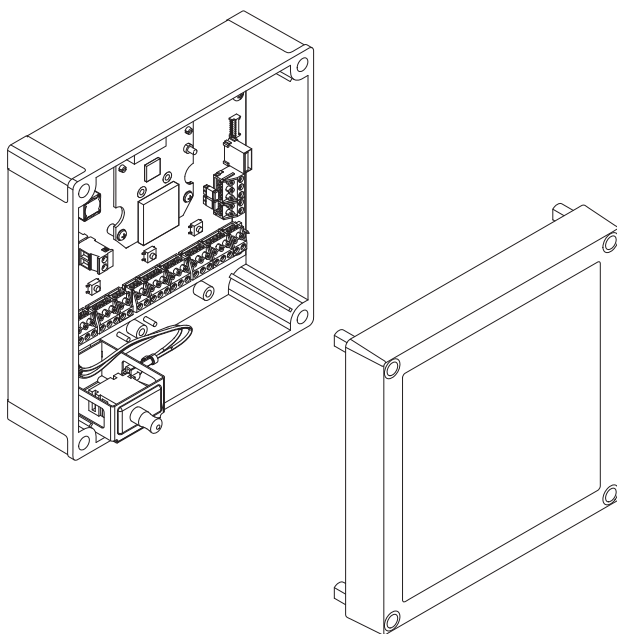




## PIM400 USER GUIDE

INSTALLATION AND OPERATING INSTRUCTIONS FOR PANEL INTERFACE  
MODULES PIM400-TD2 AND PIM400-485



# CONTENTS

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Overview.....	3
Getting Started .....	4
Handheld Device (HHD) .....	4
Features and Components .....	5
Model Specifications.....	6
Optional Remote Antenna .....	6
Link Mode .....	6
Putting the PIM400-485 into Link Mode .....	6
Putting the PIM400-TD2 into Link Mode .....	6
Installation .....	7
Determining the Location .....	7
Pre-Installation Test .....	7
Installation .....	7
Mounting the PIM400 .....	8
Wire Routing.....	8
Cable/Wire Specifications.....	8
PIM400-TD2 to ACP Connection.....	9
Typical PIM400-TD2 to ACP Wiring Diagram .....	9
PIM400-485 to ACP Connection .....	12
Typical PIM400-485 to ACP Wiring Diagram .....	13
Resetting to Factory Defaults .....	14
DC Power .....	14
Completing Installation .....	15
FCC/IC Statements .....	15

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 20cm 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



[www.schlage.com/support](http://www.schlage.com/support)

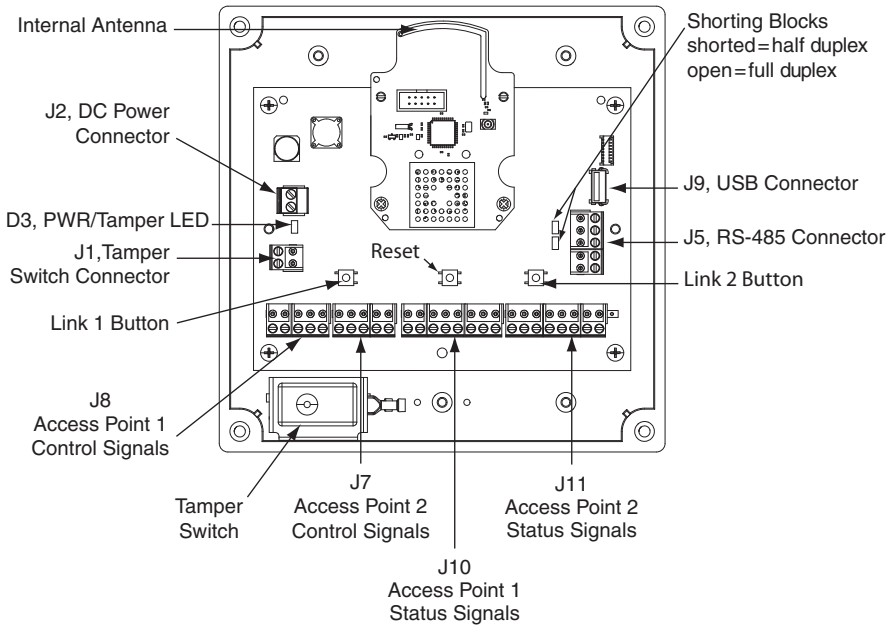


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# OVERVIEW

This manual describes the operation and interaction of all Schlage PIM400 models with Access Control Panels and Wireless Access Point Modules (WAPM's). The PIM400 is a product in the AD-400 Wireless Panel Interface Module (WPIM) category.

