

# RAC5 XT Installation Guide



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# 1 Introduction and Disclaimers

**Please read and follow all directions carefully.**

These instructions are designed for qualified installers or individuals with knowledge of common safety practices and the competence to perform the steps described herein.

dormakaba Canada Inc. is not responsible for damage or malfunction due to incorrect installation.

## CAUTION

Carefully inspect windows, doorframes, doors, etc. to ensure the installation procedures will not cause any damage. dormakaba Canada Inc.'s standard warranty does not cover damages caused by installation. The RAC5 XT should always be installed in a secured room or facility with controller access to prevent access to the system.

## WARNING

Card reader or other peripheral installations within elevators must only be done with prior consultation of the elevator manufacturer. A technician from the elevator manufacturer should always be present for installation. Do not connect to a receptacle controlled by a switch.

If installing the RAC5 XT in an elevator cage environment, or in proximity to any other equipment that may generate high levels of electromagnetic interference, follow the installation requirements as indicated in Annex C to prevent any operational instability.

The Table below outlines Access Control Levels as they pertain to certain Features.

Feature	Level
Destructive Attack Level	I
Line Security	I
Endurance Level	IV
Standby Power	IV
Single Point Locking Device with Key Locks	I

RAC5 XT Model #: T52-XXXXX

Firmware #: FW-516334-V 10.07.20.4

# 1.1 Safety Procedures

Installation is to be done following standard safety procedures and using adequate equipment and protection as prescribed. Power is to be off during the installation process as well as for any maintenance procedures.

**⚠ CAUTION** Wear safety glasses when using any tools.

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

**Adhere to UL STD 294**

**Adhere to the National Electrical Code ANSI/NFPA 70**

**Statement according to FCC part 15**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

# 2 Product Description

## 2.1 Features

The RAC5 XT is designed to operate electrical locking or control devices where a stand-alone electronic lock is not practical. It provides programmable ingress & egress access control.

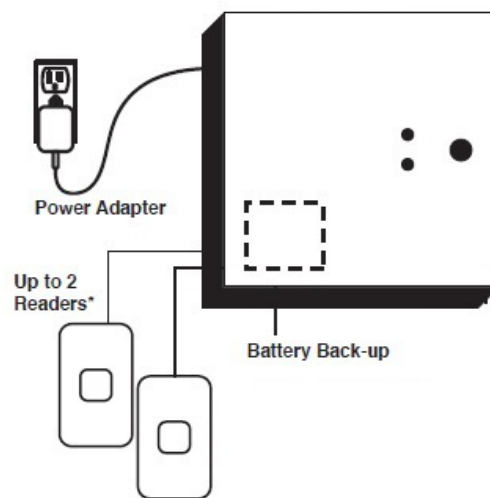
The system controls any door or access point up to 1,000 feet (300 m) away when using a contactless reader.

\* Recommended cable is 22AWG CMP cable (Belden 8723 or equivalent).

The Contactless Card Reader mounts directly on doorframes as narrow as 2 inches (5.1 cm), while the insert card reader can only be installed in an elevator panel.

The RAC5 XT is an access control solution that can operate 2 individual card readers, provides multiple relays, a battery back-up option, and much more as per the feature list below.

Figure 1 – RAC5 XT System



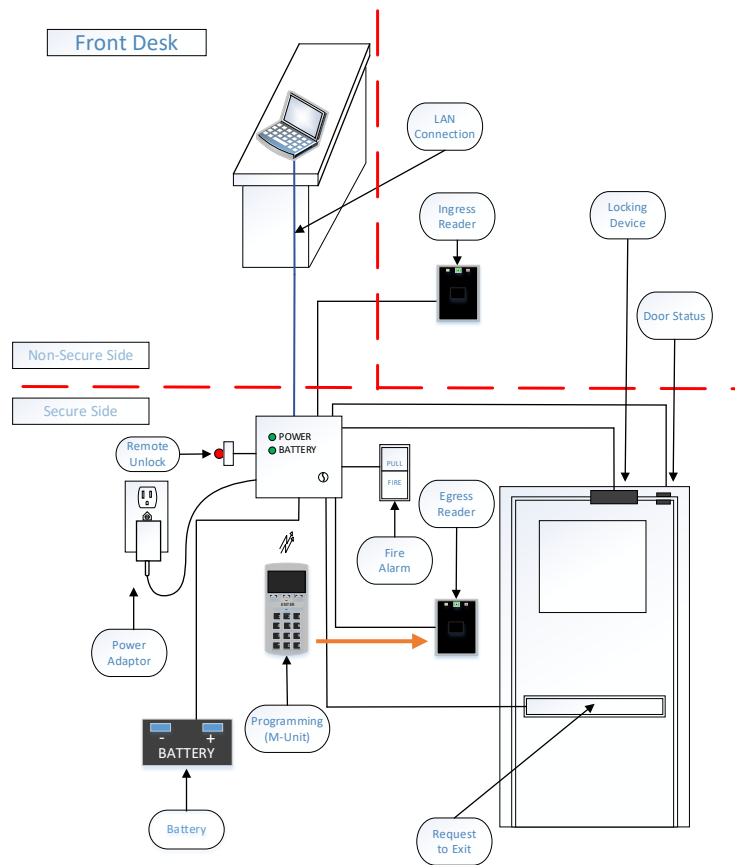
\* Contactless reader shown.

### Features

- Variable access delay
- Power failure 3-way auto-recovery; Real Time Clock (RTC)
- Relay bypassing (passing function)
- Remote Unlock Input
- Power Status LEDs feedback
- Relay Outputs x2
- Unlock delay programmable via an M-Unit
- Fire Alarm Input
- Request to Exit (REX) Input
- Battery back-up
- Control up to 2 card readers
- NFC programming & auditing
- Tamper Alarm Input

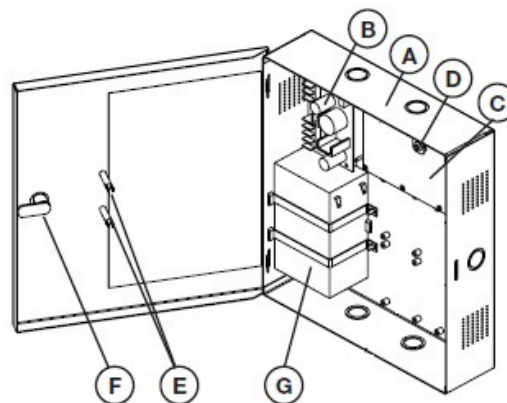
## 2.2 Components

Figure 2 – RAC5 XT Layout



### 2.2.1 Controller Box

Figure 3 – RAC5 XT Controller Box



- (A) RAC5 XT Enclosure & Access Door: Holds the controller board (PCB) and the power supply and battery back-up (optional). Knockouts are available on 3 sides for routing of peripheral cables
- (B) Power Supply: Provides the DC power required for operation of the controller PCB and all peripherals
- (C) Controller Board (PCB): Controls all the features of the RAC5 XT system
- (D) Tamper Switch: Attached to the RAC5 XT enclosure to generate an alarm if the box is opened during operation

- (E) Power & Battery Status LEDs: Provides visual indication of the operational status of the RAC5 XT system.  
Battery status LED is only used on battery back-up equipped systems
- (F) Cam-lock with Key: To provide secure locking and to control access to the RAC5 XT enclosure

**Optional Components:**

- (G) Battery Back-up: 12 VDC battery providing up to 4 hours of operation in the event of a power failure

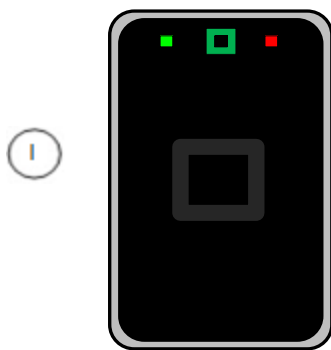
**Not Shown:**

- (H) Cables: Cables required for connections of the LEDs, power supply and controller PCB. If equipped, will also include cable for connection of battery back-up

## 2.2.2 Contactless Card Reader

The Contactless Card Reader is a small, vertical-mounted unit that protrudes from the wall and is used with RFID-based keycards.

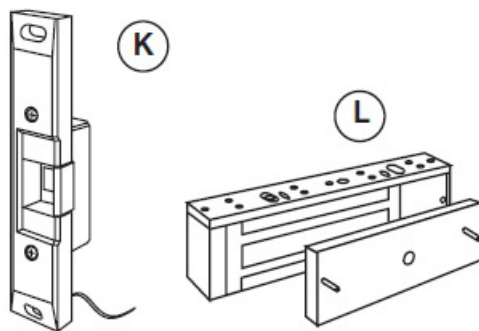
Figure 4 – Contactless Card Reader



## 2.2.3 Locking Devices

The RAC5 XT controller PCB provides one or multiple relay outputs that can be used to control Electric Strikes (K) or Electromagnetic Locks (L) as shown below.

Figure 5 – Electric Strike & Electromagnetic Lock



## 2.2.4 Optional Peripherals

The RAC5 XT can also be used with the following peripherals:

- Exit Devices
- Motion Detectors
- Panic Bars
- Request to Exit (REX) button
- Remote Unlock button
- Remote Programming Interface

# 3 Checklist and Exploded Views

## 3.1 Parts and Tools List

**NOTE:** Some items are dependent on the options or configuration purchased. Please ensure all parts ordered and required for installation are available before starting. Parts are subject to change without notice. For letter designations, refer to Figure 6.

