

GE  
Entellisys™ Low Voltage Switchgear

# Device Replacement Guide



# DEH-234

## Warnings, Cautions, and Notes as used in this publication

### Warnings

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**WARNING!** Warning notices are used in this publication to emphasize that hazardous voltages, currents, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.

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### Cautions

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**CAUTION:** Caution notices are used for situations in which equipment might be damaged if care is not taken.

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### Notes

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**NOTE:** Notes call attention to information that is especially significant to understanding and operating the equipment.

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This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described in here that are not present in all hardware and software systems. GE Consumer & Industrial assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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## How to contact us

Please have your Entellisis System Summary # and Sub # ready when calling. This information can be found on the Entellisis HMI on the **System Health** screen by clicking the **Job Info** button.

Post Sales Service

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## 1.1 Removing the side and horizontal-mount chassis

1. Prepare for the shut down of the CPU by setting the remaining CPU in the system as the default. (On the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)

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**WARNING!** Voltages hazardous to personnel are present.

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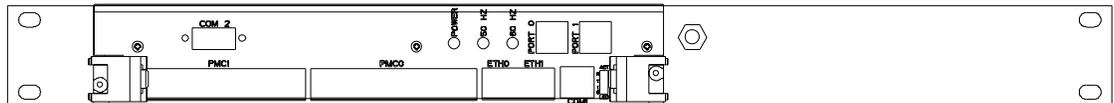
2. Open the instrument compartment. On the chassis to be removed, turn the power off using the switch located at the rear of the chassis. When the chassis is powered off, the CPU indicators do not light.

**Figure 1-1** CPU rear



3. On the CPU to be removed, disconnect the two Ethernet cables from ETH0 and ETH1 and one synch clock cable from PORT 1 or COM 2, making note to which port each is connected.

**Figure 1-2** CPU front



4. At the rear of the chassis, remove the 2-pin connector plug by depressing the tab and sliding the plug out of the socket.
5. Remove the four mounting bolts and star washers at the front of the chassis.
6. Slide the chassis outward 1 to 2 inches.
7. Remove the 120 Vac power cable at the rear of the chassis by pulling it out of its socket.
8. Remove the chassis from the mounting bracket.

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**WARNING!** Voltages hazardous to personnel and equipment are present—be careful not to contact the energized terminal blocks on the compartment walls.

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1

Figure 1-3 Side-mounted chassis

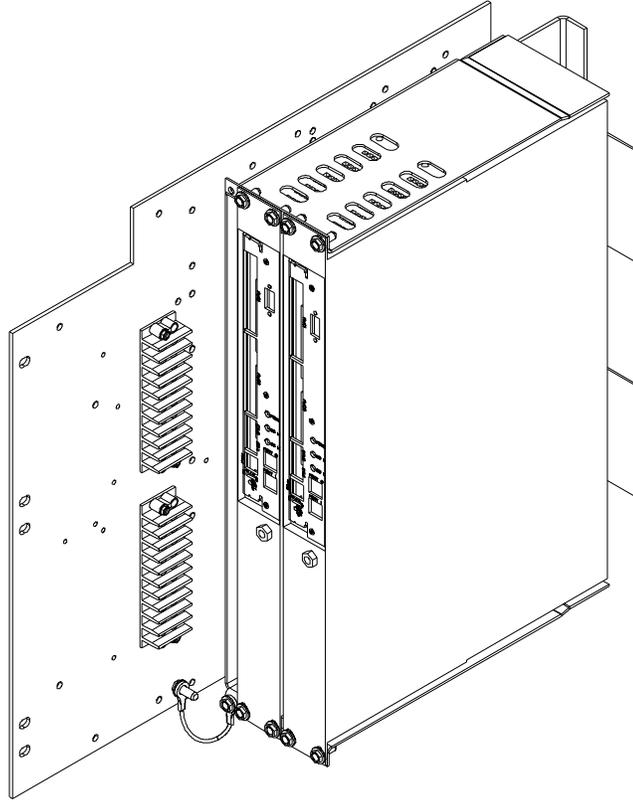
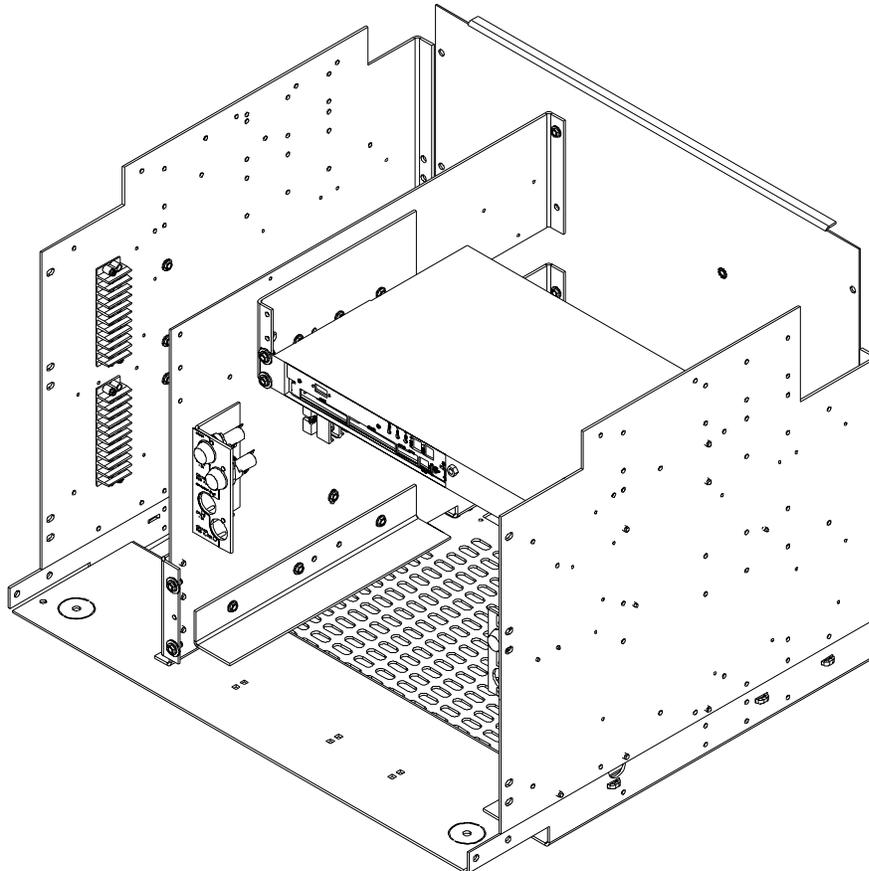


Figure 1-4 Horizontally mounted chassis



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## 1.2 Installing the side and horizontal-mount chassis

1. Make sure the power switch at the rear of the chassis is in the OFF position.
2. Locate the 120 Vac power socket and 2-pin 12 Vdc socket at the rear of the chassis.
3. Partially insert the chassis into the mounting bracket.

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**WARNING!** Voltages hazardous to personnel and equipment are present—be careful not to contact the energized terminal blocks on the compartment walls.

---

4. Install the 120 Vac power cable by pushing it firmly into the socket.
5. Connect the 2-pin plug by inserting it into the socket until it clicks into place.
6. Slide the chassis into the mounting bracket until the chassis mounting ears contact the bracket tabs.
7. Install four mounting bolts and star washers into the mounting ears and bracket tabs.
8. Reconnect the two Ethernet cables into the CPU card according to the markings on the cable ends and as noted in the removal process above.
9. Reconnect the synch clock cable to PORT 0 (CPU A) or to COM 2 (CPU B).
10. Turn on power to the CPU and chassis using the power switch. The indicators at the front of the CPU should light.
11. Close the instrument compartment.
12. When the CPU has completed booting, verify its operation from the HMI's System Health screen. At this time it may be desired to set the replaced CPU as the system default. (From the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)

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## 1.3 Removing the rear-mount front-most chassis

1. Prepare for the shut down of the CPU by setting the remaining CPU in the system as the default. (From the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)

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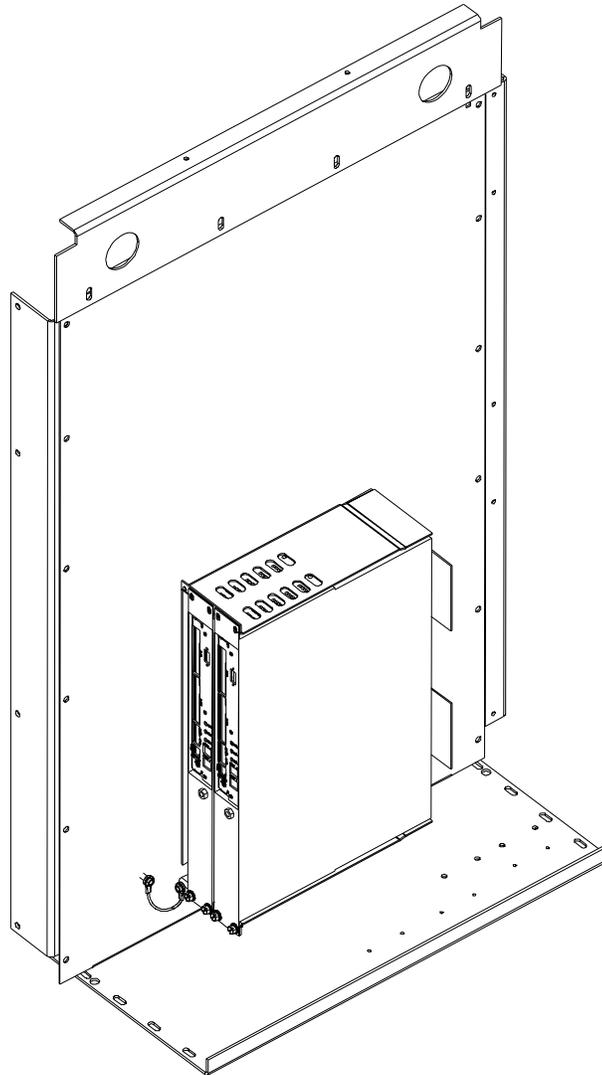
**WARNING!** Voltages hazardous to personnel are present.

