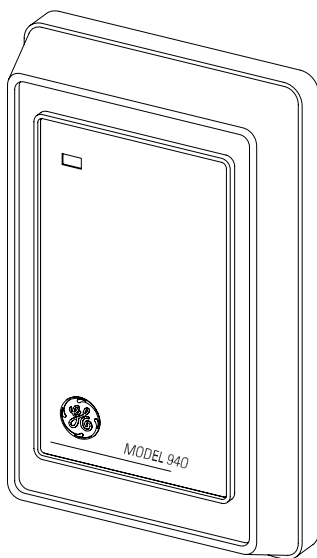


Model 940 Proximity Reader Installation Manual



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Regulatory



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Introduction

This manual is an installation guide for the GE Model 940 proximity reader which features two-state supervision that continuously monitors for closed and open circuit conditions at door contacts and request to exit (REX) connections. An internal tamper switch automatically alerts security personnel if the reader is violated. This supervision ensures that security personnel are immediately notified if someone tampers with the reader or a door is breached. Upon an alert, the reader is taken off-line to prevent a breach at that access point.

This GE proximity card reader also offers expanded hassle-free contactless convenience when entering and exiting secure facilities. A new reader optimization technology automatically adjusts to a wide range of installation environments to provide consistent read range performance no matter where or on what the reader is mounted. It automatically detects and optimizes the credential read field, even in challenging environments with metal surfaces. By optimizing the GE 940 proximity card reader, to any metal or non-metal environment, cardholders experience consistent reader performance, regardless of location or environment.

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 Model 940 Proximity Perfect™ reader combines the convenience of contactless proximity technology with flexibility of operation.

The GE Model 940 Reader offers:

- State-of-the-art architecture.
- The ability to read all ISO ProxLite™, ProxLite, and Entrée badges and key tags.¹
- Supervised F/2F communications with 2-state Door/REX supervision.
- Unsupervised F/2F communications.
- 40-bit Wiegand (4001 and 4002) format output.
- Reader to micro cable lengths up to 3,000 feet (914.4 meters).
- Weather-resistant housing for outdoor use.
- 12 VDC operation.
- A clear, logical user interface with tri-color LED and beeper.
- Rugged molded ABS construction with backplate.
- Cover removal and off-the-wall tamper detection.

1. The new Model 940 reader (single LED) does not support Proximity Perfect cards.

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 Micro/PX-2000 Micro/PXN-2000 M2000PXNplus M3000PXNplus
Micro firmware	<ul style="list-style-type: none"> For Micro/5-PX, Micro/5-PXN, Micro/PX-2000 and Micro/PXN-2000: Secure Perfect: 3.1.0.6 or later Picture Perfect: 1.7.0 or later
Badge and keytag formats	<ul style="list-style-type: none"> CASI ProxLite Entrée ISO ProxLite <p>Note: Proximity Perfect credentials, which were discontinued in 2001, are not supported.</p>

Technical specifications

For UL compliant installation notes, refer to *UL listed installations* on page 26

Operating temperature range	-31 F (-35 C) to +150 F (+66 C)
Relative humidity	5% to 95% (non-condensing)
Physical dimensions (HxWxD)	4.75" (121 mm) x 2.9" (74 mm) x 0.90" (23 mm)
Index of protection	IP51
Input voltage range	10 to 15 VDC (measured at the reader)
Reader power consumption	85 mA @ 12 VDC or 95 mA @ 15 VDC
Cable specifications	Belden 8725 or equivalent, 20 AWG minimum, shielded pairs
Maximum cabling distance ^a	3000 ft (914 m) @ 12 VDC with 20 AWG cable
Read range	ProxLite: up to 6 inches ISO ProxLite: up to 5 inches ProxLite Keytag: up to 3 inches
Operating modes	Supervised F/2F Unsupervised F/2F ^b Wiegand 40-bit ^b
Agency approvals	FCC Class A CE

a. The maximum cabling distance of 3,000 ft (914.4 meters) is influenced by a number of factors including wire gauge and reader power requirements.

b. Operating the reader in this mode, requires a programming card for set up. Refer to "*Configuring the reader*" on page 12 for more information.

Parts list

- Model 940 Reader with backplate (gray or black)
- Optional installation wrench

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

Installation overview

The following steps are general instructions for installing the 940 reader. Each step is explained in further detail in the sections that follow.