### 3.1.1 RAC5 XT Enclosure

**NOTE:** All items below come factory installed.

- (A) RAC5 XT enclosure with access door
- (B) Power Supply: 24 VAC / 24 VDC input, 12 VDC output
- (C) Controller PCB
- (D) Tamper Switch
- (E) 2 panel-mounted LEDs (green) for power and battery status
- (F) Cam-lock

### 3.1.2 Battery Back-up (optional)

**NOTE:** All items come factory installed when ordered with the initial system.

- (G) 1x lead acid battery, including:
  - 2x strapping bracket
  - 2x flat washer (#8)
  - 2x split washer (#8)
  - 2x nut (#8-32)
  - Power supply cabling (1x red, 1x black – 18 AWG, -10")

### 3.1.3 Cables (not shown)

**NOTE:** Some items come factory installed.

(H) System cables:

- Power supply to LEDs
- Power supply to controller PCB
- Controller PCB jumpers (card reader type-dependent)

### 3.1.4 Card Reader(s)

(I) Contactless reader (see Figure 4)

### 3.1.5 Locking Device

**NOTE:** Locking device(s) dependent on the system configuration ordered.

(J) Electric strike

(K) Electromagnetic lock

### 3.1.6 Power Adapter

**NOTE:** Dependent on the countries' electrical power requirements.

(L) 1x International 24 VDC output adapter with integrated 6-foot (1.8 m) power cable and interchangeable AC outlet prongs. Input power requirements of 220-240 VAC, 50-60 Hz

**Or**

(M) 1x North America 24 VAC output power adapter with separate 10-foot (3 m) power cable assembly (2x 18 AWG cables terminated on one end with fork terminals). Input power requirements of 110-120 VAC, 60 Hz

### 3.1.7 Other Peripherals (optional)

(N) Request to Exit button (REX)

(O) Remote Unlock (not shown)

### 3.1.8 Programming Device

#### **IMPORTANT**

Programming of the RAC5 XT can only be done with the M-Unit (**NOTE:** Purchased separately).

Programming of the unit same as any access point.

### 3.1.9 Installation Hardware Bag

(S) 4x Philips wood screw, #8 x 1-1/4"

(T) 4x Nylon anchor, #6-10

(U) 4x Concrete anchor, #7-9

(V) 2x Strain relief connector with locking nut

(W) 2x Diode-rectifier

(X) 5x Steel flat washer, #8

(Y) 3x Crimp fork terminal B connector

(Z) 2x Crimp fork terminals, 18-22 AWG

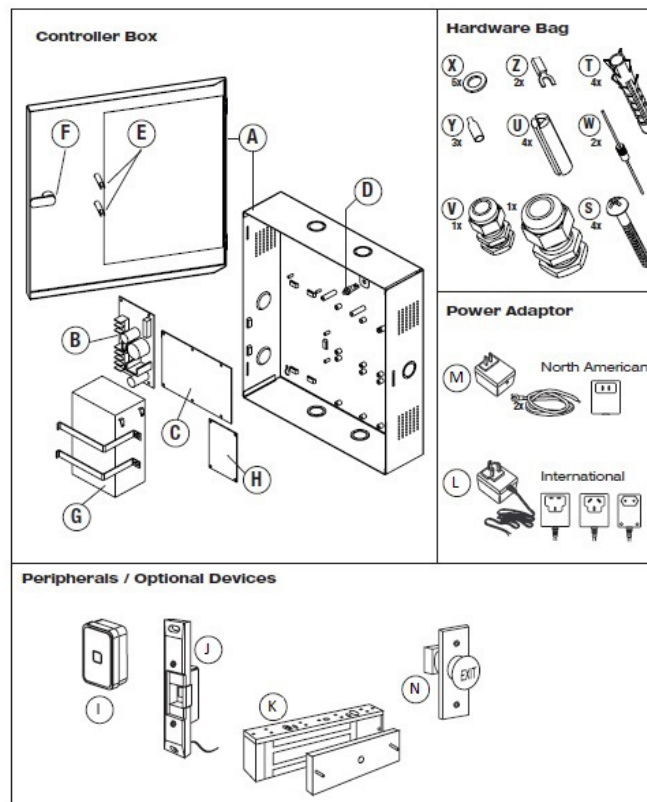
### 3.1.10 Tools Required (not supplied)

Additional tools may be required, dependent on the peripherals being installed. The list below covers the installation for the RAC5 XT enclosure only.

- Safety glasses
- Ink marker
- Electric drill
- 9/64" (3.5 mm) drill bit
- 7/32" (5.5 mm) drill bit
- 1/4" (6.5 mm) drill bit
- 3/8" (9.5 mm) drill bit
- Philips screwdriver - #2
- Slotted screwdriver – 3/32" tip width
- Adjustable wrenches
- Crimp tool – 18-22 AWG
- Pliers
- Wire cutter/stripper
- Ambiance or System 6000 via the M-Unit
- Hammer or rubber mallet
- Awl or center punch

## 3.2 Exploded View

Figure 6 – Exploded View



# 4 System Installation Overview

## Before installation:

- Ensure all components ordered and materials/tools required are available
- Ensure all cabling is available for the peripherals/components being installed

### IMPORTANT

All installations and wiring of RAC5 XT enclosure & peripherals must comply with all applicable local building codes and regulations and National Electrical Code, ANSI/NFPA 70.

### ⚠ CAUTION

Do not connect power to the enclosure until the end of the installation process. If installing the RAC5 XT in an elevator cage environment, or in proximity to any other equipment that may generate high levels of electromagnetic interference, follow the installation requirements as indicated in Annex C to prevent any operational instability.

## 4.1 Pre-installation Procedures

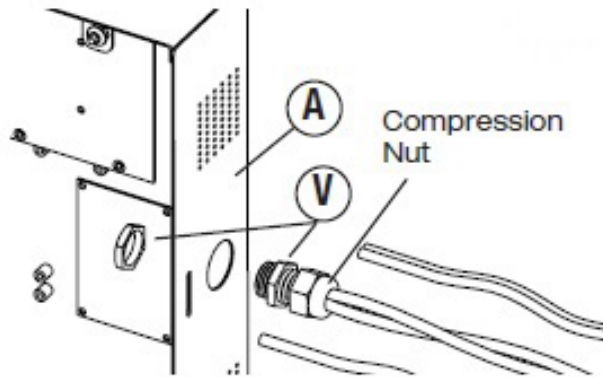
1. Identify a secure location for the RAC5 XT enclosure.

### IMPORTANT

- Access to the RAC5 XT enclosure must be restricted to authorized personnel
  - AC power must be available within distance specified in section 3.1.6.
  - The location temperature must be from 0 to 49 °C (32 to 120 °F) and sheltered against weather hazards and dripping water with relative humidity conditions less than 85% at 32 °C (90 °F)
  - The enclosure must be installed using only the hardware supplied
  - The enclosure should be mounted at a workable height with clearance to completely open the access door
  - The enclosure can be placed either horizontally in the ceiling or vertically on a concrete, wood or plaster wall
2. Identify location(s) for contactless readers and peripherals.
    - Contactless card readers must be placed within 1,000 feet (300 m) from the RAC5 XT enclosure
    - The card readers should be installed in an obvious location at an ergonomic height near the access door or elevator being controlled
    - The space to use the contactless reader must be large enough to allow for adequate clearance for the card being presented to the reader
    - For remaining peripherals: Determine the location(s) required for any other peripherals (REX, motion detector, etc.) and ensure that all required cabling is available as required in the following steps. Install as per manufacturer's instructions and route wires to the RAC5 XT enclosure for connection to the controller PCB
  3. Set the desired access delay.
    - The default factory setting for the delay on access devices is 4 seconds. To change this value, configure the controller PCB using the M-Unit (the gauge is 1 to 255 seconds).
  4. Install the strain relief.
    - Strain reliefs is provided in the hardware bag to secure the wires leading into the enclosure and to help prevent wire tampering

- a) Determine the routing needed for all wiring of the RAC5 XT card reader and peripherals and select the enclosure knock-out(s) to be removed for installation of the strain relief(s)
- b) Remove the selected knock-out(s) using a hammer and screwdriver / awl, and from the inner side of the enclosure, tap out the small metal disc
- c) Based on the amount of wires to be routed, attach the appropriate strain relief to the enclosure as shown in Figure 7. Do not attempt to route an excessive amount of wires. If extra strain reliefs are required, please contact dormakaba Canada Inc.

Figure 7 – Strain Relief



5. Utilize a dip switch (SW2) to configure the system and test parameters.
  - Number of Devices switch setting (SW3)
    - a) **OFF** – One locking device
    - b) **ON** – Two locking devices
  - Test Mode switch setting (SW4)
    - a) **OFF** – Normal operation
    - b) **ON** – Test mode

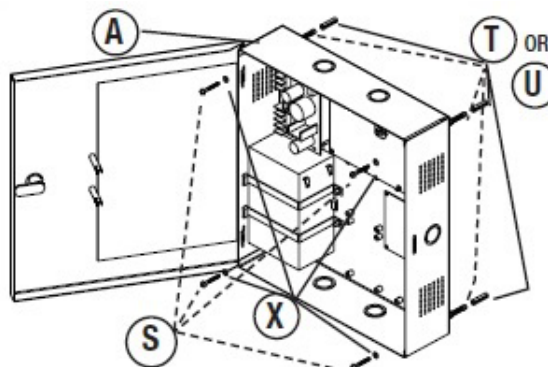
## 4.2 Installation and Wiring Procedures

### 4.2.1 Mount the Enclosure

Install the enclosure in the desired location using the appropriate items from the hardware bag.

**NOTE:** For easier access, we recommend removing the access door prior to installation

Figure 8 – Enclosure



## 4.2.2 Mount the Contactless Card Reader

**NOTE:** All readers are rated IP 54.

### **CAUTION**

Do not exceed the maximum cable length indicated by the manufacturer of the products being connected. Refer to the wiring label on the access door, the wiring diagram & tables in Annex A, or the detailed peripherals connections in Annex B.

### **IMPORTANT**

Every wire must pass through the strain relief as connected in the pre-installation procedures.

1. Remove the back plate and use it to mark the holes for the cables and screws.

**NOTE:** Do not use the actual drawing from Annex E of this document to mark the hole locations as the drawing is not to scale.

