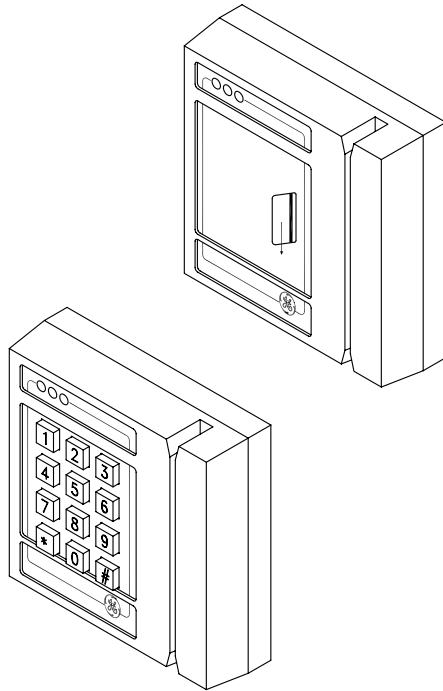


Model 430/435 Magnetic Stripe Reader Installation Manual



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Intended use	<p>Use this product only for the purpose it was designed for; refer to the data sheet and user documentation. For the latest product information, contact your local supplier or visit us online at www.gesecurity.com.</p>
FCC compliance	<p>This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.</p> <p>You are cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.</p>

Regulatory



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Introduction

This manual is an installation guide for the GE Models 430 and 435 Magnetic Stripe readers.

The Models 430 and 435 readers are identical in their functionality, except that the Model 435 includes an integrated keypad used for the entry of a personal identification number (PIN).

The reader is capable of operation in two distinct modes: supervised F/2F mode and Model 5029 reader emulation mode.

In the supervised F/2F mode, the reader communicates with the microcontroller through a bi-directional data link which carries:

- Keypad data (Model 435 only).
- Magnetic stripe data.
- Command responses.
- Exit request switch and door status switch messages.
- Supervision messages.

In the Model 5029 reader emulation mode:

- The reader replaces the Model 5029 reader physically and operationally.
- The wiring and connection to the reader and the message format to the microcontroller is identical to that of the Model 5029 reader.
- Neither the keypad of the Model 435 reader nor the internal tamper switch are functional.
- The reader sends only magnetic stripe data to the microcontroller.

- A jumper-selectable, normally open or normally closed, integrated door status switch input is provided. The operation of this input is identical to that of the corresponding Model 5029 reader input.
- You can replace an existing Model 5029 reader without any changes to the equipment to which it is connected. Simply unplug an existing Model 5029 reader and plug in the Model 430 or 435 reader.

As you upgrade your installation, a simple change of a jumper will provide the advanced features and functions of the supervised mode.

Safety

Radio interference



WARNING: This is an FCC 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.

Electrostatic discharge (ESD) precaution



WARNING: Circuit board components are vulnerable to damage by electrostatic discharge (ESD). ESD can cause immediate or subtle damage to sensitive electronic parts. An electrostatic charge can build up on the human body and then discharge when you touch a board. A discharge can be produced when walking across a carpet and touching a board, for example. Before handling any board, make sure you dissipate your body's charge by touching ground. This discharges any static electricity build-up.

Product features

The GE Models 430 and 435 Magnetic Stripe readers offer:

- Cabling distance of up to 5280 ft (1609 m). See *“Technical specifications” on page 6*.
- Ability to read ABA track 2 format, 4 to 16 numeric digits.
- 12 VDC to 48 VDC operation.
- Two jumper-selectable modes of operation: fully supervised F/2F mode and Model 5029 reader emulation mode.
- A tactile keypad (supervised Model 435) for personal identification number (PIN) entry.
- Rugged, weather-resistant, aluminum casting construction with steel backplate.
- A door strike relay for AC or DC operation with selectable normally open or normally closed contacts.
- Optional cold weather kit.

System requirements

Host software	<ul style="list-style-type: none">• Secure Perfect® Edition 3.0 or later• Picture Perfect™ 1.7 or later
Microcontrollers	<ul style="list-style-type: none">• Micro/5-PX with 2RP or 8RP• Micro/5-PXN with 2RP or 8RP• M5PXNplus with 2RP or 8RP• Micro/PX-2000• Micro/PXN-2000• M2000PXNplus• M3000PXNplus with 2RP or 8RP
Micro firmware	For Micro/5-PX, Micro/5-PXN, Micro/PX-2000 and Micro/PXN-2000: <ul style="list-style-type: none">• Secure Perfect: 3.1.0.6 or later• Picture Perfect: 1.7.0 or later
Badge formats	<ul style="list-style-type: none">• ABA track 2 format, 4 to 16 digit

Technical specifications

For UL compliant installation notes, refer to *“UL” on page 31.*

Operating temperature range	without heater kit: +32 F (+0 C) to +140 F (+60 C) with heater kit: -40 F (-40 C) to +140 F (+60 C)
Relative humidity	5% to 95% (non-condensing)
Physical dimensions (HxWxD)	4.48" (114 mm) x 4.48" (114 mm) x 1.40" (36 mm)
Index of protection	IP34
Input voltage range	12 VDC to 48 VDC
Color	Light gray
Power supply	40ma @ 12 VDC nominal 50ma @ 48 VDC nominal Max: 70ma @ 48 VDC nominal (relay and beeper activated)
Maximum cabling distance	2000 ft (610 m) @ 12 VDC ^a with standard 22 AWG shielded cable 5280 ft (1609 m) @ 48 VDC with standard 22 AWG shielded cable
Door strike relay	Maximum contact rating of 0.75 amperes ^b Maximum contact voltage of 28 volts AC or DC

a. 12 VDC operation implies that a 12 VDC power supply is located up to 2,000 feet from the reader. The use of an auxiliary power supply close to the reader may allow operation at greater distances.

b. A relay has been designed into the reader for maximum flexibility. The life of the relay will decrease as the current switched by the contacts is increased. Use low current door strikes for high traffic doors to maximize the relay life. Use an external relay for high current applications.