1. Mount the reader.
Refer to "Mounting the reader" on page 8.
2. Configure the reader
Refer to "Configuring the reader" on page 12.
3. Connect the reader.
Refer to "Connect the reader to the micro" on page 13.
4. Test the reader.
Refer to "Testing the reader" on page 22.

Mounting the reader

The reader comes with a backplate suitable for mounting directly onto standard U.S. electrical gang boxes. The reader may also be mounted directly onto a hollow wall.

Important:

- Readers should not be mounted within three feet of a computer terminal. Some terminals radiate electrical noise that may reduce the effective maximum read range.
- An installer-supplied gasket should be used to form a weather-resistant seal between the mounting surface and the inside of the reader for outdoor installations. The gasket should be located on the inside surface of the reader's plastic backplate. For outdoor installations, where the reader is mounted in direct exposure to weather, a bead of silicone caulking should be applied between the reader and the wall to prevent water from entering the back of the reader.

Off-the-wall tamper feature: The readers are equipped with an off-the-wall tamper feature.

- To activate this feature, remove the key on the backplate prior to mounting as shown in [Figure 1](#).
- To mount the reader, in addition to the standard gang box or direct wall mounting instructions, see [Figure 2](#).

Note: In order for this feature to work properly, the reader mounting surface must be flush with the backplate.

For Gang Box mounting instructions, see [Figure 3](#).

For Direct Wall mounting instructions, see [Figure 4](#).

Figure 1. Off-the-wall tamper activation

To activate the off-the-wall tamper feature, remove the key on the backplate prior to mounting.

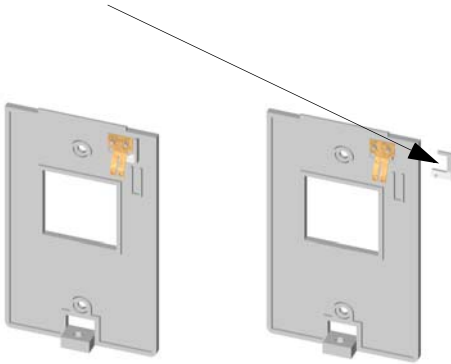
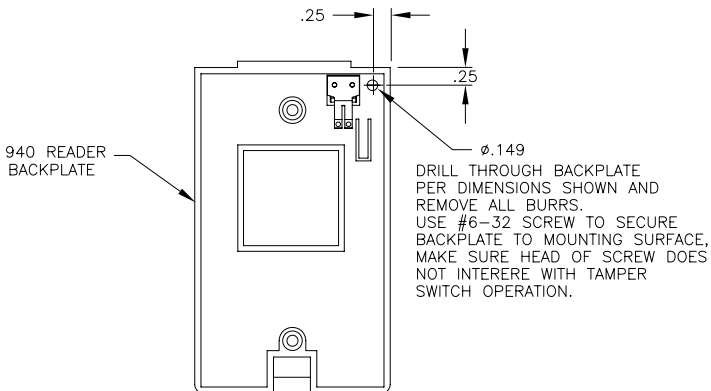
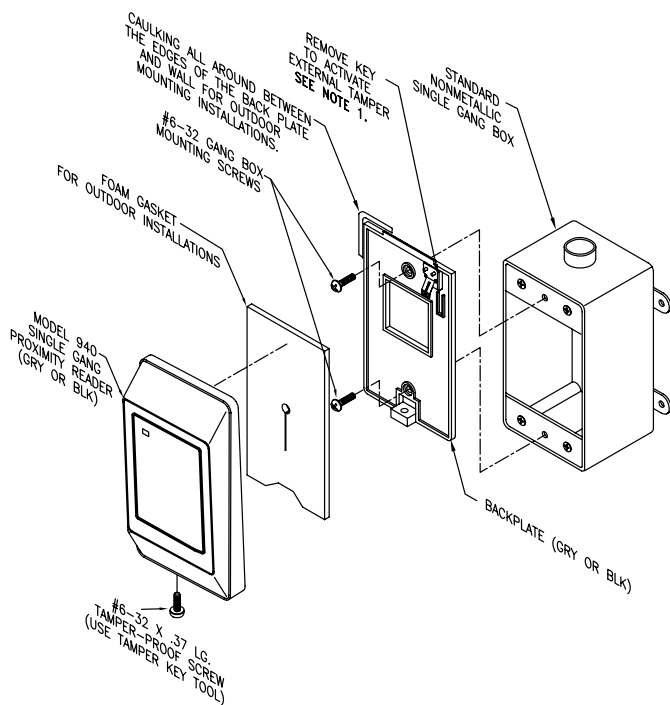