2. Drill the holes in the wall according to the diameters indicated on the drilling template in Annex E, based on the type of surface the reader is being installed on:
  - a) Metal surface mounting: Install the back plate onto the wall with the metal screws provided in the installation hardware bag
  - b) Drywall surface mounting: Tap the wall inserts (provided in the installation hardware bag) into the wall using a rubber mallet. Install the back plate onto the wall with the wood screws provided
3. Connect the included cable to the terminal block of the reader as shown in Annex A. Ensure the correct wire colour is attached to the correct terminal block connection.
4. Route the card reader's wire through the grommet of the back plate and assemble the front of the reader onto the back plate. Assemble by tightening down the screw (provided in the card reader's installation bag) on the bottom of the card reader.
5. Connect the card reader wire to the terminal blocks of the controller PCB as per Annex A.

### **IMPORTANT**

Ensure that the jumper wires are also connected on the controller PCB.

**NOTE:** If required, to differentiate between the ingress and egress, ensure that the appropriate connector on the controller PCB is used.

## 4.2.3 Connect Peripheral Wiring

### **CAUTION**

Do not exceed the maximum cable length indicated by the manufacturer of the products being connected. In addition, the wire used to connect the peripherals to the controller PCB must be of the proper gauge and type as specified by the manufacturer. Refer to the wiring label on the access door or the wiring diagrams in Annex B.

### **IMPORTANT**

Every wire must pass through the strain relief as connected in the pre-installation procedures. Follow the indications below for the different peripherals being connected. The actual items to connect will vary based on the system configuration ordered.

### 4.2.3.1 Electric Strike or Electromagnetic Lock (Locking Device)

1. Refer to Annex B for detailed wiring.

### **IMPORTANT**

dormakaba Canada Inc. does not provide technical or field support for third party locking devices. Please consult the device manufacturer for support.

The following table indicates the maximum recommended wire length that can be used for typical locking devices, based on wire gauge.

Locking Device Type	Typical Current (A)	Maximum Recommended Wire Length, One-Way (feet)			
		AWG 18	AWG 16	AWG 14	AWG 12
Electromag. Lock	0.28	168	266	425	675
Electric Strike	0.45	105	166	265	420
Double Electro. Lock	0.46	102	162	258	410
Other Devices	0.75	63	100	160	250

**NOTE:** The Maximum Recommended Wire Length is the approximate wire length that causes a 5% voltage loss, using a 12-volt locking device at the rated current included.

**⚠ CAUTION**

The table is for reference only. Actual wiring requirements for specific devices may differ. Always follow the locking device manufacturer's wiring recommendations as well as local building codes.

2. Install and route a 2-conductor cable from the controller PCB to the desired location of the electric strike or electromagnetic lock.
3. If installing an electric strike, install the diode across the terminals of the locking device, using the crimp connectors provided in the hardware bag if needed.

**IMPORTANT**

Do not reverse the diode polarity as indicated on the wiring diagram.

**⚠ CAUTION**

To prevent a possible short, the diode must not be in contact with electric strike. If required, cut the diode ends shorter.

4. Mount the locking device in the desired location and connect as per manufacturer's instructions. For connections between locking device and controller PCB, refer to Annex B.

#### 4.2.3.2 Request to Exit Button (REX)

1. Refer to Annex B for detailed wiring.
2. Mount the device at the desired location and run a 2-conductor cable from the request to exit button to controller PCB connector J8, pins 3 & 4. Connect as per Annex B.

#### 4.2.3.3 Remote Unlock Button

1. Refer to Annex B for detailed wiring.
2. Mount the device at the desired location and run a 2-conductor cable from the remote unlock button to the controller PCB connector J8, pins 1 & 2. Connect as per Annex B.

#### 4.2.3.4 Motion Detector

1. Refer to Annex B for detailed wiring.
2. Mount the device at the desired location and run a 4-conductor cable from the motion detector relay's terminal block to controller PCB connector J8, pins 3 & 4.
3. To power the motion detector, connect the +12V input of the motion detector to the red wire connecting the +DC OUT terminal on the power supply and the 12V input of the controller PCB (J16, pin 1), as shown in Annex B. Then, connect the GND input of the motion detector to the black wire connecting the -DC OUT terminal on the power supply and the GND input on the controller PCB (J16, pin 2). The use of wire connectors/caps is recommended to ensure reliable electrical connections.

#### 4.2.3.5 Fire Alarm Panel

1. Refer to Annex B for detailed wiring.
2. Remove the jumper wire connected between pins 3 and 4 of connector J18 on the controller PCB and complete the fire panel installation as per manufacturer's indications.

#### 4.2.3.6 Tamper Switch to Premise Alarm System

1. Disconnect the wires on controller PCB connector J7 pins 1 & 2, and run a 2-conductor cable from the switch to the premise alarm system.

##### **IMPORTANT**

The tamper alarm switch's polarity is such that when the door is closed, the switch itself is also in a closed state. Ensure that the wiring to the premise alarm system is done accordingly to prevent false alarms.

### 4.2.4 Power Adapter Connection

**NOTE:** Dependent on the countries' electrical power requirements. Refer to Annex B for detailed wiring.

#### 4.2.4.1 International Power Adapter

1. Attach the appropriate AC outlet prong to the power adapter.
2. Route the power adapter wires into the enclosure and secure the wire (recommended with tie wraps)
3. From the inside of the enclosure, crimp the fork terminals supplied in the hardware bag to the end of each wire.
4. Connect the fork-terminated wires to the power supply inputs as shown in Annex A.

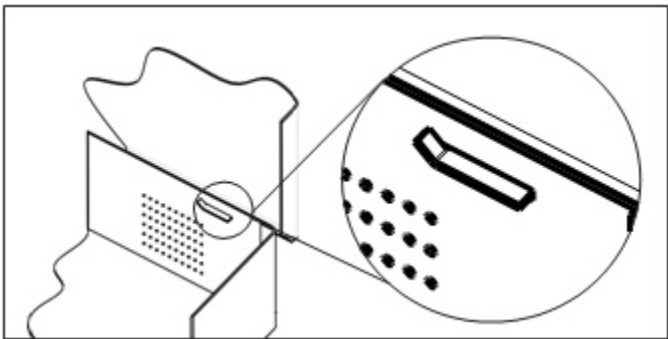
#### 4.2.4.2 North America Power Adapter

1. From the inside of the enclosure, connect one end of the fork-terminated wires to the power supply inputs as shown in Annex A.
2. Route the wires out of the enclosure to the AC power source and secure the wires (recommended with tie wraps).
3. Crimp the fork terminals supplied in the hardware bag to the end of the wires and connect them to the power adapter screw terminals.

### 4.2.5 Complete the Installation

- 1. If the access door was removed, reinstall the door to the RAC5 XT enclosure.
- 2. **Bend the two tabs on the door to a maximum of 30 degrees as shown in Figure 9.**

Figure 9 – Door Tabs



- 3. Connect the LED wire harness from the power supply to the access door LEDs as indicated in the table below.

**NOTE:** The wires must be connected with the proper polarity. Once the terminals are installed, they are designed to have a tight fit so removal may damage the LEDs.

LED Description	Location on Door	'+' Terminal Connection	'-' Terminal Connection
Power Status	Top	Red	Orange
Battery Status	Bottom	Red	Yellow

- 4. If a battery is part of the system, connect the red (+) and black (-) wires from the power supply to the battery.

**IMPORTANT** Ensure the proper connections are made (e.g. red to red, black to black).

- 5. Plug the power adapter into the AC power source and/or turn on the main AC power to the system.

# 5 Settings and Operation

## 5.1 Testing

1. If not already done, connect the AC power adapter and/or turn on the AC current.
2. Verify the Power Status LED on the access door is ON.
3. If equipped, verify the Battery Status LED on the access door is ON.  
**NOTE:** Battery status LED may be off if the battery is completely discharged or if the connections are reversed. A properly connected battery may take up to 12 hours to charge and the LED to turn on.
4. Verify that the Heartbeat LED (D46) on the controller board (B) blinks continuously and D48 and D37 are on (if 2 readers are used).
5. Activate the bypass switches SW3 and SW5 on the controller board (B).
6. Verify the locking device is activated. If it is not activated, verify the Fire Alarm input is properly connected or that a jumper wire is connected between J18 pins 3 and 4.
7. De-activate the bypass switches SW3 and SW5 on the controller board (B).
8. If a Request to Exit (REX) button is connected, press it and verify that the door unlocks. Verify the door unlocks for 5 seconds (delay is configurable) and then relocks afterwards.
9. If a Remote Unlock button is connected, press it and verify that the door unlocks for as long as the button is pressed, and then relocks when the button is released.
10. If a Motion Detector is connected, pass in front of it to verify the door unlocks.
11. If the RAC5 XT is connected to a Fire Panel and the electromagnetic lock powered by the 12 VDC output of the RAC5 XT, verify that the electromagnetic lock or a fail-safe electric strike is deactivated when the Fire Alarm is active (open input).
12. If a battery back-up is equipped, when fully charged, remove the main AC power adapter and verify the proper RAC5 XT operation.

## 5.2 Programming and Auditing

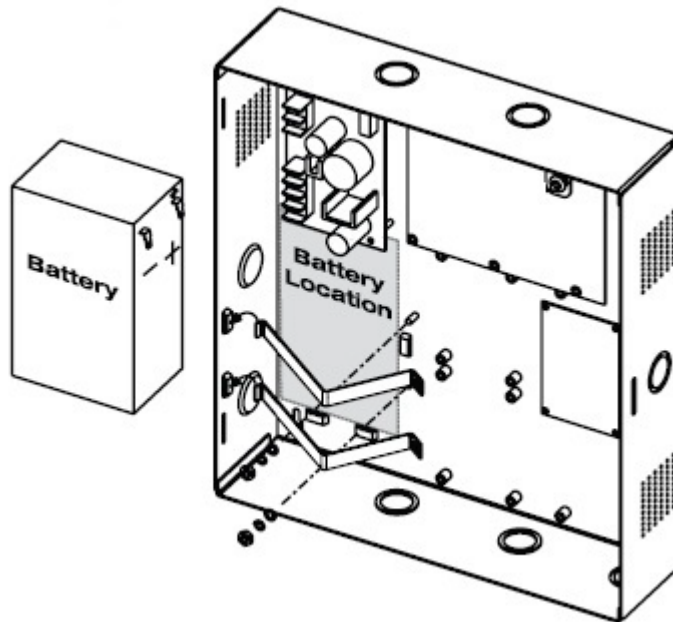
The RAC5 XT can be programmed from Ambiance or Community via the M-Unit. Once programmed, the Zone 1 key card will no longer work. Refer to the M-Unit manual for more details.

