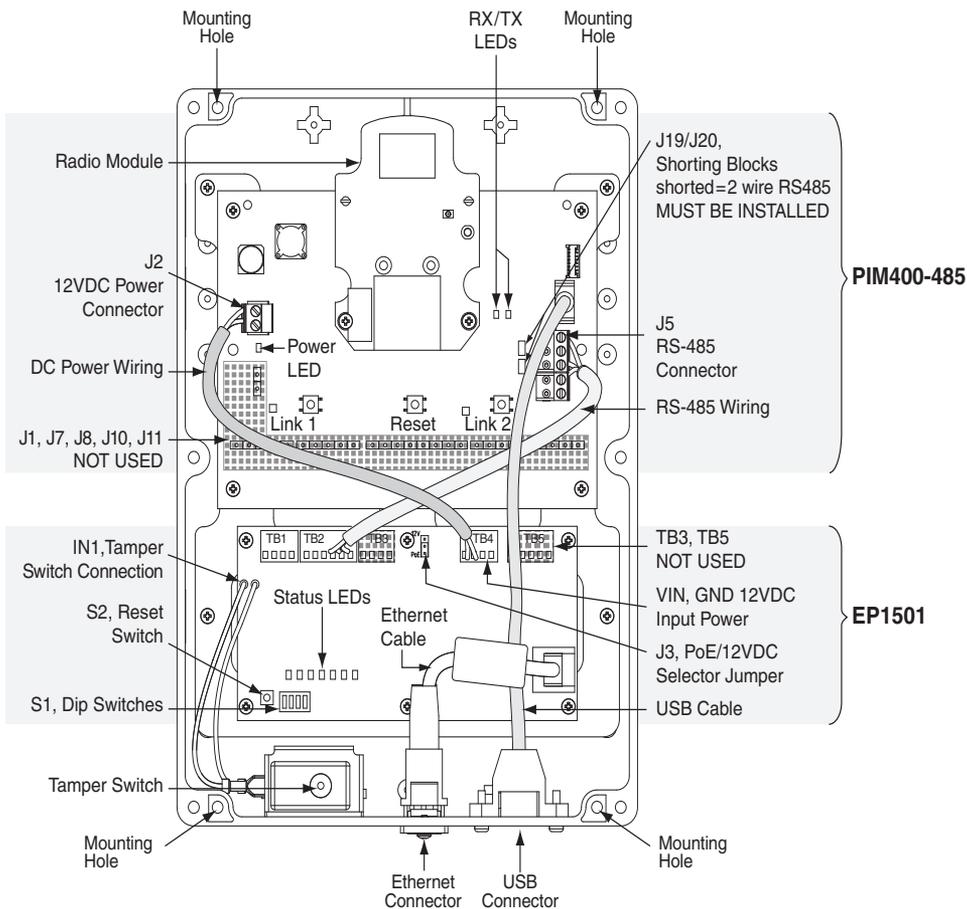This manual describes the operation and installation of the Schlage PIM400-1501.

- The PIM400-1501 is wired to an Ethernet network connection.
- The PIM400-1501 is powered externally one of two ways, selected by the power selector jumper, J3:
  a. Power over Ethernet (PoE), Class 3, fully compliant to IEEE 802.3af, or
  b. 12 VDC power supply connected to TB4-3 (VIN) and TB4-4 (GND). **The 12 VDC power supply must be compatible with all components and must have the capacity to power the PIM400-1501 and any other devices attached to the same supply.** (The PIM400-1501 requires a power supply capable of sourcing at least 400 mA @ 12 VDC).

     For UL installations, PoE powered devices shall not be used.

     Power for these devices must be provided by a UL-294 listed, ULC-S318 Listed or ULC-S319 Listed power limited power supply capable of sourcing at least 400 mA at 12 VDC.

