

ZT411/ZT421

Industrial Printer

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ZEBRA

User Guide

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About this Guide

This document is intended for use by any person who needs to perform routine maintenance, upgrade, or troubleshoot problems with the ZT411/ZT421 printer.

Notational Conventions

The following conventions are used in this document:

- **Bold** text is used to highlight the following:
 - Dialog box, window, and screen names
 - Drop-down list and list box names
 - Checkbox and radio button names
 - Icons on a screen
 - Key names on a keypad
 - Button names on a screen
- Bullets (•) indicate:
 - Action items
 - List of alternatives
 - Lists of required steps that are not necessarily sequential.
- Sequential lists (for example, those that describe step-by-step procedures) appear as numbered lists.

Icon Conventions

The documentation set is designed to give the reader more visual clues. The following graphic icons are used throughout the documentation set. These icons and their associated meanings are described below.



NOTE: The text here indicates information that is supplemental for the user to know and that is not required to complete a task.



IMPORTANT: The text here indicates information that is important for the user to know.



CAUTION—EYE INJURY: Wear protective eyewear when performing certain tasks.

About this Guide



CAUTION—PRODUCT DAMAGE: If the precaution is not taken, the product could be damaged.



CAUTION: If the precaution is not heeded, the user could receive a minor or moderate injury.



[OTHER]: Touching this area could result in burns.



CAUTION—ESD: Observe proper electrostatic safety precautions.



CAUTION—ELECTRIC SHOCK: Disconnect the printer power before performing certain procedures to avoid the risk of electric shock.



WARNING: If danger is not avoided, the user **CAN** be seriously injured or killed.



DANGER: If danger is not avoided, the user **WILL** be seriously injured or killed.



NOTE: This is an icon for wired networking notes.

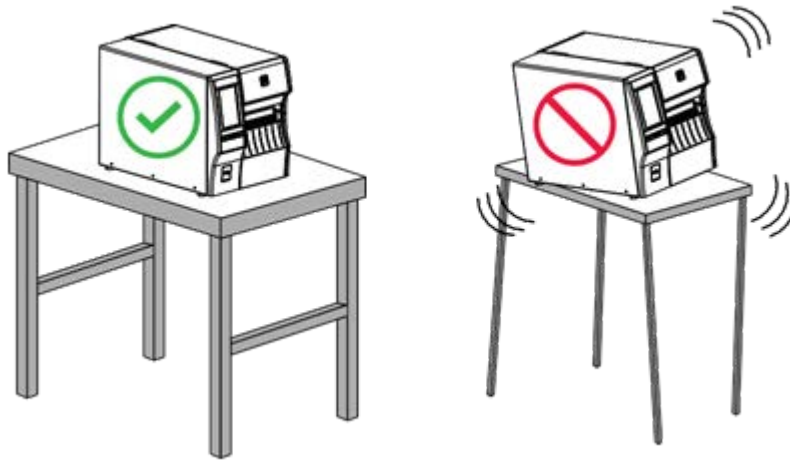
Printer Setup

This section assists a user with initial setup and operation of the printer.

Selecting a Location for the Printer

Select a location for the printer that meets these conditions:

- Surface—The surface where the printer will be located must be solid, level, and of sufficient size and strength to hold the printer.



- Space—The area where the printer will be located must include enough space for ventilation and for accessing the printer components and connectors. To allow for proper ventilation and cooling, leave open space on all sides of the printer.



CAUTION: Do not place any padding or cushioning material behind or under the printer because this restricts air flow and could cause the printer to overheat.

- Power—The printer should be within a short distance of an appropriate power outlet that is easily accessible.
- Data communication interfaces—The printer must be within range of your WLAN radio (if applicable) or within an acceptable range for other connectors to reach your data source (usually a computer). For

more information on maximum cable lengths and configuration, see [General Specifications](#) on page 182.

- Operating conditions—Your printer is designed to function in a wide range of environmental and electrical conditions, including a warehouse or factory floor. The following table shows the temperature and relative humidity requirements for the printer when it is operating.

Table 1 Operating Temperature and Humidity

| Mode | Temperature | Relative Humidity |
|------------------|---------------------------|--------------------------|
| Thermal Transfer | 40° to 104°F (5° to 40°C) | 20 to 85% non-condensing |
| Direct Thermal | 32° to 104°F (0° to 40°C) | |

Ordering Supplies and Accessories

The following things that you will need do NOT come with the printer:

- Communication/network cables (such as USB, serial, parallel, wired Ethernet)
- Media
- Ribbon (if your printer has a thermal transfer option)

Media

For optimal printing quality and proper printer performance across our product line, Zebra strongly recommends the use of Zebra Certified Supplies as part of the total solution.

A wide range of paper, polypropylene, polyester, and vinyl stock has been specifically engineered to enhance the printing capabilities of the printer and to prevent premature printhead wear. To purchase supplies, go to zebra.com/supplies.

The [Glossary](#) on page 194 includes terms associated with media, such as black mark media, gap/notch media, RFID media, fanfold media, and roll media. Use these terms to help determine which type of media will suit your needs.

Ribbon

| | |
|--|--|
| Do I need to use ribbon? | The media itself determines if you will need to use ribbon. <ul style="list-style-type: none"> • Thermal Transfer media—Requires ribbon. • Direct Thermal media—Does NOT require ribbon. |
| How can I tell if media is Direct Thermal or Thermal Transfer? (See direct thermal on page 196 and thermal transfer on page 202 for definitions.) | The easiest way to find out is to scratch the surface of the media rapidly with your fingernail. If a black mark appears where you scratched, the media is Direct Thermal, so you do NOT need ribbon. (See Performing a Ribbon Scratch Test on page 61.) |
| What kind of ribbon can I use? | This printer can only use ribbon that is coated on the outside unless you purchase and install the optional spindle that allows ribbon that is coated on the inside. Contact your authorized Zebra reseller for ordering information. |

| | |
|---|---|
| <p>How can I tell which side of the ribbon is coated?</p> | <p>Use one of these two methods to identify the coated side:</p> <ul style="list-style-type: none">• Method 1:<ol style="list-style-type: none">1. Press a corner of the sticky side of a label to the outer surface of the ribbon roll.2. Peel the label off the ribbon.<p>If ink particles adhere to the label, the outer side of the roll is coated. Repeat this test with the inner surface if needed to confirm which side is coated.</p>• Method 2:<ol style="list-style-type: none">1. Unroll a short length of ribbon and place the outer surface against a piece of paper.2. Scratch the inner surface of the ribbon with your fingernail.3. Lift the ribbon and check for marks on the paper.<p>If the ribbon left a mark, the outer side is coated.</p> <p>See Performing an Adhesive Test on page 61.</p> |
|---|---|