## 5.3 Battery Back-Up Replacement

**NOTE:** For preventative maintenance, the battery back-up should be replaced every 2 to 3 years and tested every 6 months by removing the main AC power.

1. Turn off the main AC power to the RAC5 XT or disconnect the power adapter from the wall outlet.
2. Disconnect the red and black wires from the battery.
3. Remove the hardware holding down the battery brackets.
4. Rotate the battery brackets upwards to remove them from the anchoring slots as shown in Figure 10.

Figure 10 – Battery Back-Up



5. Replace the used battery with the same type of gelled lead acid cell 12 V, 7.0 Ah (Ampere-hours).



### CAUTION

Dispose of used battery according to local regulations.

6. Place the new battery in the RAC5 XT enclosure as shown in Figure 10, ensuring the orientation and terminal polarities are as shown.
7. In order: Install the battery brackets, flat washer, split washers and nuts.
8. Reconnect the wires from the power supply to the battery, ensuring that the red wire connects to the positive (+) terminal and the black wire connects to the negative (-) terminal.
9. Reconnect the power adapter and/or turn the main AC power to the RAC5 XT.

## 5.4 New Battery Back-Up Installation

If the original system did not have a battery back-up but one is desired later, order Kit #064-511889-K and follow the steps below.

1. Turn off the main AC power to the RAC5 XT or disconnect the power adapter.
2. Connect and secure the fork-crimp terminal end of the red wire to the (+) terminal on the power supply terminal block BAT.
3. Connect and secure the fork-crimp terminal end of the black wire to the (-) terminal on the power supply terminal block BAT.
4. Place the battery back-up in the enclosure as shown in Figure 10.
5. In order: Install the battery brackets, flat washer, split washer and nuts.
6. Connect the wires from the power supply to the battery ensuring that the red wire connects to the (+) terminal and the black wire connects to the (-) terminal.
7. Reconnect the power adapter and/or main AC power to the RAC5 XT.

**NOTE:** For preventive maintenance, the battery back-up should be replaced every 2 to 3 years and tested every 6 months by removing the main AC power.

## 5.5 Power Failure

In the event of an electrical failure, the system will recover automatically and should require no additional programming if electrical power is restored within 3 days.

When electrical power is restored after a power failure, verify the status of the LED D46 on the controller board (B) is blinking. Refer to Annex A for Status LED definitions.

**NOTE:** When the power to the RAC5 XT is lost, the controller PCB stops functioning and the on-board relay will return to its normal state. Any peripheral connected to the relay will then be either in a Normally Open (NO) or Normally Closed (NC) state, dependent on the wiring.

## 5.6 Loading Recommendations

**⚠ CAUTION** Do not exceed the load limitations of the control panel.

The maximum recommended load for the output relays in the RAC5 XT system is 1 Amp at 30 VDC. The tamper switch rating is 1 Amp at 30 VDC.

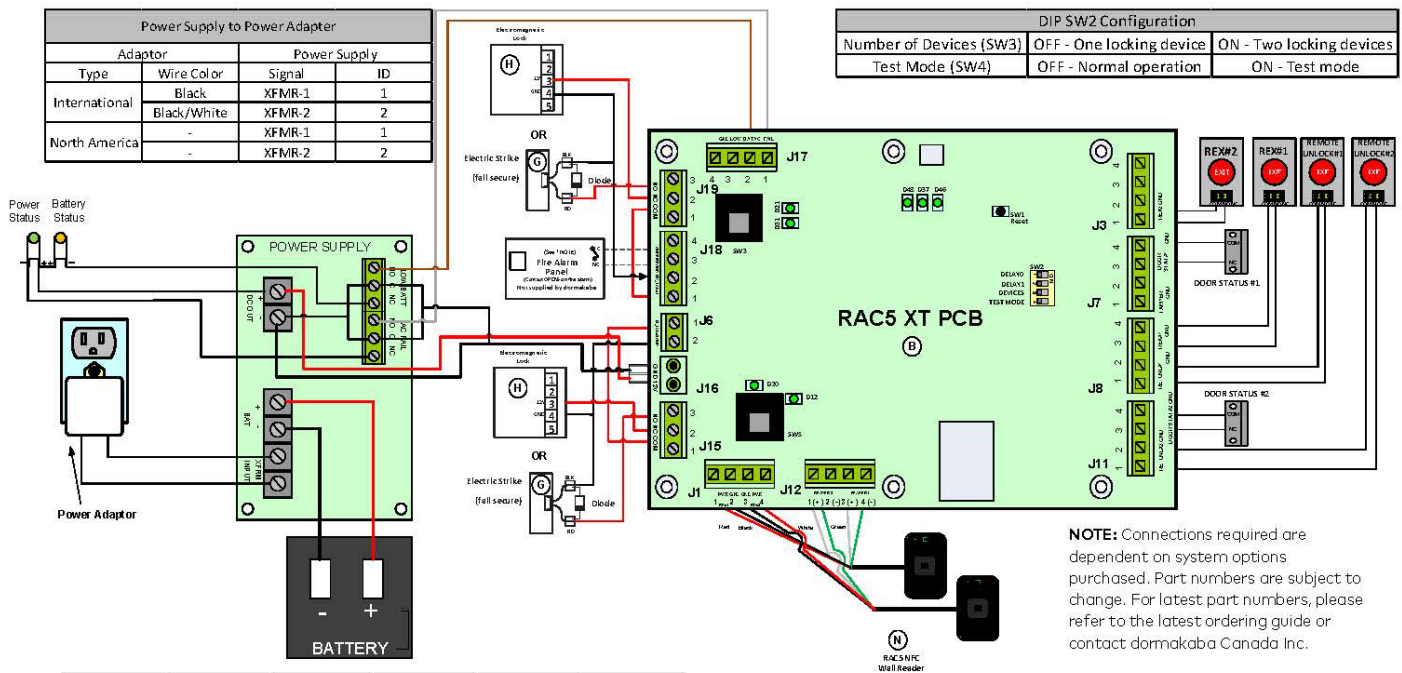
The current supplied by the controller PCB is for the locking device used is 0.54 Amps from connector J18 pin 1 and J6 pin 1. Refer to Annex A.

## 5.7 System Deactivation

In order to deactivate the RAC5 XT system, disconnect both terminals from the battery back-up (if equipped), then disconnect the AC power either by removing the power adapter from the wall outlet, or by shutting off the main power to the electrical outlet the system is connected to.

# 6 Annex A: Wiring Diagram and Tables

Figure 11 – Remote Access Controller RAC5 XT



RAC5 XT PCB to Power Supply					
Description	Controller Board			Power Supply	
	Wire Color	Connector	ID	Signal	ID
DC Power	Red	J16 pin 1	12V	DC OUT	+
	Black	J16 pin 2	GND	DC OUT	-
AC Fail	White	J17 pin 1	AC_FAIL	AC FAIL	NO
	Brown	J17 pin 2	LOW_BAT	LOW BAT	NO
	-	J17 pin 3	GND	-	-

Controller Board - RAC5 Peripherals Connections			
Controller Board		Peripheral	
Signal	PCB Conn.	Wire / Conn.	Description
REM UNL	J8 pin 1	-	Remote unlock (Q) #1
GND	J8 pin 2	-	
REX	J8 pin 3	-	Request to Exit (O) #1
GND	J8 pin 4	-	
FIRE ALM	J18 pin 3	BLACK	Fire Alarm
GND	J18 pin 4	BLACK	
12V_LOCK_DEV#1	J18 pin 1	-	Strike (K) or Maglock (L) Device #1
GND	J18 pin 2	-	
COM	J19 pin 1	-	
NC	J19 pin 2	-	
NO	J19 pin 3	-	Strike (K) or Maglock (L) Device #2
12V_LOCK_DEV#2	J6 pin 1	-	
GND	J6 pin 2	-	
COM	J15 pin 1	-	
NC	J15 pin 2	-	
NO	J15 pin 3	-	
REM UNL 2	J11 pin 1	-	Remote Unlock #2
GND	J11 pin 2	-	
REX2	J3 pin 1	-	Request to Exit #2
GND	J3 pin 2	-	

PCB Status LEDs	
LED	Description
D38	12V Power
D39	3.3V Power
D48	Reader #1
D37	Reader #2
D46	Heartbeat
D31	Lock #1
D21	Lock #1 Bypass
D30	Lock #2
D12	Lock #2 Bypass

Power Supply to RAC5 XT LEDs				
Description	Power Supply		LEDs	
	Signal	ID	Wire Color	Signal
Power Status	AC Fail-1	NC	ORANGE	(-)
	-	-	RED*	(+)
Battery Status	LOW BAT-1	NC	YELLOW	(-)
	DC OUT-2	(+)	RED	(+)
	-	-	RED*	(+)

Controller Board RAC5 Reader Connections			
Controller Board		Contactless Reader	
Signal	Reader Config	Wire Color	Term Block
12V Batt	J1 pin 1	RED	J4 - TB-2
GND	J1 pin 2	BLACK	J4 - TB-1
GND	J1 pin 3	BLACK	J4 - TB-1
12V Batt	J1 pin 4	RED	J4 - TB-2
RD2 Data +	J12 pin 1	WHITE	J5 - TB-3
RD2 Data -	J12 pin 2	GREEN	J5 - TB-4
RD1 Data +	J12 pin 3	WHITE	J5 - TB-3
RD1 Data -	J12 pin 4	GREEN	J5 - TB-4
Wire connection to back of contactless card reader			
TB-1 (BLACK), TB-2 (RED), TB-3 (WHITE), TB-4 (GREEN)			

**NOTE:** J3, J7, J8 & J11 inputs (max source current of 25mA) are all connected to dry terminals (NC, NO) with a common connection to the Ground terminal on each of the connectors; dry terminals must be able to sink minimum 25mA at a minimum of 5V rating. J1 is rated for an output of 12V @ 200mA. J6 & J18 are rated for outputs of 12V @ 500mA.

