

RAC5 MFC Installation Guide



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1 Introduction and Disclaimers

Please read and follow all directions carefully.

These instructions are designed for use by 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 that the installation procedures will not cause any damage. dormakaba Canada Inc.'s standard warranty does not cover damages caused by installation.

WARNING

Installation of card readers or other peripherals 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 MFC 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	I
Single Point Locking Device with Key Locks	I

RAC5 MFC Model #: T53-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 a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one 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

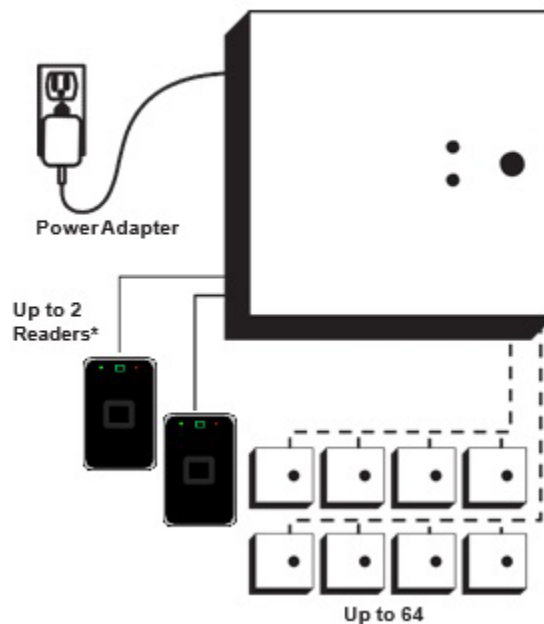
The RAC5 MFC is designed to operate either online or stand-alone elevator control units (ECUs). It provides access control and secure stops for multiple floors and functions with RAC5 NFC wall readers and AMBIANCE features. The system can control any RFID ECU up to 1,000 feet (300m) away when using the RAC5 MFC system.

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

NOTE: For installation of the contactless reader of distances greater than 1,000 feet (300m) please contact dormakaba Canada Inc. Technical Support.

The Contactless Card Reader can be mounted directly on the inside of the elevator car, typically on the elevator call button panel. For surface mount, the surface area required for the contactless reader is 5"W x 5"H x 2"D (12.7 x 12.7 x 5cm, 2" depth behind panel required). The RAC5 MFC is an access control solution that can operate 2 individual card readers, provides multiple relays, and much more as per the feature list below. See Figure 1 for a typical configuration.

Figure 1 – RAC5 MFC System



Features

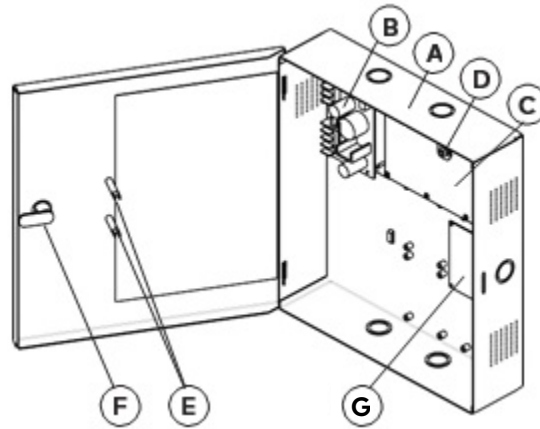
- Variable access delay
- Power failure 3-way auto-recovery; real time clock (RTC)
- Relay bypassing (passing function)
- Control up to two card readers
- Unlock delay programmable via an M-Unit
- Fire Alarm Input
- Tamper Alarm Input
- Power Status LEDs feedback
- Relay Expansion Board (up to 8) with 8 relays each

2.2 Components

Refer to Annex E for RAC5 MFC component breakdown.

2.2.1 Controller Box

Figure 2 – RAC5 MFC Controller Box



- (A) RAC5 MFC Enclosure & Access Door: Holds the controller board (PCB), power supply and relay expansion board. 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: Controls all the features of the RAC5 MFC system
- (D) Tamper Switch: Attached to the RAC5 MFC 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 MFC 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 MFC enclosure

Optional Components:

- (G) Relay Expansion Board: Interface board providing 8 relay outputs that can be used to control relay-equipped equipment. For example, it can be used with an elevator to call the elevator or to provide access only to specific floors for certain guests and staff. Up to 8 expansion boards of 8 relays each giving up to 64 individual control relays can be added

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 relay expansion board

2.2.2 Contactless Card Reader

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

Figure 3 – Contactless Card Reader



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 4.

3.1.1 RAC5 MFC Enclosure

NOTE: All items below come factory installed.

- (A) RAC5 MFC 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 Relay Expansion Board

- (G) 8 Relay expansion PCB boards, including 4 x 6-32 x 3/8" SS screw with washer and controller PCB connection cable (not shown)

3.1.3 Cables (not shown)

NOTE: All items come factory installed.

- (H) System cables: Power supply to LEDs, controller PCB and controller PCB jumpers

3.1.4 Card Reader(s)

- (I) Contactless reader (see Figure 3)

3.1.5 Power Adapter

NOTE: Dependent on the countries' electrical power requirements.