Figure 2. Recommended additional mounting instructions for off-the-wall tamper switch activation



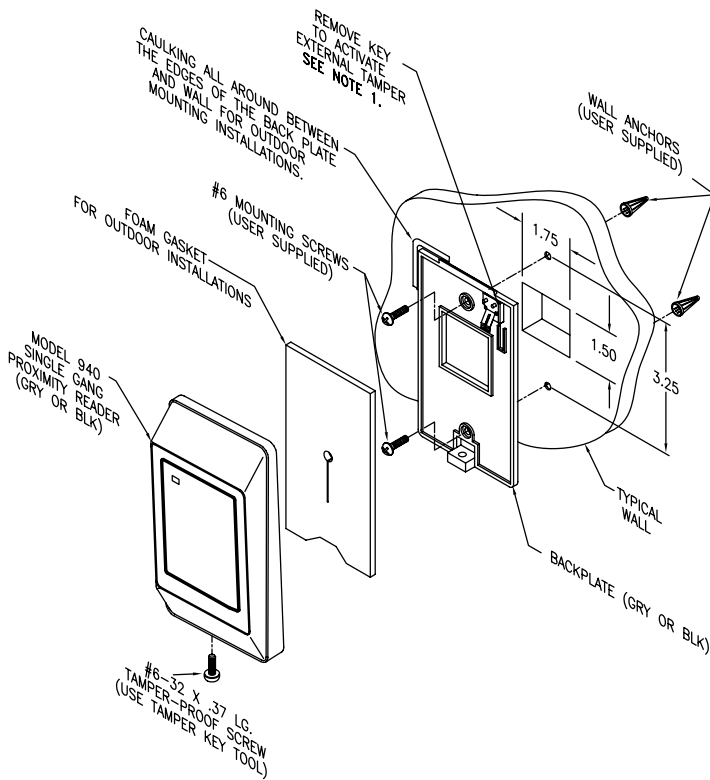
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Figure 3. Model 940 reader - Gang box mounting



NOTES: 1. READER MOUNTING SURFACE MUST BE FLUSH WITH BACKPLATE FOR THIS FEATURE TO FUNCTION PROPERLY. IN ADDITION, IT IS RECOMMENDED THAT ANOTHER MOUNTING SCREW BE INSTALLED IN THE TOP RIGHT CORNER OF THE BACK PLATE TO PREVENT FALSE TAMPER ALARMS (TRAVEL OF SWITCH IS ONLY 1/16" [1.6MM]). REFER TO EXTERNAL TAMPER FEATURE SECTION FOR ADDITIONAL INSTRUCTIONS AND A MOUNTING DIAGRAM DISPLAYING HOLE SIZE AND LOCATION.

Figure 4. Model 940 reader - Direct wall mounting



NOTES: 1. READER MOUNTING SURFACE MUST BE FLUSH WITH BACK PLATE FOR THIS FEATURE TO FUNCTION PROPERLY. IN ADDITION, IT IS RECOMMENDED THAT ANOTHER MOUNTING SCREW BE INSTALLED IN THE TOP RIGHT CORNER OF THE BACK PLATE TO PREVENT FALSE TAMPER ALARMS (TRAVEL OF SWITCH IS ONLY 1/16" [1.6MM]). REFER TO EXTERNAL TAMPER FEATURE SECTION FOR ADDITIONAL INSTRUCTIONS AND A MOUNTING DIAGRAM DISPLAYING HOLE SIZE AND LOCATION.

Configuring the reader

Supervised F/2F

For supervised F/2F operation, no further configuration is required.

Unsupervised F/2F or Wiegand 4001

For unsupervised F/2F or Wiegand 40-bit format output, you must configure the reader using the Reader Configuration Card Kit. Refer to the documentation included in the kit for detailed instructions. The kit can be ordered at no cost from the GE Security price list.

Connect the reader to the micro

The Model 940 Reader is supplied with a convenient removable 9-pin connector as shown in [Figure 5](#) below.