     Use of the Model CENB1010A1265C02 with the PIM400-1501 is permitted for UL-294 Listed applications only.
- Ideal installation location is determined by the location of the WAPM(s).
- The PIM400-1501 communicates to the WAPM(s) using Radio Frequency (RF).
- The WAPM is installed at the access point where access will be controlled and/or monitored.
- The PIM400-1501 is suitable for indoor use, ambient temperature range 0°C to +66°C (+32°F to +151°F).
- SRAM is protected against power outage by a rechargeable battery.
- Please refer to the Access Control Panel manufacturer's instructions and documentation for information on operation of the ACP.
- Please refer to Mercury documentation for the latest updates and information on the Mercury product.

Mounting Hole

RX/TX LEDs

Mounting Hole

Radio Module

J19/J20, Shorting Blocks shorted=2 wire RS485 MUST BE INSTALLED

PIM400-485

J2 12VDC Power Connector

J5 RS-485 Connector

DC Power Wiring

Power LED

RS-485 Wiring

J1, J7, J8, J10, J11 NOT USED

Link 1   Reset   Link 2

IN1,Tamper Switch Connection

TB1 TB2

TB3, TB5 NOT USED

S2, Reset Switch

Status LEDs

VIN, GND 12VDC Input Power

EP1501

Ethernet Cable

J3, PoE/12VDC Selector Jumper

S1, Dip Switches

USB Cable

Tamper Switch

Mounting Hole

Mounting Hole

Ethernet Connector

USB Connector

PIM400-1501 Printed Circuit Board Assembly

Getting started

The following is an overview of the steps required to set up the PIM400-1501.
1. Install the WAPM (AD-400, WRI400, etc). See the installation guide that came with the WAPM(s) or visit www.allegion.com/us for more information.
2. Make sure the PIM400-1501 is located to allow for optimum RF signal transmission. See *Determine the location* on page 6 for more information.
3. Before installing the PIM400-1501, check for proper communication function and linking with WAPM(s). See *Pre-installation test* on page 6 for more information.
4. The PIM400-1501 requires an Ethernet network connection in order to connect with host software.
5. The PIM400-1501 has been evaluated for UL compliance in indoor applications only.
6. Make sure to follow unique installation procedures if installing on an indoor metallic wall. Refer to *Permanently mount the PIM400-1501 on page 7* for more information.
7. Consult the Schlage Utility Software (SUS) user guide for information about configuring the PIM400-1501 and the WAPM(s).
8. Familiarize yourself with the information contained in this user guide.

Save this user guide for future reference.

Schlage Utility Software (SUS)

- The SUS is used for programming and setup only.
- The SUS is used to configure and link WAPMs to the PIM400-1501.

ⓘ **The PIM400-1501 will report as a PIM400-485-RSI on the SUS.**

ⓘ **When upgrading the PIM400-485 firmware, make sure to upgrade with PIM400-485-RSI firmware.**

ⓘ **When the SUS is connected to the PIM400-1501, RS485 communication between the PIM400-485 and EP-1501 is interrupted. The PIM400-1501 is not controlling door access at this time.**

For information about using the SUS, see the Schlage Utility Software user guide.

Link mode

Put the PIM400-1501 into link mode

To initiate linking, place the PIM400-1501 in link mode first, then place the desired WAPM in link mode.
1. Place the PIM400-1501 into link mode. Refer to the SUS user guide for detailed Link instructions.
2. Place the desired WAPM into link mode. Refer to instructions in the "Linking" section of the user guide for the WAPM.

ⓘ *Note: When utilizing the SUS application to initiate link mode, the PIM400-1501 must first be coupled to the SUS. To couple with the device, the lid must be removed from the PIM400-1501.*

Determine the location

The PIM400-1501 communicates with WAPM(s) using radio frequency (RF) signals and with host software using an Ethernet network connection. RF signals are diminished by walls, distance, metal objects or barriers. Consider the following when placing the PIM400-1501:

- Mount the PIM400-1501 in a location where a live Ethernet network connection will be available.
- Mount the PIM400-1501 within 200 horizontal feet of each WAPM. When clear line-of-sight is available, communication may be possible up to 1000 feet.
- Do not mount the WAPM(s) and the PIM400-1501 on different floors. The signal may be degraded and functionality could be severely limited.
- Do not mount the PIM400-1501 directly onto a metal surface. A separation of at least one inch must be maintained in all directions from any metal.
- Signals will not pass through metal walls or metal mesh in the walls (stucco). Use a remote antenna module (ANT400) located outside the room when necessary.
- Moving vehicles will interrupt signals. Placement distance should be reduced by half when vehicles may temporarily block the signal.
- Mount the PIM400-1501 (or the remote antenna, if used) so that the antenna is vertical for optimal communication.