## 7 Annex B: Peripheral Wiring Diagrams

### Figure 12 – Contactless Reader Wiring

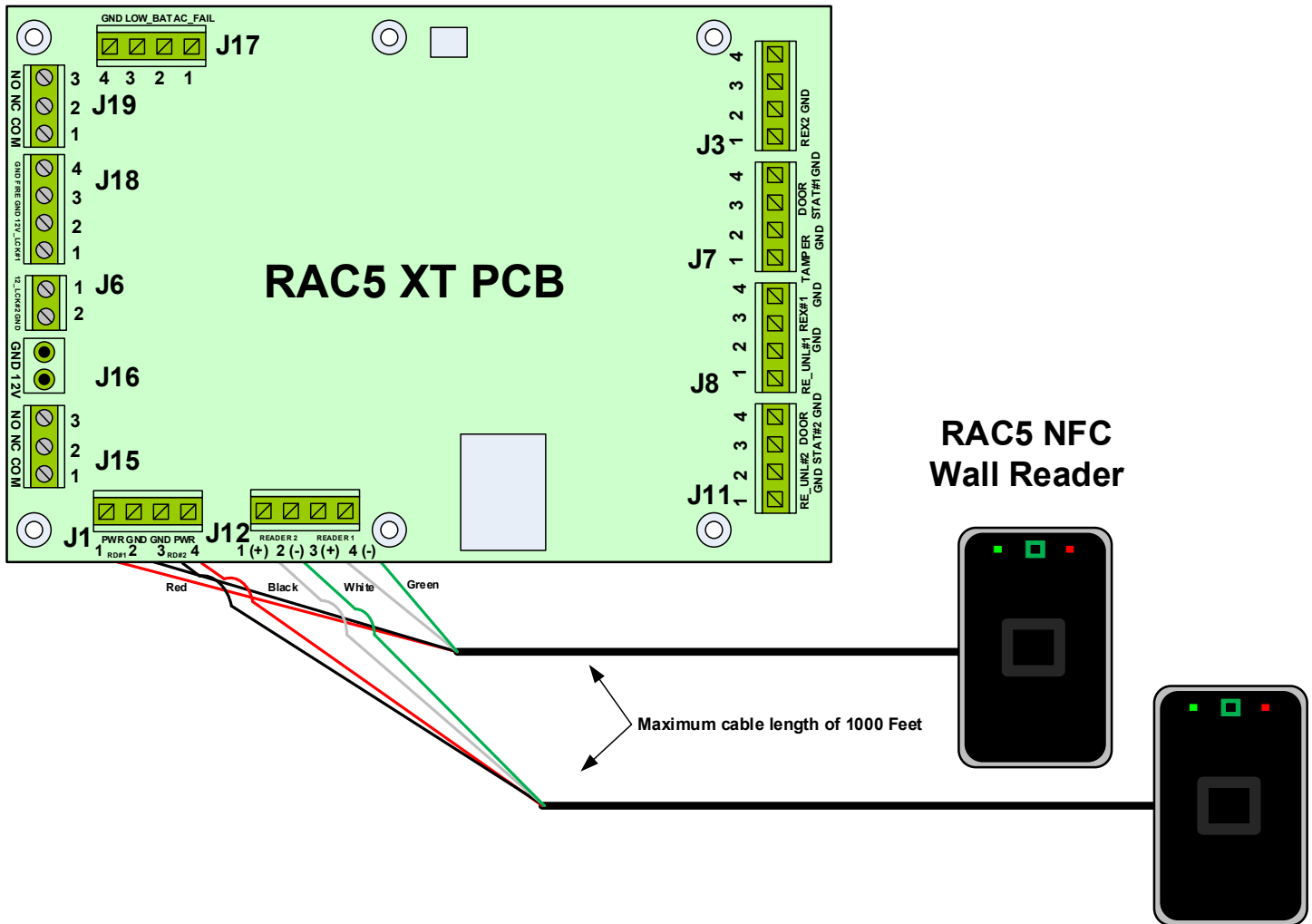
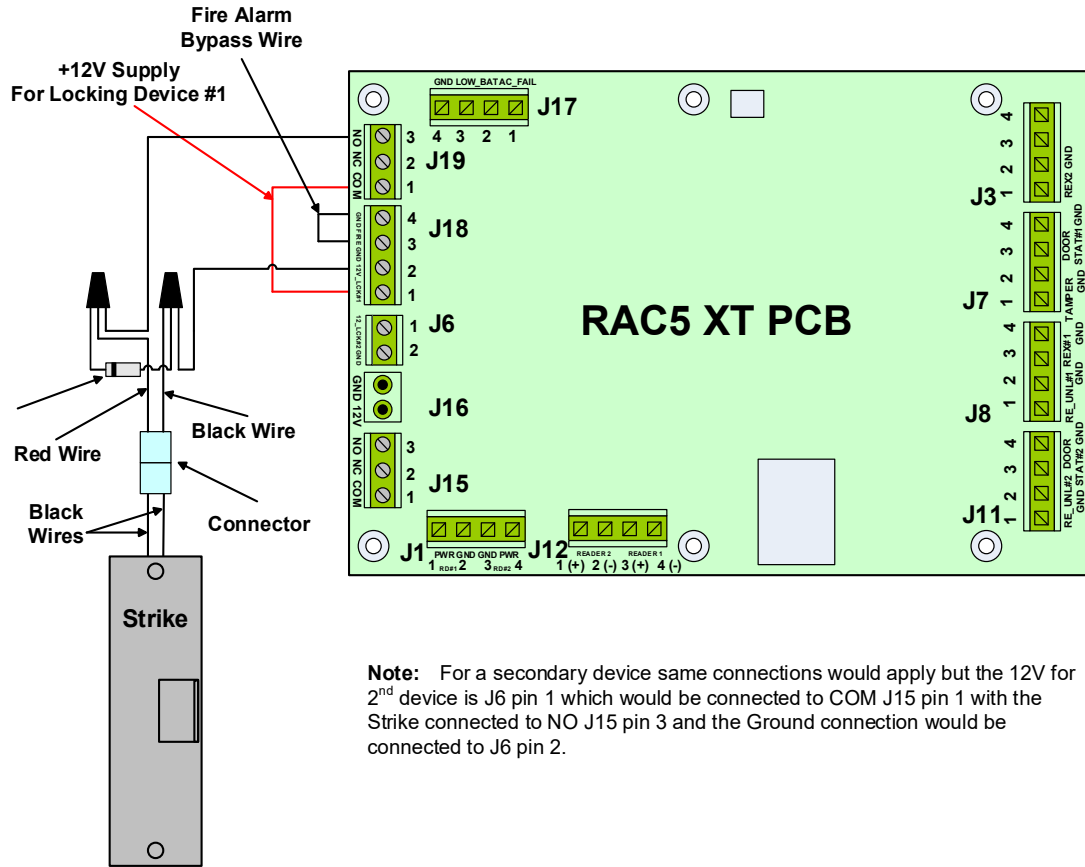


Figure 13 – Strike Wiring (Fail Secure)



**Note:** For a secondary device same connections would apply but the 12V for 2<sup>nd</sup> device is J6 pin 1 which would be connected to COM J15 pin 1 with the Strike connected to NO J15 pin 3 and the Ground connection would be connected to J6 pin 2.

Figure 14 – Strike Wiring (Fail Safe)