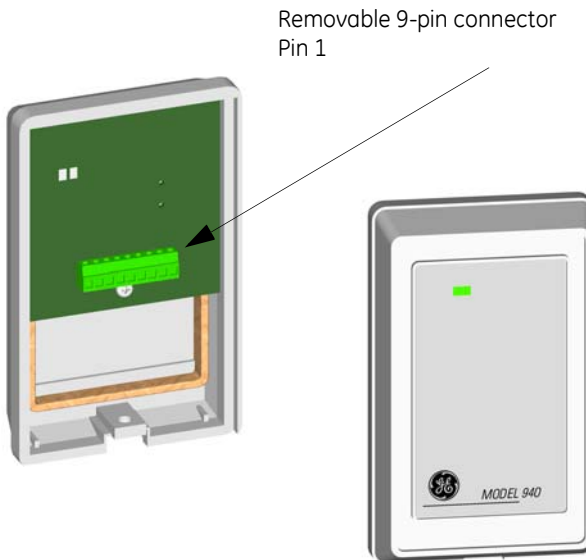
Refer to the following sections for more information on connecting the reader:

- ["Pinouts" on page 14](#)
- ["Wiring diagrams" on page 15](#)
- ["CE/FCC compliance" on page 25](#)



WARNING: It is important to ensure all connections are made prior to applying power.

Figure 5. Model 940 Reader



Pinouts

The table below shows the pinouts for connecting the reader to the microcontroller. Connector J1, pin 1 is to the right as you view the connector from behind the reader. See [Figure 5, "Model 940 Reader," on page 13](#).

Table 1. Pinouts

Connector J1 Pin number	Signal
1	Wiegand Data 0
2	F/2F Data 1 or Wiegand Data 1
3	DO connection for green LED
4	Ground
5	+12 VDC
6	Reserved
7	Reserved
8	REX DI (Exit Request Button) ^a
9	Door DI (Door Contact Switch)

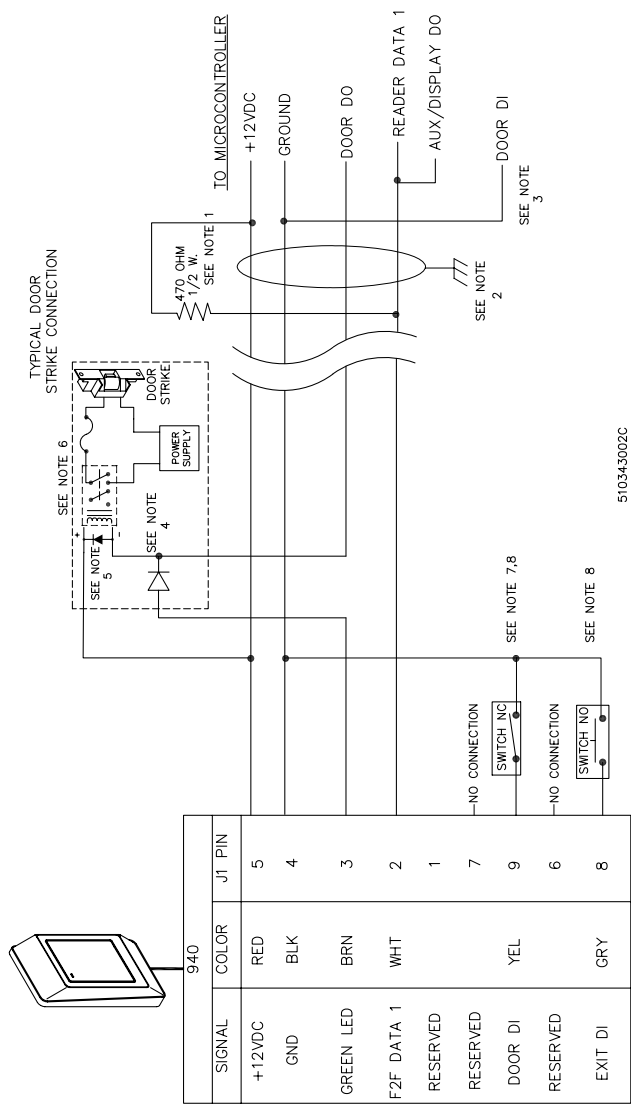
a. Refer to "UL listed installations" on page 26.