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2. Open the instrument compartment. Turn off power using the switch at the rear of the front-most chassis. When the chassis is powered off, the CPU indicators do not light.
3. Disconnect the two Ethernet cables and one synch clock cable from the CPU, making note to which port each is connected.
4. At the rear of the chassis, remove the 2-pin connector plug by depressing the tab and sliding the plug out and away from the chassis.

Figure 1-5 Rear-mounted chassis

1



5. Remove the mounting bolts and star washers from the front-most chassis.

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NOTE: Do not remove any mounting hardware from the rear chassis.

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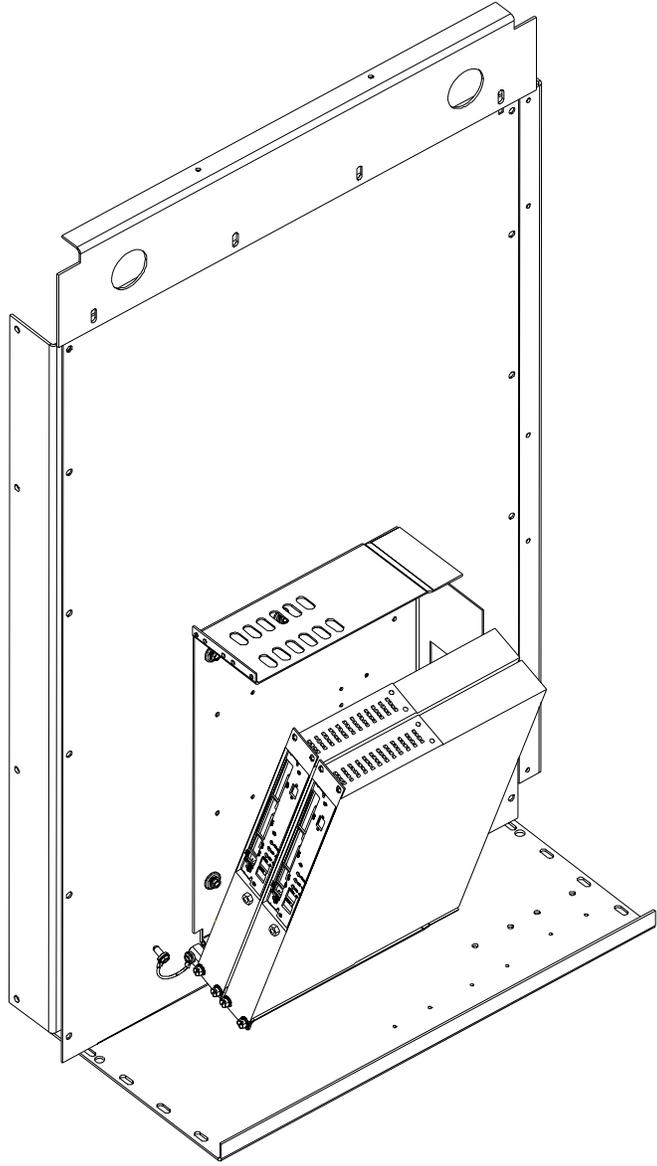
6. Remove the 120 Vac power cable by pulling it out of its socket.
7. Pull the chassis out of the mounting bracket.

---

**WARNING!** Voltages hazardous to personnel and equipment are present—be careful not to contact the energized terminal blocks on the compartment walls.

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Figure 1-6 Rear-mounted chassis, tilted forward



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## 1.4 Installing the rear-mount front-most chassis

1. Make sure that the power switch at the rear of the chassis is in the OFF position.
2. Locate the 120 Vac power socket and the 2-pin 12 Vdc socket at the rear of the chassis.
3. Insert the replacement chassis into the mounting bracket.

---

NOTE: Do not remove any mounting hardware from the rear chassis.

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**WARNING!** Voltages hazardous to personnel and equipment are present—be careful not to contact the energized terminal blocks on the compartment walls.

---

4. Install the 120 Vac power cable by pushing it firmly into the socket.
5. Connect the 2-pin plug by inserting it into the socket until it clicks into place.
6. Install four mounting bolts and star washers into the chassis tab holes. Make sure they are fully tightened.
7. Re-connect the two Ethernet cables into the CPU card according to the markings on the cable ends.
8. Reconnect the synch clock cable to PORT 0 (CPU A) or to COM 2 (CPU B).
9. Turn on power to the CPU and chassis using the power switch. The indicators at the front of the CPU should light.
10. Close the instrument compartment.

When the CPU has completed booting, verify its operation from the HMI's System Health screen. At this time it may be desired to set the replaced CPU as the system default. (From the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)

---

## 1.5 Removing the rear-mount rear-most chassis

1. Prepare for the shut down of the CPU by setting the remaining CPU in the system as the default. (From the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)

---

**WARNING!** Voltages hazardous to personnel are present.

---

2. Open the instrument compartment. Turn off power using the switch at the rear of the rear-most chassis. When the chassis is powered off, the CPU indicators do not light.
3. Disconnect the two Ethernet cables and one synch clock cable from the CPU, making note to which port each is connected.
4. At the rear of the chassis, remove the 2-pin connector plug by depressing the tab and sliding the plug out and away from the chassis.
5. Remove the four mounting bolts and star washers at the tops of both chassis.

6. Tip each chassis outward, pivoting on the hinge at the bottom of the mounting bracket. Do not allow the wiring to support the chassis.
7. Remove the remaining two mounting bolts and star washers from the rear-most chassis.
8. Remove the 120 Vac power cable by pulling it out of its socket.
9. Pull the rear-most chassis out of the mounting bracket.

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**WARNING!** Voltages hazardous to personnel and equipment are present. Be careful not to contact the energized terminal blocks on the compartment walls.

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## 1.6 Installing the rear-mount rear-most chassis

1. Make sure that the power switch at the rear of the chassis is in the OFF position.
2. Locate the 120 Vac power socket and the 2-pin 12 Vdc socket at the rear of the chassis.
3. Tip the front-most chassis outward, pivoting on the hinge at the bottom of the mounting bracket. Do not allow the wiring to support the chassis.
4. Insert the replacement chassis into the mounting bracket.

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**WARNING!** Voltages hazardous to personnel and equipment are present—be careful not to contact the energized terminal blocks on the compartment walls.

---

5. Install the 120 Vac power cable by pushing it firmly into the socket.
6. Connect the 2-pin plug by inserting it into the socket until it clicks into place.
7. Install two mounting bolts and star washers into the replacement chassis tabs nearest the bracket hinge.
8. Tip the chassis back into the vertical position. Hold down the cables at the rear of each chassis to avoid snagging them on the stationary portion of the mounting bracket.
9. Install four mounting bolts and star washers into the chassis tab holes opposite the bracket hinge. Make sure they are fully tightened.
10. Reconnect the two Ethernet cables into the CPU card according to the markings on the cable ends.
11. Reconnect the synch clock cable to PORT 0 (CPU A) or to COM 2 (CPU B).
12. Turn on power to the CPU and chassis using the power switch. The indicators at the front of the CPU should light.
13. Close the instrument compartment.
14. When the CPU has completed booting, verify its operation from the HMI's System Health screen. At this time it may be desired to set the replaced CPU as the system default. (From the **Main Menu**, click **User Settings**, and then click **HMI Preferences**.)



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**WARNING!** Disconnecting an EntelliGuard Messenger removes overcurrent protection and centralized control from its associated circuit breaker frame. Other EntelliGuard Messenger and circuit breaker frames will continue to function normally as long as control power is maintained.

