



GE Security

***GE Contactless
Reader
Models 240/245/250
Installation Guide***

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Note: Changes since the last publication of this document are marked by a change bar, which is a vertical line in the margin that visually identifies significant new or revised information.

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Introduction

The GE Contactless Model 240, 245, and 250 readers read ISO 14443A and ISO 15693 compliant badges, disc tags, and key fobs. The Model 245 includes an integral 12-button (3x4) keypad for PIN entry.

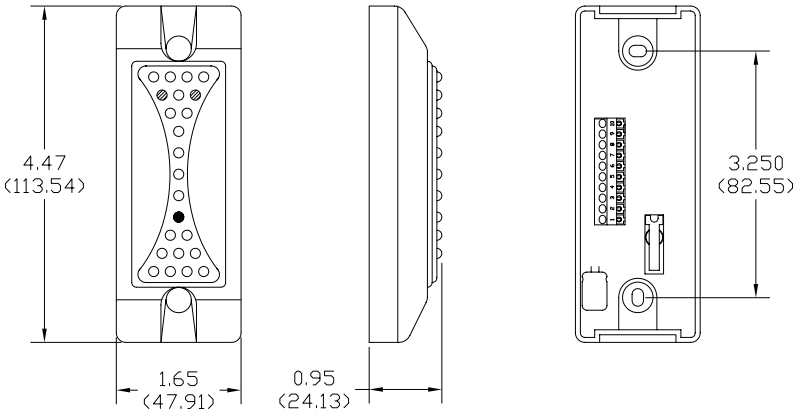
FIGURE 1: GE Contactless Reader Model 240



FIGURE 2: GE Contactless Reader Model 245



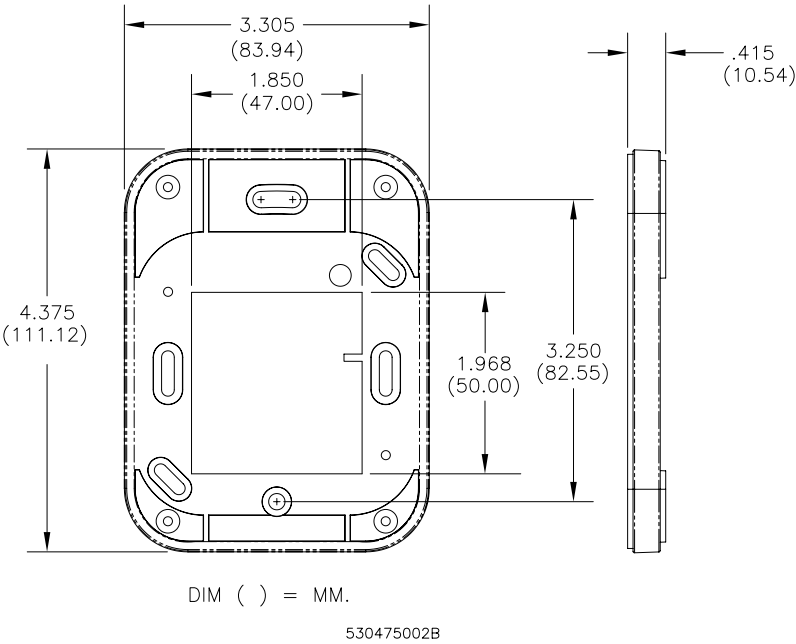
FIGURE 3: GE Contactless Reader Model 250 (Mullion Enclosure)



DIM () = MM.

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FIGURE 4: GE Model 24x Reader Backplate (includes tamper switch magnet)

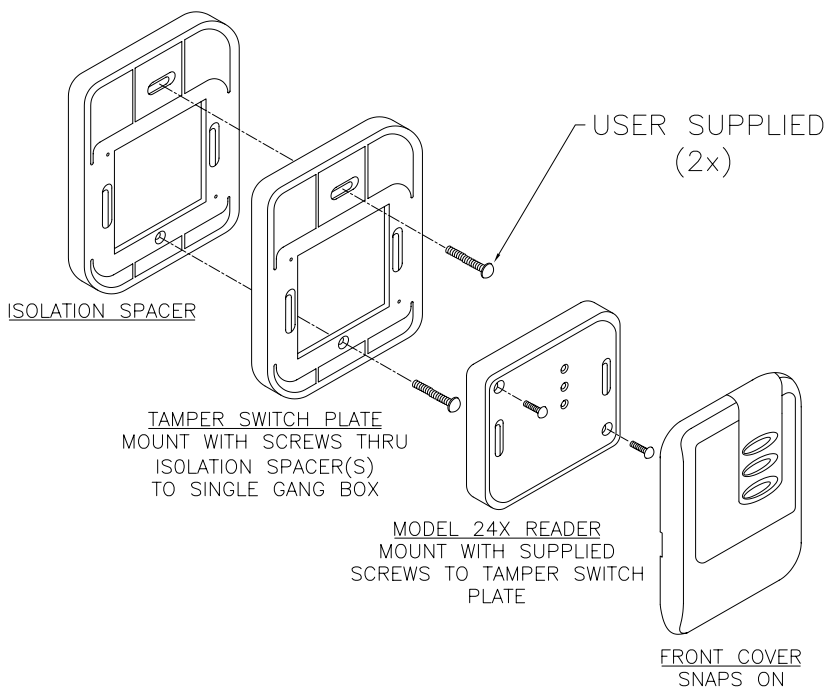


Notes:

- **Mounting holes fit standard US single-width electrical box and standard European (EMEA) electrical box hole pattern.**
- **For flush mounting, a cutout in the mounting surface, to accommodate the connector, must be made.**

An Isolation Spacer (shown in Figure 5) may be used to improve the read-range distance when mounting to metal surfaces. Dimensions are the same as the Reader Backplate.