Parts list

- Model 430/435 reader
- Optional Tool, installation wrench
- Optional cold weather kit

Refer to the GE price list for part numbers and ordering information.

Installation overview

The following is the general sequence of steps to follow to install the Model 430/435 reader. Each step is explained in further detail in the sections that follow:

1. Install reader mounting.
Refer to *“Mounting the reader” on page 9*.
2. Configure the reader board jumpers and switches.
Refer to *“Configuring the reader” on page 15*.
3. Connect the reader to the controller.
Refer to *“Connecting the reader” on page 18*.
4. Test the reader.
Refer to *“Testing the reader” on page 24*.

Mounting the reader

A gasket is supplied with the reader to form a seal between the mounting plate of the reader and the mounting surface. Ensure a good contact surface is present for the gasket. The reader is weather-resistant, not weather-proof. Mount the reader out of direct exposure to rain or snow. Order and install the optional Cold Weather Kit for installations where below-freezing temperatures are anticipated.

Preparing the reader backplate

1. Prior to mounting the backplate, remove the connector cutout to suit the installation.
2. Punch or cut to enable off-the-wall tamper.
3. For mounting installations other than a standard dual-gang box or 5029 plate, select other mounting hole locations on the backplate. Place the backplate face down on a flat surface and then using a small Phillips head screw driver or round punch, punch through selected mounting holes.

Mounting diagrams

There are four different methods of mounting the reader:

- **Door mounting.** Refer to [Figure 1](#) on page 10 and [Figure 2](#) on page 11.
- **Gang-box surface mounting.** Refer to [Figure 3](#) on page 12.
- **Gang-box mounting.** Refer to [Figure 4](#) on page 13.
- **Back-box mounting.** Refer to [Figure 5](#) on page 14.