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## 2.1 Removing the Messenger from the switchgear compartment

1. Place the equipment into Reduced Let-Thru Mode by logging into the HMI under an account with Administrative privilege.
2. On the **Main Menu**, click the **Reduced Let-Thru Mode** button.
3. Click the **Enable** button on the **Reduced Let-Thru Mode** screen, and then click **OK**.
4. Ensure the PPE (Personal Protective Equipment) is appropriate for opening and removing a circuit breaker from the gear.
5. Open the circuit breaker (immediately under the Messenger) that you intend to replace. Check that the circuit breaker flag, Messenger faceplate, and HMI indicate that the circuit breaker is open.
6. Rack the circuit breaker out to the “Disconnect” position.

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**NOTE:** Closing springs will discharge during the rack out procedure if the circuit breaker is charged; however, the circuit breaker will remain in the open position.

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**WARNING!** Verify the circuit breaker position indicator and HMI indicate that the circuit breaker is in the “disconnect” position.

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7. Open the compartment door.
8. In compartments for electrically operated circuit breakers, remove the charge motor, close coil, and shunt trip fuses at the upper left side of the compartment
9. In compartments for circuit breakers with a network interlock accessory, remove the set and reset fuses at the upper right side of the compartment
10. Under the Messenger and to the right, locate one blue 30-pin plug and one configuration plug. At the left of the Messenger, locate one blue 12-pin plug and two Ethernet cables (A and B).

Figure 2-1 Right-hand underside of Messenger

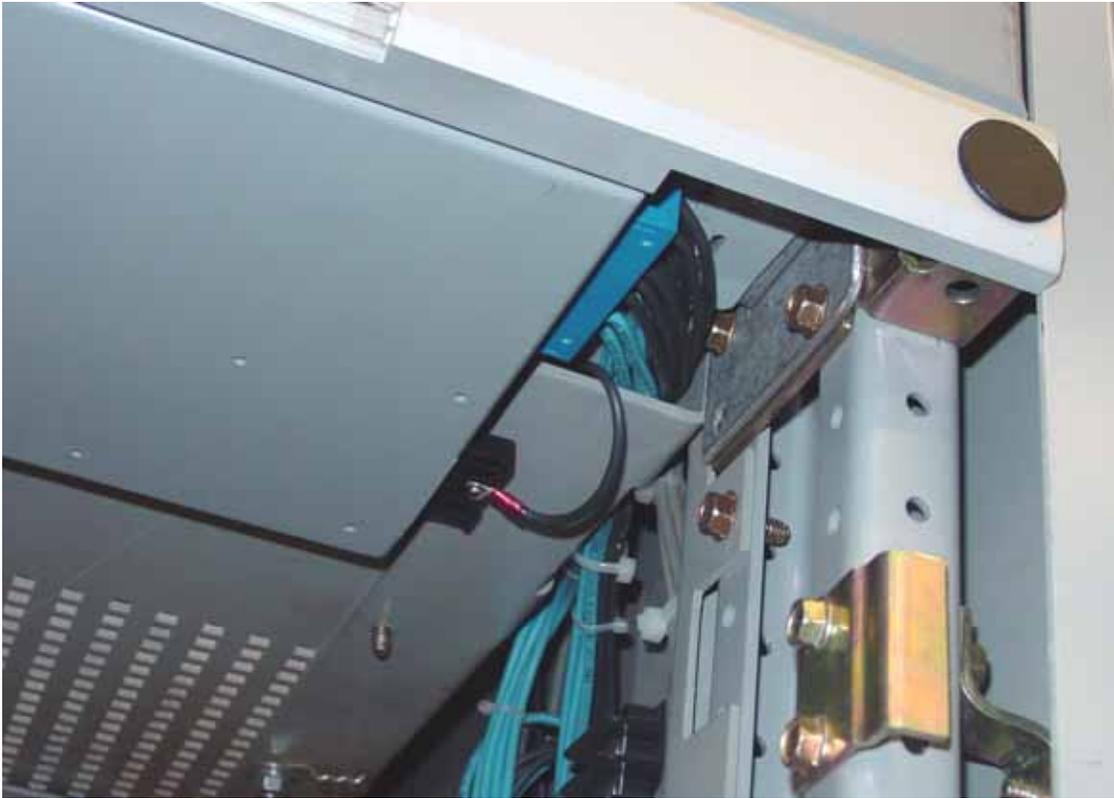


Figure 2-2 Left-hand underside of Messenger



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**WARNING!** The 30-pin plug contains 120 Vac control power connections. Avoid physical contact with the connector pins.

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11. Disconnect the 30-pin plug by first depressing the side tabs and then pulling the plug out of the Messenger.
12. Disconnect the configuration plug by first depressing the side tabs and then pulling the plug out of the Messenger.
13. Note the relative positions of each Ethernet cable. Disconnect the two cables by first depressing the tab at the top of the connector and then pulling the connector out of the Messenger.

---

**WARNING!** The 12-pin plug can contain 18 Vac PT connections depending on system configuration. Avoid physical contact with the connector pins.

---

14. Disconnect the 12-pin plug by first depressing the side tabs and then pulling the plug out of the Messenger.
15. At the Messenger faceplate, record the Rating and Setting rotary switch positions. These will be needed to set the replacement unit.
16. At the Messenger faceplate, remove the two round plastic caps to expose the mounting screws.
17. Completely remove the two mounting screws.
18. Using both hands, carefully pull the Messenger out and away from the front of the switchgear compartment so as not to disturb any wiring and then remove it from the compartment.

## 2.2 Replacing the Messenger faceplate

2

1. Open the clear window on the faceplate by depressing the top-center tab.

**Figure 2-3** Faceplate with window opened



2. Completely remove the two screws.
3. Carefully pull the faceplate from the original Messenger.

**NOTE:** To avoid mismatching the faceplates to their respective compartments, remove only one Messenger and faceplate from the switchgear at a time.

4. Place the faceplate over the front of the new Messenger housing. Align the two screw holes, two knobs, and plug opening in the faceplate with the corresponding holes, knobs, and plug on the Messenger housing.
5. Install the two screws through the faceplate into the Messenger housing. Gently tighten the two screws.
6. At the Messenger faceplate, set the Rating and Setting rotary switch positions to the previously recorded value.
7. Close the plastic window.

---

## 2.3 Installing the Messenger

1. Ensure that PPE is appropriate for installing and closing a circuit breaker and that the equipment is still in Reduced Let-Thru Mode.
2. Open the door of the circuit breaker compartment located immediately below the Messenger opening.
3. Place the tabs at the sides of the Messenger housing onto the mounting rails in the compartment.
4. Slide the Messenger into the compartment until the rear of the faceplate has contacted the switchgear hinge blocks, being careful to not disturb any wiring.
5. Fasten the faceplate to the hinge blocks with the two mounting screws.
6. Replace the two round plastic caps over the mounting screws.

---

**WARNING!** The 12-pin plug can contain 18 Vac PT connections depending on system configuration. Avoid physical contact with the connector pins.

---

7. Install the 12-pin plug into the corresponding socket at the left of the Messenger. The plug's side tabs should lock the connector into place and prevent removal.
8. Check for proper installation by gently tugging on the 12-pin plug.
9. Re-connect the two Ethernet cables into the sockets at the left of the Messenger in the same positions they were originally installed in. The tab of the Ethernet cables should lock the connectors into place and prevent removal.
10. Check for proper installation by gently tugging on each Ethernet cable.
11. Install the configuration plug at the right of the Messenger by inserting the plug housing into the socket until the side tabs click into place.
12. Check for proper installation by gently tugging on the plug housing.

---

**WARNING!** The 30-pin plug contains 120 Vac control power connections. Avoid physical contact with the connector pins.

---

13. Install the 30-pin plug into the corresponding socket at the right of the Messenger. The side tabs should lock the plug into place and prevent removal.
14. Check for proper installation by gently tugging on the 30-pin plug.
15. Check to ensure the Messenger power and communication indicators illuminate.
16. In compartments for circuit breakers with a network interlock device, install the 10A set and reset fuses in the fuse holders at the upper right of the compartment.
17. In compartments for electrically operated circuit breakers, install the 20A charge motor, 15A close coil, and 10A shunt trip fuses into the fuse holders at the upper left of the compartment.
18. Check the wire bundles at the sides of the Messenger. The wire bundles should not obstruct the circuit breaker as it enters or exits the compartment. Any extra wire length may be gently pushed into the openings in the compartment side sheets.