FIGURE 5: Isolation Spacer



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Product Overview

Features

- Universal compatibility with all ISO 15693 and ISO 14443A credentials (badges, disc tags, and key fobs).
- Supervised four-state (open, closed, wire cut, and wire short) monitoring for door contacts, REX (request to exit).
- Electrical protection (reverse polarity diode protection on power lines).
- Data lines; high-speed transient voltage suppressor diodes.
- Compatible with Micro/5 2RP and 8RP Reader Processor boards, Micro/PX-2000, and Micro/PXN-2000 controllers.
- IP 65-rated sealed electronics for deployment in both interior and exterior environments.
- Integrated reader tamper protection and supervised data communications.
- Reads the serial BID (badge ID) number of all ISO 15693 and ISO 14443A credentials.
- 12-button tactile membrane keypad (3 x 4 matrix) for PIN (personal identification number) entry (Model 245 only).

Access Control System Compatibility

The Model 24x badge reader outputs a 16-digit badge identification (BID) number. As a result, the Model 24x readers are compatible with Picture Perfect while microcontrollers on a Secure Perfect 4.0 system must be field-configured for Model 24x compatibility.

Picture Perfect Edition Setup

Refer to **Access/Badge Formats** or to the Picture Perfect online help for assistance. A 16-digit BID format must be defined within Picture Perfect. Enter a suitable badge format description. Example: **16-digit BID** and define the format: **%16S**.

Secure Perfect Edition Setup

Secure Perfect 5.0 supports badge IDs (BIDs) to a maximum of 20 digits.

Secure Perfect 4.0 supports badge IDs (BIDs) to a maximum of 12 digits. Since the Model 24x Contactless Reader outputs a 16-digit number, the Secure Perfect 4.0 microcontrollers must be configured to receive the

incoming 16-digit BID number, and then convert it into a compatible 12-digit BID format.

If you are using Model 240/245/250 readers with your Secure Perfect system (4.0), you cannot combine with any other reader or credential technologies.

To make your Secure Perfect 4.0 system compatible with GE Models 240/245/250 Contactless readers, do the following:

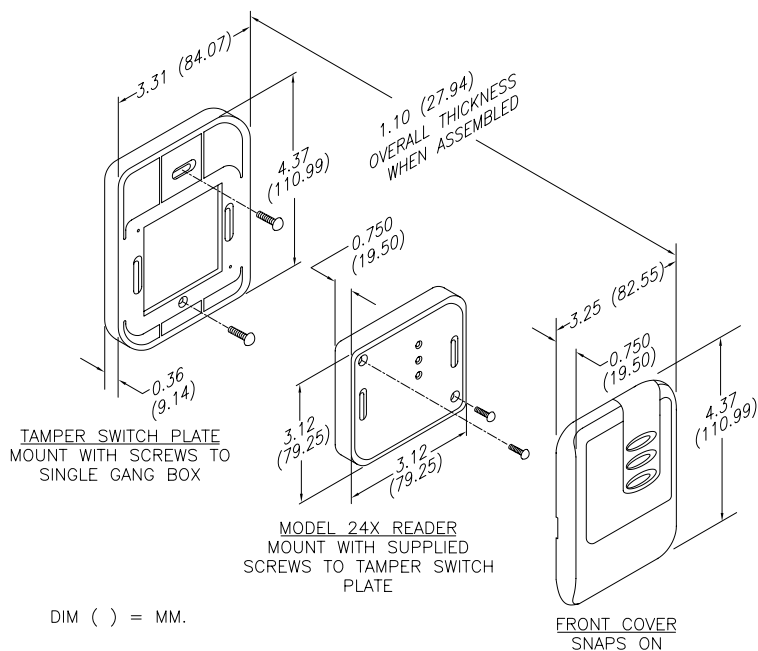
1. Install Secure Perfect 4.0 as instructed.
2. Following the installation of Secure Perfect 4.0, load the Secure Perfect Update CD in the Server computer's CD-ROM drive.
3. Navigate to the **Badge Formats/15693.REG** file.
4. Double-click this self-executing file to configure your system and microcontrollers for operation with the reader.
5. Double-click the Secure Perfect desktop icon to open the application, log in from the **File** menu and then select the **Operations** menu, **Micro Utility Form**.
6. Select applicable micros from the list of micros displayed and then click **Download Database** in order for the badge format change to take effect.

Note: For earlier versions of Secure Perfect Editions, please contact GE Security Sales Engineering for the **15693.REG** file

To restore Secure Perfect's system back to factory settings, install the **BADGE FORMATS.REG** file.

Installation

FIGURE 6: GE Model 24x Backplate and Snap-on cover



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The front cover snaps into place. To remove the cover, use a small flat-blade screwdriver to pry the cover from the backplate, using either of the two provided locations on the vertical sides of the reader.

Installation of the Model 245 is similar to that of the Model 240.