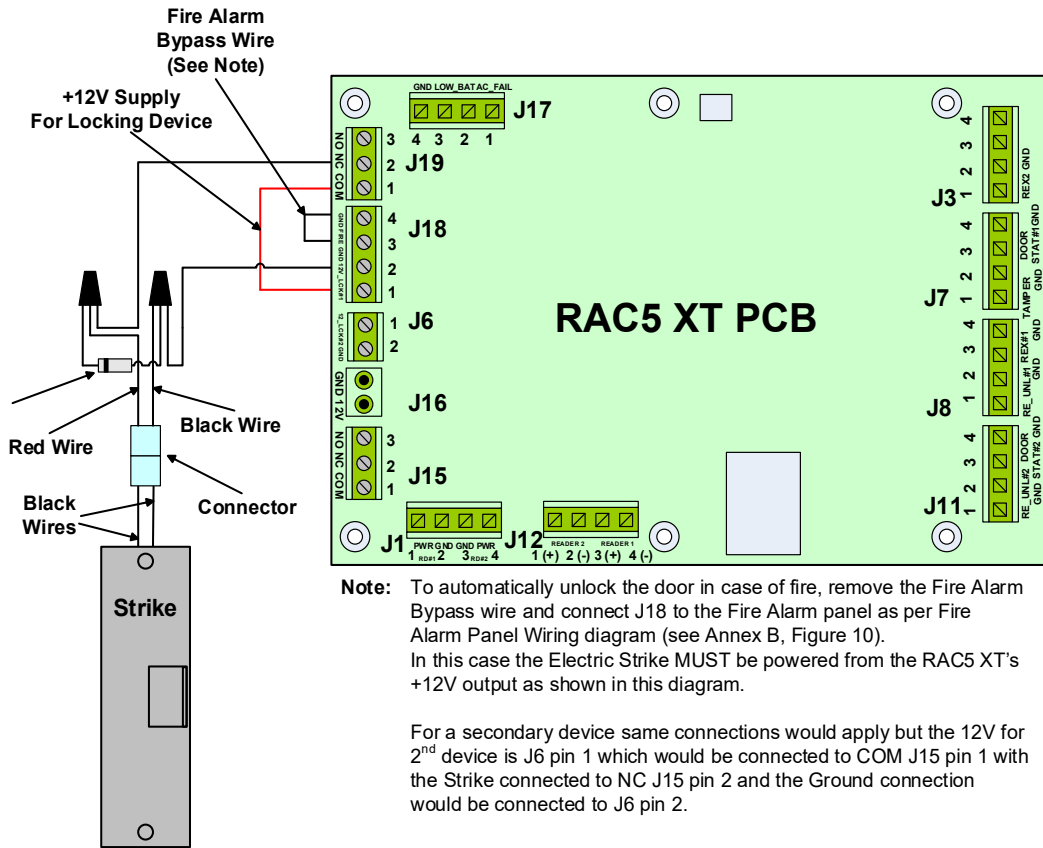


Figure 15 – Electromagnetic Lock Wiring

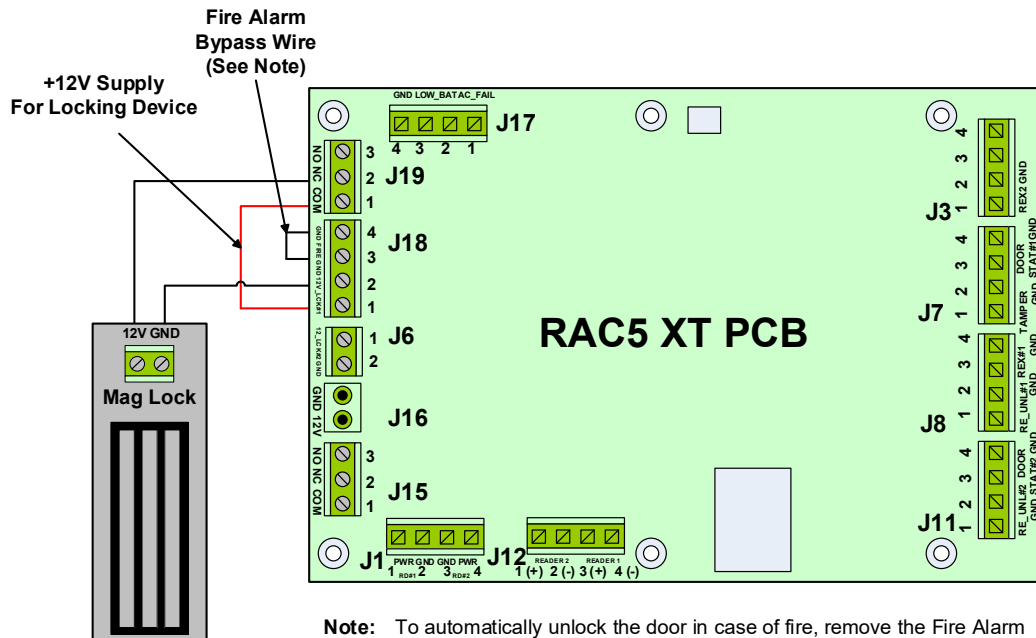
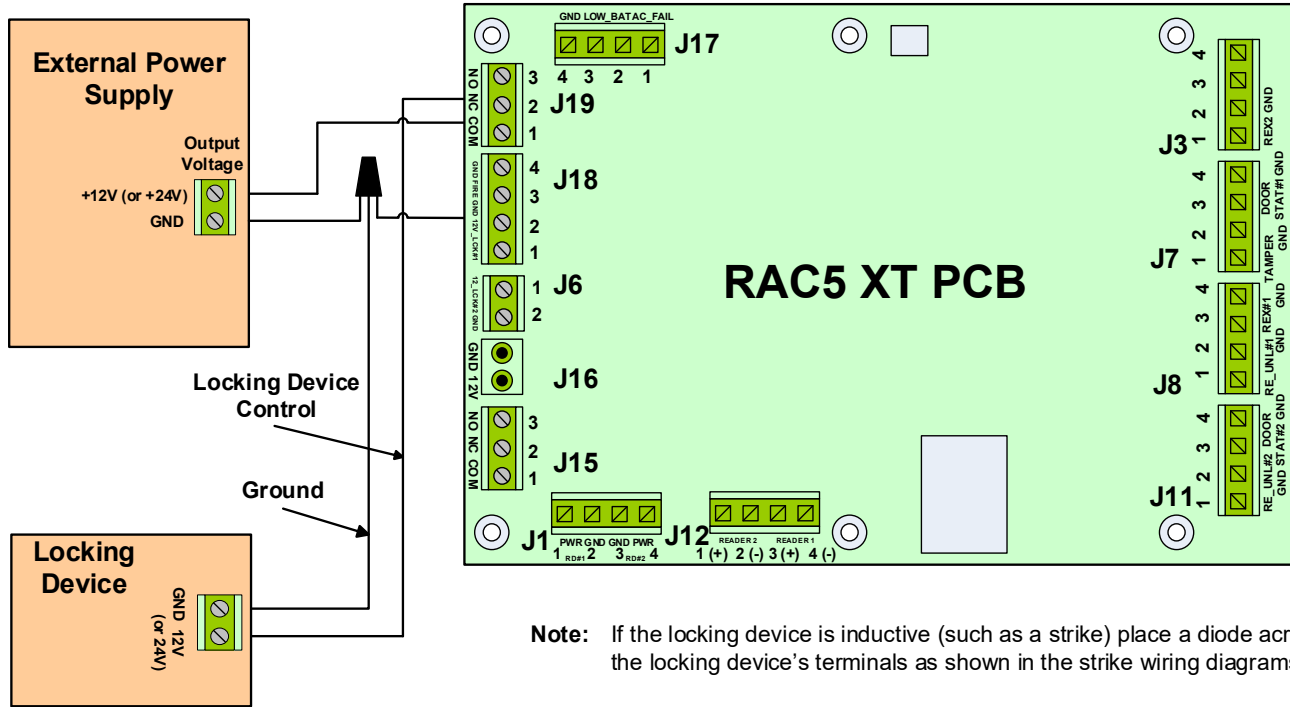


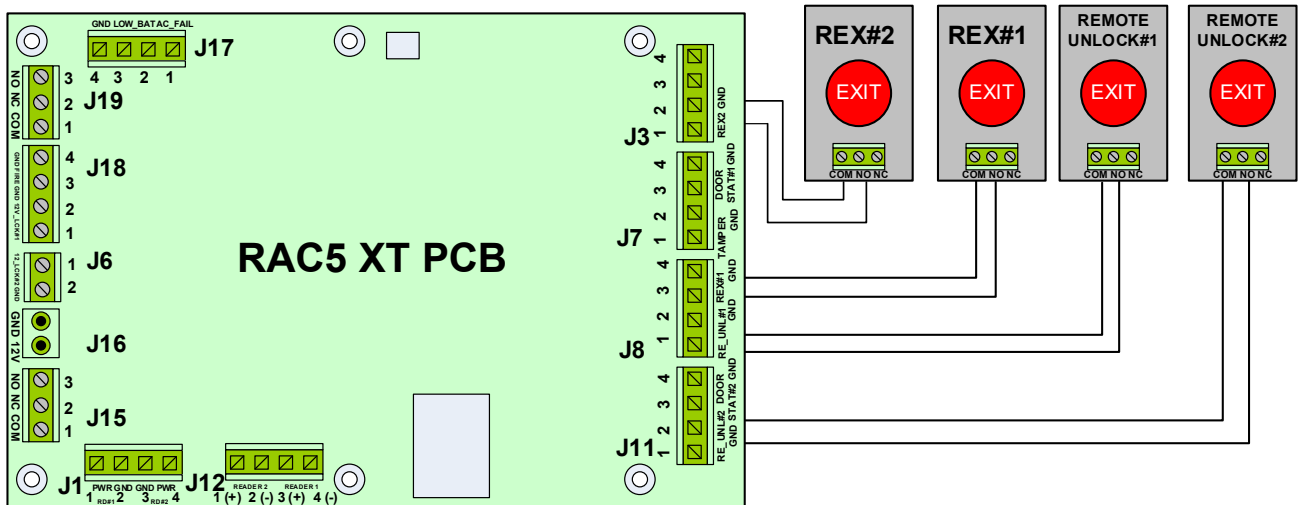
Figure 16 – Externally Powered Locking Device Wiring (+12V or +24V)

**IMPORTANT:** dormakaba does not provide Technical or Field Support on 3<sup>rd</sup> party locking devices. Please contact the device manufacturer for assistance on installation or functional issues.



**Note:** If the locking device is inductive (such as a strike) place a diode across the locking device's terminals as shown in the strike wiring diagrams.

Figure 17 – Request to Exit (REX) or Remote Unlock Button Wiring



The Remote Unlock 1 input (J8, pins 1 & 2) and Remote Unlock 2 input (J11, pins 1 & 2) unlocks the door only for the delay set by default, EVEN if the button stays pressed.

The REX input 1 (J8, pins 3 & 4) and REX input 2 (J3, pins 1 & 2) unlocks the door for as long as the button is pressed PLUS the delay set by the M-Unit.

The Exit Button can be connected to either the Remote Unlock or the REX input, depending on the required functionality. In both cases, the wires should be connected to the Normally Open contact of the Exit button.

In general, a Motion Detector or a manual override should be connected to the REX input (J8, pins 3 & 4) or REX input 2 (J3, pins 1 & 2).