19. Close the compartment door.
20. On the HMI's **System Health** and **Breaker Status** screens, verify that the EntelliGuard Messenger is communicating, IButton is recognized, and the settings are correct for the replaced unit.
21. Verify that the circuit breaker is discharged and in the open position.
22. Rack the circuit breaker into the "Test" position. Verify that the circuit breaker position indicator and the HMI indicate that the circuit breaker in question is in the "Test" position.
23. Charge the circuit breaker.
24. On the HMI's **Main Menu**, click the **One-Line** button.
25. On the system one-line double-click the circuit breaker in question. The **Breaker Status** screen should now be displayed.
26. Click the **Control** button. A dialog box will appear. If the circuit breaker is non-electric (manual charge) a dialog box with a "TRIP" button will appear. Select **Trip** and click **OK**. The circuit breaker should trip open. Skip to step 30.
27. If the circuit breaker is electrically operated, a dialog box with two buttons will appear: **TRIP** and **OPEN**. Select **TRIP** and confirm by clicking **OK**. The circuit breaker should trip open. Verify this status on the **Breaker Status** screen.
28. Click the **Control** button again, click **CLOSE** on the dialog box, and then click **OK**. The circuit breaker should close. Verify this status on the **Breaker Status** screen.
29. Click the **Control** button again and select **OPEN** and confirm by selecting **OK**. The circuit breaker should open. Verify this status on the **Breaker Status** screen.
30. Rack the circuit breaker into the "connected" position. Verify the circuit breaker status indicates the circuit breaker racking position is "in" and the Secondary Disconnect Position is "connected".
31. Take the equipment out of Reduced Let-Thru Mode by logging into the HMI under an account with Administrative privilege. On the **Main Menu**, click the **Reduced Let-Thru Mode** button and then click the **Enable** button on the **Reduced Let-Thru Mode** screen to clear it. Click **OK**.

# 3 Replacing an HMI

## 3.1 Removing the HMI: standard compartment door

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**NOTE:** Disconnecting the HMI removes a single user interface from the Entellisys system. Centralized protection and control continues to function properly during HMI removal. Other HMIs within the system continue to function as well.

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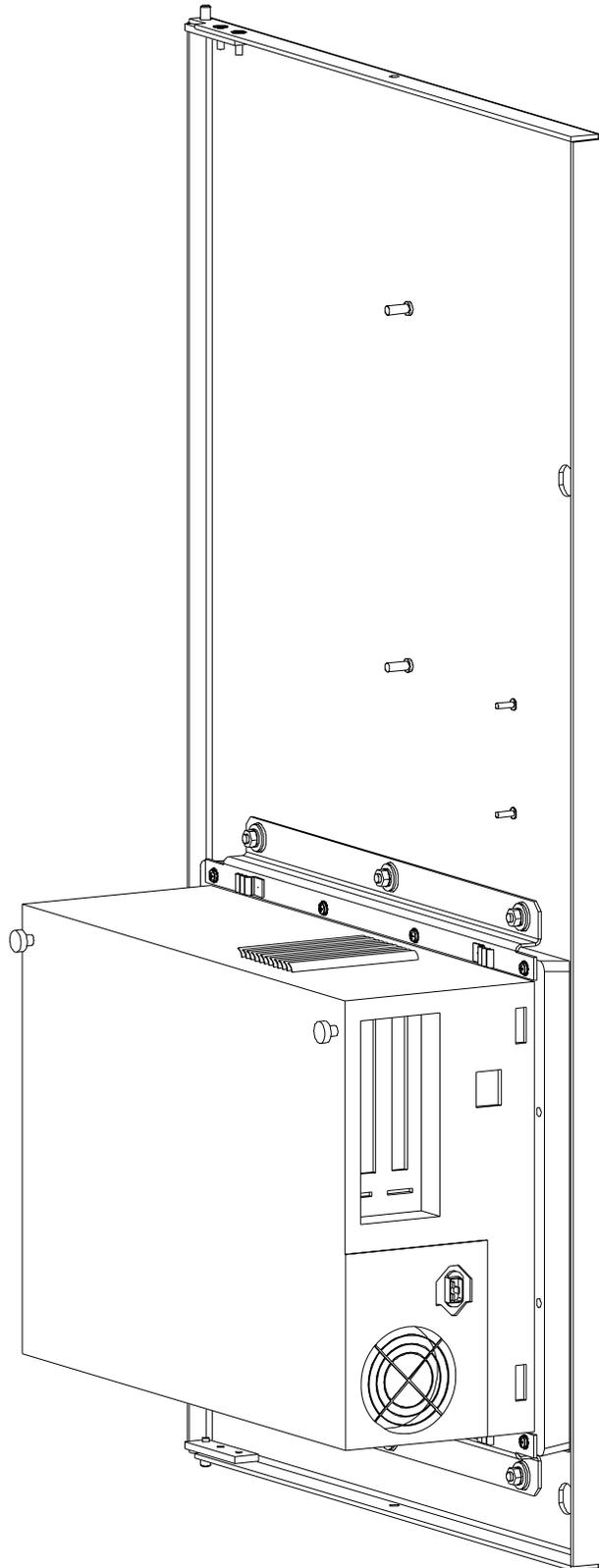
1. On the HMI's **Main Menu** screen, click **User Settings**.
  2. On the **User Settings** screen, click **HMI Preferences**. Record the current IP address for each CPU on the Communication tab.
  3. Follow the applicable HMI instructions to close the HMI program and then shut down Windows using the touch screen.
- 

**WARNING!** Voltages hazardous to personnel are present.

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4. Open the compartment door.
5. Remove the power cable from the HMI housing by disconnecting the retainer and pulling the angled plug out of the socket.
6. Disconnect the Ethernet cable from the HMI housing.
7. Disconnect the 9-pin serial cable adaptor from the HMI housing by loosening the two screw locks.
8. Remove the three nuts, flat washers, and lock washers from the lower rail mounting studs on the HMI door.
9. While supporting the HMI, remove the three nuts, flat washers, and lock washers from the upper rail mounting studs on the HMI door.
10. Pull the HMI out and away from the rear of the door and place it on a solid work surface.
11. Remove the eight screws and lock washers that hold the two mounting rails to the rear of the HMI bezel. Remove the two mounting rails.

Figure 3-1 HMI mounting



3

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## 3.2 Installing the HMI: standard compartment door

1. Fasten each of the two mounting rails to the rear of the HMI bezel using four screws and lock washers.

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**WARNING!** Voltages hazardous to personnel are present.

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2. Open the compartment door. Position the HMI and mounting rails on the six studs at the rear of the HMI door. Install six lock washers, flat washers, and nuts onto the studs to secure the HMI to the door.
3. Connect the 9-pin serial cable adaptor to the HMI housing and then fully tighten the two screw locks.
4. Connect the Ethernet cable to the HMI.
5. Insert the power cable into the HMI power socket. Replace the retainer to prevent power cord from being removed. The HMI should now power up.
6. Check the wiring around the HMI housing. The wires should not be loose or positioned such that they will be pinched when the door is closed.
7. Close the HMI compartment door.
8. Log into the HMI.
9. On the **Main Menu**, select the **User Settings** button.
10. On the **User Settings** screen, select **HMI Preferences**.
11. On the **HMI Preferences** screen's **Communication** tab, enter the IP address for each CPU recorded prior to the HMI removal.
12. Click the **Test Communication** button one at a time and verify each CPU is reported as communicating OK.
13. Select the **General** tab on the **HMI Preferences** screen.
14. Select the **Update HMI** button to upload the CPU settings from each CPU to the HMI. Click **Yes** in the dialog box to confirm the upload.
15. When the upload is complete, click **Close** on the **HMI Preferences** screen. Then click **Close** on the **User Settings** screen.



# 4 Replacing a switch

## 4.1 Before you begin

**CAUTION:** Disconnecting an Ethernet switch will disable communications on the network on which the switch operates. If a CPU switch is disconnected, the system will lose redundancy of centralized control and protection. If both CPU switches are disconnected, centralized control and protection is eliminated, but EntelliGuard Messengers will continue to provide minimal backup protection. If the HMI switch is removed, all HMIs will lose communication with the central control system, but protection will still function properly.

4

## 4.2 Removing the 8-port and 16-port mounting plate

1. Loosen the two screws on the green power plug(s) and remove the plug(s) from the socket(s) in the switch housing.

**NOTE:** Do not remove the wires from the plugs. When disconnected, the Ethernet switch power indicator light should not illuminate.

