GE Contactless Smart Card Reader Model 240 and 245 Installation Guide

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WARNING

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

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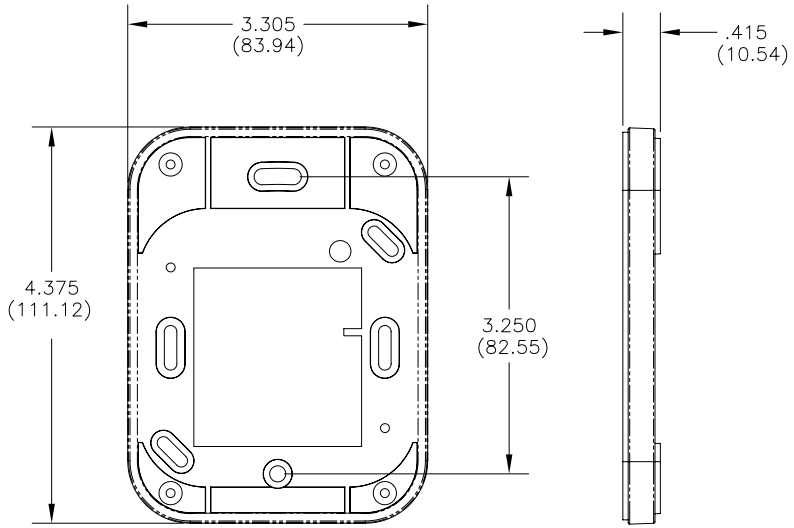
Introduction

The GE Contactless Model 240 and Model 245 Smart Card readers will read ISO14443A and ISO15693 compliant badges, disc tags, and key fobs. The Model 245 includes an integral 12-button keypad for PIN entry.

FIGURE 1: GE Contactless Smart Card Reader Model 240

FIGURE 2: GE Contactless Smart Card Reader Model 245

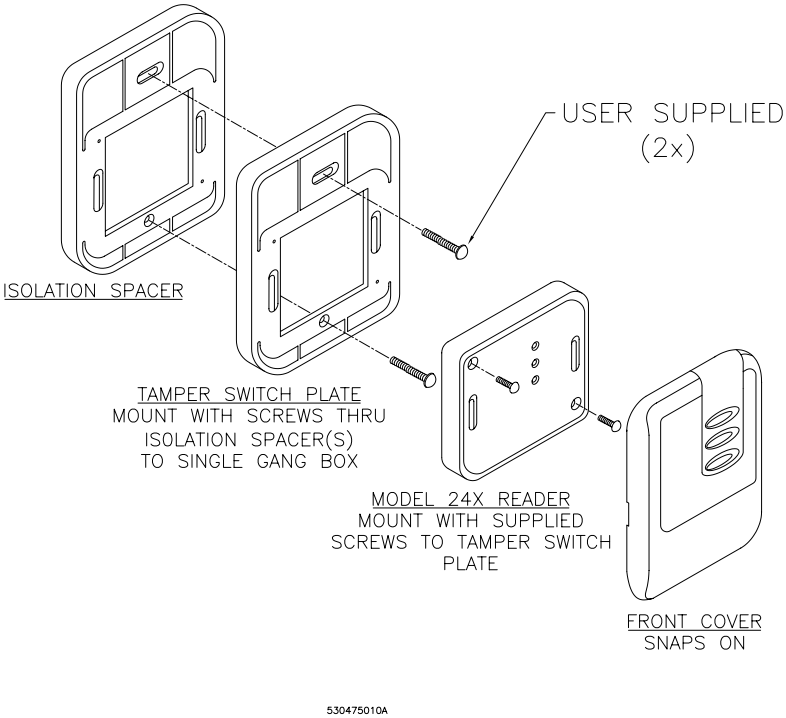
FIGURE 3: GE Model 24x Reader Backplate (includes tamper switch magnet)



Note: Mounting holes fit standard US single-width electrical box and standard European (EMEA) electrical box hole patterns.