Installation Considerations

1. Installation of the GE Model 24x Reader on metal.

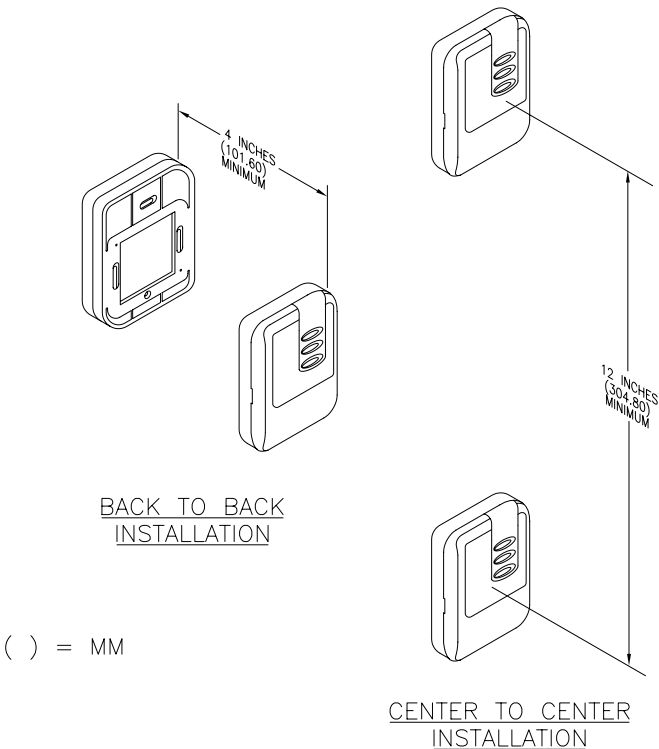
For the Model 24x readers, read-range reduction can be improved by adding Isolation Spacers (approximately 25% per plate) up to a maximum of four spacers.

2. Installation of two Model 24x/250 readers side-by-side and back-to-back.

Read range is not affected if the center-to-center distance between two readers is equal to or greater than four inches (101.60 mm). If the distance between the two readers is less than four inches (101.60 mm), field interference between the two readers may result in a double-badge read.

Note: Two readers can simultaneously read the same badge or tag if the distance between the two readers is less than 4 inches (101.6 mm), center-to-center.

FIGURE 7: Back-to-Back/Center-to-Center Installation



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3. Installation of two GE Model 24x/250 readers back-to-back.

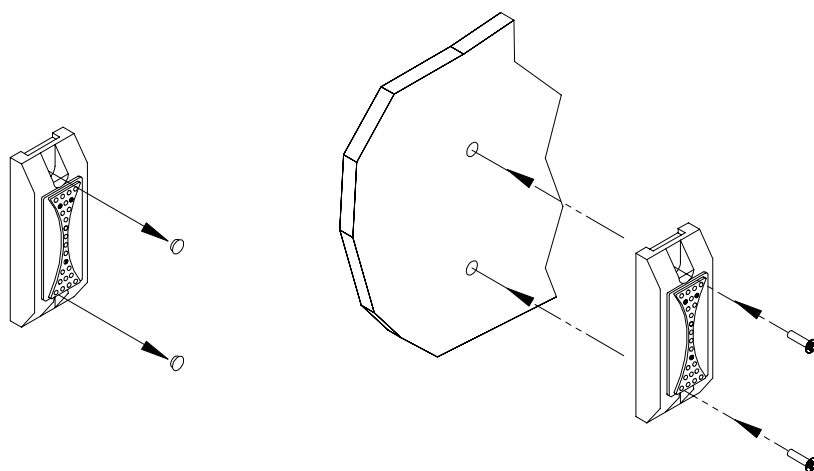
When installing two readers back-to-back on a wall that will separate the two readers by four inches (101.60 mm) or less, a metal plate (for example: Reader isolation plate, metal wall) must be placed between the readers. To obtain the maximum read range, mount each GE Model 24x/250 reader onto one or more Isolation Spacers.

Note: Two readers can simultaneously read the same badge or tag if the distance between the two readers is less than four inches (101.60 mm), back-to-back.

4. Installation of the GE Model 250 Reader.

Mount as shown in Figure 8.

FIGURE 8: Mounting the GE Model 250



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Micro Compatibility

- Micro/5 Controller with either 2RP or 8RP Reader Boards: refer to the *Micro/5 Installation Guide*.

IMPORTANT: DO NOT use the GE Model 24x/250 readers with the Micro/5 2SRP.

- Micro/PX-2000 and Micro/PXN-2000 controllers: refer to the *Micro/PX-2000* and *Micro/PXN-2000 Installation Guide*.
- Micro/Reader-Junction Box: refer to the point-to-point wiring diagrams in this manual.

Reader-to-Micro Wiring Distance

Table 1: Model 240/245/250 Current and Cable Distance

Current and Cable Distances				
Supply Voltage	12 VDC		13.6 VDC	
Current	200 mA @12 VDC			
Wire	18 AWG	22 AWG	18 AWG	22 AWG
Distance* * 10 ft. (3.05 m) min.	2,041 ft. (622 m)	856 ft. (261 m)	3,123 ft. (952 m)	1,309 ft. (399 m)

Keypad Operation: Model 245

The reader sends each key press to the microcontroller and the yellow LED will blink. The reader beeper sounds with each key press.

Wiring

Table 2: Reader (Model 24x/250) 12-Position Field Wiring Connector

Pin	Definition
1	Micro control, reader beeper (option) or Ground (Model 250 only)
2	Ground
3	8 VDC to 30 VDC
4	Door contact
5	Reader Data 1
6	Exit request (REX)
7	Green LED
8	Micro control, red LED (option)
9	Reserved for future use
10	Reserved for future use (model 250 only)
11	Reserved for future use (model 250 only)
12	Reserved for future use (model 250 only)

Installation Notes: Model 24x/250

All numbered items below are referenced on the appropriate wiring diagrams that follow:

