Technical Guide

A Member of the Kaba Group

KEYSCAN ACCESS CONTROL SYSTEMS FROM KEYSCAN INC.

Information and specifications in this document are subject to change without notice.

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Foreword

This technical guide outlines general information for installing Keyscan access control systems. The guide assumes the installer has knowledge of electrical, electronic, mechanical, and computer concepts, as well as having familiarity with access control systems and associated components. For reliable and safe operation of the equipment, comply with stated cable, power, ground, and environment specifications.

Approved Standards

Keyscan CA250, CA4500, CA8500, EC1500 and EC2500 series control units conform to the following approved standards:

- UL STD 294 – Access Control Systems Units
- CSA STD C22.2 No. 205-M1983 – Signal Equipment
- CE Standards
  - EN 55022 RF Emissions
  - EN 55024 RF Immunity
  - EN 60950-1 Equipment Safety
- FCC Subpart B RF Emissions
- Industry Canada ICES 003 Emissions

Product Certification

The CSA/UL certification record can be viewed at http://directories.csa-international.org. Enter 110441_0_000 in the File Number box.

Electrical Precautions

Ensure all circuit breakers powering the system are off before commencing installation or modifying wiring connections. Do not apply power before completing the installation; otherwise, you may damage the circuit boards. Ensure all enclosures have earth ground connections for proper and safe system operation.

Tools

Keyscan recommends having the following tools on hand to install the access control system:

- Digital voltmeter
- Wire cutters & needle nose pliers
- Soldering iron & tape
- Set of screwdrivers
- Drill & drill bits
- Laptop computer (optional)

Cable Specifications

The following table outlines system cable specifications. Please be sure to review grounding guidelines for safe system operation. Avoid running access control cables parallel with AC wires or across fluorescent light fixtures. This can cause AC induction or transmission interference.

Table 1 – Cable Specifications

Device / Circuit Board	Signal Protocol	Maximum Distance	Cable Type	Notes
Readers to ACU (includes HID iClass – Rev B & Rev C)	Wiegand	500 ft / 152.4 m	6 conductors shielded 22 AWG	Overall shielded cable accepted. CAT5 cable not acceptable with Wiegand signal protocol.
Exception Readers to ACU – PX-620, HID-5375, MR-10, MR-20, HID-iClass (Rev A), iClass KEYRK40 and elevator readers	Wiegand	500 ft / 152.4 m	6 conductors shielded 18 AWG	Overall shielded cable accepted. CAT5 cable not acceptable with Wiegand signal protocol.
Door strikes & electro magnets to ACU	n/a	500 ft / 152.4 m	1 pair 18 AWG	Shielded wire not required.
Contacts & exit devices	n/a	500 ft / 152.4 m	1 pair 22 AWG	Shielded wire not required.
Motion sensors (PIR)	n/a	500 ft / 152.4 m	2 pairs 22 AWG	Shielded wire not required
CIM	CAN Bus 1	3280 ft / 1000 m @ 9600 BPS 3280 ft / 1000 m @ 19,200 BPS 984 ft / 300 m @ 57,600 BPS 262 ft / 80 m @ 115,200 BPS	CAT 5 – 2 twisted pairs	Maximum overall distance between first and last CIM units
Direct serial - PC to ACU - NETCOM to ACU	RS-232	100 ft / 30 m @ 9600 BPS 49 ft / 14.9 m @ 19,200 BPS 26 ft / 8 m @ 57,600 BPS 9.8 ft / 3 m @ 115,200 BPS	5 conductors 22 AWG shielded	Overall shielded cable accepted. CAT 5 cable not acceptable with RS-232 signal protocol.
WIEEX2 (Wiegand protocol extender)	n/a	4000 ft / 1219.2 m	CAT 5 – 1 twisted pair communication. 1 pair 18 AWG power to TX.	If powering transmitter locally, 18 AWG power wiring is not required. Kit includes 1 transmitter & 1 receiver.
Relay Floor Wiring for floor control	n/a	500 ft / 152.4 m	1 pair 18 AWG	Shielded wire not required.
(Optional) Floor Input Wiring for floor reporting	n/a	1000 ft / 304.8 m	1 pair 22 AWG	Shielded wire not required

Grounding

Ground all access control units and shielded cables to a cold water pipe. For multiple access control units, all shields should be connected to a single point earth ground.

It is important to ground the shields of the readers and communication cables to a single point cold water pipe at the access control unit. Failing to ground the shields or using incorrect cables may cause noise or interference and result in improper card reads.

Important

Ensure the chassis ground (GND) on the DPS-15 is connected to the metal enclosure ground lug.

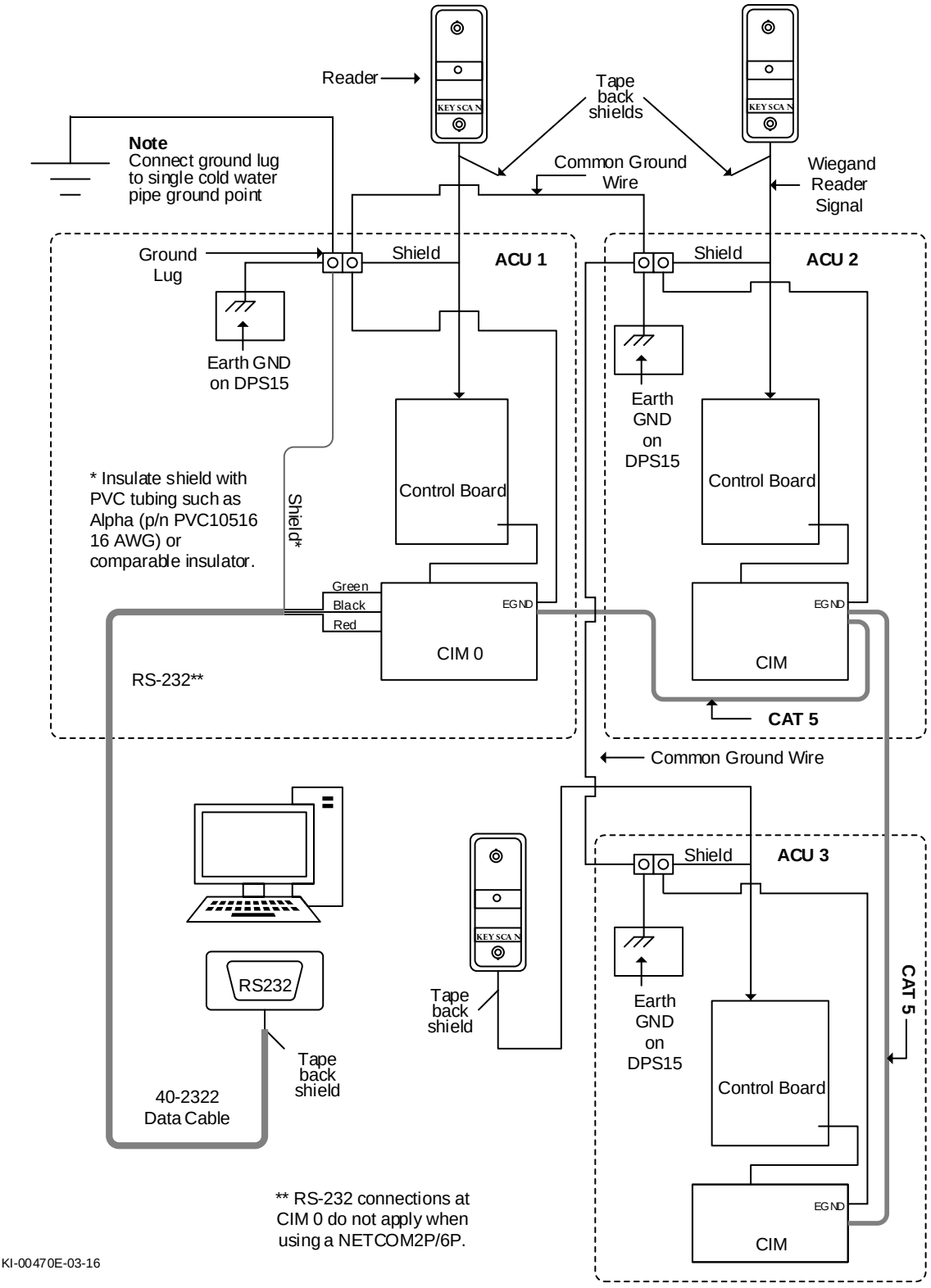
Grounding Communication Cable Shield

When terminating the communication cable in the metal enclosure, insulate the shield and connect it to the ground lug. Keyscan suggests Alpha PVC 10516 – 16 AWG clear tubing or a comparable tubing to insulate the shield. Do not connect the shield to GND on a communication terminal block.

Note

Keep all shield wires and cables away from the control board.

Figure 1 - Grounding Access Control Units and Cables with CIMs



Mount the Enclosure & Circuit Boards

The following sub-sections review mounting metal enclosures, control boards, communication boards, output control boards and power supplies.

UL STD 294, CSA STD C22.2 (No. 205), CE, FCC 15 Subpart B

To be compliant with UL STD 294, CSA STD C22.2, CE, or FCC 15 Subpart B standards, adhere to the following practices:

- use the Keyscan metal enclosure with the CSA, CE, FCC label on the inside of the panel cover
- mount control boards with the standoffs supplied as instructed
- secure the enclosure cover with the 4 screws supplied
- connect the tamper switch to the TB3 terminal block on the control board
- use the Keyscan DPS-15 to power the control board and readers
- ensure 2 x 16V 40VA transformers or 2 x 16.5V 37VA transformers are connected to the Keyscan DPS-15 power supply
- locate the transformers within 30 feet (9.144 m) of the Keyscan DPS-15 power supply - do not mount the transformers inside the ACU metal enclosure
- do not use the Keyscan DPS-15 power supply to power door strikes or auxiliary equipment
- use a standby battery with sufficient amp hours (minimum is 12V 7.0 Ah) connected to the Keyscan DPS-15 power supply
- connect a proper ground wire from the ground lug inside the metal enclosure to a cold water pipe ground (earth ground)
- connect the enclosure ground strap to the designated studs on the metal enclosure and the enclosure cover

Any deviations or alterations will result in non-compliance of these standards.

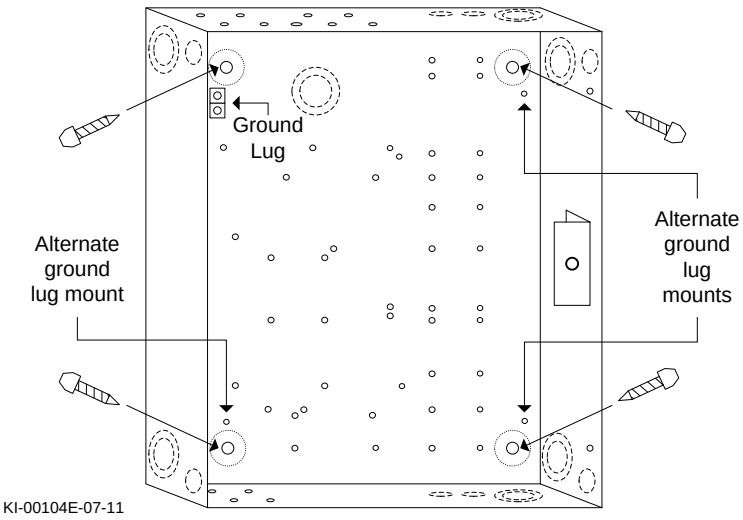
Mounting the Metal Enclosure

The metal enclosure has four (4) pre-drilled holes for mounting to the wall. Connect the ground lug to a true earth ground. When locating mounting areas, ensure the metal enclosure is not close to high voltage equipment and the cable lengths are within their maximum allowable distances.

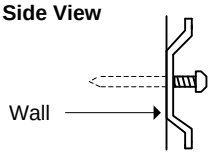
For knockout and mounting hole locations/dimensions, see the diagram on the next page.

Figure 2 – Mounting the Metal Enclosure

Front View – Cover removed (diagram not to scale)



Side View



Enclosure
Single locking CEMA/NEMA Type 1 box
Height - 20" (50.8 cm)
Width - 16" (40.64 cm)
Depth - 5 1/2" (13.97 cm)

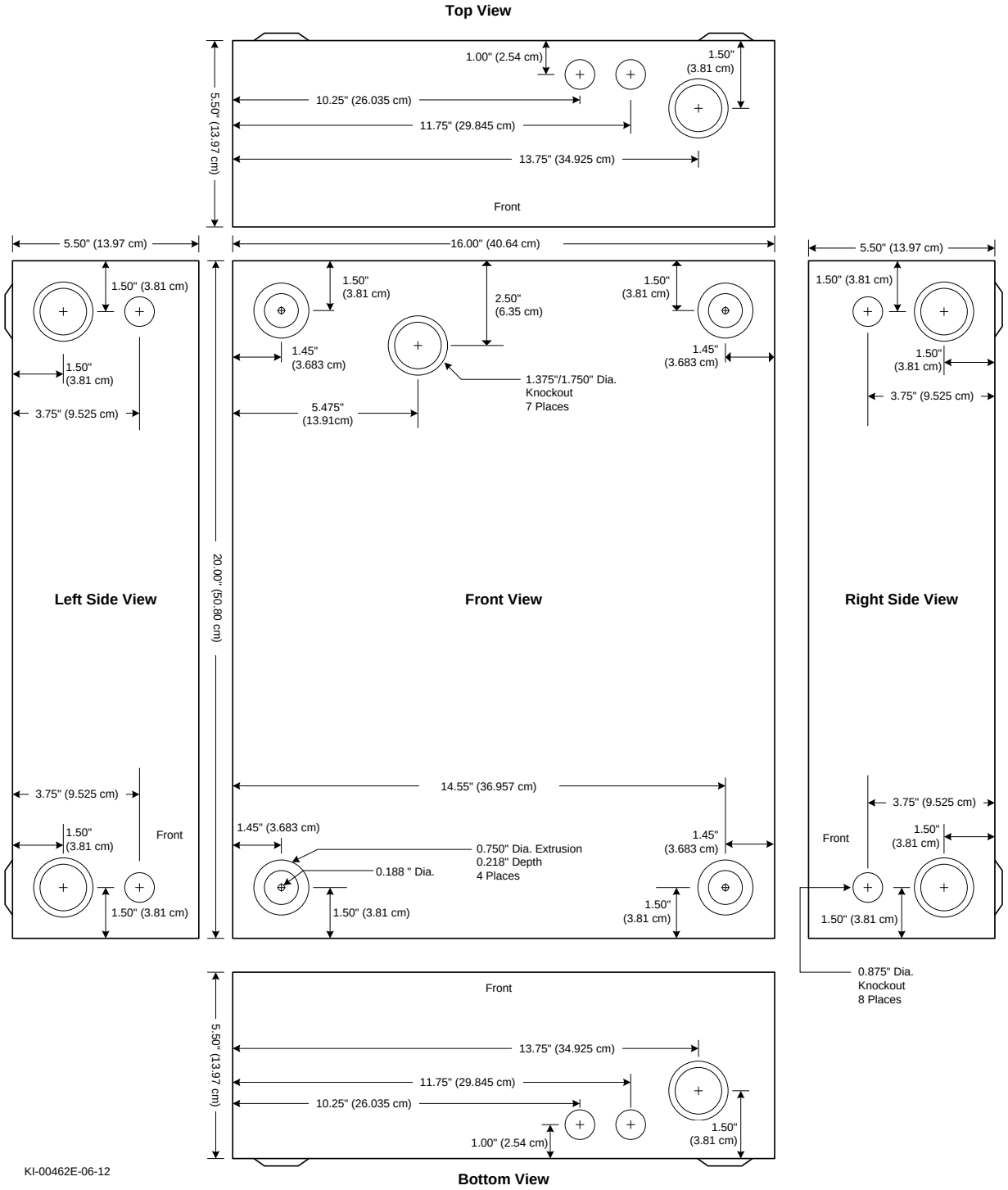
Knockouts
Large - 1 3/4" (4.5 cm)
Small - 7/8" (2.0 cm)

Do not mount enclosure near high-voltage equipment.

Ground Lugs

The metal enclosure includes one ground lug pre-mounted near the top and one spare ground lug, which mounts on one of the available ground lug studs. You can also re-locate the pre-mounted ground lug to minimize the length of shield used.

Figure 3 – Enclosure Knockout & Mounting Hole Locations/Dimensions



Mounting the PC109x Control Board to Metal Standoffs

Use the eight (8) enclosed ¼" screws to secure the PC109x control board to the 3/8" metal standoffs mounted inside the metal enclosure. Be sure the internal tooth star washers are placed between the control board and the screw as shown in Figure 4 – Mount and Fasten PC109x Control Board to 3/8" Male/Female Standoffs.

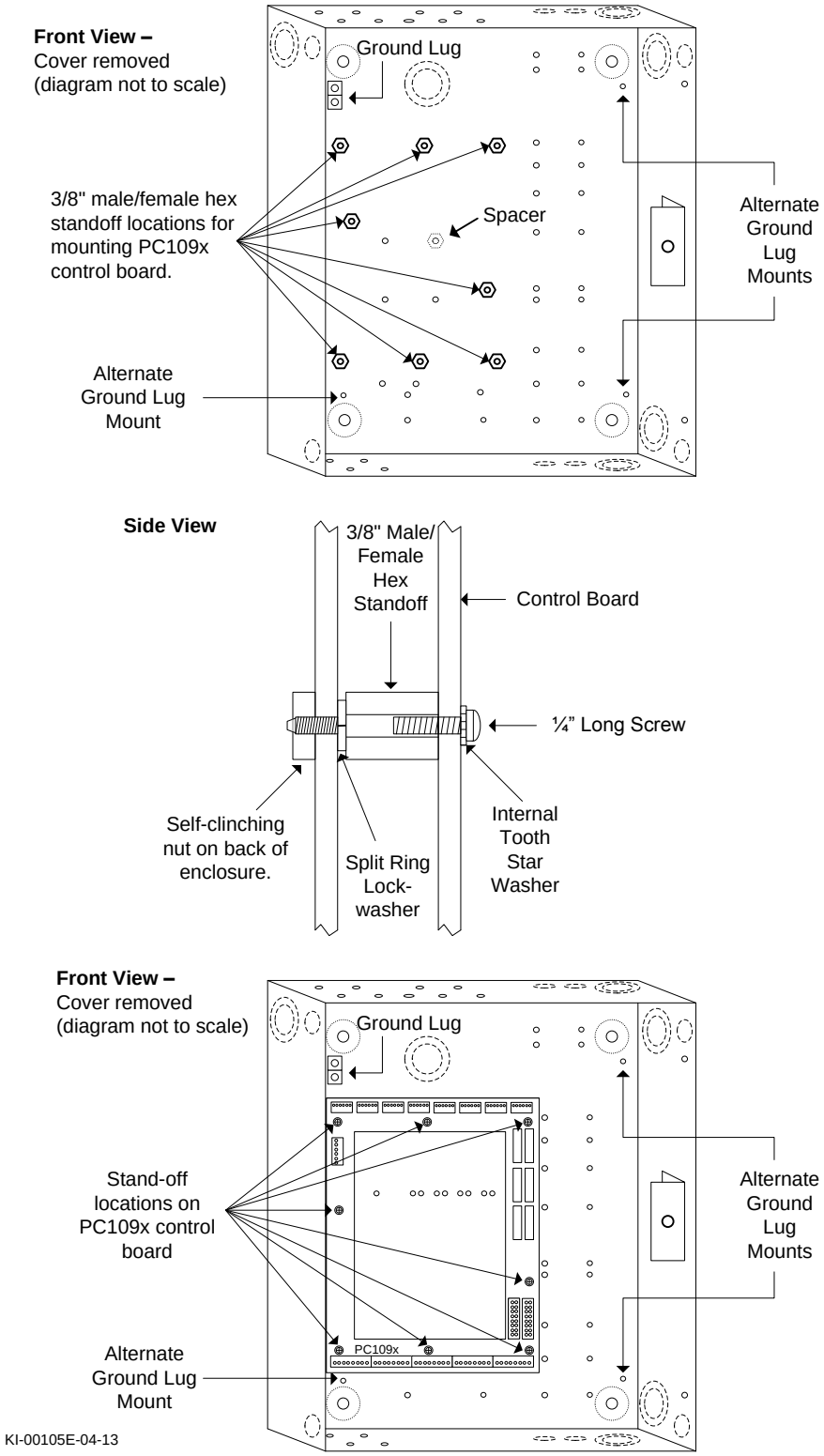
Important

Finger-tighten the ¼" screws with a screwdriver. Do not use a power screwdriver or apply excessive force tightening screws into the metal standoffs when mounting control boards. Ensure the control board is disconnected from the power when mounting; otherwise, the control board may be damaged from a potential short-circuit.

Rev 11, Rev 10 & Rev 9 Control Boards

If installing a Rev.11, Rev.10, or Rev. 9 control board in a metal enclosure with the pre-mounted metal standoffs, you require an adaptor kit - P/N – AK2005.

Figure 4 – Mount and Fasten PC109x Control Board to 3/8" Male/Female Standoffs



Mounting the DPS-15 Power Supply

The DPS-15 is a 13.5 VDC dual linear regulated power supply for powering the ACU circuit boards and the readers with the following outputs:

- ACU output 12 VDC @ 1.2 Amperes
- AUX/RDR output 12 VDC @ 1.2 Amperes

Maximum Current Draw

The total current draw on each output should not exceed one (1) Ampere with 200mA in reserve for accommodating peak current operating demands. See page 121 and use the calculation tables to determine the total current demand of all devices connected to the DPS-15.

CSA/UL Approved Transformers

The DPS-15 power supply requires either of the following class 2 CSA/UL approved transformers and a backup battery with sufficient amp hours.

- 2 x 16 V 40 VA
- 2 x 16.5 V 37 VA

The purpose of two transformers is to comply with UL STD 294, CSA STD C22.2, and charge the battery circuit. The transformers must be located within 30 feet of the Keyscan power supply. Do not mount the transformers inside the ACU metal enclosure. Use of non-compliant transformers or deviation from the use of two (2) approved transformers per access control unit or incorrect voltages void all Keyscan warranties. The system may operate erratically if the voltage is lower than 12 VDC.

Mount the DPS-15 power supply as shown on page 21. For power supply connections, refer to Figure 85 on page 125.

Important

Do not use the DPS-15 to power door strikes or auxiliary equipment.

Backup Batteries

Select a battery with enough amp hours to operate the system for the total hours specified. The following table lists power duration times:

Table 2 – Battery Duration Times

Amp-hour Battery	Amps	Power Duration
8.0	1.4	5.71 hours
7.5 *	1.4	5.36 hours
7.0 *	1.4	5.00 hours

* Indicates the two most commonly used backup batteries.

Plastic Stand Offs

Plastic stand offs are pre-mounted on most power supplies, relay and communication boards. In cases where stand offs are not pre-mounted, insert the double pronged end of the stand offs in the metal enclosure hole first. Then mount the circuit board to the stand offs.

Figure 5 – Plastic Stand Off

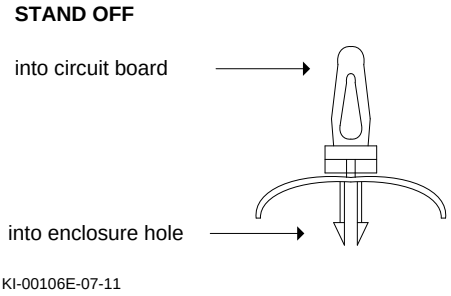
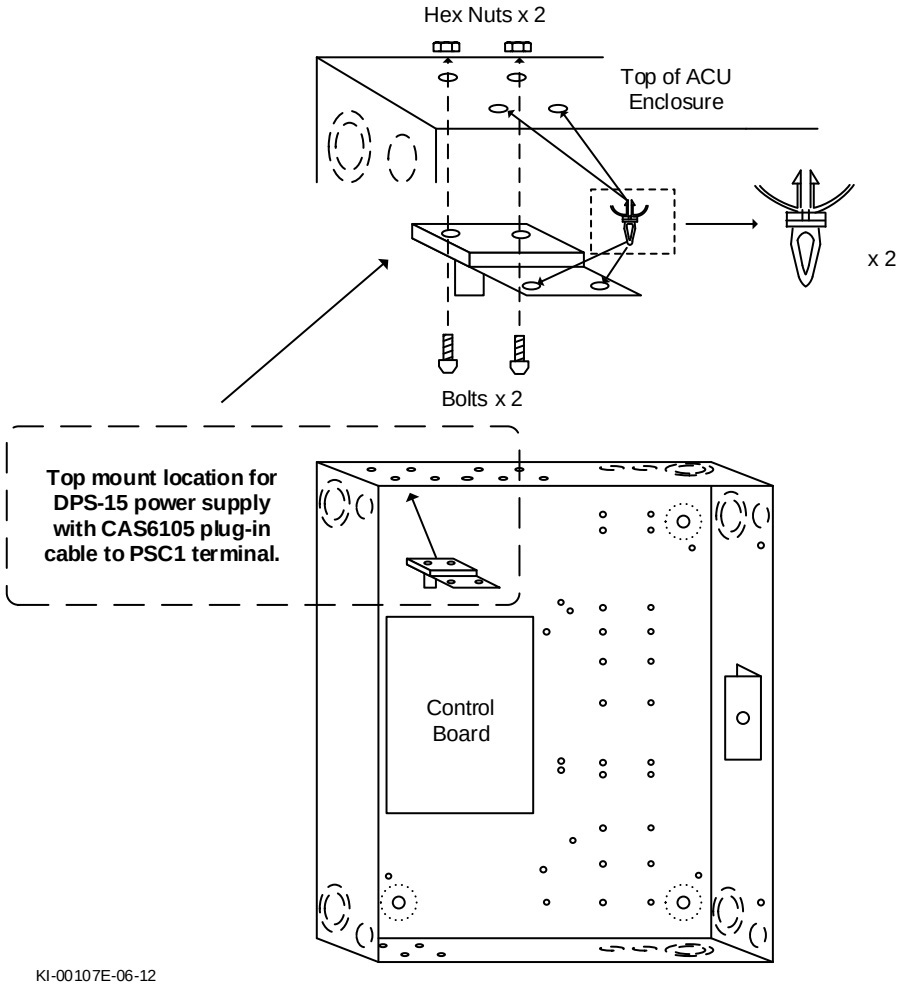


Figure 6 – Mounting Power Supplies



Control Board – Mounting Locations

The following diagrams illustrate the mounting positions for control board series CA250, CA4500, CA8500, EC1500 and EC2500 units. Illustrations also show mounting positions for communication boards and output control boards (OCB-8). Different door control board series – CA250, CA4500, and CA8500 – can be used within the same communication loop.

CA & EC Control Board Dimensions

- Width 20.35 cm (8.01 inches)
- Height 28.9 cm (11.38 inches)

Operating Environment – ACUs & ECUs

- Temperatures: 41°F to 120°F (5°C to 49°C)
- Humidity: 0% to 90% R.H., non-condensing

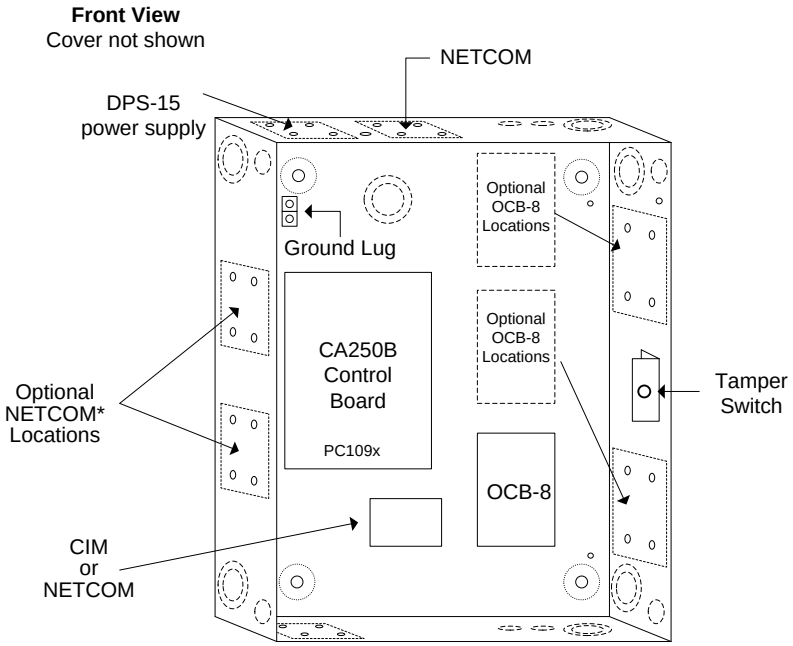
Important

Do not mount close to high voltage equipment.

Figure 7 – CA250 with Board Mounting Positions

Parts

1 x CA250B control board
1 x OCB-8
1 x DPS-15 power supply
1 x metal enclosure



* NETCOM - use terminal block connections only, not 9-pin male connector. (NETCOM refers to NETCOM2 & NETCOM6)

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Figure 8 – CA4500 with Board Mounting Positions

Parts

1 x CA4500B control board
1 x OCB-8
1 x DPS-15 power supply
1 x metal enclosure

* NETCOM - use terminal block connections only, not 9-pin male connector. (NETCOM refers to NETCOM2 & NETCOM6)

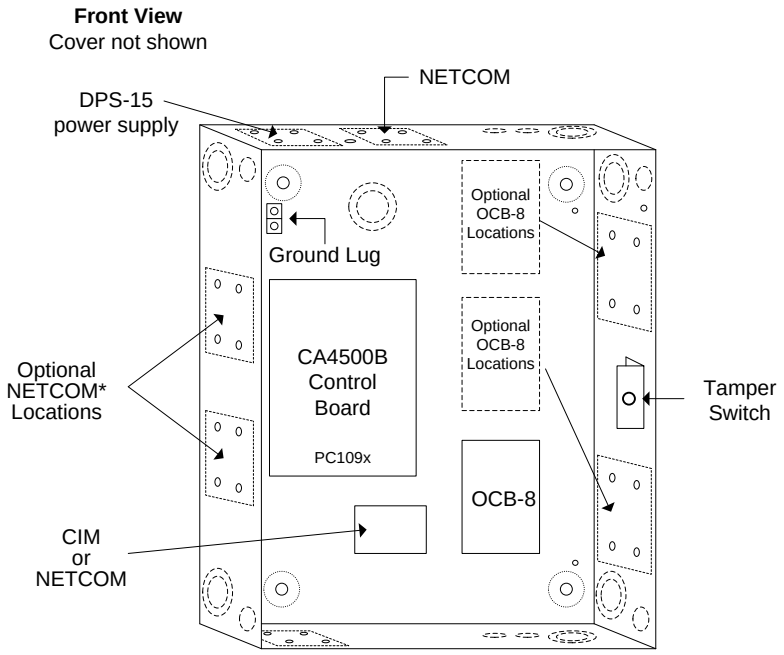

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Figure 9 – CA8500 with Board Mounting Positions

Parts

1 x CA8500B control board
2 x OCB-8
1 x DPS-15 power supply
1 x metal enclosure

* NETCOM - use terminal block connections only, not 9-pin male connector. (NETCOM refers to NETCOM2 & NETCOM6)

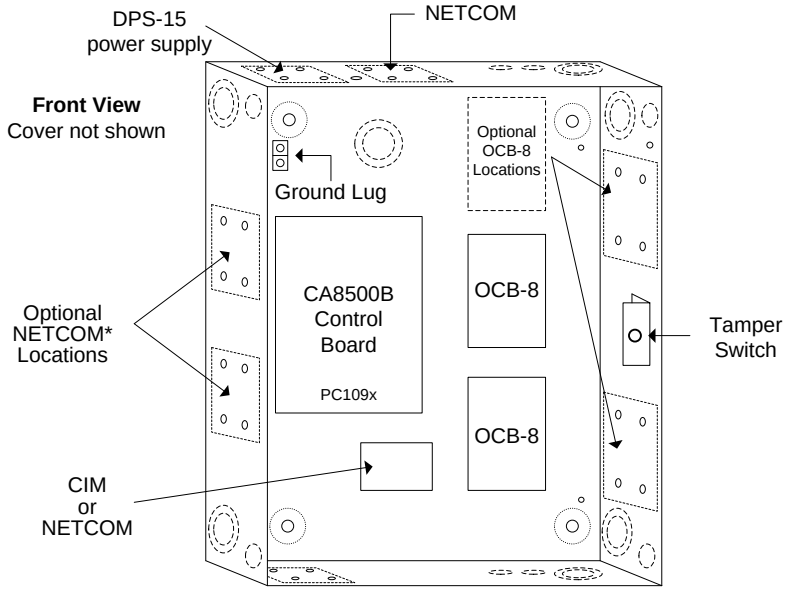

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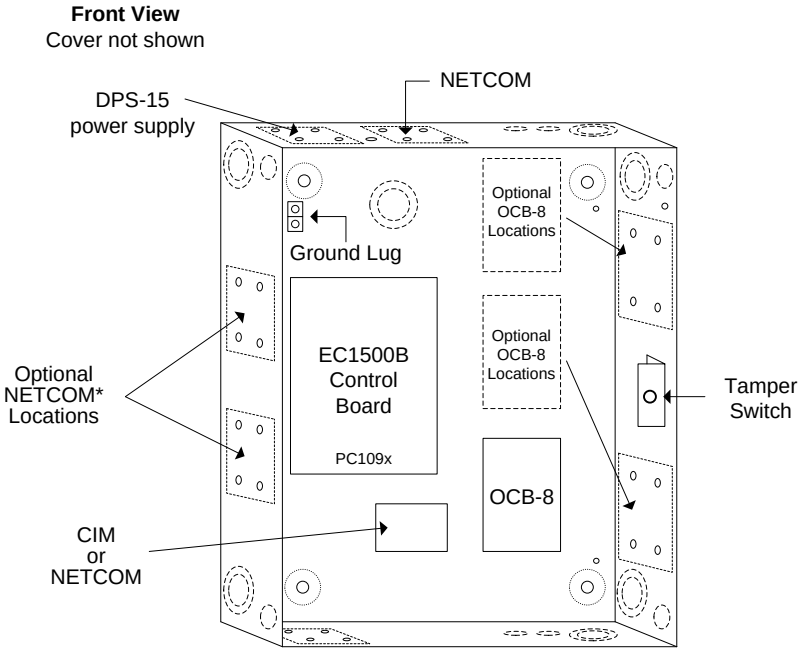
Figure 10 – EC1500 with Board Mounting Positions

Parts

1 x EC1500B control board
1 x OCB-8
1 x DPS-15 power supply
1 x metal enclosure



* NETCOM - use terminal block connections only, not 9-pin male connector. (NETCOM refers to NETCOM2 & NETCOM6)

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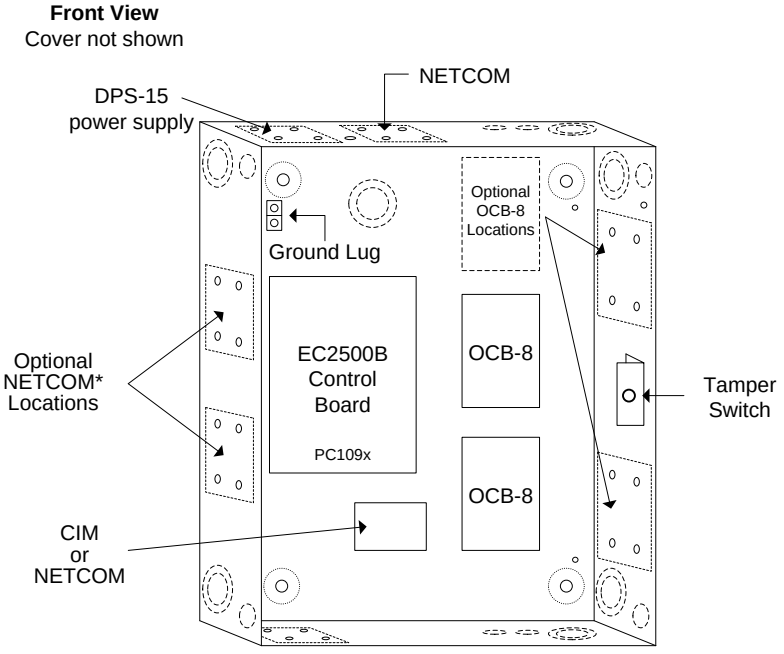
Figure 11 – EC2500 with Board Mounting Positions

Parts

1 x EC2500B control board
2 x OCB-8
1 x DPS-15 power supply
1 x metal enclosure



* NETCOM - use terminal block connections only, not 9-pin male connector. (NETCOM refers to NETCOM2 & NETCOM6)

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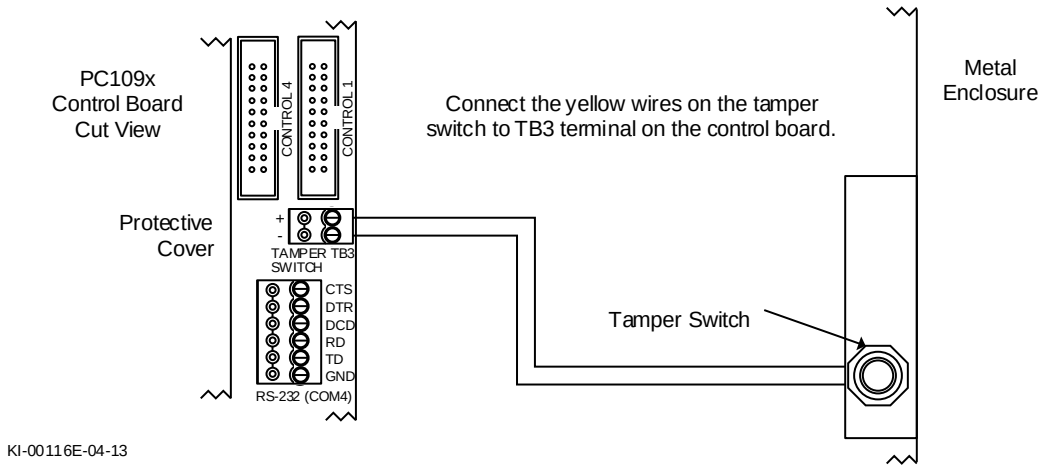
Connect Enclosure Tamper Switch to TB3

Connect the yellow wires from the tamper switch to the control board's TB3 terminal block as illustrated in the diagram below. Please remember that connecting the tamper switch, the ground strap and securing the enclosure cover are all requirements for compliance with the following standards: UL STD 294, CSA STD C22.2, CE, or FCC 15 Subpart B.

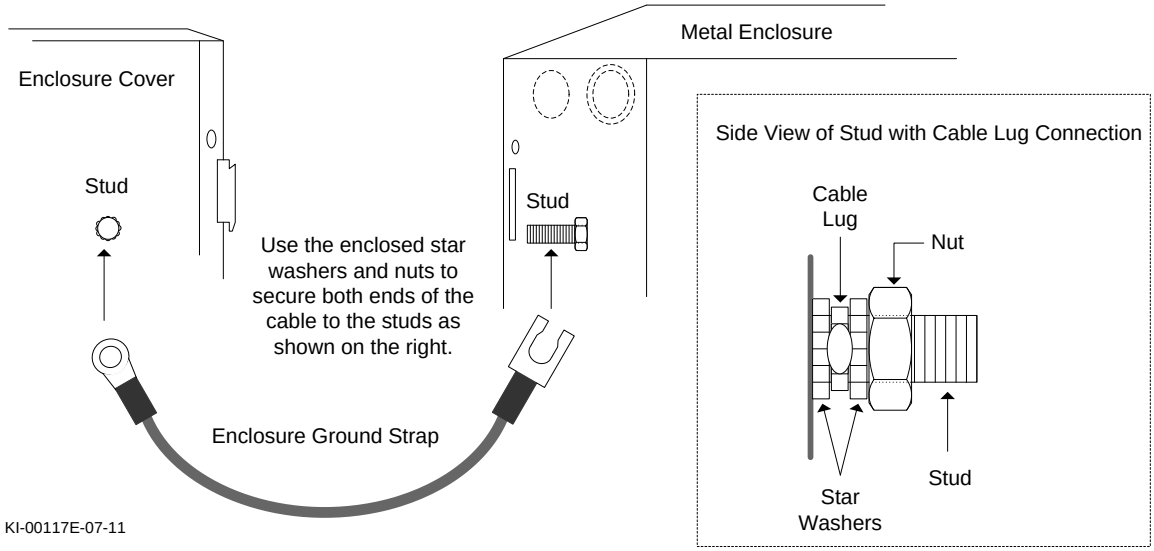
Figure 12 – Enclosure Tamper Switch Connected to TB3 Terminal



Connect Enclosure Ground Strap

Connect the enclosure ground strap to the designated studs on both the metal enclosure and the enclosure cover. Position the cable lug between two star washers and securely tighten with a nut as illustrated in the diagram below.

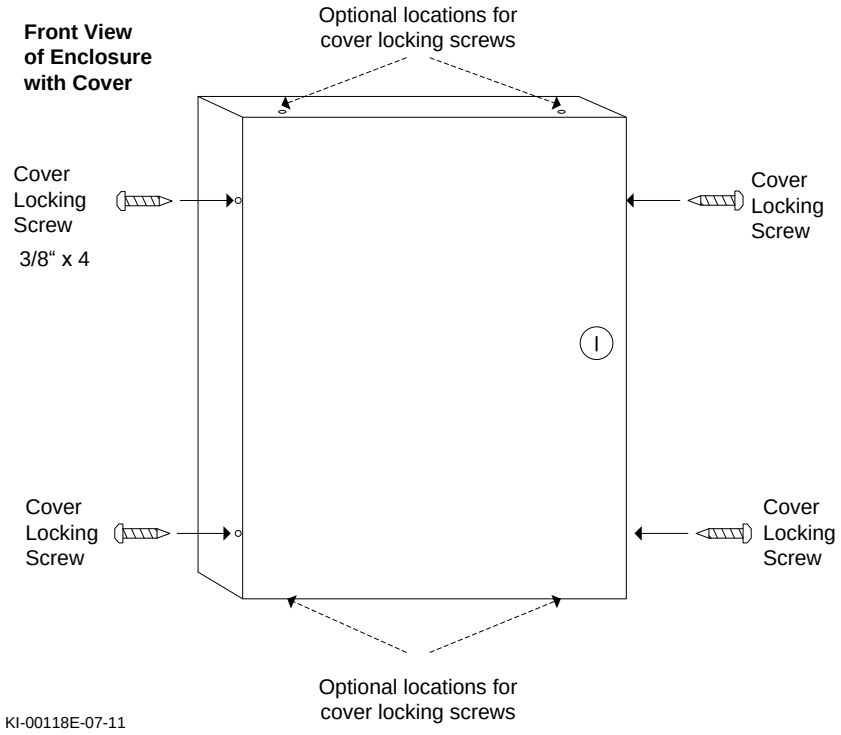
Figure 13 – Enclosure Ground Strap Connection



Secure Enclosure Cover

Use the four (4) cover locking screws to secure the metal enclosure cover as shown in the diagram below.

Figure 14 – Securing the Enclosure Cover

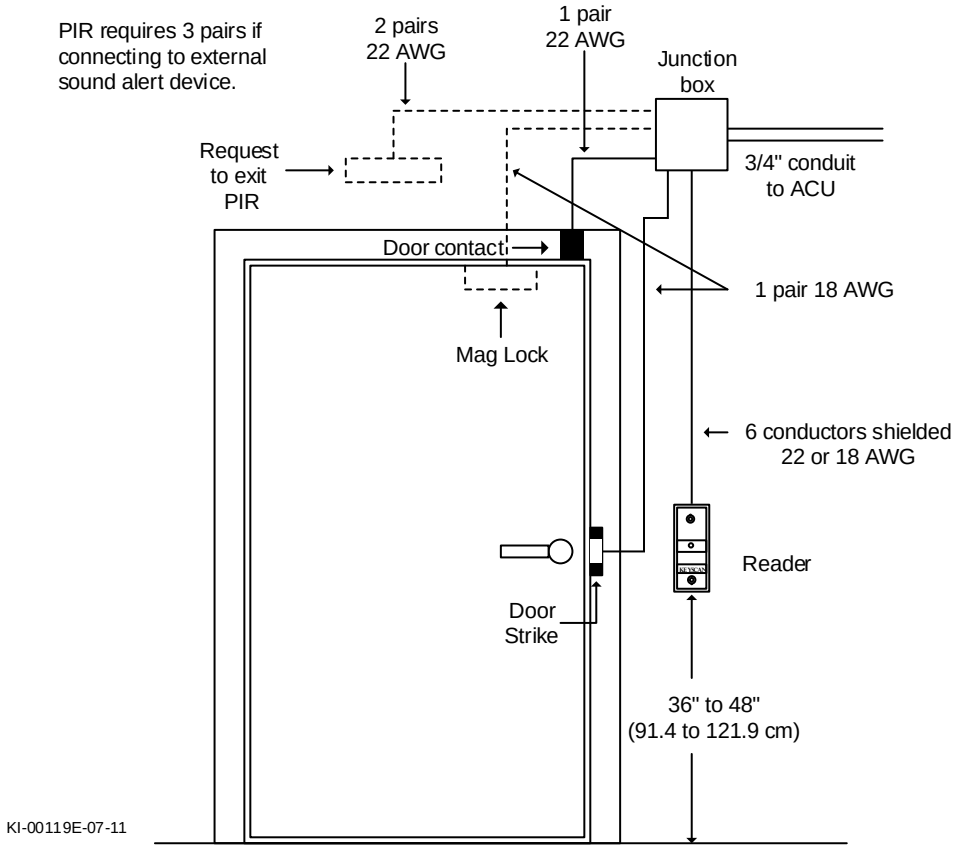


Typical Door Layout and Hardware

The following sub-sections review door components with related diagrams. Refer to the lock manufacturer's documentation for more detailed information on mounting door hardware. Some jurisdictions require a qualified locksmith for installation of lock hardware. Consult with local authorities.