An Isolation Spacer (shown in Figure 4) may be used to improve the read-range distance when mounting to metal surfaces. Dimensions are the same as the Reader Backplate.

FIGURE 4: Isolation Spacer



Product Overview

Features

- Universal compatibility with all ISO 15963 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).
- RS-485 communications for reader firmware maintenance operations.

Access Control System Compatibility

The Model 24x badge reader outputs a 16-digit badge identification (BID) number. As a result, the Model 24x Smart Card Readers are compatible with Picture Perfect while microcontrollers on a Secure Perfect 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

The Secure Perfect Edition access control system supports Badge IDs (BIDs) up to a maximum of 12-digits. Since the Model 24x readers output a 16-digit BID number, the Secure Perfect host controller/

microcontrollers must be specially configured to receive the incoming 16-digit BID numbers, and convert them into the proper 12-digit BID format.

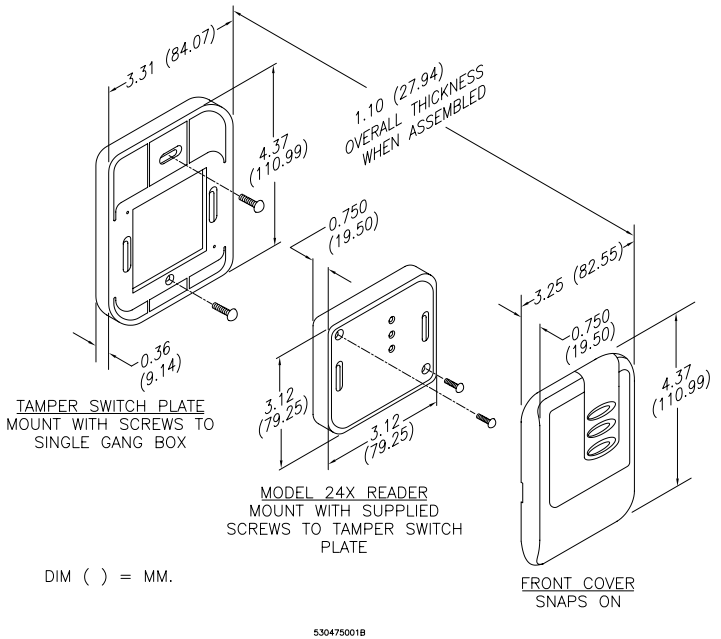
To make a Secure Perfect 4.0 or higher system compatible with the complete line of GE Contactless Smart Card Reader, do the following:

- Install Secure Perfect Edition, 4.0 or higher
- Load the **Secure Perfect Update CD** in the server CD drive
- Locate the Badge Formats folder
- In the Badge Formats folder, locate the **15693.REG** file
- Double-click the **15693.REG** to configure the Secure Perfect Edition system

This file configures the Secure Perfect Edition's system to communicate with the GE Contactless Smart Card Readers.

Installation

FIGURE 5: GE Model 24x Backplate and Snap-on cover



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**.

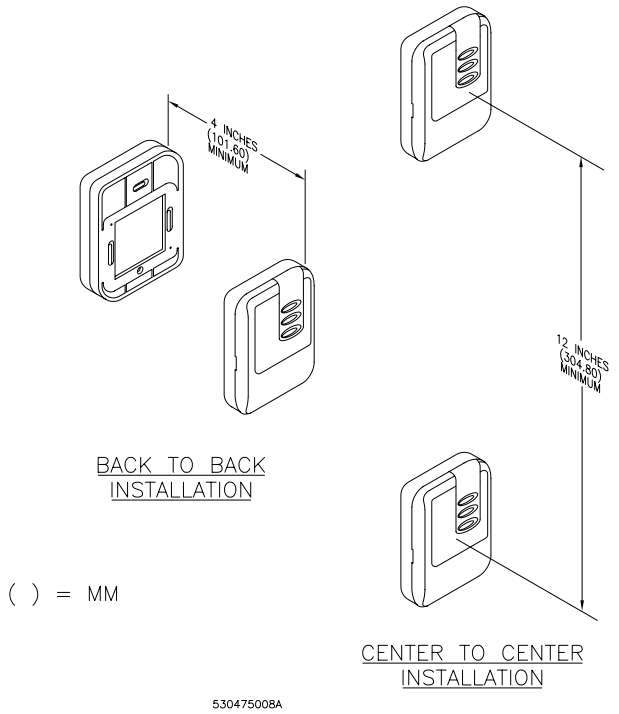
   Read-range reduction can be improved by adding Isolation Spacers (approximately 25% per plate).