- The PIM400 is wired to the access control panel
- Connect PIM400 to external power using a UL 294 Listed Power Supply
- Installation location is determined by location of the WAPM. The PIM400 is ideally installed very close to the access control panel
- The PIM400 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 enclosure is NEMA Type 4



**PIM400 Printed Circuit Board (PCB)**

## **GETTING STARTED**

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The following is an overview of the steps required to set up the PIM400:

1. Install the WAPM (AD-400, WPR400, etc). See the installation guide that came with the WAPM, or visit [www.schlage.com/support](http://www.schlage.com/support) for more information.
2. Make sure the PIM400 is located to allow for optimum RF signal transmission. See *Determining the Location* on page 7 for more information.
3. Before installing the PIM400, check for proper communication function and linking with WAPM(s). See *Pre-Installation Test* on page 7 for more information.
4. The PIM400 has been evaluated for UL compliance in indoor applications only.
5. Make sure to follow unique installation procedures if installing on a metallic wall. Refer to *Mounting the PIM400* on page 8 for more information. Consult the Schlage Utility Software User Manual for information about configuring the PIM400 and the WAPM.
6. Familiarize yourself with the information contained in this user guide.

**!** *Save this user guide for future reference.*

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## **HANDHELD DEVICE (HHD)**

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**!** *The Handheld Device is used for programming and setup only.*

The Handheld Device (HHD) is used to configure this device's links and outputs. For information about the HHD, see the Schlage Utility Software User Guide.

## FEATURES AND COMPONENTS

Feature	Description
PIM400 Status	Power and Tamper status is indicated at the PWR/Tamper LED (D3). The LED is steady green when power is on, and blinking green when the Tamper switch is activated.
Access Point Link and Status	The PIM400-TD2 overall status is communicated by a red/green LED for each Access Point.  A red LED communicates real time and trouble status. Real time status: D40 = Access Point 1, D43 = Access Point 2 Trouble status: D1 = Access Point 1, D2 = Access Point 2.  Each Access Point has clock (CLK) and data (DATA) LEDs that indicate proper communication between the PIM400-TD2 and the ACP.
Reset Switch	Press the Reset Switch (S1) if the PIM400 does not seem to operate properly.
Tamper Switch	The Tamper Switch senses if the PIM400 enclosure cover is open or closed. If closed, the D3 LED is steady green, trouble signals are inactive and extended unlock works, if enabled.  If open, the D3 LED is blinking green, trouble signals are active and extended unlock does not work even if enabled.
Component	Description
Access Panel Connections	The PIM400-TD2 connects two WAPM's to the Access Control Panel.  WAPM (Door) 1 connects through the Access Point 1 connections on J8 and J10 to the ACP, and WAPM (Door) 2 connects through the Access Point 2 connections on J7 and J11.  The PIM400-485 connects up to 16 WAPM's to an access control panel using the RS-485 connection J5.
DC Power Connection	The PIM400 DC power input (J2) is non-polarized. If DC power is lost or cycled, upon restoring DC power, the PIM400 will continue operation with the same configuration and linking information. <b>There is no need to re-configure or re-link.</b>

## MODEL SPECIFICATIONS

PIM400 Models			
Model	Maximum Number of WAPMs	Location	Access Control Panel Interface/ Description
PIM400-TD2	2	Indoor/Outdoor	Magnetic (clock & data) or Wiegand (data 1/data 0)
PIM400-485	16	Indoor/Outdoor	RS-485

### Optional Remote Antenna

The PIM400 may be used with a remote antenna if:

- the PIM400 must be located in a remote, more serviceable or secure area, or
- it is necessary to increase the RF range.