The following diagram shows a single conduit to the access control unit. For high-voltage readers greater than 150 mA, avoid running the communication cables in the same conduit with the door lock cables.

Figure 15 – Typical Door Layout



Door Lock Hardware

Consult with the manufacturer's documentation for mounting door lock hardware.

The lock must be appropriate for the barrier and meet all applicable building codes and fire regulations. If necessary, consult with local officials such as the fire department to ensure the installation conforms to municipal, state, or provincial safety regulations. Permits may be required before installing magnetic locks.

Use a battery for temporary power to ensure the door operates properly – alignment, holding, activation, de-activation – before connecting to the Keyscan access control unit.

Figure 16 – Typical Door Strike Connection

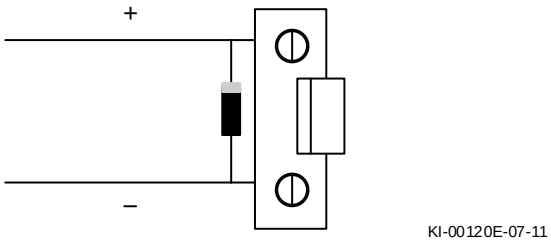
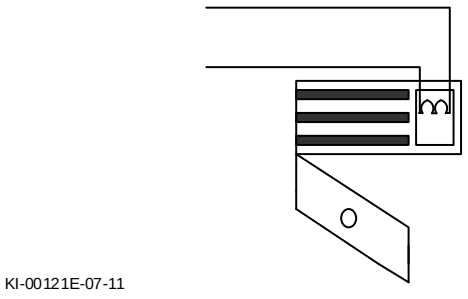


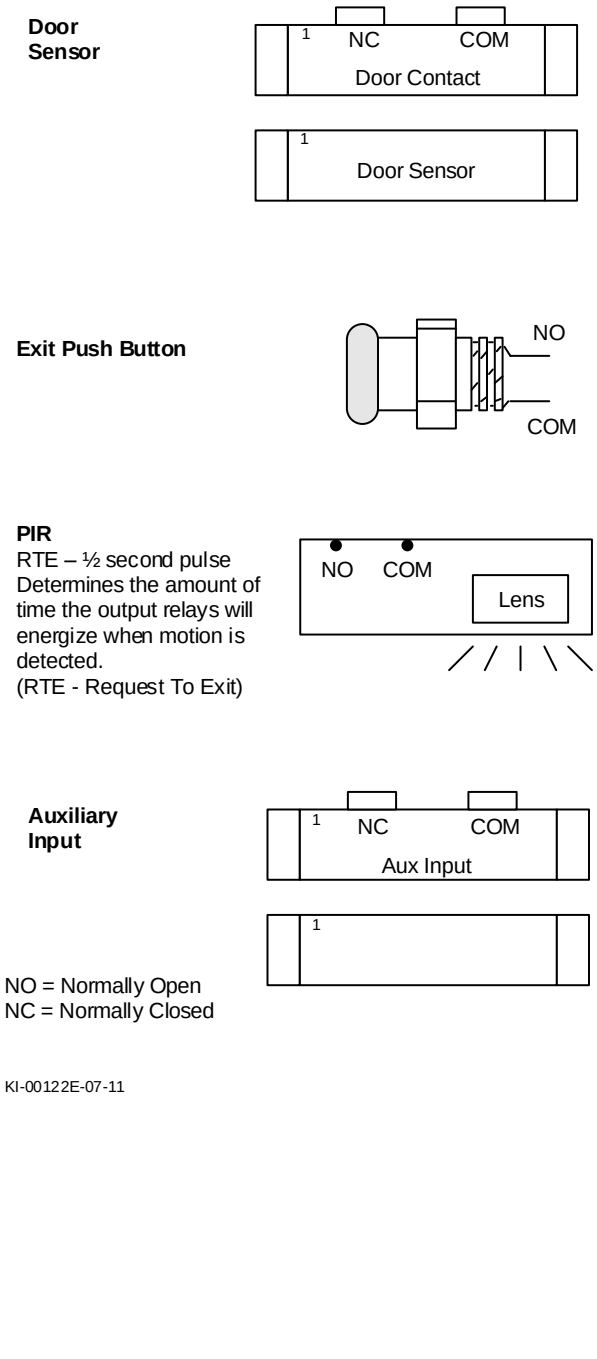
Figure 17 – Typical Magnetic Lock Connection



Door Contacts, Exit Buttons, Auxiliary Inputs

The following diagram illustrates the door contacts, exit buttons, PIRs, and auxiliary inputs. See the manufacturer's documentation for mounting instructions. Avoid running cables parallel with AC wiring or across fluorescent light fixtures; this causes AC induction and transmission interference.

Figure 18 – Door Contacts, Exit Buttons, PIRs, & Auxiliary Inputs



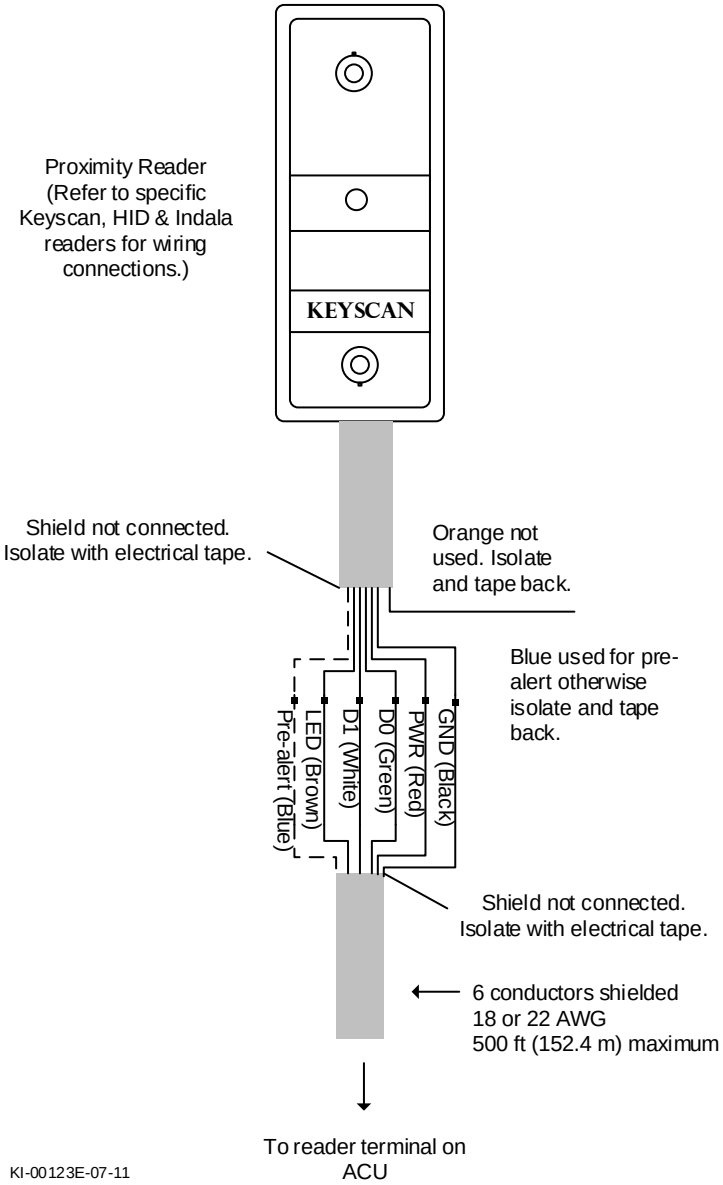
Readers

Never mount readers close to high-voltage equipment. For convenient entry, mount readers on the latch side of doors. When mounting proximity readers for monitoring in and out activity at the same door, space the readers at a distance greater than the combined radio signal read ranges.

As an example, if the read range is 4 inches, mount the two readers at a distance greater than 8 inches from each other. For mounting readers to a metal surface, consult with the manufacturer's documentation.

If a door/reader is located beyond the maximum cable length to the ACU, use a Keyscan WIEEX2 extender kit to a maximum distance of 4000 feet (1219.2 m).

Figure 19 – Typical Door Reader Connection



OCB-8 Relay Board

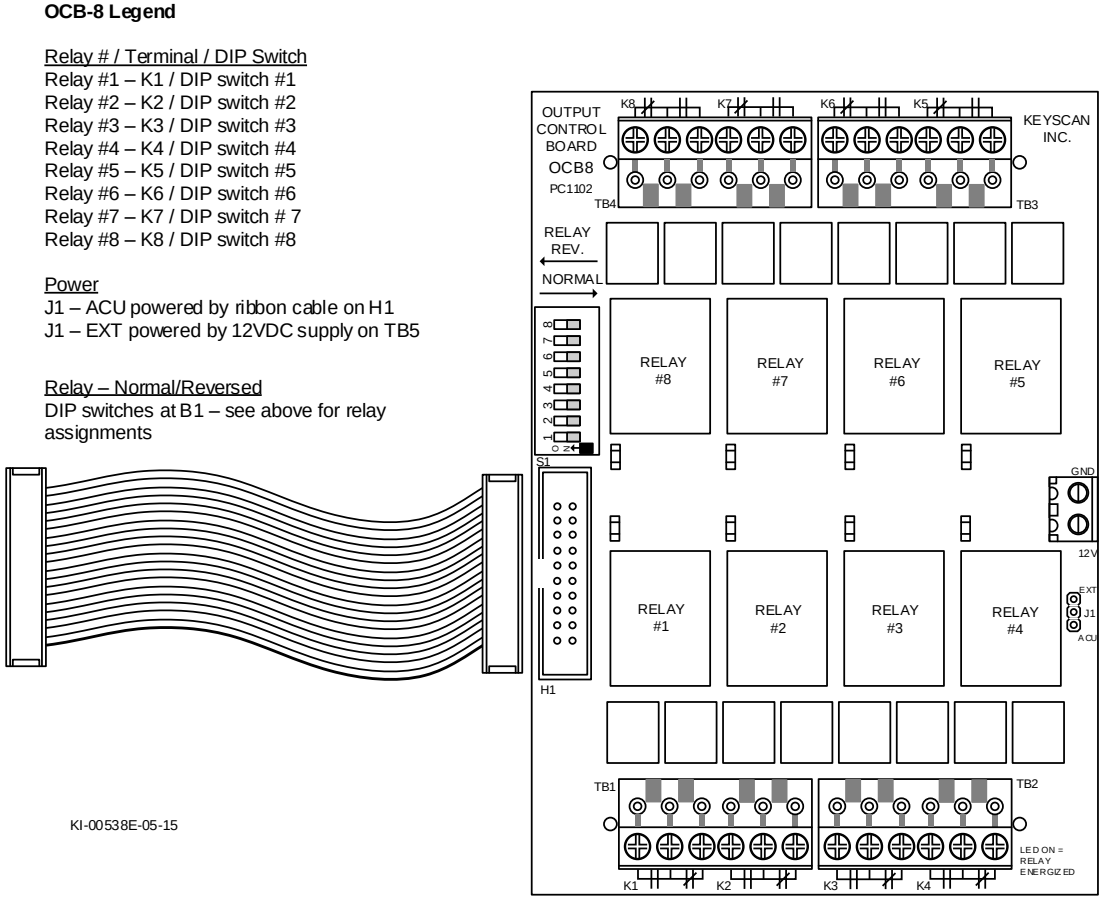
The OCB-8 relay board functions as an output board using form C contacts on both door control units and elevator control units. The table below outlines board specifications.

Table 3 – OCB-8 Specifications

OCB-8 Specifications	
OCB-8 power requirements	12 VDC – 230 mA
Relay outputs	Form C contacts, 30 VDC 5 Amps, 24 VAC 10 Amps
# of outputs	8
Dimensions	8.6 cm x 12.5 cm (3 3/8" x 4 7/8")
Operating environment	Temperature: 5° C to 49° C (41° F to 120° F) Humidity: 0% to 90% R.H., non-condensing

For specific OCB-8 relay board output functions refer to Terminating Cables at Door Control Units starting on page 34 or Terminating Cables at Elevator Control Units starting on page 60.

Figure 20 – OCB-8 Relay Board PC1102



OCB-8 Relays - Normal and Reversed

OCB-8 relay boards have DIP switches that set the relay to "normal" or "reversed". Each relay has an LED that indicates the relay status. The following table reviews each output type in normal and reversed states.

Table 4 - List of Relay States

Device	DIP Switch		Status	Possible Schedule Status	LED State	N.C. Relay State	N.O. Relay State
Door Relay		Normal	Unlocked	ON			
Door Relay		Normal	Locked	OFF			
Door Relay		Reversed	Unlocked	ON			
Door Relay		Reversed	Locked	OFF			
Aux Output Relay		Normal	Door Held Open Alarm	-			
Aux Output Relay		Normal	Alarm Tripped	-			
Aux Output Relay		Reversed	Door Held Open Alarm	-			
Aux Output Relay		Reversed	Alarm Tripped	-			
Aux Output Relay		Normal	☐ or (red)	OFF			
Aux Output Relay		Normal	☑ or (green)	ON			
Aux Output Relay		Reversed	☐ or (red)	OFF			
Aux Output Relay		Reversed	☑ or (green)	ON			
Pre-alert Relay		Normal	Activated	-			
Pre-alert Relay		Normal	Normal	-			
Pre-alert Relay		Reversed	Activated	-			
Pre-alert Relay		Reversed	Normal	-			
Accessibility Relay		Normal	Activated	-			
Accessibility Relay		Normal	Normal	-			

Device	DIP Switch		Status	Possible Schedule Status	LED State	N.C. Relay State	N.O. Relay State
Accessibility Relay		Reversed	Activated	-			
Accessibility Relay		Reversed	Normal	-			
Elevator Relay		Normal	Unsecured	ON			
Elevator Relay		Normal	Secured	OFF			
Elevator Relay		Reversed	Unsecured	ON			
Elevator Relay		Reversed	Secured	OFF			

Legend

	LED – On
	LED – Off
	Aurora - Auxiliary Output Status – Aux output – Off (red)
	Aurora - Auxiliary Output Status – Aux output - On (green)
	System VII or Vantage - Manual Output Control – Aux Status Off (Red)
	System VII or Vantage - Manual Output Control – Aux Status On (Green)
	Relay State Open
	Relay State Closed
	DIP Switch in Normal Position
	DIP Switch in Reversed Position

Terminating Cables at Door Control Units

The following sub-sections review termination of input and output cables at the access control unit for locks, input devices, readers, and auxiliary output devices.

This section reviews outputs and associated diagrams followed by inputs and associated diagrams.

Outputs

Outputs, such as door locks or auxiliary devices, connect to the OCB-8 relay board that in turn, via a ribbon cable, connects to a specific header on the control board depending on the type of output. Keyscan door control units support the following types of outputs:

- Door lock output
- Auxiliary output
- Extended entry output (for mechanical door operator)
- Pre-alert output
- Global output

The following sub-sections review cable connections and ribbon cable assignments for each type of output

Terminate Lock Wiring at the OCB-8

Depending on the series of door control unit, the following table outlines door relay assignments for the CA250B, CA4500B and CA8500B and the ribbon cable connection.

Normal and Reversed OCB-8 Relays

OCB-8 relay boards have DIP switches that may be set to "normal" or "reversed". Each relay has an LED that indicates the relay status:

- Normal – LED on the circuit board is not illuminated when door is locked
- Reversed – LED on the circuit board is illuminated when door is locked

Relay output and DIP switch assignments are on the OCB-8 diagrams on the succeeding pages.

Door Lock Power Supplies

Use a separate power supply for door strikes and other 12 VDC equipment. The power supply should have battery backup for continued operation during a power failure. When adding equipment to an existing system, be sure the power supply can withstand the increased current consumption.

Determine Power Supply Current Requirements

Use a power supply that has sufficient current capacity for all connected devices. Factor in a reserve allowance for peak current demands when determining the power supply. Use the following formula that includes a 30% tolerance factor when calculating total current requirements for power supplies:

- Total Current = (Device A amps + Device B amps + Device C amps, etc.) x 1.30

Example

An installation calls for one magnetic lock and three door strikes requiring 12 VDC:

- Mag Lock – 100 mA + Door Strike A – 200 mA + Door Strike B – 200 mA + Door Strike C – 200 mA x 1.30 = 910 mA

In this example, a separate 1-amp power supply is sufficient.

Important

The total combined current of the devices must not be greater than the current rating of the power supply.

Door Strike Diodes

The access control units include diodes. Install diodes across all DC door strikes as shown in Figure 24 on page 39. The cathode of the diode connects to the positive side of the strike at the door. The anode of the diode connects to the common return wire.

Diodes must be installed for proper operation.

Fail Safe/Fail Secure Lock Devices

The power supply's positive output connects to the common on the door relay output.

For 'fail-safe' and 'fail-secure' door strikes, observe the following relay connections:

- 'Fail-safe' – connect the positive terminal on the door strike to the 'normally closed' position on the relay board. Connect the return wire to the common on the DC power supply via the metal enclosure's ground lug
- 'Fail-secure' – connect the positive terminal on the door strike to the 'normally open' position on the relay board. Connect the return wire to the common on the DC power supply via the metal enclosure's ground lug

Warning

Before securing any exit, please ensure all wiring to electrical door hardware conforms to federal, state, provincial, or municipal fire regulations and building codes.

Table 5 – Door Lock Relay Assignments & Ribbon Cable Connections

Control Board/OCB-8	Door # /Relay #	Ribbon Cable Connection OCB-8 to Control Board
CA250B/OCB-8	Door 1/Relay 1 (K1) Door 2/Relay 2 (K2)	Connect ribbon from H1 on OCB-8 to Control 1 on CA250B
CA4500B/OCB-8	Door 1/Relay 1 (K1) Door 2/Relay 2 (K2) Door 3/Relay 3 (K3) Door 4/Relay 4 (K4)	Connect ribbon from H1 on OCB-8 to Control 1 on CA4500B.

Control Board/OCB-8	Door # /Relay #	Ribbon Cable Connection OCB-8 to Control Board
CA8500B/OCB-8	Door 1/Relay 1 (K1) Door 2/Relay 2 (K2) Door 3/Relay 3 (K3) Door 4/Relay 4 (K4) Door 5/Relay 5 (K5) Door 6/Relay 6 (K6) Door 7/Relay 7 (K7) Door 8/Relay 8 (K8)	Connect ribbon from H1 on OCB-8 to Control 1 on CA8500B.

Figure 21 – Lock State - Fail Safe Device

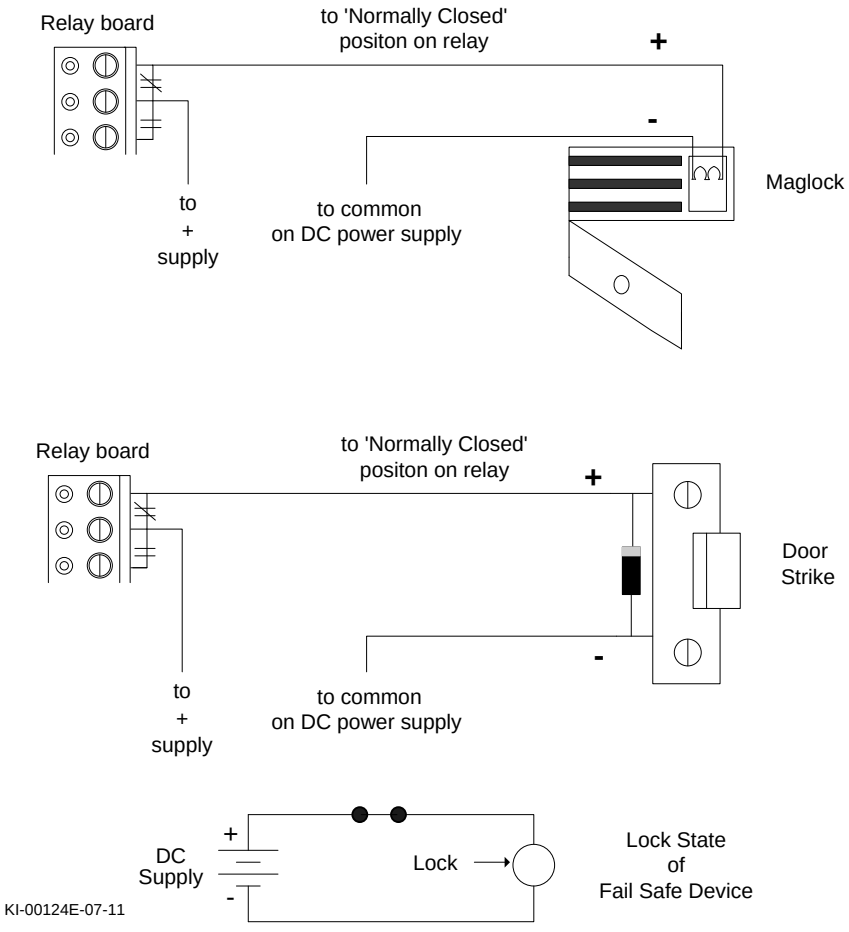


Figure 22 – Lock State - Fail Secure Device

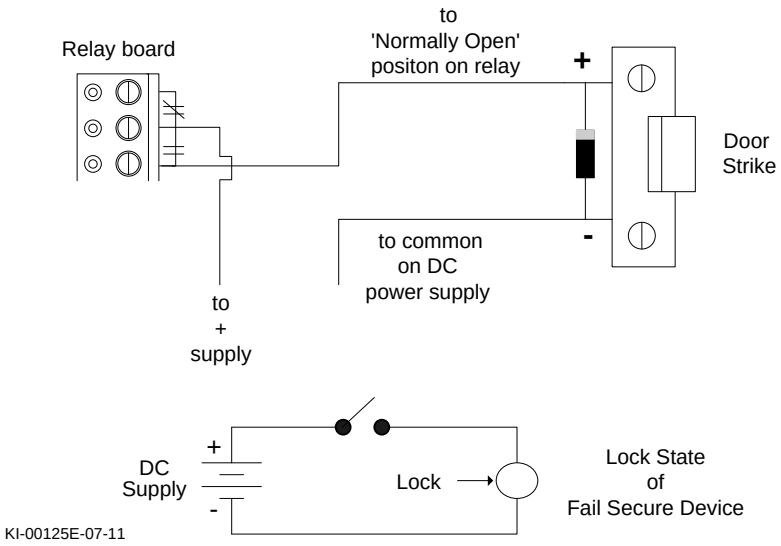


Figure 23 – Terminate Lock Wiring CA250B

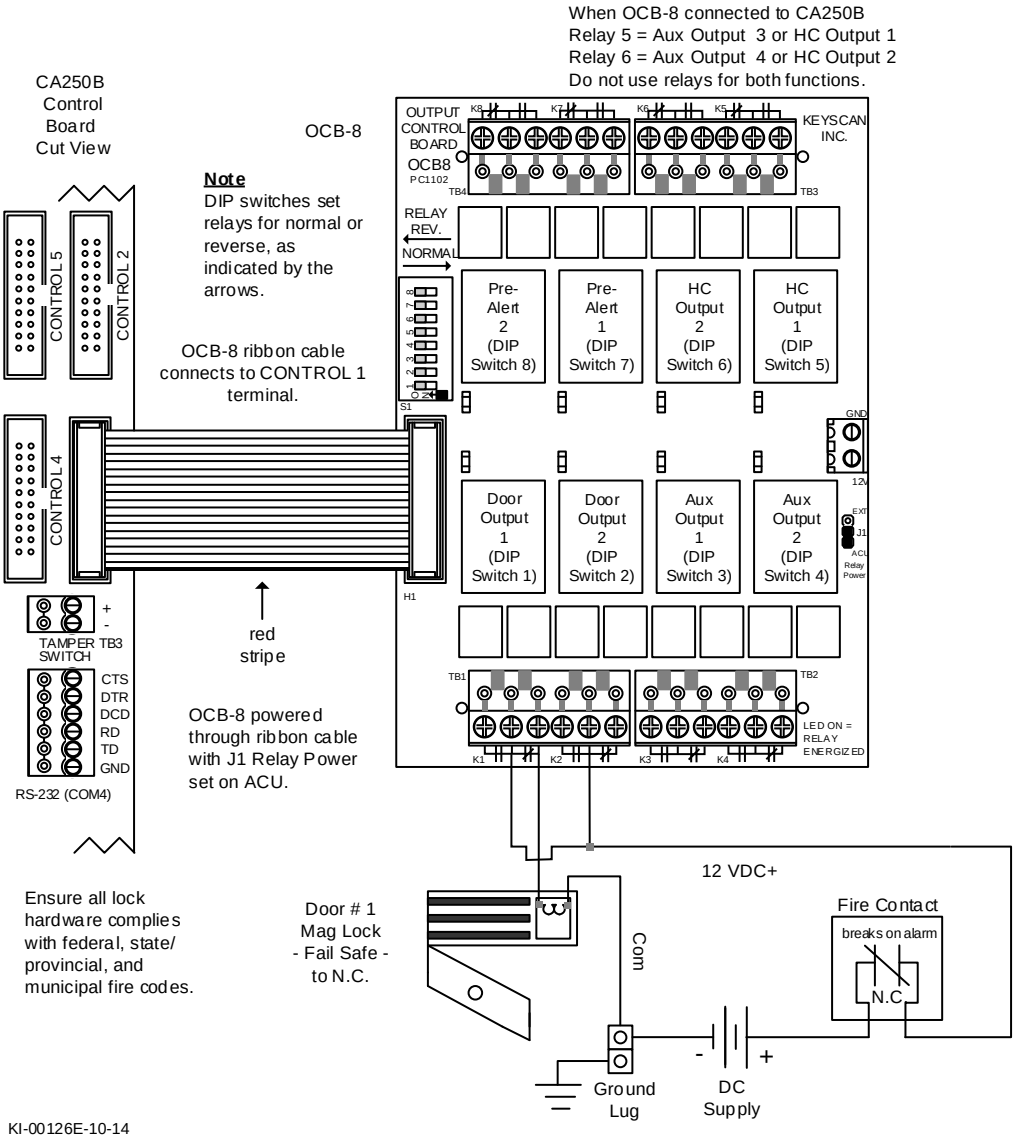


Figure 24 – Terminate Lock Wiring CA4500B

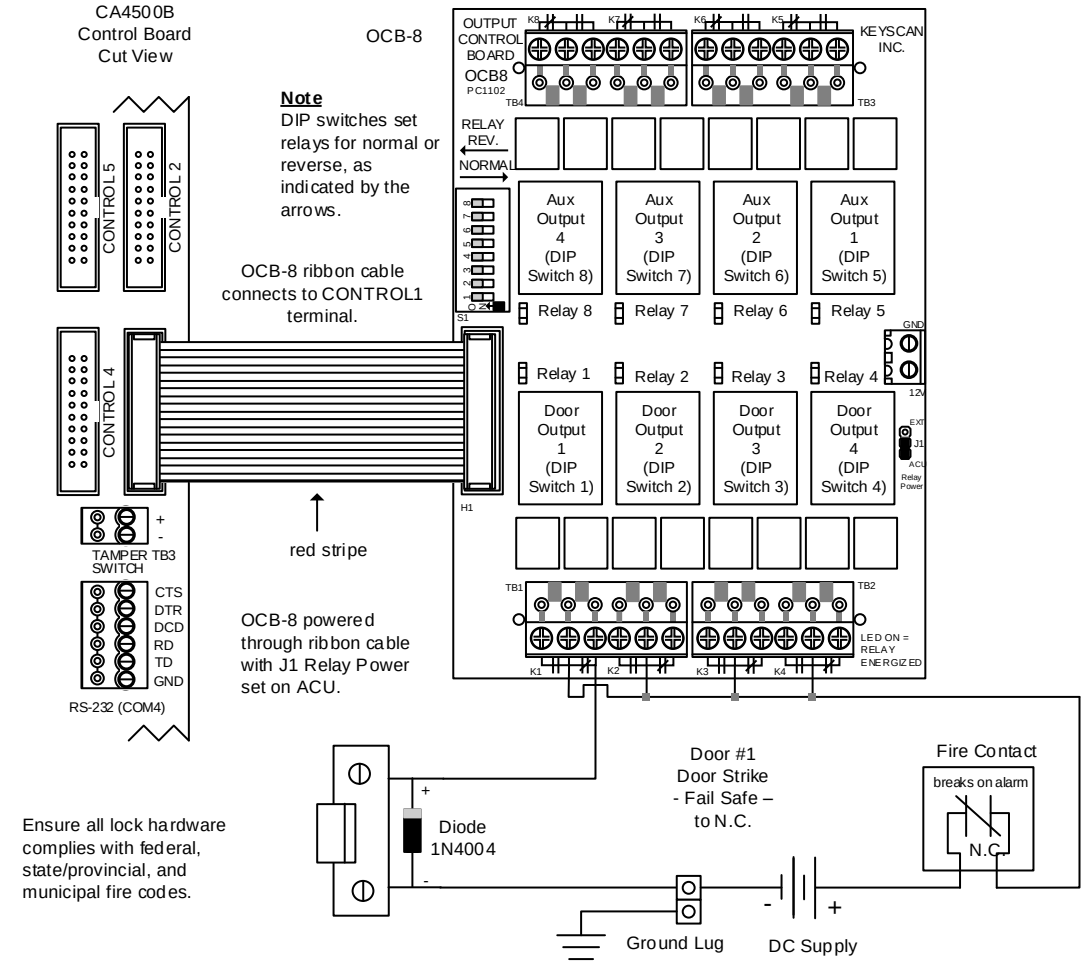


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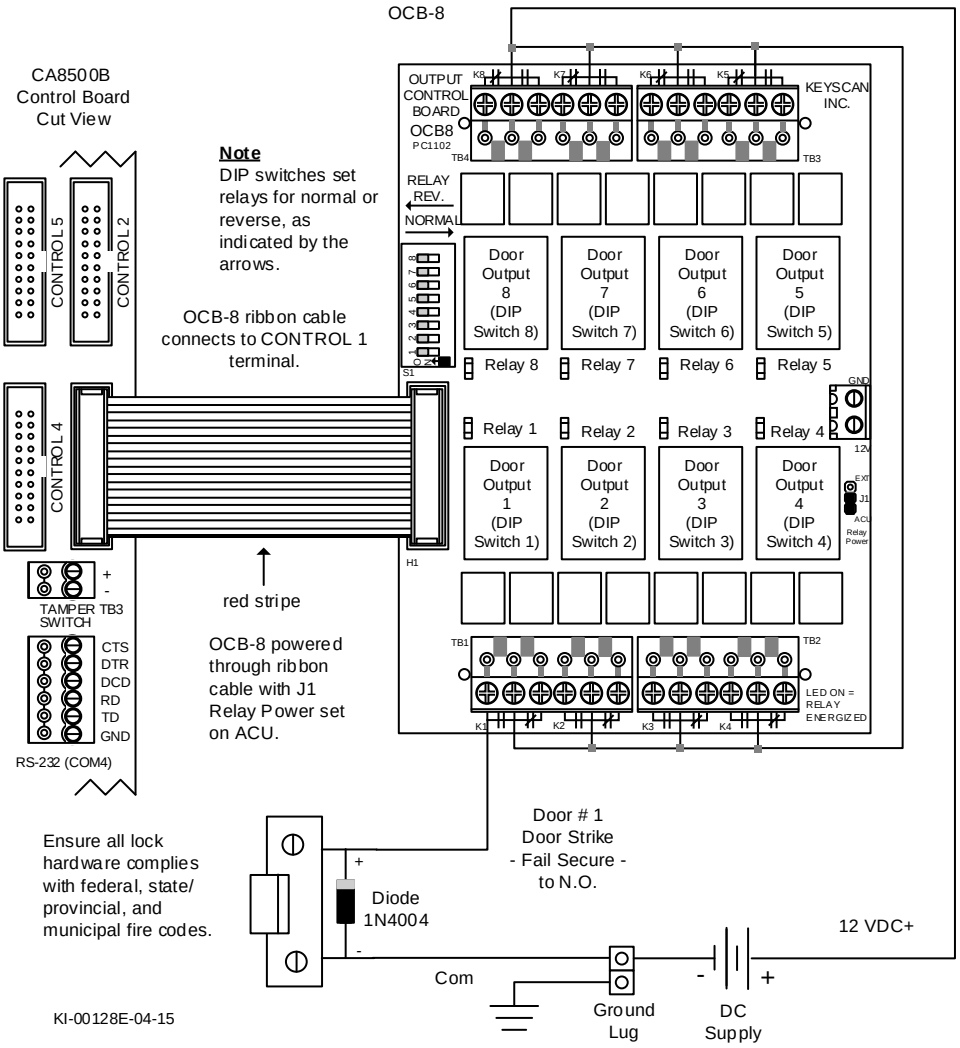
Figure 25 – Terminate Lock Wiring CA8500B



Terminate Auxiliary Outputs with Hardware/Alarms

Door and auxiliary inputs are programmable to trip auxiliary output relays on an alarm event. This excludes pre-alert relays. Auxiliary output relays can connect to alarm panels, CCTV systems etc.

As an example, a forced entry detected by a door input could trip an auxiliary output that initiates a CCTV system to record the intrusion at the door.

Auxiliary output relays may also control hardware with an associated time zone, such as scheduling the locking/unlocking of a reader-less door on a defined time zone.

Table 6 – Auxiliary Output Relay Assignments & Ribbon Cable Connections

Control Board/OCB-8	Aux Output # /Relay #	Ribbon Cable Connection OCB-8 to Control Board
CA250B/OCB-8	Aux. Output 1/Relay 3 (K3) Aux. Output 2/Relay 4 (K4) (See note on Figure 26 – Terminate Auxiliary Outputs CA250B about relays 5 & 6)	Connect ribbon from H1 on OCB-8 to Control 1 on CA250B
CA4500B/OCB-8	Aux. Output 1/Relay 5 (K5) Aux. Output 2/Relay 6 (K6) Aux. Output 3/Relay 7 (K7) Aux. Output 4/Relay 8 (K8)	Connect ribbon from H1 on OCB-8 to Control 1 on CA4500B.
CA8500B/OCB-8	Aux. Output 1/Relay 1 (K1) Aux. Output 2/Relay 2 (K2) Aux. Output 3/Relay 3 (K3) Aux. Output 4/Relay 4 (K4) Aux. Output 5/Relay 5 (K5) Aux. Output 6/Relay 6 (K6) Aux. Output 7/Relay 7 (K7) Aux. Output 8/Relay 8 (K8)	Connect ribbon from H1 on OCB-8 to Control 2 on CA8500B.

Important

Do not assign a time zone to an auxiliary output already assigned to an alarm event. The alarm has priority over the time zone.

Figure 26 – Terminate Auxiliary Outputs CA250B

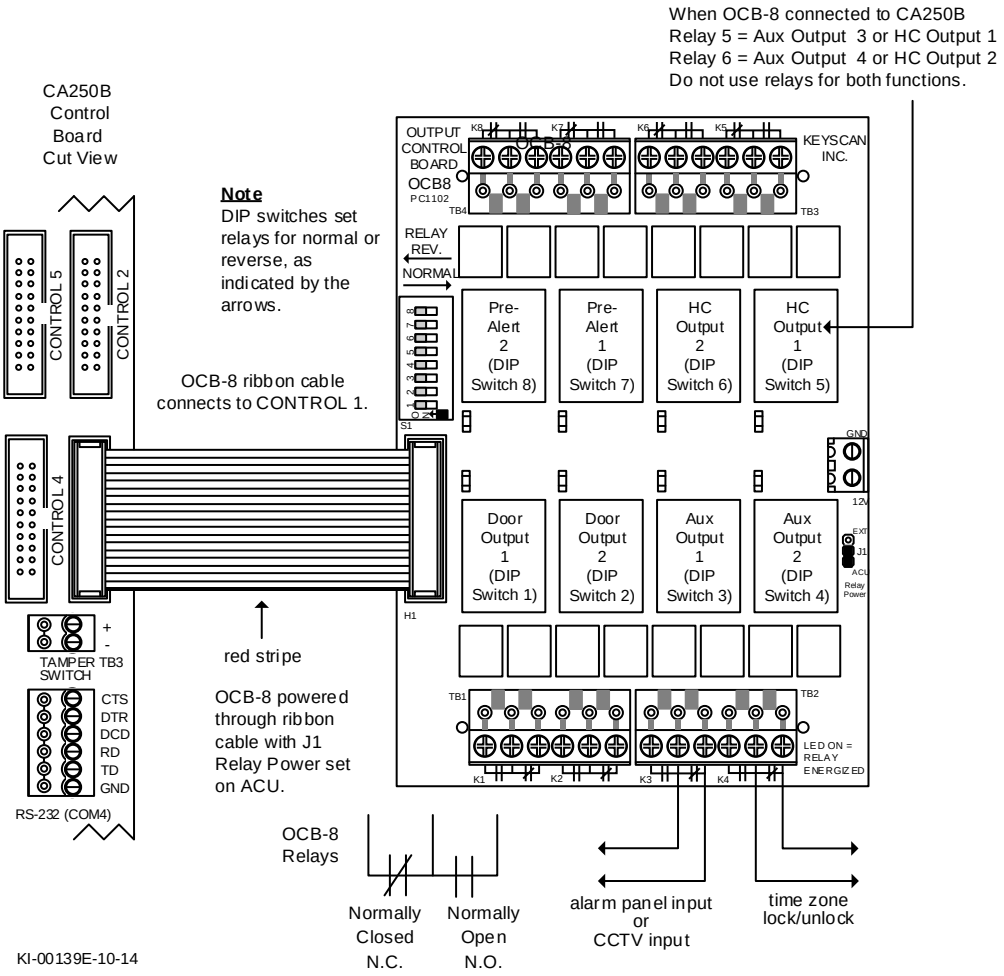


Figure 27 – Terminate Auxiliary Outputs CA4500B

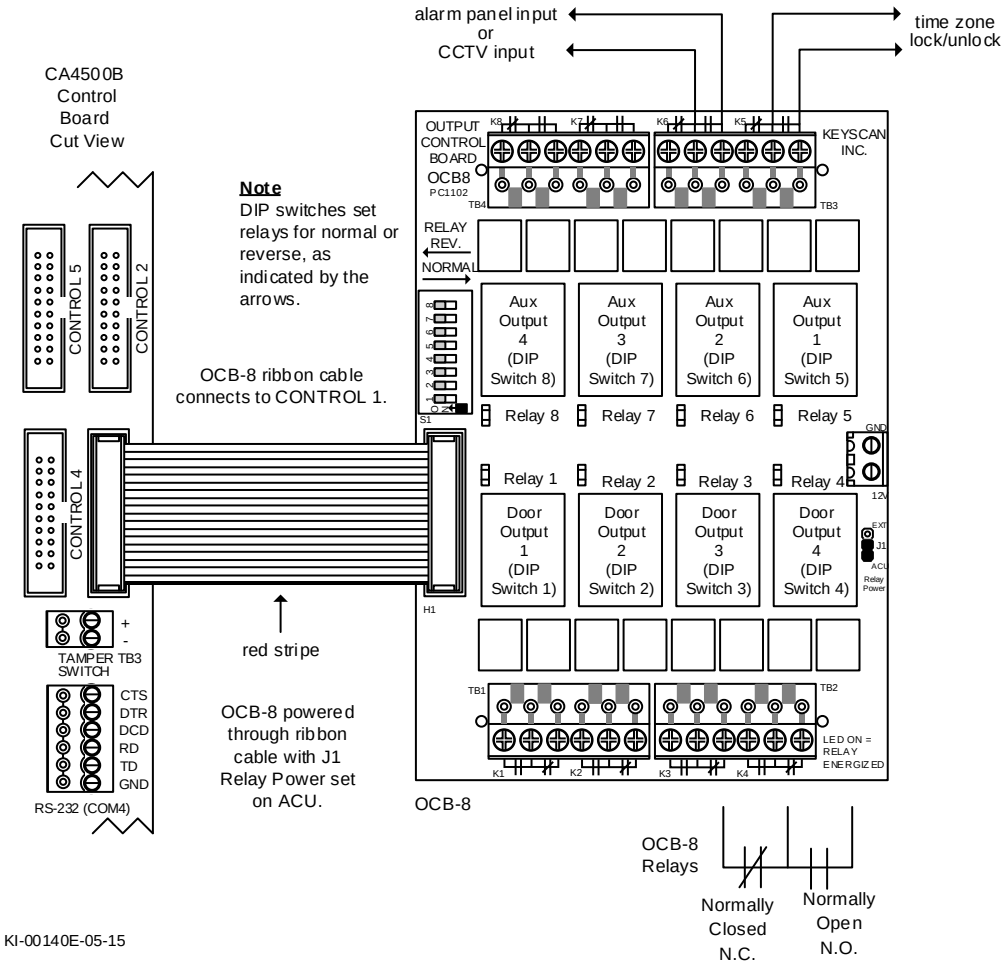
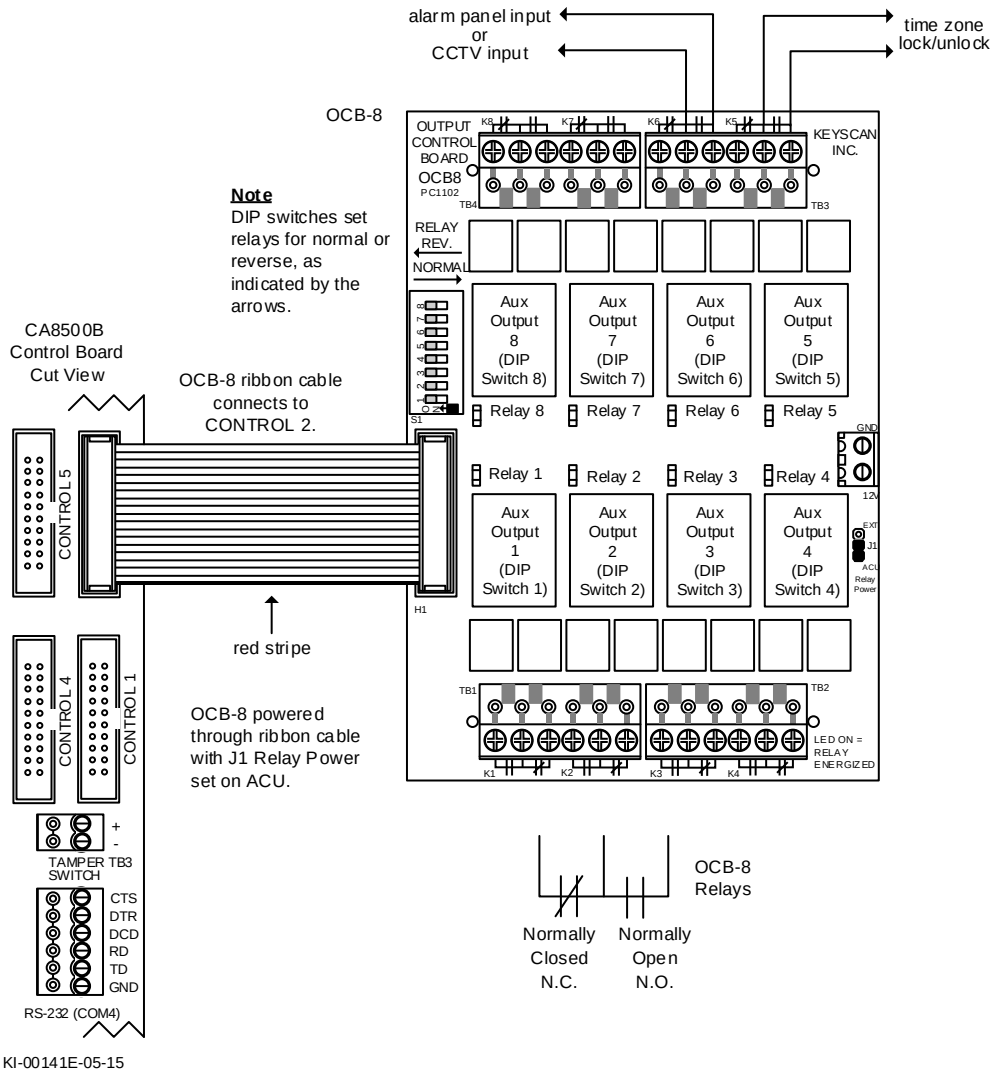


Figure 28 – Terminate Auxiliary Output CA8500B



HC Accessibility Relay

OCB-8 relays can operate as HC accessibility outputs for connections with electro-mechanical door operators. When the OCB-8 relay has an HC accessibility assignment, the relay observes the following door settings in the Client software as outlined:

- Aurora - the Extended Entry Timer setting for the door unlock time and the Extended Entry Door Held Open setting for the door contact monitoring time
- System VII/Vantage - the Accessibility Door Timer setting for the door unlock time and the Accessibility Door Held Open setting for the door contact monitoring time

Individuals with Extended Entry enabled (Aurora) or Accessibility Feature On (System VII/Vantage) in their records trip the HC accessibility output relay when they present credentials for door access. The HC accessibility relay option requires an additional OCB-8 purchased separately for CA4500B and CA8500B control boards.