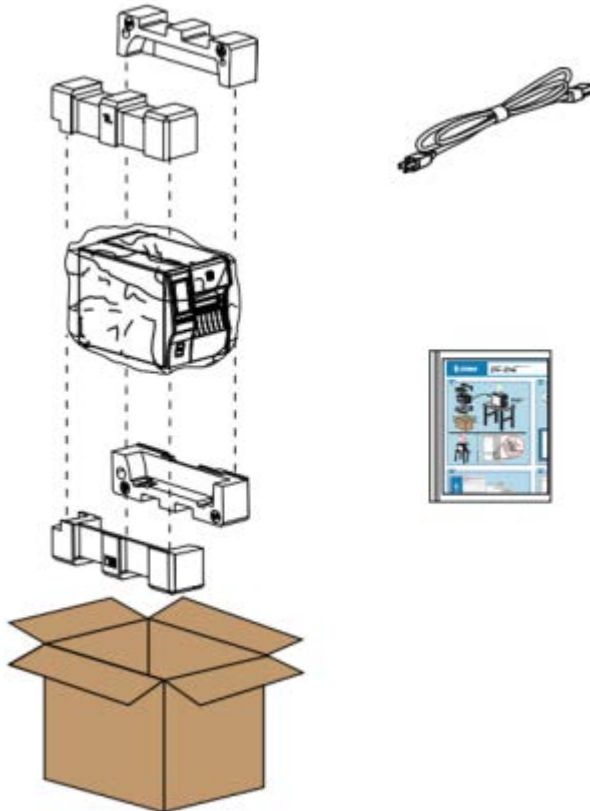
Inspecting the Contents of the Box

Ensure that the printer box contains all the items you need to set it up.



IMPORTANT: Zebra Technologies is not responsible for any damage incurred during the shipment of the equipment and will not repair this damage under warranty.

1. Verify that the following items are included in the box with the printer:



Additional items may be included, depending on the options ordered with the printer.

2. If anything is missing, notify your authorized Zebra reseller.
3. Immediately unwrap the printer and inspect for shipping damage.
 - Save all packing materials.
 - Check all exterior surfaces for damage.
 - Raise the media door, and inspect the media compartment for damage to components.
4. If you discover shipping damage upon inspection:
 - Immediately notify the shipping company and file a damage report.
 - Keep all packaging material for shipping company inspection.
 - Notify your authorized Zebra reseller.
5. The printer shipped with several protective items for shipping, including a film of plastic over the transparent window on the media door. Before operating the printer, remove these protective items.

Connecting the Printer to a Device

After you have set up the printer, you are ready to connect the printer to your device (such as a computer, phone, or tablet).

Connect to a Phone or Tablet

Download the free Zebra Printer Setup Utility app for your device.

- [Android devices](#)
- [Apple devices](#)

The applications support the following types of connectivity:

- Bluetooth Classic
- Bluetooth Low Energy (Bluetooth LE)
- Wired/Ethernet
- Wireless
- USB On-The-Go

For the User Guides for these printer setup utilities, go to zebra.com/setup.

Installing Drivers and Connecting to a Windows[®]-Based Computer

To use your printer with a Microsoft Windows-based computer, you must install the correct drivers first.



IMPORTANT: You may connect your printer to your computer using any of the connections that you have available. However, do not connect any cables from your computer to the printer until you are instructed to do so. If you connect them at the wrong time, your printer will not install the correct printer drivers. To recover from incorrect driver installation, see [What to Do If You Forget to Install Printer Drivers First](#) on page 24.

Installing the Drivers

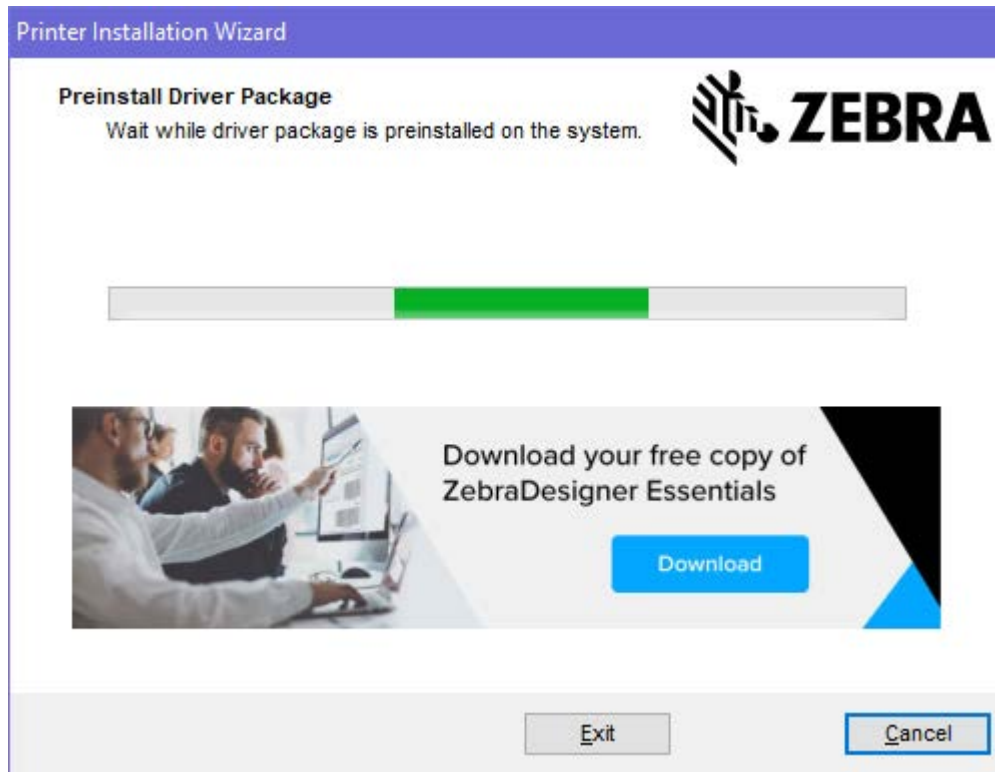
Follow these steps to install the correct drivers.

1. Navigate to zebra.com/drivers.
2. Click **Printers**.
3. Select your printer model.
4. On the printer product page, click **Drivers**.
5. Download the appropriate driver for Windows.

The driver executable file (such as `zd86423827-certified.exe`) is added to your Download folder.

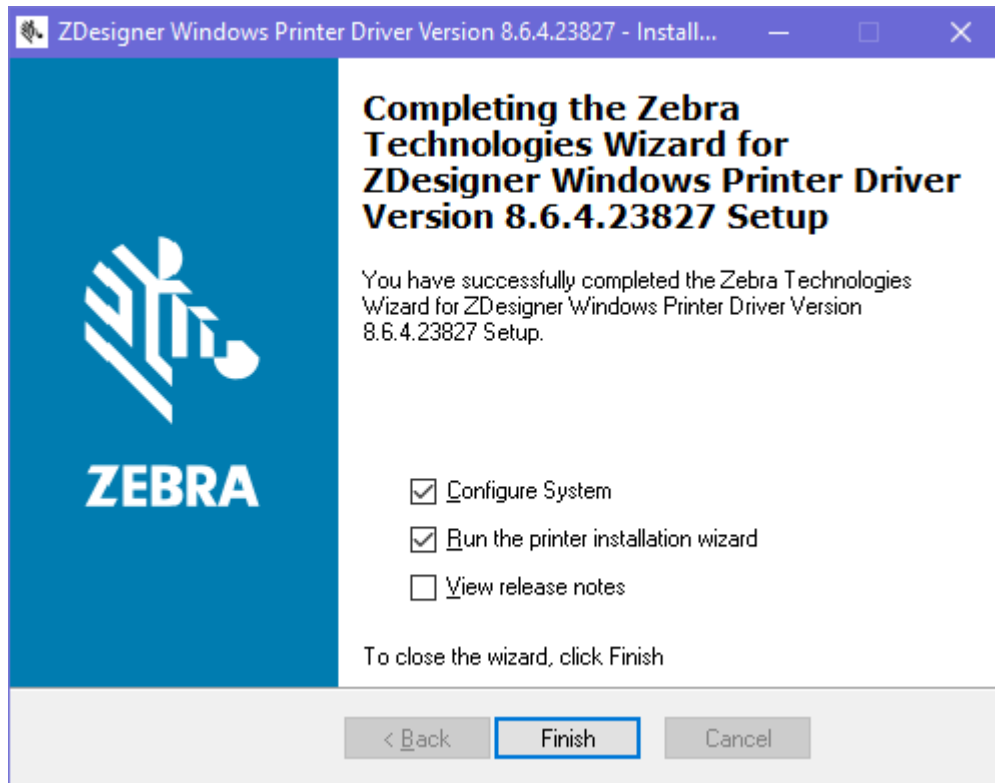
6. Run the executable file and follow the prompts.