Optional remote antenna models are shown below. For more information on remote antenna use and installation, refer to the Optional Remote Antenna User Guide.

Optional Remote Antenna Models			
Model	Enclosure	Location	Description
ANT400-REM-CEILING		Indoor	Optional remote omni-directional antenna (0 DB gain)
ANT400-REM-I/O	NEMA 4	Indoor/Outdoor	Optional remote omni-directional antenna (0 DB gain)
ANT400-REM-HALL		Indoor	Optional remote bi-directional antenna (0 DB gain)
ANT400-REM-I/O+6dB	NEMA 4	Indoor/Outdoor	Optional remote directional antenna (6 DB gain)

## LINK MODE

### Putting the PIM400-485 into Link Mode

→ The Schlage Utility Software (SUS) on the Handheld Device (HHD) is used to put a PIM400-485 into Link Mode. Refer to the Schlage Utility Software User Guide for information.

### Putting the PIM400-TD2 into Link Mode

1. Press and release LINK 1 switch (SW2) to link Access Point 1, or LINK 2 (SW3) to link Access Point 2. The corresponding LED (LED1 for LINK1; LED2 for LINK2) flashes red and green. This indicates that the PIM400-TD2 is in Link Mode. To abort Link Mode, press the same switch again.
2. When the PIM400-TD2 is powered and in Link Mode, the system is ready for the WAPM to initiate linking.

→ Refer to the "Linking" section of the user guide for the desired WAPM.

# INSTALLATION

## Determining the Location

The PIM400 communicates with WAPM(s) using radio frequency (RF) signals. RF signals are diminished by walls, metal objects or barriers. Consider the following when placing the PIM400:

- Mount the PIM400 within 200 horizontal feet of each WAPM. When clear line-of-sight is available, communication may be possible up to 1000 feet.
- When mounting WAPM(s) and PIM on different floors, placement distance should be reduced by 100 feet. The signal will not pass through more than one floor.
- Avoid mounting the PIM400 on a metal surface. A separation of at least one inch must be maintained in all directions from any metal<sup>1</sup>.
- Signal will not pass through metal walls or metal mesh in the walls (stucco). Use a Remote Antenna Module located outside the room when necessary.
- Moving vehicles will interrupt the signal. Placement distance should be reduced by half when cars or trucks may temporarily block the signal.
- Mount the PIM400 so that the antenna is vertical for optimal communication.

## Pre-Installation Test

Once locations for a PIM400 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 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). Do not connect power yet.
  - *The WPR400 may be used as a portable range tester to facilitate properly locating the PIM400.*
2. Temporarily mount the PIM400 in the exact location and orientation it will be mounted.
3. Power the PIM400 with a 12 to 24 VDC supply capable of delivering 250 mA.
4. Put the PIM400 into Link Mode. Refer to *Link Mode* on page 6.
5. Go to the access point being tested. Make sure the access point is secure (closed).
6. Connect the battery, or connect to a compatible UL 294 Listed Power Supply. See *PIM400-TD2 to ACP Connection* on page 9, or *PIM400-485 to ACP Connection* on page 12.
7. 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 channel number to which the PIM400-485 is set.

## Installation

1. If linking occurred successfully install the PIM400. Link and install additional WAPMs.
  2. If linking was unsuccessful, move the PIM400 six to ten inches in any convenient direction and repeat Pre-Installation Test, step 7, until all WAPMs link successfully. If still not successful, move the PIM400 closer to the WAPMs and repeat.
- *If still not successful, RF interference may be the cause. Refer to the Schlage Utility Software User Guide for information on changing the RF channel.*

<sup>1</sup> A spacer kit is available. Contact Schlage technical support to order. (Kit #K381-000-001 includes: four #8 x 1½" screws and four heavy-duty anchors. Kit #K384-003-001 includes: four #8 x 2 ½" screws and four 1" round by 1" high (1" O.D. x 1") spacers.)