Ensure that the HC accessibility output relay matches the door output as indicated below.

Table 7 – HC Accessibility Output/Door Assignment

Control Board/OCB-8	Door #/HC Relay #	Ribbon Cable Connection OCB-8 to Control Board
CA250B/OCB-8	Door 1/HC relay 5 (K5) Door 2/HC relay 6 (K6) Relay 7 and 8 reserved for Pre-alert.	Connect ribbon from OCB-8 to control 1 on CA250B
CA4500B/OCB-8 (optional OCB-8 required)	Door 1/HC relay 1 (K1) Door 2/HC relay 2 (K2) Door 3/HC relay 3 (K3) Door 4/HC relay 4 (K4) Relays 5 to 8 not used.	Connect ribbon on OCB-8 to control 4 on CA4500B.
CA8500B/OCB-8 (optional OCB-8 required)	Door 1/HC relay 1 (K1) Door 2/HC relay 2 (K2) Door 3/HC relay 3 (K3) Door 4/HC relay 4 (K4) Door 5/HC relay 5 (K5) Door 6/HC relay 6 (K6) Door 7/HC relay 7 (K7) Door 8/HC relay 8 (K8)	Connect ribbon on OCB-8 to control 4 on CA8500B.

Figure 29 – HC Accessibility Relay CA250B/OCB-8 Connections

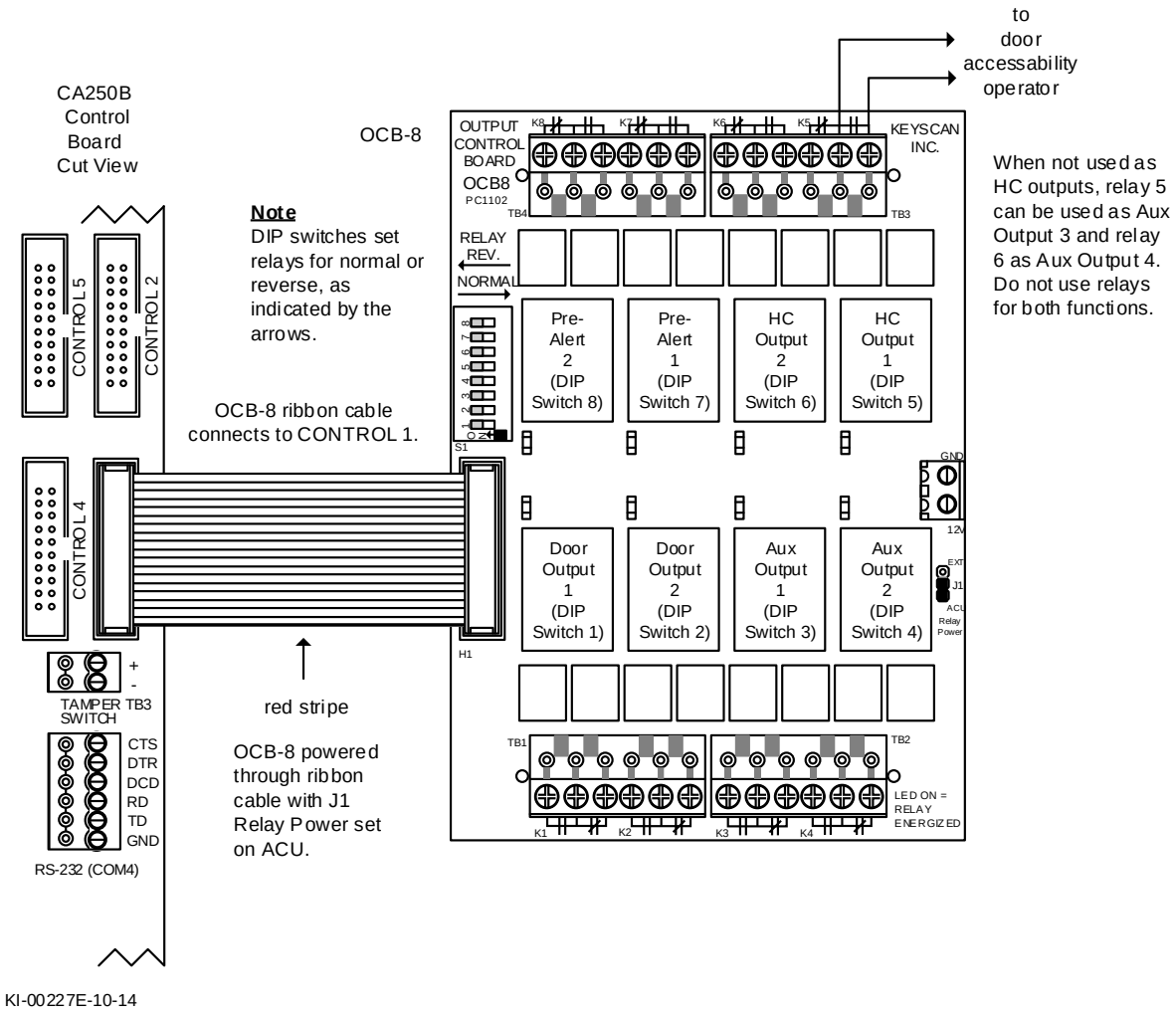


Figure 30 – HC Accessibility Output Relay CA4500B/OCB-8 Connections

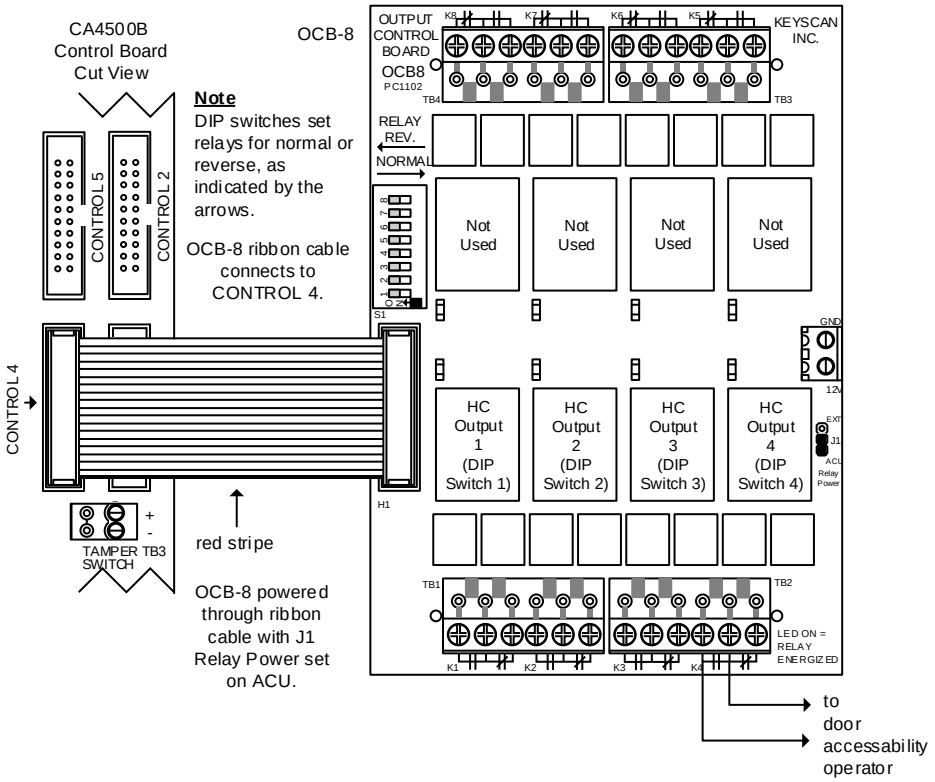


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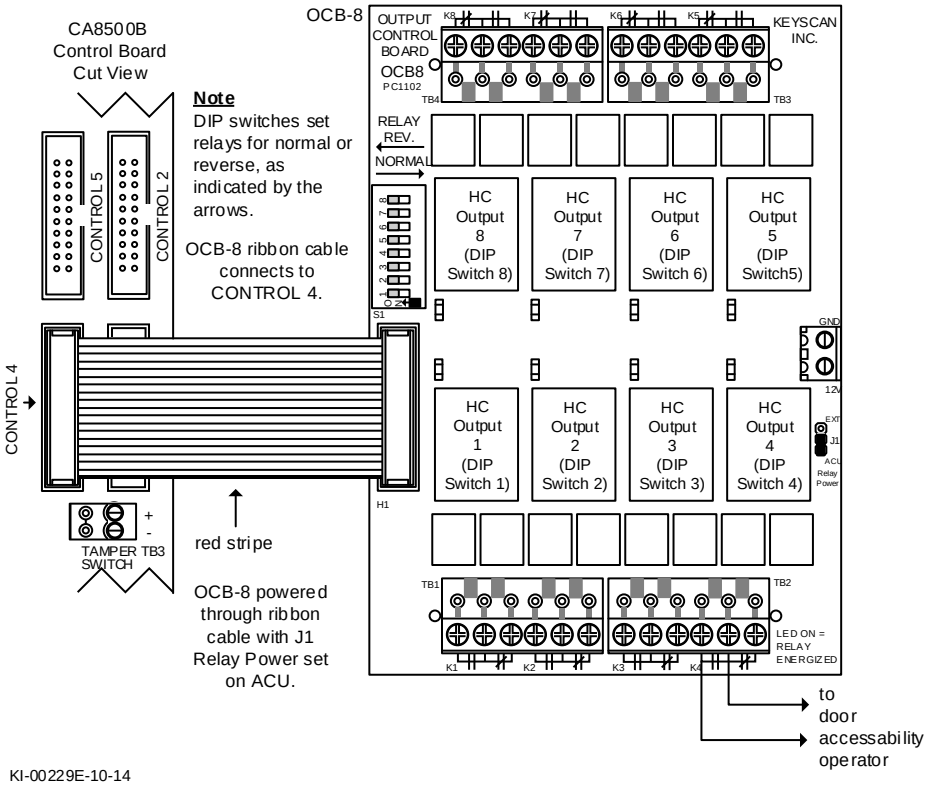
Figure 31 – HC Accessibility Output Relay CA8500B/OCB-8 Connections



Pre-alert Output Relay

The OCB-8 may be used for pre-alert relays which trip when doors remain open at the half interval of the combined door relay unlock time and door held open time in the Client software. This function is a feature within the control board. The OCB-8 pre-alert relay connects to an external device. The Pre-alert relay is optional on CA4500B or CA8500B control boards and requires an additional OCB-8 purchased separately.

Note

A reader with a pre-alert conductor connected to the C1 (Beep) reader terminal will beep intermittently at the half interval as well. The reader will also sound on an alarm tripped.

Depending on the number of doors and series of control unit, ensure that the pre-alert relay on the output control board matches the correct door contact as indicated in the following table.

Table 8 – Pre-alert Relay to Door Assignments

Control Board/OCB-8	Pre-alert Outputs	Pre-alert Relay # on OCB-8	Door Contact #	Ribbon Cable Connection
CA250B/OCB-8	2	Relay 7 (K7) Relay 8 (K8)	Door 1 Door 2	Connect ribbon on OCB-8 to control 1 on CA250B
CA4500B/OCB-8 (optional)	4	Relay 5 (K5) Relay 6 (K6) Relay 7 (K7) Relay 8 (K8)	Door 1 Door 2 Door 3 Door 4	Connect ribbon on OCB-8 to control 2 on CA4500B.
CA8500B/OCB-8 (optional)	8	Relay 1 (K1) Relay 2 (K2) Relay 3 (K3) Relay 4 (K4) Relay 5 (K5) Relay 6 (K6) Relay 7 (K7) Relay 8 (K8)	Door 1 Door 2 Door 3 Door 4 Door 5 Door 6 Door 7 Door 8	Connect ribbon on OCB-8 to control 3 on CA8500B.

Important

All relays on the OCB-8 board are dedicated as pre-alert output relays when connected on the CA8500B circuit board.

The pre-alert relay also activates on an “alarm tripped”.

Figure 32 – Pre-alert Relay CA250B/OCB-8 Connections

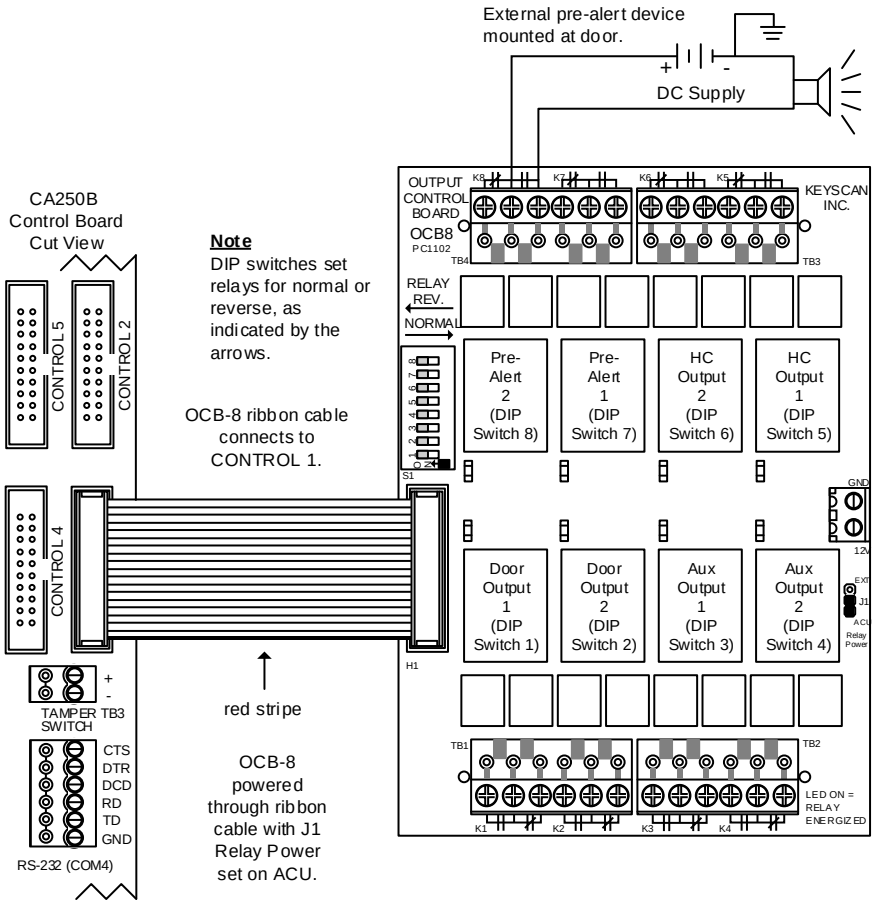


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Figure 33 – Pre-alert Relay CA4500B/OCB-8 Connections

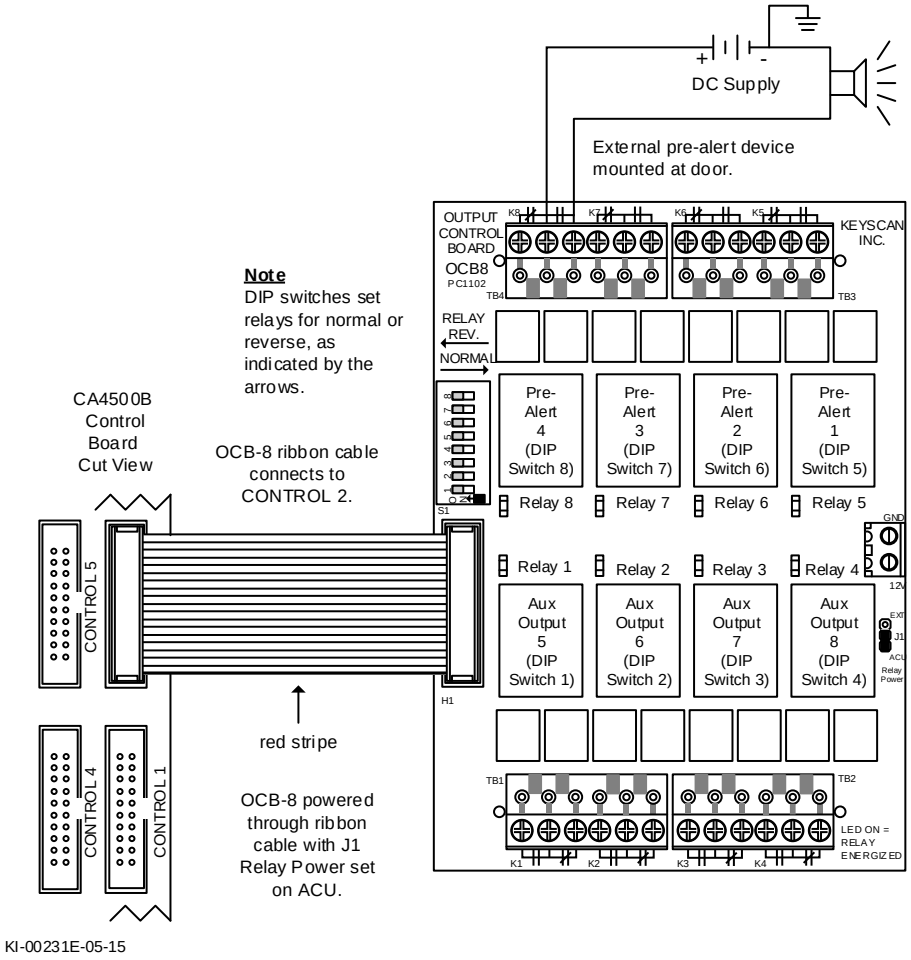
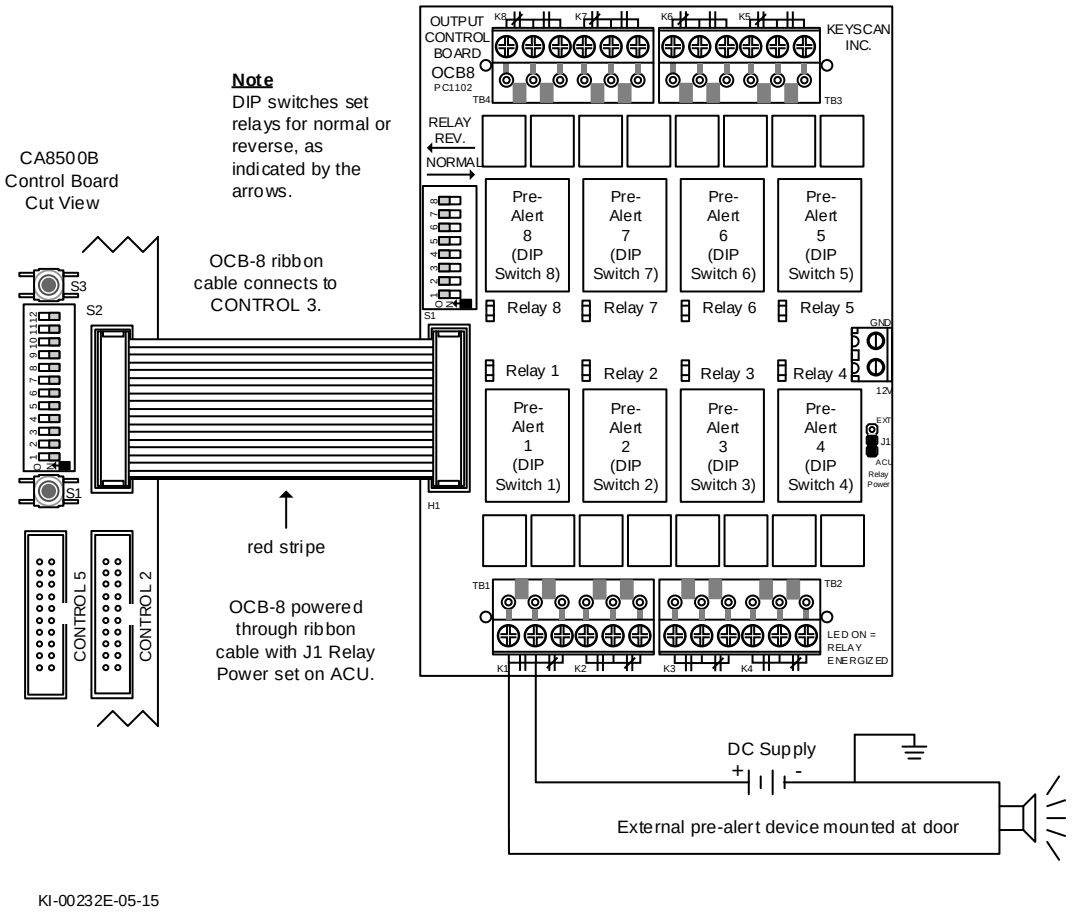


Figure 34 – Pre-alert Relay CA8500B/OCB-8 Connections



Global Output Relay

PC109x control boards connected on CIM and/or CIM-LINK communication loops may be configured so that various alarm inputs on multiple access control units can trip assigned global outputs. Global outputs require CAN Bus 2 communication and an optional OCB-8 relay board.

- Global outputs are supported on CA4500 and CA8500 control boards
- Global outputs are not supported on CA250 control boards

When using an optional OCB-8 for global outputs, refer to the corresponding auxiliary output (AO) #s in the Client software.

Complete Global I/O Setup Instructions

For complete instructions and requirements on configuring global inputs and outputs, refer to the Global Inputs & Outputs / Time Zones Setup Guide on the Keyscan Document Library CD or the Aurora Installation DVD in the Documents folder.

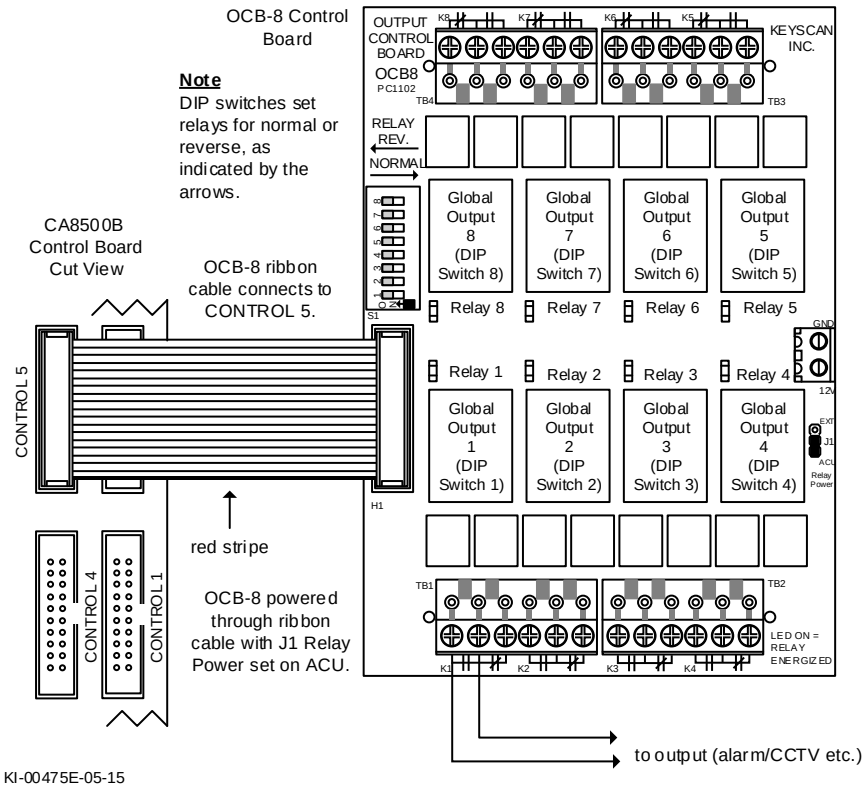
OCB-8/Global IO Assignments

The following table outlines global output relay assignments on the OCB-8 and Client software. Please note the CA250 does not support global outputs.

Table 9 - OCB-8 Global Output Relay #/ Client Relay Assignments

OCB-8 Global Output Relay #/Client Relay	Ribbon Cable Connection
Global output relay 1 = 09 – AO # 09 in Client software Global output relay 2 = 10 – AO # 10 in Client software Global output relay 3 = 11 – AO # 11 in Client software Global output relay 4 = 12 – AO # 12 in Client software Global output relay 5 = 13 – AO # 13 in Client software Global output relay 6 = 14 – AO # 14 in Client software Global output relay 7 = 15 – AO # 15 in Client software Global output relay 8 = 16 – AO #16 in Client software	Connect ribbon cable on OCB-8 to Control 5 on CA4500B or CA8500B – PC109x.

Figure 35 – Global OCB-8 Ribbon Cable Connection with CA4500 & CA8500



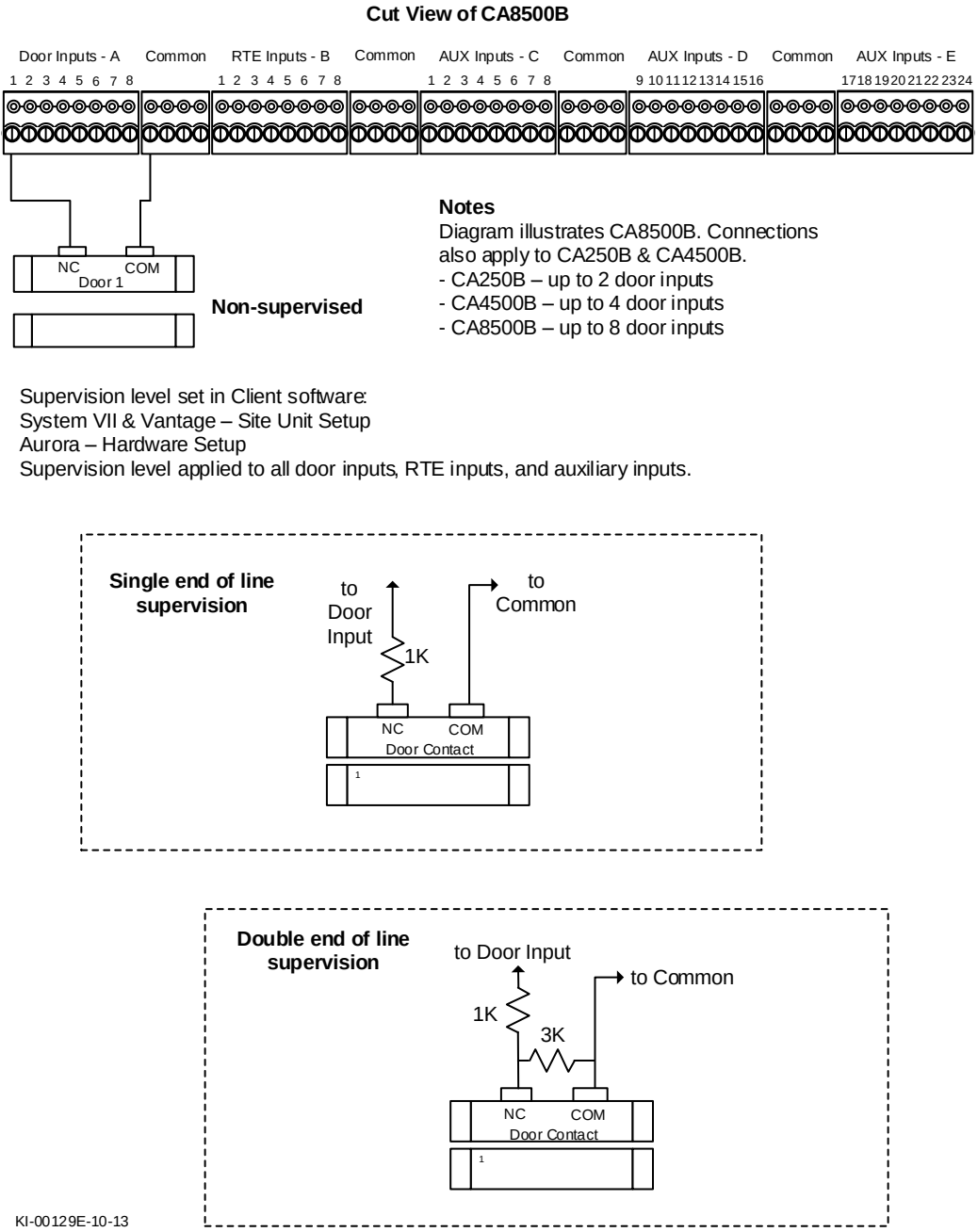
Terminate Input Wiring

The following sub-headings review termination of door contacts, exit, and auxiliary alarm input wiring.

Door Monitoring Connections

A normally-closed door contact is for monitoring door security. Door inputs are shunted during the door relay unlock time.

Figure 36 – Terminate Input Wiring – Door Inputs (Contacts)

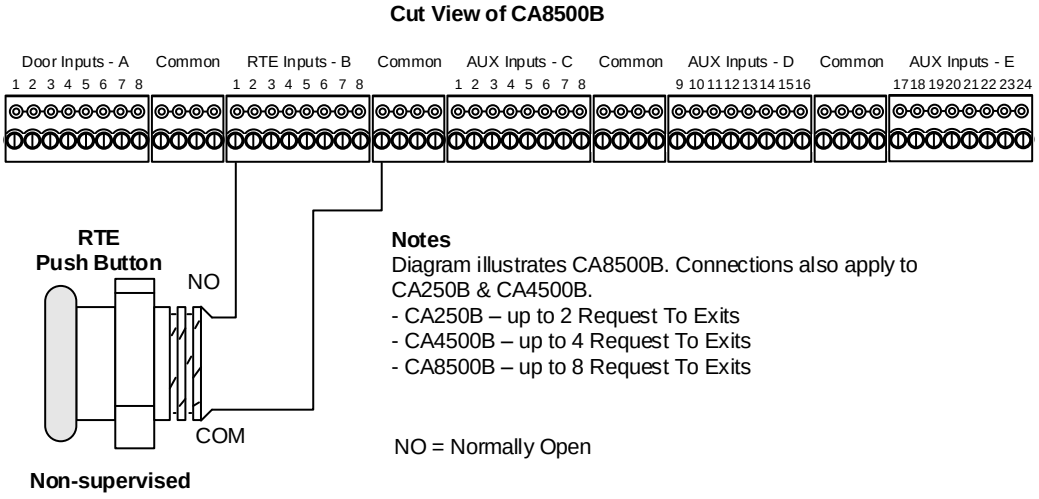


Exit Device Connections

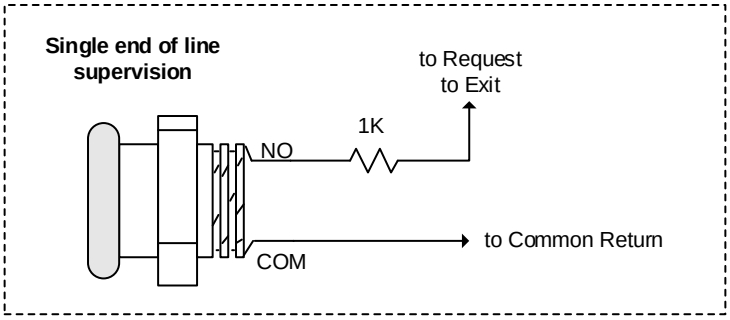
A normally-open exit device contact unlocks its assigned door for its defined door relay unlock time and overrides the alarm input during its defined door held open time. Examples of exit devices are exit push buttons or motion sensors (PIR) etc.

Keyscan recommends a PIR with a pulse output of 1/2 second and suitable for its environment.

Figure 37 – Terminate Input Wiring – RTE Push Button



Supervision level set in Client software:
System VII & Vantage – Site Unit Setup
Aurora – Hardware Setup
Supervision level applied to all door inputs, RTE inputs, and auxiliary inputs.



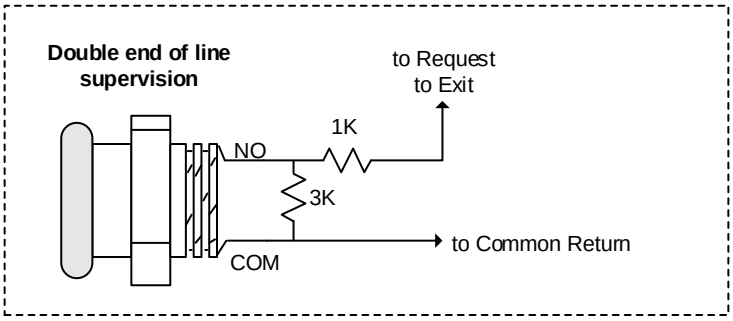


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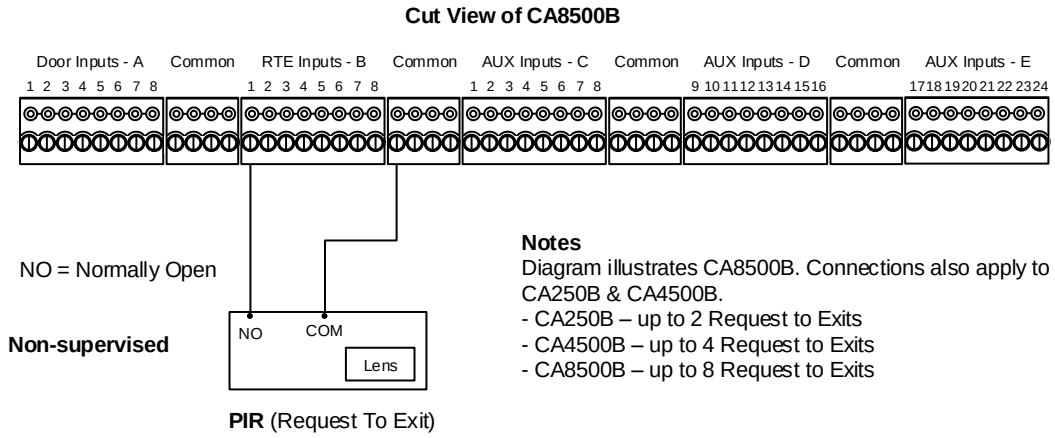
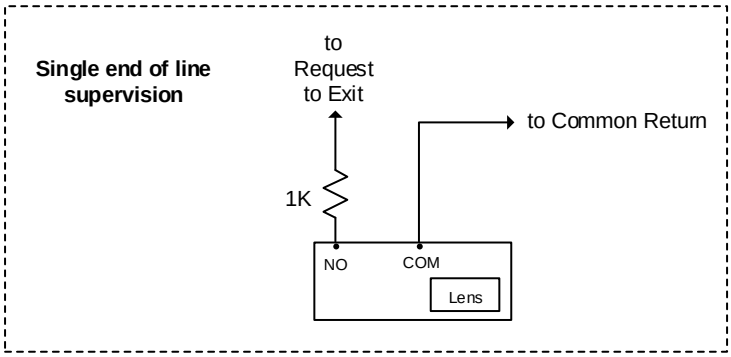
Figure 38 – Terminate Input Wiring – RTE PIR Motion Sensor



PIR
RTE (Request to Exit) – ½ second pulse
Determines the amount of time the output relays will energize when motion is detected.

Supervision level set in Client software:
System VII & Vantage – Site Unit Setup
Aurora – Hardware Setup
Supervision level applied to all door inputs, RTE inputs, and auxiliary inputs.



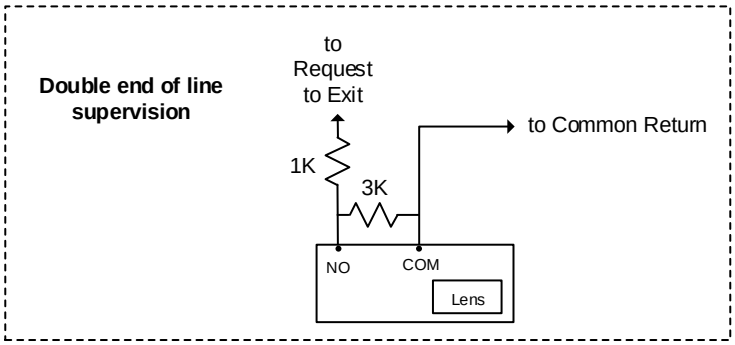


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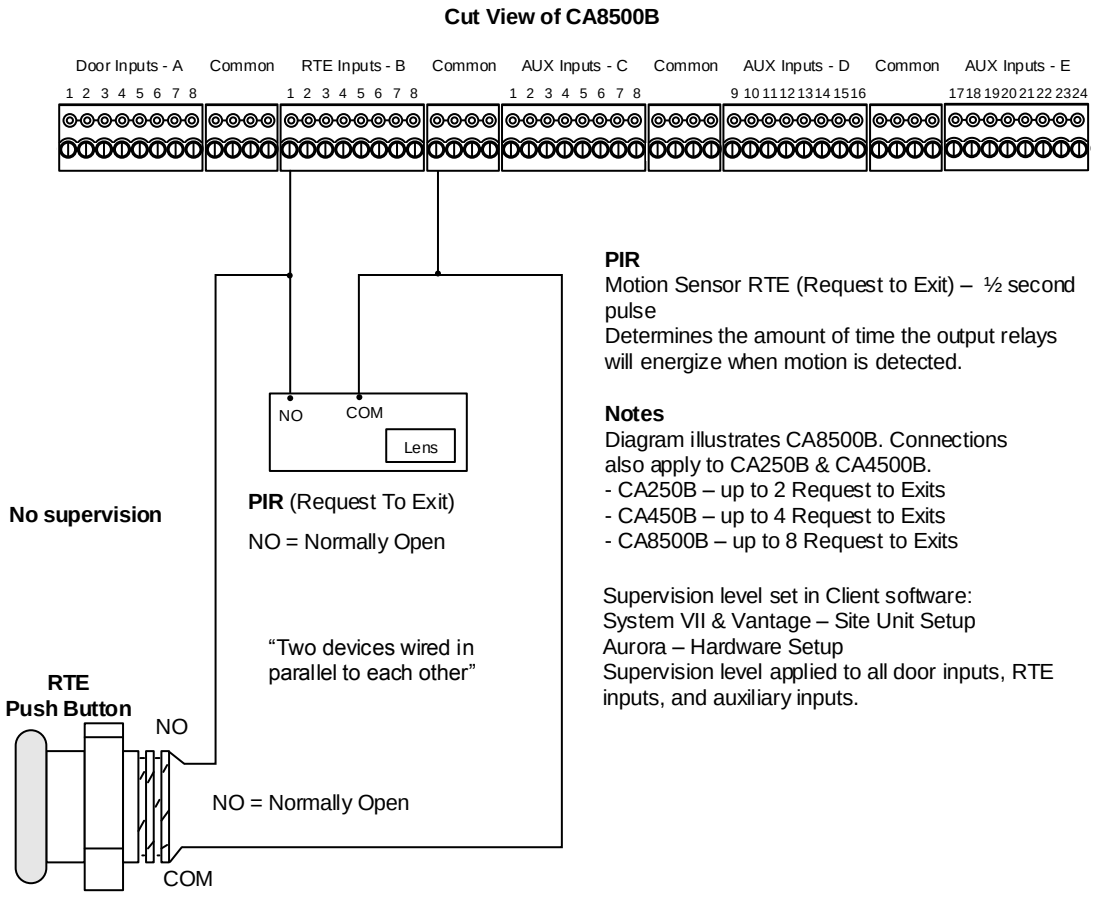
Figure 39 – Terminate Input Wiring RTE - PIR & Push Button

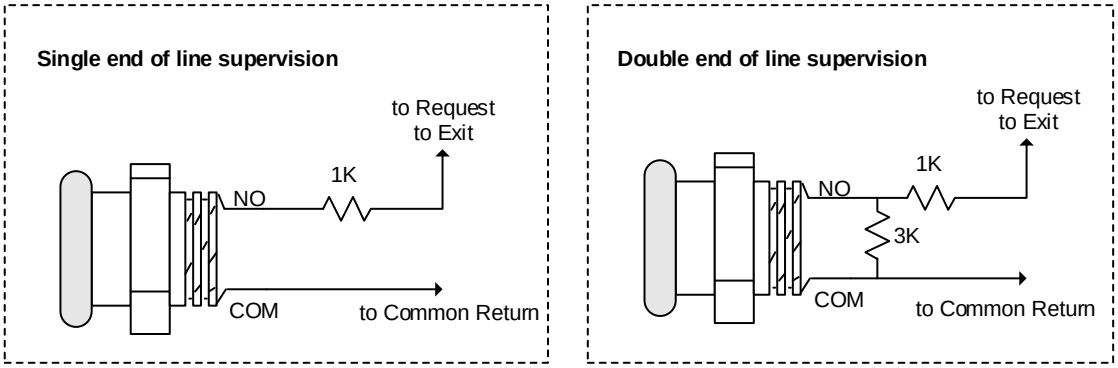


PIR
Motion Sensor RTE (Request to Exit) – ½ second pulse
Determines the amount of time the output relays will energize when motion is detected.

Notes
Diagram illustrates CA8500B. Connections also apply to CA250B & CA4500B.
- CA250B – up to 2 Request to Exits
- CA450B – up to 4 Request to Exits
- CA8500B – up to 8 Request to Exits

Supervision level set in Client software:
System VII & Vantage – Site Unit Setup
Aurora – Hardware Setup
Supervision level applied to all door inputs, RTE inputs, and auxiliary inputs.

Note
If using supervision, it is only required on the device farthest from the ACU terminal. Example shows supervision on RTE Push Button.