When setup is complete, you may select to add all of the drivers to your system (**Configure System**) or to add/configure specific printers (see [Running the Printer Installation Wizard](#) on page 16).



7. Select **Configure System**, and then click **Finish**.

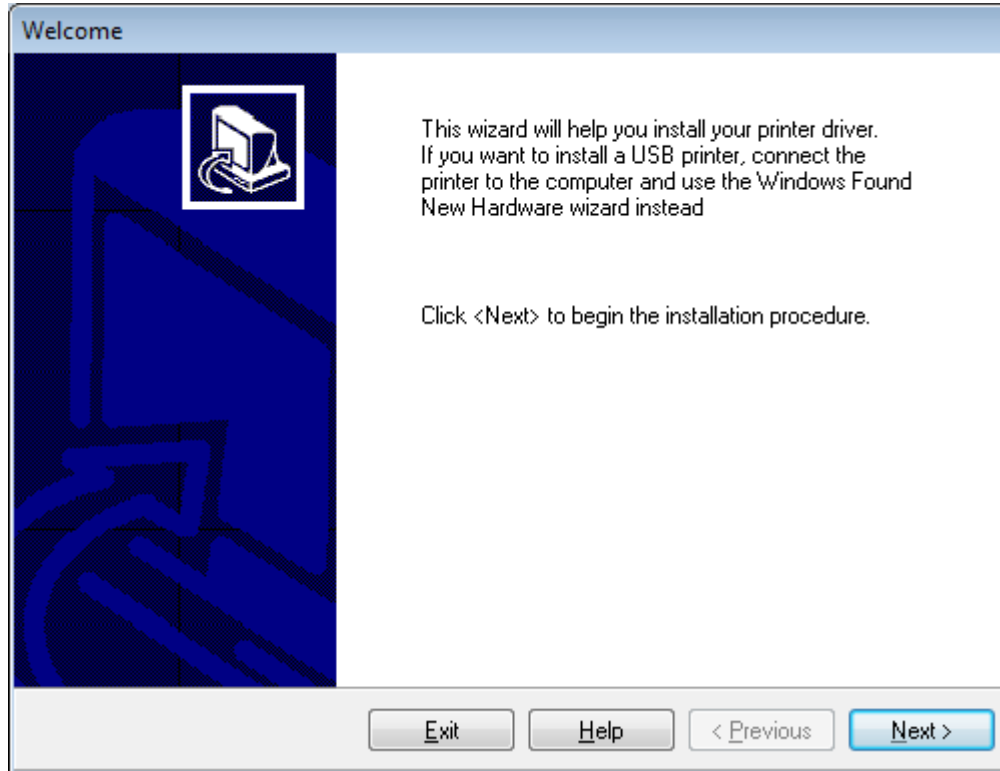
The Printer Installation Wizard installs the drivers.



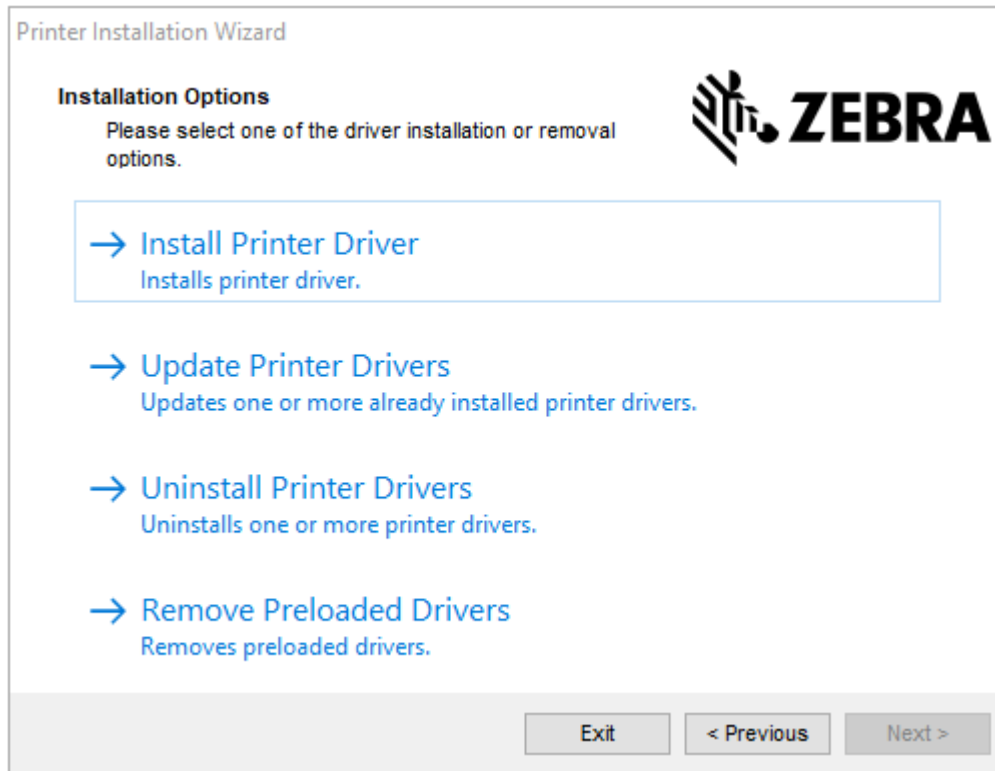
Running the Printer Installation Wizard

1. On the last screen of the driver installer, leave **Run the Printer Installation Wizard** checked, and then click **Finish**.

The Printer Installation wizard displays.




2. Click **Next**.



3. Click **Install Printer Driver**.

The license agreement displays.



The screenshot shows a window titled "Printer Installation Wizard" with a "License Agreement" section. It includes the Zebra logo and a scrollable text area containing the "END USER LICENSE AGREEMENT (UNRESTRICTED SOFTWARE)". The text states that the user is entering into a legal agreement with Zebra Technologies Corporation for software. At the bottom, there are two radio buttons: "I accept the terms in the license agreement" (which is selected) and "I do not accept the terms in the license agreement". Navigation buttons for "Exit", "< Previous", and "Next >" are located at the bottom right.

Printer Installation Wizard

License Agreement
Please read license agreement before installing printer driver.