2. **Installation of two Model 24x Smart Card Readers side-by-side.**

   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 field. In that case, add a metal back-to-back mounting plate. This can be improved by adding Isolation Spacers.

Note: Two readers can simultaneously read the same badge or tag if the distance between the two readers is less than 12 inches (304.8 mm), center-to-center.

FIGURE 6: Back-to-Back/Center-to-Center Installation



3. **Installation of two GE Model 24x Readers back-to-bac**k.

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 Smart Card 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.

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 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: Current and Cable Distance

Supply Voltage	Cable Distance			
Model 240 and 245	**12 VDC**		**13.6 VDC**	
Current	18 AWG	22 AWG	18 AWG	22 AWG
105 mA @12 VDC	2,041 ft. (622 m)	856 ft. (262 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 12-Position Field Wiring Connector

Pin	Definition
1	Micro control, reader beeper (option)
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	RS-485-B, reader firmware maintenance
10	RS-485-A, reader firmware maintenance
11	Reserved for future use
12	Reserved for future use

Installation Notes (unless otherwise specified). All numbered items below are referenced on the appropriate wiring diagrams throughout this manual.

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.
4. 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.
5. Make sure the distance of the wiring from the power supply to the reader is less than 50 feet (15.24 mm). If using a local power supply, do not connect the power (8-30 VDC) 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).
6. J3 is typically not used in this installation. For additional information, see the appropriate Micro / Reader Junction Box Installation Instructions.
7. Blocking diodes may be 1N4148 or similar (installer supplied) and located in a secure area.
8. Protection diodes may be 1N4002, 1N4003, or 1N4004 (installer supplied) for the door strike assembly.
9. Install two 1k Ω ¼-watt high-quality resistors at Door DI and Exit DI, as shown.
10. Connect a protection device across a door strike.

    AC Door Strikes: Connect a 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)
11. 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 2A 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.
12. Connect protection diode across relay coil. Connect a diode across the relay coil (cathode to positive side of relay coil).