Pre-installation test

Once locations for the PIM400-1501 and WAPM(s) are determined, check performance prior to installation.

ⓘ **If using a remote antenna module, install the antenna as indicated in the optional remote antenna module (ANT400) user guide.**

1. As close as possible to its exact mounting location, temporarily mount the WAPM to the access control point (i.e. door, gate, elevator).

ⓘ **A WPR400 may be used as a portable range tester to facilitate properly locating the PIM400-1501.**

2. Temporarily mount the PIM400-1501 in the exact location and orientation it will be mounted.
3. Power the PIM400-1501 with a 12 VDC supply capable of delivering 400 mA or PoE, Class 3, 12.95W, fully compliant to IEEE 802.3af.

ⓘ **For UL installations, PoE powered devices shall not be used. Power for these devices must be provided by a UL 294 listed power limited power supply capable of sourcing at least 400 mA at 12 VDC (example: Schlage models PS902, PS904, PS906).**

4. Put the PIM400-1501 into link mode. The PIM400-1501 will stay in link mode for 30 minutes or until linking to a WAPM has taken place. Refer to *Link mode on page 5*.
5. Go to the WAPM being tested and put the WAPM into link mode. Refer to instructions in the "Linking" section of the user guide for the WAPM.
6. Verify that linking has occurred, indicated at the WAPM by the green LED flashing and optionally by an internal sounder beeping. The number of green flashes and audible beeps should be the same as the RF channel number to which the PIM400-1501 is set.

Installation

1. If linking was successful, install the PIM400-1501. Install and link additional WAPMs.
2. If linking was unsuccessful, move the PIM400-1501 six to ten inches in any convenient direction and repeat steps 4 through 6 of the Pre-Installation Test (see page 6) until all WAPMs link successfully. If linking is still unsuccessful, move the PIM400-1501 closer to the WAPM(s) and repeat, or add more PIM400-1501 modules.

ⓘ **If still not linking successfully, RF interference may be the cause. Refer to the SUS user guide for information on changing the RF channel, and/or consider using a remote antenna module (ANT400).**

Permanently mount the PIM400-1501

Follow these steps to permanently mount the PIM400-1501 to its desired location.

1. Place the PIM400-1501, cover removed, against the wall in the position where it successfully linked.
2. Orient the PIM400-1501 vertically with the radio board at the top of the enclosure.
3. Drill four holes, ⁹⁄₃₂" diameter drill bit, 1¾" deep, located to match the mounting holes as shown on page 3.
4. If the location does not adequately support the PIM400-1501, wall anchors should be used (not included).
5. If mounted on a non-metallic surface or where no metal is within 1 inch (25 mm) of the back of the PIM400-1501, attach the PIM400-1501 directly to the wall using appropriate #8 mounting hardware.
6. If mounted on a metallic surface or where metal is within 1 inch (25 mm) of the back of the PIM400-1501, attach the PIM400-1501 1 inch (25 mm) from the wall.

ⓘ **If a remote antenna is to be used, refer to the optional remote antenna module (ANT400) user guide.**

Wiring connections

ⓘ **IMPORTANT: When drilling holes in the PIM400-1501 to accommodate the 12 VDC power cable, ensure that the drill bit does not damage any electronics inside the enclosure. Use light drill pressure to prevent the bit from entering the enclosure very far, or use a stop drill bit no longer than ½" (13 mm) to prevent the bit from damaging electronics inside the enclosure.**

ⓘ **When using the internal antenna, attention to wire routing is very important. Improper wire routing will reduce the RF range. Wires inside the enclosure should be as short as possible (i.e. do not coil any excess wire inside the enclosure).**