(J) 1x International 24 VDC output Adapter with integrated 6-foot (1.8m) power cable and interchangeable AC outlet prongs. Input power requirements of 100-240 VAC, 50 – 60 Hz, 1.0A

Or

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

3.1.6 Installation Hard Bag

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

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

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

(O) 2x Strain relief connector with locking nut

(P) Ring terminal connector

(Q) 5x Steel flat washer, #8

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

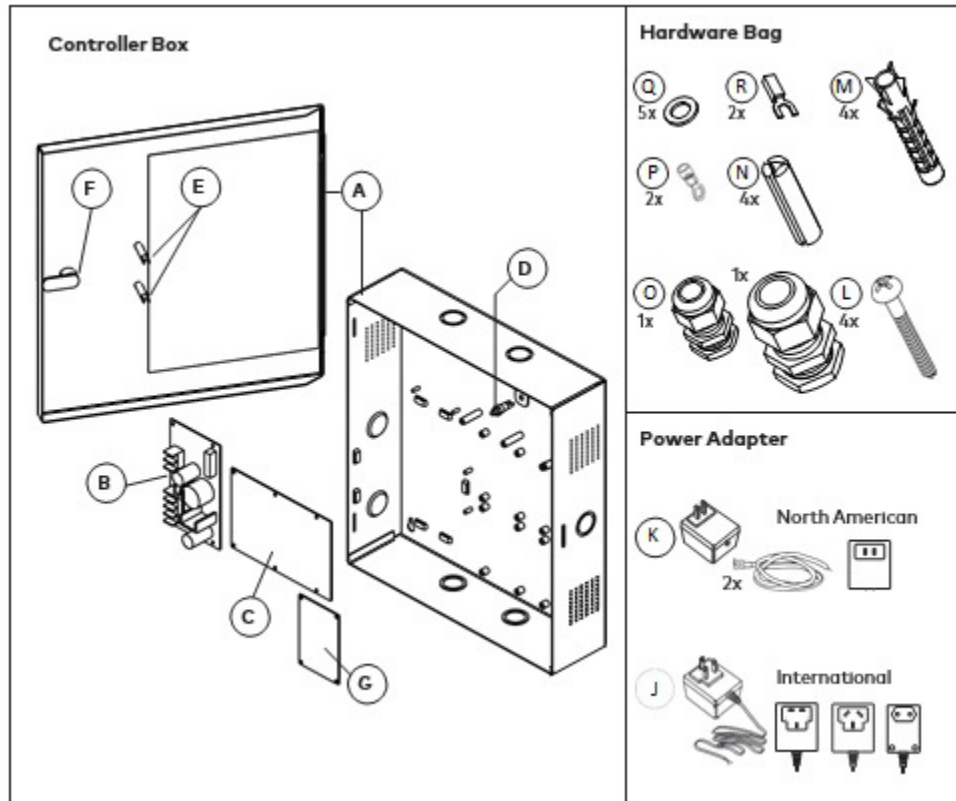
3.1.7 Tools Required (not supplied)

Additional tools may be required dependent on the peripherals being installed. The list below covers the installation of the RAC5 MFC 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
- Hammer or rubber mallet
- Awl or center punch

3.2 Exploded View

Figure 4 – Exploded View



4 System Installation Overview

Before starting 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 MFC enclosure & peripherals must comply with all applicable local building codes and regulations and National Electric Code, ANSI/NFPA 70.

CAUTION

Do not connect power to the enclosure until the end of the installation.

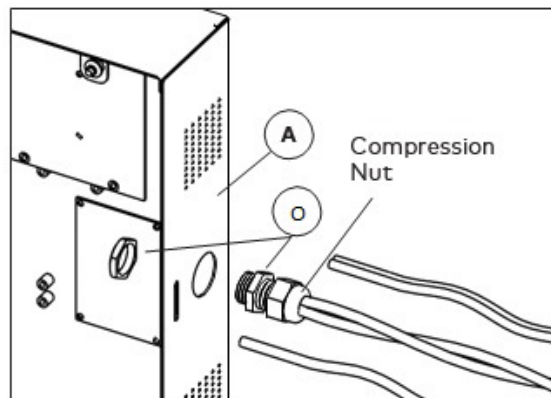
4.1 Pre-installation Procedures

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

IMPORTANT

- Access to the RAC5 MFC enclosure must be restricted to authorized personnel
 - AC power must be available within distance specified in section 3.1.5.
 - 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 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.
 - Card readers must be placed within 1,000 feet (300 m) from the RAC5 MFC enclosure
 - 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
 3. Install strain relief.
 - Strain reliefs are provided in the hardware bag to secure the wires leading into the enclosure and to help prevent the possibility of wire tampering
 - a) Determine the routing needed for all wiring of the RAC5 MFC card readers 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 5. Do not attempt to route an excessive amount of wires. If extra strain reliefs are required, please contact dormakaba Canada Inc

Figure 5 – Strain Relief



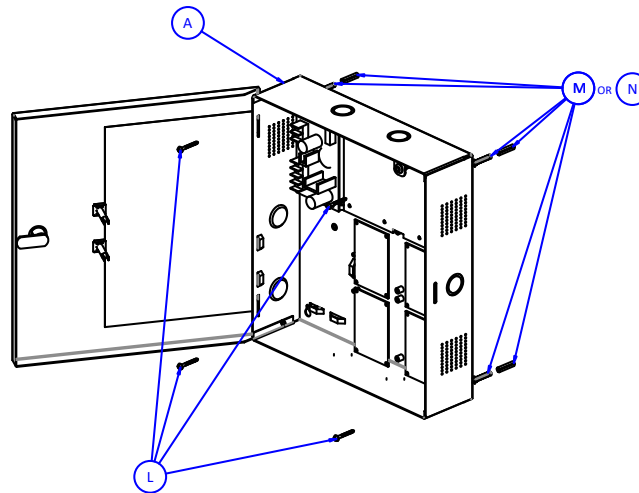
4. Ensure that Dip Switch SW2 has Test Mode switch setting (SW4) is set to **OFF**.

4.2 Installation and Wiring Procedures

1. Mount the RAC5 MFC enclosure
 - a) 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 6 – Enclosure



2. Mount the contactless card reader.

NOTE: All readers are rated IP 54.