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

Point-to-Point Wiring Diagrams

FIGURE 7: GE Model 24x Reader Wiring Diagram to Micro/5 8RP

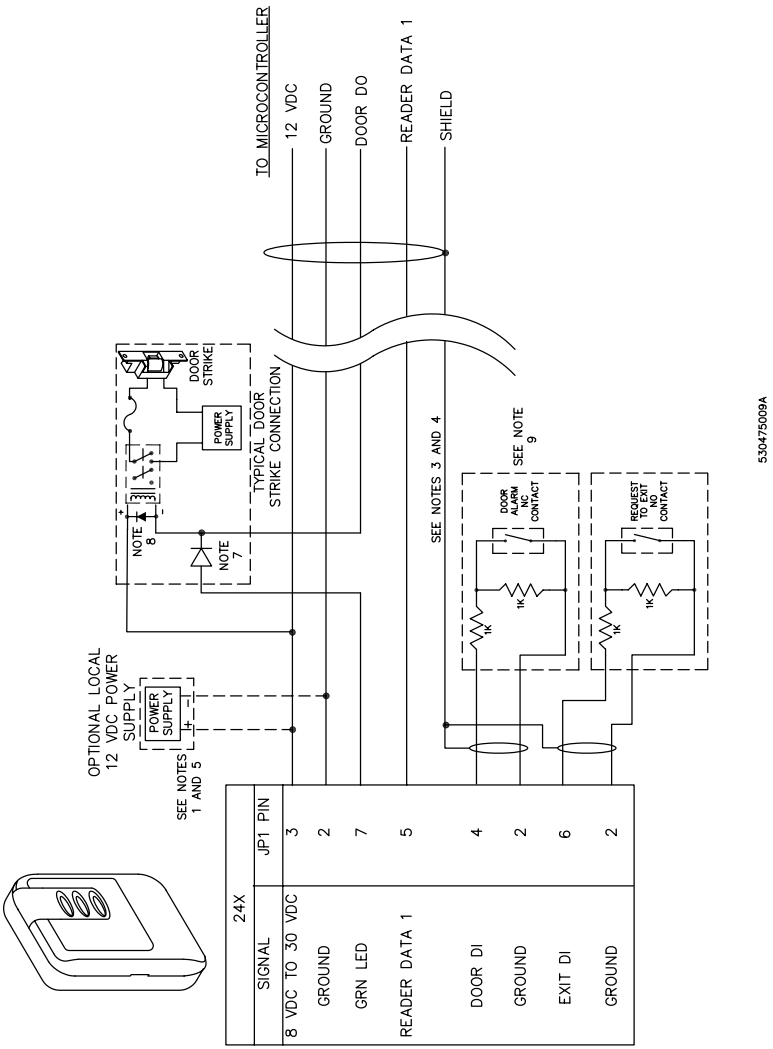


FIGURE 8: Model 24x Smart Card Reader Wiring Diagram to J-Box

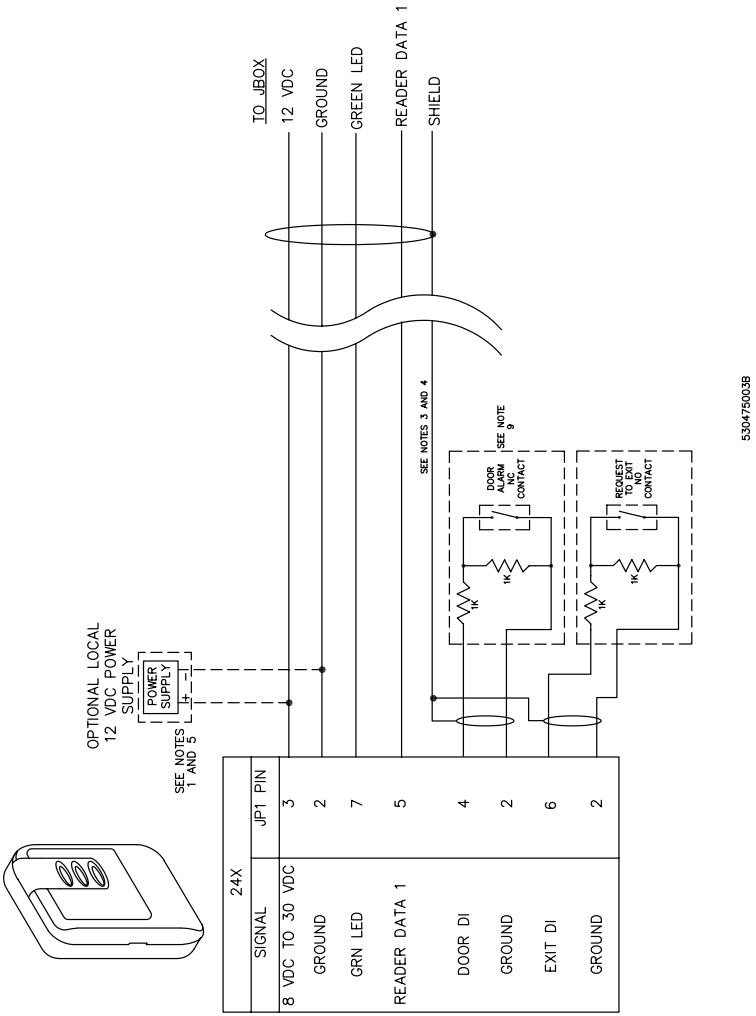