**Figure 4-1** 8-port Ethernet switch

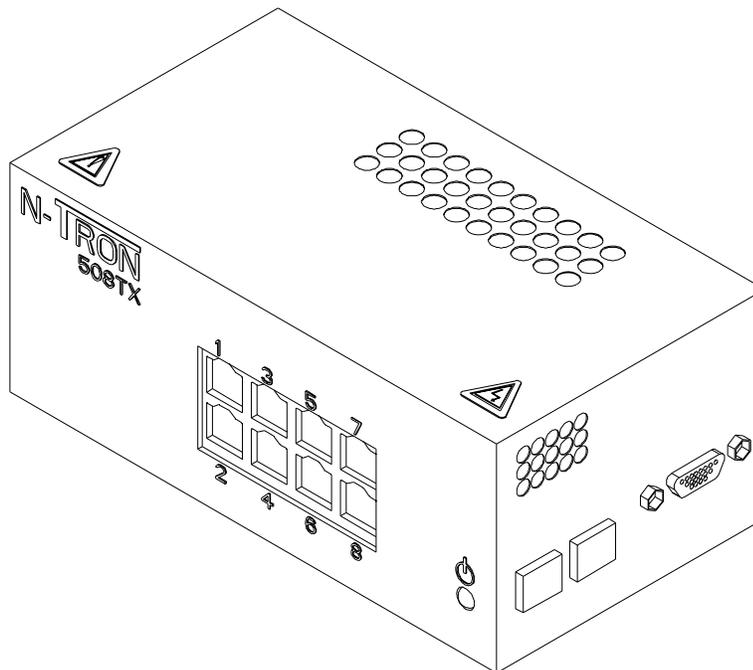
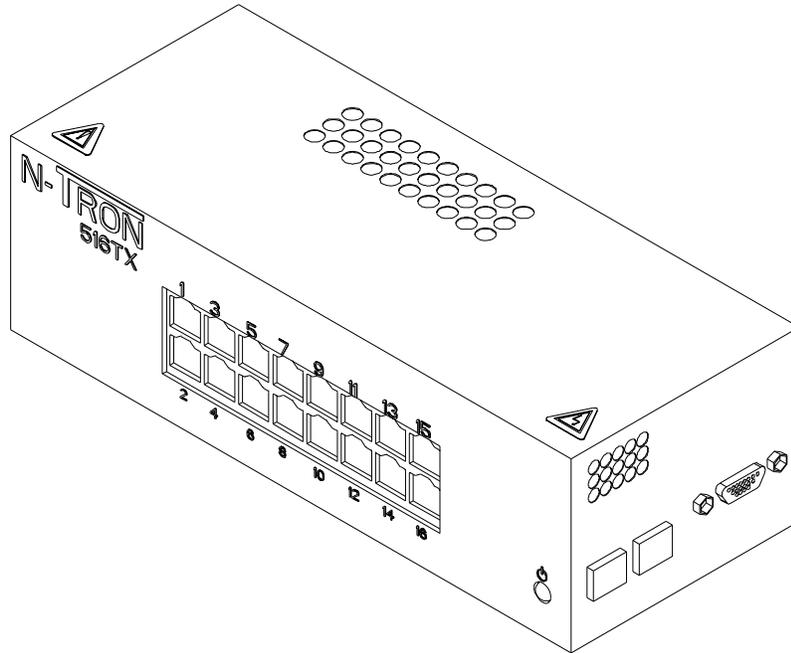
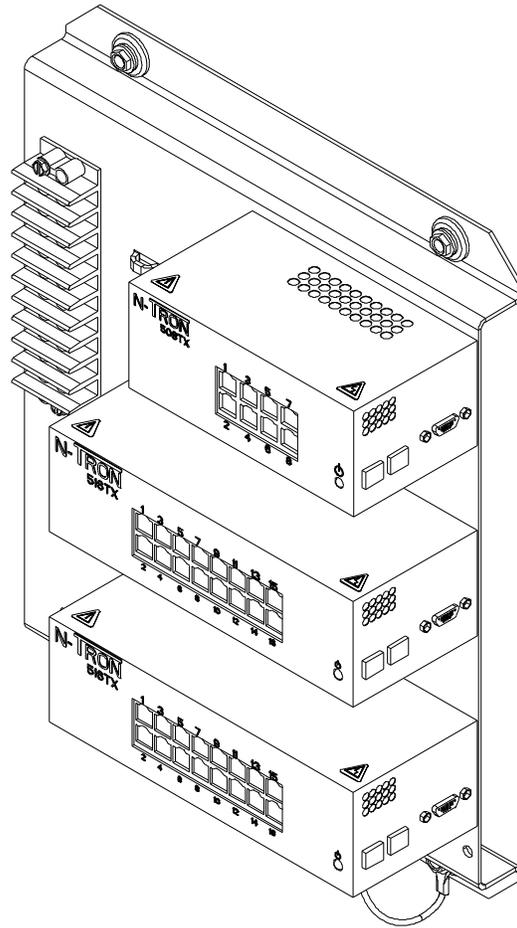


Figure 4-2 16-port Ethernet switch



2. If removing more than one switch, bundle and label the Ethernet cables from each switch separately. The cables must be associated with the switch from which they were removed. It is not necessary to identify individual cables with switch ports.
3. Disconnect the Ethernet cables from switch to be removed. Do not disconnect the opposite ends of cables.
4. If the green grounding wire is fastened to the compartment wall, remove the mounting bolt from the wall.
5. Remove four mounting bolts, flat washers, and lock washers that fasten the mounting plate to the compartment wall. Do not allow any of the wires to support the weight of the mounting plate after it has been removed from the wall.
6. On the rear of the mounting plate, remove the four screws and lock washers from the switch to be replaced.

Figure 4-3 8/16-port switch mounting plate assembly



## 4.3 Installing the 8-port and 16-port mounting plate

1. Position the new switch on the front of the mounting plate. With the mounting plate terminal block on the left, the power connector sockets should face the right of the plate.
2. On the rear of the mounting plate, install four screws and lock washers through the plate and into the switch to be replaced.
3. Position the mounting plate over the mounting holes in the compartment wall.
4. Install the four mounting bolts, flat washers, and lock washers through the mounting plate into the holes. Install the grounding cable ring terminal onto the nearest mounting bolt between the flat washer and the grommet.
5. Reconnect the Ethernet cables to the switches. Cables must be installed into the switch from which they were removed. However, it is unnecessary to reconnect cables to their original ports within the switch.
6. Insert the green power plug(s) into the socket(s) in the new Ethernet switch housing and tighten the two screws. When properly connected, the power indicator light should illuminate.

---

## 4.4 Removing the 8-port and 16-port switches from DIN rail

1. Loosen the two screws on the green power plug(s) and remove the plug(s) from the socket(s) in the switch housing. Do not remove the wires from the plugs. When disconnected, the Ethernet switch power indicator light should not illuminate.
2. If removing more than one switch, bundle and label the Ethernet cables from each switch separately. Cables must be associated with the switch from which they were removed. It is not necessary to identify individual cables with switch ports.
3. Disconnect all Ethernet cables from switch to be replaced. Do not disconnect opposite ends of cables.
4. Locate the locking tab on the Ethernet switch DIN rail clip.
5. Using a spring hook or similar instrument, pull the locking tab away from the DIN rail.
6. When the tab slides outward, pull the switch away from the DIN rail.
7. Remove the DIN rail clip from the rear of the switch by removing the three or four screws and lock washers.

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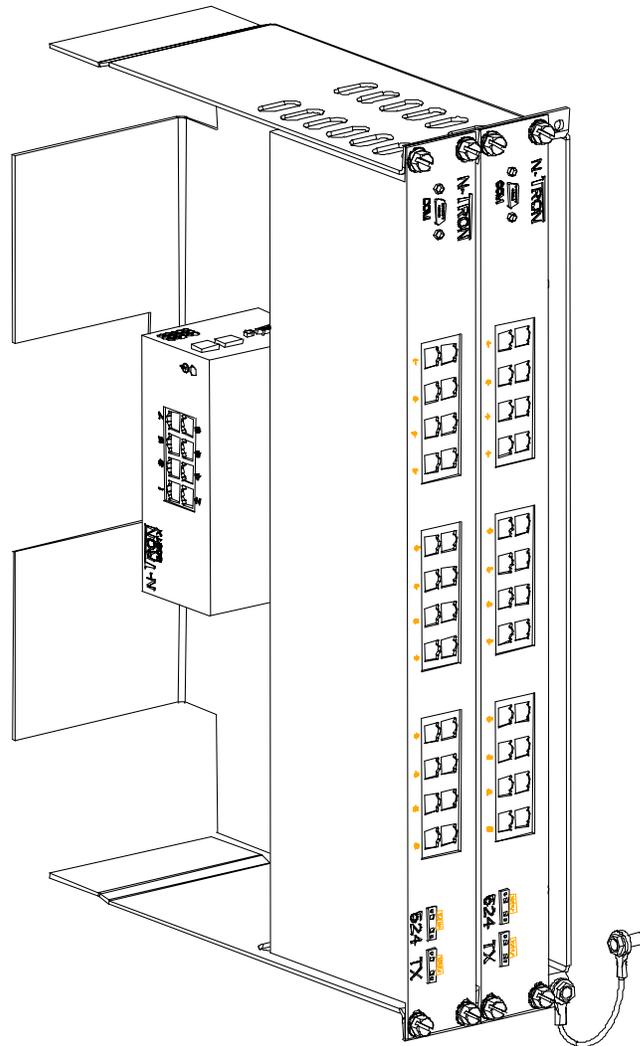
## 4.5 Installing the 8-port and 16-port switches from DIN rail

1. Mount the DIN rail clip to the rear of the switch by installing the three or four screws and lock washers. The clip should have the same orientation as the removed switch.
2. Position the new switch over the DIN rail in the compartment. Hook the side of the clip opposite the locking tab onto the DIN rail. Push the switch toward the DIN rail and the clip will snap into place.
3. Reconnect the Ethernet cables to the switches. The cables must be installed into the switch from which they were removed. However, it is unnecessary to reconnect cables to their original ports within the switch.
4. Insert the green power plug(s) into the socket(s) in the new Ethernet switch housing and tighten the two screws. When properly connected, the power indicator light should illuminate.