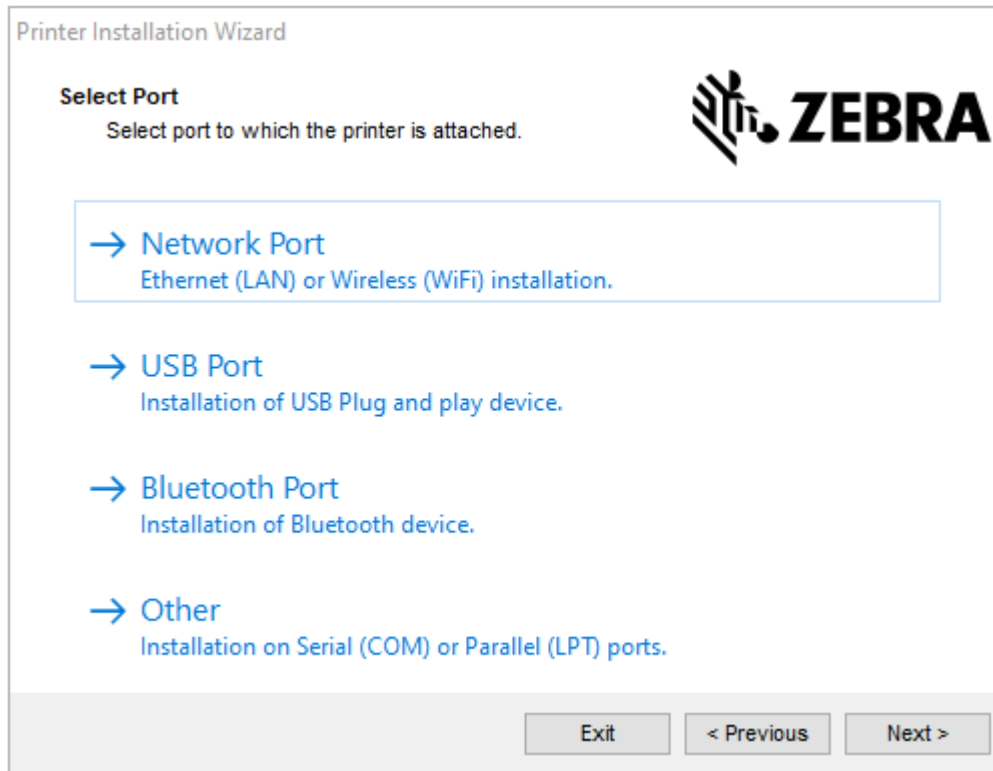
**END USER LICENSE AGREEMENT
(UNRESTRICTED SOFTWARE)**

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I accept the terms in the license agreement
 I do not accept the terms in the license agreement

Exit < Previous Next >

4. Read and accept the terms of the license agreement, and then click **Next**.



5. Select the communication option that you want to configure for your printer:

- Network Port—For installing printers with an Ethernet (LAN) or wireless (Wi-Fi) network connection. Wait for the driver to scan your local network for devices and follow the prompts. If necessary, set the values as directed in [Connecting to Your Network through the Printer's Ethernet Port](#) on page 22 or in [Connecting the Printer to Your Wireless Network](#) on page 24.
- USB Port—For installing printers connected with the USB cable. Connect the printer to the computer as shown in [Connecting to a Computer Using the Printer's USB Port](#) on page 20. If the printer is already connected and powered on, you may need to remove the USB cable and install it again. The driver will automatically search for the model of the connected printer.
- Bluetooth Port—For installing printers with a Bluetooth connection. Not applicable to this printer.
- Other—For installation using another type of cable, such as Parallel (LPT) and Serial (COM). No additional configuration is necessary.

6. If prompted, select your printer model and resolution.

The model and resolution are on a part number sticker on the printer, usually located below the media hanger. The information will be in the following format:

Part Number: XXXXXxY - xxxxxxxxx

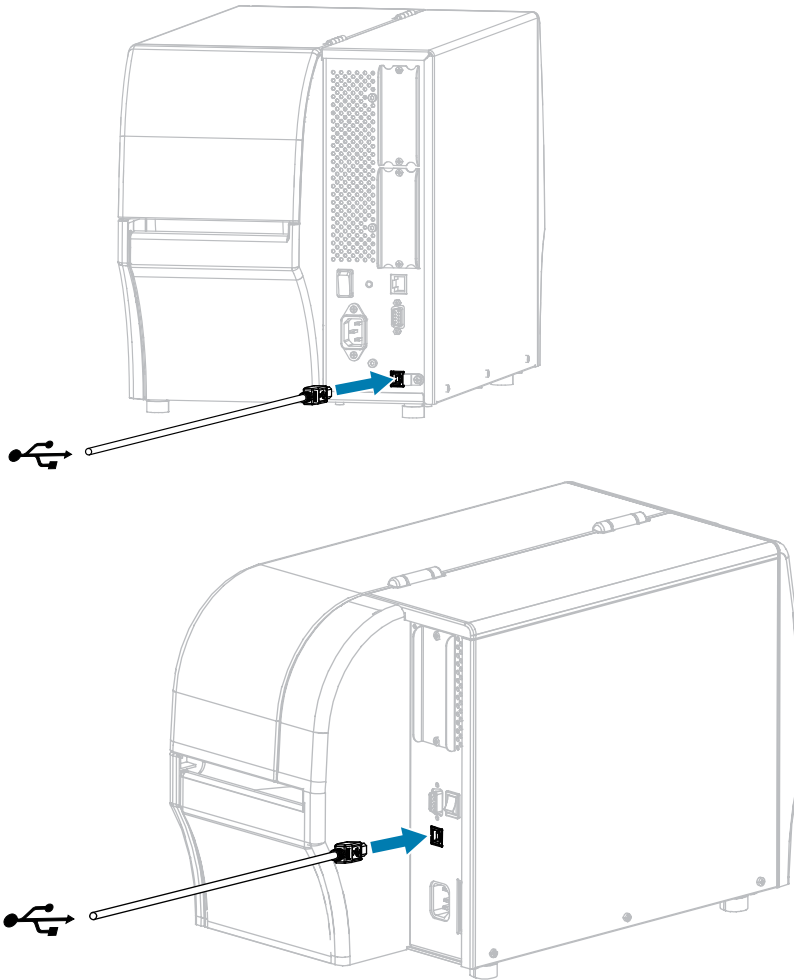
where

XXXXX = the printer model, and Y = the printer resolution (2 = 203 dpi, 3 = 300 dpi, 6 = 600 dpi).

For example, in the part number ZT411x3 - xxxxxxxxx, ZT411 indicates that the printer is a ZT411 model, and 3 indicates that the printhead resolution is 300 dpi.