12 VDC input power
- If powering the PIM400-1501 with 12 VDC, drill a hole in the enclosure to accommodate the 12 VDC cable. DO NOT drill this hole in the top of the enclosure. Holes in the top of the PIM400-1501 are for remote antenna installation only. DO NOT run power wiring through the top of the PIM400-1501 enclosure. **Keep all wiring away from the radio module.**
- Use cable entry/exit connectors that comply with local electrical codes (i.e. conduit, etc.).
- 12 VDC power is required for UL 294 installations. The 12 VDC power supply must be compatible with all components and must have the capacity to power the PIM400-1501 and any other devices attached to the same supply. (The PIM400-1501 requires a power supply capable of sourcing at least 400 mA @ 12 VDC).
- Connect the 12 VDC cable to TB4-3 (VIN), TB4-4 (GND).
- Set the PoE/12 VDC power selector jumper (J3) to "12V".

PoE Input Power
- If powering the PIM400-1501 with PoE, there is no need for a hole to be drilled in the PIM400-1501 enclosure to accommodate power. Power is delivered through the Ethernet cable.
- Set the PoE/12 VDC power selector jumper (J3) to "PoE".

Cable recommendations

Application	AWG	Description	Max Distance
12 VDC Power Input	18	2 Conductor	1000 Feet
Ethernet Connection	-	CAT5 or higher	300 Feet

Ethernet connection

Connect a live Ethernet connection to the Ethernet port on the PIM400-1501. The green LED on the PCBA Ethernet port will light up when a live network connection is present.

The PIM400-1501 is shipped with the factory default network settings shown below.

DIP switches

The four switches on S1 DIP switches configure the operating mode of the EP-1501 processor.

DIP switches are read on power-up except where noted. Pressing switch S2 causes the EP-1501 to reset.

Switch 4	Switch 3	Switch 2	Switch 1	Definition
Off	x	Off	Off	Normal operating mode
x	x	x	On	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to reboot.
Off	x	On	Off	**Factory default network connection parameters** 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 Host port: IP Server, no encryption, port 3001 Communication Address: 0
Off	x	On	On	**Schlage OEM Default Communication Parameters** With the Schlage OEM code, the network connection parameters are set by DHCP. The DHCP hostname is "MAC" followed by the 12 digit MAC address of the device (e.g., MACxxxxxxxxxxxx). If a different OEM code besides Schlage is loaded into the PIM400-1501, the OEM default communication parameters may be different than DHCP.
x	On	x	x	Disable TLS secure link. Switch is only read when logging on the web page.

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

ⓘ **Note: In order to ensure that the default login account is not enabled indefinitely, the EP controllers have been changed as follows:**

- Even if no user accounts have been created, the default login account is not automatically enabled.
- Enabling the default user account: switch DIP SW1 from OFF to ON and log in within 5 minutes.
- Rebooting the board or logging in within 5 minutes will disable the default account until DIP SW1 is transitioned again.
- "Password" is not a valid password for a user account as it matches the default login.

Remote antenna (if applicable)

ⓘ **If the installation requires a remote antenna, refer to the optional remote antenna module (ANT400) user guide for complete instructions and information on the following antenna models.**

Antenna Model	Application
ANT400-REM-CEILING ANT400-REM-HALL	Intended for indoor applications.
ANT400-REM-I/O ANT400-REM-I/O+6dB	Intended for indoor or outdoor applications.

Antenna location and safety
- Locate within 15 cable feet (4.5 meters) of the PIM400-1501.
- Locate for best RF line-of-sight path between the PIM400-1501 and WAPM(s).
- Ensure the antenna and WAPM(s) are located on the same floor of a building.
- Outside antenna systems should not be located near overhead power lines or other electric circuits, or where the antenna can fall into such power lines or circuits. Extreme care should be taken to keep the antenna from touching any power line or circuit.

WARNING: Antenna contact with electric power lines or close proximity to a high voltage electrical field may cause serious or fatal injury.