Figure 1. Model 430/435 Magnetic Stripe reader door mounting dimensions

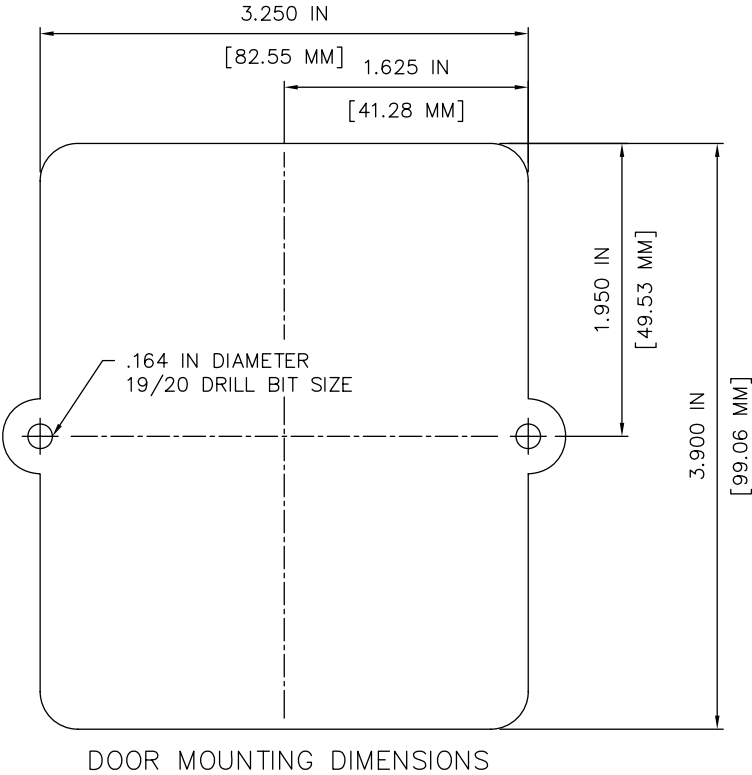


Figure 2. Model 430/435 reader, door mounting

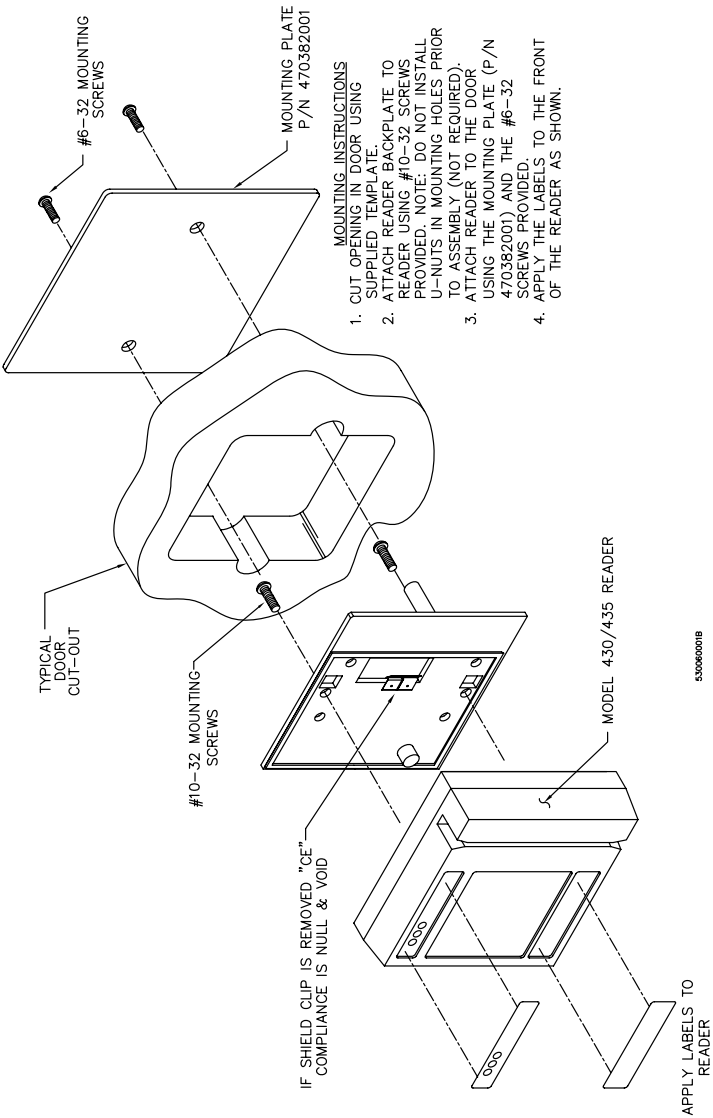


Figure 3. Model 430/435 reader, gang-box surface mounting

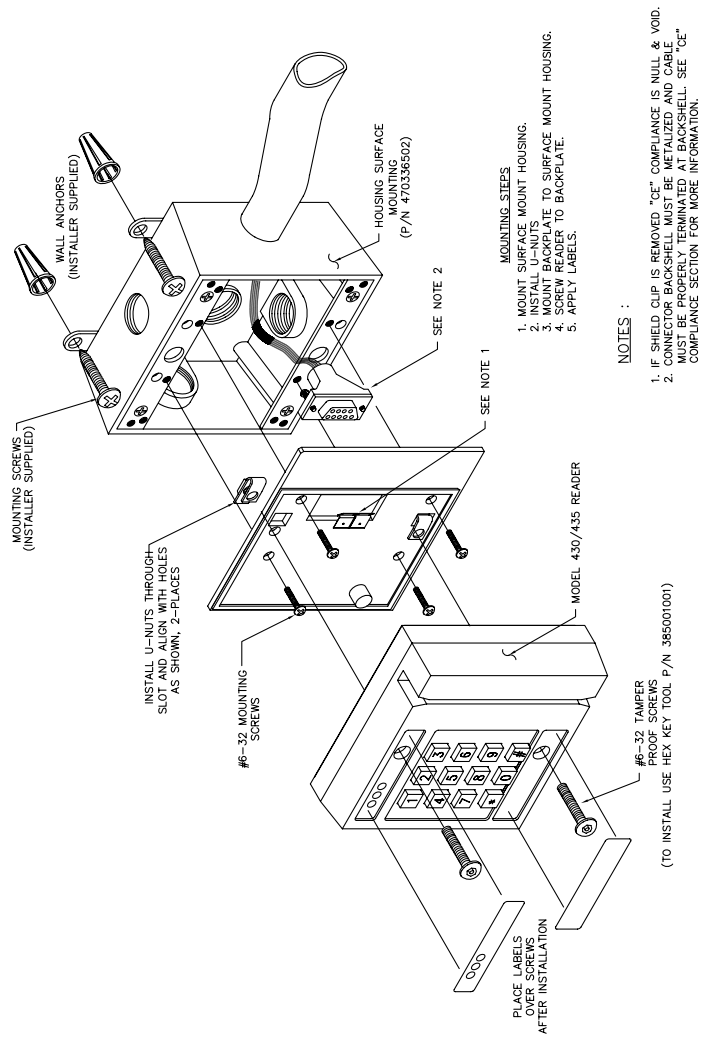


Figure 4. Model 430/435 reader, gang-box mounting

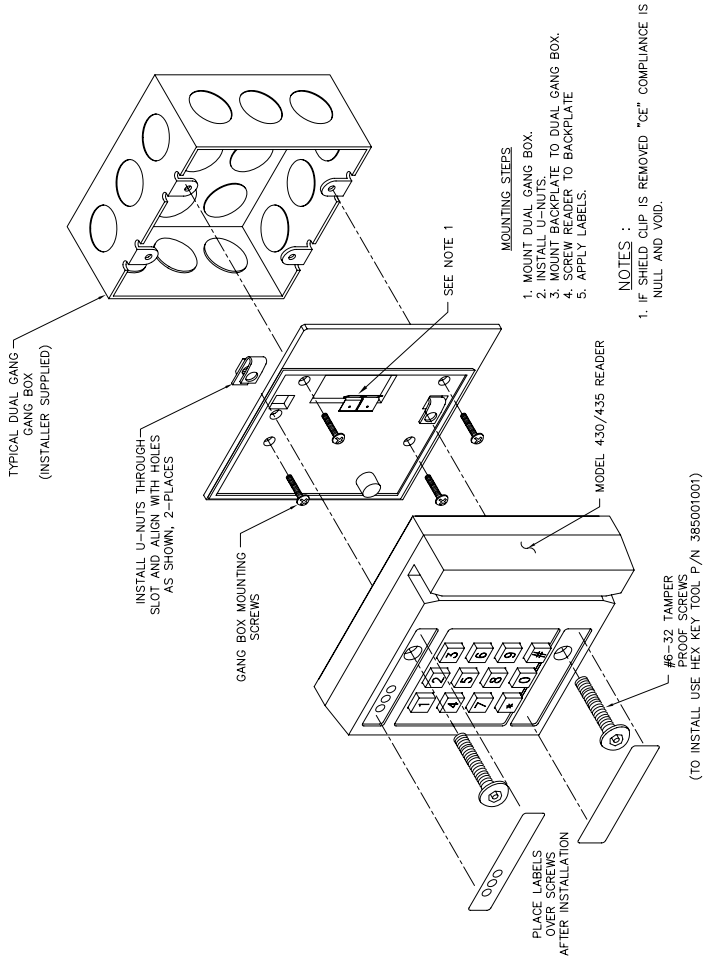
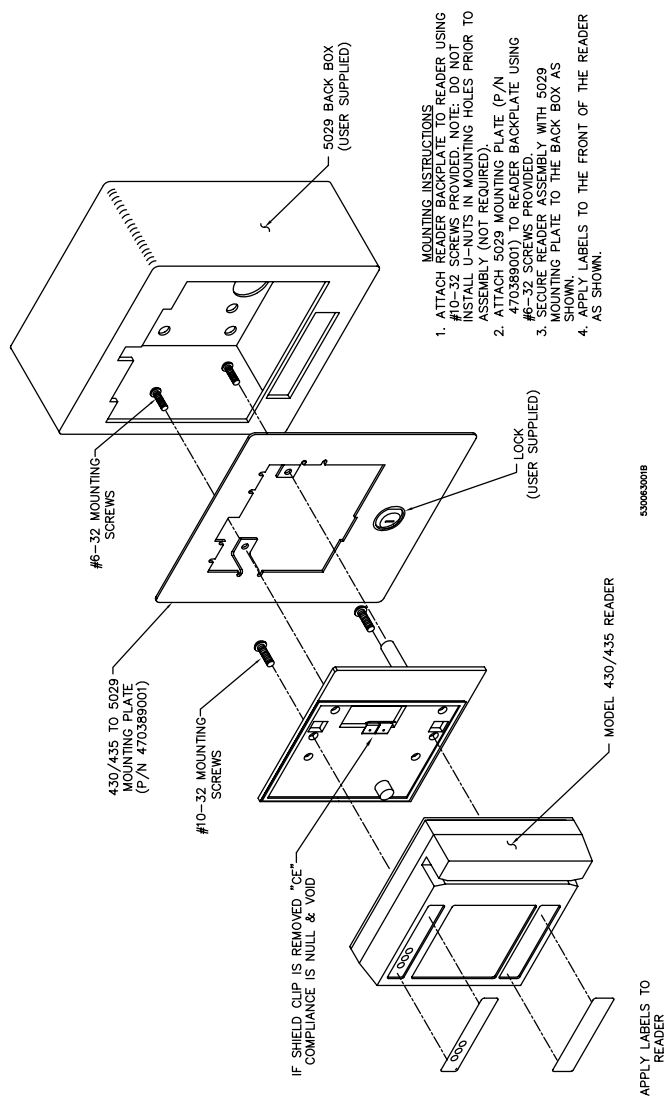


Figure 5. Model 430/435 reader, Model 5029 reader back-box mounting



Configuring the reader

Refer to *Figure 6, “Model 430/435 reader, jumper setting,” on page 17* for the location of the jumpers.

Mode select

To select Model 5029 reader emulation mode, place the mode select jumper in the JP1 position. To select the supervised F/2F reader mode, remove the jumper from JP1 and retain the jumper for possible use with the door and exit request jumpers. Note that the exit request is not supported in the IBM emulation mode.

The reader is shipped from the factory as follows:

- JP1 installed (the Model 5029 reader emulation mode selected)
- JP3 installed (the relay normally open contacts for use with fail secure door strikes)
- JP5 installed (the normally closed input for the door switch)

Door strike relay output

- **JP2 position** - Selects the normally closed contacts for use with fail safe door strikes.
- **JP3 position** - Selects the normally open contacts for use with fail secure door strikes.