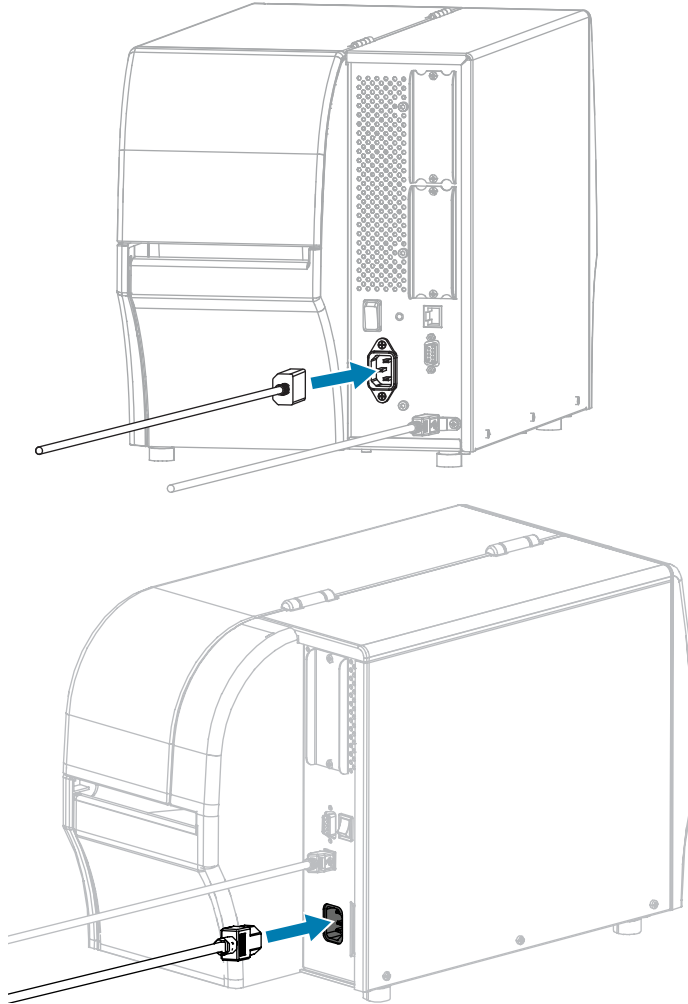
Connecting to a Computer Using the Printer's USB Port

1. After you install the drivers, connect the USB cord to the USB port on your printer.

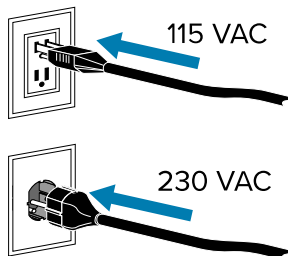


2. Connect the other end of the USB cord to your computer.

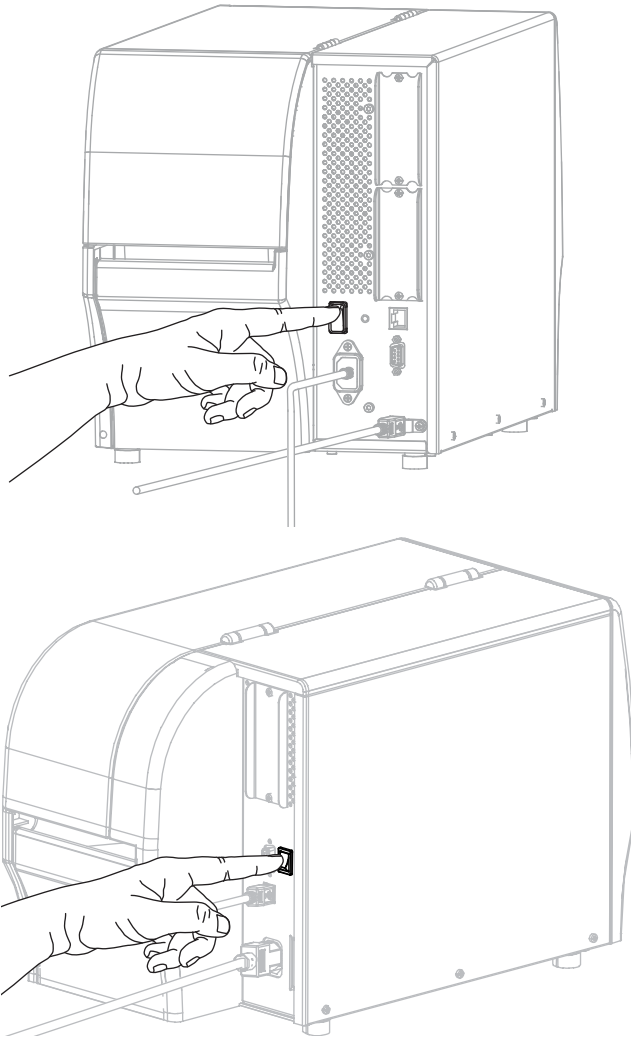
3. Plug the A/C power cord into the A/C power connector on the back of the printer.



4. Plug the A/C power cord into an appropriate power outlet.



5. Turn on (I) the printer.



As the printer boots up, your computer completes the driver installation and recognizes your printer.

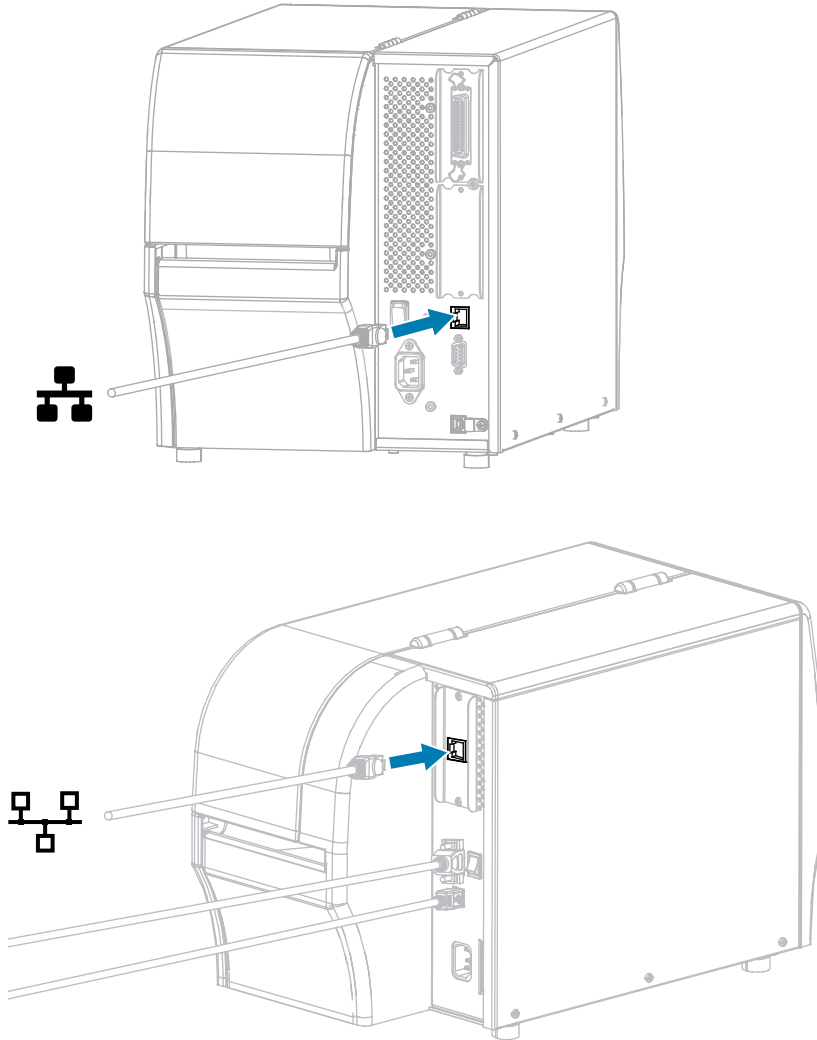
If you did not install the drivers first, see [What to Do If You Forget to Install Printer Drivers First](#) on page 24.