1. Fuse, power supply, door strike, protection device, and relay are provided by the installer.
2. The included 470 Ω ½-watt pull-up resistor **must** be installed at the microcontroller's terminal block. The Micro PX-2000 and 8RP boards do not require this resistor.
3. Shielded cable is recommended in electrically noisy environments. If using shielded cable:
 - **At the Reader end:** connect all shields together and insulate them.
 - **At the Micro end:** connect the shield to the Micro cabinet as indicated in the appropriate Micro Installation Manual.
4. If using a local power supply, do not connect the power line from the microcontroller to the reader. The ground line of the power supply must be connected to the micro (pin 2 on the reader connector).
5. Blocking diodes may be 1N4148 or equivalent (installer supplied) and located in a secure area.
6. Install two 1k Ω ¼-watt high-quality resistors at Door DI and Exit DI, as shown.
7. Connect a protection device across the door strike. Protection diodes may be 1N4002, 1N4003, or 1N4004 (installer supplied) for the door strike assembly.
 - **AC Door Strikes:** Connect an MOV (metal oxide varistor) across the door strike.
 - **DC Door Strikes:** Connect a diode across the door strike (cathode to positive side of door strike)
8. Relay Coil Current Restriction (Micro/5 2RP with external relay).

The relay coil current must be limited to 40 mA to prevent damage to the board. Verify that the relay coil requires less than 40 mA.
12 VDC relay: coil resistance must be greater than 300 Ω .

The Micro/5 2RP with internal or AUX DO relay current through the relay contacts must be limited to less than 2 A to prevent damage to the 2RP.
Current limiting may be achieved by using either a current-limiting power supply or by wiring in an external fuse.
9. J3 is typically not used in this installation. See Figure 12, "GE Model 24x/250 Reader to Micro/Reader Junction Box (Manufactured prior to February 15, 2004) and Microcontroller," on page 18.

General note: Pair wires as shown in all wiring diagrams.

Point-to-Point Wiring Diagrams

FIGURE 9: GE Model 24x/250 Reader Wiring Diagram to Micro/5 8RP

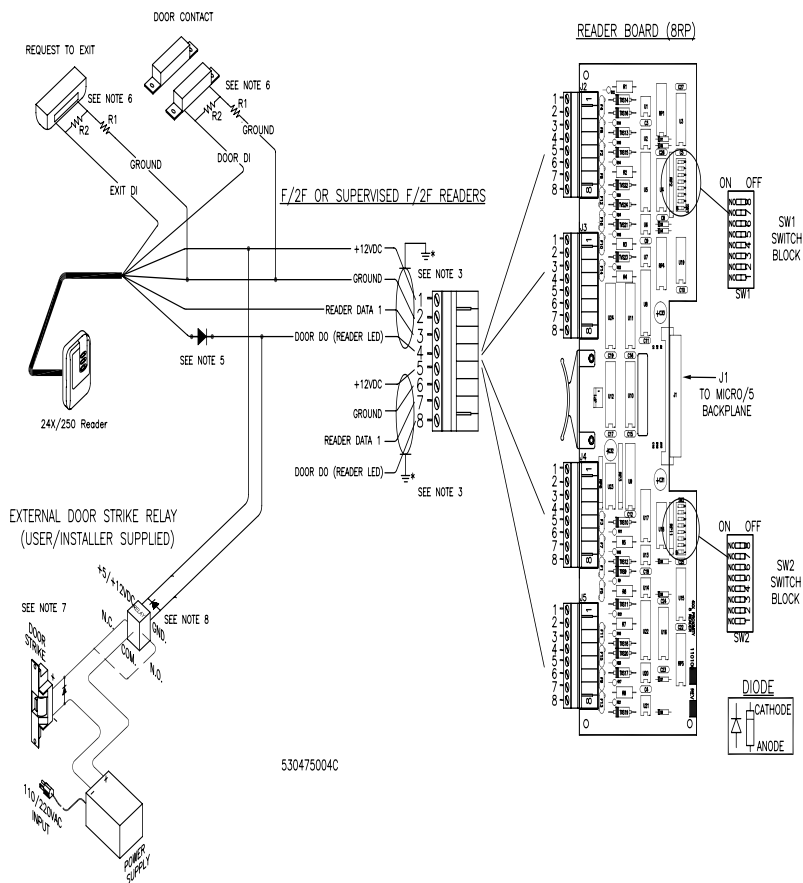


Table 3: 8RP Reader Technology and Format

Reader Technology and Format	SW1-1	SW1-2	SW1-3	SW1-4
Supervised F/2F	ON	OFF	ON	OFF

Table 4: 8RP Board Address Settings

Board Type	SW 1			
	5	6	7	8
Standard	ON	ON	ON	OFF
Board 1 ^a	Does not apply.		OFF	ON
Board 2 ^b			OFF	ON

a. Readers 1 - 8

b. Readers 9 - 16

Note: The 8RP board appears to the Microcontroller as four 2RP boards.

Board Type	SW 2							
	1	2	3	4	5	6	7	8
Standard	OFF	OFF	ON	ON	ON	OFF	ON	OFF
Board 1 ^a	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Board 2 ^b	ON	ON	OFF	OFF	OFF	ON	OFF	ON

a. Readers 1 - 8.

b. Readers 9 -16.