Figure 18 – Motion Detector Wiring

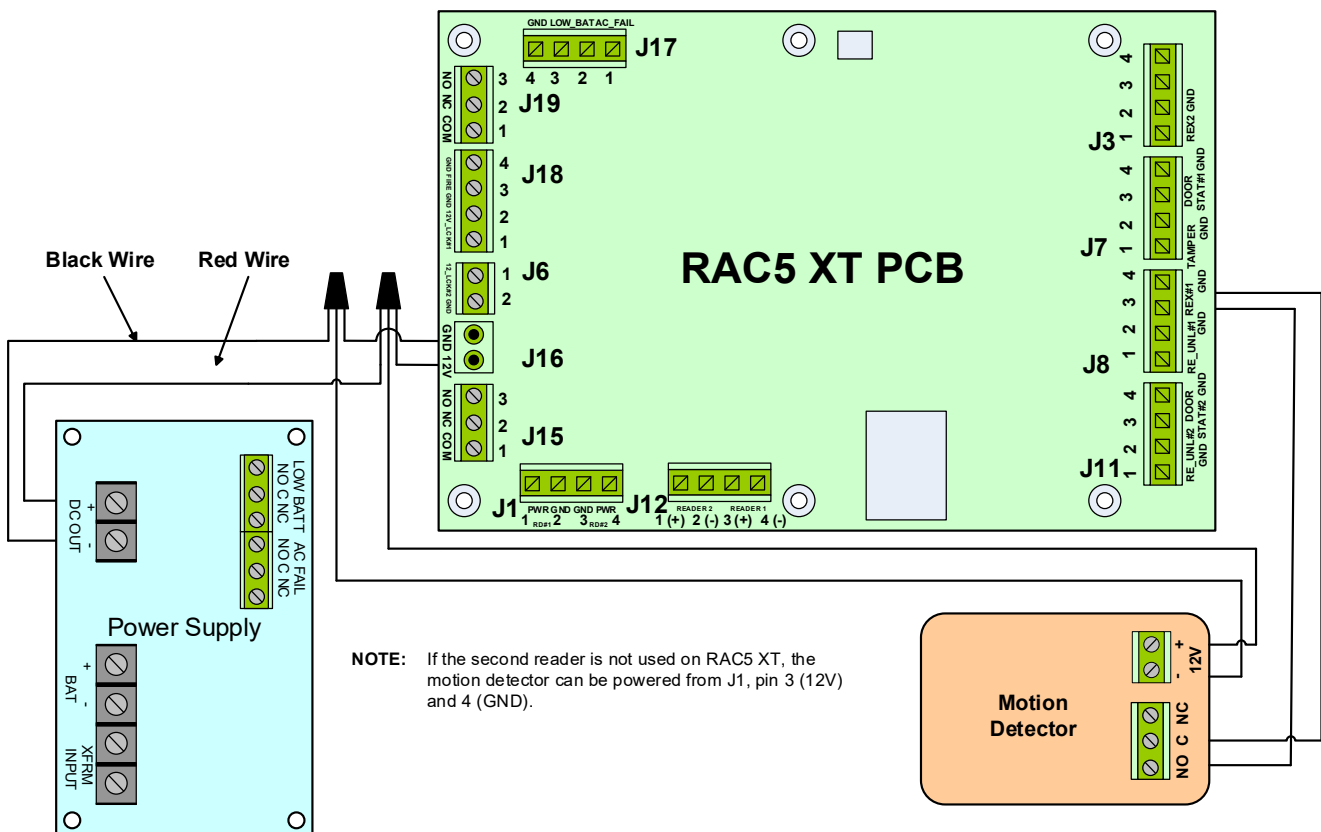
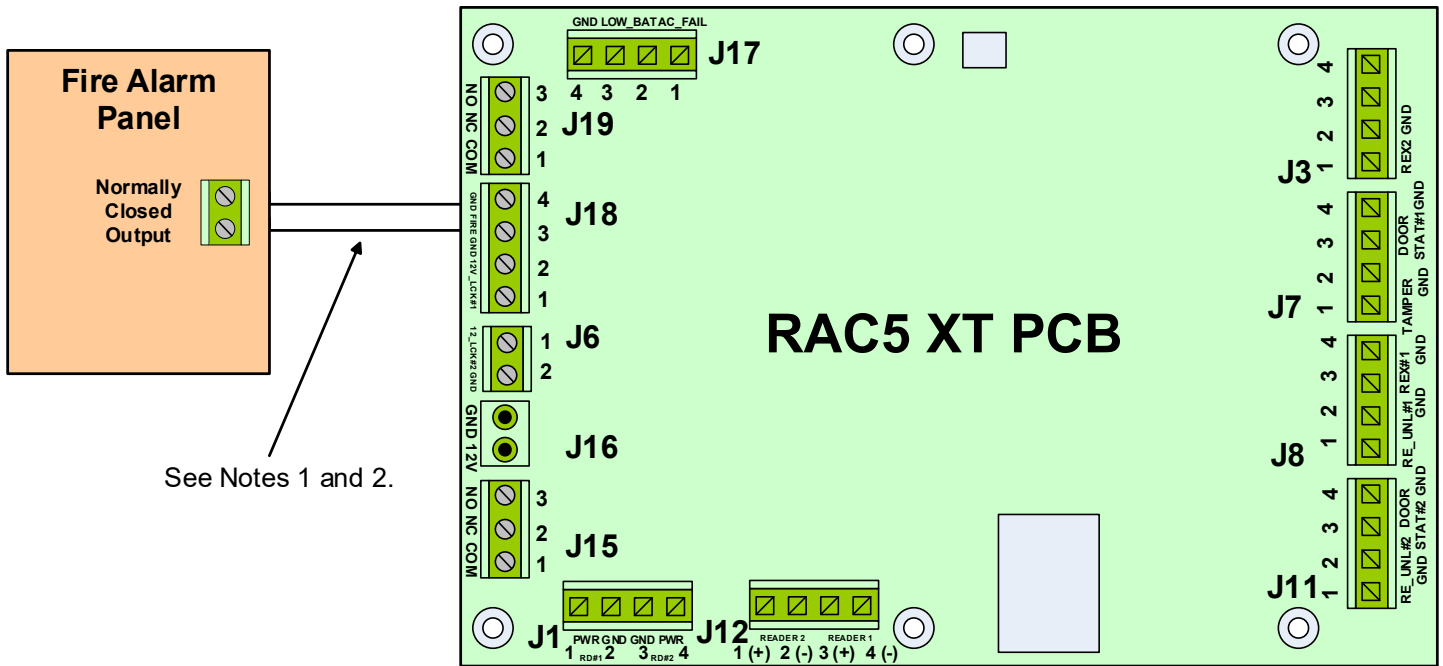


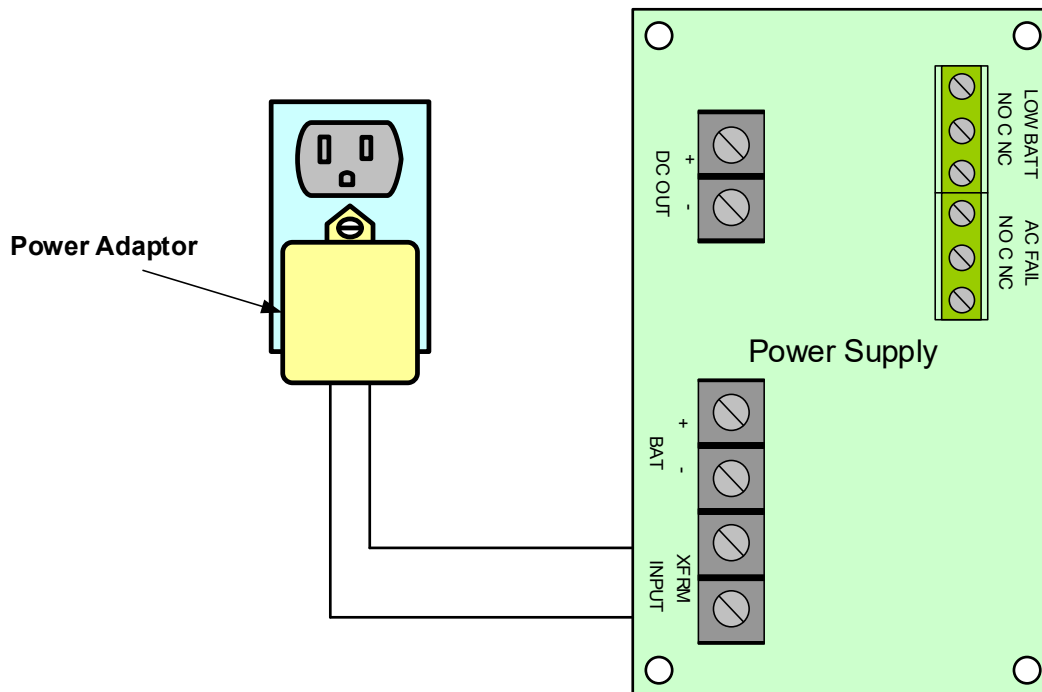
Figure 19 – Fire Alarm Panel Wiring



**Note 1:** When the RAC Lite or RAC5 4XT is connected to a Fire Alarm Panel, it must be connected to a Normally Closed dry contact output.