## 4.6 Removing the 8-port switch from the mounting bracket

1. Remove both 24-port switches from the mounting bracket without disconnecting the control power or Ethernet cables to either switch.
2. Loosen the two screws on the green power plug(s) and remove the plug(s) from the socket(s) in the 8-port switch housing. Do not remove the wires from the plugs. When disconnected, the Ethernet switch power indicator light should not illuminate.

Figure 4-4 8 and 24-port switch mounting



3. Disconnect all Ethernet cables from switch to be replaced. Do not disconnect the opposite ends of the cables.
4. Disconnect the green grounding cable between the bracket and the compartment wall by removing the bolt from the wall.
5. Remove the 6 mounting bolts, flat washers, and lock washers from the switch mounting bracket.
6. On the rear of the mounting bracket, remove the four screws and lock washers from the 8-port switch.

---

## 4.7 Installing the 8-port switch to the mounting bracket

1. Position the new switch on the front of the mounting bracket. The green power sockets should face the top of the bracket.
2. On the rear of the bracket, install the four screws and lock washers into the 8-port switch.
3. Position the mounting bracket over the mounting holes in the compartment wall.
4. Install the six mounting bolts, washers, and lock washers through the mounting bracket into the compartment wall.
5. Bolt the green grounding cable to the wall in the same position from which it was removed.
6. Reconnect the Ethernet cables to the switches. The cables must be installed into the switch from which they were removed. However, it is unnecessary to reconnect cables to their original ports within the switch.
7. Insert the green power plug(s) into the socket(s) in the new Ethernet switch housing and tighten the two screws. When properly connected, the power indicator light should illuminate.

---

## 4.8 Removing the 24-port switch from the mounting bracket

1. Loosen the two screws on the green power plug(s) and remove the plug(s) from the socket(s) in the switch housing. Do not remove the wires from the plugs. When disconnected, the Ethernet switch power indicator light should not illuminate.
2. If removing more than one switch, bundle and label the Ethernet cables from each switch separately. The cables must be associated with the switch from which they were removed. It is not necessary to identify individual cables with switch ports.
3. Disconnect all Ethernet cables from switch to be replaced. Do not disconnect opposite ends of cables.
4. Remove the four bolts and star washers that fasten the switch to the mounting bracket.
5. Slide the switch out of the bracket.

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## 4.9 Installing the 24-port switch to the mounting bracket

1. If the 8-Port switch was removed, perform the 8-Port switch installation per instructions before proceeding.
2. Slide the switch into the bracket.
3. Replace the four bolts and star washers that fasten the switch to the mounting bracket.
4. Reconnect the Ethernet cables to the switches. The cables must be installed into the switch from which they were removed. However, it is unnecessary to reconnect cables to their original ports within the switch.
5. Insert the green power plug(s) into the socket(s) in the new Ethernet switch housing and tighten the two screws. When properly connected, the power indicator light should illuminate.

# 5 Replacing a VPN

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## 5.1 Removing the VPN device and bracket

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**NOTE:** Disconnecting a VPN device will sever the connection between the Entellisys system and the rest of the network. Central protection and control as well as the HMIs located in the gear will continue to function properly.

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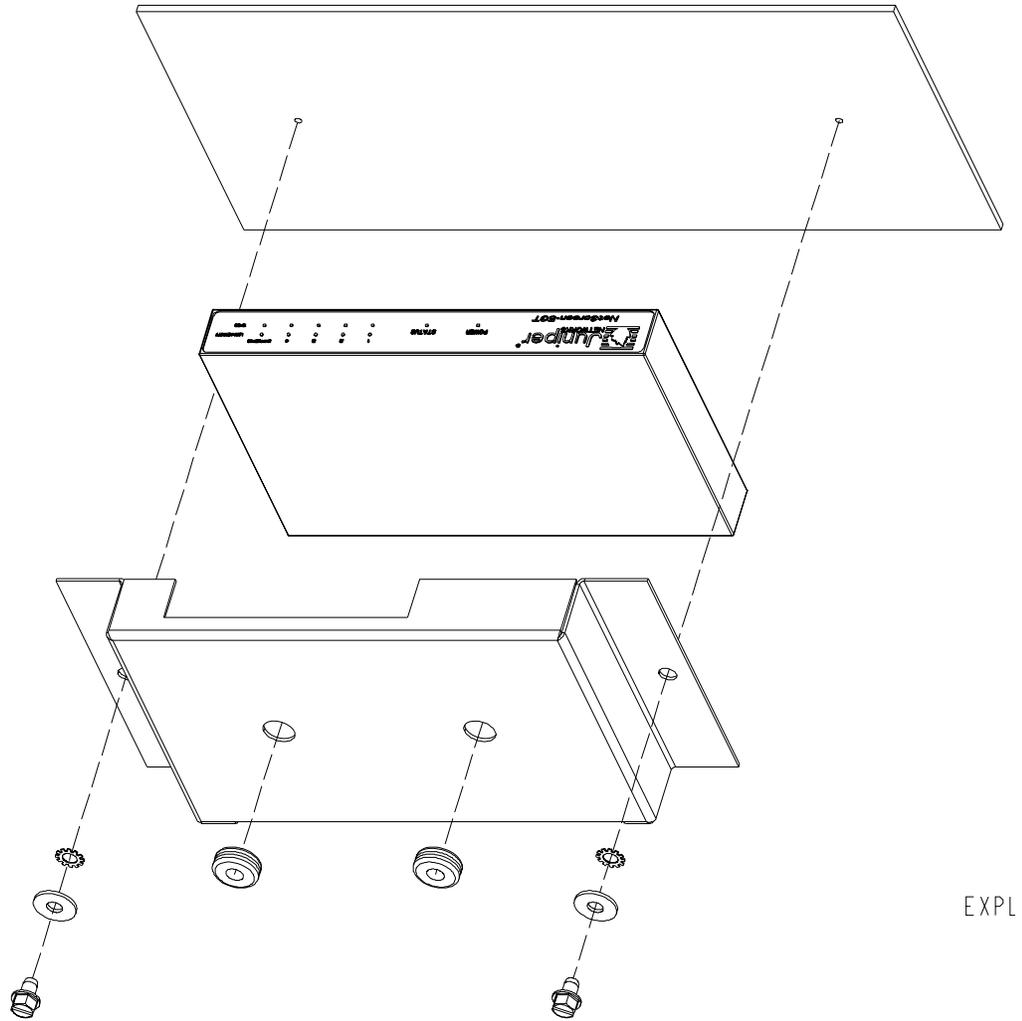
1. If the VPN device is mounted on a bracket with a CPU chassis, remove the chassis per the appropriate instruction before proceeding. The bracket does not need to be removed from the compartment wall.
  2. Power down the VPN device by removing the plug at the DC power connection on the back of the VPN device.
  3. Label each Ethernet cable with respect to the port it is currently plugged into.
- 

**NOTE:** It is important to return the cables to their original positions after replacing the VPN device.

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4. Remove all Ethernet cables.
5. Remove the VPN device bracket by removing the nuts and washers from the surface-mount studs or by removing the bolts and washers from the mounting surface.
6. Remove the VPN device and bracket from mounting surface.

Figure 5-1 VPN mounted with bolts



## 5.2 Installing the VPN and bracket

1. Position the VPN device inside the mounting bracket so that the Ethernet and power sockets are visible. The top of the VPN device should contact the two rubber grommets on the bracket.
2. Position the flange holes on the bracket over the studs or bolt holes in the mounting surface.
3. Install the nuts and washers onto the studs or install bolts and washers into the mounting surface holes.
4. Tighten the nuts or bolts enough to compress bracket grommets slightly. The VPN device housing should not move freely after tightening.
5. Install the Ethernet cables according to end markings.
6. Reconnect the DC power cable to the VPN device. The power indicator light should illuminate.
7. If the VPN device was mounted on a bracket with a CPU chassis, replace the chassis per the appropriate instruction.

# 6 Replacing an RS-232 to RS-485 converter

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## 6.1 Removing the RS232/485 converter

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**NOTE:** Disconnecting the RS232/RS485 converter disables the communication between the HMI and UPS or between the synch clock and CPU B.

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1. Before proceeding, if the converter is mounted on a bracket with a CPU chassis, remove the chassis following the appropriate instructions. Note that the bracket does not need to be removed from the compartment wall.
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**WARNING!** Voltages hazardous to personnel are present.

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2. Open the instrument compartment. Locate the 12 Vdc terminal block or power supply that the converter derives its power from.
3. Disconnect the power by removing the three wires connecting the converter to the 12 Vdc terminal block.
4. Disconnect the 9-pin plug by loosening the screw locks and pulling the plug out of its socket.
5. Remove the three power wires from the converter by loosening the screw locks on the terminal block with a screwdriver.
6. Locate and label the two communication wires at the converter.
7. Remove the two communication wires at the converter by loosening the screw locks on the terminal block with a screwdriver.
8. Remove converter by removing the nuts and washers from the surface-mount studs or by removing the bolts and washers from the mounting surface.
9. Remove the converter from the mounting surface.