FIGURE 9: GE Model 24x Reader to 2RP

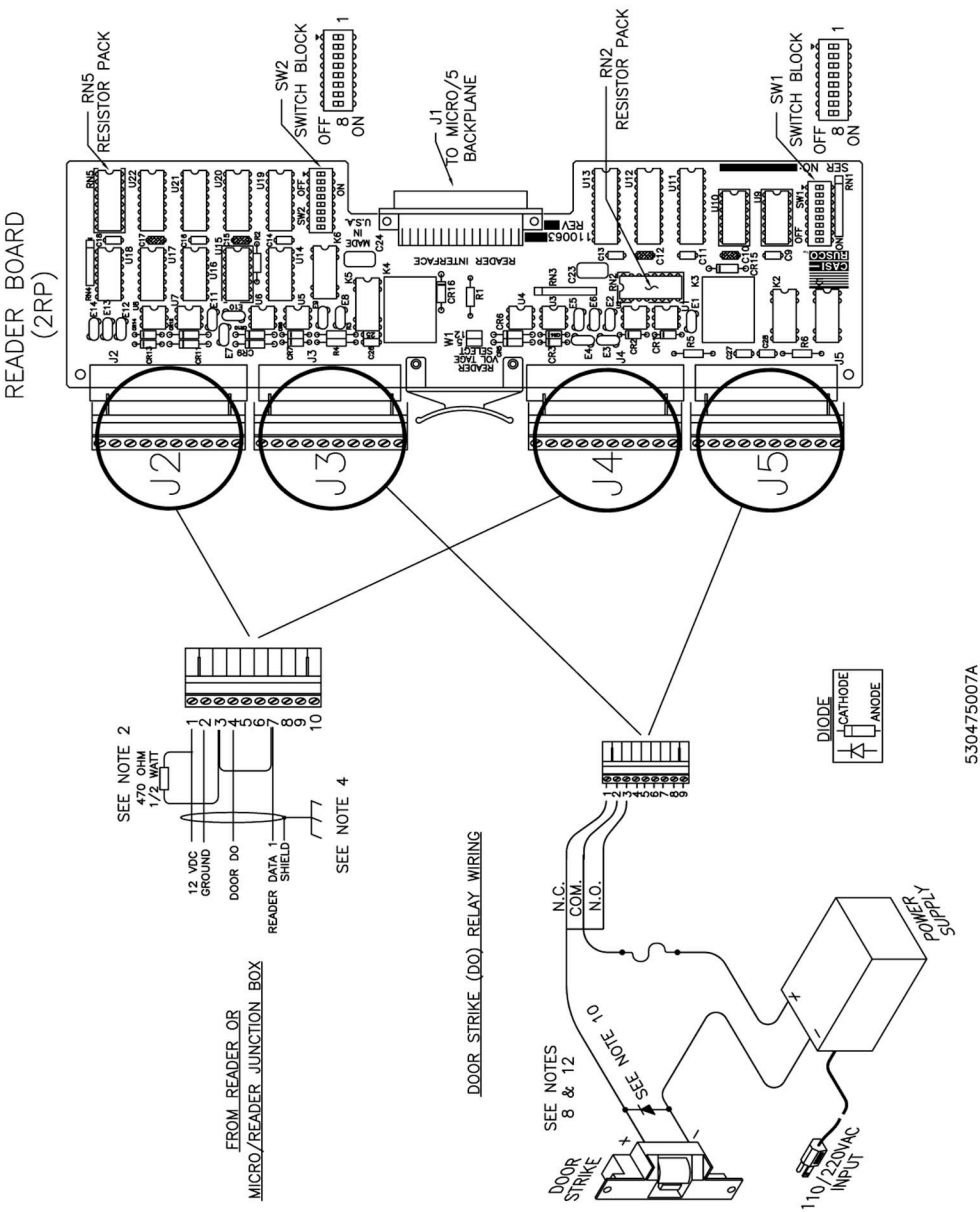


Table 3: 2RP Reader Switch Settings

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

Table 4: 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 10: GE Model 24x Reader to 8RP