 - a) Remove the back plate and use it to mark the holes for the cables and screws

NOTE: Refer to Annex H of this manual for elevator panel preparation for mounting readers.

 - b) Drill the holes in the wall according to the diameters indicated on the drilling template in Annex H, based on the type of surface the reader is being installed on.
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.

IMPORTANT

Every wire must pass through a strain relief as connected in the pre-installation procedures. dormakaba Canada Inc. does not provide technical or field support for third party locking devices. Please consult the device manufacturer for support.

NOTE: The maximum recommended wire length is the approximate wire length that causes a 5% voltage loss in the wire, using a 12-volt locking device at the rated current included.

- a) **Fire Alarm Panel:** Refer to Annex G, Figure 14 for detailed wiring
 - i. 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
- b) **Tamper Switch to Premise Alarm System**
 - i. To wire the tamper switch to the premise alarm system, disconnect the wires on controller PCB connected J7 pins 1 & 2 and run a 2-connector 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. Wire relay expansion board outputs. Refer to Annex B for sample wiring diagram.

The relay expansion board provides 8 relay contacts for wiring and control of relay-enabled elevator. The board only provides normally open or normally closed dry contacts, so no power is provided by the board. As wiring of relay-controller equipment may vary between products, please refer to the product manufacturer's instruction booklet.

NOTE: Refer to Annex B, Figure 8 for specific relay expansion board bypass switches.

- If bypass switches are ON, the relays are bypassed, and the green LED associated with that relay is turned ON
- If bypass switches are OFF, the controller PCB can activate the relays. The associated LEDs turn ON during relay activation
- When the power of the RAC5 MFC is too low (power failure), the controller PCB stops functioning and the relays on the controller PCB or the expansion board will return to their normal state. The normal state is defined as relays OFF. Any peripheral connected to the relays will then be either in a normally open (NO) or normally closed (NC) state, depending on the wiring

5. Install elevator controller.

Each Expansion board contains 8 dry relay contacts. Up to 8 expansion boards can be used for total control of 64 common areas. The relay outputs are at the wiring input of each three-terminal connector (NO, COM, NC) on the expansion PCB as well as being indicated on the label on the inside of the door. Several floors can be controlled by one relay (one common area).

The relays in the RAC5 MFC are UL rated and are capable of a maximum switching of 30 VDC @ 1A. For time duration of relay state change, please refer to Annex B, Figure 8.

6. Connect the power adapter.

NOTE: Dependent on the countries' electrical power requirements, follow the directions below for the power adapter required. Refer to Annex B, Figure 8 for detailed wiring.

a) International Power Adapter

- i. Attach the appropriate AC outlet prong to the power adapter
- ii. Route the power adaptor wires into the enclosure and secure the wire (recommended with tie wraps)
- iii. From the inside of the enclosure, crimp the fork terminals supplied in the hardware bad to the end of each wire
- iv. Connect the fork-terminated wires to the power supply input as shown in Annex B, Figure 8

b) North America Power Adapter

- i. From the inside of the enclosure, connect one end of the fork-terminated wires to the power supply inputs as shown in Annex B, Figure 8

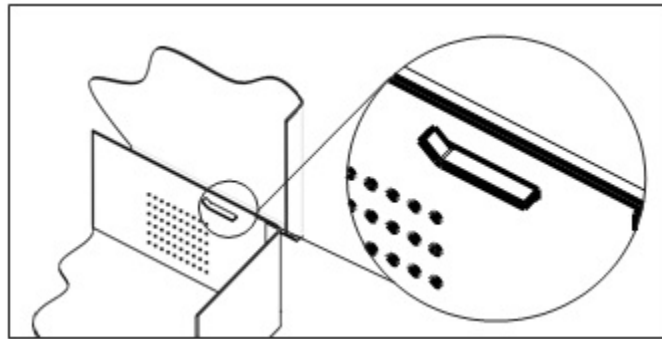
- ii. Route the wires out of the enclosure to the AC power source and secure the wires (recommended with tie wraps)
- iii. Crimp the fork terminals supplied in the hardware bag to the end of the wires and connect them to the power adapter screw terminals

7. Complete the installation.

a) If the access door was removed, reinstall the door to the RAC5 MFC enclosure

b) Bend the two tabs on the door to a maximum of 30 degrees as shown in Figure 7

Figure 7 – Door Tabs



c) Connect the LED wire harness from the power supply to the access door LEDs as indicated below and in Annex B, Figure 8

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

IMPORTANT

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

d) Plug the power adapter into the AC power source and/or turn on the main AC power to the system

5 Annex A: Quick Troubleshooting Guide

The following sections show basic troubleshooting for some common problems that may occur during installation. Each section related to a specific type of problem. For detailed assistance, please contact Technical Support.

5.1 Power Troubleshooting

Symptom	Action
Power adapter LED is OFF	<ul style="list-style-type: none">• Verify that the AC supply is not turned off• Verify that the Adapter output is not shorted
Power supply AC ON green LED is OFF	<ul style="list-style-type: none">• Verify that the wiring to the power wall-mount adapter is correct• If using the 24 VDC International Adapter, verify that the polarity is correct
Power supply DC ON red LED is OFF	<ul style="list-style-type: none">• Verify the wiring between the power supply and the RAC5 MFC controller• Verify that the power supply output is not shorted
RAC5 MFC enclosure's panel door 'Power Status' LED is OFF	<ul style="list-style-type: none">• Verify that the power supply is powered (both AC ON and DC ON LEDs are on)• Verify the LED wiring to the power supply
All RAC5 MFC LEDs are OFF	<ul style="list-style-type: none">• Verify that the DC ON LED on the power supply is on• Verify that the AC power is active for the wall-mount adapter• Verify that the RAC5 MFC controller is connected properly to the power supply as per Annex B, Figure 8• If qualified, with a multi-meter, verify that 24 VAC (North American Power Adapter) or 24 VDC (International Power Adapter) is present across the power supply terminal block XFMR_1 and XFMR_2 as per Annex B, Figure 8