Figure 6-1 Converter mounted with bolts

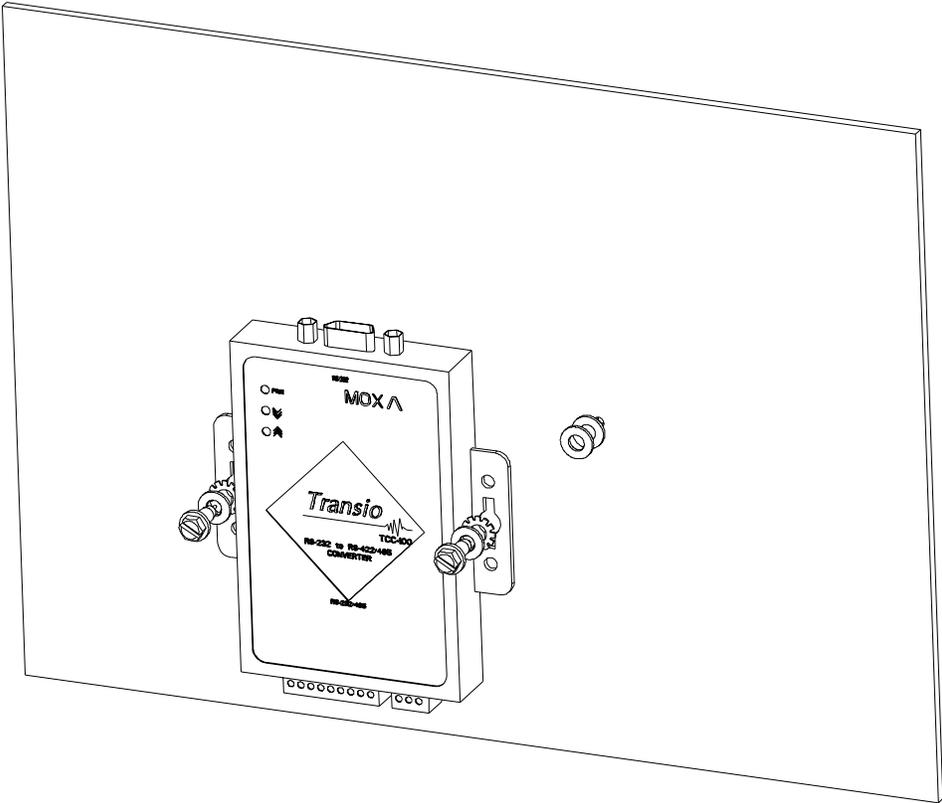
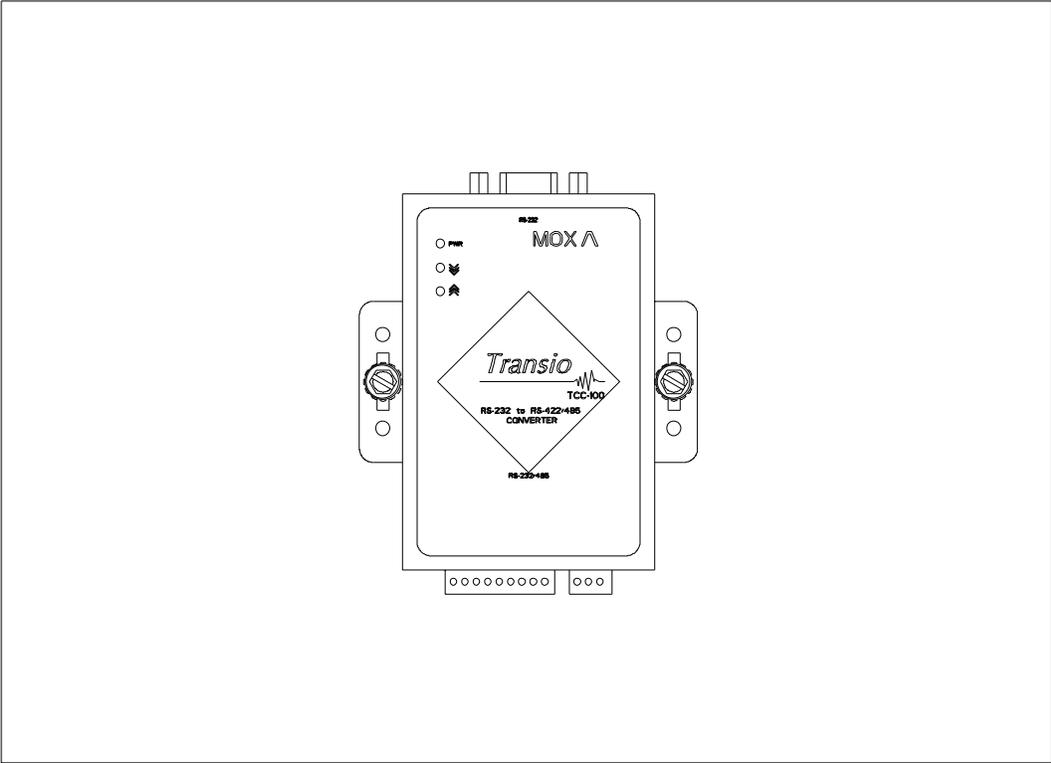


Figure 6-2 Converter mounted on studs



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## 6.2 Installing the RS232/485 converter

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**WARNING!** Voltages hazardous to personnel are present.

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1. Open the instrument compartment where the converter is to be installed. If mounting the converter on studs, place two flat washers on each stud. Otherwise, proceed to step 4.
2. Position the flange holes on the bracket over the studs in the mounting surface. Install and fully tighten one star washer, flat washer, and nut on each stud.
3. Proceed to step 7.
4. If mounting with holes, place one mounting bolt, flat washer, and star washer through each converter mounting tab.
5. Place two flat washers on each mounting bolt, between the converter tabs and the mounting surface.
6. Insert each mounting bolt into the holes in the mounting surface and fully tighten.
7. Replace the two communication wires at the converter, per the labeling, by inserting the wire ends into the terminal block and tightening the screw locks with a screwdriver.
8. Replace the three power wires at the converter by inserting the wire ends into the terminal block and tightening the screw locks with a screwdriver.
9. Push the 9-pin plug into the corresponding socket on the converter and tighten the screw locks.
10. Connect the power wires between the converter and the 12 Vdc terminal strip, observing the proper polarity.
11. Check the power indicator light on the converter. When power is connected properly, the indicator should light.
12. If the converter was mounted on a bracket with a CPU chassis, replace the chassis following the appropriate instructions.



# 7

## Replacing a UPS

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**WARNING!** By opening or removing covers of the UPS you run the risk of exposure to dangerous voltages! Do not attempt to service the UPS unless you have had proper training.

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**CAUTION: RISK OF ELECTRIC SHOCK.** Carefully read the User Manual for the GE Digital Energy GT Series-UL Uninterruptible Power Supply – (P/N:5011319800) for important safety instructions concerning the servicing of this device PRIOR to performing this procedure.