Wiring diagrams

See the following wiring diagrams for details on connecting the reader to the microcontroller:

- *"Supervised F/2F wiring diagram" on page 16.*
- *"Unsupervised F/2F wiring diagram" on page 18.*
- *"Wiegand wiring diagram" on page 20.*

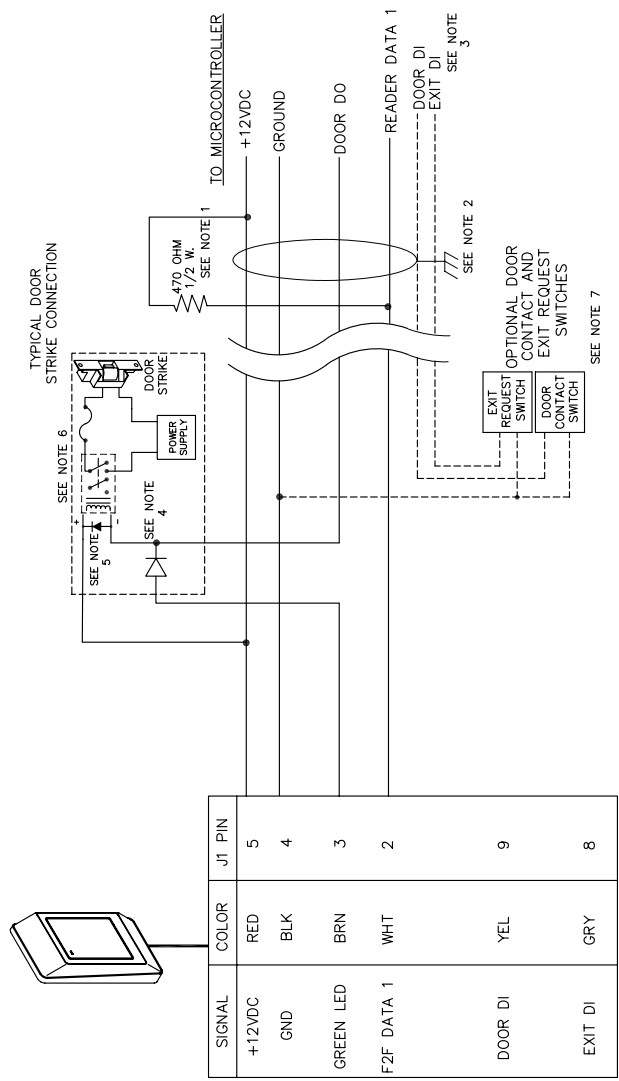
Figure 6. Supervised F/2F wiring diagram



Note:

- 1 A 470 ohm, 1/2W, pull-up resistor may be required between +12 VDC and READER DATA 1. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate microcontroller manual for installation requirements.
- 2 Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader.
- 3 Refer to the appropriate microcontroller manual to determine whether this connection is required for proper door switch operation.
- 4 Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed in a secure location, not accessible through the reader removal.
- 5 Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
- 6 Fuse, power supply, door strike, diodes, and relay are provided by the installer.
- 7 If the door contact switch is not used, connect reader pin 9 directly to ground.
- 8 Request to exit (REX) terminals on the reader are not to be connected for UL listed installations.