FIGURE 10: GE Model 24x/250 Reader to 2RP

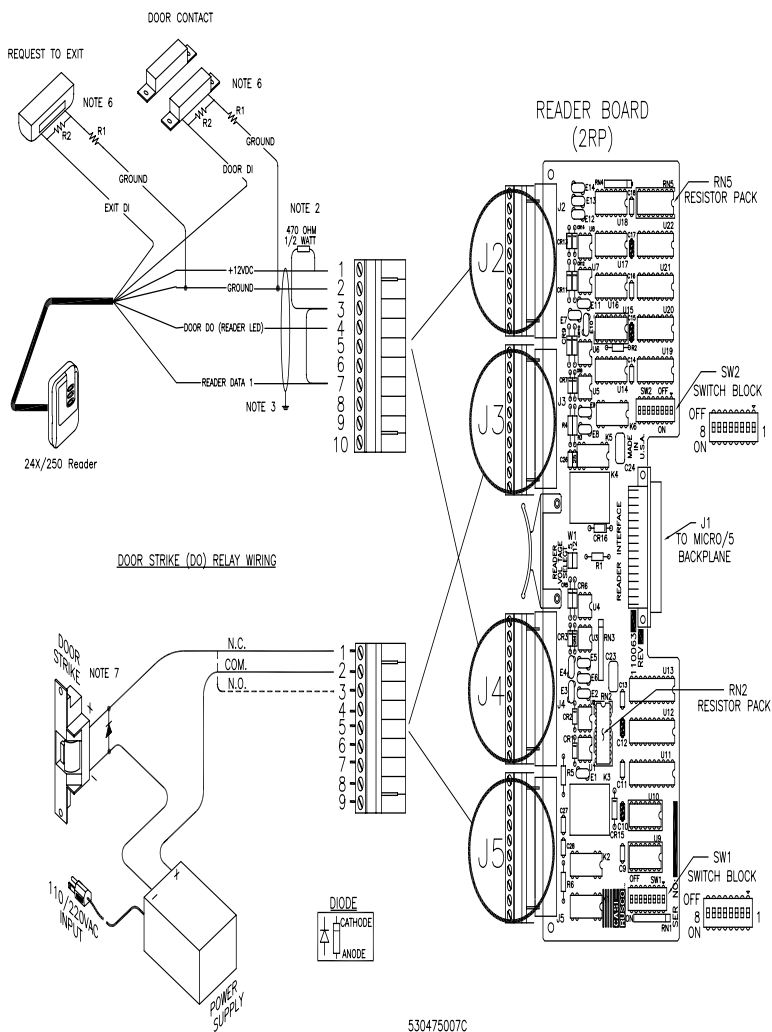


Table 5: 2RP Reader Switch Settings

Reader Technology and Format	SW-1	SW-2	SW-3	SW-4
Supervised F/2F	ON	OFF	ON	OFF

Table 6: 2RP Reader Board Address Settings

Reader Board	SW 1				SW 2			
	5	6	7	8	1	2	3	4
1	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
3	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON

Note: Switches SW2-5, 6, 7, and 8 are not used.

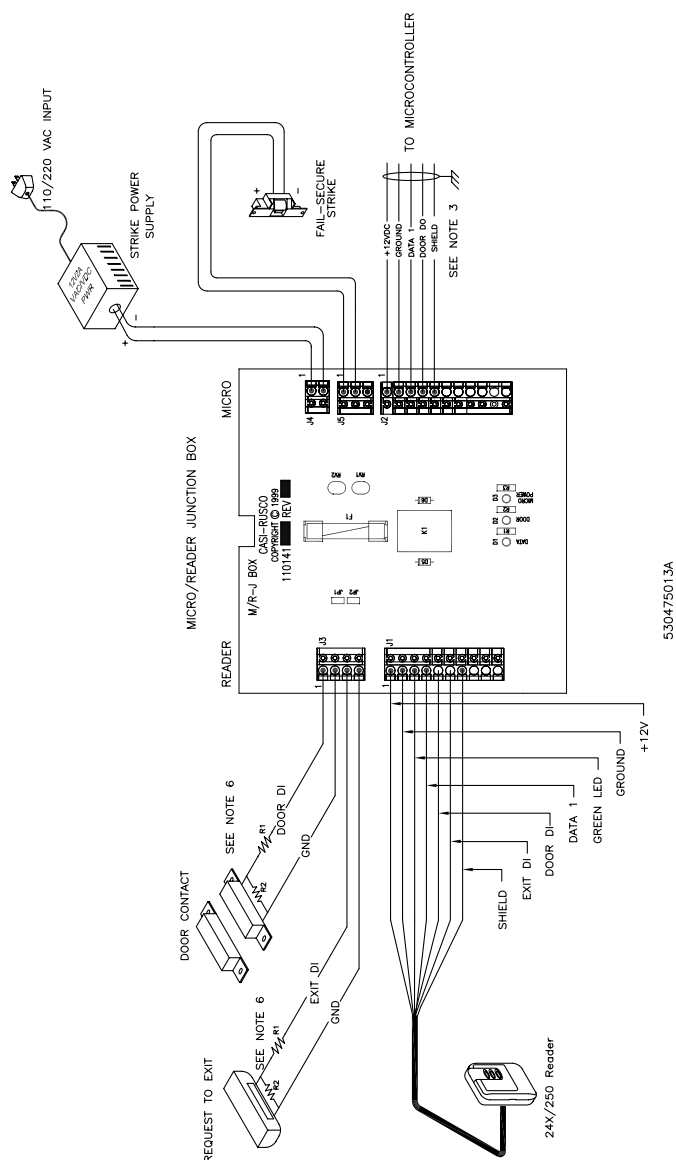
Jumper W1

Set to 12 V

RN2 and RN5 (labeling)