**Mounting the PIM400**

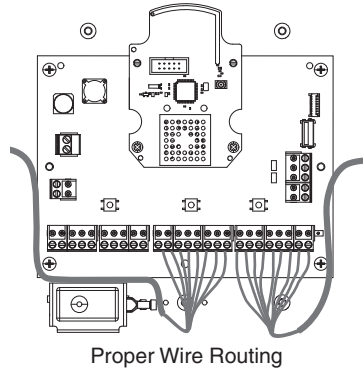
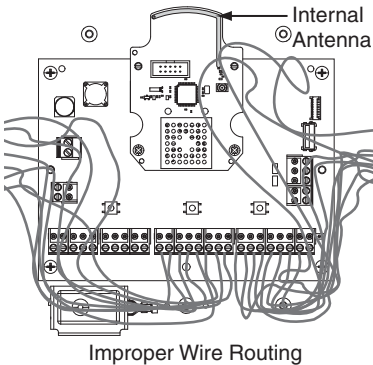
1. Place PIM400, cover removed, against the wall in the position where it successfully “link” tested.
  2. Using the four mounting holes in the corner of the PIM400 housing as a template, mark these holes with a pencil.
  3. Remove the PIM400 and drill the four holes, 9/32” diameter drill bit, 1 1/4” deep.
    - ➔ *If the wall does not adequately support the PIM400, wall anchors should be used.*
  4. If mounted on a non-metallic surface or where no metal is within 1 inch of the back of the PIM400, use the #8 x 1 1/2” screws provided.
  5. If mounted on a metallic surface or where metal is within 1 inch of the back of the PIM400, attach the PIM400 1 inch from the wall.
    - ➔ *For a metallic wall installation, a spacer kit is available by contacting Schlage technical support. (Kit #K381-000-001 includes: four #8 x 1 1/2” screws and four heavy-duty anchors. Kit #K384-003-001 includes: four #8 x 2 1/2” screws and four 1” round by 1” high (1” O.D. x 1”) spacers.)*
- ➔ *If a remote antenna is to be used, refer to the Optional Remote Antenna Module User Guide.*

**Wire Routing**

➔ **IMPORTANT:** *When drilling holes in the PIM400 to accommodate connectors, 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. The electronics may be removed before drilling holes. To remove electronics, remove only the four screws holding the circuit board to the enclosure. Do not loosen or remove any screws securing the electronics to the circuit board.*

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).

Drill hole(s) in the PIM400 enclosure to accommodate the size and number of entry/exit connectors to be used. Holes in the top of the PIM400 are for remote antenna installation only; do not run signal or power wiring through the top of the PIM400 enclosure.



**Cable/Wire Specifications**

Application	Part Number	AWG	Description	Max Distance
DC Power Input	Belden 8760 or equivalent	18	2 Conductor	1000 Feet
RS-485	Belden 9841 or 9842 or equivalent	24	2 or 4 Conductor shielded	4000 Feet
PIM400-TD2 to Access Control Panel	Alpha 1298C or equivalent	22	8 Conductor shielded	500 Feet