5.2 Card Reading Troubleshooting

Symptom	Action
No feedback on Reader when using a card	<ul style="list-style-type: none">• Verify that the RAC5 MFC controller is active. If not, restart the RAC5 MFC controller: Press the Reset Switch (SW1) or disconnect and reconnect the power• Check that the Reader LED (D48 for Reader 1 or D37 for Reader 2) is steady ON. If not, verify the reading wiring• Verify that the card is encoded properly

5.3 External Inputs Troubleshooting

Symptom	Action
Tamper Alarm is not activating the premise alarm	<ul style="list-style-type: none"> Verify that the Tamper Alarm LED (D53) on the RAC5 MFC controller turns on when the button is pressed. If not, verify the wiring on the Tamper Switch

5.4 Relay Expansion Board Troubleshooting

⚠ CAUTION

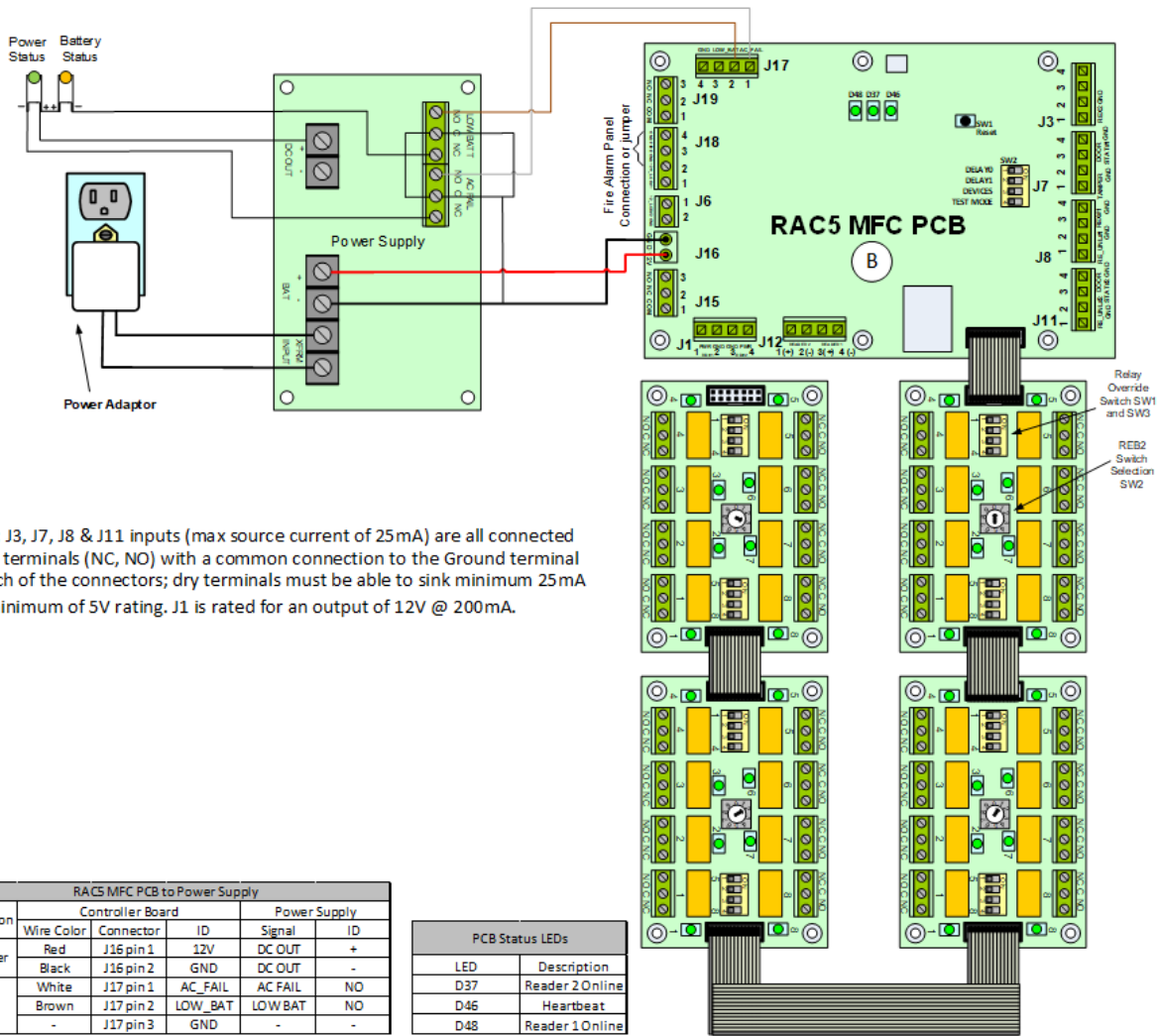
The power for the RAC5 MFC must be turned off before connecting or disconnecting the Relay Expansion Board.

LEDs on Relay Expansion board are normally OFF, meaning no trouble.