Antenna grounding
National Electrical Code (NEC) requires that every antenna installation be properly grounded. Local electrical codes may have additional requirements.
- A grounding block is recommended for all antenna installations. Consult the NEC and local electrical codes, and the local Authority Having Jurisdiction (AHJ) for information on proper grounding of the antenna system.
- A grounding block kit compatible with all of the previously mentioned antenna models is available as a kit (sold separately, part number MGB + MCA5). Be sure to consider the length of the grounding block cable when locating the antenna.

For more information, refer to *Accessories* in the optional remote antenna module (ANT400) user guide.

Terminate the coax whip at the PIM400-1501

ⓘ **Only applicable to installations using an optional remote antenna.**

1. Drill a ⅝" (16 mm) hole in the top of the PIM400-1501 enclosure as shown to accommodate the mounting of the coax whip to be connected to the PIM400-1501 radio board.

Top of PIM400-1501 Enclosure

1½" (38 mm)

1¼" (32 mm)

⅝" (16 mm) hole

Reverse MCX plug
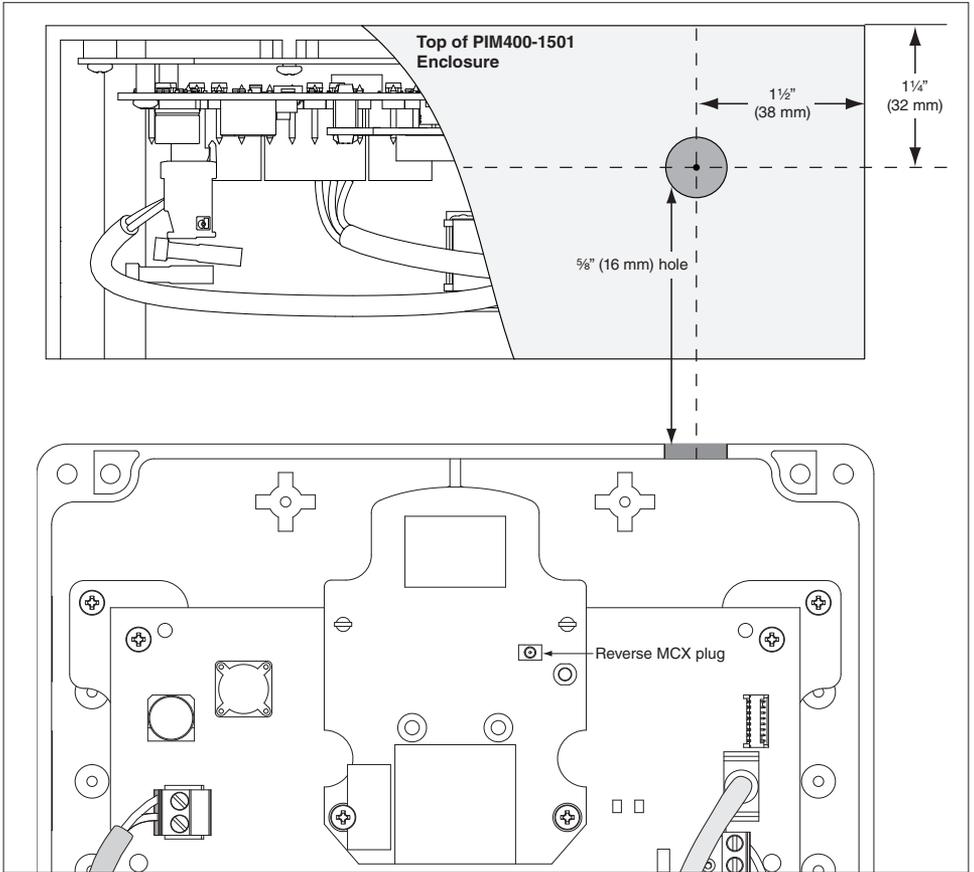
To avoid damage to electronics inside the enclosure when drilling, use light pressure so that the bit does not penetrate very far, or use a stop drill bit no longer than ½" (13 mm) to stop the bit from damaging electronics inside the enclosure.