# PIM400-TD2 TO ACP CONNECTION

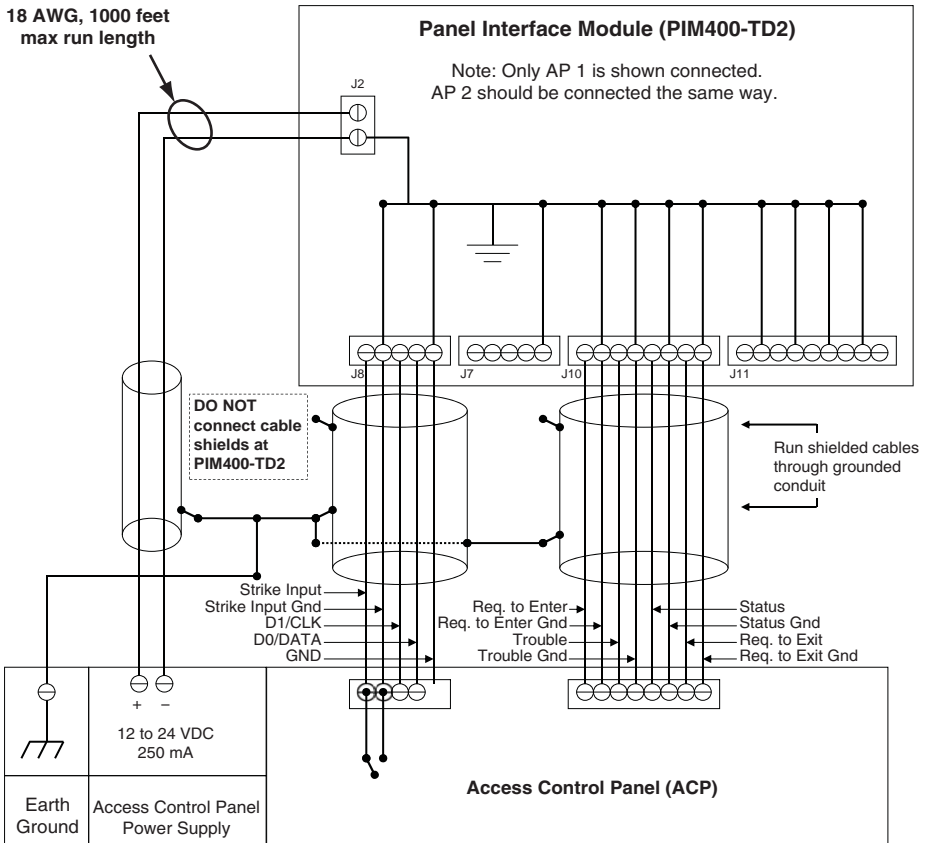
➔ Review Features and Components on page 5 before connecting the PIM400 to an Access Control Panel.

! **CAUTION:** Disconnect the Access Control Panel power and batteries while wiring the PIM400 to the panel.

! **WARNING:** Because every Access Control Panel is different, always check the panel's instruction manual for appropriate interface wiring.

- Use shielded cables for the signal wiring between PIM400-TD2 and the Access Control Panel. For maximum wire lengths and cable specifications, refer to *Cable/Wire Specifications* on page 8.
- Must be used with a UL 294 Listed Power Supply capable of sourcing at least 250mA @ 12 to 24 VDC.

## Typical PIM400-TD2 to ACP Wiring Diagram



### Notes:

Unsupervised, ground switched inputs to panel shown. Some access control panels require supervised inputs and/or "dry/contact" isolated inputs. **The optional Schlage TD2-RLBD is available for these applications.**

The PIM400 can also be powered by the access control panel power supply or a separate external power supply.

## PIM400-TD2 TO ACP CONNECTION, Continued

ACCESS CONTROL PANEL CONNECTION				
Connector	PIM400 Signal	Access Panel Signal	Description/Explanation	
J2	12V+	12 to 24 VDC	<p>PIM400 inputs for 12 to 24 VDC power.</p> <p>Draws 250mA max during transmit.</p> <p>If the Access Control Panel (ACP) reader power outputs do not source enough current for the PIM400, use the ACP main regulated 12 VDC power supply or a separate UL 294 Listed 12 to 24 VDC power supply.</p> <p>Power input is non polarized.</p>	
J10 for Access Point A  J11 for Access Point B	J10/J11 (1)	REQ TO ENTER	Request to Enter Input Signal	<p>PIM400 output indicating when the Access Point exterior door handle is making a request to enter.</p> <p>Connect to the Access Control Panel Request to Enter input.</p>
	J10/J11 (2)		Request to Enter Common Contact (GND)	<p>Connect only if the Access Point needs to have Request to Enter function.</p> <p>Output is Pulled-up to 5 VDC and can sink 50mA.</p>
	J10/J11 (3)	TROUBLE	General Purpose Alarm Input Signal	<p>PIM400 output indicating Trouble is reported by the Access Point.</p> <p>Logic polarity is configurable.</p>
	J10/J11 (4)		General Purpose Alarm Common Contact (GND)	<p>Output is Pulled-up to 5 VDC and can sink 50mA.</p>
	J10/J11 (5)	DOOR 1/2 STATUS	Door Status Input Signal	<p>PIM400 output indicates the position of the Access Point portal, Open/Closed.</p> <p>Connect only if the Access Control Panel needs to know the Access Point portal state.</p>
	J10/J11 (6)		Door Status Input Common Contact (GND)	<p>Logic polarity is configurable.</p> <p>Output is Pulled-up to 3.6 VDC and can sink 50mA.</p>