Symptom	Action
LEDs on the Relay Expansion Board are ON	<ul style="list-style-type: none"> Verify that the ribbon cable between the RAC5 MFC controller and the Relay Expansion Board is connected properly. If it is not connected, turn the power off, connect the cable, and turn the power back on Verify that the relays are not bypassed (the bypass switches SW1 and SW3 on the Relay Expansion Board should be off) Verify that the RAC5 MFC is not in Passage Mode
Relay Expansion Board relays do not activate	<ul style="list-style-type: none"> Activate the manual bypass switches SW1 and SW3 on the Relay Expansion Board and verify that the relays are activated and the corresponding LEDs turn on. De-activate the manual bypass Verify that the RAC5 MFC controller is active: Heartbeat LED D46 should be blinking, and the Reader LEDs (D48 and D37) are respectively ON. If not, reset the RAC5 MFC Controller by pressing the reset switch (SW1) or disconnect and reconnect the power. Verify that the RAC5 MFC controller is programmed properly Verify that the card is encoded properly
Fire Alarm does not unlock door	<ul style="list-style-type: none"> Verify that the Fire Alarm input is connected to a Normally Closed contact Verify that the Fire Alarm LED (D47) is normally on and turns off when the Fire Alarm is present
RAC5 MFC Controller PCB resets when relay is activated	<ul style="list-style-type: none"> Verify that there is no short-circuit on the locking device wiring If a diode is installed on the locking device, verify the polarity

6 Annex B: Multi-Floor Controller RAC5 MFC

Figure 8 – RAC5 MFC



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.

RACS MFC 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	-
	White	J17 pin 1	AC_FAIL	AC FAIL	NO
AC Fail	Brown	J17 pin 2	LOW_BAT	LOWBAT	NO
	-	J17 pin 3	GND	-	-

PCB Status LEDs	
LED	Description
D37	Reader 2 Online
D46	Heartbeat
D48	Reader 1 Online

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)

DIP SW2 Configuration		
Number of Devices (SW3)	OFF - One locking device	ON - Two locking devices
Test Mode (SW4)	OFF - Normal operation	ON - Test mode

Relay Expansion Board					
Termina	State	Bypass	Termina	State	Bypass
J1-1	NO	SW1-1	J5-1	NO	SW3-1
J1-2	COMM		J5-2	COMM	
J1-3	NC		J5-3	NC	
J2-1	NO	SW1-2	J6-1	NO	SW3-2
J2-2	COMM		J6-2	COMM	
J2-3	NC		J6-3	NC	
J3-1	NO	SW1-3	J7-1	NO	SW3-3
J3-2	COMM		J7-2	COMM	
J3-3	NC		J7-3	NC	
J4-1	NO	SW1-4	J8-1	NO	SW3-4
J4-2	COMM		J8-2	COMM	
J4-3	NC		J8-3	NC	

Power Supply to Power Adaptor			
Adaptor	Power Supply		
	Type	Wire Color	Signal
International	Black	Black	XFMR-1
	Black/White	Black/White	XFMR-2
North America	-	-	XFMR-1
	-	-	XFMR-2

Power Supply to MFC 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*	(+)

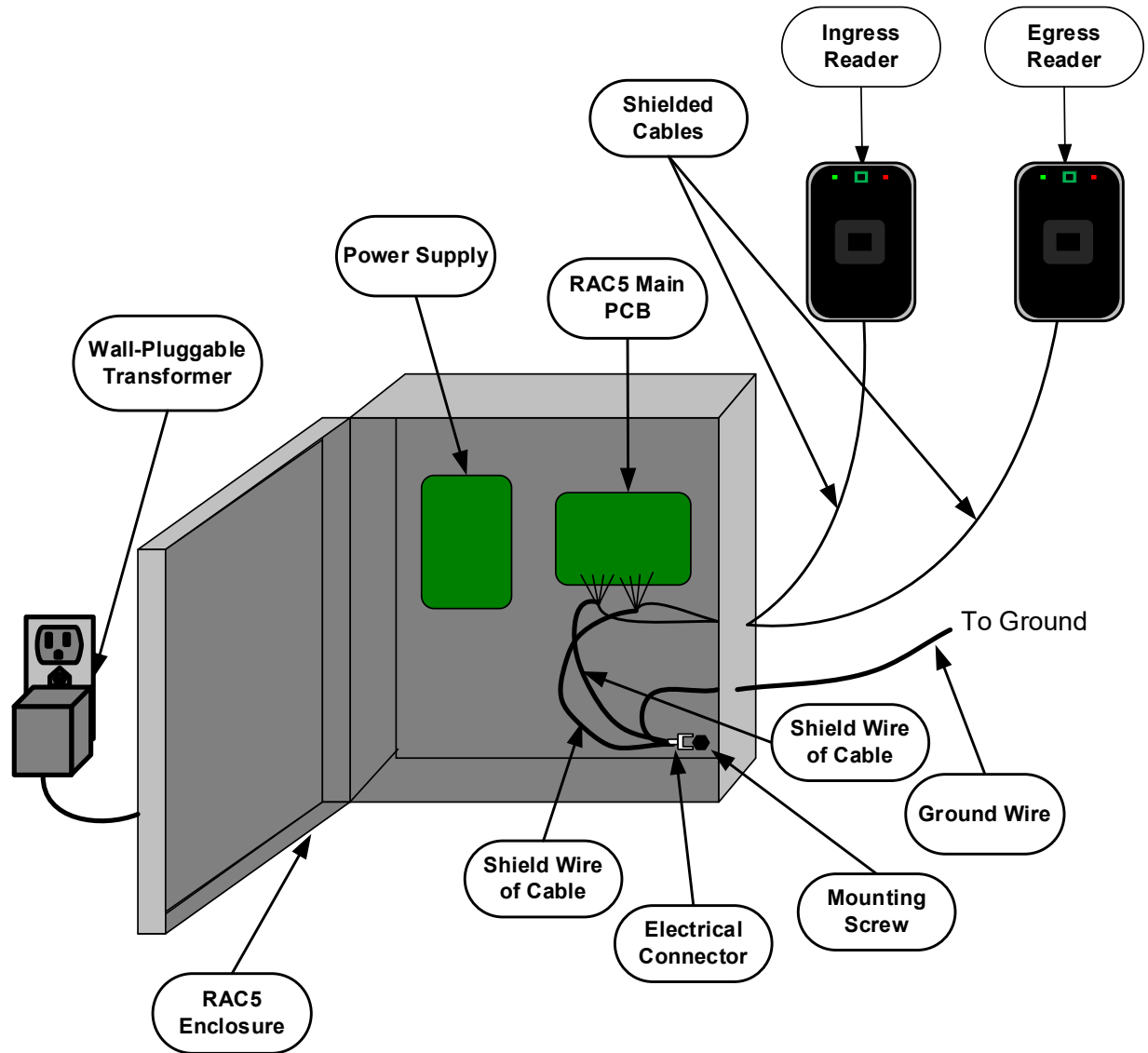
Caution:
If bypass switches are "ON"
- Relays are bypassed & GREEN LEDs are "ON".
If bypass switches are "OFF"
- GREEN LEDs are "OFF" & Controller Board can activate relays.