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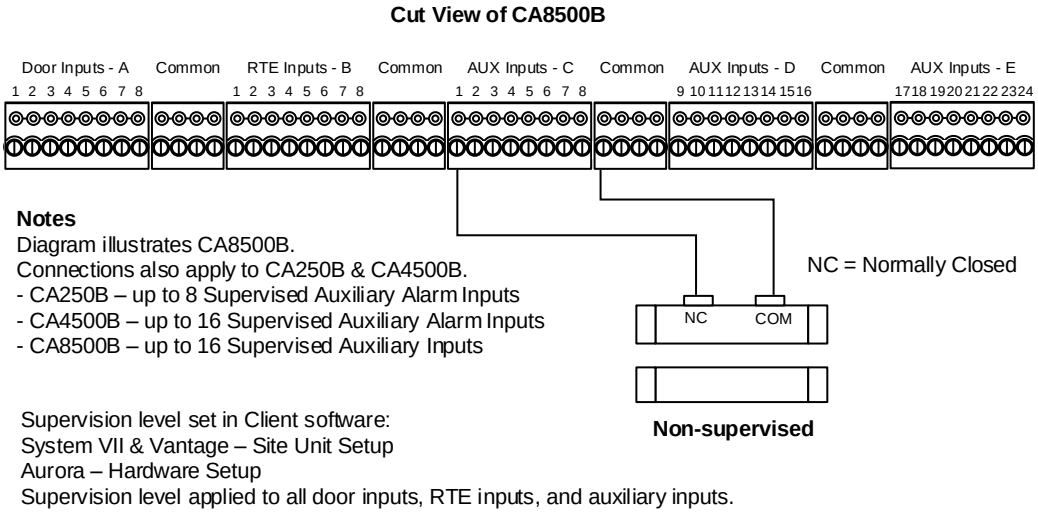
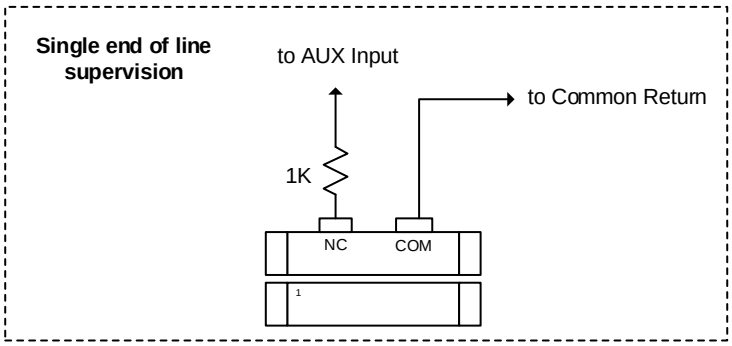
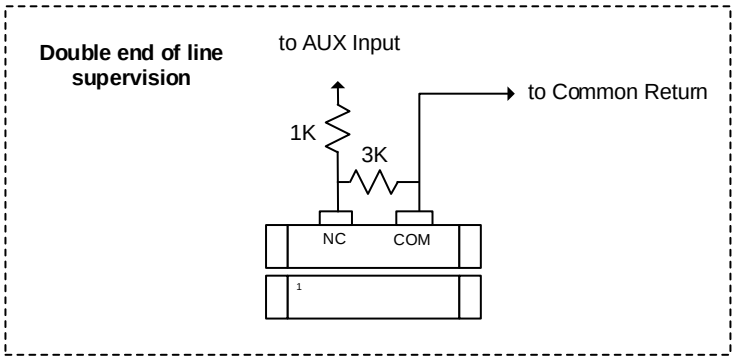
Security Monitoring Connections

A normally-closed device may be connected to an auxiliary alarm input for monitoring stairwell or interior doors, or windows. The auxiliary alarm inputs may be connected to infrared sensors or to an existing alarm system with a normally-closed auxiliary output relay contact.

Figure 40 – Terminate Input Wiring – AI/SI Inputs







KI-00133E-10-13

Terminating Cables at Elevator Control Units

The following diagrams outline how to connect Keyscan elevator control units – EC1500 or EC2500 – to an elevator.

Figure 41 - Elevator Control Overview

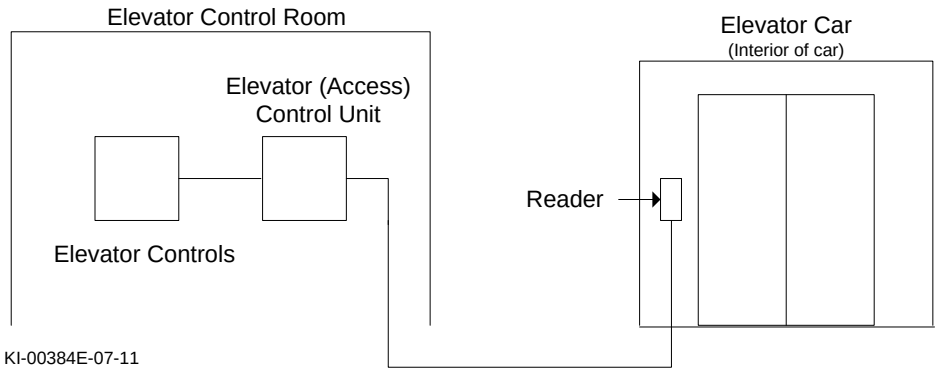
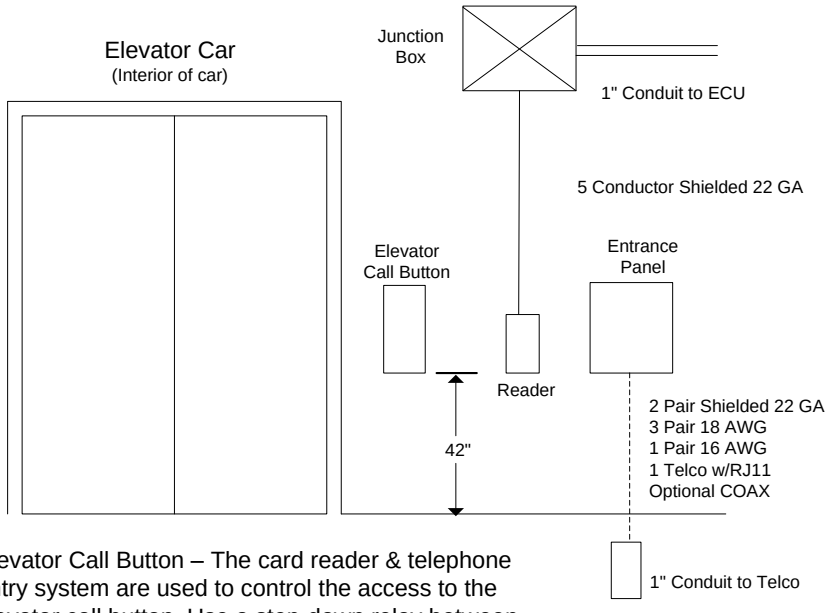


Figure 42 – Elevator Layout – Interior of Car



Elevator Call Button – The card reader & telephone entry system are used to control the access to the elevator call button. Use a step-down relay between Keyscan on-board relay and elevator call button control.

KI-00385E-07-11

OCB-8 Relay Boards

OCB-8 relay boards regulate floor control with the elevator. Each OCB-8 controls up to a maximum of eight (8) floors. If the elevator control board regulates more than eight (8) floors, multiple OCB-8 control boards are required. See Table 10 and Table 11 for ribbon cable elevator/floor assignments from the OCB-8 terminal to the elevator control board terminal.

OCB-8 DIP Switch Settings

- DIP Switches 1 to 8 set to Reversed position
- J1 Relay Power set on EXT

Note

Verify all floor hardware conforms to federal, state, provincial or municipal building codes and fire regulations.

Table 10 – OCB-8 to EC1500B Ribbon Cable Connections

OCB Terminal	Elevator Control Board Terminal	Elevator	Floors
1st OCB-8 – H1	Control 1	1	1 – 8
*2nd OCB-8 – H1	Control 2	1	9 – 16
*3rd OCB-8 – H1	Control 3	1	17 – 24
*4th OCB-8 – H1	Control 4	1	25 – 32
*5th OCB-8 – H1	Control 5	1	33 – 40

Table 11 – OCB-8 to EC2500B Ribbon Cable Connections

OCB Terminal	Elevator Control Board Terminal	Elevator	Reader	Floors
1st OCB-8 – H1	Control 1	1	1	1 – 8
*2nd OCB-8 – H1	Control 2	1	1	9 – 16
3rd OCB-8 – H1	Control 3	2	2	1 – 8
*4th OCB-8 – H1	Control 4	2	2	9 – 16

* Optional OCB-8. Requires separate purchase.

Figure 43 – Terminate Floor Wiring EC1500B

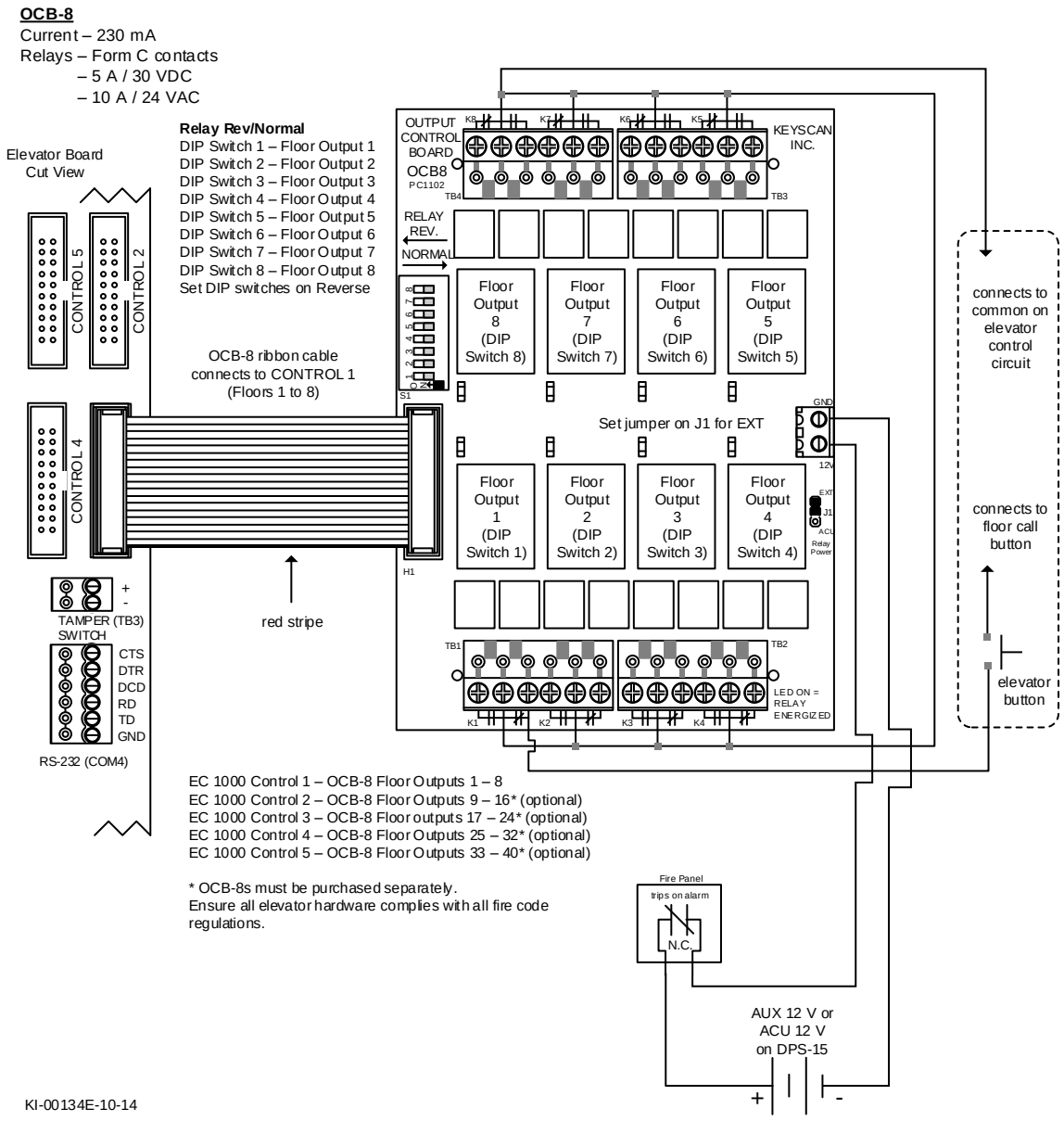
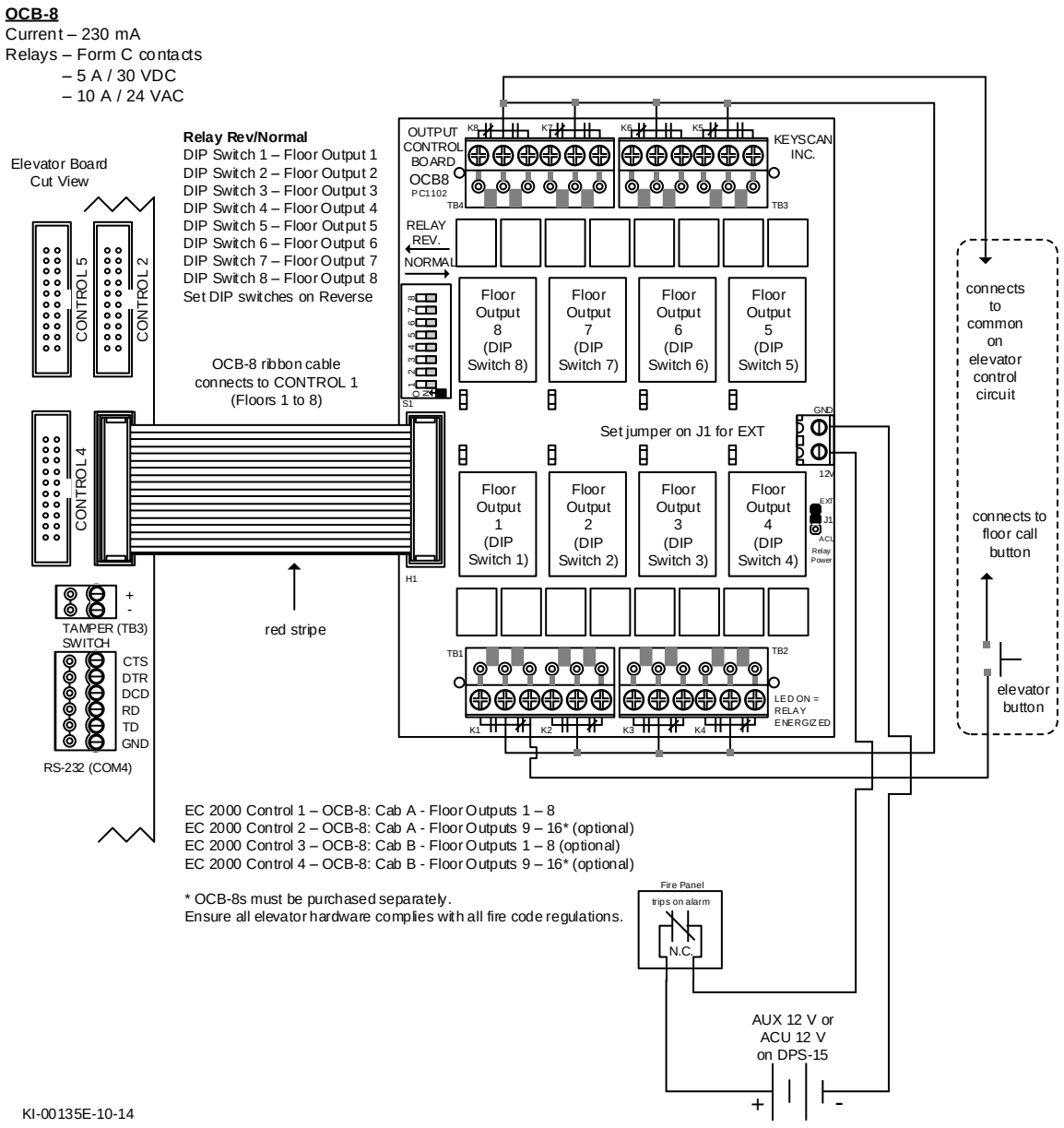


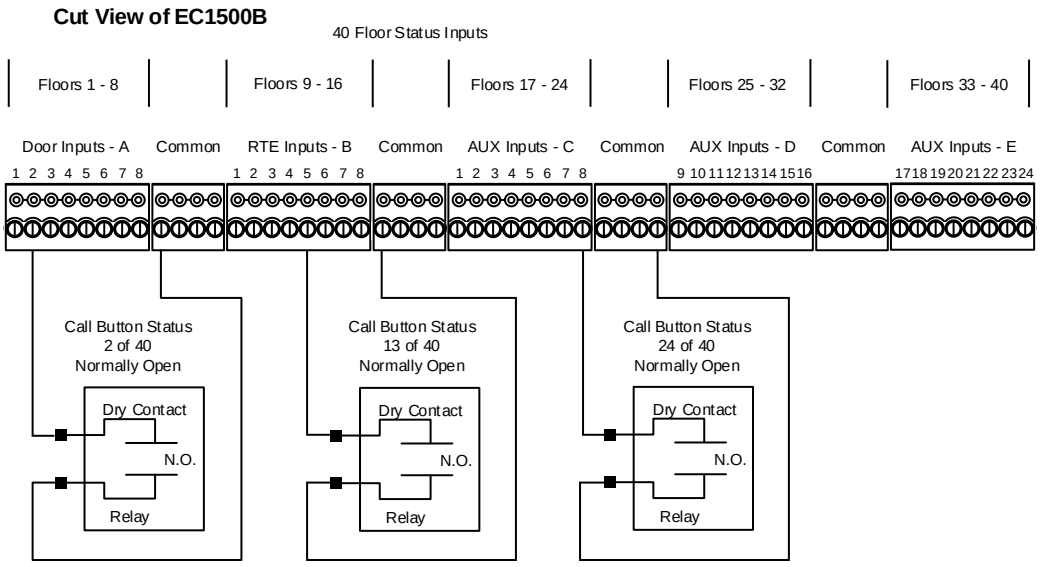
Figure 44 – Terminate Floor Wiring EC2500B



Terminate Floor Input Wiring

The EC1500 with five (5) output control boards can regulate up to 40 floors. The EC1500 and EC2500 do not have floor status with supervision.

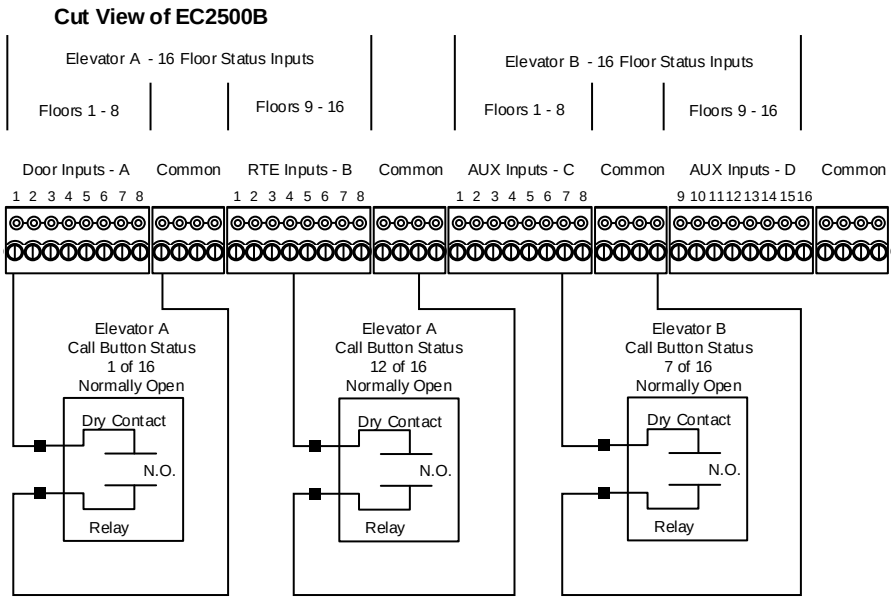
Figure 45 – Terminate Floor Input Wiring EC1500B



Floor monitoring inputs (separate dry contacts) provided by 3rd party elevator company.

KI-00136E-07-11

Figure 46 – Terminate Floor Input Wiring EC2500B



Floor monitoring inputs (separate dry contacts) provided by 3rd party elevator company.

KI-00137E-07-11

Terminate Reader Cables

For readers, use six (6) conductors 22 AWG shielded cable or a cable with overall shielding.

For elevator readers or current demanding readers, such as the Indala PX620 or the HID5375, use six (6) conductors 18 AWG shielded cable.

The shielding wire must be connected to the earth ground lug at the ACU and isolated and taped at the reader. The maximum reader distance is 500 feet (152.4 m) from the ACU when transmitting a Wiegand signal. If the distance is greater than 500 feet (152.4 m), install one WIEEX2 per reader, which extends the distance to 4000 feet (1219.2 m). See Appendix B – WIEEX2.

Reader Wiring

- Red – Positive DC power. For readers that draw more current, connect the red wire directly to the power supply.
- Black – Ground (GND)
- Brown – Light emitting diode (LED) on reader
- Green – Data output bit 0
- White – Data output bit 1
- Blue – Optional pre-alert (reader beeper)

Keyscan & HID Readers

Wiring diagrams are on the following pages. Refer to the appropriate diagram for specific reader connections. Be sure to use cables that comply with the reader's wiring specifications.

Ensure that the total current draw of all readers connected to the control board's reader terminals is within the limit of the DPS-15 power supply; otherwise, you will require a separate power supply.

Power Specifications

The following table outlines reader power specifications:

Table 12 – Keyscan & HID Reader Power Specifications

Reader	Power	Notes
K-PROX2 & K-PROX SG (125 KHz compatible)	12 VDC, 80 mA	
K-VAN	12 VDC, 90 mA	
K-KPR	12 VDC, 115 mA	
K-SMART (13.56 MHz)	12 VDC, 210 mA	
K-SMART GOV	12 VDC, 210 mA	
HID-5365	12 VDC, 110 mA	
HID-5395	12 VDC, 115 mA	
HID-6005	12 VDC, 75 mA	

Reader	Power	Notes
HID-5455	12 VDC, 125 mA	
HID-5355KP	12 VDC, 120 mA	
HID 5375	24 VDC, 1.5 A	Requires 18 AWG cable. Connect to separate 24 VDC 2 Amp linear power supply. (Not supplied with ACU)
KR90L – HID iClass Long Range Reader	12 VDC 1300 mA in-rush 110 mA standby 300 mA peak	12 VDC - 2 amps independent power supply per KR90L with 18 AWG cable recommended
HID iClass Legacy		**HID Base Part #**
KR10L	12 VDC, 60 mA	900N
KR40L	12 VDC, 65 mA	920N
KRK40L	12 VDC, 85 mA	921N
HID multiClass Legacy		
KRP10L	12 VDC, 75 mA	900P
KRP15L	12 VDC, 75 mA	910P
KRP40L	12 VDC, 85 mA	920P
KRPK40L	12 VDC, 95 mA	921P
HID pivClass Legacy		
R10HGOV	12 VDC, 60 mA	900NHR
RP10HGOV	12 VDC, 75 mA	900PHR
R15HGOV	12 VDC, 60 mA	910NHR
RP15HGOV	12 VDC, 75 mA	910PHR
R40HGOV	12 VDC, 65 mA	920NHR
RP40HGOV	12 VDC, 85 mA	920PHR
RK40HGOV	12 VDC, 85 mA	921NHR
RPK40HGOV	12 VDC, 95 mA	921PHR
HID iClass SE		
KR10SE	12 VDC, 60 mA	900N
KR40SE	12 VDC, 65 mA	920N
KRK40SE	12 VDC, 85 mA	921N
HID multiClass		
KRP10SE	12 VDC, 75 mA	900P
KRP15SE	12 VDC, 75 mA	910P
KRP40SE	12 VDC, 85 mA	920P
KRPK40SE	12 VDC, 95 mA	921P

Installation Notes on Proximity Readers

Do not run reader cables in the same conduit with AC power or signal cables. Keep reader cables at least 12 inches or 30 centimetres from AC, computer data, telephone data, or electric lock device cables. Do not install readers within 3.5 feet or 1.1 metres of computer CRTs. Do not install readers where broad spectrum EMI noise may be present. Motors, pumps, generators, and AC switching relays can create EMI noise. Readers mounted on a metal surface can have reduced read ranges. See HID manual for operational details and recommendations. The following diagrams illustrate HID readers with dual LEDs. On models 5365, 5395, and 6005 do not use the brown wire with "00" LED. If readers are single LED type "06", substitute the brown wire in place of the orange wire.

- S16 – 5 ON dual LED = 00
- S16 – 5 OFF single LED = 06

C1 Beep

When the pre-alert wire is connected to C1 (Beep) on the reader terminal, the reader will also sound on an “alarm tripped”.

Figure 47 – Keyscan K-PROX2 (125 kHz)

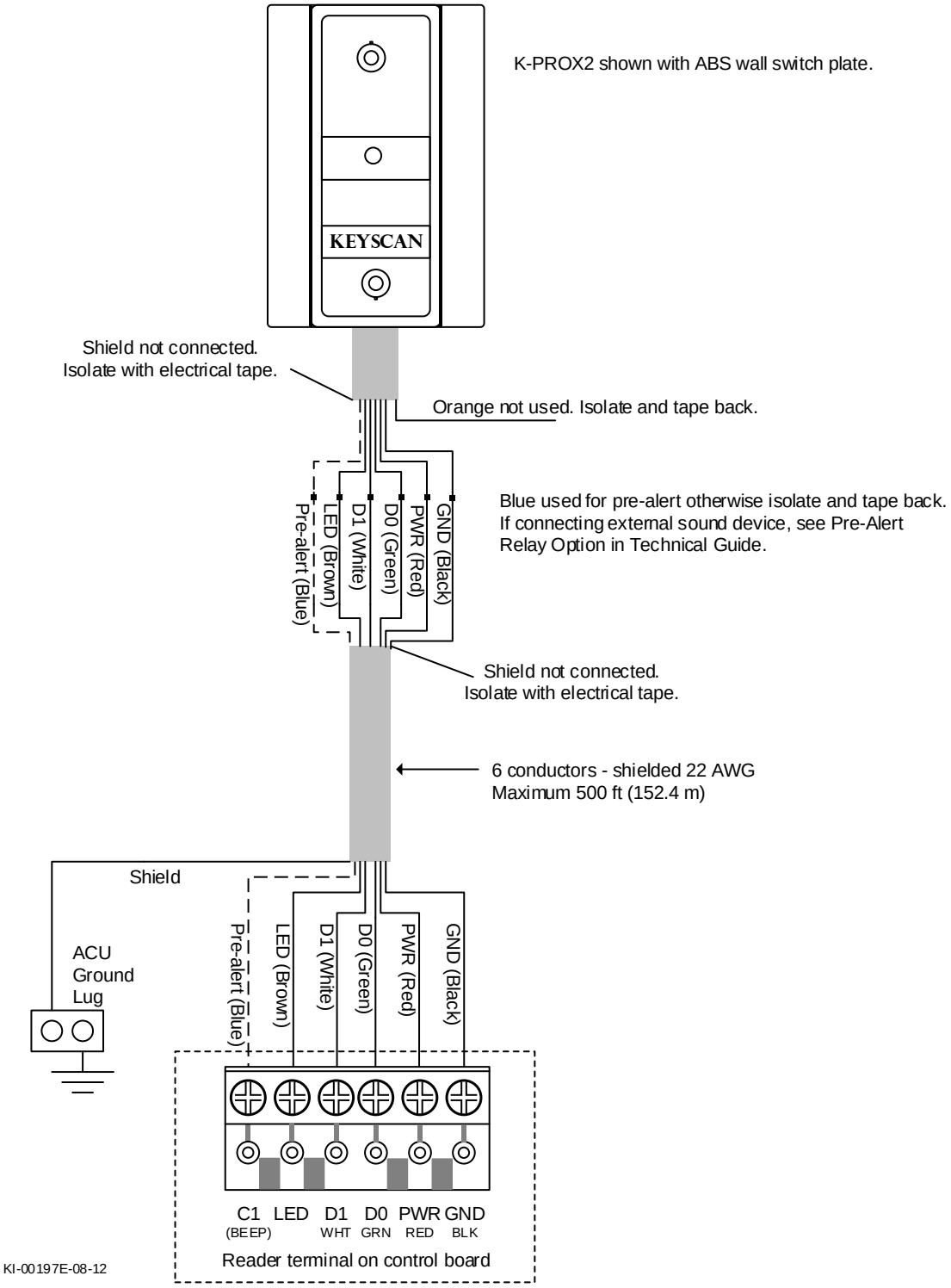


Figure 48 – Keyscan K-VAN Proximity Reader (125 kHz)

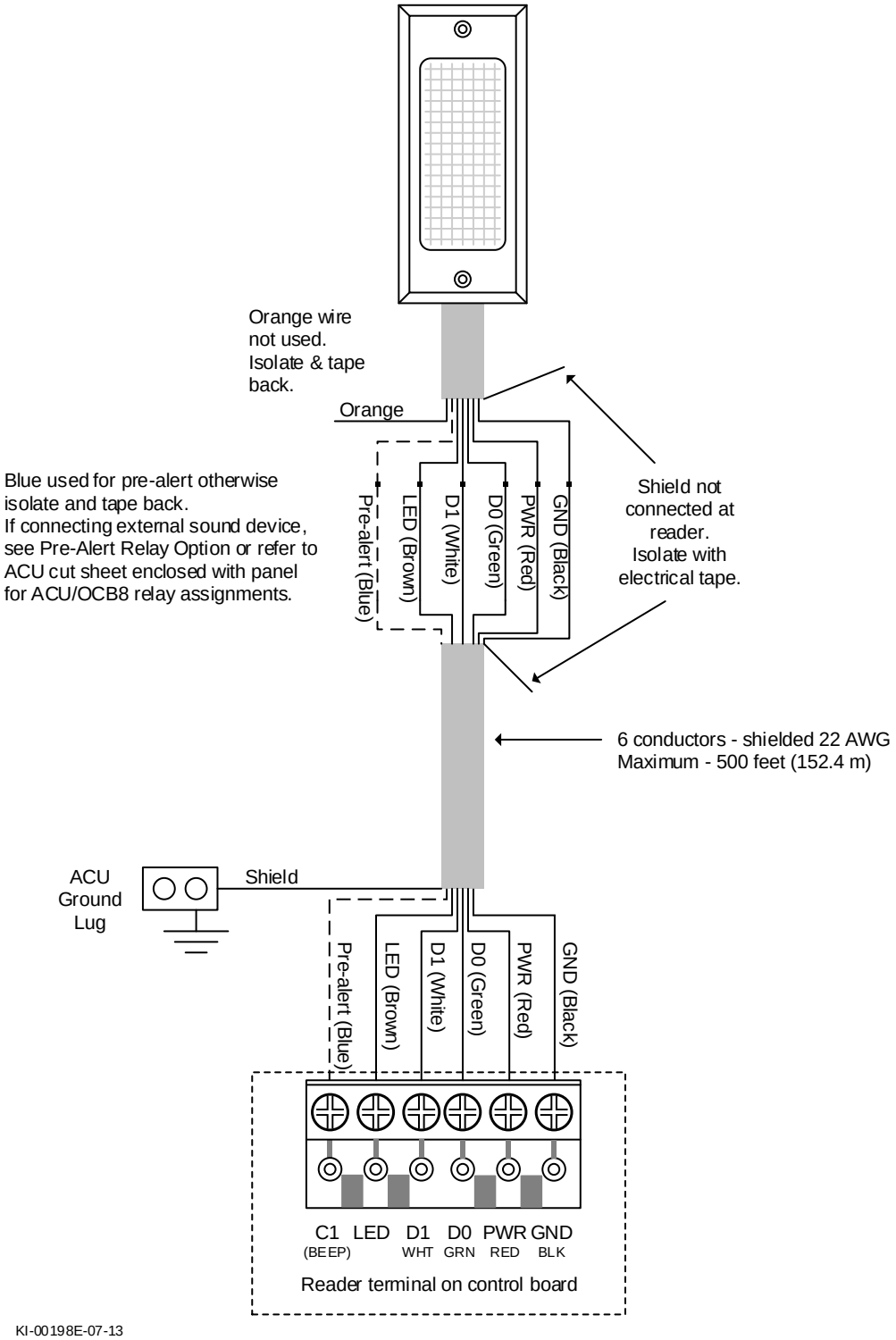


Figure 49 – Keyscan K-KPR Keypad / Proximity Reader (125 KHz)

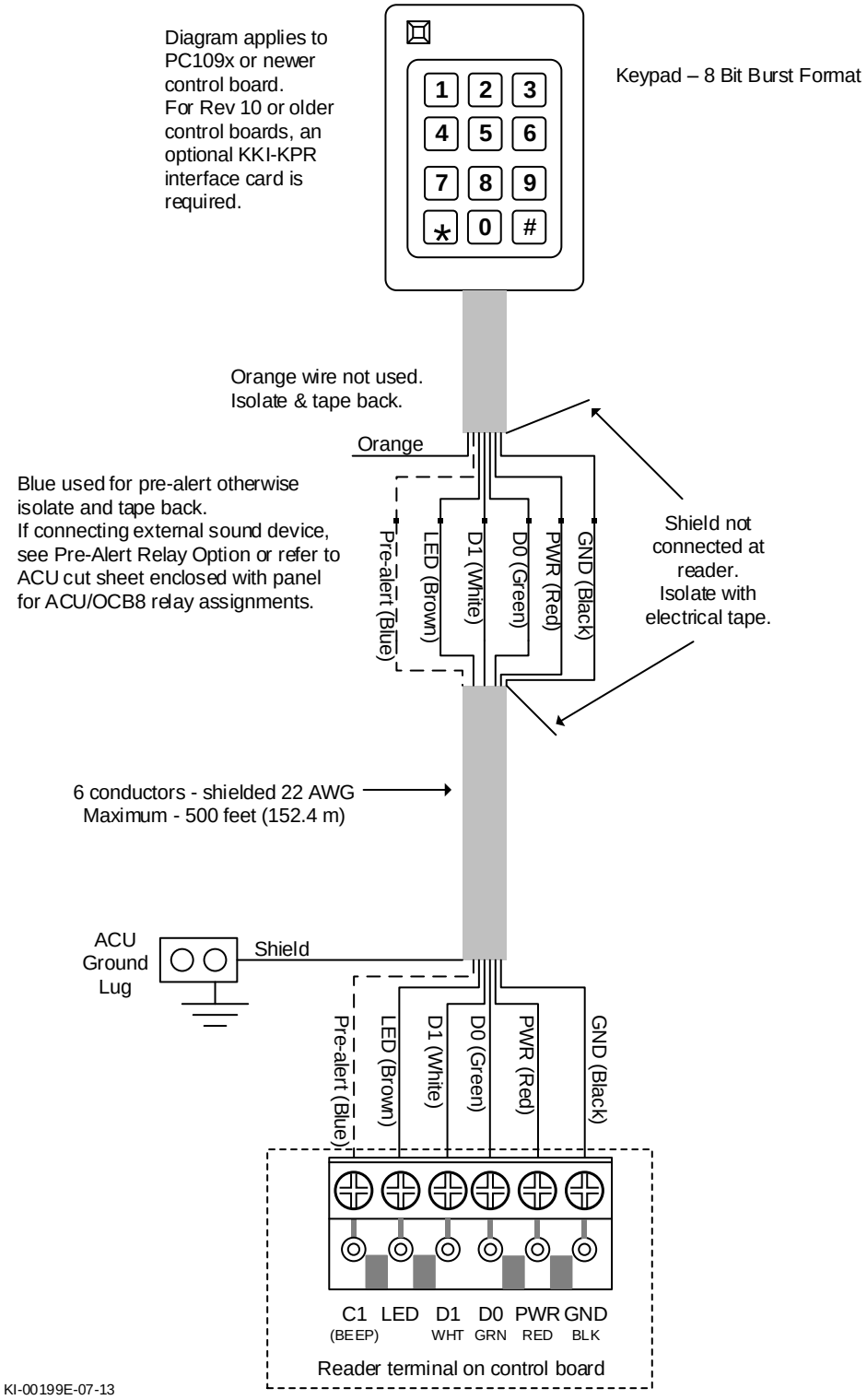


Figure 50 – Keyscan K-SMART Reader

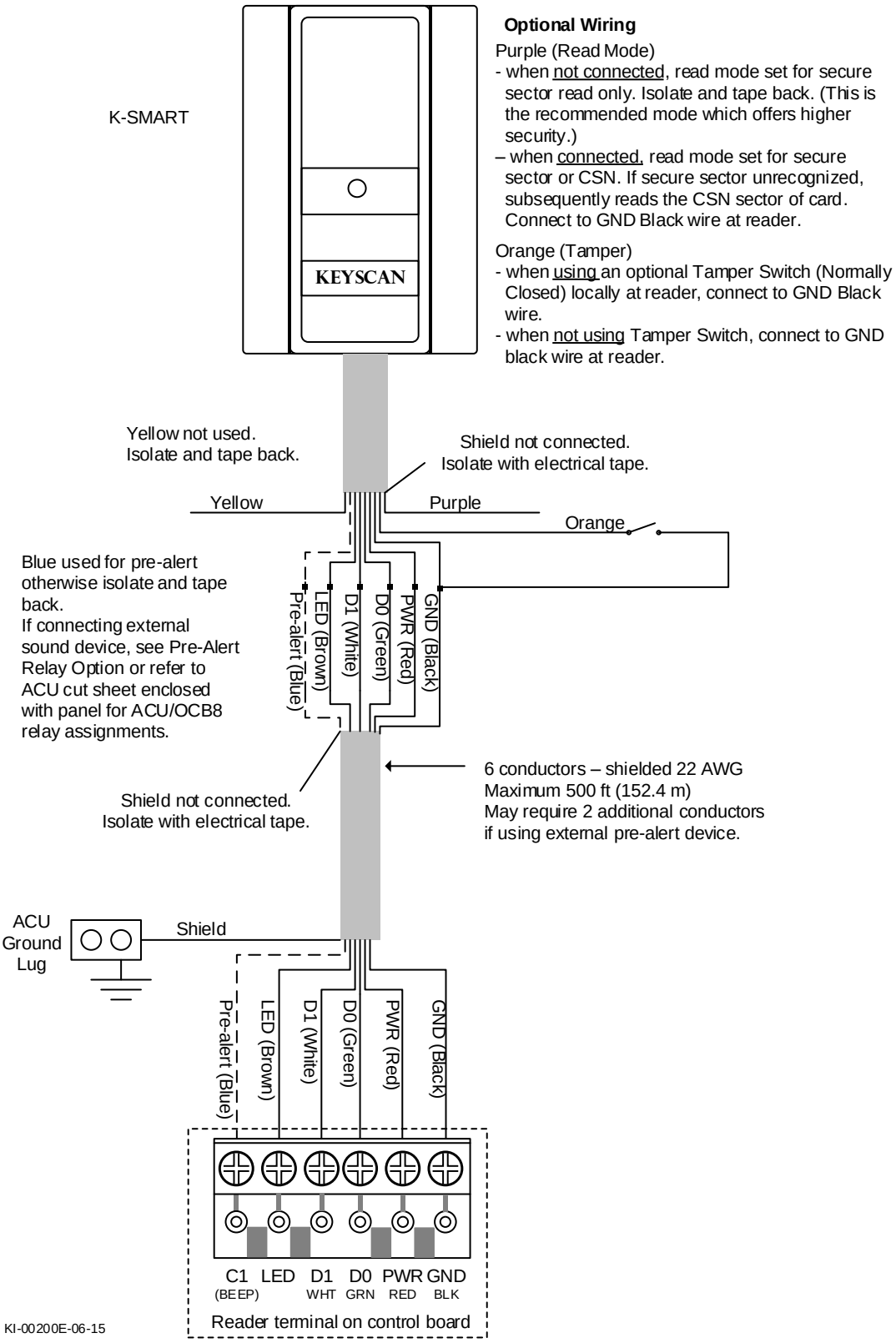


Figure 51 – HID-5395 Wiring

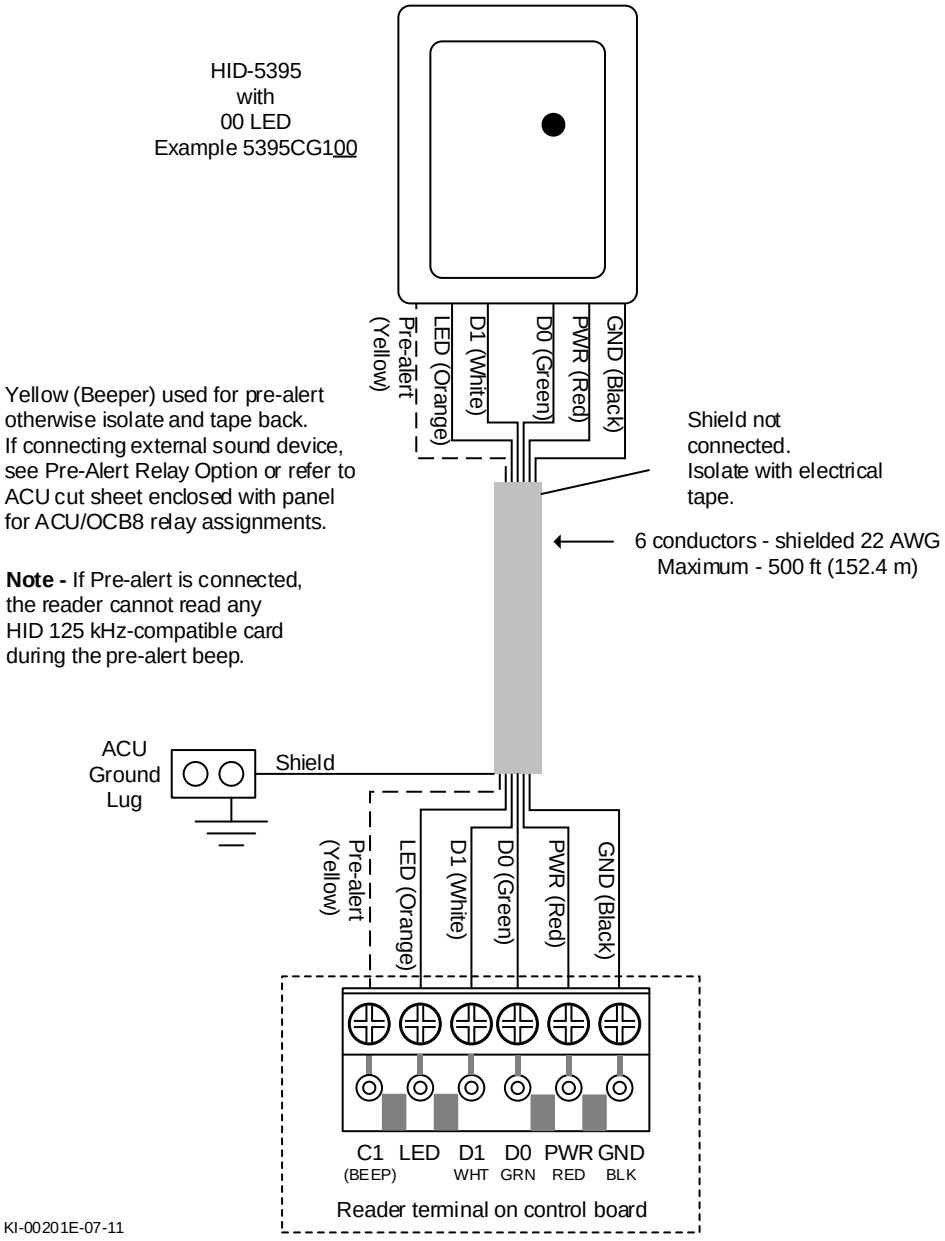


Figure 52 – HID 5365 / 6005 Wiring

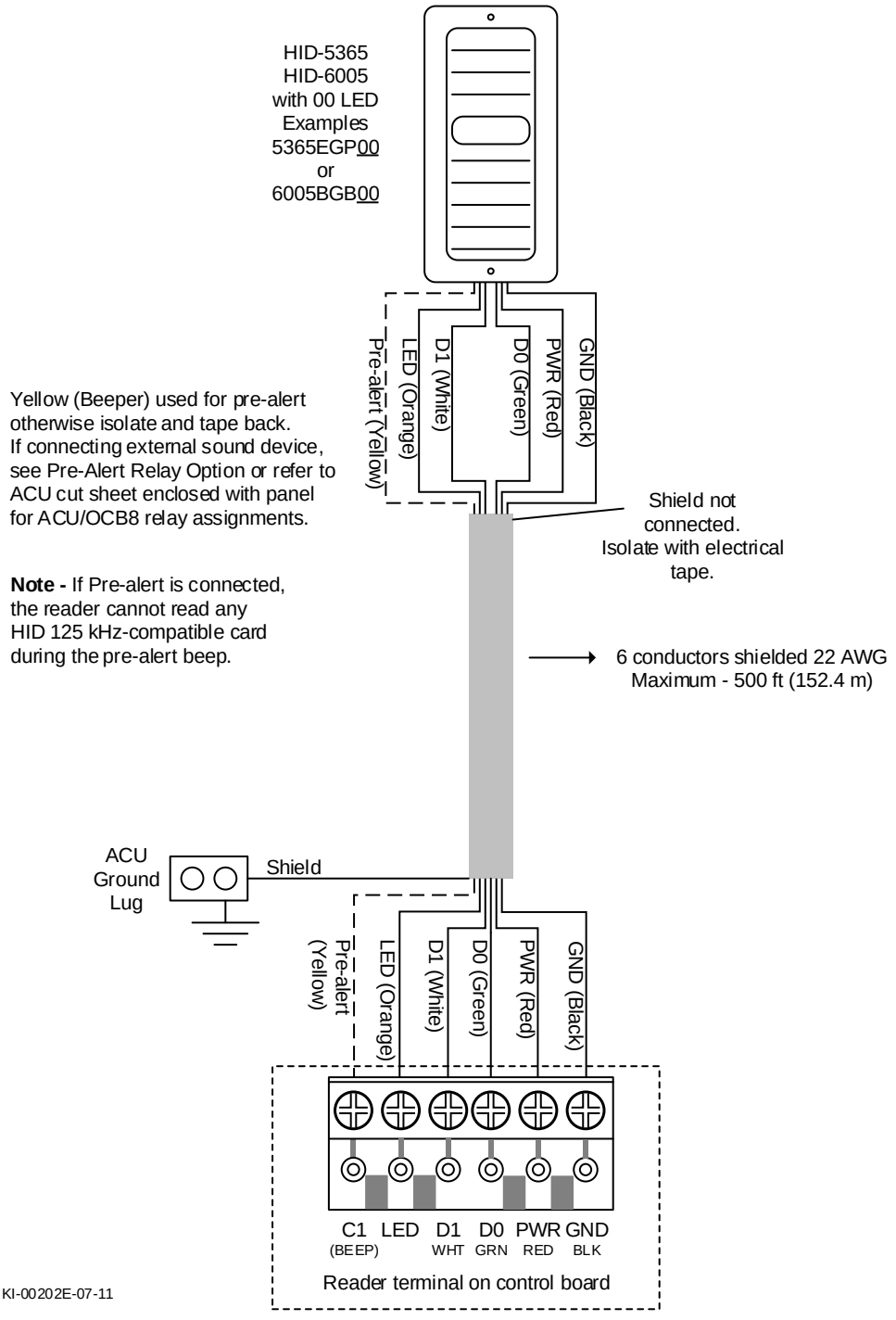
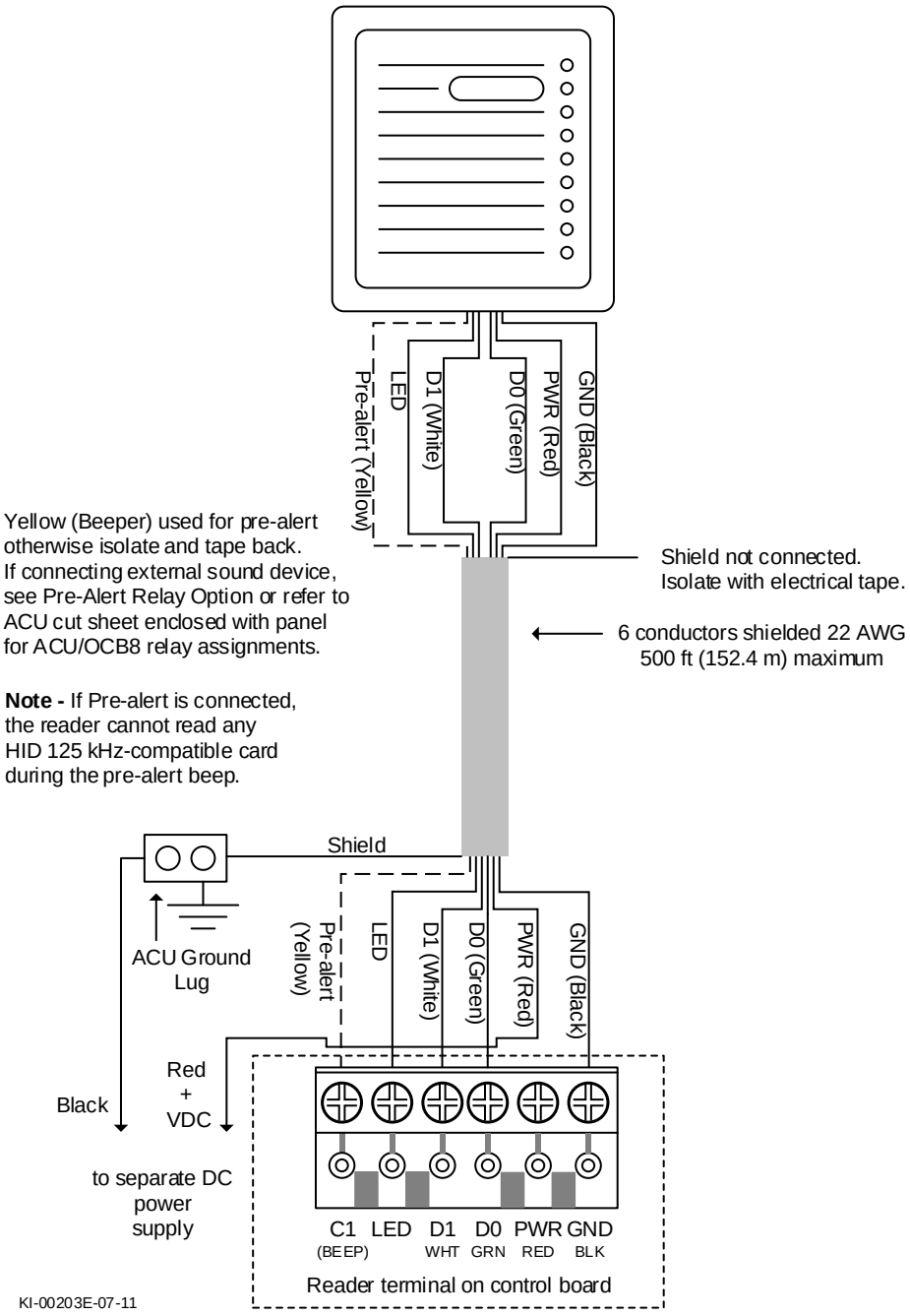