## PIM400-TD2 TO ACP CONNECTION, Continued

ACCESS CONTROL PANEL CONNECTION				
Connector		PIM400 Signal	Access Panel Signal	Description/Explanation
J10 for Access Point A J11 for Access Point B	J10/J11 (7)	REQ TO EXIT	Request to Exit Input	PIM400 output indicating when the Access Point interior door handle is making a request to exit. Connect to the Access Control Panel Request to Exit input.
	J10/J11 (8)		Request to Exit Common Contact (GND)	Connect only if the Access Point needs to have Request to Exit function. Output is Pulled-up to 5 VDC and can sink 50mA.
	J11 (9)	+5V	5 VDC	RESERVED 5 VDC power supply pin for the RLBD, dry contact relay board.
J8 for Access Point A J7 for Access Point B	J8/J7 (1)	STRIKE INPUT	Normally Open Strike Relay Contact	Strike Input monitors the access panel strike relay. Connect the STRIKE signal to the normally open terminal of the strike relay.
	J8/J7 (2)		Common Strike Relay Contact	Connect the GROUND signal to the common terminal of the strike relay. Connect only if the access point needs to be unlocked (door) or raised (gate).
	J8/J7 (3)	D1/CLK	Clock or Data 1 Output	PIM400 outputs used to present card data to the Access Control Panel (ACP). For an access point with a magnetic reader, will present Clock and Data signals to the Access Control Panel. For an access point with a Wiegand or Proximity reader, will present Data1 and Data0 signals to the ACP.
	J8/J7 (4)	DATA	Data or Data 0 Input	If initial hookup fails to operate, switch wires at these terminals. Output is Pulled-up to 3.6 VDC and can sink 50mA.
	J8/J7 (5)	GND	Signal Ground	Common signal ground for the EXIT REQ, DOOR STAT, TROUBLE, DATA/D0 and CLK/D1 signals.

# PIM400-485 TO ACP CONNECTION

➔ Review Features and Components on page 5 before connecting the PIM400 to an Access Control Panel.

! **CAUTION:** Disconnect the Access Control Panel power and batteries while wiring the PIM400 to the panel.

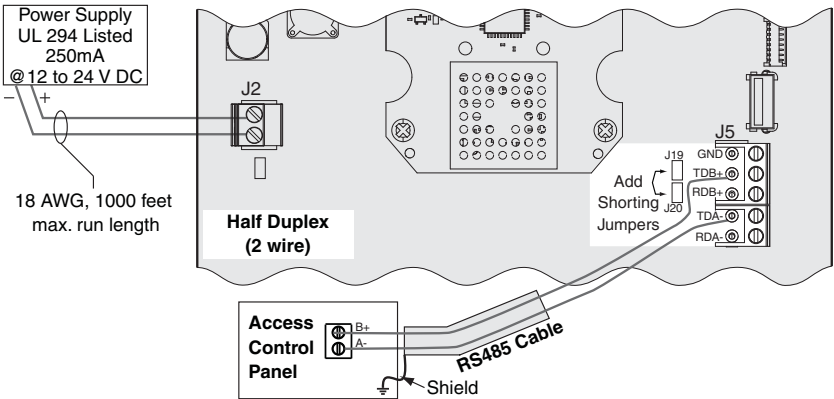
! **WARNING:** Because every Access Control Panel is different, always check the panel's instruction manual for appropriate interface wiring.

➔ The EIA RS-485 specification labels the data wires as "A" and "B", however, many RS-485 products label their wires "+" and "-." Some products associate the "+" signal with "A", some with "B". Reversing polarity will not damage either RS-485 device, it just won't communicate; if it doesn't work, switch the connections.