2. Refer to the optional remote antenna module (ANT400) user guide for complete coax connection instructions.

Reset to factory defaults

Reset the PIM400-485 to factory defaults

All configuration information will be deleted and the PIM400-485 will be reset to factory defaults!
1. Remove the main cover.
2. Press and hold both link buttons for over 3 seconds.
3. Release both link buttons. The PIM400-485 will blink the red lights beside each link button while configuration reset takes place.
4. The two green lights beside the link buttons will blink 3 times when the reset is complete.
5. Replace the main cover.

Reset the EP-1501 to factory defaults - bulk erase

Use the bulk erase procedure on the EP-1501 to erase all configuration and cardholder databases.
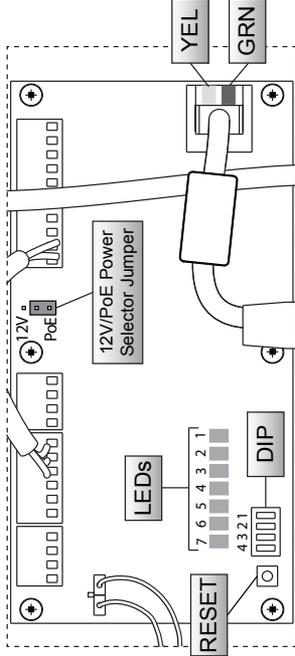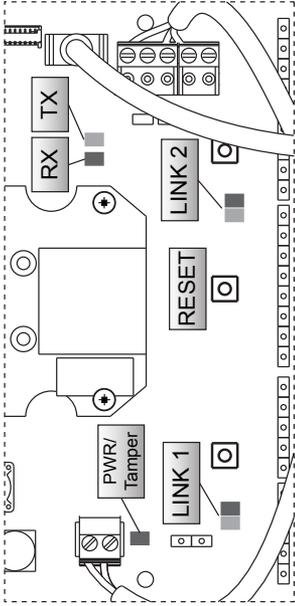1. Set S1 switches to 1 and 2 ON, and 3 and 4 OFF.
2. Cycle power to the PIM400-1501, or press the S2 reset button on the EP-1501.
3. The EP-1501 is now in a 10 second reset window. LEDs 1, 2 and 3, 4 will blink alternately.
4. Within the 10 second window, change switch 1 or 2 to the OFF position. This will erase the EP-1501 memory. While erasing memory, LED 2 will blink at a 2 second rate. DO NOT CYCLE POWER. Memory will be erased in less than 60 seconds.
5. LEDs 1 and 4 will blink for 10 seconds after the memory has been erased, then the EP-1501 will re-boot.
6. Set the DIP switches to the desired network connection settings and cycle power, or press the S2 reset button on the EP-1501. Refer to *DIP switches on page 9* for more information on network connection settings.

Memory backup battery

The EP-1501 SRAM is backed up by a rechargeable battery when input power is removed. This battery allows for retention of data for approximately two (2) weeks.

If data in the SRAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased. If this should occur, all configuration data must be downloaded again.

ⓘ **The initial charge of the backup battery may take up to 24 hours to fully charge.**

Note: Locations of objects and scale of diagram are approximate.

RESET - COUPLING - BULK ERASE

Factory Default Reset	Press and hold both **LINK1** and **LINK2** buttons for three seconds and release.
Coupling	Press and hold **LINK1** button, then press **LINK2** button three times.
Bulk Erase Configuration Memory	With power OFF, set DIP switches 1 & 2 to ON and 3 & 4 to OFF. Apply power and change switch 1 or 2 to OFF within 10 seconds.