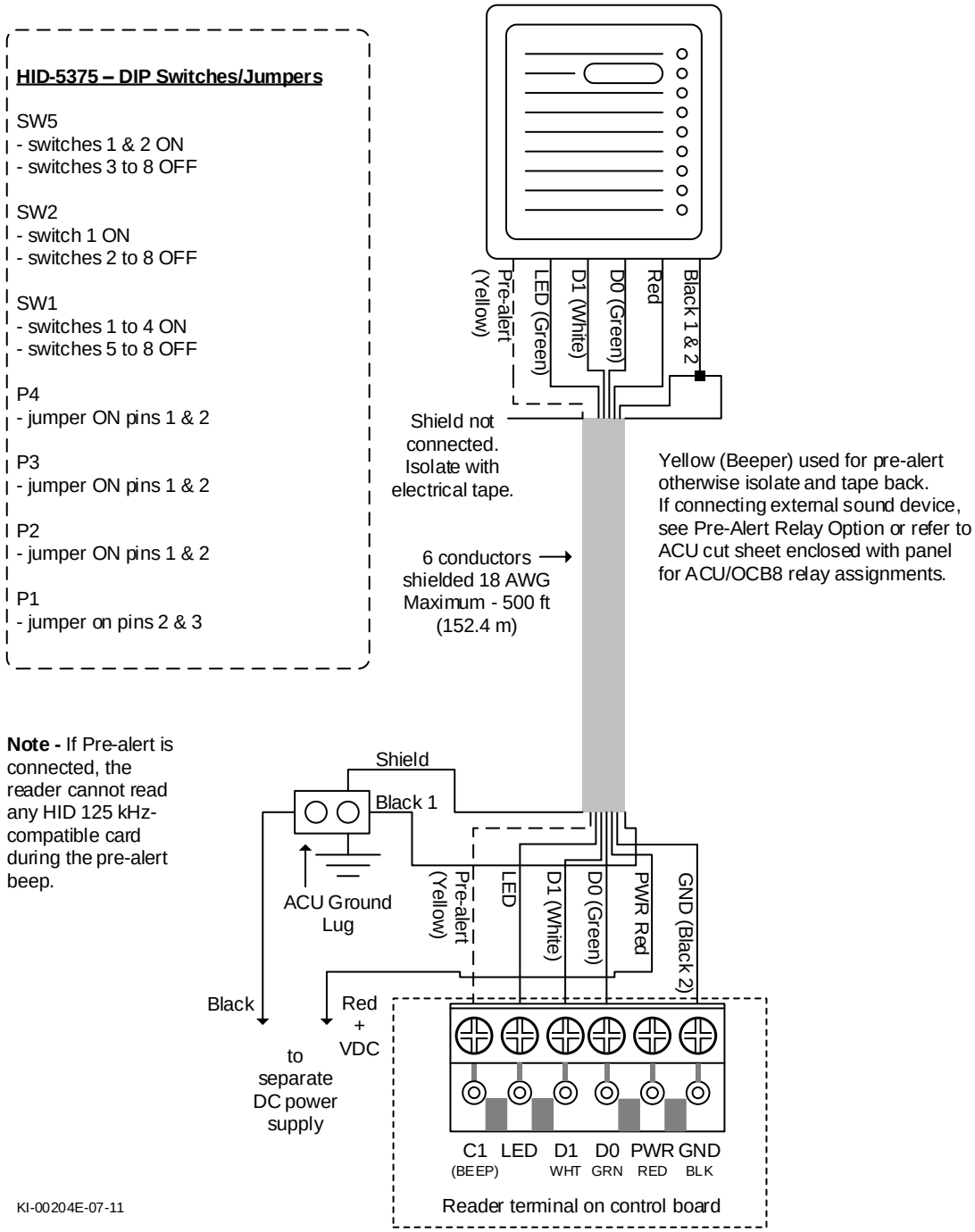
Figure 53 – HID 5355 Wiring



Notes on HID 5355

The HID 5355 is suitable for indoor and outdoor use. Maximum read range at 12VDC – ProxCard II card is 9" (22 cm) – ISO ProxII card is 8" (20 cm).

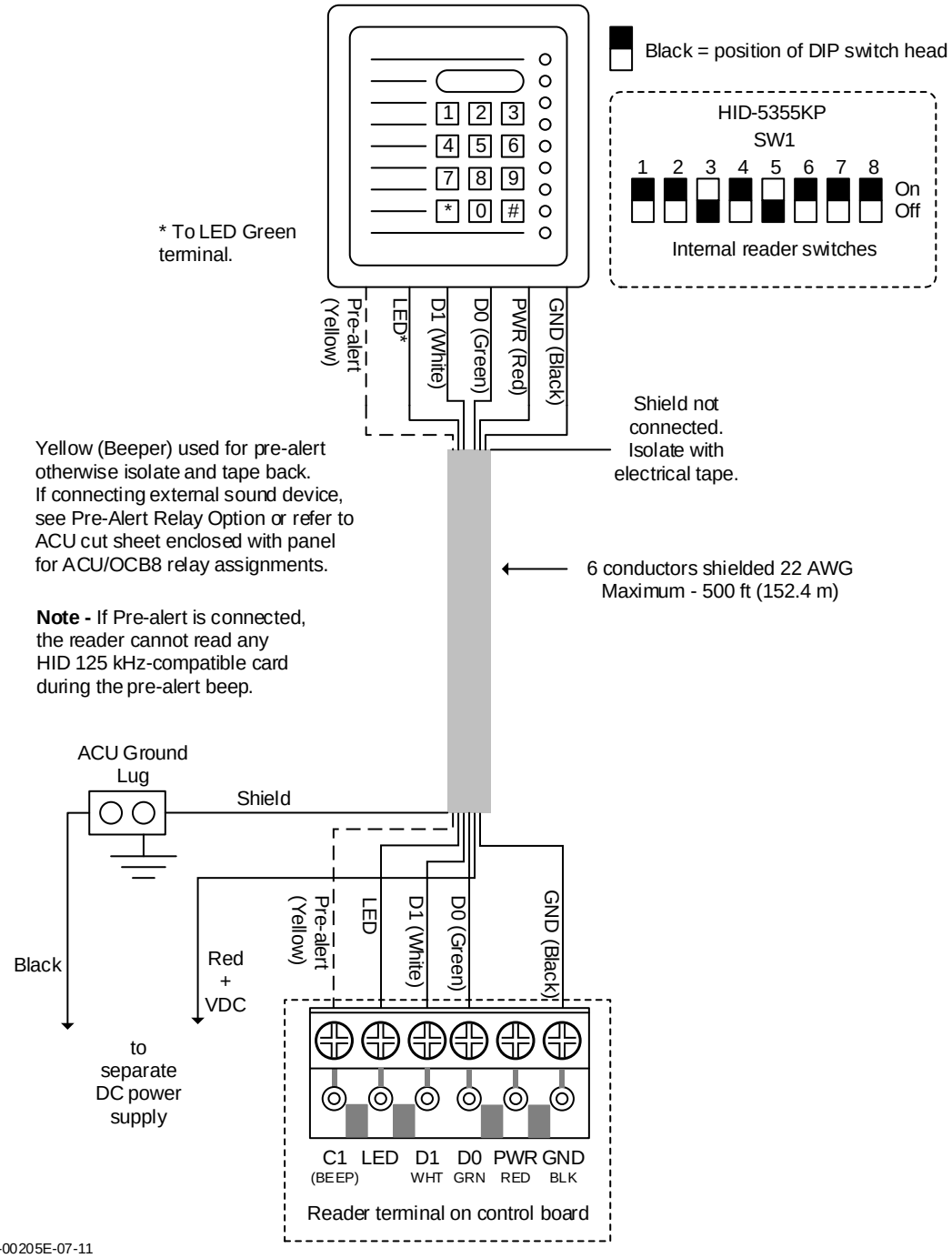
Figure 54 – HID 5375 Wiring



Notes on HID 5375

HID 5375 operates at 12 VDC or 24 VDC. Refer to HID literature for correct jumper settings. If configured for 12 VDC, do not connect to 24 VDC power supply, otherwise damage to the reader circuit board will result.

Figure 55 – HID 5355KP Wiring



Note on HID 5355 KP

Reader/Keypad/LED ordered as 00 (4 bit burst) example 5355AGK00 (Red/Green colour)

Figure 56 – HID iClass KEYR10

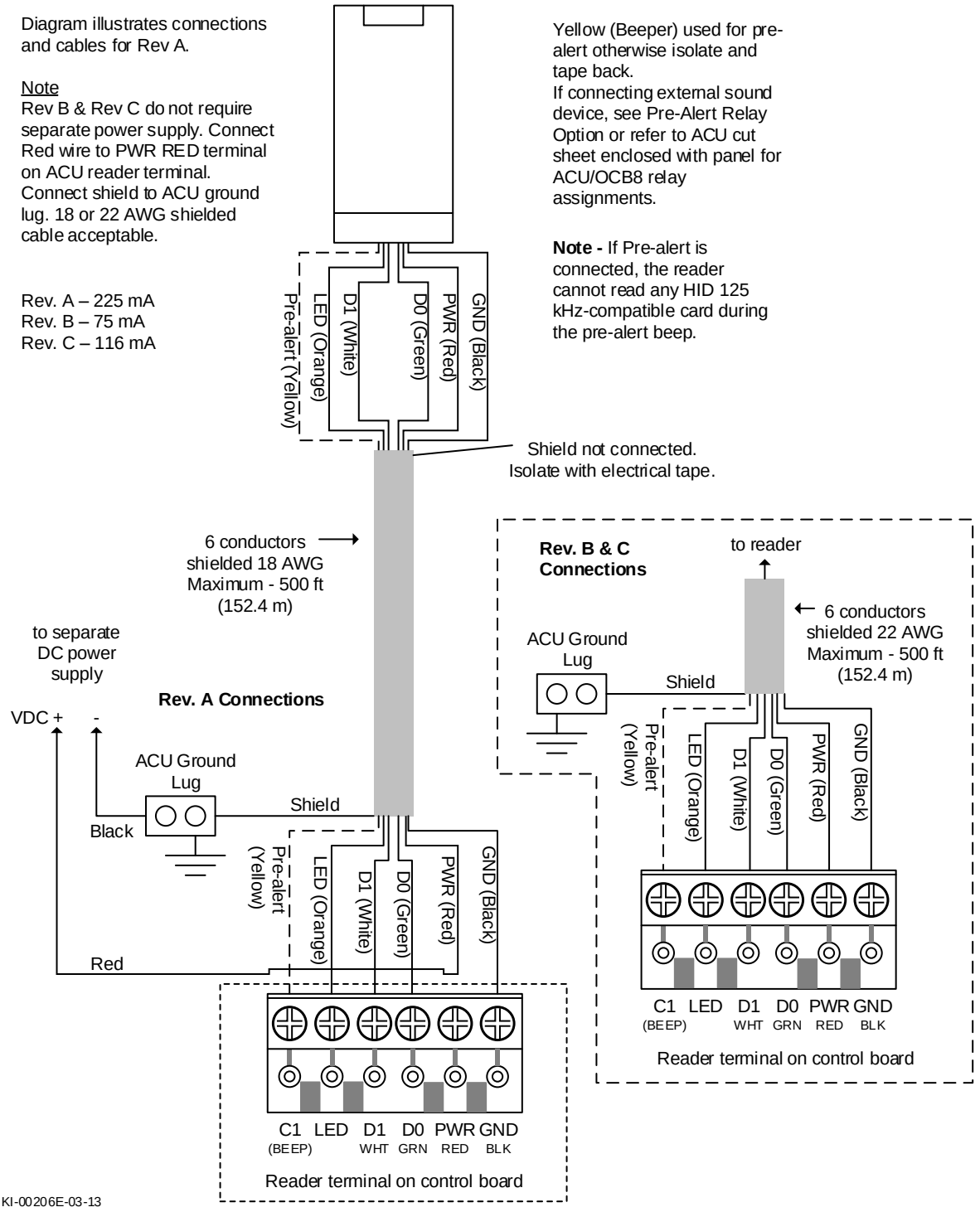


Figure 57 – HID iClass KEYR40

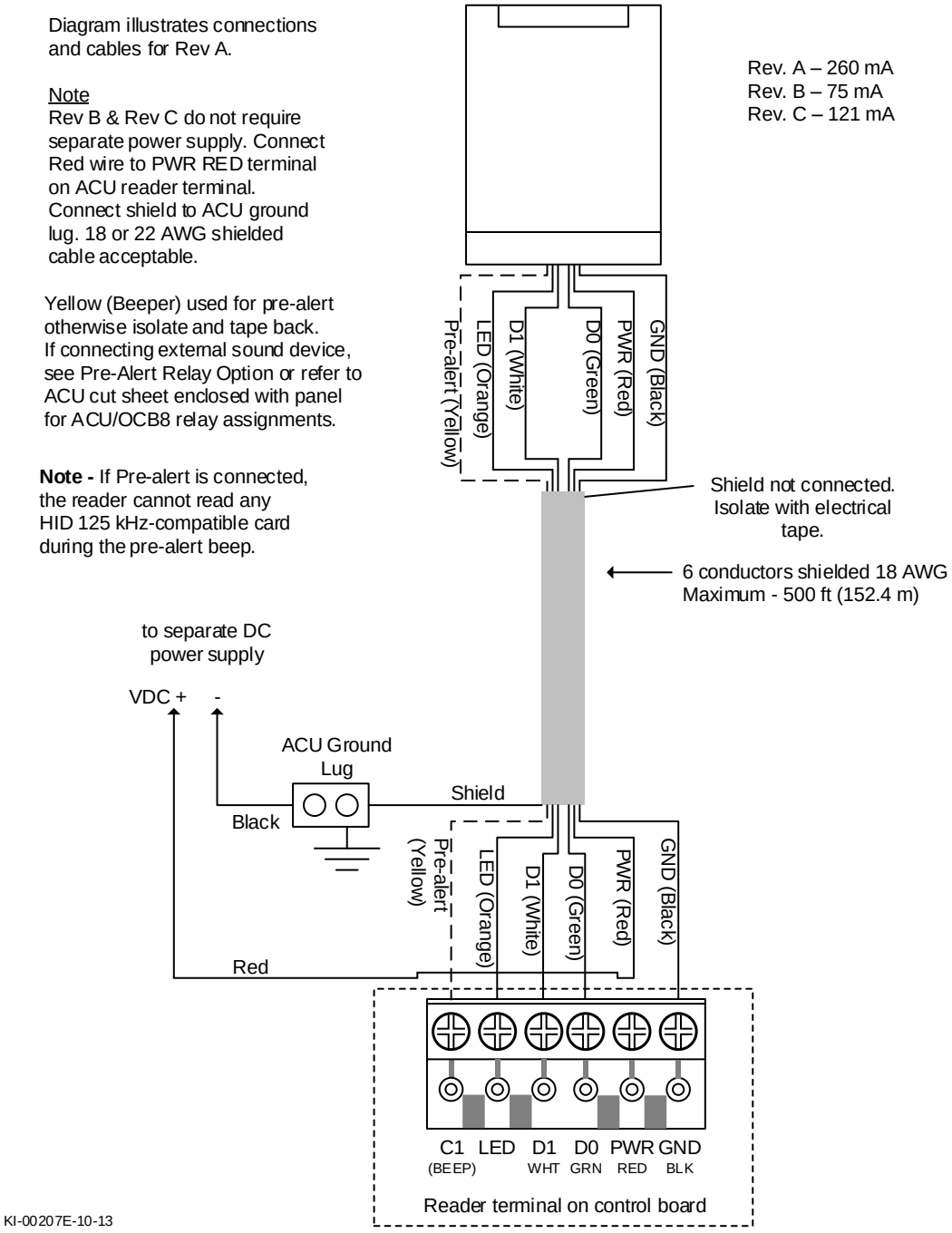
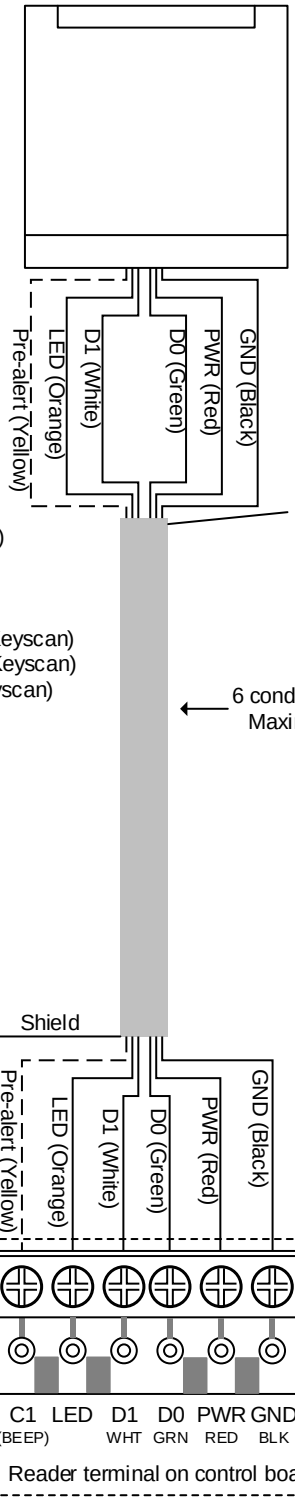


Figure 58 – HID iClass KEYRW400

Diagram illustrates connections and cables for Rev C.

Note
Rev A requires separate power supply. 18 or 22 AWG shielded cable acceptable.



HID Reader Terminal Blocks Legend

P1 Terminal
- P1-1 Yellow (Beeper)
- P1-2 Orange (Green LED)
- P1-3 Black (Ground RTN)
- P1-4 Red (+ 12 VDC)
- P1-5 Drain (Shield / Do not connect to Keyscan)
- P1-6 Brown (Red LED / Do not connect to Keyscan)
- P1-7 Blue (Hold / do not connect to Keyscan)

P2 Terminal
- P2-7 RS-232/RS-485/UART-T (Do not connect to Keyscan)
- P2-6 RS-232/RS-485/UART-R (Do not connect to Keyscan)
- P2-5 Violet (Open Collector / Do not connect to Keyscan)
- P2-4 White (Wiegand Data 1)
- P2-3 Green (Wiegand Data 0)
- P2-2 RS-485/USB-D (Do not connect to Keyscan)
- P2-1 RS-485-Z (Do not connect to Keyscan)

Connections to Keyscan Reader Terminal

- P1-1 Yellow to C1 (Beep)
- P1-4 Red to PWR/RED
- P1-3 Black to GND/BLK
- P2-4 White to D1/WHT
- P2-3 Green to D0/GRN
- P1-4 Orange to LED/BRN

Yellow (Beeper) used for pre-alert otherwise isolate and tape back. If connecting external sound device, see Pre-Alert Relay Option or refer to ACU cut sheet enclosed with panel for ACU/OCB8 relay assignments.

Note - If Pre-alert is connected, the reader cannot read any HID 125 kHz-compatible card during the pre-alert beep.

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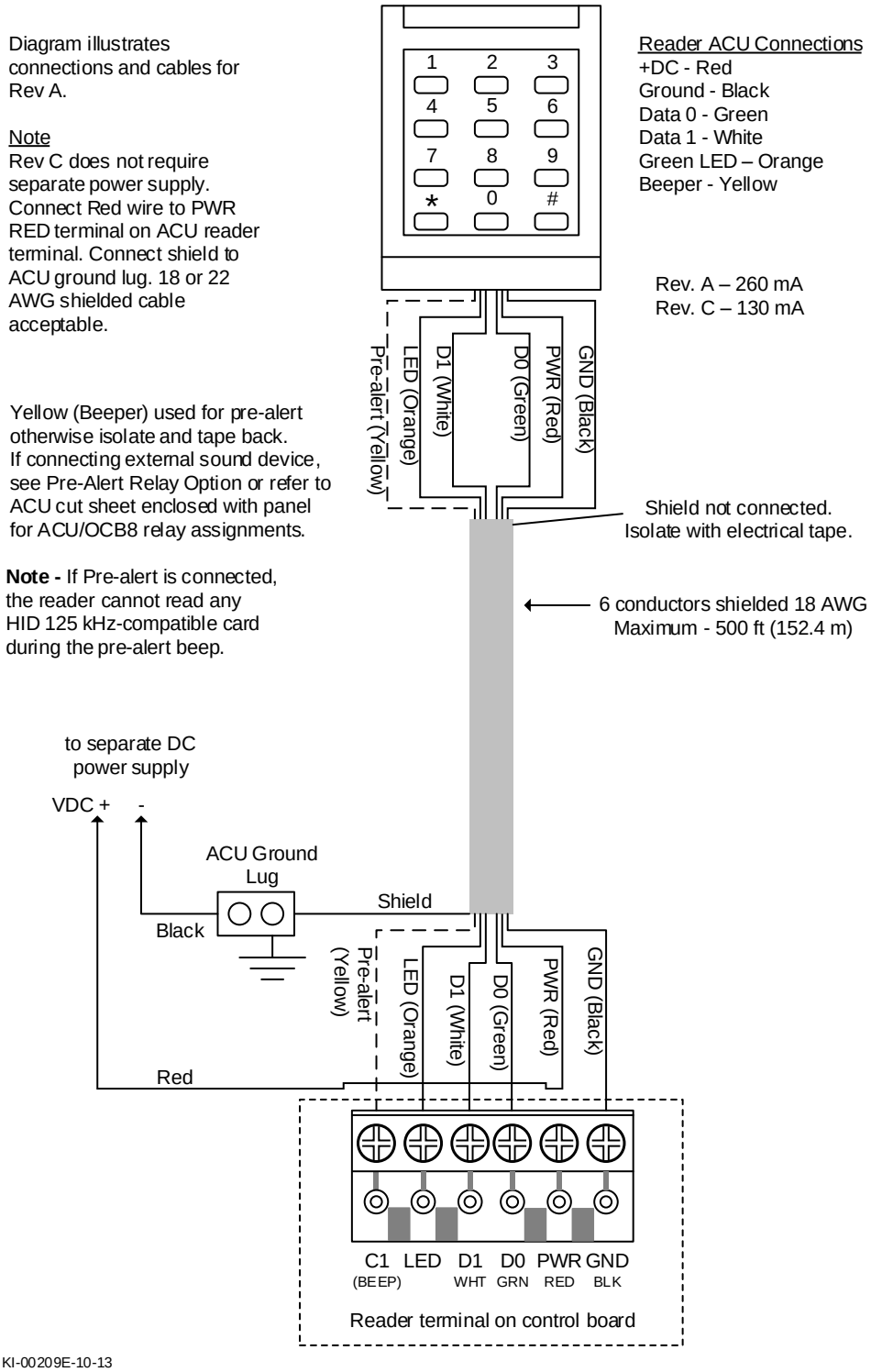
Figure 59 – HID iClass KEYRK40



Note on HID iClass KEYRK40

Reader/Keypad/LED ordered as 00 (4 bit burst) – example 6131AKN00100 (Red/Green colour)

Figure 60 – HID iClass KR90L Long Range Reader

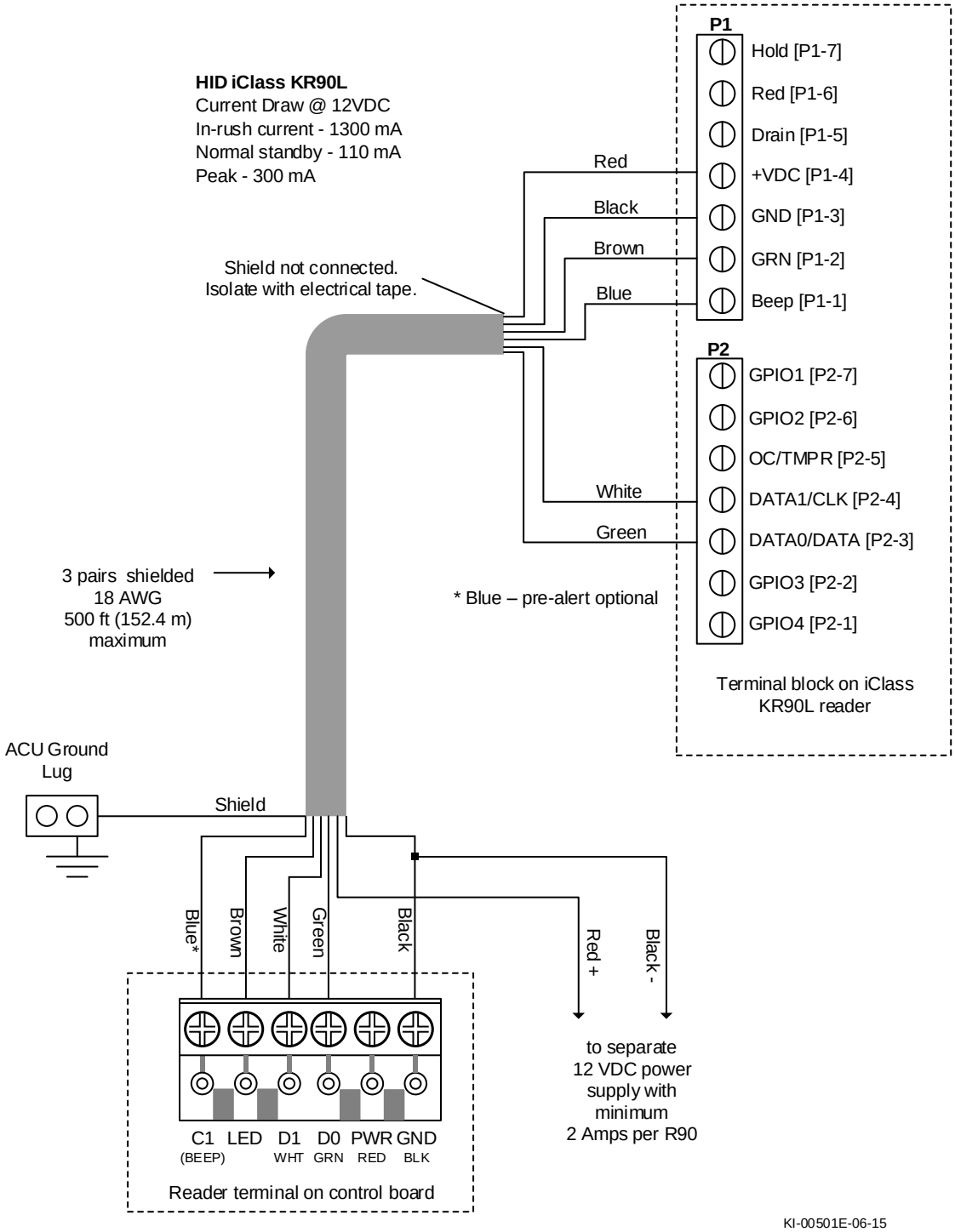


Figure 61 – HID iClass R10 Series

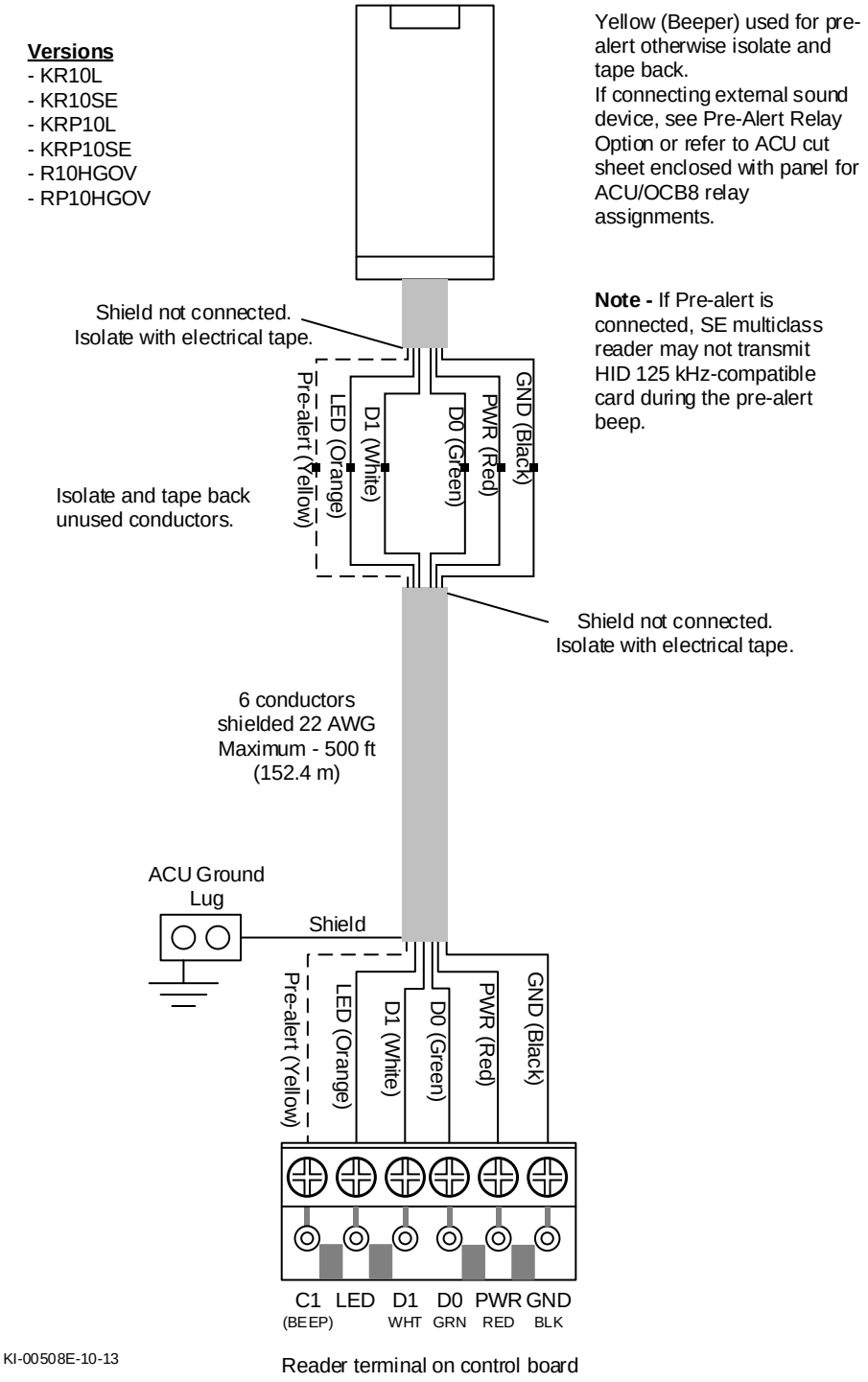


Figure 62 – HID iClass R15 Series

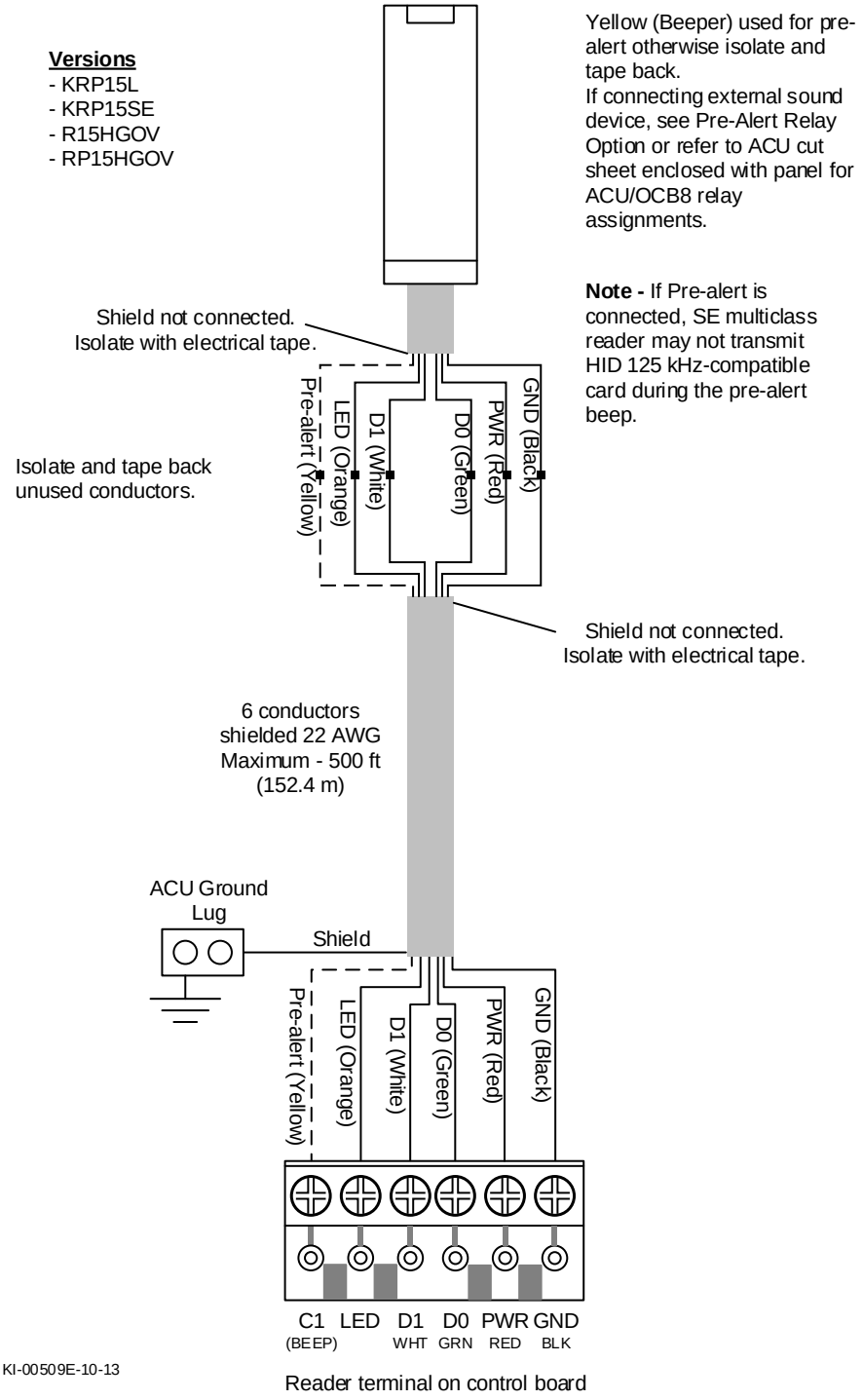


Figure 63 – HID iClass R40 Series

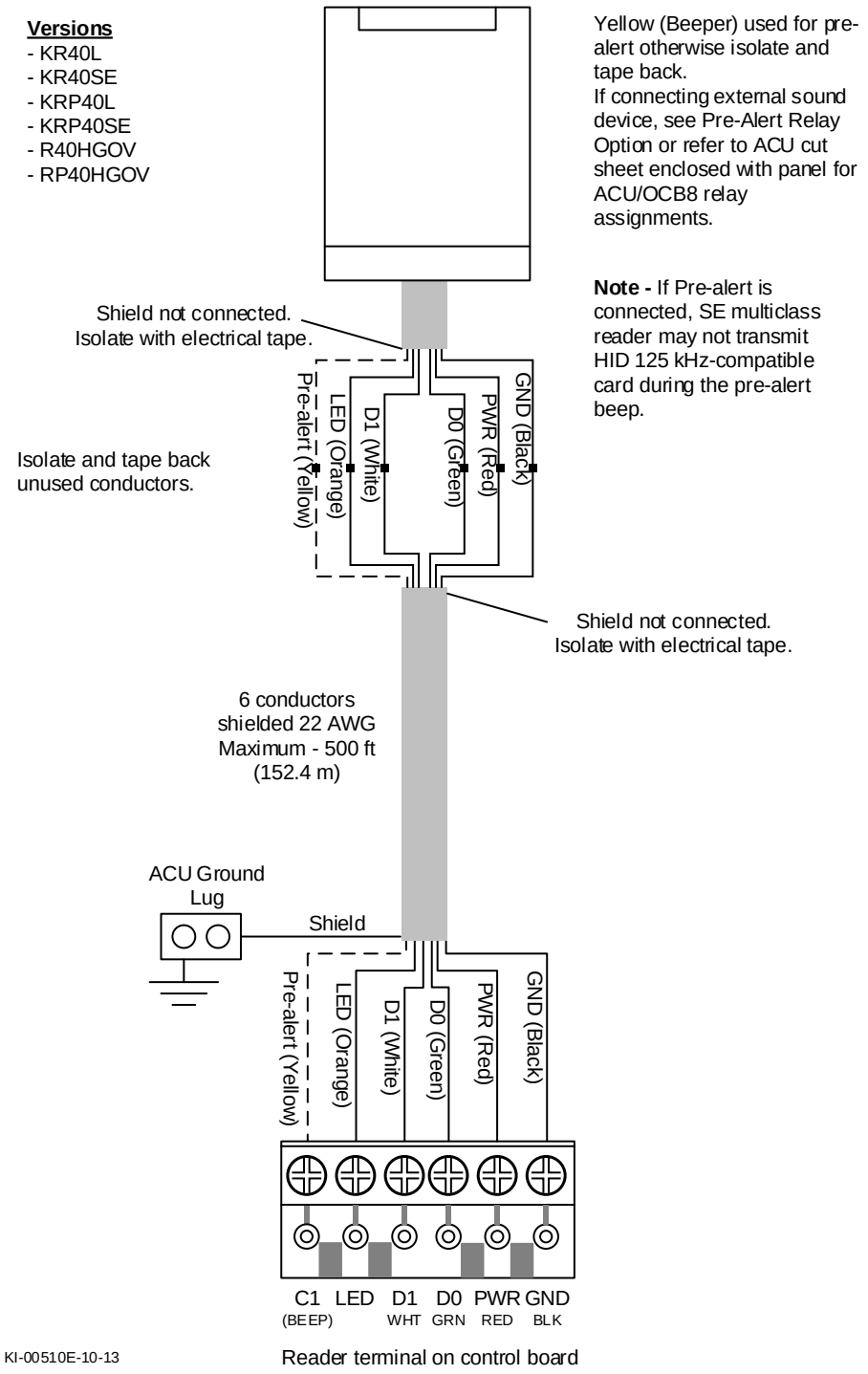
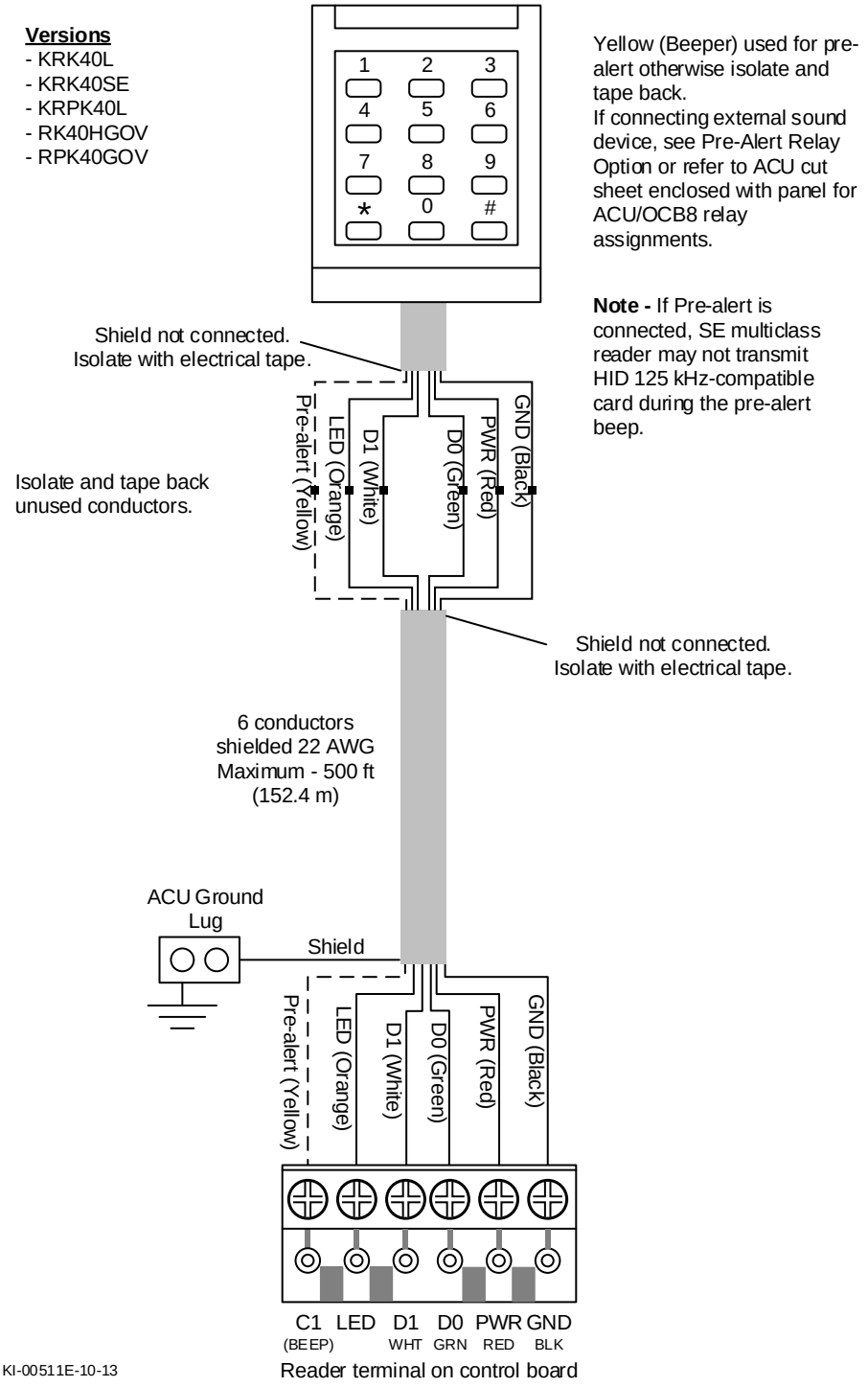


Figure 64 – HID iClass RK40 Series



Indala Readers

Wiring diagrams are on the following pages. Refer to the appropriate diagram for specific reader connections. Be sure to use a cable that complies with the reader's wiring specifications.