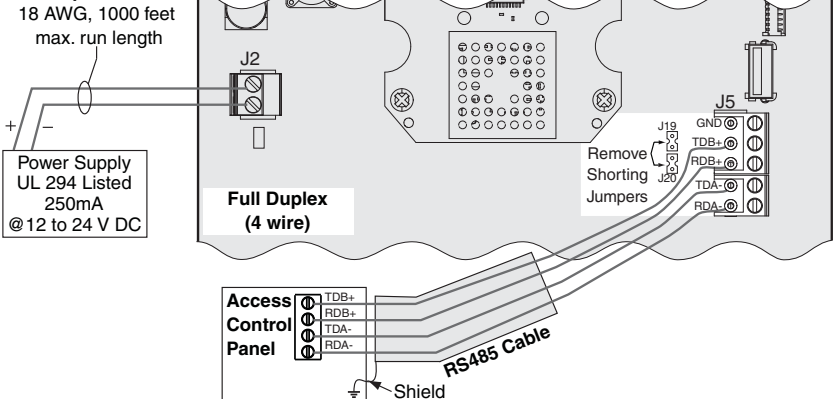
- The two wires from the panel (Data A (-) and Data B (+)) must be a shielded twisted pair. For maximum wire lengths and cable specifications, refer to *Cable/Wire Specifications* on page 8.
- Must be used with a UL 294 Listed Power Supply capable of sourcing at least 250mA @ 12 to 24 VDC.

## Typical PIM400-485 to ACP Wiring Diagram

### Half Duplex



### Full Duplex



## PIM400-485 TO ACP CONNECTION, Continued

ACCESS CONTROL PANEL CONNECTION				
Connector		Signal	Access Panel Signal	Description Explanation
J2		J2 (1)	+ 12 to 24 VDC	PIM400 inputs for 12 to 24 VDC power. Draws 250mA max during transmit. If the Access Control Panel (ACP) reader power outputs do not source enough current for the PIM400, use the ACP main regulated 12 VDC power supply or a separate UL 294 Listed 12 to 24 VDC power supply. Power input is non polarized.
		J2 (2)	DC Ground	
J5	J5 (1)	RA –	– Receive Data	Full (4 wire) or half (2 wire) duplex, bi-directional RS-485 communications port for interface to access control panels.
	J5 (2)	TA –	– Transmit Data	
	J5 (3)	RB +	+ Receive Data	2 wire (half duplex) installation: shorting jumpers J19 and J20 should be added.
	J5 (4)	TB +	+ Transmit Data	4 wire (full duplex) installation, shorting jumpers J19 and J20 should be removed.
	J5 (5)	GND	Signal Ground	See <i>Typical PIM400-485 to ACP Wiring Diagram</i> on page 12 for more information.

## **RESETTING TO FACTORY DEFAULTS**

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**!** *All configuration information will be deleted and the PIM400 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 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.
- 

## **DC POWER**

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This connection is always required regardless of the system application or configuration. Refer to page 9 for how to connect DC power to the PIM400-TD2, and page 12 for how to connect DC power to the PIM400-485.

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## **COMPLETING INSTALLATION**

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After all required connections have been made, connect the power and Access Control Panel standby batteries to the panel.

## 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 4 antennas associated with this module:

1. PCB trace inverted-L with a measured gain of 5.7dBi.
2. Omni, wall/post, indoors/outdoors.
3. Omni, ceiling, indoors.
4. Directional, wall/post, indoors/outdoors.
5. Bi-directional, ceiling, indoors.

Specifications of the radio module:

Power Output: 19.6 dBm

Operating Frequency: 906 -924 MHz

Modulation: BPSK

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 Ingersoll Rand, and not by a third party. The Ingersoll Rand AD400 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

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.

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 device has been designed to operate with the antennas listed below, and having a maximum gain of 9.3 dBi. Antennas not included in this list or having a gain greater than 9.3 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

#### Approved antenna list

##### Model Number

23530553	1	Remote antenna, Omni, wall/post, indoors/outdoors
23530561	1	Remote antenna, Omni, ceiling, indoors
23530579	1	Remote antenna, Directional, wall/post, indoors/outdoors
23520587	1	Remote antenna, Bi-directional, ceiling, indoors

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.

These units were tested by UL with the Schlage SMS (model #SRCNX) and Bright Blue (model #SBB) Access Control Panels.