MFC PCB Peripherals Connections				
Peripheral			Controller Board	
Wire / Conn.	Description	Item*	Signal	PCB Conn.
Black	Relay Exp. Board	(H)	Fire Alarm	J18 pin 3
Black	Fire Alarm	-	GND	J18 pin 4
	Sever	-		J10

7 Annex C: Electromagnetic Interference

As per any other electronic equipment, the RAC5 MFC can be affected by electromagnetic interference cause 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.

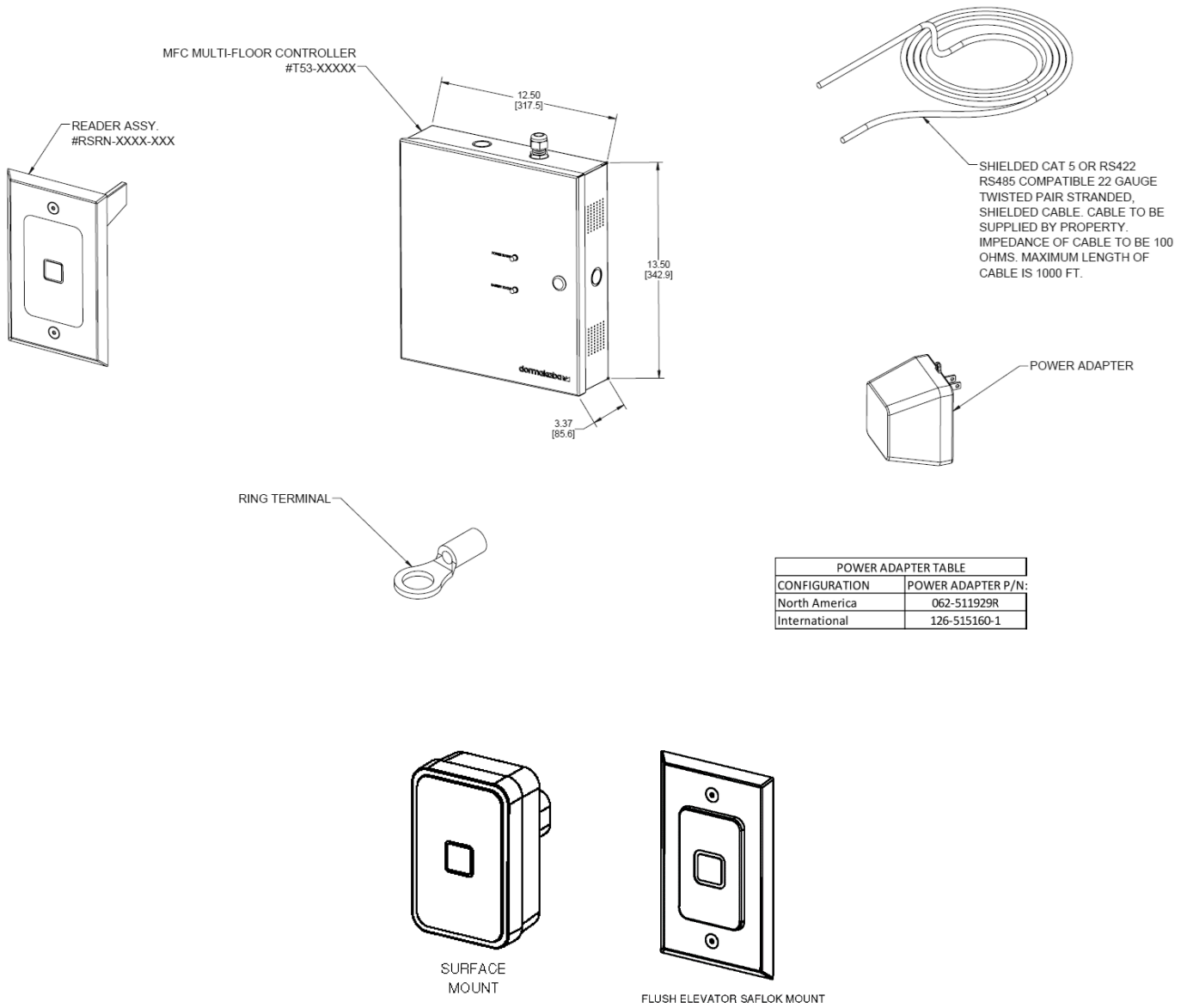
Figure 9 – Shielded Cable



- 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.)