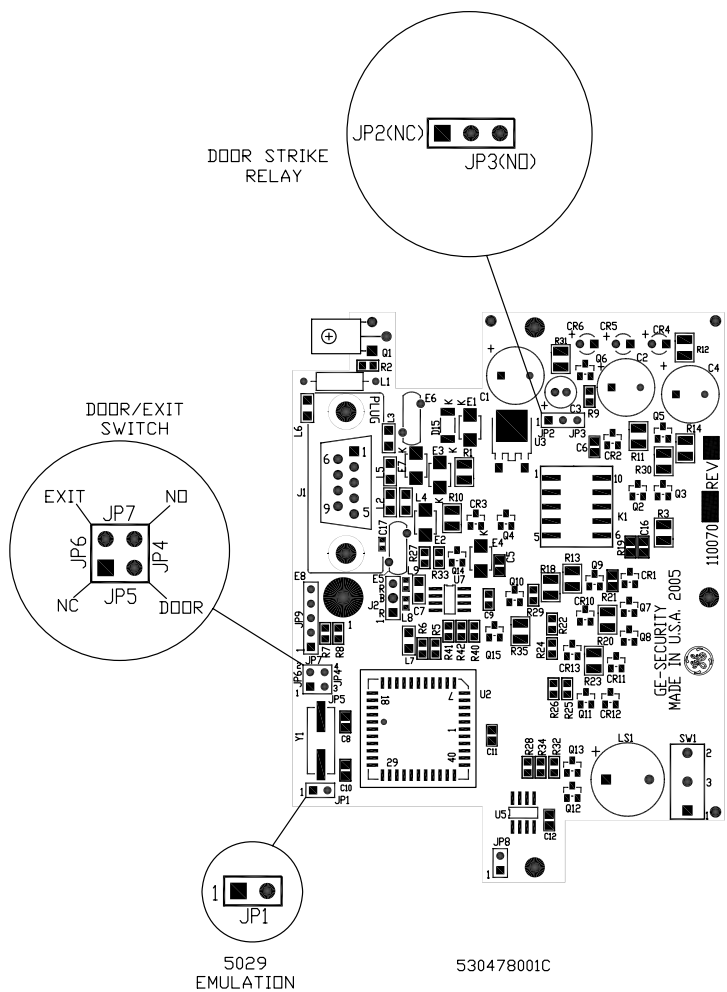
Door contact and exit request inputs

The reader has one normally open input and one normally closed input. Jumpers JP4 through JP7 direct these inputs for use as a door contact or an exit request contact. If both the door contact and the exit request input are used, one must be a normally open contact and the other must be a normally closed contact.

- **JP4 position** - Selects the normally open input for the door switch.
- **JP5 position** - Selects the normally closed input for the door switch.
- **JP6 position** - Selects the normally closed input for the exit switch.
- **JP7 position** - Selects the normally open input for the exit switch.

If the door contact or the exit request input are not used, be sure the associated jumper is removed or placed in the normally open position.

Figure 6. Model 430/435 reader, jumper setting



Connecting the reader

For pinout and wiring information, refer to the following:

Pinouts on page 19.

Figure 7, “Model 5029 reader emulation mode,” on page 20

Figure 8, “Supervised F/2F mode,” on page 22

Note: To maintain CE compliance, shielded cable and connections must be used as shown in Figure 3, Figure 4, and in the section, “CE/FCC compliance” on page 33.

When replacing a Model 5029 reader with the Model 430 or 435 reader, no change of wiring is required when the existing cable does not exceed one mile and is 22 AWG or larger.

Some Model 5029 reader installations used thin gauge wire over long distances (greater than one mile or with wire smaller than 22 AWG). There may be cases with long cable runs where an auxiliary power supply at the reader is needed to allow operation with the same cable used for the Model 5029 reader. If this situation arises:

1. Disconnect the power supply wire at the reader (J1 pin 7) from the microcontroller supply and connect a local power supply to this pin.
2. Connect the power supply return to the ground wire (J1 pin 1), leaving the ground wire to the microcontroller connected.
3. Fold and tape the power wire from the microcontroller to prevent a short circuit.

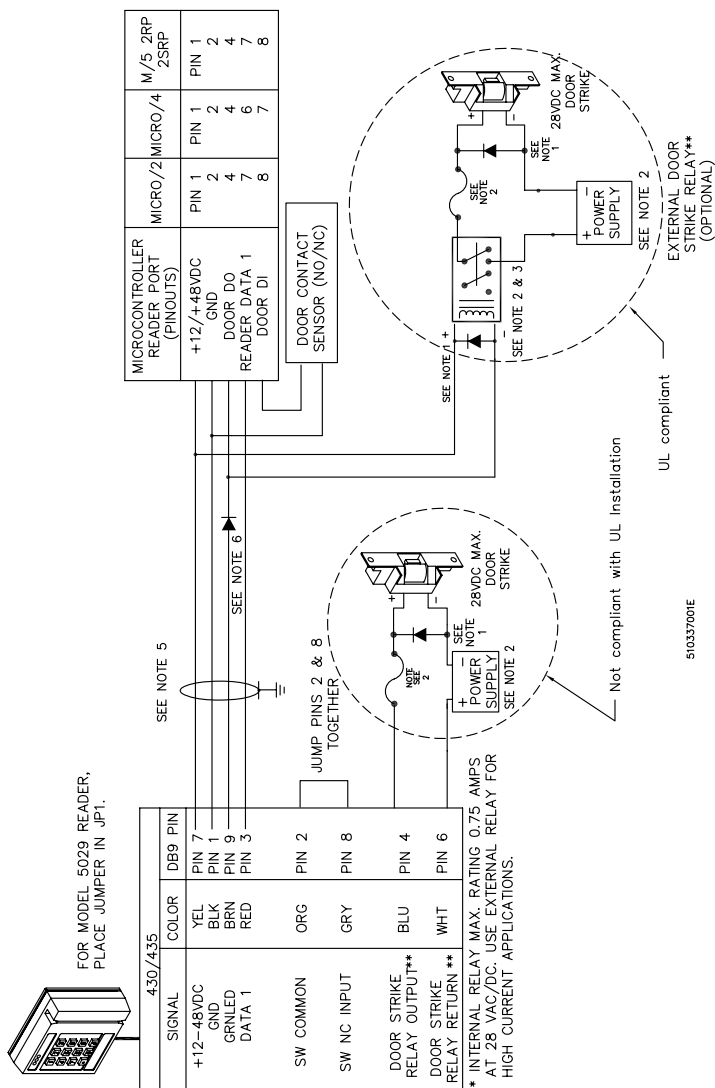
Pinouts

Standard 9 pin D-subminiature connector:

Table 1. Pinouts for DB9 connector

Pin #	Signal	Standard color
1	Power return (Ground)	Black
2	Switch common	Orange
3	Data I/O	Red
4	Strike relay output	Blue
5	Switch normally open input (REX)	Violet
6	Strike relay return	White
7	Power input	Yellow
8	Switch normally closed input (Door contact)	Gray
9	Door DO input from microcontrollers (to control the strike relay)	Brown

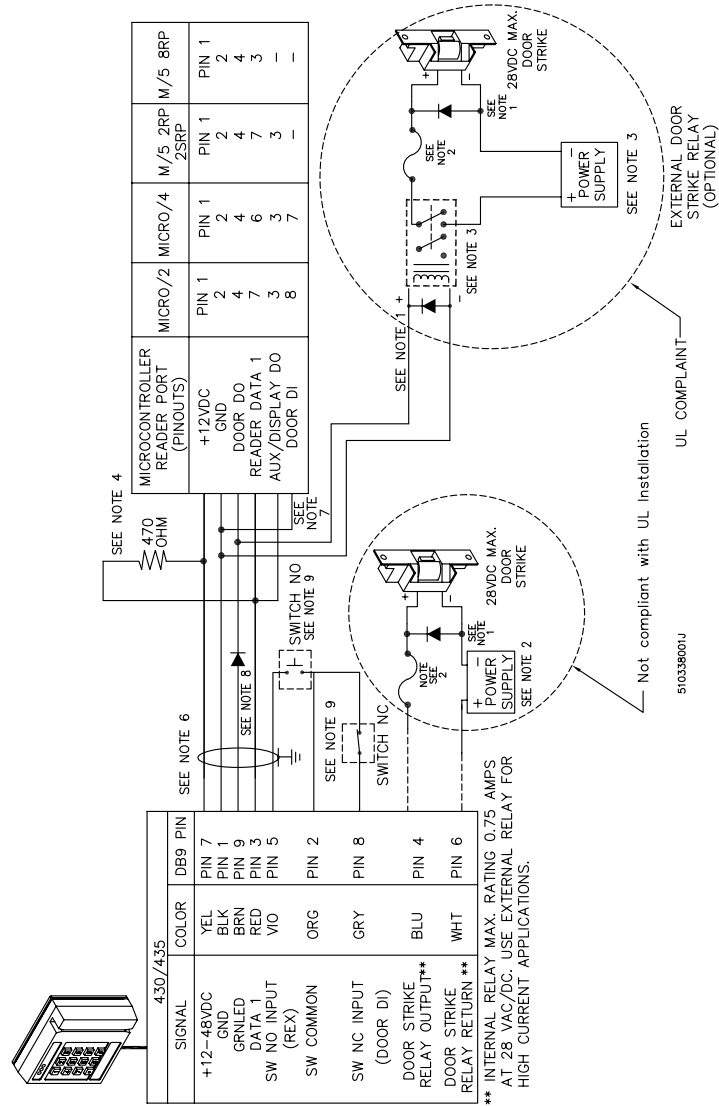
Figure 7. Model 5029 reader emulation mode



Note: Unless otherwise specified:

- 1 Protection diodes may be 1N4002, 1N4003, or 1N4004 for the door strike assembly (supplied by the installer) for DC strikes only.
- 2 One amp fuse, power supply (fused primary), and relay provided by the installer/customer.
- 3 Relay coil resistance must be 100 ohms or greater at 12/48 VDC.
- 4 Maximum cabling distance using 22 AWG shielded cable is 2,000 feet for 12 VDC micros or one mile for 48 VDC micros.
- 5 Shielded cable must be properly terminated at both the reader and micro end as instructed in Figure 3, Figure 4, and in the section, "CE/FCC compliance" on page 33.
- 6 Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed on the secure side of the door.

Figure 8. Supervised F/2F mode



Note: Unless otherwise specified:

- 1 Protection diodes may be 1N4002, 1N4003, or 1N4004 for the door strike assembly (supplied by the installer) for DC strikes only.
- 2 One amp fuse, power supply (fused primary), and relay provided by the installer/customer.
- 3 Relay coil resistance must be 100 ohms or greater at 12/48 VDC.
- 4 Pull-up resistors, 470 ohm, 1/4W required on AUX DO lines on runs over 500 feet installed at micro connector, supplied with the reader.
- 5 Maximum cabling distance using 22 AWG shielded cable is 2,000 feet for 12 VDC micros or one mile for 48 VDC micros.
- 6 Shielded cable must be properly terminated at both the reader and micro end as instructed in Figure 3, Figure 4, and in the section, "CE/FCC compliance" on page 33.
- 7 Micro/2 and Micro/4 only: If wiring door DI switch through reader (as shown), door DI on reader board must be connected to Ground.
- 8 Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed on the secure side of the door.
- 9 Request to exit (REX) terminals on the reader are not to be connected for UL listed installations.

Testing the reader

Perform the following test procedure to verify correct operation of the Models 430 and 435 Magnetic Stripe readers:

Note: When in Model 5029 reader emulation mode, skip Steps 5, 6, and 7D.

1. Check all cabling and electrical connections from the reader to the microcontroller.
2. Verify that the microcontroller is properly configured (refer to the appropriate microcontroller manual).
3. Verify that the reader jumpers are properly set. Refer to *Configuring the reader* on page 15.
4. Apply power to the reader and verify that the red LED is on.