Connecting to Your Network through the Printer's Ethernet Port

If you wish to use a wired print server (Ethernet) connection, you may need to configure the printer to communicate with your Local Area Network (LAN).

For additional information about Zebra print servers, refer to the ZebraNet Wired and Wireless Print Server User Guide. To download the latest version of this guide, go to zebra.com/manuals.

1. After you install the drivers, connect the printer to an Ethernet cable that is connected to your network.



The printer attempts to communicate with your network. If it is successful, it fills in your LAN's gateway and subnet values and gets an IP address. The printer display then alternates between the printer's firmware version and its IP address.

2. Check the display to see if an IP address was assigned to the printer. See [Connection > Wired > Wired IP Address](#) for ways to view the IP address

| If the printer's IP address is... | Then... |
|--|--|
| 0 . 0 . 0 . 0 or 000 . 000 . 000 . 000 | <p>Configure the following printer settings. Contact your network administrator for the proper values for your network.</p> <ul style="list-style-type: none"> • Connection > Wired > Wired IP Protocol (change the value from ALL to PERMANENT) • Connection > Wired > Wired Gateway (match the gateway value of your LAN) • Connection > Wired > Wired Subnet (match the subnet value of your LAN) • Connection > Wired > Wired IP Address (assign a unique IP address to the printer) |
| any other value | The connection was successful. |

3. Reset the network (see [Connection > Networks > Reset Network](#)) to allow changes to the network settings to take effect.

Connecting the Printer to Your Wireless Network

If you wish to use the printer's optional wireless print server, you must configure the printer to communicate with your Wireless Local Area Network (WLAN) through the wireless print server.

For additional information about Zebra print servers, refer to the ZebraNet Wired and Wireless Print Server User Guide. To download the latest version of this guide, go to zebra.com/manuals.

1. Install the drivers as instructed in [Installing Drivers and Connecting to a Windows®-Based Computer](#) on page 13.
2. Configure the following printer settings. Contact your network administrator for the proper values for your network.
 - [Connection > WLAN > WLAN IP Protocol](#) (change the value from ALL to PERMANENT.)
 - [Connection > WLAN > WLAN Gateway](#) (match the gateway value of your WLAN)
 - [Connection > WLAN > WLAN Subnet](#) (match the subnet value of your WLAN)
 - [Connection > WLAN > WLAN IP Address](#) (assign a unique IP address to the printer)
3. Reset the network (see [Connection > Networks > Reset Network](#)) to allow changes to the network settings to take effect.

What to Do If You Forget to Install Printer Drivers First

If you plug in your Zebra printer before installing the drivers, the printer displays as an Unspecified device.

1. Follow the instructions in [Installing Drivers and Connecting to a Windows®-Based Computer](#) on page 13 to download and install the drivers.
2. From the Windows menu, open the Control Panel.

3. Click **Devices and Printers**.

In this example, the MZ320 is an incorrectly installed Zebra printer.

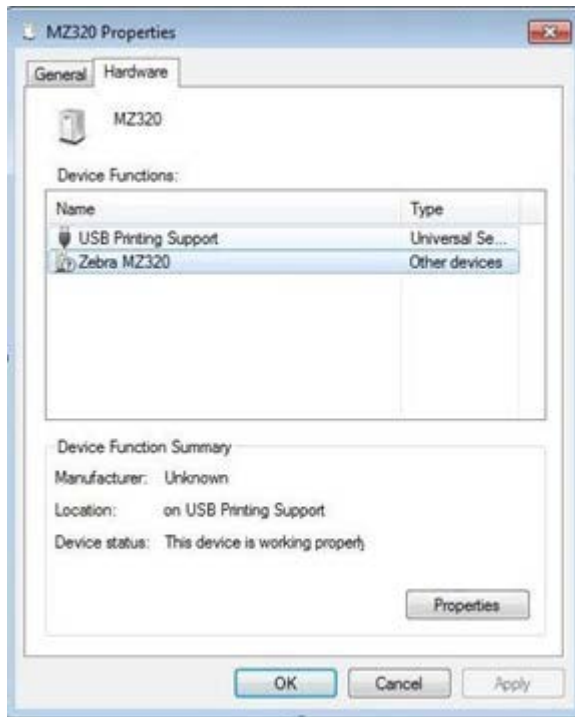


4. Right-click on the device, and select **Properties**.

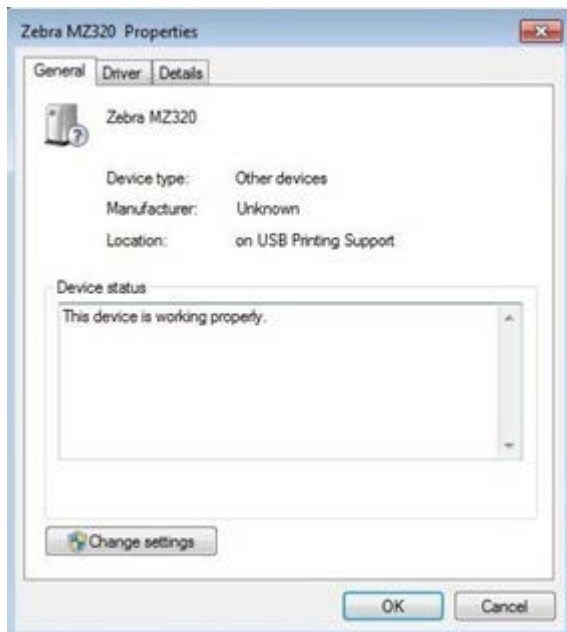
The properties for the device display.



5. Click the **Hardware** tab.



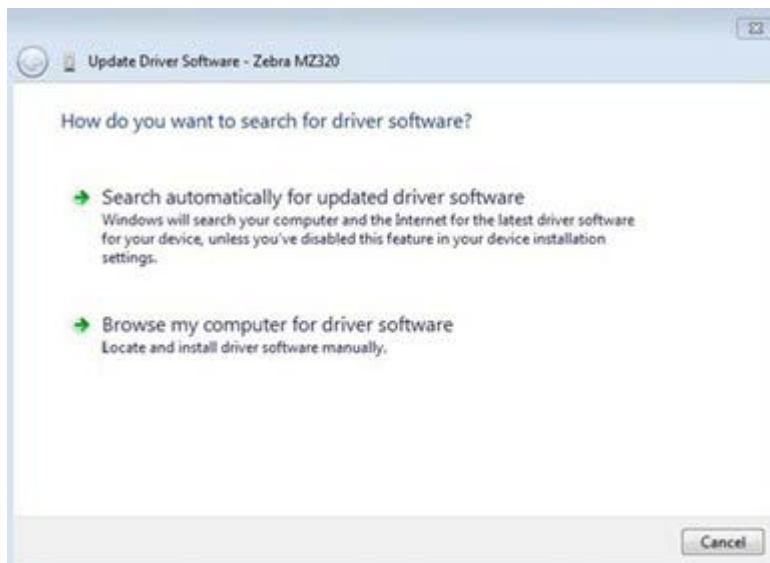
6. Select the Zebra printer in the **Device Functions** list, and then click **Properties**.
The properties display.