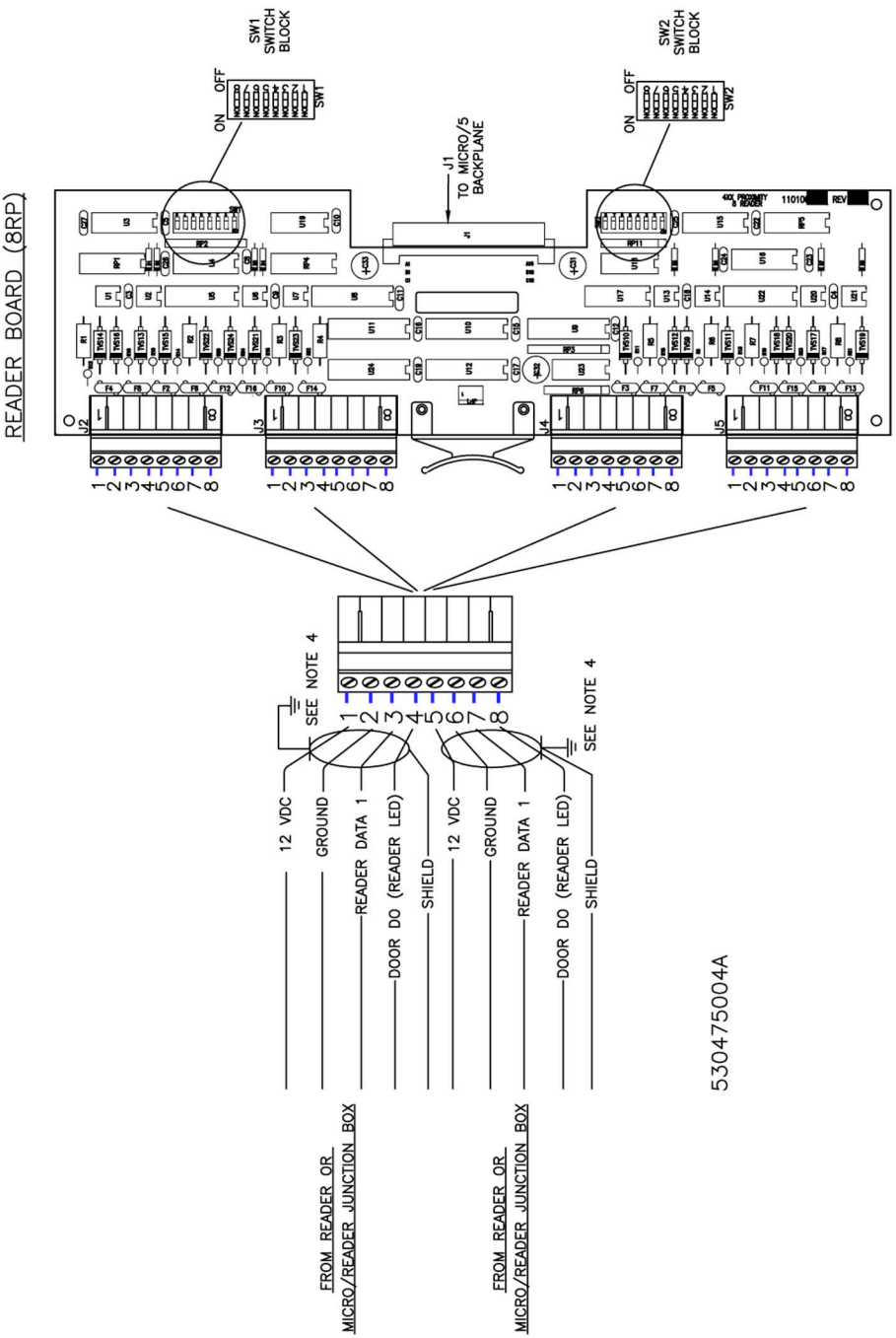


Table 5: 8RP Reader Technology and Format

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

Table 6: 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

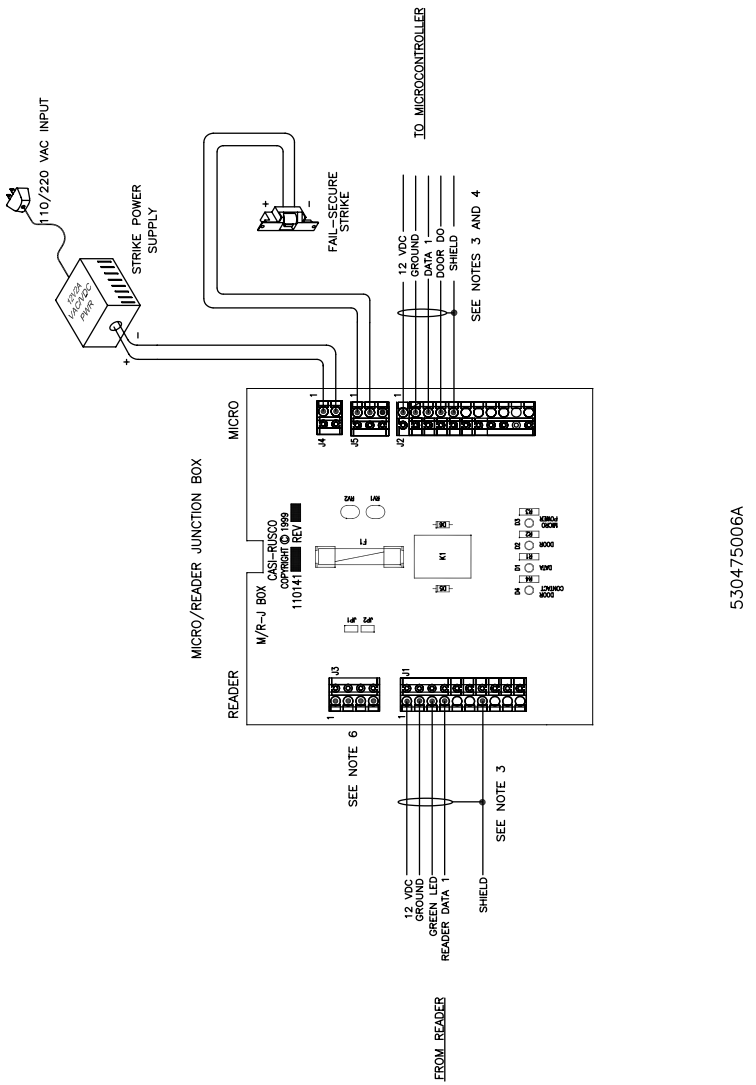
a. Readers 1 - 8
b. Readers 9 - 16

Note: the 8RP board appears to the Micro 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 11: GE Model 24x Reader to Micro



If using a J-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.

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 before powering up the system.

Table 7: Error Conditions and Possible Solutions

Condition	Possible Solutions
None of the LEDs are on.	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: • 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.	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. 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: • 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.	Verify that the door strike and the green LED are wired correctly. Verify that the access card has been entered and that the reader has been properly configured in the host system.

Condition	Possible Solutions
The green LED does not light, but the door strike unlocks the door when a valid ISO 15693 card is presented.	Verify that the door strike is wired correctly. Refer to the appropriate wiring diagram. 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.
Green LED lights, but the door does not open.	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.
Reader sounds a short triple beep every 30 seconds and the red LED flashes slowly (every 2 seconds).	The reader has lost communication with the microcontroller. 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. Verify that the correct pull-up resistor is installed on the microcontroller (470 Ω ½-watt, 2RP JP2 and JP4, pins 1 and 3). Verify that the microcontroller has the correct firmware. Refer to the manual that came with your microcontroller for instructions. 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. 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. 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.