It may be desirable to test the connections with a multimeter by testing voltage levels at the 9-pin D-subminiature connector. All measurements are done on connector J1. Using ground (pin 1) as a reference, the power (pin 7) and data (pin 3) lines should measure 9 to 14 volts on a 12-volt system and 44 to 51 volts on a 48-volt system. The door DO (pin 9) should measure approximately 12 volts on a 12-volt system and greater than 30 volts on a 48-volt system.

5. Ensure the proper version of the firmware is installed in the microcontroller. Refer to the appropriate microcontroller manual.
6. Close the tamper switch by joining the reader and backplate so that the tamper alarm is suppressed. When all wires are connected to the reader, ensure that the supervision function is operating properly by verifying

that the reader is not beeping. If the reader is beeping, refer to the troubleshooting guide at the end of this manual.

7. Verify proper reader operation as follows:
 - a. Select a known good test badge. Be sure that the badge is properly enrolled in the host system. If the reader is used with a keypad, assign a proper PIN.
 - b. Ensure that the door is securely closed and latched. This is the first step to verify that the reader strike relay is wired properly.
 - c. Pass the card through the reader. Observe that the yellow LED lights and the reader beeps briefly.
 - d. If used with a keypad, enter the PIN number when the yellow LED flashes. Refer to the appropriate host manual for the correct PIN entry sequence.
 - e. Observe that the red LED turns off and the green LED turns on, indicating a valid access has been granted by the host.
 - f. Open the door. This verifies that the reader strike relay operates properly.

Troubleshooting the reader

If the operation of a reader is in doubt, substitute a known good reader and retry the system.

Always verify wiring against the wiring diagrams before powering up the system.

Refer to the following Troubleshooting chart.

Table 2. Troubleshooting

If you see this:	Explanation/Action:
Red LED is always off and green LED is always on.	<p>The red LED indicates that power is on and the strike relay is off. The green LED indicates that the strike relay is on. These LEDs are controlled by the input on J1 pin 9.</p> <p>Disconnect the wire on J1 pin 9. If the green LED goes off and the red LED comes on, the problem is probably not with the reader. If the red LED does not turn on and/or the green LED does not turn off when J1 pin 9 is disconnected, replace the reader and return the defective unit for repair.</p> <p>Reconnect the wire on J1 pin 9 and measure the voltage at J1 pin 9. A low voltage turns off the red LED and turns on the green LED and strike relay. If the voltage is low, check to see if the host system is turning on the door strike relay.</p>
None of the LEDs are on.	<p>Swipe a badge through the reader and listen for the beep while watching the yellow LED.</p> <p>If the beeper sounds and the yellow LED lights briefly, the reader has power. Replace the reader and return the defective unit for repair.</p> <p>If the beeper does not sound and the yellow LED is off, check the power connection to the reader as described in Step 4 of Testing the reader on page 24.</p>

Table 2. Troubleshooting (continued)

If you see this:	Explanation/Action:
<p>Reader beeps three short, rapid beeps per second.</p> <p>Note: Applies to supervised mode only.</p>	<p>The reader has lost communications with the microcontroller.</p> <ol style="list-style-type: none"> 1 Check reader-to-microcontroller wiring (refer to the appropriate installation drawing in this manual). Verify that the AUX DO is jumpered to the READER IN on the microcontroller using the resistor supplied with the reader. If the cable length is longer than 500 feet, be sure that the correct pull-up resistor is installed on the microcontroller. 2 Verify that the microcontroller has the correct firmware for a supervised reader (refer to the appropriate microcontroller manual). 3 Try the reader on a different reader input of the microcontroller. If this corrects the problem, the problem is probably in the microcontroller. 4 Replace the reader with a known good reader. If this corrects the problem, return the defective unit for repair. <p>If you have eliminated all of the above possibilities (Steps 1 through 4), there may be a significant electrical noise source present in the installation that is interfering with the reader-to-microcontroller communications. If so, the use of shielded wire for the reader-to-microcontroller connections is recommended.</p>
<p>Reader beeps three short, rapid beeps per half second.</p> <p>Note: Applies to supervised mode only.</p>	<p>Indicates a tamper violation. Verify that the tamper switch is held closed by fastening the reader back to the reader. If this does not correct the problem, return the reader for repair.</p>

Table 2. Troubleshooting (continued)

If you see this:	Explanation/Action:
Beeper is always on.	<ol style="list-style-type: none"> 1 The exit request input will turn the beeper on. If the beeper turns off when the exit request switch is activated, the exit request switch is wired wrong or the exit jumper is incorrect. Verify that the exit request switch is wired correctly and that the exit jumper is correctly placed. If in Model 5029 reader mode, the exit jumper should be removed or placed in the normally open position. 2 In the supervised mode, the microcontroller may command the reader to turn on the beeper. If the beeper is always on, verify that the system has not told the reader to turn on the beeper. Refer to the appropriate system manual for details. 3 Replace the reader with a known good reader. If this corrects the problem, return the defective unit for repair. If the beeper continues to beep, repeat Steps 1 and 2 above.
Yellow LED and/or beeper do not turn on briefly when a badge is swiped.	<p>The yellow LED and the beeper turn on briefly to indicate a valid badge read. Perform the following tests using a known good badge:</p> <ul style="list-style-type: none"> • Swipe a known good badge through the reader. If the yellow LED and the beeper do not turn on briefly, replace the reader with a known good reader. If the replacement reader works correctly, return the defective unit for repair. • If the yellow LED and the beeper do not turn on briefly on the replacement reader, the badge is probably defective.