7. Click **Change settings** and then click the **Driver** tab.



8. Click **Update Driver**.



9. Click **Browse my computer for driver software**.
10. Click **Browse...** and navigate to the Downloads folder.

11. Click **OK** to select the folder.



12. Click **Next**.

The device is updated with the correct drivers.

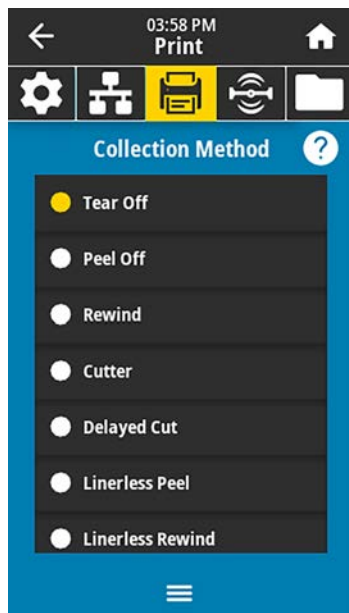
Determining the Label Collection Method

Use a label collection method that matches the media being used and the printer options available using the table and figures at the end of this section.

The media path is the same for roll and fanfold media.

1. On the Home screen, touch **Menu > Print > Label Position > Collection Method**.

The Collection Method options display.



2. Select a collection method that is compatible with the options available on your printer.
3. Touch the **Home** icon to return to the Home screen.

Table 2 Collection Methods and Printer Options

| Collection Method | Required Printer Option | Description |
|-------------------|---|--|
| Tear Off | Can be used with any printer option and most media types. | The printer prints label formats as it receives them. The printer operator can tear off the printed labels when the printer stops. |
| Peel Off | Liner Take-Up option or Rewind option | The printer peels the label from the backing during printing and then pauses until the label is removed. The empty backing may be allowed to exit the front of the printer, or it may be wound onto the liner take-up spindle or rewind spindle. |
| Rewind | Rewind option | The printer prints without pausing between labels. The media is wound onto a core after printing. The rewind plate is used to keep the labels from separating from the backing. |
| Cutter | Cutter option | The printer cuts between labels after each one is printed. |
| Delayed Cut | Cutter option | The printer waits for a delayed cut ZPL command (~JK) before it cuts the last printed label. |
| Applicator | This mode is for use with a machine that applies labels. | The printer prints when it receives a signal from the applicator. Authorized Service Technicians should refer to the Advanced User Information section of the Maintenance Manual for additional information about the applicator interface. |

Table 2 Collection Methods and Printer Options (Continued)


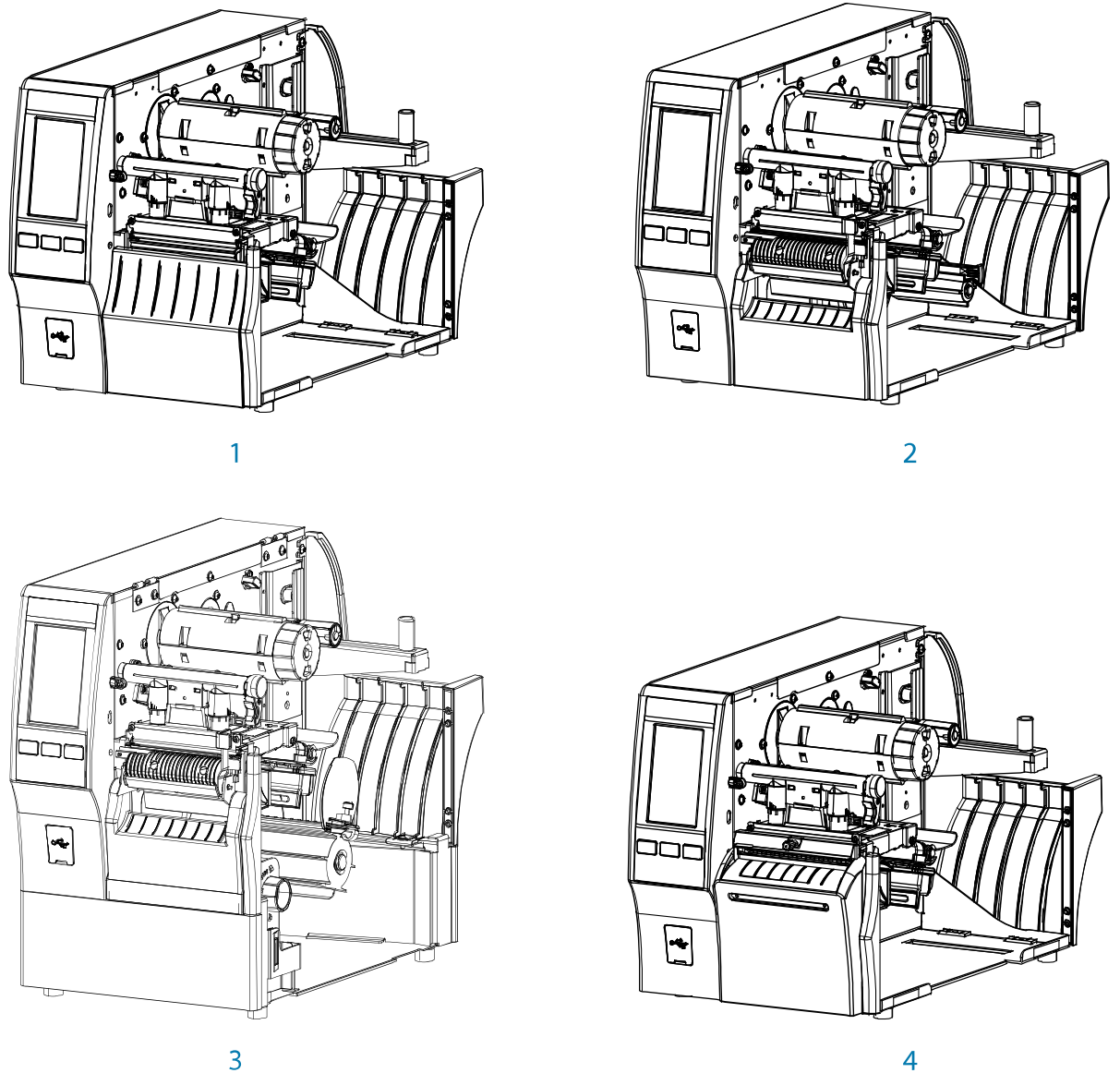
| Collection Method | Required Printer Option | Description |
|--|-------------------------|-------------|
|  NOTE: Linerless Peel, Linerless Rewind, Linerless Tear, Linerless Cut, and Linerless Delayed Cut are options reserved for future use. | | |

Figure 1 Printer Options



| | | | |
|---|---------------------|---|--------------------------------|
| 1 | Tear-Off (standard) | 2 | Peel with Liner Take-Up option |
| 3 | Rewind option | 4 | Cutter option |

Loading the Media

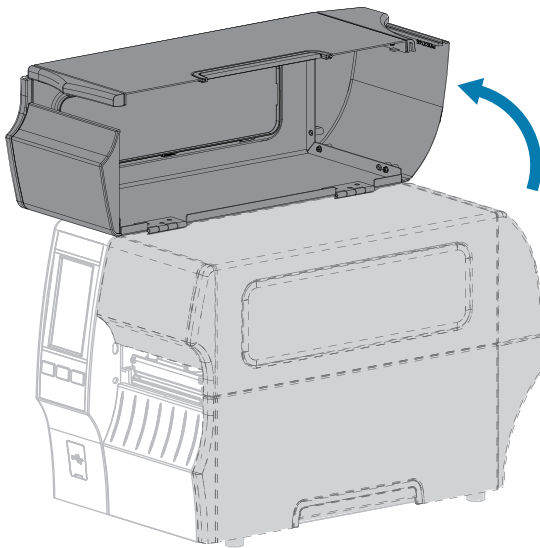
Use the instructions in this section for loading roll or fanfold media in the appropriate label collection method for your needs.