Power Specifications

The following table outlines Indala reader power specifications:

Table 13 – Indala Reader Power Specifications

Reader	Power	Notes
PX 603	12 VDC, 100 mA	
PX 605	12 VDC, 100 mA	
PX 610	12 VDC, 150 mA	Requires additional power supply when connected to CA 8500 circuit board.
PX 620	24 VDC, 1.2 A	Requires 18 AWG cable. Connect to separate 24 VDC 2 Amp linear power supply. (Not supplied with ACU kit.)
PXK 501	12 VDC, 80 mA + 20 mA interface = 100 mA	Current consumption includes interface circuit board

Installation Notes on Proximity Readers

Do not run reader cables in same conduit with AC power or signal cables.

Keep reader cables at a minimum distance of 12 inches or 30 centimetres from AC, computer data, telephone data, or electric lock device cables.

Do not install readers within 3.5 feet or 1.1 metres of computer CRTs.

Do not install readers in areas where broad spectrum EMI noise may be present. Devices such as motors, pumps, generators, and AC switching relays can create EMI noise.

Readers mounted on a metal surface can reduce the read range. See the Indala manual for recommendations.

Figure 65 – Indala PX 603 and PX 605 Wiring

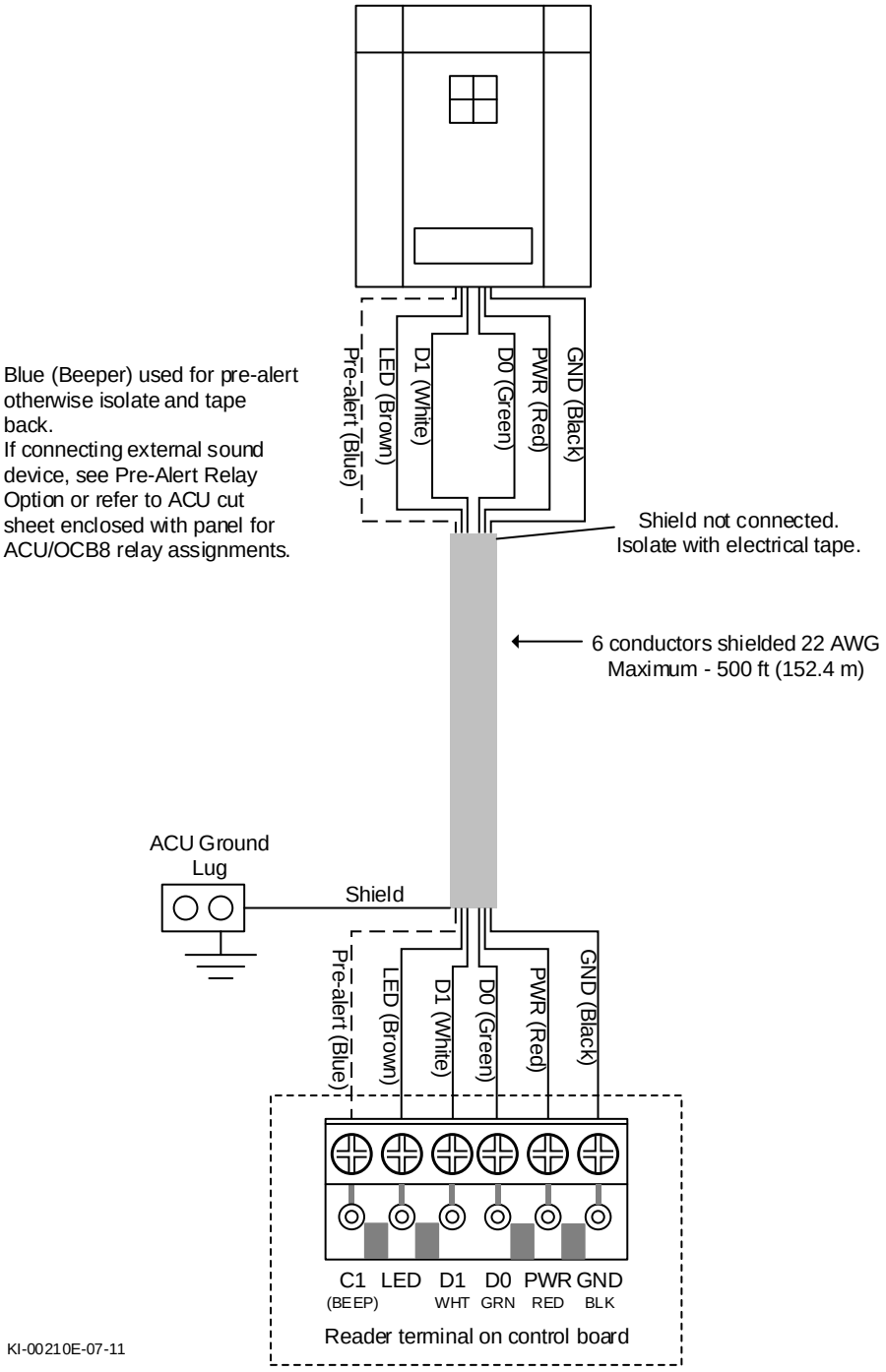


Figure 66 – Indala PX610 Wiring

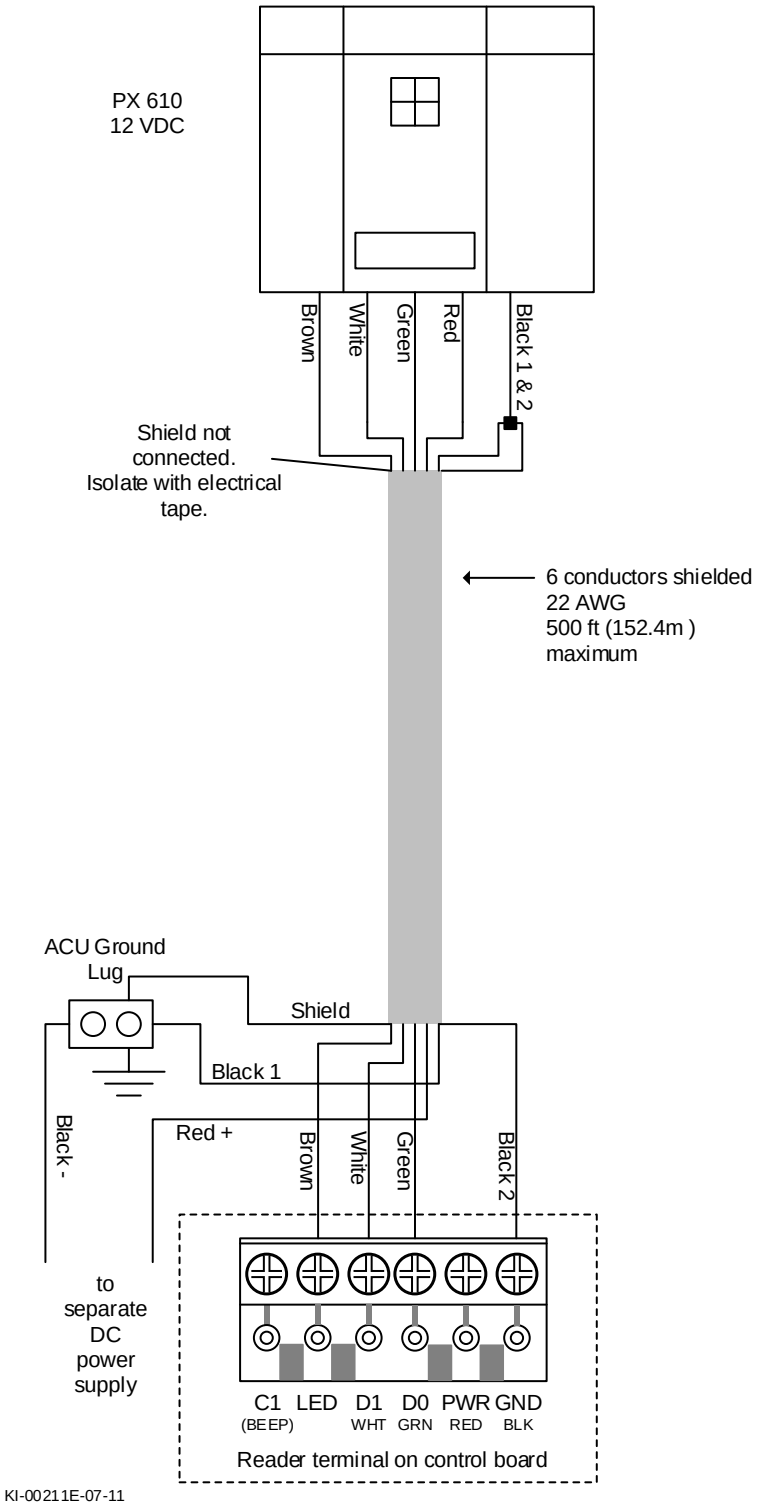
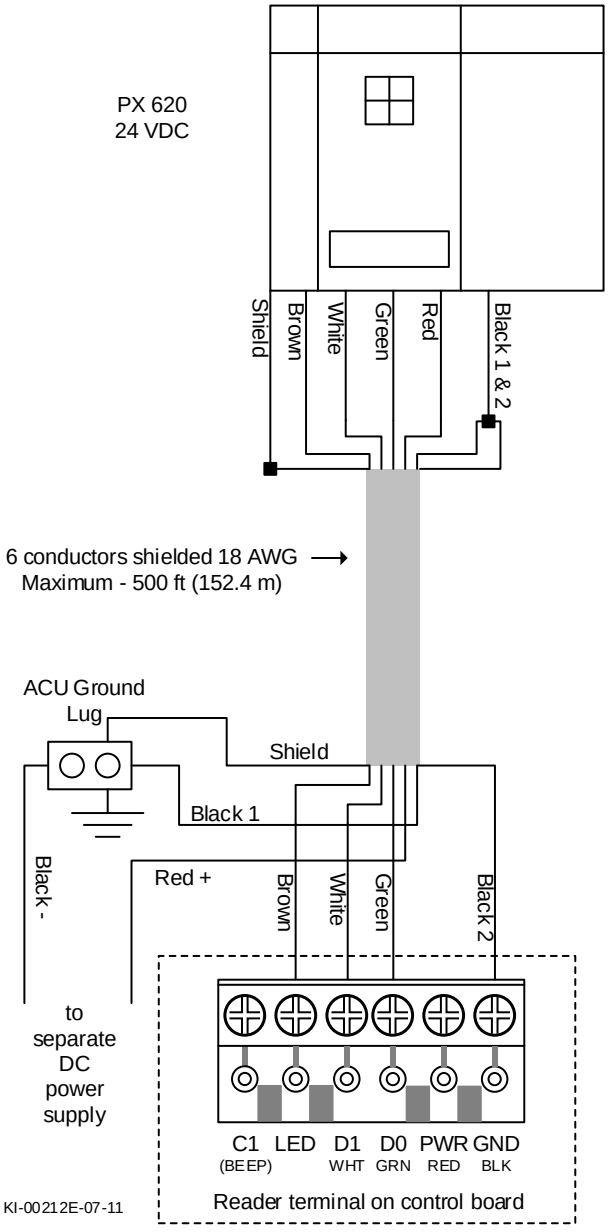


Figure 67 – Indala PX 620 Wiring

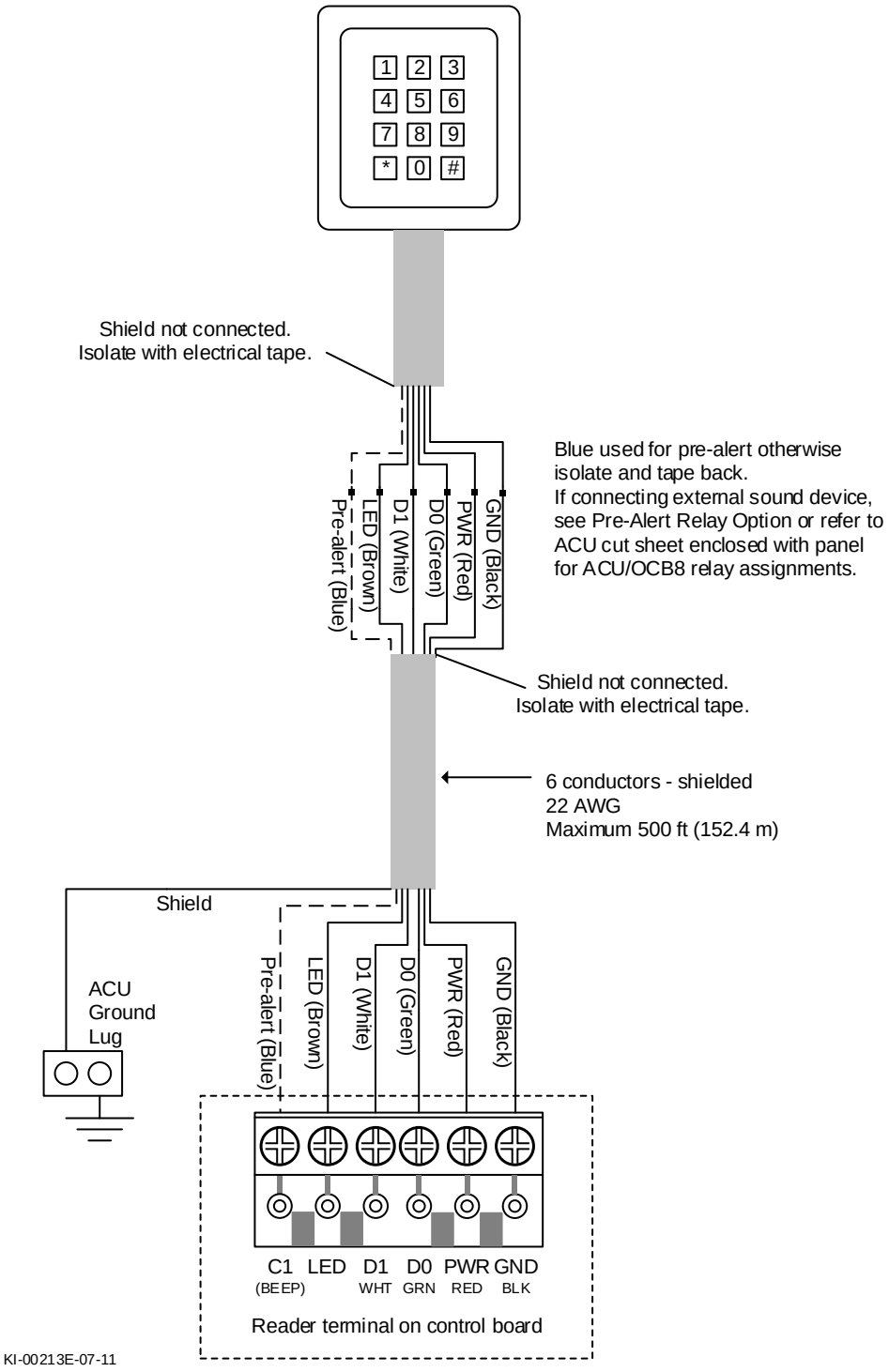


Important

Do not mount an Indala PX 620 reader in an elevator car. The environment is unsuitable and causes the reader to malfunction.

The PX 620 is factory tuned. If a PX 620 requires tuning, tune only once. Excessive tuning may permanently damage the reader. Refer to the Indala documentation for instructions on tuning.

Figure 68 – Indala PXK 501 Wiring



Note on Indala PXK 501 Wiring

Reader/Keypad/LED ordered as 8 bit burst – example FP5061B-8 Bit Burst (Red only)

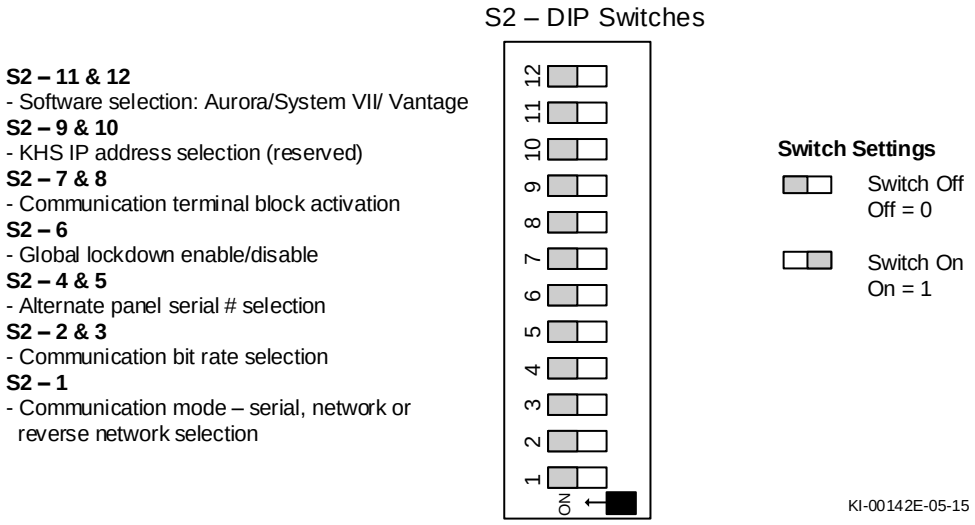
S2 DIP Switches

The following sub-sections outline S2 DIP switch functions and settings on door (CA) and elevator (EC) control boards. Keyscan factory defaults all control board settings prior to shipment. Depending on the installation however, you may have to reset various switches and reconfigure the control board for specific operating requirements.

Important

Whenever altering S2 DIP switches, refer to S1 - System Reset / S3 - Restore Factory Defaults on page 96 for determining when you must perform a system reset or restore factory defaults. This ensures the control board initializes the changes.

Figure 69 – S2 DIP Switch Legend



S2 DIP Switch Functions

The following sub-headings outline the specific S2 switches and their respective functions.

S2.1 - Communication Mode

Keyscan control boards support serial, network and reverse network communication modes. Reverse network is a proprietary Keyscan communication application and requires the purchase of a license.

S2.2 & S2.3 - Communication Bit Rate Selection

The number of bits the control board processes per second. For a communication bus with multiple control boards, all control boards must be set on the same bit rate. Ensure the control board is set on the desired and correct rate. Also, ensure that all Keyscan software settings match the control board's bit rate.

S2.4 & S2.5 - Alternate Panel Serial Number

Each control board has a factory-assigned serial number for identification and communication with the Keyscan access control management software.

Always use the factory-assigned serial number as a setting in the Client software. In the event the Client software detects a duplicate serial number during ACU setup, a prompt informs you to reconfigure the control board for an alternate serial number by an increment of 10, 100 or 1000. Set the S2 DIP switches accordingly as outlined in the table.

S2.6 - Lockdown

This function enables a control unit to lockdown all connected doors or floors via the Client software or a lockdown input. Refer to Lockdown – Door / Floors document on Keyscan Product Documentation Library CD for more information.

S2.7 & S2.8 - Communication Terminal Block Activation

The following communication terminal blocks on the control board require activation for communication: TB4 (RS-232 serial), the H1 header (CB-485 or CPB-10-2) or the M1 terminal (NETCOMP).

The H2 header for CIM connections is an open header and not regulated by S2.7 and S2.8.

S2.9 & S2.10 - IP Address

Reserved for Keyscan hosted services.

S2.11 & S2.12 – Software Selection

The control board must be set on the corresponding Keyscan software platform – System VII, Vantage or Aurora.

S2 DIP Switch Settings

Review Table 14 for determining S2 DIP switch settings.

Table 14 – S2 DIP Switch Settings

S2 Switch #	Setting	Function	Notes
S2.1	0 = Off 1 = On	**Communication Mode**	
	0	Serial Communication	Also see S2.7 & S2.8 in the table.
	0	Network Communication	As above.
	1	Reverse Network Communication	Applies only to the reverse network designated control board with the programmed IP of the host location. All other boards on communication bus S2.1 = 0. Also see S2.7 & S2.8 in the table.
S2.2 & S2.3		**Communication Bit Rate**	
	0 0	9600 bit/s	
	1 0	19,200 bit/s	(not applicable for reverse network)
	0 1	57,600 bit/s (CPB-10-2 not supported)	Recommended setting
	1 1	115,200 bit/s (CPB-10-2 or CB-485 not supported)	(not applicable for reverse network)
S2.4 & S2.5		**Alternate Panel Serial # Selection**	
	0 0	Factory-assigned serial # *	* Leave on factory assigned setting unless prompted in the Client software when inputting panel data.
	0 1	Alternate serial #1 – adds 1000 to factory-assigned serial #	(not supported on Aurora)
	1 0	Alternate serial # 2 – adds 100 to factory-assigned serial #	(not supported on Aurora)
	1 1	Alternate serial # 3 – adds 10 to factory-assigned serial #	(not supported on Aurora)
S2.6		**Lockdown**	
	0	Disabled	
	1	Enabled	CA250 – AI #8 / CA4500 & CA8500 – AI #16 are dedicated lockdown aux inputs when the control board is lockdown enabled.
S2.7 & S2.8		**Communication Terminal Block Activation**	
	0 0	For direct serial communication connect to RS-232 (COM4) - TB4 terminal block	
	0 1	CB-485 and CPB-10-2 communication via CPB/CB MODULE (COM4) - H1 header	
	1 0	NETCOMP communication plugged directly into M1 on control board (COM4)	
	1 1	Program mode for NETCOMP plugged into M1 (COM4) on the control board	

S2 Switch #	Setting	Function	Notes
The H2 header for CIM connections is an open header not regulated by S2.			
S2.9 & S2.10		**KHS - IP Address**	
	n/a	Reserved for Keyscan Hosted Services	
S2.11 & S2.12		**Software Selection**	
	1 1	Aurora	
	0 0	System VII	
	1 0	Vantage	
	0 1	Future use	
	0 = Off 1 = On		

Notes on Communication Settings

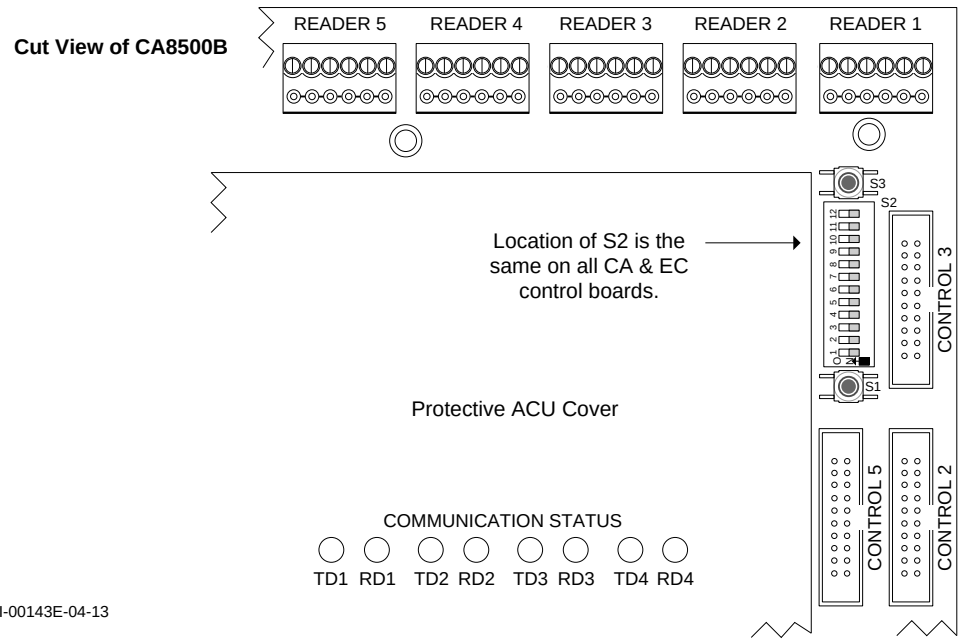
The 9600 bit/s communication setting is recommended for the CPB-10-2 only. Aurora does not support this communication setting.

The 19,200 bit/s communication setting is recommended only for CPB-10-2 connections, which do not exceed 200 ft/61 m between units and overall distance.

Aurora and all current hardware products do not support modem communication.

Ensure you are running the most current software version with this control board. For the latest software updates, visit www.keyscan.ca.

Figure 70 – Location of S2 DIP Switches



Important - Circuit Board Function Revisions

The following functions on PC1097 version and higher control boards are programmable via the Client software:

- Reader configuration (formerly jumper J3)
- Reader LED lock state (formerly J16)
- Temporary card countdown (formerly J16)
- Accessibility HC relay all cards enabled (formerly J16)
- End-of-line supervision mode (formerly J18)
- Reader lockdown LED mode (formerly J18)

You require the following Keyscan software versions:

- Aurora – version 1.0.1.0 or higher
- System VII – version 7.0.19 or higher
- Vantage – version 8.1.18 or higher

Circuit Board Card Capacity

PC1097 and higher circuit boards are defaulted for 45,000 – Aurora - and 32,000 – System VII and Vantage - card-storage capacity – names not stored in ACU. Keyscan strongly advocates that either the dealer/installer or the end-user schedule automatic database backups at regular intervals to safeguard all site and credential holder data. The database backup and scheduling functions are located in the Client software. In the event that the database is not backed up, the Disaster Recovery utility is unable to retrieve names from the access control board.

S1 - System Reset / S3 - Restore Factory Defaults

S1 – System Reset

The System Reset S1 is a push button that re-boots the control board to initialize any previous changes made to the S2 DIP switches. If the control board has power and you alter any of the following S2 DIP switches, briefly press and then release the S1 System Reset push button:

- S2.1 - Communication Mode
- S2.2 & S2.3 - Communication Bit Rate Selection
- S2.4 & S2.5 - Alternate Panel Serial Number
- S2.6 – Lockdown
- S2.7 & S2.8 - Communication Terminal Block Activation
- S2.11 & S2.12 – Software Selection – refer to S3 Restore Factory Defaults

If the control board was not powered while the S2 DIP switches were changed, with the exception of S2.11 & S2.12 – Software Selection, you do not have to perform a system reset. The control board initializes the changes when power is applied.

S3 – Restore Factory Defaults (Clear Memory)

S3 restores the control board's factory default settings. You must restore the factory default settings whenever you have performed one or more of the following procedures to a control board:

- when a control board has been newly installed
- when an EPROM or reader PROM has been changed
- when the software selection DIP switches have changed
- when the ACU protective cover has been removed to mount a NETCOMP on the Ethernet M1 socket

Procedure

To restore the factory default settings, ensure the control board has power, press S1, wait 5 seconds. Press S3 within 10 seconds.

After performing the above clear memory procedure, the system status LED begins flashing red and the control board's piezo emits a cycle of two (2) short beeps followed by a pause. This occurs for approximately 120 – 150 seconds while the factory default settings are loaded and the board erases database information from the on-board memory. Do not make any changes to the control board, such as altering DIP switches or powering down the board, while the factory defaults are being restored or you will have to repeat the procedure. After the System Status LED has stopped flashing, the factory default settings have been restored and the Keyscan database has been cleared from the on-board memory. After you have restored the factory defaults, perform an upload at a PC with the Keyscan Client software to populate the Keyscan database in the control board's on-board memory.

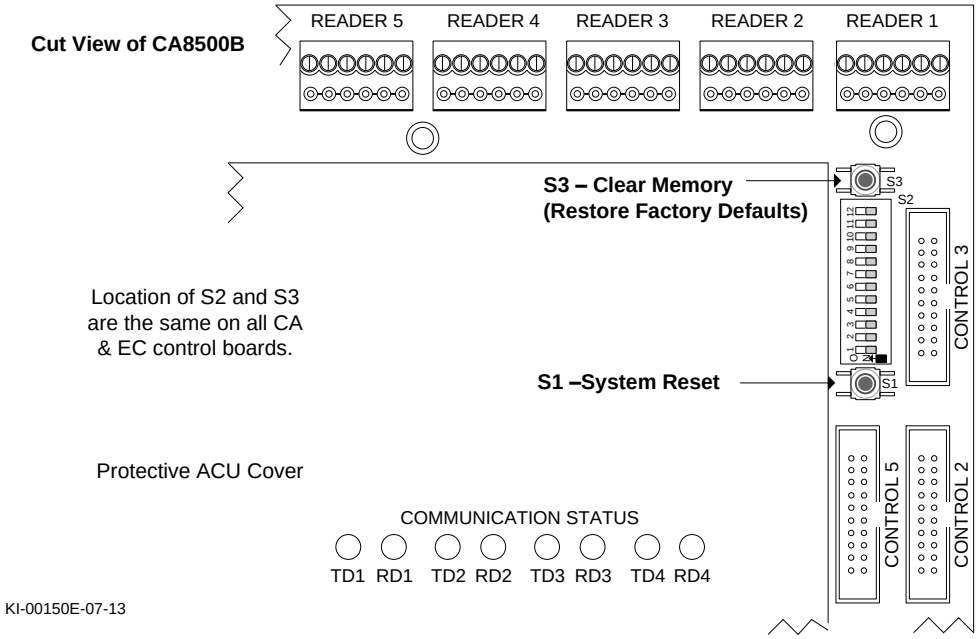
If this is a new installation, enter the site information in the Keyscan Client software and then upload the Keyscan database information to the control board(s). Until you perform an upload from a Keyscan Client, the access control units will not function. Also, see Power Up and Test Voltages for a new installation.

Clear Memory without Full Memory Test

Ensure the control board has power, press S1, wait 5 seconds. Hold down the tamper switch, and then momentarily press S3 within 10 seconds. Then release the tamper switch.

This clear memory procedure is shorter in duration for restoring the factory defaults – approximately 15 to 20 seconds – but bypasses performing a full memory test on the control board. Do not use this clear memory method on newly installed control boards.

Figure 71 – S3 Restore Default Settings (Clear Memory) & S1 System Reset Locations



Single ACU Communication

This section outlines ACU to PC communication where only a single control board is on the communication loop. The control boards support the following types of communication:

- Serial (direct RS-232)
- USB (USB 1.1 & USB 2.0 supported)
- Network (TCP/IP)

For connecting multiple control boards on a communication loop, refer to the CIM Communication section.

If you are connecting a legacy communication board – CPB-10-2 or CB-485, – refer to the installation document that was included with the product.

Important

Do not mix CIM, CPB-10-2 or CB-485 boards on the same communication loop.

NETCOMs

The technical guide includes only operational connections for NETCOM devices. For programming instructions and temporary serial programming connections, refer to the specific installation guide that was included with the NETCOM device.

Multiple Building Communication on a WAN

A point-to-point private network is required where NETCOMs integrate building-to-building communication over a LAN/WAN (TCP/IP).

For reverse network communication applications, a public or private network is required with a path and connectivity between the host location and the remote location. Reverse network communication requires a license from Keyscan.

Keyscan RS-232 Data Cable

Keyscan's RS-232 data cable has multiple applications for various Keyscan products and as such has a generic configuration for the loose wires. When used in applications where the shield must be connected to the metal enclosure ground lug, Keyscan suggests one of following wiring options:

- Option A – trim back the shield wire to approximately 0.5" (1.5 cm) then solder an appropriate length of green # 20 AWG wire to the shield and terminate the shield at the ground lug
- Option B – remove sufficient cable jacketing allowing the shield wire to return to the ground lug from the communication connector. Trim the 5 communication wires to a length of 2.5" (6.5 cm) and strip the ends

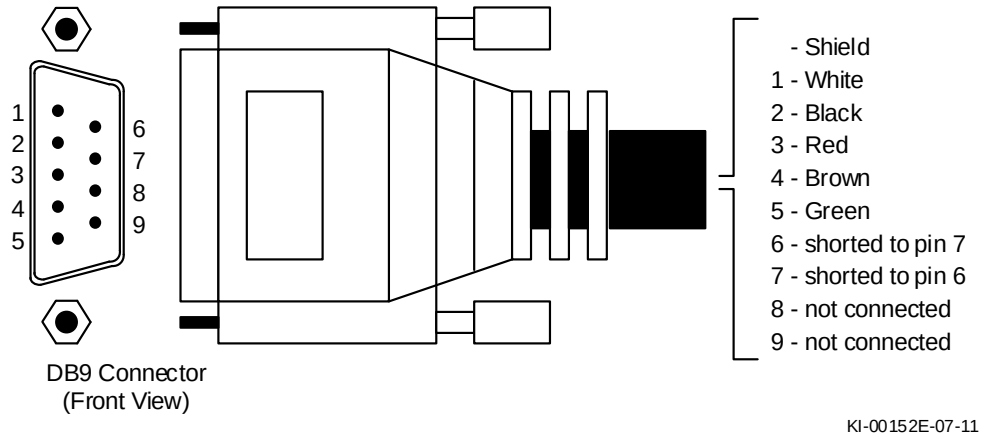
Insulate the shield wire with a length of tubing to prevent it from shorting. Terminate the shield.

Configure a 9-pin RS-232 Data Cable

In the event that you are establishing a serial connection from the PC either to the control board or a communication board and you have to make a 9-pin RS-232 data cable, ensure that you follow the pin to wire

colour assignments on the following diagram. When possible, use a Keyscan 9-pin RS-232 data cable (Keyscan part # 40-2322) manufactured specifically for Keyscan serial data connectivity.

Figure 72 – RS-232 Data Cable Connections



Installation Notes

Typically, the black wire of the RS-232 cable from the PC, which is the receive data input of the PC, is connected to the serial port TD pin of most Keyscan products.

Typically, the red wire of the RS-232 cable, which is the transmit data output of the PC, is connected to the RD pin of most Keyscan products.

Figure 73 – Communication - Direct Serial

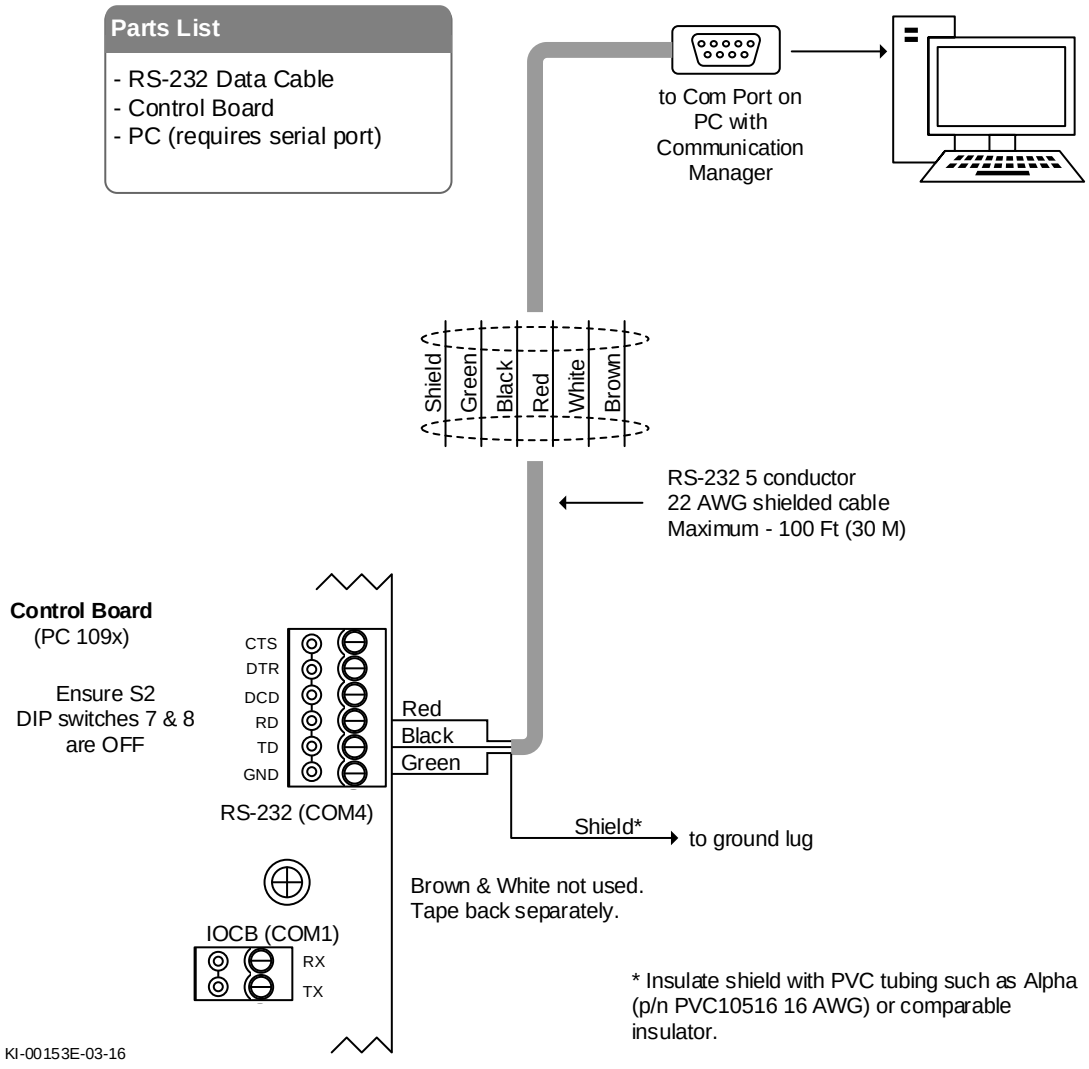


Figure 74 – Single ACU Communication - USB Adaptor

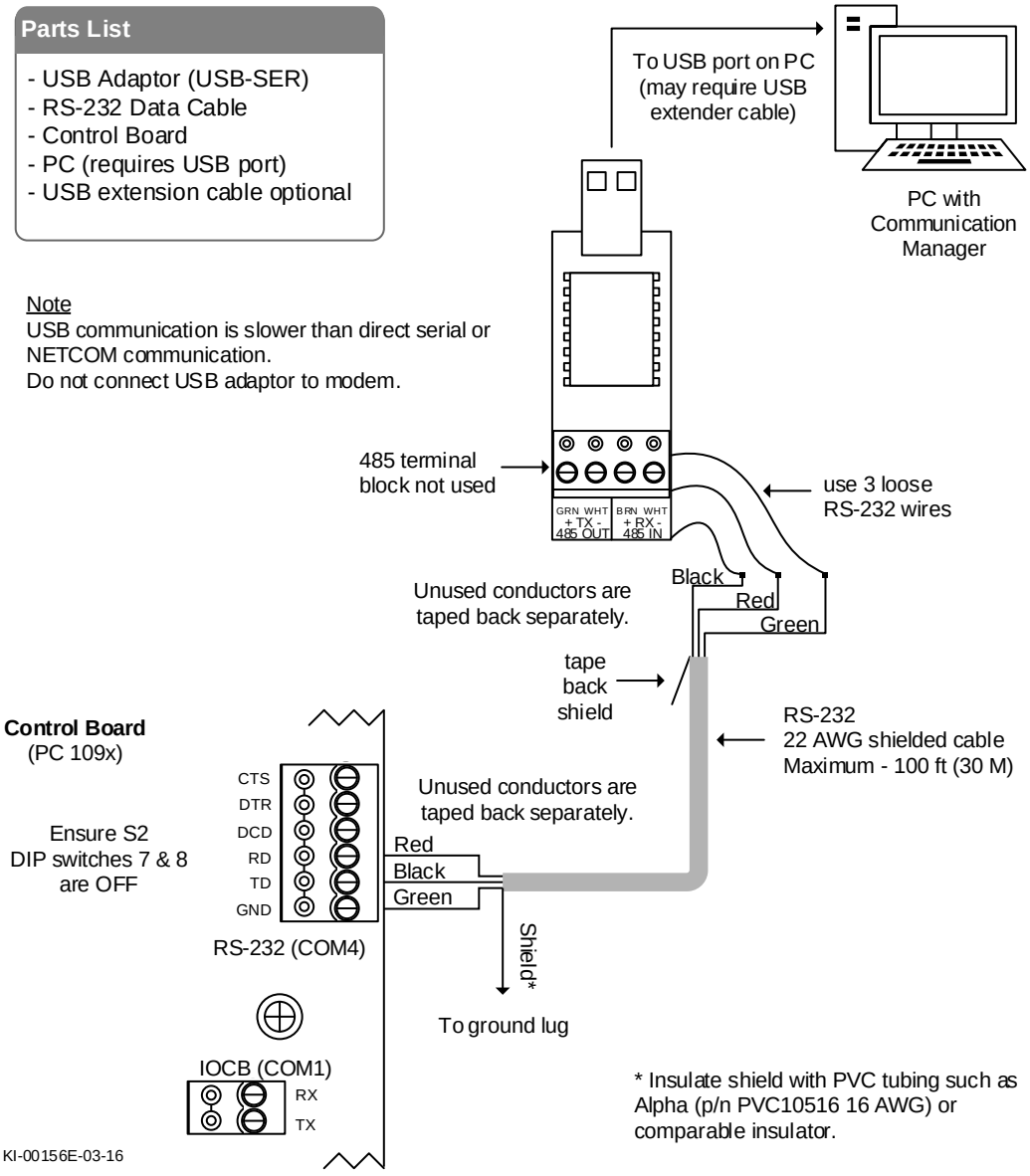
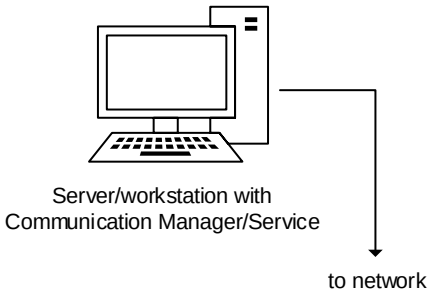


Figure 75 - Communication - NETCOM2P or NETCOM6P/ACU

Parts List

- PC
- 10/100 Base-T Cable
- Control Board
- NETCOM2P or NETCOM6P

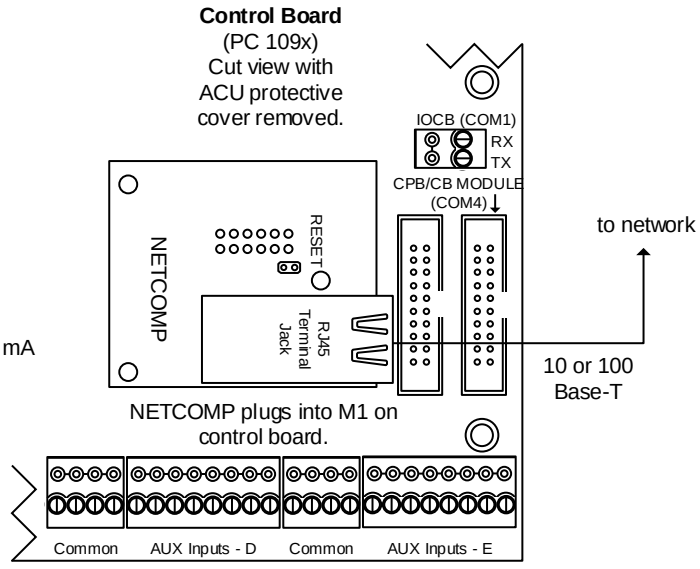


J16
Pin F = ON
Pin G = OFF

Or

S2
DIP switch 7 = ON
DIP switch 8 = OFF

Current Draw
ACU + NETCOMP = 270 mA



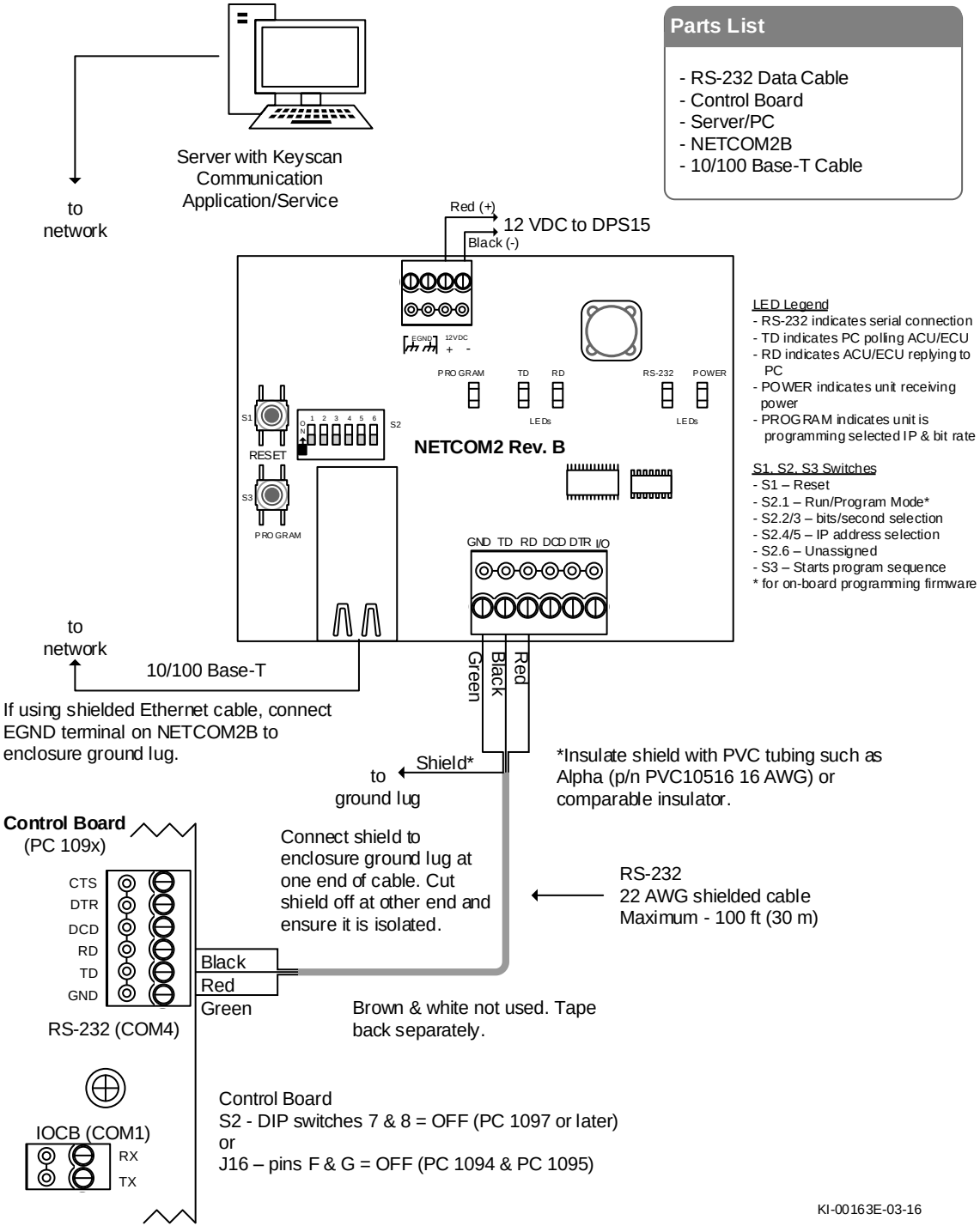
KI-00161E-02-16

Important

NETCOM2P or NETCOM6P plugged directly into the control board only supports a single panel communication loop.