Figure 7. Unsupervised F2F wiring diagram

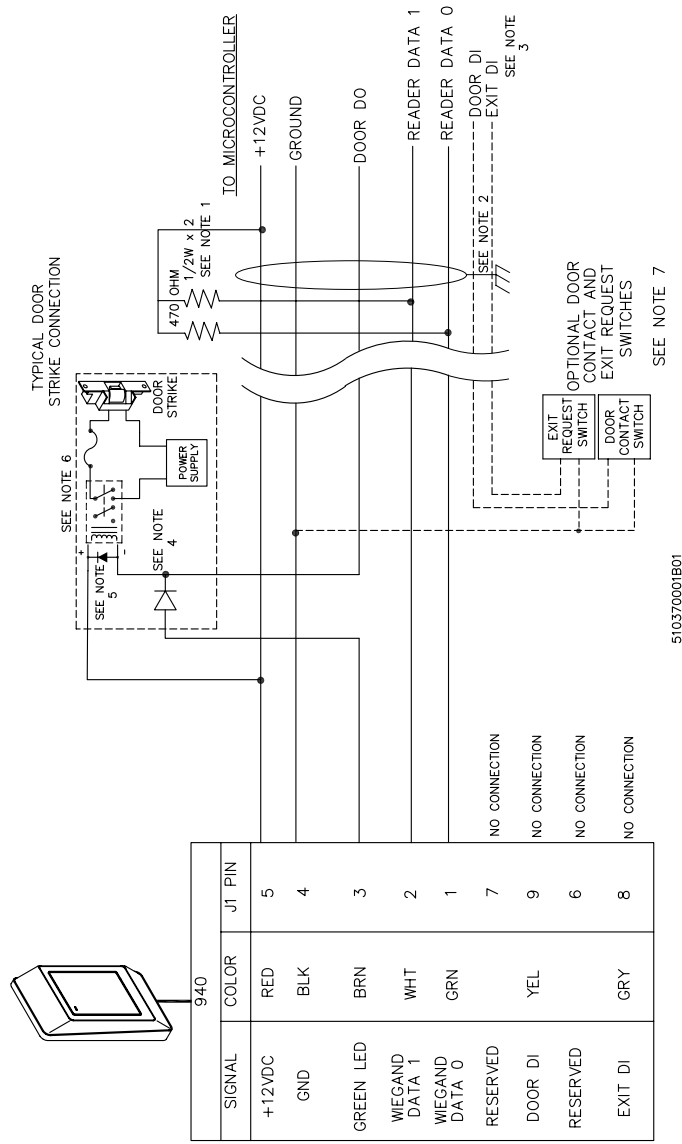


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Note:

- 1 A 470 ohm, 1/2W, pull-up resistor may be required between +12 VDC and READER DATA 1. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate microcontroller manual for installation requirements.
- 2 Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader.
- 3 Refer to the appropriate microcontroller manual for specific wiring details.
- 4 Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed in a secure location, not accessible through the reader removal.
- 5 Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
- 6 Fuse, power supply, door strike, diodes, and relay are provided by the installer.
- 7 Request to exit (REX) terminals on the reader are not to be connected for UL listed installations.

Figure 8. Wiegand wiring diagram



Note:

- 1 Two 470 ohm, 1/2W, pull-up resistors may be required between +12 VDC and READER DATA 1 and DATA 0. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate microcontroller manual for installation requirements.
- 2 Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader. Do not pair Wiegand DATA 1 and DATA 0.
- 3 Refer to the appropriate microcontroller manual for specific wiring details.
- 4 Blocking diode may be type 1N5817 or GE part number 521224001 (included with reader). The diode must be installed in a secure location, not accessible through the reader removal.
- 5 Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
- 6 Fuse, power supply, door strike, diodes, and relay are provided by the installer.
- 7 Request to exit (REX) terminals on the reader are not to be connected for UL listed installations.

Testing the reader

Follow the steps below to verify that the reader is working correctly.



WARNING: It is important to ensure all connections are made prior to applying power.

1. Check the following:
 - Proper cabling and electrical connections exist between the reader and the microcontroller.
 - The microcontroller is properly configured and the proper version of firmware is installed.
 - The reader is properly mounted.
2. Close the tamper switch by joining the reader and backplate so that the tamper alarm is not activated or by ensuring the reader is securely mounted.
3. Apply power to the reader and verify that the power-on self test completes as described in the section ["Indicators" on page 23](#).
4. Verify that the reader is not beeping and that the red LED is not flashing. If either of these two conditions exist, refer to the section ["Indicators" on page 23](#).
5. 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.
 - b. Ensure that the door is closed and latched. This is the first step to verify that the reader strike relay is wired properly.

- c. Present a card to the reader. Observe that the reader behaves as described in the section "[Indicators" on page 23](#).
- d. Observe that the green LED turns on, indicating a valid access has been granted by the host.
- e. Open the door. This verifies that the reader strike relay operates properly.

Indicators

A tri-color LED (red, yellow, and green), and a beeper are incorporated into the reader and operate as indicated in the following table:

Table 2. Indicators

Condition	Standard indicators
Power-on Self Test	Red LED flashes, Yellow LED flashes, Green LED flashes
Reader Ready	Yellow LED on continuously
Badge Read	Yellow LED flashes briefly, 1 short beep
Valid Access	Green LED on until door strike is deactivated
Loss of Communication (Supervised)	Red LED flashes slowly, every 2 seconds, 3 short beeps every 30 seconds
Tamper (Supervised mode)	Red LED flashes quickly (every 400 ms), 3 short beeps every 30 seconds
Alarm State	Red LED may be turned on and off and the beeper may be sounded by the microcontroller, to indicate an alarm state. Consult the appropriate Access Control manual for details on this operation.