Contact your local authorized dealer or visit www.schlage.com/support

PIM400-485 PCBA

LED	Condition	PIM400-485 PCBA
Power/Tamper (D3)	Solid GREEN	Power applied
Link 1 / Link 2 (LED1 / LED2)	Alternating RED/GREEN flashing	Link mode
	More GREEN flashing than RED	Strong wireless link
	More RED flashing than GREEN	Weak wireless link
	LED1: RED flashing	Communicating with even # WAPM
	LED2: RED flashing	Communicating with odd # WAPM
RX/TX (D4/D5)	RX and TX flashing	RS485 communication with EP1501
	RX and TX flashing	USB communication with HHD
	RX and TX alternating flash	Coupling mode

EP1501 PCBA

LED	Condition	EP1501 PCBA
LED1	80% RED ON	Online
	20% RED ON	Offline
LED2	RED Flashing	Host communication activity
LED3	RED Flashing	RS485 communication with PIM400-485
LED6	Solid RED	Lid tamper active
YEL	OFF	10 Mb/S Ethernet speed
	ON	100 Mb/S Ethernet speed
GRN	OFF	No network activity
	ON or Flashing	Network activity

DIP Switch Settings

4	3	2	1	Definitions
OFF	X	OFF	OFF	Normal operating mode
X	X	X	ON	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly; no need to reboot.
OFF	X	ON	OFF	Factory Default Communication Parameters
OFF	X	ON	ON	OEM default communication parameters. Contact system manufacturer for details.
X	ON	X	X	Disable TLS secure link. Switch is read only when logging on the web page.

FCC / IC statements

The communication module is a 900 MHz transceiver for electronic locks and non-lock devices. The communication module links the access device to the Access Control Management System, with feedback control to the Access Device via a wireless means. The module contains the embedded firmware implementing the radio physical and data layers. There are 5 antennas approved for use with this module:

Approved antenna list:

The required antenna impedance is 50 ohms.
1. PCB trace antenna with a 5.7dBi maximum gain
2. p/n: 23520587, dual beam antenna with a 3.5dBi gain (ANT400-REM-HALL)
3. p/n: 23530579, multi band directional panel antenna with 8.5dBi gain (ANT400-REM-I/O+dB)
4. p/n: 23530553, dual band quasi-omni panel antenna with 4.5dBi gain (ANT400-REM-I/O)
5. p/n: 23520561, multi band omni antenna with 2dBi gain (ANT400-REM-CEILING)

Antennas having a gain greater than the antenna type approved in the list are strictly prohibited for use with this device. However, antennas of the same type with a gain equal to or less may be used. Examples of this may include:

• a directional panel antenna with a gain equal to or less than 8.5 dBi may be used with this module

• an omni-directional antenna with a gain equal to or less than 2.0 dBi may be used with this module

Specifications of the radio module:

Power output: 18.6 dBm   Modulation: BPSK-40   Operating frequency: 906 -924 MHz

Note: The intended use of this module is not for the general public. It is generally for industry/commercial use only. This transceiver is to be professionally installed in the end product by Allegion, and not by a third party. The Schlage XPB-COMAD400V2 900 MHz Communication Board Module will not be sold to third parties via retail, general public or mail order. In the case of a repair, the transceiver will be replaced by a professional Installer.

Federal Communication Commission interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

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.

FCC/IC caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

To comply with FCC/IC RF exposure limits for general population/uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada statements

This Device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This radio transmitter, 8053B-COMAD400V2, has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated.

Approved antenna list:

The required antenna impedance is 50 ohms.

1. PCB trace antenna with a 5.7dBi maximum gain
2. p/n: 23520587, Dual Beam Antenna with a 3.5dBi gain (ANT400-REM-HALL)
3. p/n: 23530579, Multi band Directional Panel antenna with 8.5dBi gain (ANT400-REM-I/O+dB)
4. p/n: 23530553, Dual Band Quasi-Omni Panel Antenna with 4.5dBi gain (ANT400-REM-I/O)
5. p/n: 23520561, Multi band Omni Antenna with 2dBi gain (ANT400-REM-CEILING)

Antennas having a gain greater than the antenna type approved in the list are strictly prohibited for use with this device. However, antennas of the same type with a gain equal to or less may be used. Examples of this may include:

• a directional panel antenna with a gain equal to or less than 8.5 dBi may be used with this module

• an omni-directional antenna with a gain equal to or less than 2.0 dBi may be used with this module.

To comply with IC RF exposure limits for general population/uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

ALLEGION™