After installing and connecting the NETCOMP, attach and secure the control board's protective cover before applying power.

Figure 76 – Communication - NETCOM2 Rev. B/ACU



Note

If the NETCOM2 is mounted in the metal enclosure, the shield of the serial cable may be connected to GND as shown. If the NETCOM2 is mounted outside the metal enclosure, the shield must be insulated and connected directly to the metal enclosure ground lug. See Grounding Communication Cable Shield.

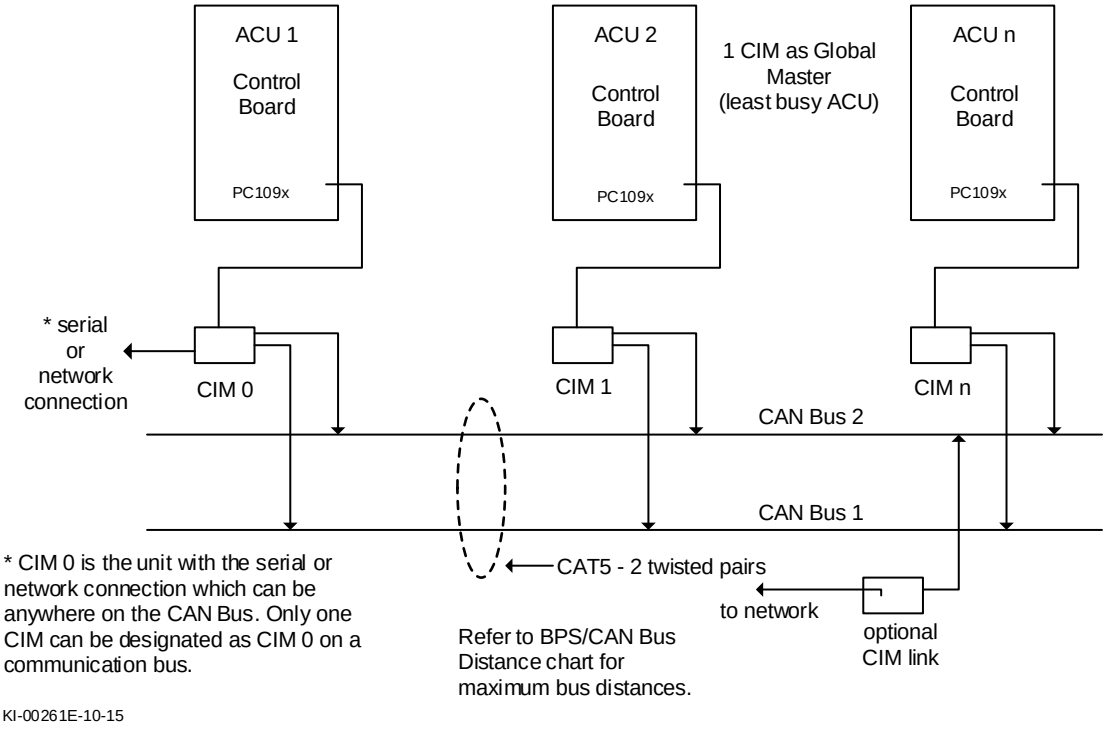
CIM Communication

The Communication Interlink Module (CIM) is used to establish PC to ACU and ACU to ACU communication when multiple access control units are installed on a communication bus. The CIM uses highly reliable CAN Bus architecture on CAT 5 cable with two (2) twisted pairs. The CIM modes of communication are as follows on the CAN Bus:

- CAN Bus 1 (required) - PC to ACU main communication
- CAN Bus 2 (optional) - ACU to ACU communication for global functions (i.e. global anti-pass back, global time zones, and global I/Os)
- CAN Bus 2 - CIM to CIM communication for CIM hardware control and monitoring and Keyscan's reverse network communication

Keyscan recommends CAN Bus 1 and CAN Bus 2 are connected on all CIM units.

Figure 77 – CIM Overview



CIM Conventions

Before connecting, please be aware of the following CIM conventions.

- CIM modules inter-connect two or more ACUs with a CIM connected to each ACU on the communication bus
  - CIM modules are not required for a single ACU communication bus
- One CIM must be jumpered as a global master when using ACU to ACU communication for global anti-pass back on CAN Bus 2 (global anti-pass back does not apply to elevator control units)

- Any CIM module on the communication bus can be configured as the global master as well as CIM 0
    - where a higher number of control boards are on the communication bus, assign the global master to a CIM other than CIM 0
- The CIM unit with the serial or network connection must be jumpered as CIM 0
- Only one global master and one CIM 0 are allowed per communication bus
    - If connecting CIM-Link modules, designate only one global master for the entire network of bridged communication buses
- First and last modules must be jumpered to terminate CAN Bus 1 and CAN Bus 2
- Reverse network communication or global functions require CAN Bus 1 and CAN Bus 2
- For reverse network communication CIM 0 requires a NETCOM6P

CIM Module Requirements

The CIM module requires the following control board firmware versions:

Hardware

Please note the CIM is compatible with the following control board firmware:

- EPROM version 7.40/8.20 or higher – door control units
- EPROM version 7.97/8.77 or higher – elevator control units (supports global time zones only)

If using a NETCOM2P or NETCOM6P, ensure the NETCOMP version is a PC1051 or later (blue) printed circuit board.

Software

- Aurora – version 1.0.1.0 or higher for global inputs/outputs
- System VII – version 7.0.6 or higher for global inputs/outputs
- Vantage – version 8.1.5 or higher for global inputs/outputs

Note

For global outputs, Keyscan recommends using the global OCB-8 option. This requires the purchase of an optional OCB-8, which connects to the control board's Control 5 header. Global outputs are not supported on CA200 or CA250 door control units and EC1000, EC2000, EC1500, or EC2500 elevator control units.

CIM Specifications

The following table outlines CIM specifications. The CIM and NETCOMP receive power from the control board's H2 terminal via the ribbon cable.

Note

The control board's H2 terminal is an open terminal block and does not require setting S2 – switches 7 & 8 for activation.

Table 15 – CIM Specifications

Operating Voltage	12 VDC
Current Draw	CIM only – 150 mA; CIM and NETCOM2P/6P – 290 mA
Dimensions	4 5/8 " x 3.0 " (11.7 cm x 7.6 cm)
Operating Environment	32° F – 140° F (0° C - 60° C)
Cables	CIM to CIM – CAT 5, 2 twisted pairs - maximum cable distance first CIM to last CIM - 3280 ft (1000 m) @ 9600 bps CIM to ACU - ribbon cable to communication header H2 CIM 0 to PC direct serial – 5 conductor shielded 22 AWG – maximum 49.2 ft (15 m) @ 9600 bps CIM 0 to NETCOM2P/6P* – plugs directly into CIM, no cable required * If configuring CIM 0 with a NETCOM2P or NETCOM6P, ensure the NETCOMP version is a PC1051 or later printed circuit board.
CAN Bus	CAN Bus 1 – PC to ACU communication CAN Bus 2 – ACU to ACU communication for global functions and CIM to CIM
Topology	Linear (does not support star or ring topologies)
Inter-building Connectivity	Yes
Firmware	Requires control board with EPROM versions 7.40/8.20 or higher

BPS/CAN Bus Distance Chart

Select bit rates based on the cable distance of CAN Bus 1. The PC and ACU bit rates must be the same. Determine CAN Bus 1 distances before setting baud rate jumpers as outlined under Serial Bit Rate Jumpers J9 – J11.

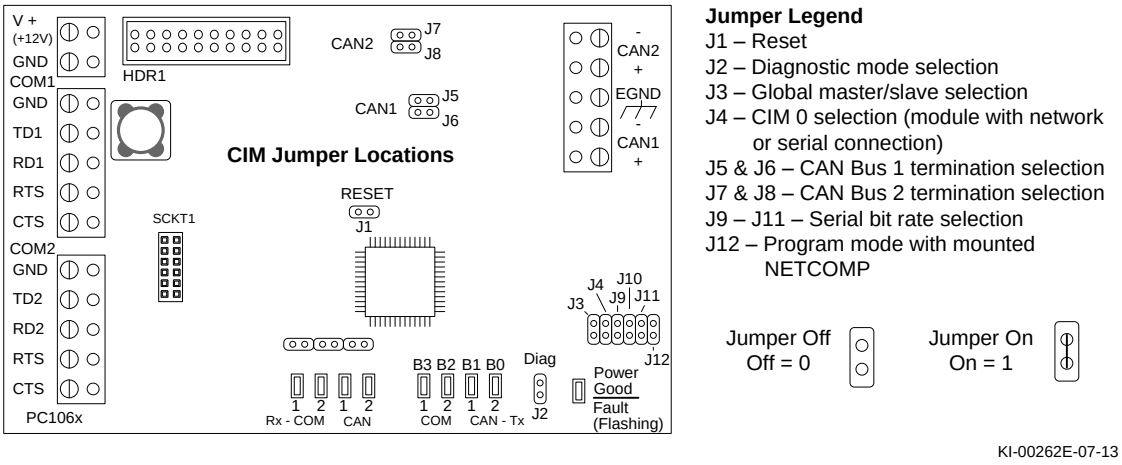
Table 16 – BPS/CANBUS Distance Chart

PC/ACU Bit Rate	CAN Bus 1 / CAT 5 Distance	RS-232 Serial Distance
9600	3280 ft (1000 m)	100 ft (30 m)
19,200	3280 ft (1000 m)	49.2 ft (15 m)
57,600	984.25 ft (300 m)	26.2 ft (8 m)
115,200	262.46 ft (80 m)	9.84 ft (3 m)

CIM Jumper Settings

The CIM has jumpers that determine the board's attributes. Ensure the necessary jumpers are set depending on the position and function the board is serving. Jumper settings are reviewed in the following tables. Please note the jumper locations in the diagram below.

Figure 78 – CIM Jumper Locations



CIM Global Master Jumper – J3 (Master/Slave ACUs)

Jumper J3 sets the CIM as global master. Designate only one (1) CIM as a global master. Designate all other CIMs as slaves.

Table 17 – CIM Global Master Jumper J3

Module	Jumper #	Jumper Setting	Notes
CIM - Global Master	J3	1	Set global master CIM at least busiest ACU. Set global master CIM connected to door control unit only when using ACU to ACU communication on CAN Bus 2. Do not set a CIM as global master that is connected to an elevator control unit. See note below.
CIM - Slave	J3	0	

Note

On a communication bus with elevator control units only, a global master CIM is not applicable. Do not place a jumper on J3.

CIM 0 Jumper – J4

Set a jumper on J4 on the module designated as CIM 0. This is the module with either the direct serial connection to a PC or a network connection via a NETCOMP to the system communication software.

Table 18 – CIM 0 – Jumper J4

Module	Jumper #	Jumper Setting	Notes
CIM 0	J4	1	Off = 0 / On = 1
CIM 1 to CIM n	J4	0	

CAN Bus Termination Jumpers - J5 to J8

The first and last modules on CAN Bus 1 and CAN Bus 2 must have the appropriate jumpers set to terminate the bus. Terminating modules can be a CIM, CIM 0 or, if applicable, a CIM-Link.

Later, if additional CIMs are placed at either end of CAN Bus 1 or CAN Bus 2, be sure to reset the termination jumpers accordingly.

Table 19 – CIM CAN Bus Termination Jumpers J5 – J8

CAN Bus 1			
Module	**Jumper #**	**Jumper Setting** Off = 0 / On = 1	**Notes**
First & last module (CIM or CIM 0)	J5 & J6	1 1	Termination ON
All other modules	J5 & J6	0 0	Termination OFF
CAN Bus 2			
Module	**Jumper #**	**Jumper Setting** Off = 0 / On = 1	**Notes**
First & last module (CIM or CIM 0 or CIM-Link)	J7 & J8	1 1	Termination ON
All other modules	J7 & J8	0 0	Termination OFF

Serial Bit Rate Jumpers J9 – J11

The CIM has selectable serial bit rates. The jumper settings are outlined in the following table. Bit rates are governed by CAN Bus 1 distances and RS-232 distances. Refer to the BPS Distance Chart. Set CIM jumpers to match the ACU baud rate.

The Auto-match bit rate functions in the same manner irrespective of which ACU panel it is connected to or if it is configured as CIM 0 or CIM (n). The CIM will detect and match the communication bit rate with the ACU panel.

Keyscan recommends using the auto-match ACU jumper setting outlined in the table below.

As an example, if configuring a system with five panels, set communication bit rates the same on all ACU control boards, and then allow the CIM unit to auto-match the ACU bit rate. The CIM unit automatically sets the CAN Bus bit rate to match.

Table 20 – CIM Serial Bit Rate Jumpers J9 – J11

Bit Rate/Second	Jumper #	Jumper Settings
		Off = 0 / On = 1
Auto match ACU	J9 & J10 & J11	0 0 0
9600	J9 & J10 & J11	0 0 1
19,200	J9 & J10 & J11	0 1 0
57,600	J9 & J10 & J11	1 0 0
115,200	J9 & J10 & J11	1 0 1
230,400	N/A	For future use – not supported on PC109x
460,800	N/A	For future use – not supported on PC109x

Reset Jumper J1

The CIM has a reset jumper J1. If the board has been re-configured while powered, momentarily short J1 on the CIM board to institute the changes.

Momentarily shorting the System Reset J6 jumper on the control board also effects changes to the CIM board while powered.

CIM Installation Guidelines

The following guidelines offer a general outline for configuring and connecting the CIM units. You may have to refer to other Keyscan documentation that was included with other components such as a NETCOM2P or NETCOM6P – Reverse Network to complete the installation depending on how you are configuring the CIM units.

If using a network connection, ensure that you program the NETCOM device as outlined in the documentation included with your particular NETCOM unit.

Connect the CIM circuit board according to the communication and power diagrams.

Ensure that the EGND terminal on TB1 of each CIM is connected to an earth ground to protect the circuit board and the system from high-voltage transients.

Set the jumpers accordingly on the CIM depending on whether it is a global master or slave, it is a terminating CIM on the CANBUS, or it is CIM 0. Also, ensure the correct communication serial bit rates are correct. Refer to the CIM Jumper Settings table.

Repeat connections and jumper settings for each control board and CIM.

Apply power to all CIM and ACU circuit boards.

Do one of the following procedures at the control board:

- If this is an existing system, press reset S1 on the control board for board initialization.
- If this is a new installation, press S1, wait 5 seconds, and then press S3 within ten seconds. Allow two minutes for board initialization after clearing memory.

Return to a PC with the Client module, log on to the appropriate site, and perform a full upload.

CIM Connection Diagrams

Observe the diagrams on the following pages for connecting the CIM units to the access control boards and connecting the CIMs with CAN Bus 1 and CAN Bus 2.

The CIM designated as CIM 0 supports serial or network (TCP/IP) to CANBUS 1 communication. The CIM unit does not support modem communication.

Note

The control board's H2 terminal is an open terminal block and does not require setting S2 – switches 7 & 8 for activation.

Figure 79 – CIM to ACU Connections

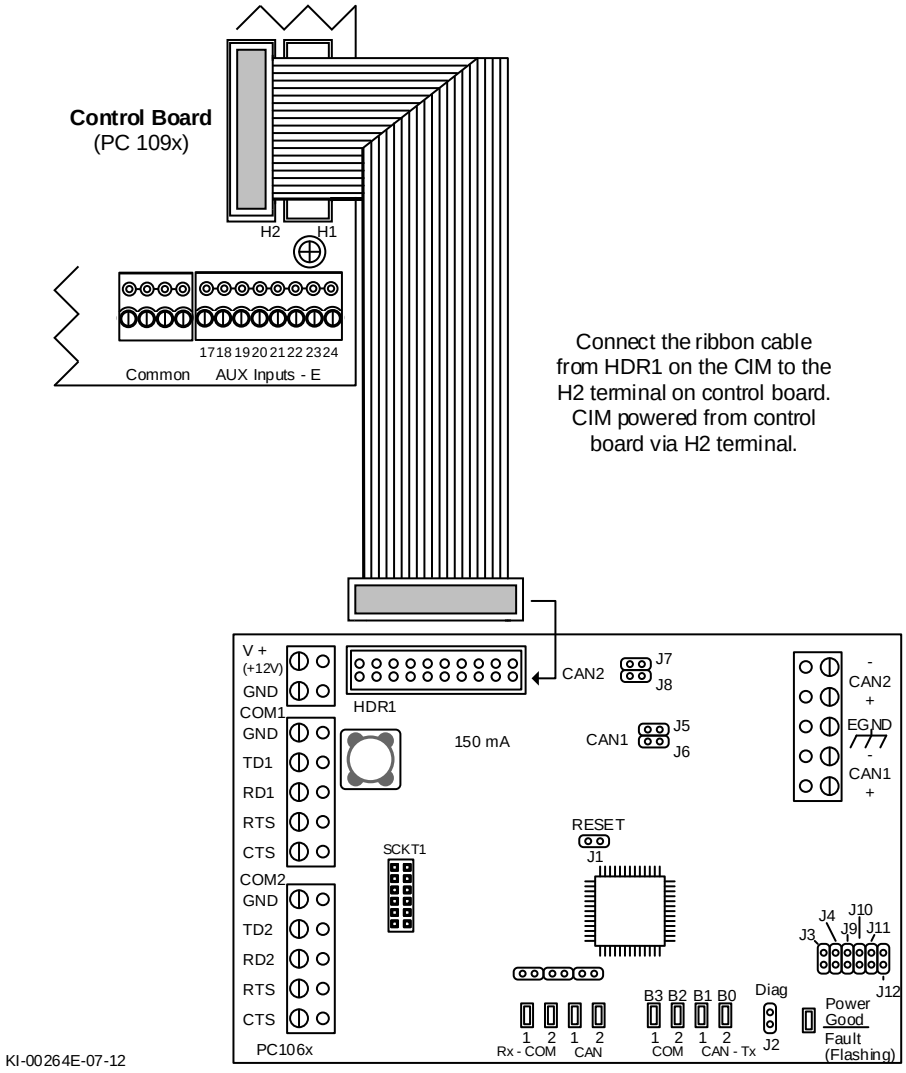
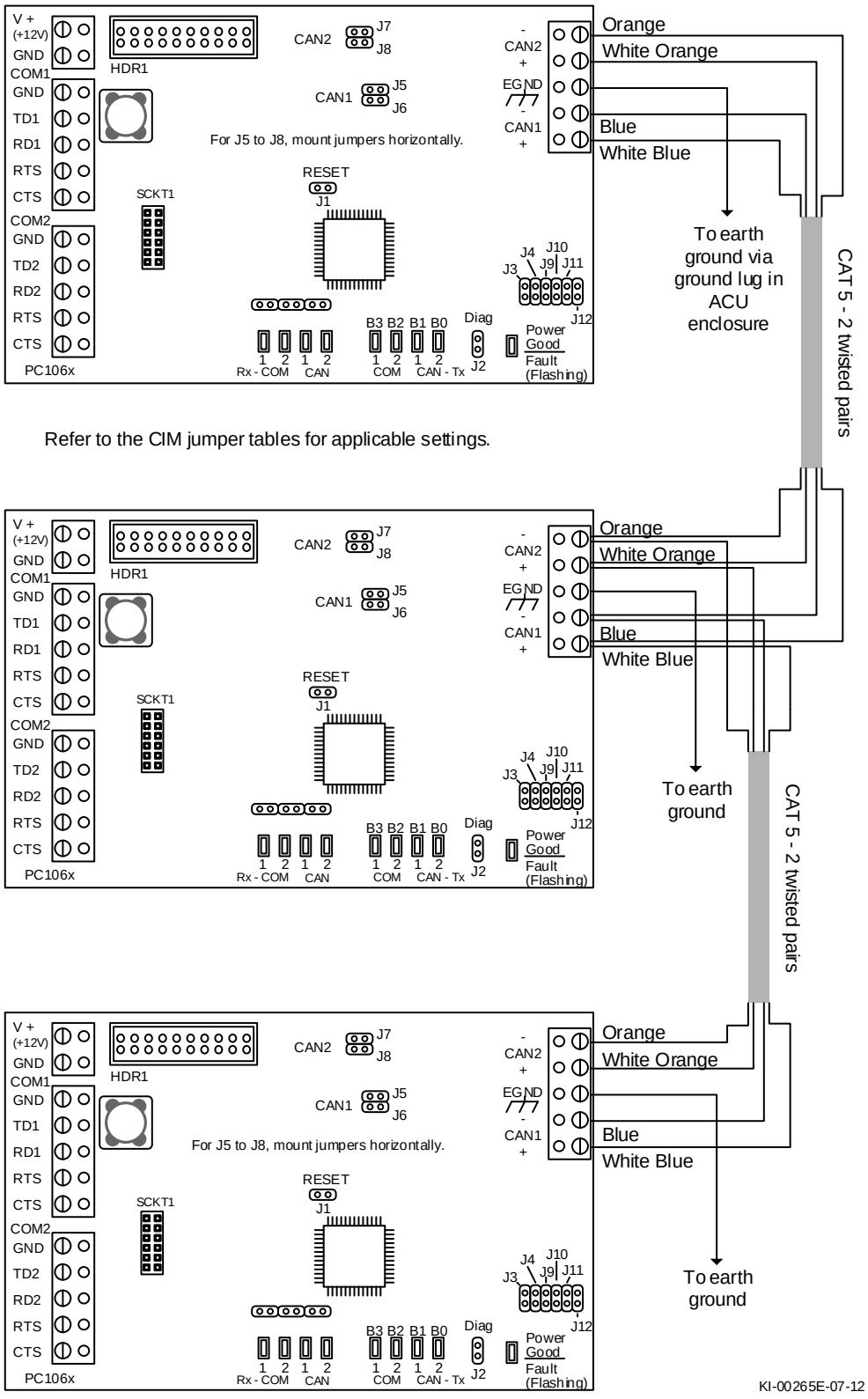


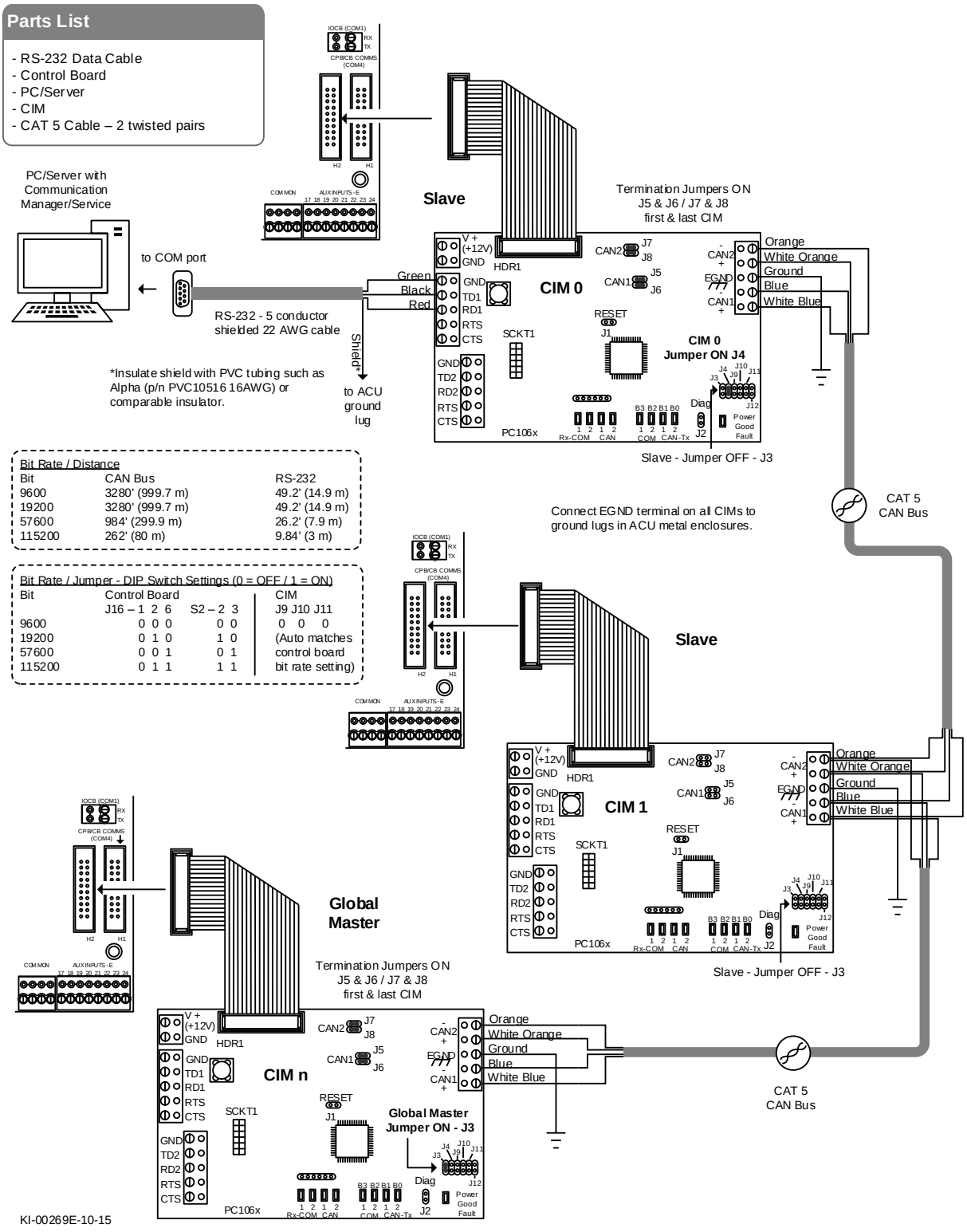
Figure 80 – CIM to CIM CANBUS Connections



Serial Communication

Serial communication is a direct serial connection from the PC to the CIM unit using a 9-pin RS-232 data cable with five (5) conductors - Keyscan part # 40-2322. A Communication Manager/Service must be installed on the PC that has the direct serial connection to CIM 0.

Figure 81 – PC Serial Connection - CIMs/ACUs



Network Communication via Optional NETCOM2P or NETCOM6P (Encrypted)

The NETCOM2P and NETCOM6P (encrypted) are modular serial to TCP/IP converters that plug directly into the CIM board for network communication. The CIM circuit board with the network connection is referred to as CIM 0. This CIM unit must have a jumper on J4.

Important

The NETCOM2P and the NETCOM6P must be programmed with the Keyscan NETCOM Program Tool utility in order to function. Refer to the NETCOM2P/CIM or NETCOM6P/CIM Programming Guides for programming instructions.

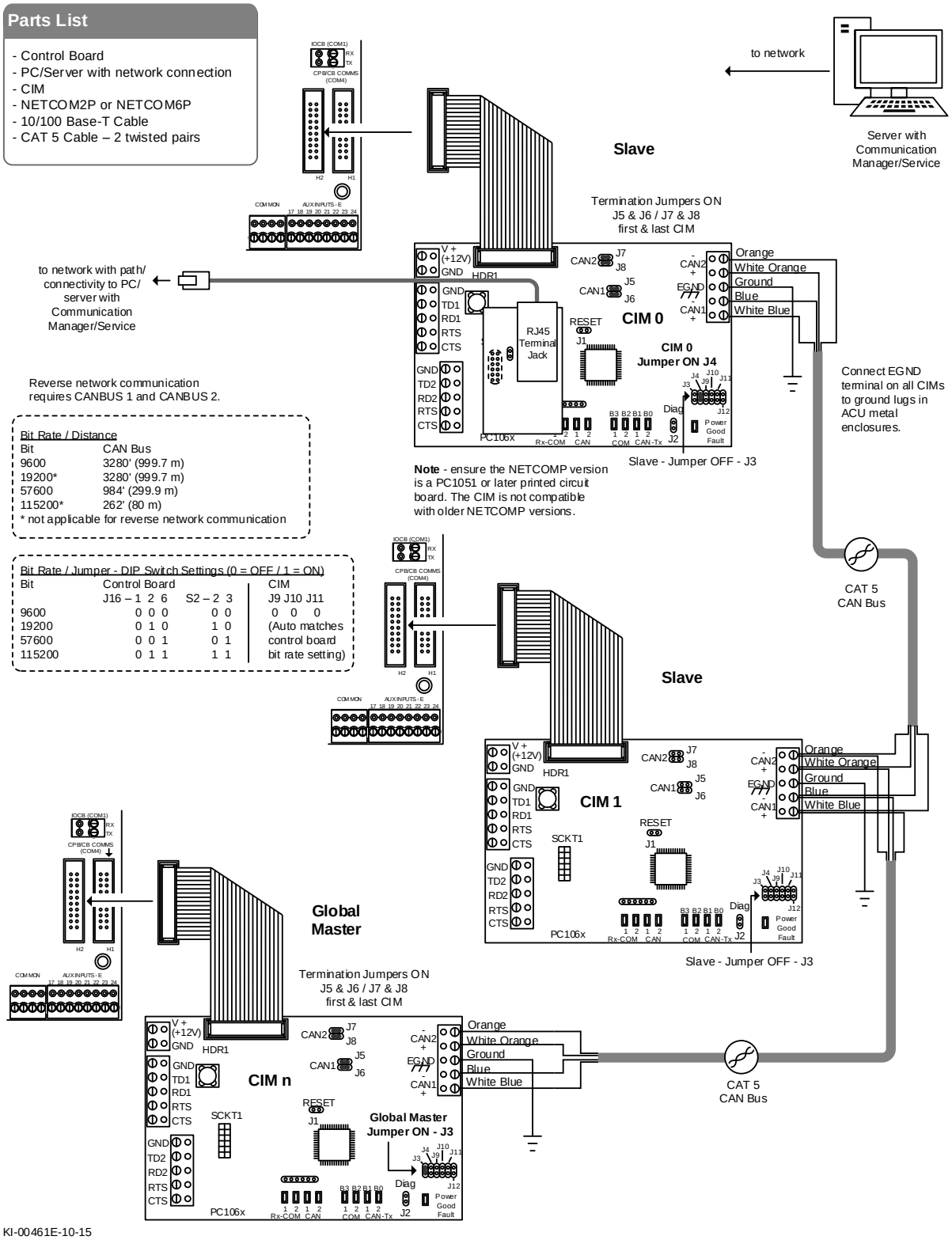
When configuring CIM 0 with a NETCOM2P or NETCOM6P ensure the NETCOMP version is a PC1051 or later printed circuit board. The CIM is not compatible with older NETCOM2P/6P versions.

Multiple Building Communication on a WAN

Keyscan requires a point-to-point private network where NETCOMs are used on a LAN/WAN (TCP/IP) that integrates building to building communication for a non-reverse network application.

For a reverse network application, review the NETCOM6P (Encrypted) Installation Guide for more information regarding network communication and configuration.

Figure 82 – Network Connection with NETCOM2P or 6P - CIMs/ACUs



Network Communication via Optional NETCOM2 Rev. B

The NETCOM2 Rev. B is a modular serial to TCP/IP converter that can be connected via a RS-232 data cable to the CIM board for network communication. The CIM circuit board with the network connection is referred to as CIM 0. This CIM unit must have a jumper on J4.

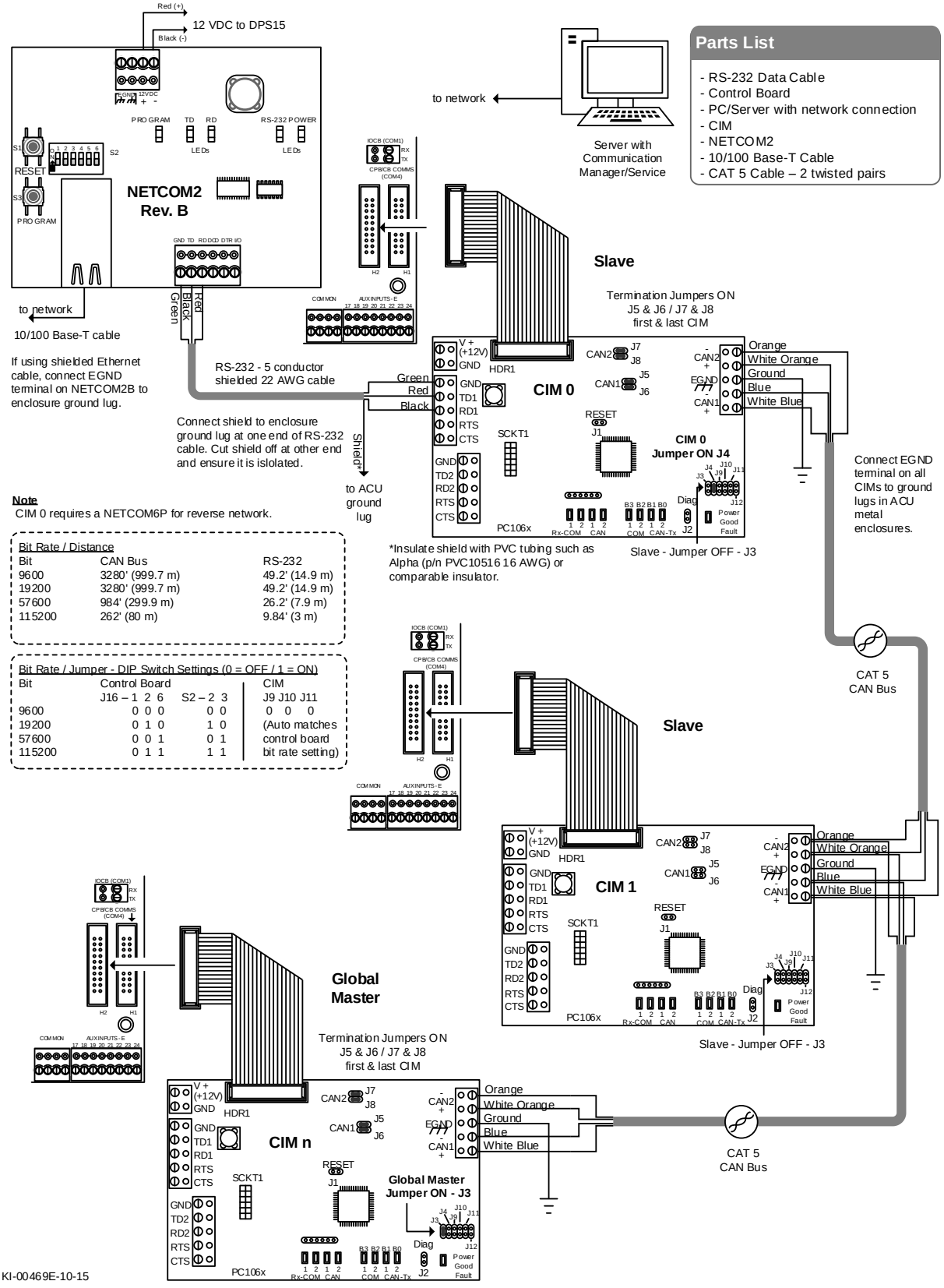
Important

The NETCOM2 must be programmed with the Keyscan NETCOM Program Tool utility in order to function. Refer to the NETCOM2 Rev. B Programming Guide for programming instructions.

Multiple Building Communication on a WAN

Keyscan requires a point-to-point private network where NETCOMs integrate building-to-building communication on a LAN/WAN (TCP/IP) for a non-reverse network application.

Figure 83 – Network Connection with NETCOM2 Rev. B - CIMs/ACUs



CIM Diagnostic LEDs B3 – B0

The CIM unit has on-board diagnostic LEDS - B3 to B0 - designed to assist in troubleshooting communication difficulties.

- diagnostic LEDs during boot-up - initial power or Reset J1
- data LEDs during operation are TX – transmit

Diagnostic Guidelines

LEDs B3 – B0 indicate TX data transmission states. Diagnostic Jumper J2 - sets the CIM board to run in diagnostic mode.

CIM Diagnostics – LED Codes

The following table lists diagnostic LED codes on the CIM. LED indicators are as follows:

- 0 = OFF
- 1 = ON

Place a jumper on J2 to run the CIM in diagnostic mode.

Table 21 – CIM Diagnostic LED Codes

LED				Trouble Indication Code	Fault
B3	**B2**	**B1**	**B0**		
0	0	0	0	0	None
0	0	0	1	1	+ 5V logic voltage low
0	0	1	0	2	+ 12V input voltage low
0	0	1	1	3	+ 5V isolated logic supply low
0	1	0	0	4	CAN Bus 1 fault
0	1	0	1	5	Global broadcast fail
0	1	1	0	6	ACU panel initialize fail
0	1	1	1	7	CAN Bus 2 fault
1	0	0	0	8	CIM to ACU auto-match bit rate fail or incomplete
1	0	0	1	9	Data carrier detect (DCD) connection lost. Applies to reverse network communication mode only.

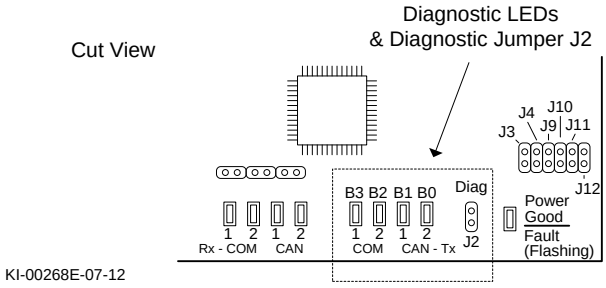
Note

Diagnostic mode indicated by all four (4) LEDs flashing three (3) times. Diagnostic codes displayed every 20 seconds. Multiple codes displayed lowest to highest.

End of diagnostics routine is indicated when all four (4) LEDs flash three (3) times.

Unless Power Good/Fault LED is flashing, the unit will not enter unit diagnostics mode even if a jumper is on J2.

Figure 84 - CIM Diagnostic LEDs - B3 - B0



CIM Boot-up

When power is applied to the CIM or the reset jumper J1 is momentarily shorted, the CIM module will begin its boot-up sequence. The module uses the four (4) diagnostic LEDs to indicate where it is in the boot-up sequence.

B3 – B0 Code

- 1 to 4 – basic initialization notices
- 5 (0101) – the CIM has entered NETCOMP program mode (LEDs will extinguish after approximately 1 second.)
- 6 (0110) – the CIM has entered ACU connection mode (The LEDs may extinguish after 1 second if the CIM can establish communication with the ACU quickly. The CIM may stay in this mode longer if it is auto-matching the bit rate of the ACU or is unable to communicate to the ACU via the global communication port.)
- 7 (0111) – the CIM has entered CIM 0 mode (It has been set to provide PC to CANBUS communication. (If the bit rate has been set via jumpers J9 – J11, the CIM will extinguish the LEDs after approximately 1 second. If the CIM has been set for auto-match bit rate, the LEDs may extinguish after 1 second if the CIM can establish communication with the ACU quickly. The CIM may stay in this mode longer if it is auto-matching the bit rate of the ACU or is unable to communicate to the ACU via the global communication port.)

DPS-15 Power Supply Connections

Power Supply Specifications

The DPS-15 is a 13.5 VDC dual linear regulated power supply with the following outputs for powering CA & EC circuit boards and readers:

- ACU output 12 VDC @ 1.2 Amperes
- AUX/RDR output 12 VDC @ 1.2 Amperes

Before making any power connections at the ACU, Keyscan recommends that you use the tables on the following pages and calculate the sum of the current demand for the devices drawing power from the ACU supply side and the RDR AUX supply side ensuring that you do not exceed the DPS-15's current capacity.

On CA8500B control boards, readers with higher current specifications may collectively exceed the capacity of the DPS-15 RDR AUX supply. If this occurs, you require an additional power supply.

Do not connect the reader power wire (red) to the ACU supply side of the DPS-15.

CSA/UL Approved Transformers

The DPS-15 power supply requires either of the following class 2 CSA/UL approved transformers and a backup battery with sufficient amp hours.