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### 7.1 Removing the UPS

**Figure 7-1** Horizontally-mounted UPS

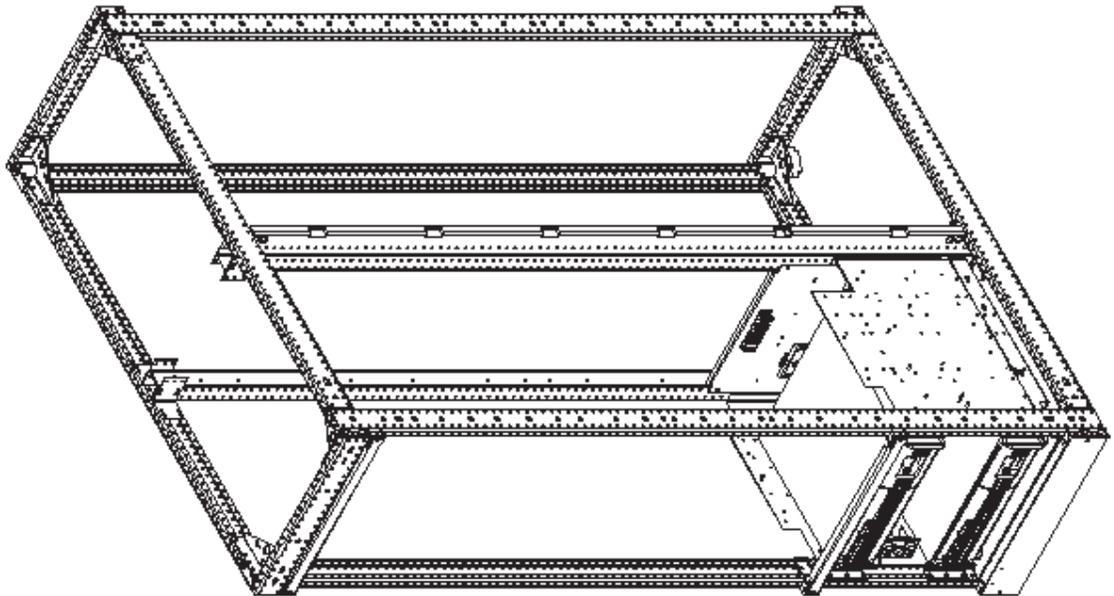
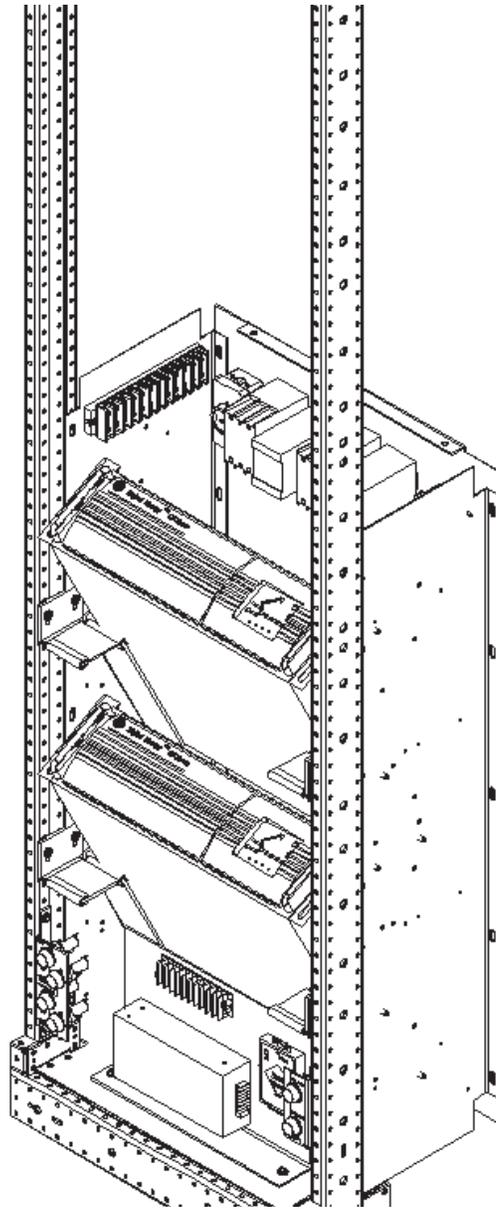


Figure 7-2 Vertically-mounted UPS



1. Identify the Entellisis instruments that are powered solely by the UPS to be removed.

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NOTE: Each CPU and HMI is powered by one source only.

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2. Shut down the devices identified in Step 1 according to the device documentation. It is not necessary that these devices be further disconnected in any way.
3. Shut down the UPS according to the device documentation. See the GE Publication: PRD\_GTU\_19X\_1K0\_3K0\_XGB\_0311 for more information.

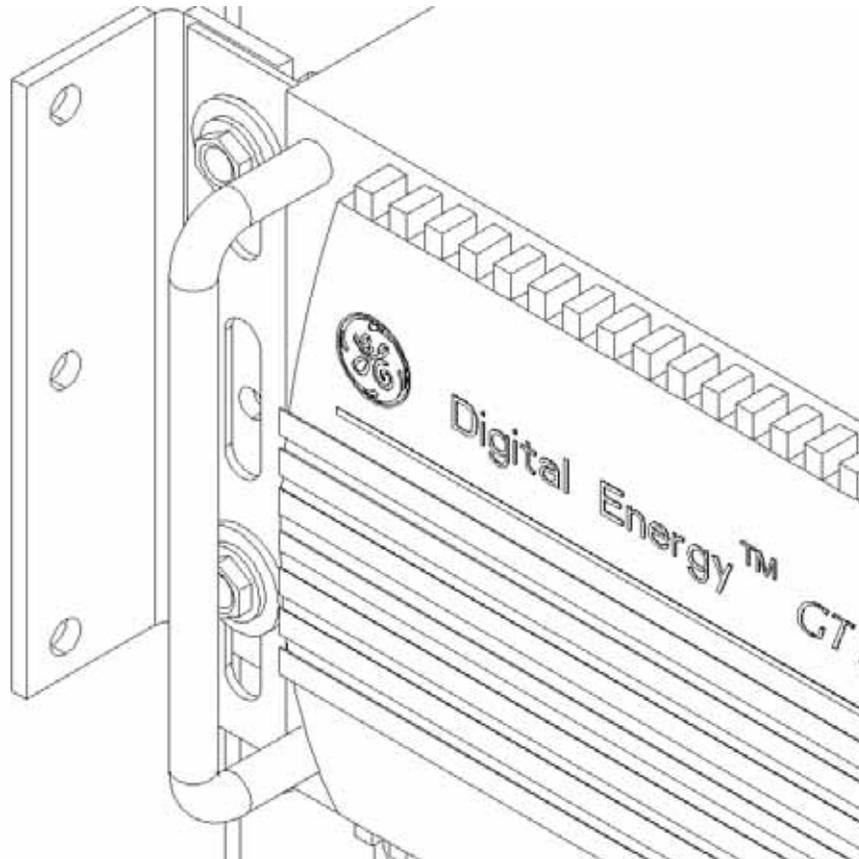
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**WARNING!** Voltages hazardous to personnel are present.

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4. Remove the 30A input fuse for the UPS to be replaced. The input fuse holders, marked UPS A and UPS B, are located on the right-hand side of the instrument compartment.
5. Remove the 10A and 20A fuse, marked CPU and CONTROL BUS respectively, from the fuse holders located on the left-hand side of the instrument compartment only for the UPS being replaced.
6. Remove the washers and bolts that fasten the UPS mounting tabs to the mounting brackets in the compartment.

**Figure 7-3** UPS mounting tabs and bolts



7. Slide the UPS approximately halfway out of the instrument compartment. Ensure the weight of the UPS is adequately supported.
8. Follow the input power cable from the rear of the UPS to the receptacle on the rear wall of the compartment.

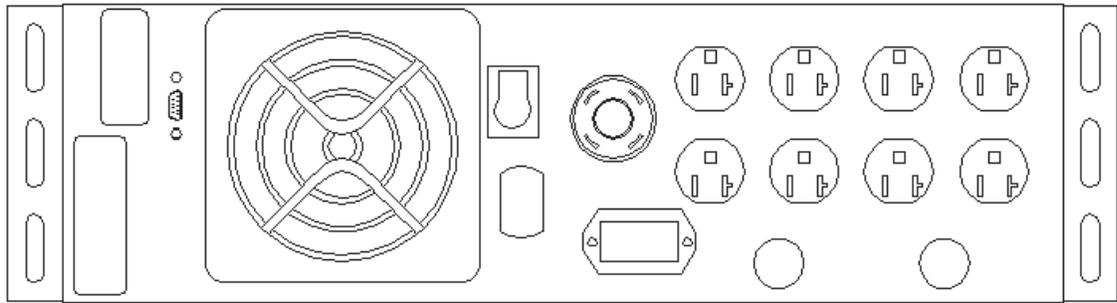
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**NOTE:** The input power cable is permanently connected to the UPS housing.

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9. Unplug the input power cable from the wall receptacle.
10. Locate the output power cable and plug at the rear of the UPS. The output power cable plugs into a socket in the UPS housing.
11. Unplug the output power cable from the UPS.
12. Disconnect the communication cable from the rear of the UPS housing by unscrewing the two screw locks at the plug.

Figure 7-4 Rear of UPS



13. Slowly remove the UPS from the compartment. Ensure that the weight of the UPS is adequately supported during removal.
14. UPS removal is complete.

7

## 7.2 Installing the UPS

1. Locate the input power cable, the output power socket, and the communication cable socket at the rear of the UPS housing.
2. Slide the UPS approximately halfway into the instrument compartment. Ensure the weight of the UPS is adequately supported.
3. Connect the communication cable to the socket at the rear of the UPS housing and tighten the two screw locks on the plug.
4. Plug the UPS input power cable into the wall receptacle.
5. Plug the output power cable into the power socket at the rear of the UPS housing.
6. Slowly slide the UPS into the compartment until the UPS mounting tabs contact the mounting brackets.
7. Fasten the UPS mounting tabs to the mounting brackets using the washers and bolts provided.
8. Install the 30A input fuse, marked UPS A or UPS B, into the fuse holder located on the right-hand side of the instrument compartment.
9. Install the 10A and 20A output fuses, marked CPU and CONTROL BUS, into the fuse holders located on the left-hand side of the instrument compartment.
10. Start up the UPS according to the device documentation. See the GE Publication: PRD\_GTU\_19X\_1K0\_3K0\_XGB\_0311 for more information.
11. UPS installation is complete.
12. Start-up the devices identified in Step 1 according to the device documentation.
13. Verify from the HMI's **System Health** screen that all EntelliGuard Messengers have both control powers and that all components are communicating.