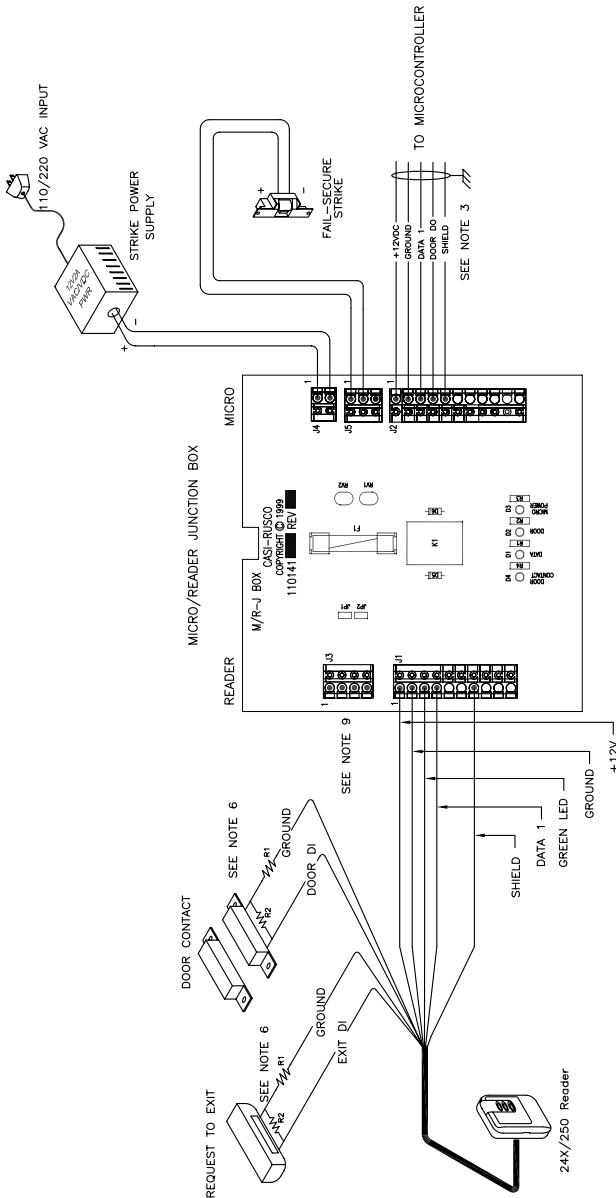
Use 2k Ω (202) resistor packs.

FIGURE 11: GE Model 24x/250 Reader to Micro/Reader Junction Box (Manufactured after February 15, 2004) and Microcontroller



When using a Micro/Reader Junction Box relay as a dry contact, place a jumper across J4, pins 1 and 2 as shown in Figure 11 above. Connect the power supply in series with the door strike.

FIGURE 12: GE Model 24x/250 Reader to Micro/Reader Junction Box (Manufactured prior to February 15, 2004) and Microcontroller



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When using a Micro/Reader Junction Box relay as a dry contact, place a jumper across J4, pins 1 and 2 as shown in Figure 12 above. Connect the power supply in series with the door strike.

Troubleshooting

If the operation of a component is in doubt, substitute a known-good component and retry the system. Always verify wiring against the provided wiring information before powering up the reader.

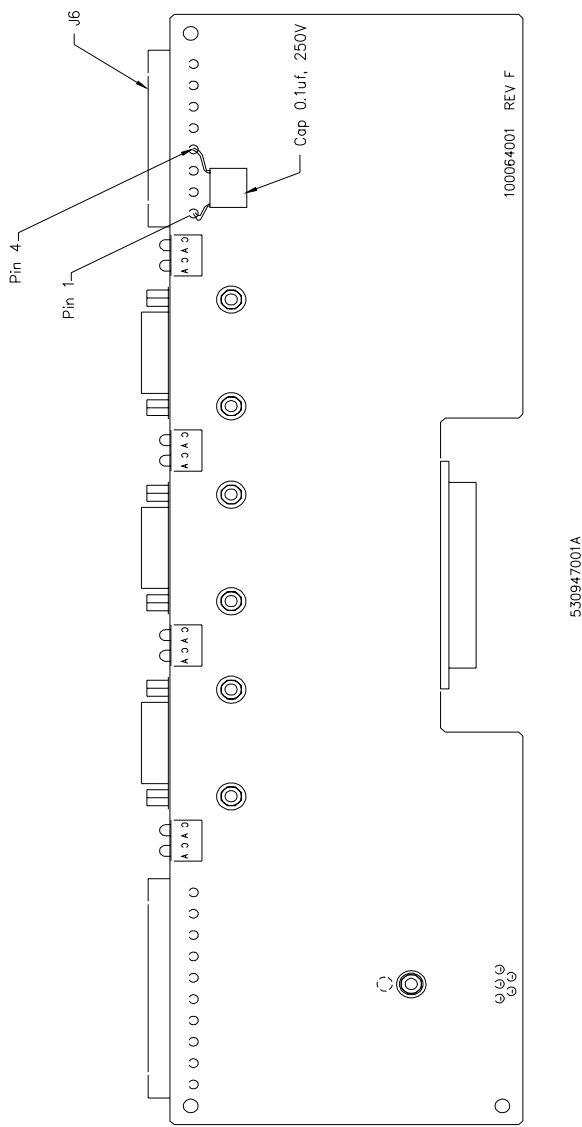
Table 7: Error Conditions and Possible Solutions