- 2 x 16 V 40 VA
- 2 x 16.5 V 37 VA

The purpose of two transformers is to comply with UL STD 294, CSA STD C22.2, and charge the battery circuit. The transformers must be located within 30 feet of the Keyscan power supply. Do not mount the transformers inside the ACU metal enclosure. Use of non-compliant transformers or deviation from the use of two (2) approved transformers per access control unit or incorrect voltages void all Keyscan warranties. The system may operate erratically if the voltage is lower than 12 VDC.

Wiring Connections

Before connecting power at the ACU, be sure to observe the following points:

- verify the devices do not exceed the power supply ratings
- check the cable and wire connections
- ensure no short circuits exist when measuring voltages
- verify the DC polarity is correct for all equipment
- ensure the backup battery is fully charged

Following the above guidelines ensures each device will function properly and not be damaged.

Circuit Board Current Ratings

The following table outlines door and elevator control board, communication board, output relay board, and specialty communication board current ratings. Use the current calculation worksheets for determining power supply requirements. Ratings are based on 12 VDC. Do not exceed the recommended operating maximum of a

power supply. See also Keyscan and HID reader voltage/current ratings and Indala reader voltage/current ratings.

Table 22 – Keyscan Circuit Board Current Ratings

Circuit Board Type	Models	Current Rating
Control Boards	CA250B	130 mA
	CA4500B	130 mA
	CA8500B	130 mA
	EC1500B	130 mA
	EC2500B	130 mA
Output Relay Boards	OCB-8	230 mA
Communication Boards	CIM	150 mA
	CIM-LINK	150 mA
	NETCOM2	270 mA
	NETCOM2P or NETCOM6P	140 mA
Specialty Boards	IOCB1616	400 mA
	WIEEX2 Transmitter (Tx)	50 mA
	WIEEX2 Receiver (Rx)	50 mA

DPS-15 Dual Power Supply – Current Calculation

The DPS-15 power supply has two independent linear 1.2 Amp DC outputs – the ACU supply and the AUX RDR supply. Use the following two tables for calculating the total current required from the ACU supply and the AUX RDR supply. Please note the ACU supply and the AUX RDR supply each have an operational limit of 1000 mA.

ACU Supply – 1.2 A

Opposite Add-on Board #, enter the name of the module in the Product Description column and the board's current requirement in the Current Rating column. Current ratings are in the preceding table and printed on the circuit boards. Add all the current ratings including the control board to determine the total current. Keyscan recommends a 200 mA reserve operating margin. The total current from the ACU supply, including the control board, should not exceed 1000 mA.

Table 23 - ACU Supply - Current Calculation Table

ACU Supply	Product Description	Current Rating	
	Control Board (CA250B, CA4500B, CA8500B, EC1500B, EC2500B)	**130**	mA
Add-on board #1			mA
Add-on board #2			mA
Add-on board #3			mA
Add-on board #4			mA
Add-on board #5			mA
Add-on board #6			mA
Add-on board #7			mA
	Total current draw		mA
	Maximum current draw	**1000**	mA

AUX RDR Supply – 1.2 A

Opposite readers, enter the model, the current rating multiplied by the number of readers and the total current. Refer to the tables under Terminate Reader Cables for specific reader current ratings.

Opposite Add-on Board #, enter the name of the module in the Product Description column and the board's current requirement in the Current Rating column powered from the AUX RDR supply on the DPS-15. Keyscan recommends a 200 mA reserve operating margin. The total current required from the AUX RDR supply should not exceed 1000 mA.

Table 24 - AUX RDR Supply - Current Calculation Table

	Model	mA		Quantity	Current Rating	
Readers – type 1			x		=	mA
Readers – type 2			x		=	mA
	Product Description					mA
Add-on board #1						mA
Add-on board #2						mA
Add-on board #3						mA
Add-on board #4						mA
	Total current draw					mA
	Maximum current draw				**1000**	mA

System Power-up

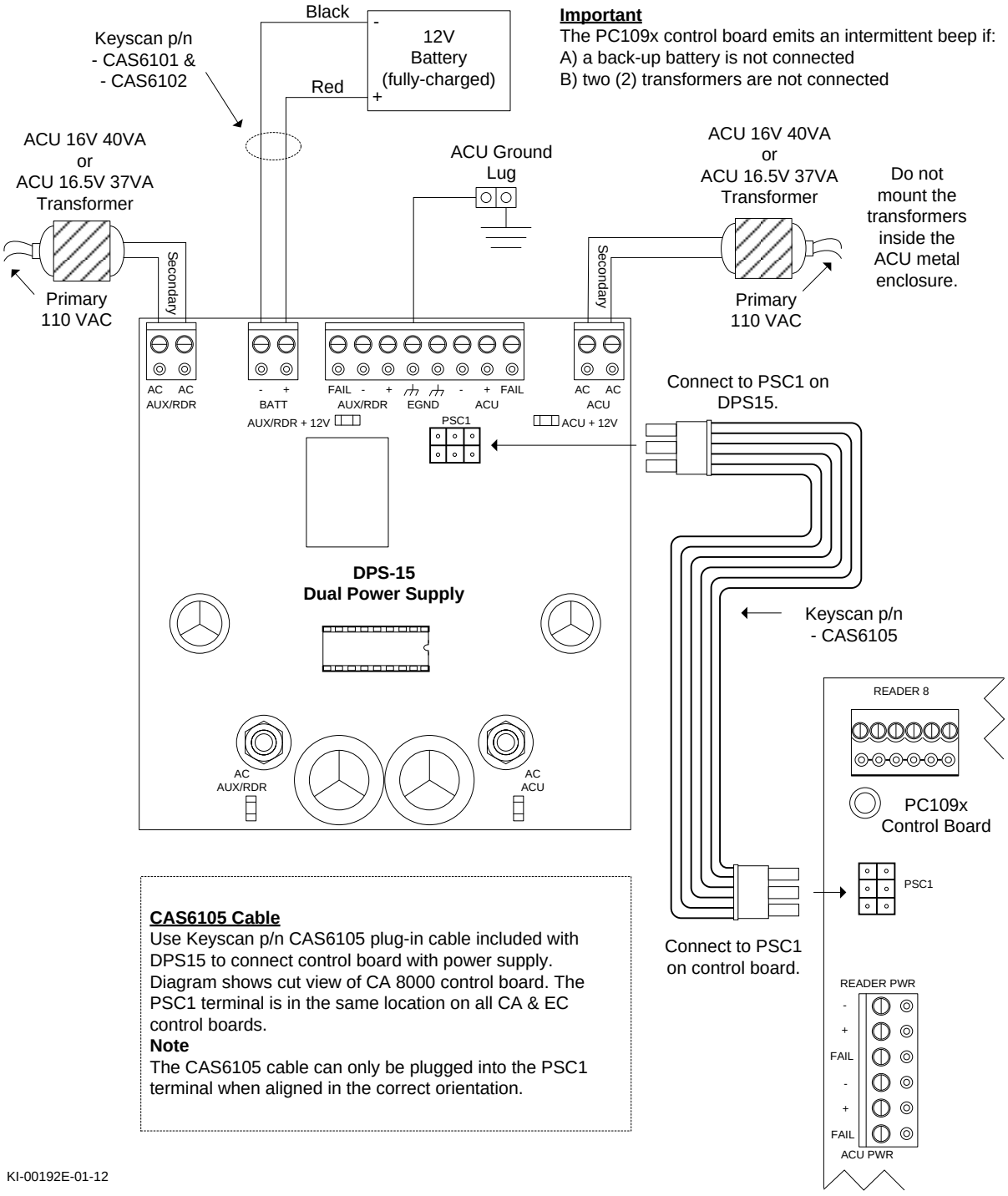
The following is a guideline on initially powering up the control board.

- connect 12 VDC power to the control board as shown in Figure 85 – DPS-15 Power Supply
- connect fully-charged backup battery
- connect 2 x 16V 40VA or 16.5V 37VA class 2 transformers - ensure that both CSA/UL approved transformers and fully-charged backup battery are connected for proper system operation - do not mount the transformers or bring 120/240 VAC inside the ACU metal enclosure
- repeat battery and transformer connections for additional power supplies
- check ACU voltage test points after power is applied to the ACU - refer to Table 25 and Table 26.
- if software selection S2 switches 11 and 12 were altered, load factory default settings by pressing S1, wait 5 seconds, and then press S3 within 10 seconds.
- from a server/workstation with a Keyscan Client module upload the Keyscan database to the ACUs after all correct voltage and current measurements are verified

Notes

For battery circuit and auxiliary power output to function, connect two (2) CAS/UL approved transformers as shown in the following DPS-15 connection diagram.

Figure 85 – DPS-15 Power Supply Connections



Test Voltages

After applying power to the control board, use a voltmeter and verify voltages at the test points as outlined in Table 25 and Table 26.

Control Board Voltage Test Points

The following table lists correct voltages for the control board's test points. Be sure to review the notes opposite the appropriate voltage test points to comply with proper measuring techniques.

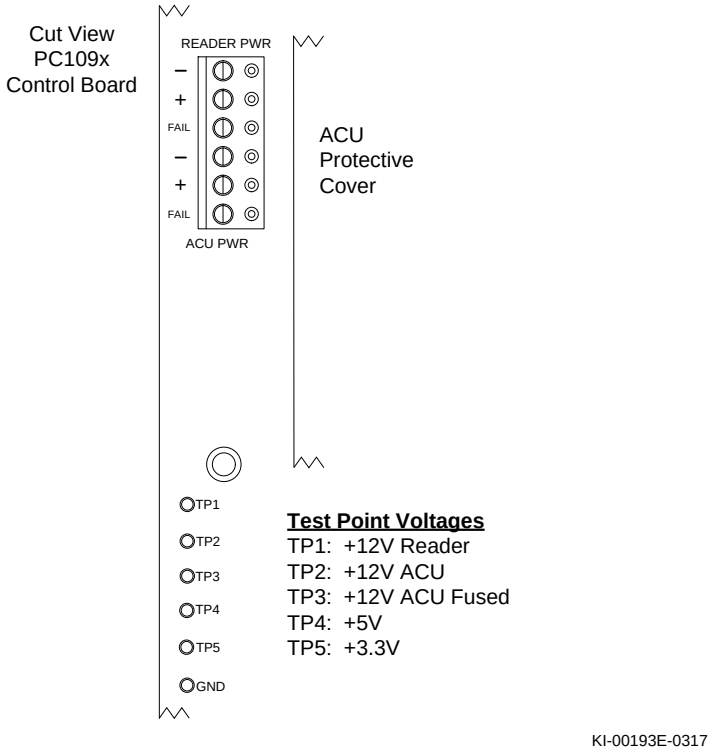
Voltmeter Connections

- Voltmeter set to VDC
- V-Ω (ohms) to test points
- Com to ground lug in metal enclosure

Table 25 – Control Board Test Points - Voltages

Board Test Point	Voltage	Instructions/Notes
Reader Terminal		
D1 WHT	(+) 5 VDC	White data 1 – if reader connected
D0 GRN	(+) 5 VDC	Green data 0 – if reader connected
PWR RED	(+) 12VDC	Red DC out
TP1	(+) 13.5 VDC	Reader power
TP2	(+) 13.5 VDC	ACU power
TP3	(+) 13.5 VDC	ACU power after circuit protector
TP4	(+) 5 VDC	
TP5	(+) 3.3 VDC	
Input Points		
Input points with open circuit	(+) 5 VDC	
Input points shorted to common return	0 VDC	

Figure 86 – Control Board Test Points – Voltages



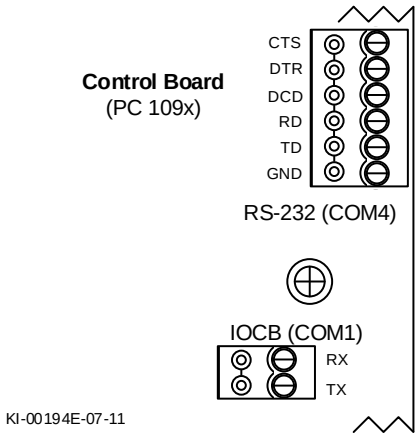
Test Points – Communication Terminals

The following table outlines the correct voltages for the test points on the communication terminal on CA or EC control boards.

Table 26 – Communication Voltage Test Points

Communication Test Point	Voltage	Instructions/Notes
CA / EC Communication Terminal RS-232 connected to ACU		Connect voltmeter COM to GND on ACU communication terminal block or green on data cable.
GND		
TD	(-) 9 VDC	TD is an ACU generated voltage
RD	(-) 10 VDC	RD is a PC generated voltage
DCD		
DTR	n/a	
CTS	n/a	

Figure 87 – Control Board Communication Test Points



Communication Diagnostics

The PC109x control boards have communication status LEDs and a system status LED, which indicate the current communication status.

For CIM diagnostic LEDs, refer to page 119.

Communication Status LEDs

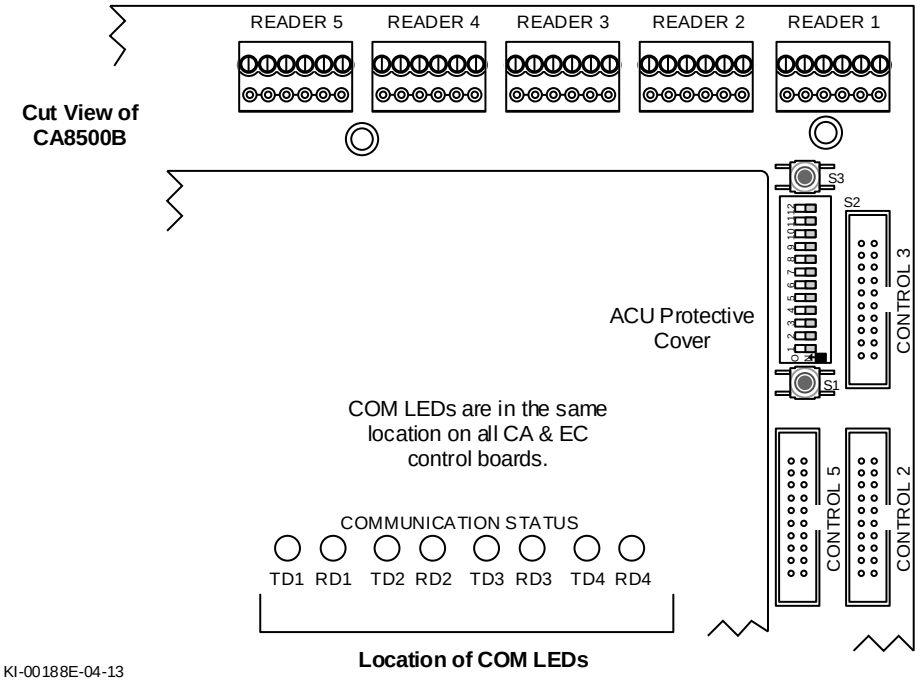
The CA250B, CA4500B, CA8500B, EC1500B, and EC2500B have communication LEDs for diagnostics and troubleshooting. The table below outlines the LED and its diagnostic function. When calling Keyscan technical support, indicating the LEDs state assists our technicians in isolating potential difficulties.

Table 27 – Communication Status LEDs

All CA & EC Control Boards		
LED	**State of LED**	**Notes**
TD 1 - Green	Flashing – normal	If IOCB function disabled in Client software, main processor sending data to on-board supervised inputs processor only If IOCB function enabled in Client software, main processor sending data to on-board supervised inputs processor and IOCB modules connected to TB2
	Not Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve.
	Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve.
RD 1 - Red	Flashing – normal	If IOCB function disabled in Client software, main processor receiving data from on-board supervised inputs processor only If IOCB function enabled in Client software, main processor receiving data from on-board supervised inputs processor and IOCB modules connected to TB2
	Not Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve
	Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve
TD 2 – Green	Flashing – normal	Control board sending global, inter-panel communication data to CIM module connected to H2 header
	Not Illuminated	If CIM module not connected to H2 header If CIM module not communicating
	Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve
RD 2 – Red	Flashing – normal	Control board receiving data from CIM module connected to H2 header for global, inter-panel communication
	Not Illuminated -	If CIM module not connected to H2 header If CIM module not communicating
	Illuminated - abnormal condition	Possible fault on CIM module Possible wiring fault

TD 3 – Green	Flashing - normal	Control board sending Client/Communication Mgr. communication data to CIM module connected to H2 header
	Not Illuminated	If CIM module not connected to H2 header If the control board is not communicating with the Client/Communication Mgr. If the Client/Communication Mgr. is communicating with the control board using COM4
	Illuminated - abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve
TD 3 – Red	Flashing - normal	Control board receiving Client/Communication Mgr. communication data from CIM module connected to H2 header
	Not Illuminated	If CIM module not connected to H2 header If the control board is not communicating with the Client/Communication Mgr. If the Client/Communication Mgr. is communicating with the control board using COM4
	Illuminated - abnormal condition	Possible fault on CIM Possible wiring fault
TD 4 – Green	Flashing – normal	Control board sending data via communication path determined by S2 – switches 7 & 8 to Client/Communication Mgr.
	Not Illuminated	If CIM module connected to H2 header for communication with the Client/Communication Mgr. software If Client/Communication Mgr. not polling the control board If S2 – switches 7 & 8 are configured for on-board NETCOMP programming
	Illuminated – abnormal condition	Follow restore factory defaults S3 procedure in attempt to resolve
RD 4 – Red	Flashing – normal	Control board receiving data via communication path determined by S2 – switches 7 & 8 from Client/Communication Mgr.
	Not Illuminated	If CIM module connected to H2 header for communication with the Client/Communication Mgr. software If Client/Communication Mgr. not polling the control board If S2 – switches 7 & 8 are configured for on-board NETCOMP programming
	Illuminated – abnormal condition	Possible fault on module connected to H1 header Possible wiring fault
LED states listed above are during normal CA or EC control board operation and do apply in other modes such clearing memory. COM4 LEDs functions are dependent on the configuration of S2 – switches 7 & 8.		

Figure 88 - Communication LEDs - CA & EC Control Boards



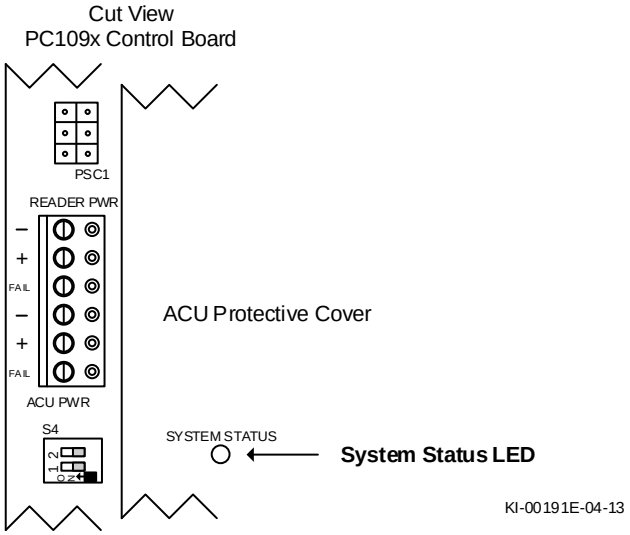
System Status LED

The system status LED is multi-color – red, amber and green – indicating the current system status as outlined. The control board also has a piezo that beeps under certain LED states.

Table 28 - System Status LED

LED Color/State	System Status
Red – solid	The main processor is held in reset and not operating. This can be caused when S1 is depressed or the main processor supervisory circuit's critical PCB voltages are not within normal operating parameters. The on-board piezo emits a steady tone while in this mode.
Red – flashing	The CA or EC control board is in clear memory mode. The on-board piezo emits a cycle of 2 short beeps and then a pause while the control board is in this mode.
Amber – solid	The CA or EC control board has not communicated to the Client software since its last system reset or clear memory.
Amber – flashing	The CA or EC control board's last communication with the Client software was 3 minutes or greater.
Green – solid	The CA or EC control board has communicated to the Client software since its last system reset or clear memory.

Figure 89 - Location of System Status LED



Card Diagnostics - LED Wiegand Bit Counters

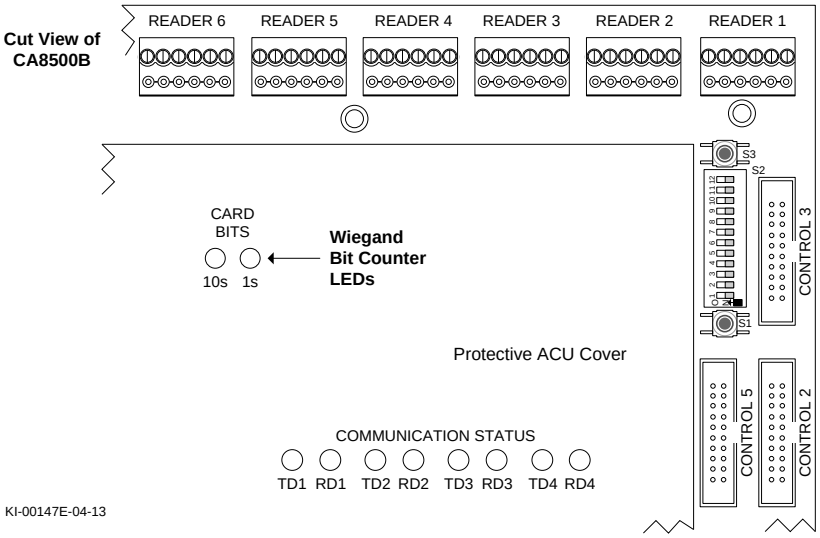
CA and EC control boards have LED Wiegand bit counters – 10s and 1s – to determine card binary bits. You must be able to observe the control board to do this procedure. To verify the binary bits, present the card or tag at the reader and count the number of times each LED blinks.

- 10s count the 1st binary digit
- 1s count the 2nd binary digit

Example

If the 10s LED blinks 3 times and the 1s LED blinks 6 times, the card has 36 binary bits (36-bit Wiegand card).

Figure 90 – Location of Wiegand Bit Counter LEDs



Appendix A – WSSKP-1 Keypad

Appendix A reviews WSSKP-1 keypad connections and keypad/reader combination connections. For more information on the WSSKP-1 refer to the Keyscan Documentation Library CD.

Table 29 – Keypad Power Specifications

Reader	Power	Notes
WSSKP-1 No digital output.	12 VDC, 20 mA	Orange wire not connected.
WSSKP-1 Digital output	12 VDC, 530 mA	Orange wire connected.

Installation Notes on Keypads

Do not run keypad cables in same conduit with AC power or signal cables.

Keep keypad cables at a minimum distance of 12 inches or 30 centimetres from AC, computer data, telephone data, or electric lock device cables.

Do not install keypads within 3.5 feet or 1.1 metres of computer CRTs.

Do not install readers in areas where broad spectrum EMI noise may be present. Devices such as motors, pumps, generators, and AC switching relays can create EMI noise.

Important

Keypads made by other manufacturers may not have the necessary Wiegand interface. Hence, these keypads will not operate in dual card and PIN modes; they will only operate in card/reader simulation.

Figure 91 – WSSKP-1 Keypad Connection

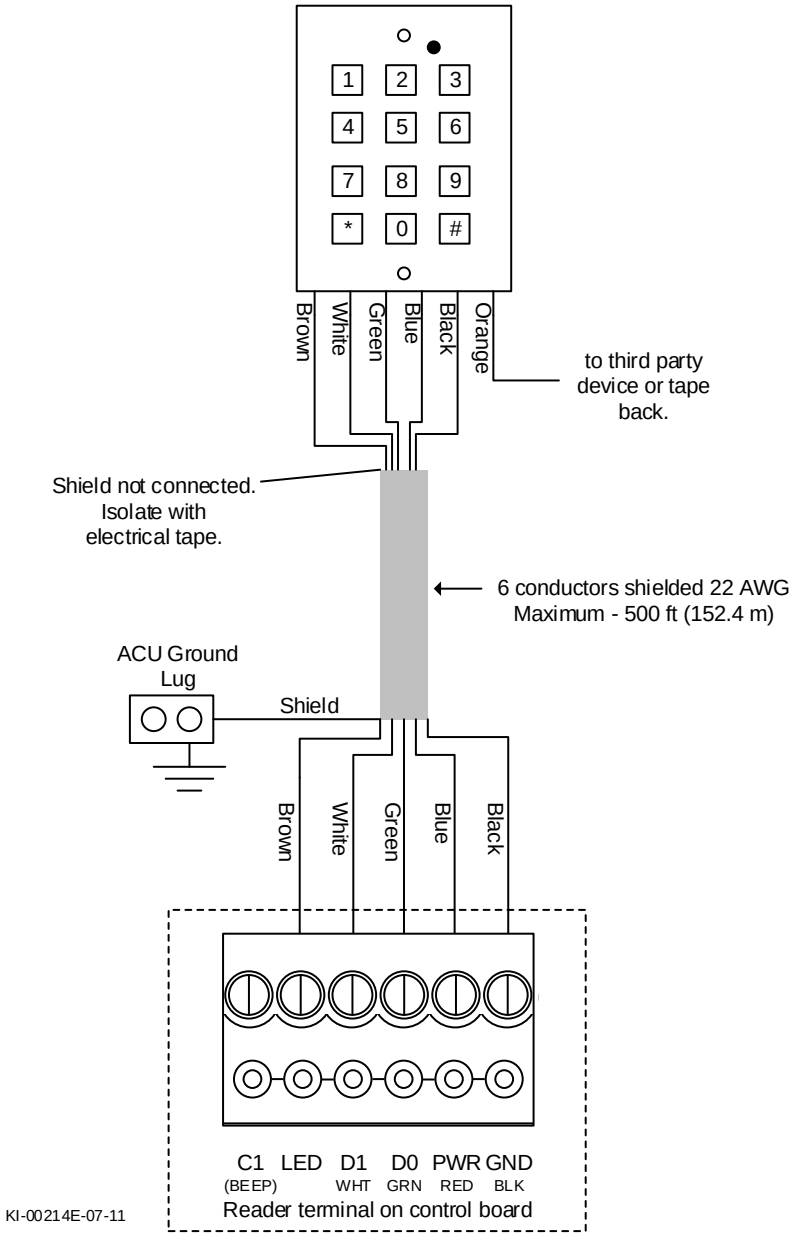


Diagram Notes on WSSKP-1

The orange wire in the keypad is the negative digital trigger for a third party device such as a relay or a lock. If using the orange wire, it triggers from a local PIN stored in the keypad memory. The keypad memory stores 28 personal identification numbers (PIN). If the orange wire is not used, tape back. See instructions with WSSKP-1 keypad for connections with third party devices.

Figure 92 – WSSKP-1 Keypad/Reader Combination Connections

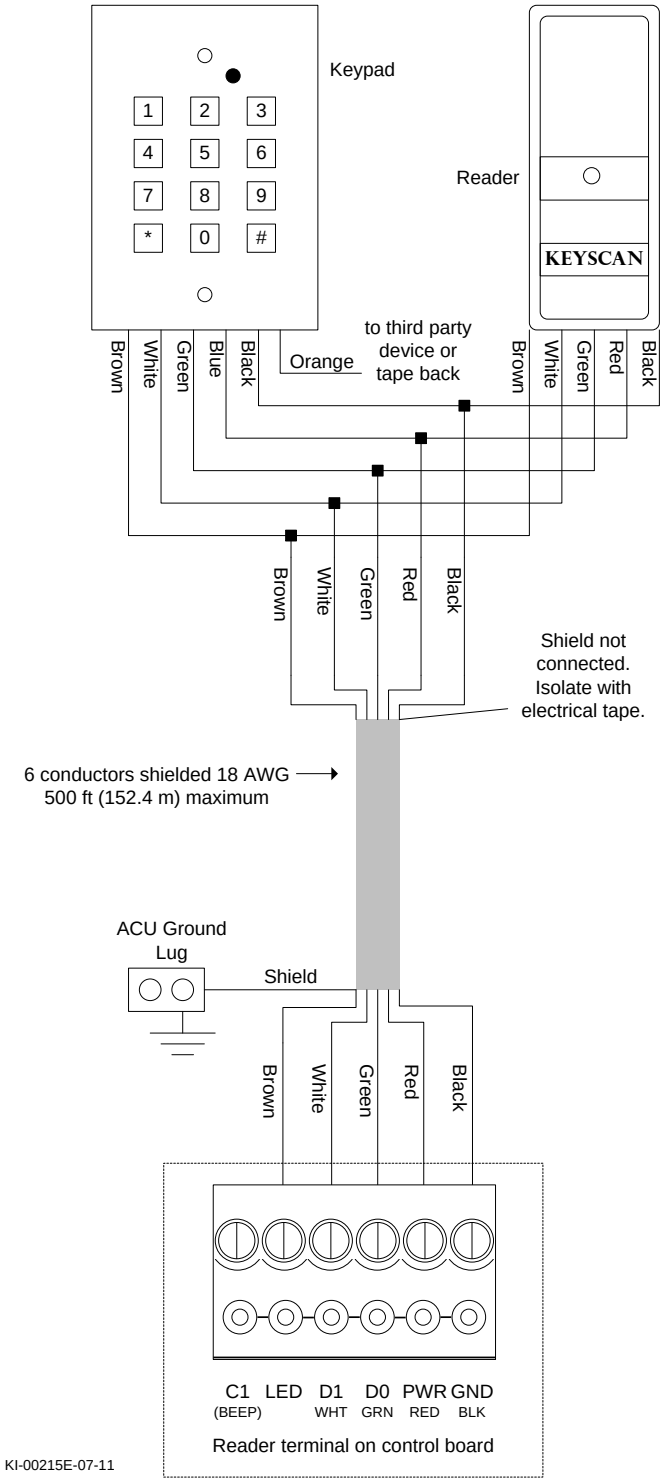


Diagram Notes on WSSKP-1/Reader Combination

The above diagram generally applies to a retro-fit where either a reader or keypad is already installed. Consider Keyscan's K-KPR if a reader/keypad combination is required for a new installation.

Appendix B – WIEEX2

Appendix B reviews general information, installation guidelines, and connection diagrams for Keyscan's RS485 Wiegand extender kit (WIEEX2). For doors/readers at distances greater than 500 feet/152 metres from the access control units, which is the maximum Wiegand communication distance, the WIEEX2 extends the communication range by up to 4000 feet/1219 metres. When installing the WIEEX2 extenders please check the version and observe the corresponding wiring diagram. Each Wiegand extender – WIEEX2 – includes one (1) transmitter and one (1) receiver. The following additional components may be required to complete the installation:

- 12VDC 1 Amp power supply with battery backup
- mounting interface enclosure

Important

Do not mix WIEEX2 (firmware 6.00 or higher) receivers and transmitters with previous generation or WIEEX (firmware 5.03 or lower) receivers and transmitters.

WIEEX2 Functions

The following table outlines the functions and capabilities of WIEEX2 extenders.

Table 30 – WIEEX2

WIEEX2	Functions/Capabilities
WIEEX2 – (firmware 6.00 or higher)	- 26 bits to 80 bits - multi-baud rates 9,600 & 19,200 - supports Present3 - PIN keypad transmission - 4 & 8 bit burst

Table 31 – WIEEX2 Power Requirements

Unit	Power	Notes
WIEEX2 Transmitter (TX)	12 VDC, 50 mA	
WIEEX2 Receiver (RX)	12 VDC, 50 mA	
OCB-8	12 VDC, 230 mA	Optional – An OCB8 is required when not switching a 12VDC door lock or gate operator. See Figure 95 – WIEEX2 to OCB-8 Cable Connection on page 140.

Table 32 – WIEEX2 Cables and Distances

Unit Connections	Maximum Distance	Cable
WIEEX2 transmitter (TX) to reader	500 feet (152.4 m)	Refer to Table 1 – Cable Specificationss - Readers
WIEEX2 transmitter (TX) to receiver (Rx)	4000 feet (1219.2 m)	CAT 5 - 1 twisted pair (communication) 1 pair 18 AWG power if no local independent power supply
WIEEX2 receiver (RX) to ACU	500 feet (152.4 m)	

WIEEX2 (RS485) - Installation Notes

Existing 22 AWG UTP can be used between a WIEEX2 transmitter and receiver provided it is in good condition without breaks or high impedance splices. Nominal resistance for 22 AWG UTP is approximately 18 ohms/1000 feet.

Short J1 on the WIEEX2 transmitter and receiver.

Connect the WIEEX2 transmitter (TX) to the reader, door contact, request-to-exit device, auxiliary input, and door lock, whichever are applicable.

Connect the WIEEX2 receiver (RX) to the appropriate ACU terminals.

Power the transmitter with a 12 VDC 1 Amp power supply, if a local power supply is required and not sourced from the ACU.

The door unlock output (RA2/OC) is defaulted for 'fail safe'. If 'fail secure' is required on a WIEEX2 (firmware 6.00 or higher), connect RB4 on the receiver to the ‘normally closed’ position on the ACU lock relay.

The WIEEX2 transmitter (TX) can control a lock device or relay to a maximum of 12 VDC, 500 mA.

Figure 93 – Wiegand Extender Overview

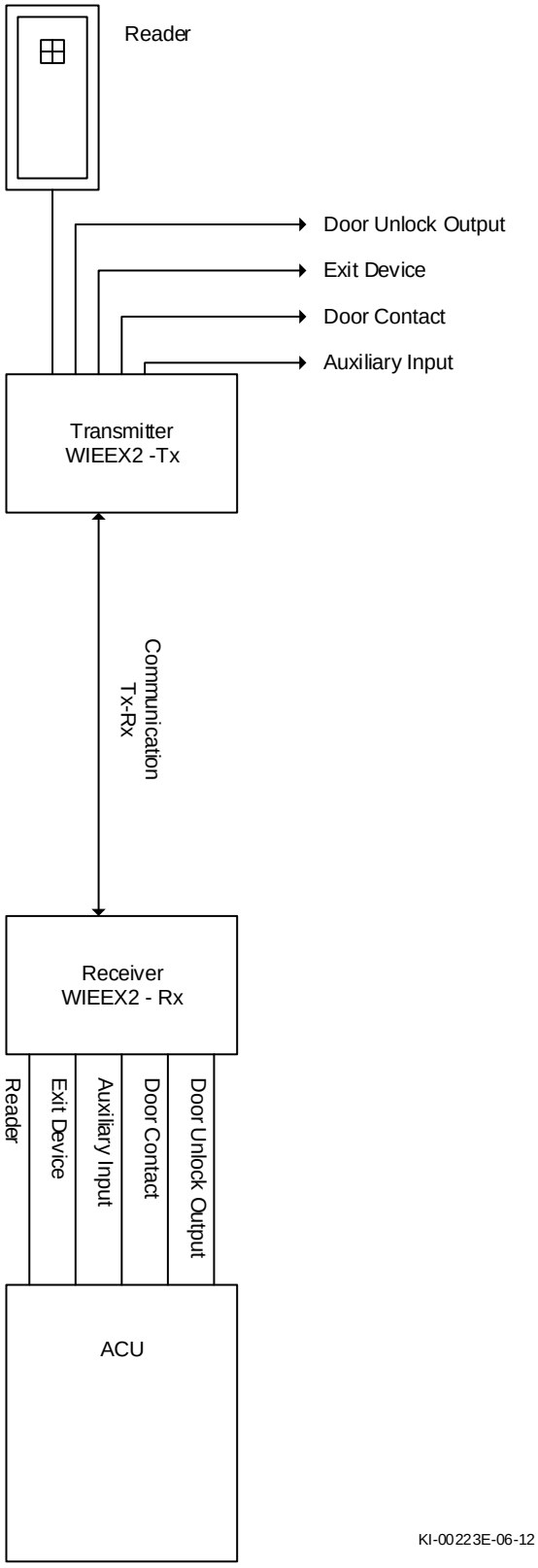


Figure 94 – WIEEX2 RS485 Connections – (Firmware 6.00 or Higher)

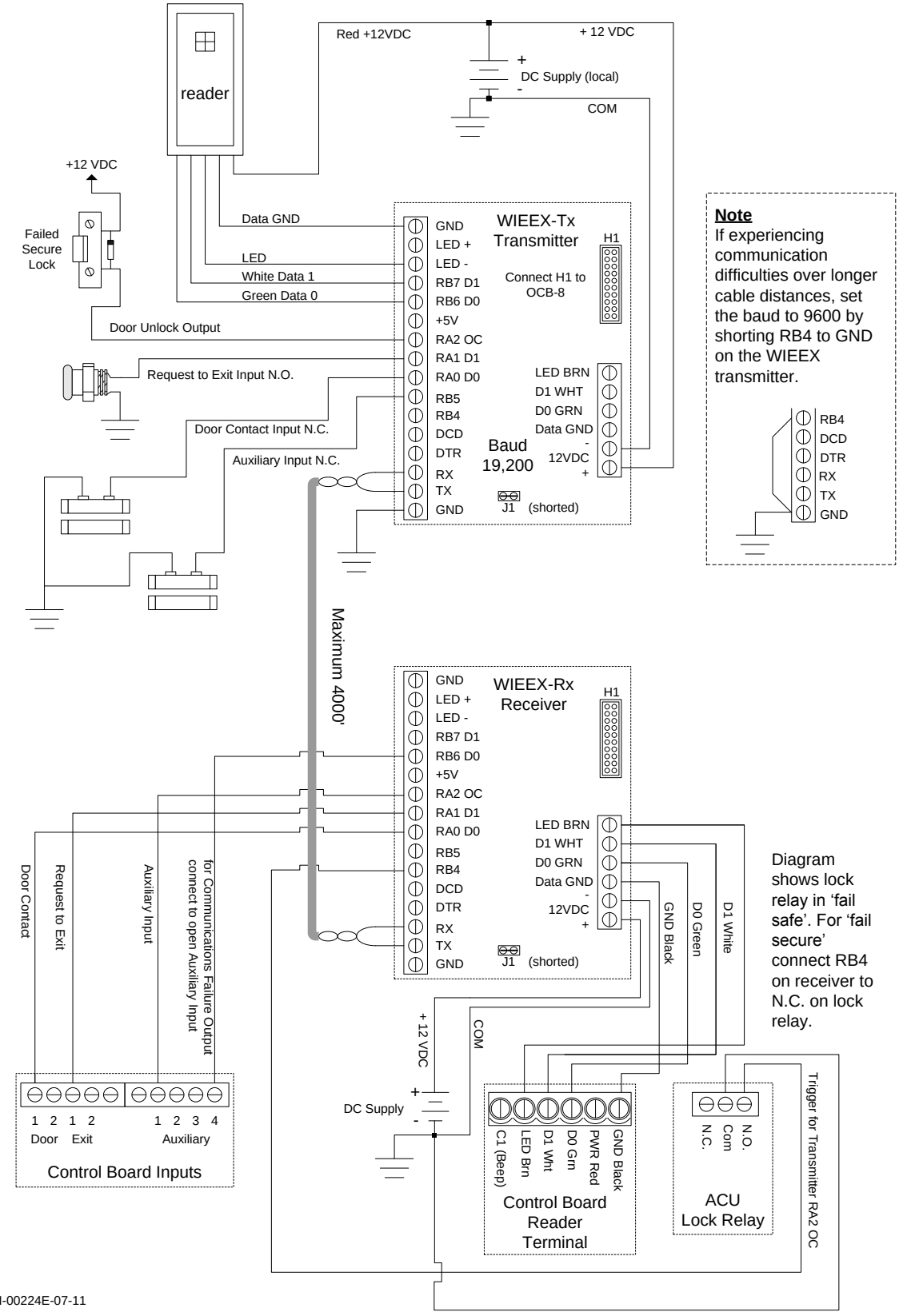
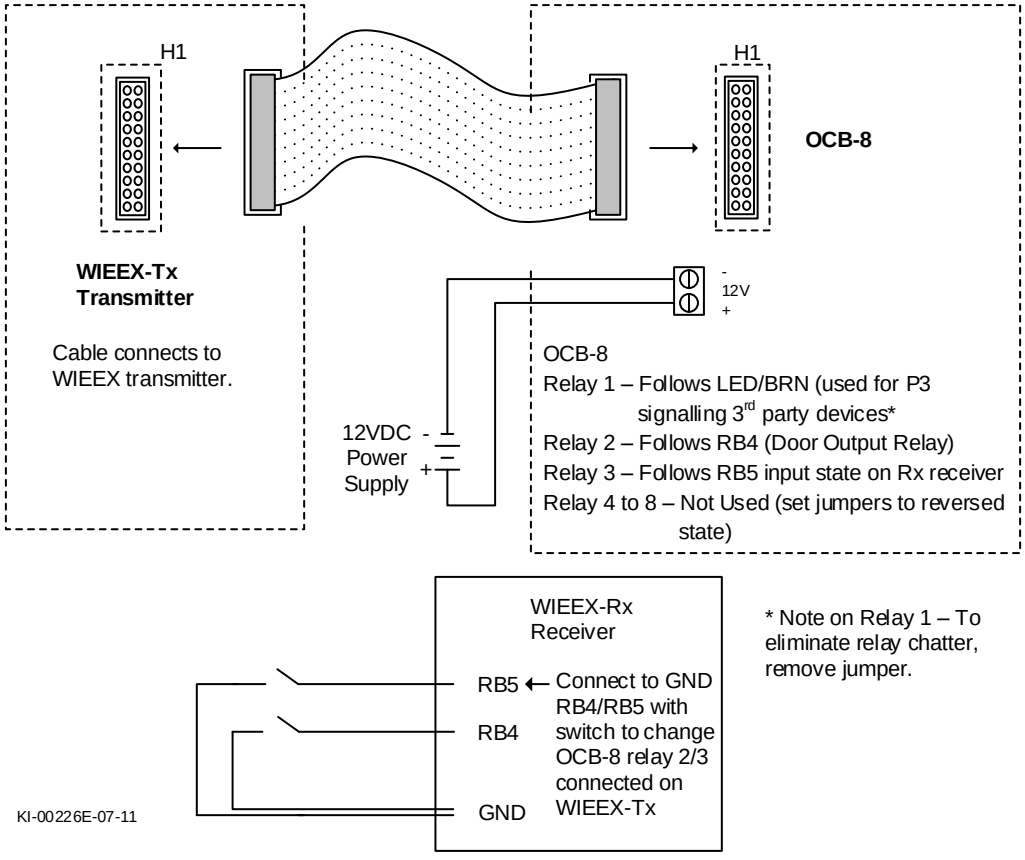


Figure 95 – WIEEX2 to OCB-8 Cable Connection



Warranty

Limited Warranty

Keyscan warrants that all Keyscan manufactured products shall be free of defects in materials and workmanship under normal use for a period of two years from the date of purchase. In fulfillment of any breach of such warranty, Keyscan shall, at its option, repair or replace defective equipment upon return to its facilities. This warranty applies only to defective parts or workmanship. This warranty does not apply to damage that occurred during shipping or handling, or damage due to causes beyond the control of Keyscan such as lightning, excessive voltage, mechanical shock, water damage, or damage arising out of abuse, alteration or improper application of the equipment.

This warranty does not extend to products distributed by Keyscan that are manufactured by 3rd parties. The original equipment manufacturer's warranty shall apply.

The foregoing warranty shall apply only to the original buyer and is and shall be in lieu of any and all other warranties, whether expressed or implied and of all other obligations or liabilities on the part of Keyscan. This warranty contains the entire warranty. Keyscan neither assumes, nor authorizes any other person purporting to act on its behalf to modify or to change this warranty, nor to assume for it any other warranty or liability concerning this product.

In no event shall Keyscan be liable for any direct, indirect, or consequential damages, loss of anticipated profits, loss of time or any other losses incurred by the buyer in connection with the purchase, installation, or operation or failure of this product.

WARNING – Keyscan recommends that the entire system be completely tested on a regular basis. However, despite frequent testing and due to, but not limited to, criminal tampering or electrical disruption, it is possible for this product to fail to perform as expected.

Seller's Right of Possession

In addition to all remedies Keyscan may possess, Keyscan shall have the right at any time for credit reasons or because of buyer's defaults, to withhold shipments in whole or in part, to recall goods in transit, retake same and repossess all goods, which may be stored, without the necessity of taking any other action.

Buyer consents that all merchandise so recalled, retaken, or repossessed shall become the absolute property of Keyscan provided that buyer is promptly notified of such action and is given full credit therefore.

Product Installation and Operation

Buyer assumes all responsibility for the proper selection, installation, operation, maintenance and adherence to any and all federal, state/provincial and municipal building and fire codes of the merchandise purchased from Keyscan. Keyscan SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL, CONTINGENT, SPECIAL OR INCIDENTAL DAMAGES whatsoever, except as specifically set forth in the LIMITED WARRANTY.

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