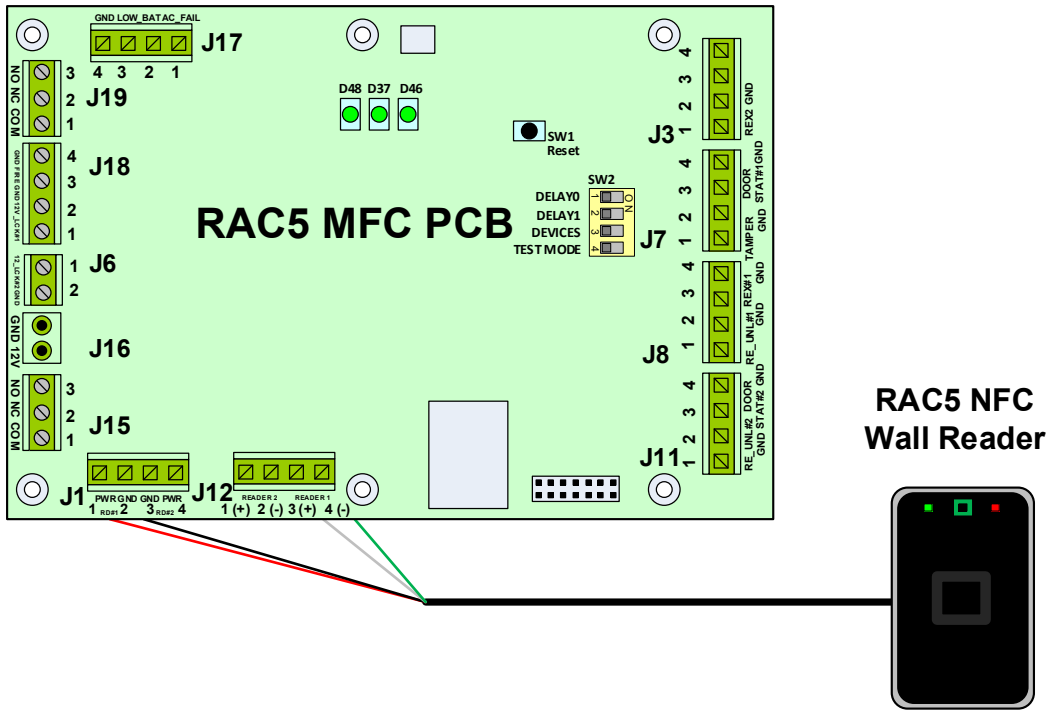
8 Annex D: RAC5 MFC Components

Figure 10 – RAC5 MFC Components



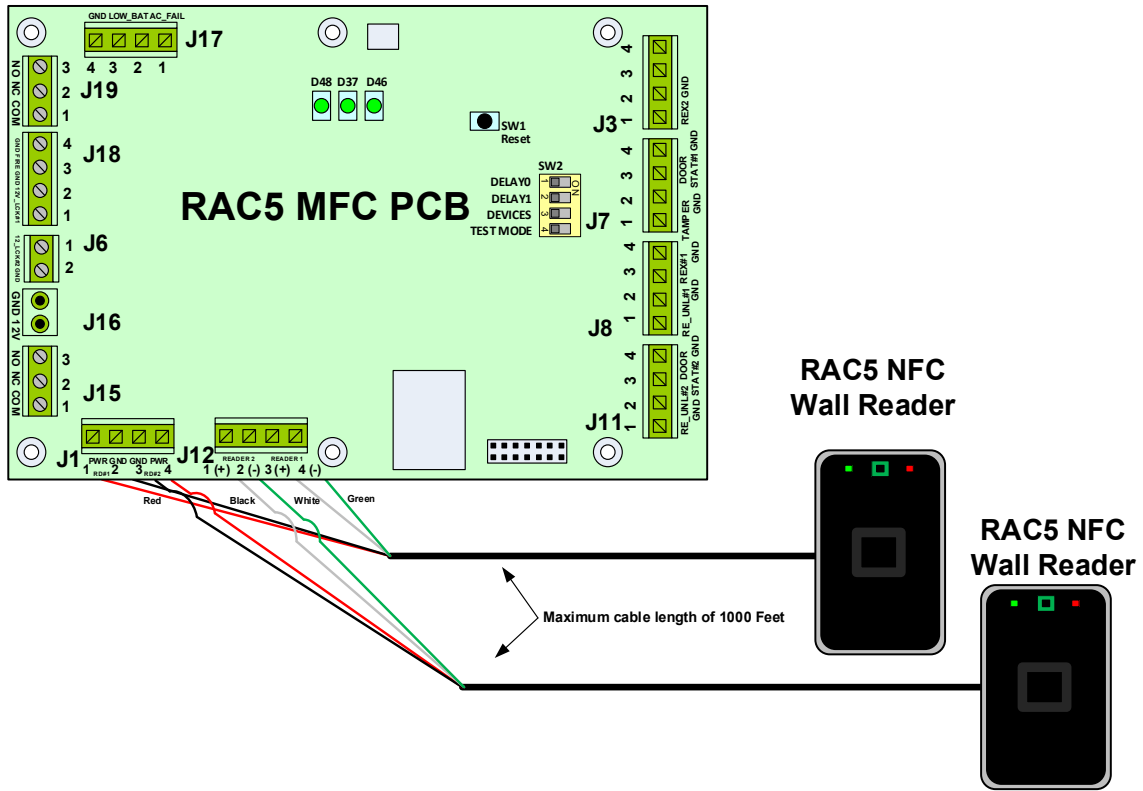
9 Annex E: Single Reader Wiring

Figure 11 – Single Reader Wiring



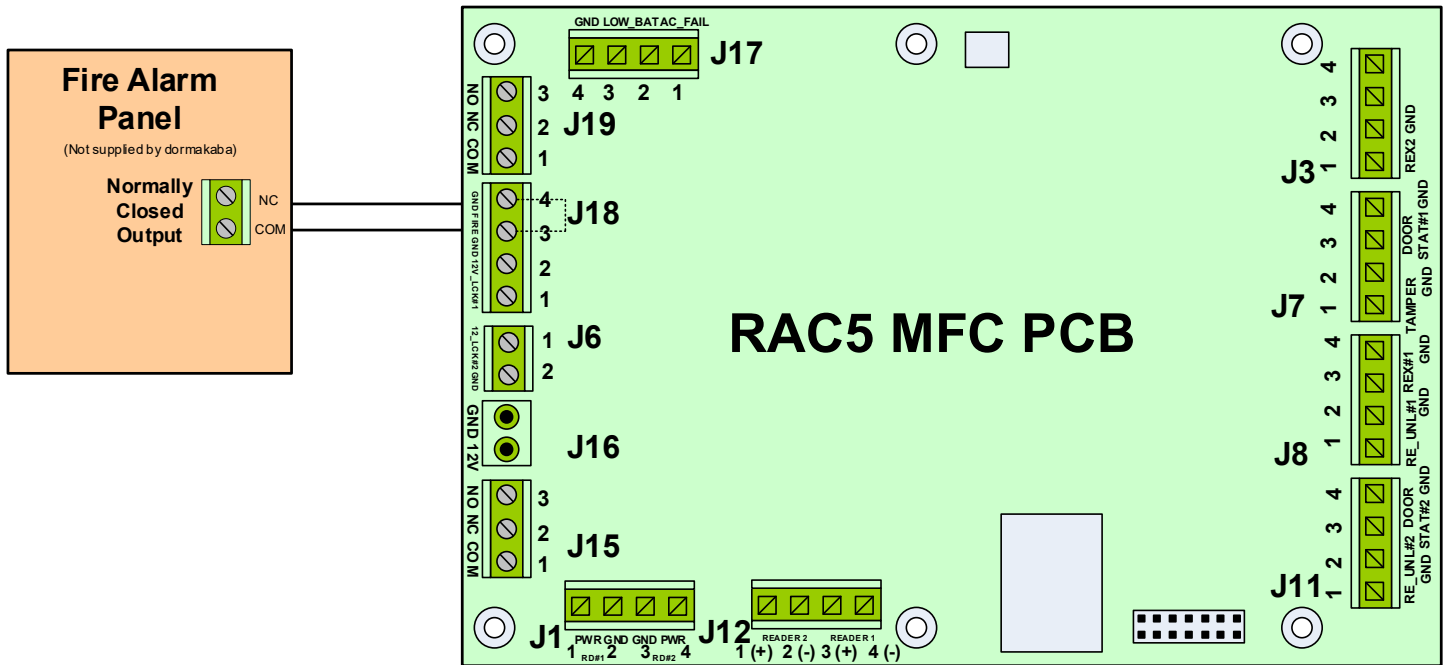
10 Annex F: Dual Reader Wiring

Figure 12 – Dual Reader Wiring



11 Annex G: Fire Alarm Panel Wiring

Figure 14 – Fire Alarm Panel Wiring

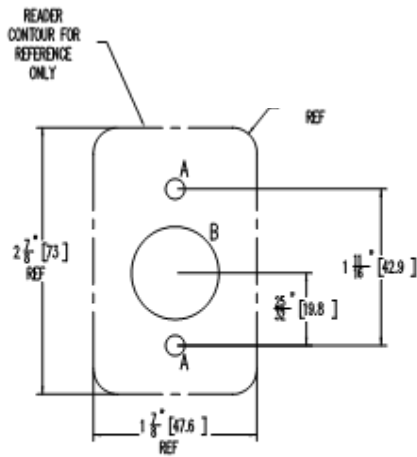


Note 1: When the RAC5 Lite or RAC5 XT are connected to a Fire Alarm Panel, it must be connected to a Normally Closed dry contact output.