Condition	Possible Solutions
None of the LEDs are on.	<p>Present a known-good ISO 15963 or ISO 14443A type card to the reader while listening for the beeper. If the beeper sounds, the reader is faulty and should be replaced. If the beeper does not sound, check the following:</p> <ul style="list-style-type: none">• Power connections to the reader• Reader supply voltage at connector JP1 pin 3 and that the ground connection JP1 pin 2 is secure
The green LED is always on. The green LED indicates that the door strike is open. It is controlled by the input on connector JP1 pin 7.	<p>Disconnect the wire on JP1 pin 7. If the green LED stays on, the reader is faulty and should be replaced. If the green LED goes off, then the problem is most likely not in the reader.</p> <p>Reconnect the wire on JP1 pin 7 and measure the voltage at JP1 pin 7. A low voltage (0 to 2 VDC) lights the green LED. If the voltage is low, there are two possibilities:</p> <ul style="list-style-type: none">• A short to ground in the wiring between the reader and microcontroller, or• The host system may be energizing the door strike
The door does not open and the green LED does not light when an ISO 15963 or ISO 14443A card is presented.	<p>Verify that the door strike and the green LED are wired correctly.</p> <p>Verify that the access card has been entered and that the reader has been properly configured in the host system.</p>

Condition	Possible Solutions
<p>The green LED does not light, but the door strike unlocks the door when a valid ISO 15693 card is presented.</p>	<p>Verify that the door strike is wired correctly. Refer to the appropriate wiring diagram.</p> <p>Disconnect the wire from JP1 pin 7 (green LED) and connect JP1 pin 7 to JP1 pin 2 (ground). If the green LED is now on, the reader is good and the connection to the reader is defective. If the green LED does not light, replace the reader.</p>
<p>Green LED lights, but the door does not open.</p>	<p>Verify correct door strike wiring and operation. The reader is functioning. If not, check that the blocking diode is functioning. If it is not, replace it.</p>
<p>Reader sounds a short triple beep every 30 seconds and the red LED flashes slowly (every 2 seconds).</p>	<p>The reader has lost communication with the microcontroller.</p> <p>Check the reader-to-microcontroller wiring, in particular, the terminations for Reader Data 1. Refer to the appropriate wiring diagram. Verify that the 2RP AUX DO is jumpered to the reader data 1 on the microcontroller. Jumper between 2RP JP2 and JP4, pins 3 and 7.</p> <p>Verify that the correct pull-up resistor is installed on the microcontroller (470 Ω ½-watt, 2RP JP2 and JP4, pins 1 and 3).</p> <p>Verify that the microcontroller has the correct firmware. Refer to the manual that came with your microcontroller for instructions.</p> <p>Try the reader on a different reader input port at the microcontroller. If this corrects the problem, the operational status of the original port is suspect.</p> <p>Replace the reader with one you know is working correctly. If this corrects the problem, then the reader is probably faulty and should be replaced.</p> <p>If none of the above steps have identified the problem, there may be a significant noise source present in the installation which is interfering with the reader-to-microcontroller communications. If this is the case, use shielded wire for reader-to-microcontroller connections.</p>

Condition	Possible Solutions
<p>The reader sounds a short triple beep every 30 seconds and the red LED flashes quickly (every 400 ms).</p>	<p>Indicates a tamper violation. Ensure the reader is properly attached to its backplate. The red LED will continue to blink for 30 seconds. The reader is ready for use when the yellow LED is steadily on.</p>
<p>The reader sounds a short triple beep every 5 seconds and the red LED also flashes every 5 seconds.</p>	<p>Check that the 4-state supervised switches are connected with two 1K Ω resistors to the door contact and the exit request inputs or, if the inputs are not used, that resistors are installed at the reader connector: DI: Pins 2 and 4, 1K Ω REX: Pins 2 and 6, 2K Ω</p> <p>A 470 Ω ½-watt pull-up resistor is required between 12 VDC and Reader Data 1 on the Micro/5 2RP (only).</p>
<p>Reader functions unreliably.</p>	<p>Carefully inspect all Micro/5 power and communication assemblies (110064001) for the existence of a 1uf, 250V capacitor on the circuit side (backside) of the board, near connector J6. The capacitor should be wired to pins 1 and 4 on J6. Refer to Figure 13, “Power Comm Board with Capacitor,” on page 22</p>

FIGURE 13: Power Comm Board with Capacitor



Technical Specifications (24x)

- Cable: Belden (shielded) 8777, 9873, 9773
- Certifications: FCC Part 15; CE Mark, and UL 294
- Color: Gray
- Dimensions with backplate (height/width/depth): 4.37" x 3.31" x 1.10" (110.99 x 84.07 x 27.94 mm)
- Environments: interior or exterior
- Humidity Range: 5 to 95%, non-condensing
- Index of Protection: IP 65 (IEC 529)
- 12-button (3 x 4 matrix) tactile membrane keypad (Model 245 only)
- Microcontroller Communications: F/2F supervised door input, REX, and reader communication/power monitoring
- Minimum Wiring: 4 conductors
- Operating Temperature/Range: -35 to 151° F (-35 to 66° C)
- Power supply: 8 - 30 VDC (see requirements below)
- Weight: 5.6 oz (158.75 g)

Table 8: Currents, Ranges, and Distances

Cable Distance				
Supply Voltage	12 VDC		13.6 VDC	
Current	200 mA @12 VDC			
Cable Gauge	18 AWG	22 AWG	18 AWG	22 AWG
Distance	2,041 ft. (622 m)	856 ft. (261 m)	3,123 ft. (952 m)	1,309 ft. (399 m)

Note: With the exception of the Power, Common/Ground, Reader Data Lines and External Green LED Circuit, all other wiring is limited to same-room installations or no more than 20 feet.