**Note 2:** If the Fire Alarm Panel connection is not required, place a jumper wire between pin 3 and 4 of J18.

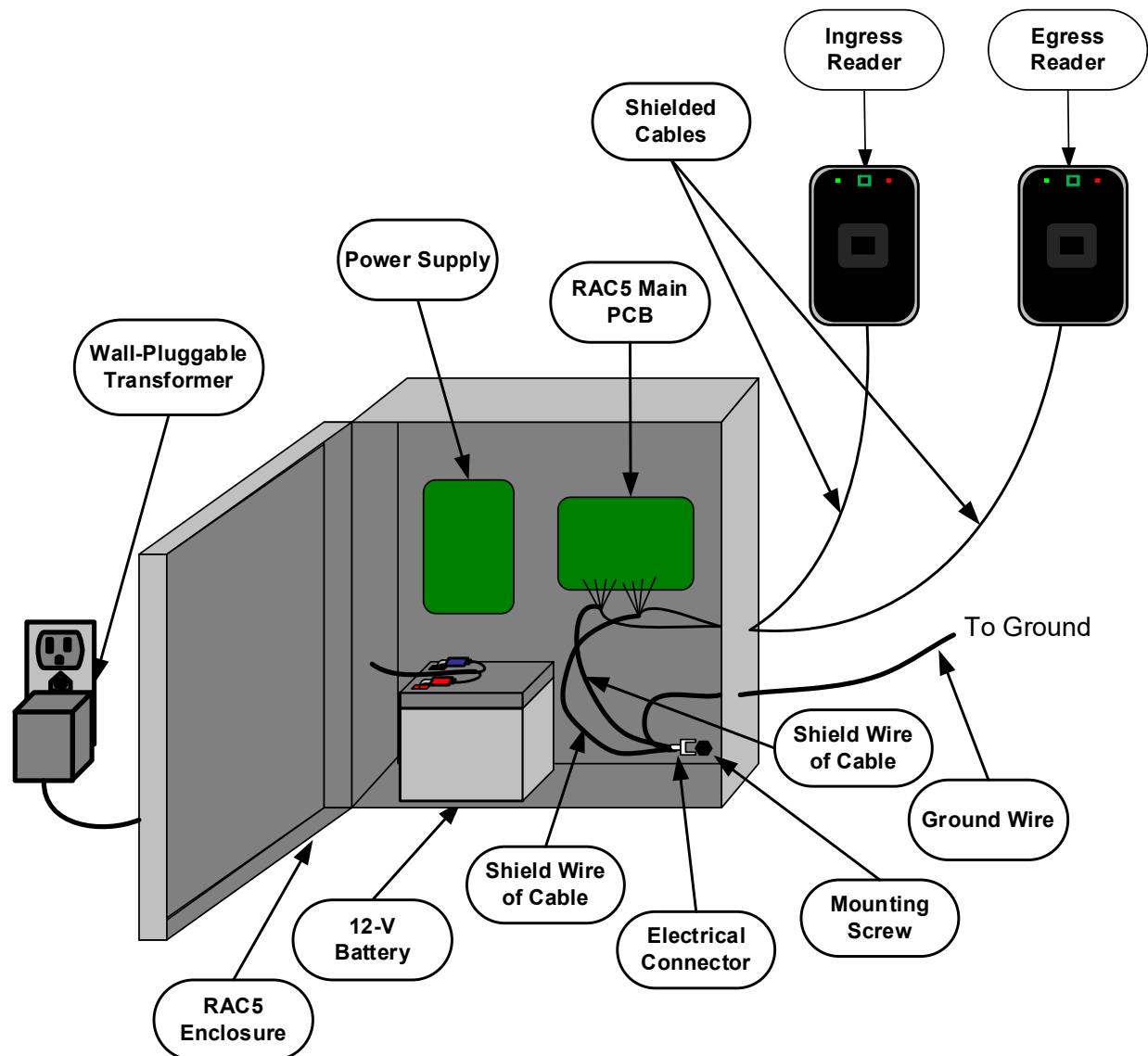
Figure 20 – Power Adapter to Power Supply PCB Wiring



## 8 Annex C: Electromagnetic Interference

As per any other electronic equipment, the RAC5 XT can be affected by electromagnetic interference caused by industrial electrical equipment, such as elevator motors. To prevent the unit from operational instability, such as 'freezing' or losing programming, shielded cables should be used and connections made as per the diagram below.

Figure 21 – Protection from Electromagnetic Interference



- 1- Use shielded cables for the readers
- 2- Connect the shield wire of the reader cables to the Ground wire
- 3- Connect the wires to the Mounting screw of the RAC5.  
(Remove the paint under the mounting screw for good electrical contact.)

# 9 Annex D: Quick Troubleshooting Guide

The following sections show basic troubleshooting for some common problems that may occur during installation. For detailed assistance, please contact Technical Support.

## 9.1 Power Troubleshooting

Symptom	Action
Power adapter LED is OFF	<ul style="list-style-type: none"><li>• Verify the AC supply is not turned off</li><li>• Verify the adapter output is not shorted</li></ul>
Power Supply AC ON green LED is OFF	<ul style="list-style-type: none"><li>• Verify the wiring to the power wall-mount adapter is correct</li><li>• If using the 24 VDC international adapter, verify the polarity is correct</li></ul>
Power supply DC ON red LED is OFF	<ul style="list-style-type: none"><li>• Verify the wiring between the power supply and the RAC5 XT controller</li><li>• Verify the power supply output is not shorted</li></ul>
RAC5 XT enclosure's panel door 'Power Status' LED is OFF	<ul style="list-style-type: none"><li>• Verify the power supply is powered (from AC ON and DC ON LEDs are on)</li><li>• Verify the LED wiring to the power supply</li></ul>
RAC5 XT enclosure's panel door 'Battery Status' LED is OFF	<ul style="list-style-type: none"><li>• Verify the wiring polarity to the battery. If correct, the battery may be discharged. After charging for a few hours, the Battery Status LED should turn green. A full charge may take up to 12 hours, the battery may need to be replaced</li></ul>
All RAC5 XT LEDs are OFF	<ul style="list-style-type: none"><li>• Verify the DC ON LED on the power supply is on</li><li>• Verify the AC power is active for the wall mount power adapter</li><li>• Verify the RAC5 XT controller is connected properly to the power supply as per Annex A</li><li>• If qualified, with a multi-meter, verify the 24 VAC (North America power adapter) or 24 VDC (International power adapter) is present across power supply terminal block XFMR_1 and XFMR_2 as per Annex A</li></ul>

## 9.2 Card Reading Troubleshooting

Symptom	Action
No feedback on Reader when using a card	<ul style="list-style-type: none"><li>• Verify that the RAC5 XT controller is active. If not, reset the RAC5 XT controller: Press the Reset Switch (SW1) or disconnect and reconnect the power</li><li>• Check that the Reader LED (D48, D37) is steady ON. If not, verify the reader wiring</li><li>• Verify the card is encoded properly</li></ul>

## 9.3 External Inputs Troubleshooting

Symptom	Action
Request to Exit (REX) does not work	<ul style="list-style-type: none"><li>• Verify that the REX LED (D33) on the RAC5 XT controller turns on when the button is pressed. If not, verify the wiring to the Request to Exit (REX) button</li></ul>
Request Unlock does not work	<ul style="list-style-type: none"><li>• Verify that the Remote Unlock LED (D36) on the RAC5 XT controller turns on when the button is pressed. If not, verify the wiring to the Remote Unlock button</li></ul>
Tamper Alarm is not audited	<ul style="list-style-type: none"><li>• Verify the Tamper Alarm LED (D53) on the RAC5 XT controller turns on when the button is pressed. If not, verify the wiring to the Tamper Switch</li></ul>

## 9.4 Locking Device Troubleshooting

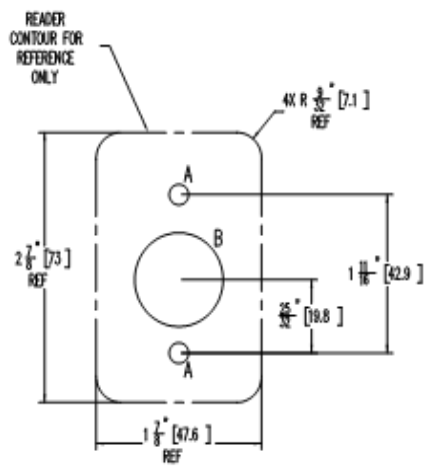
Symptom	Action
Locking Device always unlocked	<ul style="list-style-type: none"> <li>• If the Locking Device Relay LED (D31) on the RAC5 XT controller is ON: <ul style="list-style-type: none"> <li>• Verify that the lock is not in Passage Mode</li> </ul> </li> <li>• If the Locking Device Relay LED (D31) on the RAC5 XT controller is OFF: <ul style="list-style-type: none"> <li>• Verify that the Bypass Switch is not active (Bypass LED, D21 [D12 for the second device] is OFF)</li> <li>• Verify that the Fire Alarm input is not active (input contact closed, Fire Alarm LED, D47, is ON)</li> <li>• Verify the wiring to the locking device</li> </ul> </li> </ul>
Locking Device does not unlock	<ul style="list-style-type: none"> <li>• If the Locking Device Relay LED (D31 [D30 for the second device]) turns ON: <ul style="list-style-type: none"> <li>• Verify the Fire Alarm input is not active (input contact closed, Fire Alarm LED, D47, is on)</li> <li>• Verify the wiring to the locking device</li> </ul> </li> <li>• If a diode is installed on the locking device, verify the polarity</li> <li>• If the locking device Relay LED (D31 [D30 for the second device]) does not turn ON: <ul style="list-style-type: none"> <li>• Verify that Request to Exit (REX) or Remote Unlock activation unlocks the door</li> <li>• Verify the card is encoded properly</li> <li>• Verify the RAC5 XT is not in Lockout Mode</li> <li>• Verify the RAC5 XT is programmed properly</li> </ul> </li> </ul>
Fire Alarm does not Unlock door	<ul style="list-style-type: none"> <li>• Verify the Fire Alarm input is connected to a Normally Closed (NC) contact</li> <li>• Verify the Fire Alarm LED (D47) is normally on and turns off when the Fire Alarm is present</li> <li>• Verify the 12V_Lock (Dev#1 or Dev#2) output of the RAC5 XT controller is connected to the COMMON of the respective locking device relay</li> </ul>
RAC5 XT Controller PCB resets when relay is activated	<ul style="list-style-type: none"> <li>• Verify that there is no short-circuit on the locking device wiring</li> <li>• If a diode is installed on the locking device, verify the polarity</li> </ul>

## 9.5 Programming and Auditing Troubleshooting

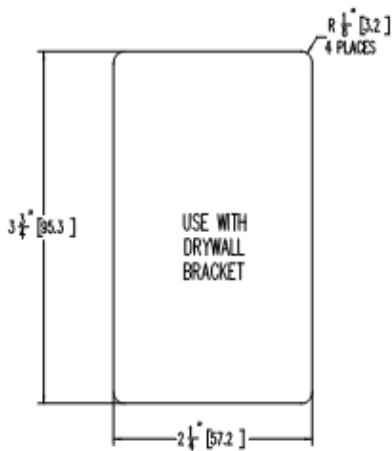
Symptom	Action
Cannot program or audit the RAC5 XT	<ul style="list-style-type: none"> <li>• Verify the RAC5 XT controller is active: The Heartbeat (D46) should be blinking, and Reader LEDs (D48, D37) are on. If not, reset the RAC5 XT Controller: Press the Reset Switch (SW1) or disconnect and reconnect the power</li> </ul>

# 10 Annex E: Reader Drilling Templates

Reader Drilling Templates (not to scale)



SURFACE MOUNT



FLUSH MOUNT



SURFACE MOUNT

FLUSH MOUNT

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