Regulatory approvals

CE



Manufacturers Declaration of Conformity For



Product Identification: 430084001/2
Model/type: Model 940 BOM revision level :T
Category (description): Proximity Reader
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:	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Test report reference	03F375I	03P375	03F375C
Applied standards	EN50130-4(1998)	EN60950 (2000)	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.

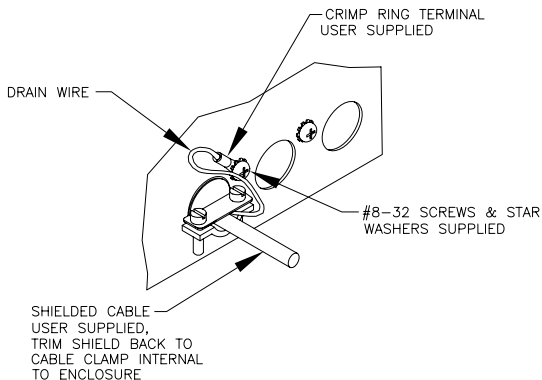
Notice: Not approved for use in Greece.

CE/FCC compliance

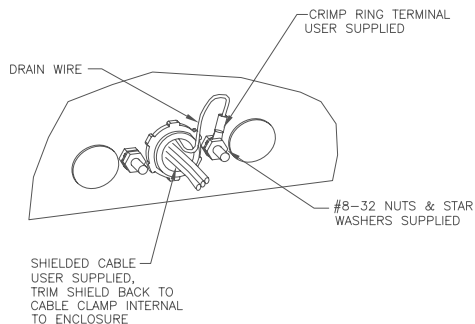
To make the Model 940 Reader installation CE and FCC compliant, the cable connecting the reader to the micro must have its shield grounded at the micro, according to one of the methods specified in the figures below.

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*



UL

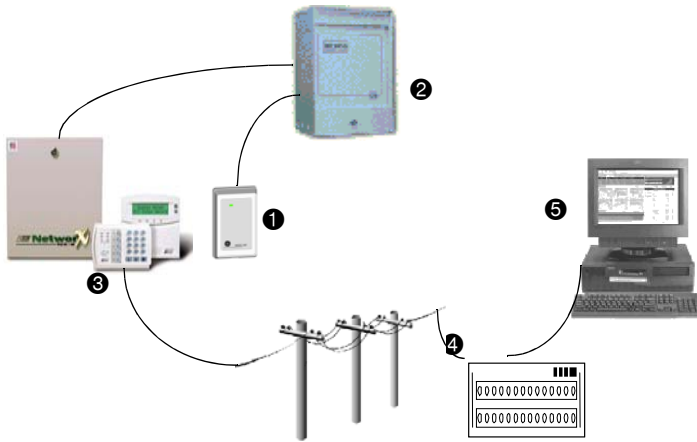


UL listed installations

The following are the results of the UL evaluation of the Model 940 reader:

- Operating Temperature Range: +32 F (+0 C) to +120 F (+49 C)
- Relative Humidity: 85%
- The Model 940 reader was evaluated by UL for indoor use only.
- Request to exit (REX) terminals on the reader are not to be connected for UL listed installations.
- The Model 940 reader, used in conjunction with Picture Perfect and an OH Receiver, can be used as a Proprietary Burglar Alarm Unit Accessory when configured as shown in [Figure 11](#).

Figure 11. Proprietary burglar alarm unit accessory configuration



- ❶ Model 940 Reader: See Figure 6, [Supervised F/2F wiring diagram](#) on page 16 for wiring the Model 940 to the Micro/5.
- ❷ Micro/5: See the Micro/5 Installation Manual and the NX-8E Control Panel Installation and Startup Manual for wiring the Micro/5 to the NX-8E keypad.
- ❸ NX-8E panel: Connect to the OH2000E Receiver using a dial-up connection.
Note: The NX-8E keypad must be installed adjacent to the Model 940 reader in order to be UL compliant.
- ❹ OH2000E Receiver: Connect to the Picture Perfect server, using a serial line RS-232 connection.
Note: The OH2000 E receiver must be installed adjacent to the Picture Perfect host in order to be UL compliant.
- ❺ Picture Perfect Server running one or more instances of the oh_receiver interface.

Notes

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