Table 9: Functional Specifications

International Standards	ISO 15693 and ISO 14443A
Microcontroller compatibility	Micro/5-PX and Micro/5-PXN with 2RP and 8RP processor boards (incompatible with M/5 and 2SRP board configurations) Micro/PX-2000 and Micro/PXN-2000
Status Indicators	Red, Yellow, and Green LEDs and Beeper

Technical Specifications (250)

- Cable: Belden (shielded) 8777, 9873, 9773
- Certifications: FCC Part 15; CE Mark, and UL 294 (pending)
- Color: Gray
- Dimensions with backplate (height/width/depth): 4.47" x 1.65 " x 0.95 " (113.54 x 47.91x 24.13 mm)
- Environments: interior or exterior
- Humidity Range: 0 to 95%, non-condensing
- Index of Protection: IP 65 (IEC 529)
- Microcontroller Communications: F/2F supervised door input, REX, and reader communication/power monitoring
- Minimum Wiring: 4 conductors
- Operating Temperature/Range: -4 to 158° F (-20 to 70° C)
- Power supply: 8 - 30 VDC (see requirements below)
- Weight: 2.4 oz (68 gm)

Table 10: Currents, Ranges, and Distances

Cable Distance	
Supply Voltage	12 VDC
Current	200 mA
Cable Gauge	22 AWG
Distance	856 ft. (261 m)

Note: With the exception of the Power, Common/Ground, Reader Data Lines and External Green LED Circuit, all other wiring is limited to same-room installations or no more than 20 feet.

Table 11: Functional Specifications

International Standards	ISO 15693 and ISO 14443A
Microcontroller compatibility	Micro/5-PX and Micro/5-PXN with 2RP and 8RP processor boards (incompatible with M/5 and 2SRP board configurations) Micro/PX-2000 and Micro/PXN-2000
Status Indicators	Red, Yellow, and Green LEDs and Beeper

Regulatory Notices

UL

Underwriters Laboratories Inc. (UL) has not verified compatibility with the Micro/5 2RP; with the Micro/5 8RP reader processor boards nor with Micro/PX-2000 and Micro/PXN-2000 controllers.

Only the SF2F protocol was verified by UL.

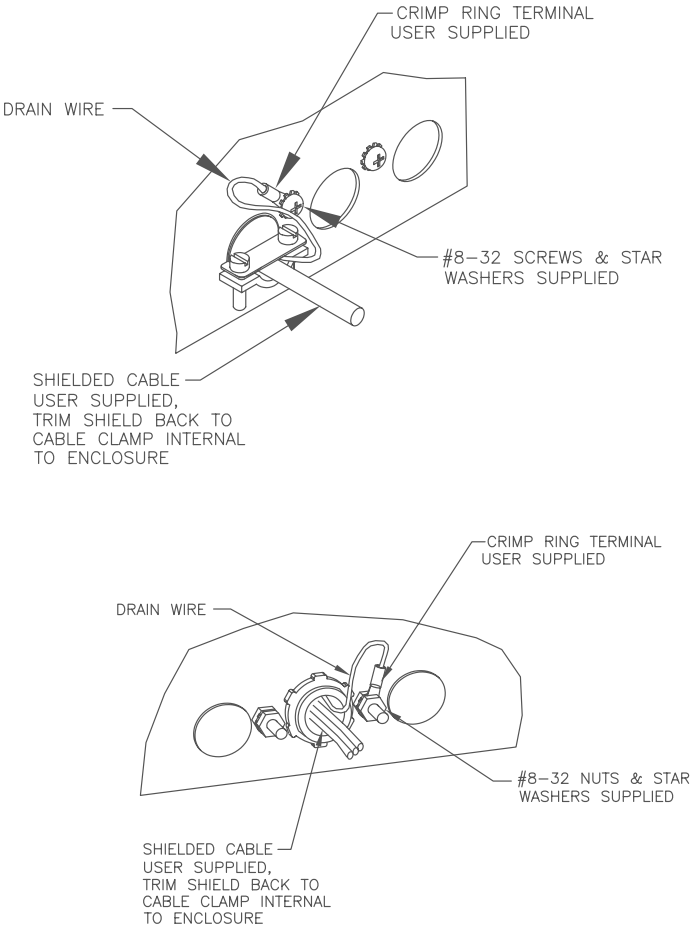
FCC

Changes or modifications not expressly approved by GE Security for compliance could void the user's authority to operate the equipment.

FCC and CE Compliance.

Shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground stud provided on the microcontroller.

FIGURE 14: Stripping of Shield Grounds



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Regulatory Notices:



Manufacturers Declaration of Conformity

For Model 24x/250 Readers



Product Identification: Model 240: 430177001
Model 245: 430182001
Model 250: 430200001

Model/type: 240
245
250

BOM revision level: A
BOM revision level: A
BOM revision level: A

Category (description): Interface Unit

Brand: GE Security

Manufacturer: GE Security
Suite 100
791 Park of Commerce Blvd.
Boca Raton, Florida 33487
USA

EU Representative: GE Security B.V.
Kelvinstraat 7
6003 DH Weert
The Netherlands

Concerning	R&TTE		
	EMC	Safety	Radio
A sample of the product has been tested by:	Seton GmbH Aeussere Fruehlingsstrasse 45 D-94315 Straubing Germany		Seton GmbH Aeussere Fruehlingsstrasse 45 D-94315 Straubing Germany
Test report reference: 430177001 430182001	50430-30107-2	50430-30107-A	50430-30107-1
Test report reference: 430200001	Pending	Pending	Pending
Applied standards	EN301-489	EN60950	EN300 330 v.1.3.1(04-2001)

Equipment class identifier (*RF products falling under the scope of R&TTE*)

☒ Not Applicable

☐ None (class 1 product)

☐ (class 2 product)

Means of Conformity:

We declare under our sole responsibility that this product is in conformity with Directive 93/68/EEC (Marking and/or complies with the essential requirements and all other relevant provisions of the 1999/5/EC (R&TTE) based on test results using harmonized standards in accordance with the Directives mentioned.

NOTES