Table 2. Troubleshooting (continued)

If you see this:	Explanation/Action:
Green LED turns on but the door does not unlock properly. OR Green LED does not turn on and door does not open with a valid badge.	<p>The green LED is turned on by an external source. When the green LED is on, the door strike relay is on.</p> <ol style="list-style-type: none">1 Verify that the door strike is wired correctly and that the relay jumper is set correctly. Be sure the door is locked when the red LED is on.2 Remove the wire from J1 pin 9 and place a jumper wire from J1 pin 9 to ground (J1 pin 1). Verify that the green LED is now on. If the door is unlocked, the reader and door strike are operating correctly. If the door does not unlock, reconnect the wire on J1 pin 9 and proceed to Step 3.3 Remove the wires from J1 pin 6 and J1 pin 4. This disconnects the door strike from the reader. If a fail-safe door strike was used, the door should now be open. If a fail-secure door strike was used, the door should now be locked. Take the two wires that were removed from J1 pin 6 and J1 pin 4 and short them together. Note that the status of the strike has reversed; a fail-secure strike is now unlocked and a fail-safe strike is now locked. If the door strike is working as described above, the reader is defective and should be returned for repair. If the door strike is not working, reconnect the wires and return to Step 1.

Table 2. Troubleshooting (continued)

If you see this:	Explanation/Action:
<p>Reader beeps more than once when a valid badge is presented.</p> <p>Note: Applies to supervised mode only.</p>	<p>The reader beeps and the yellow LED lights briefly each time badge data is sent to the microcontroller. When a badge is swiped, the reader reads the badge and tests to see if the badge was read correctly. If the badge was read correctly, the reader sends the data to the microcontroller and waits approximately 1/3 second for the microcontroller to acknowledge receipt of the badge data. If the microcontroller does not acknowledge receipt of the data, the reader sends the data again until it is acknowledged by the microcontroller. Each time the data is sent, the reader beeps briefly. After the reader has sent the badge data unsuccessfully three times, it will stop trying and sound an error signal (three short beeps). This feature is useful in troubleshooting marginal installations. A high level of electrical interference may cause the reader to make multiple attempts at communications with the microcontroller.</p> <ol style="list-style-type: none">1 If multiple beeps occur regularly, refer to the installation diagrams to verify that the correct pull-up resistor has been added to the microcontroller. In the presence of high electrical noise levels, this pull-up resistor should improve communications, even on short cable runs. If the problem persists, the use of shielded cable is recommended.2 The reader sounds an error signal immediately after a badge is read, if a badge data parity error or an LRC error (message integrity) was detected. If this occurs with known good badges, replace the reader and return the defective unit for repair. If the problem is present on all readers, replace the defective badge.

Regulatory approvals

UL



UL Listed Installations

Specifications for UL compliance are shown below:

- Operating temperature range: +32 F (+0 C) to +120 F (+49 C)
- Relative humidity: 85%
- The Cold Weather Kit was not evaluated by UL.
- The Model 430/435 readers were evaluated by UL for indoor use only.
- Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed on the secure side of the door.
- Using the internal relay of the reader to control/activate the door strike will result in an installation that is not UL compliant.

CE



Manufacturers
Declaration of Conformity
For




Product Identification: 430083001
430083501
Model/type: Model 430
Model 435
Category (description): Magnetic Stripe Reader
Magnetic Stripe Reader+Keypad
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

BOM revision level: K
BOM revision level: K

Concerning	R&TTE		
	EMC	Safety	Radio
A sample of the product has been tested by:	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	
Test report reference	02F477C	02F477I	
Applied standards	EN55022: 1998	EN50130-4(1995) +A1(1998)	

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

☒ Not Applicable ☐ None (class 1 product) ☐  (class 2 product)

Means of Conformity:

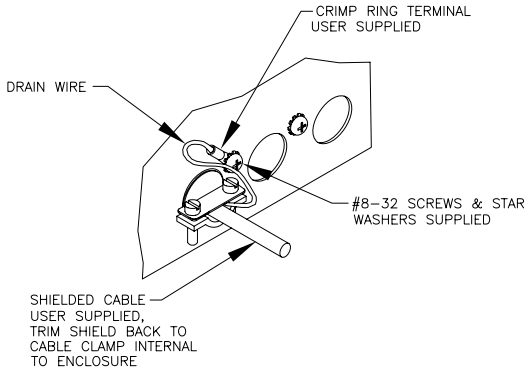
We declare under our sole responsibility that this product is in conformity with Directive 93/68/EEC (Marking) and/or complies with the essential requirements and all other relevant provisions of the 1999/5/EC (R&TTE) based on test results using harmonized standards in accordance with the Directives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

CE/FCC compliance

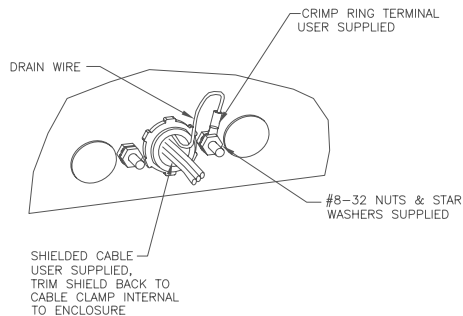
To make the Model 430/435 reader installation CE and FCC compliant, the cable connecting the reader to the micro must have its shield grounded at the micro, according to one of the methods specified in the figures below.

Note: Do not make shielded connections at the reader.

*Figure 9. Typical installation (Internal to the micro)
Using shielded cable/drain wire*



*Figure 10. Typical installation (External to the micro)
Using shielded cable/drain wire*



Notes

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