Condition	Possible Solutions
The reader sounds a short triple beep every 30 seconds and the red LED flashes quickly (every 400 ms).	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.
The reader sounds a short triple beep every 5 seconds and the red LED also flashes every 5 seconds.	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 a 1K Ω resistor is installed at the reader connector. A 470 Ω ½-watt pull-up resistor is required between 12 VDC and Reader Data 1 on the Micro/5 2RP (only).

Technical Specifications

- Cable: Belden (shielded) 8777, 9873, 9773
- Certifications: FCC Part 15; CE Mark, and UL 294 (pending)
- Color: Gray
- Dimensions with backplate (height / width / depth): 4.37” 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 (GE Model 245 only)
- Microcontroller Communications: F / 2F supervised door input, REX, and reader communication / power monitoring
- Minimum Wiring: 4 conductors
- Operating Temperature / Range: -13 to 140^{o} F (-25 to 60^{o} C)
- Power supply: 8 - 30 VDC (see requirements below)
- Weight: 5.6 oz (158.75 g)

Table 8: Currents, Ranges, and Distances

Supply Voltage	Cable Distance			
Model 240 and 245	**12 VDC**		**13.6 VDC**	
Current	18 AWG	22 AWG	18 AWG	22 AWG
105 mA @12 VDC	2,041 ft. (622 m)	856 ft. (262 m)	3,123 ft. (952 m)	1,309 ft. (399 m)

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

Regulatory Notices

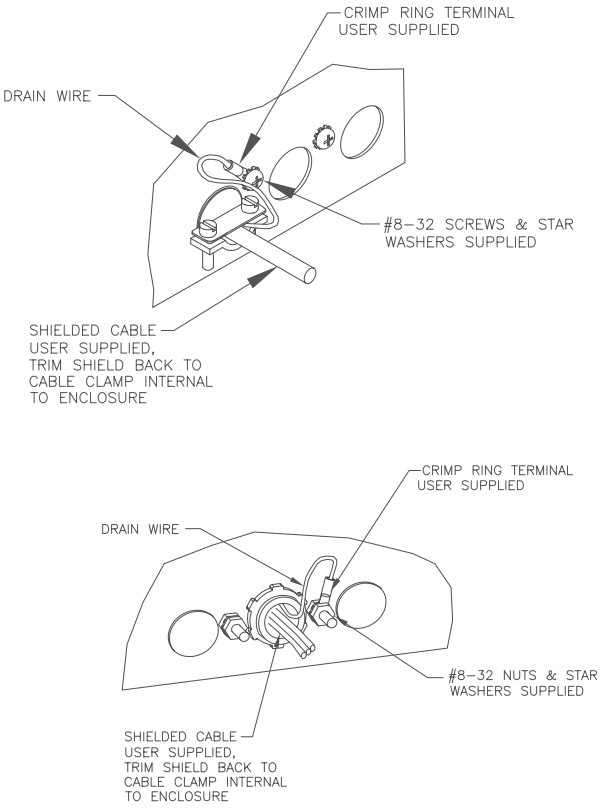
FCC

Changes or modifications not expressly approved by GE-Interlogix 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 12: Stripping of Shield Grounds



CE Manufacturers Declaration of Conformity

Manufacturer's Name:	**GE Interlogix, CASI**
Manufacturer's Address:	**791 Park of Commerce Boulevard, Suite 100 Boca Raton, FL USA 33487**
EU Representative:	**Interlogix Europe & Africa Excelsiorlaan 28 B- 1930 Zaventum Belgium**
Product Identification:	**Product: GE Interlogix, CASI Smart Card Reader Model Number: 240, 245 Brand: CASI**
Means of Conformity:	• **Hereby, GE Interlogix, CASI, declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.** • **Hierbij verklaart GE Interlogix, CASI dat het apparoat in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.** • **Par la présente GE Interlogix, CASI déclare que l'appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.** • **Hiermit erklärt GE Interlogix, CASI, dass sich diese Ausrüstung in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet". (BMWi)**
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