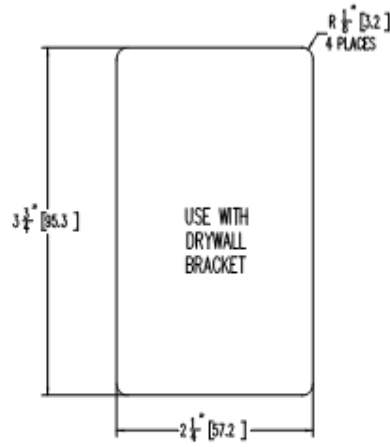
Note 2: If the Fire Alarm Panel connection is not required, place a jumper wire between pin 3 and 4 of J18.

12 Annex H: Reader Drilling Templates

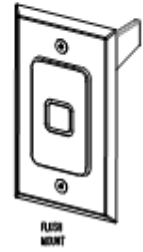
Reader Drilling Templates (not to scale)

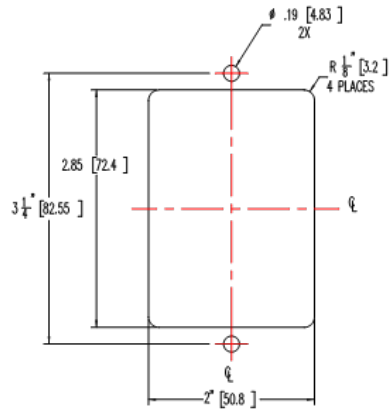


SURFACE MOUNT



FLUSH MOUNT





FLUSH ELEVATOR SAFLOK MOUNT
 FLUSH ELEVATOR /PARKING KEYSKAN MOUNT

FLUSH ELEVATOR
 SAFLOK MOUNT

FLUSH ELEVATOR /PARKING
 KEYSKAN MOUNT

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