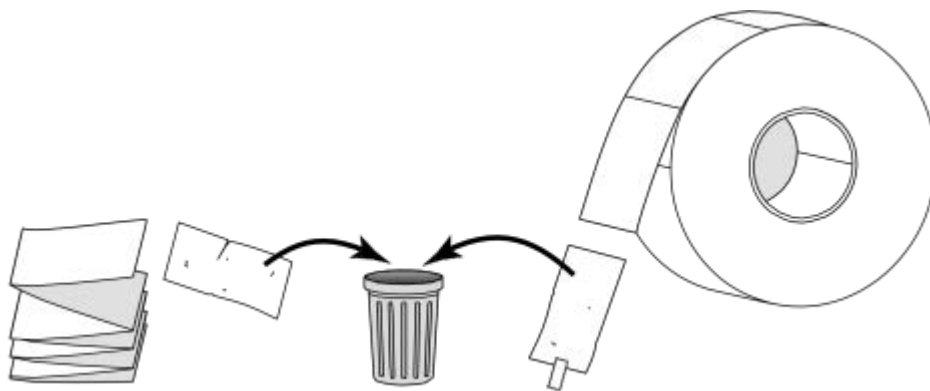
IMPORTANT: You are not required to turn off the printer power when working near an open printhead, but Zebra recommends it as a precaution. If you turn off the power, you will lose all temporary settings, such as label formats, and you must reload them before you resume printing.

Inserting the Media into the Printer

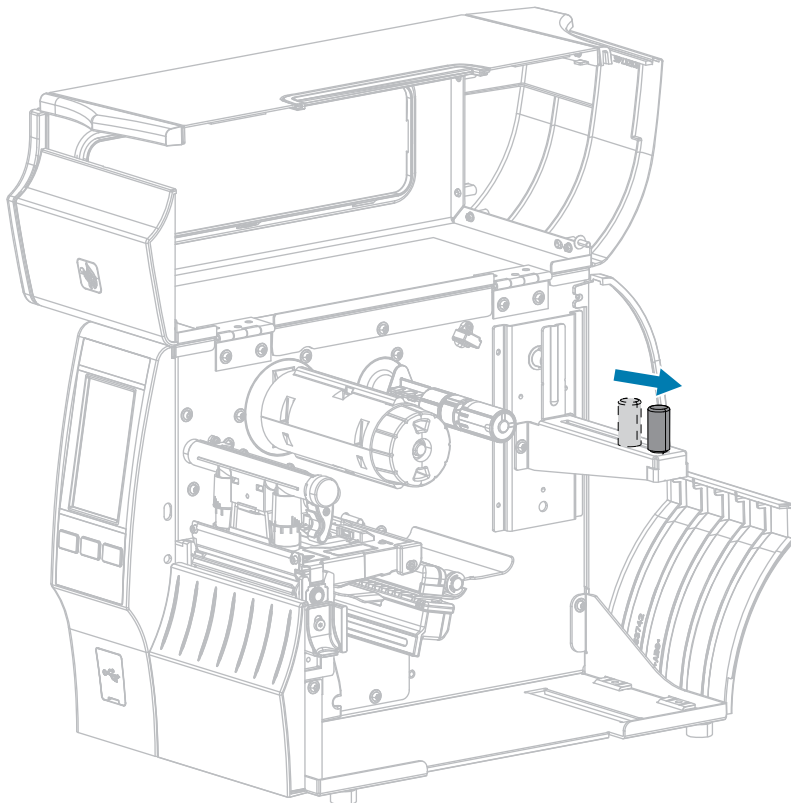
1. Raise the media door.





2. Remove and discard any tags or labels that are torn or dirty or that are held by adhesives or tape.



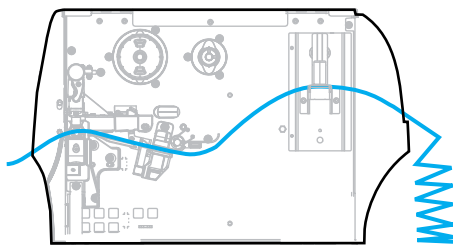
3. Pull out the media supply guide as far as it goes.



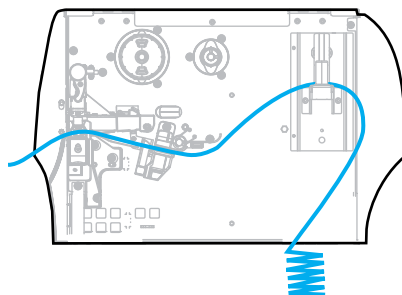
4. Insert roll or fanfold media into the printer. The media loading path is the same for both roll and fanfold media, so this is the only step that will be different.

| Type of media | Instructions |
|--|---|
| Roll media  | Place the roll of media on the media supply hanger. Push the roll as far back as it will go. |
| Fanfold media  | Fanfold media can be stored behind or under the printer. Depending on where the media is stored, feed the media either from behind or through the bottom access slot, then drape it over the media supply hanger. |

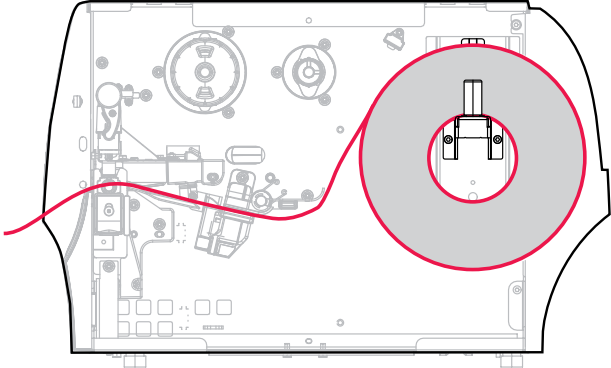
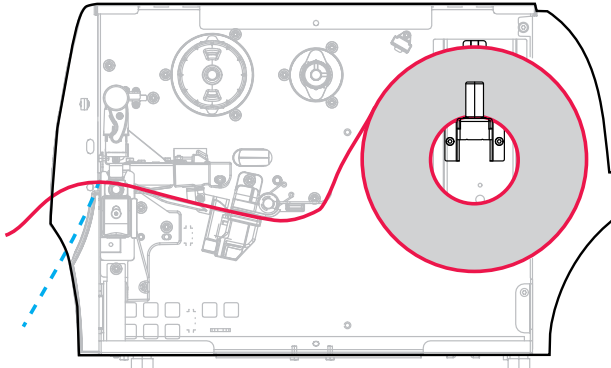
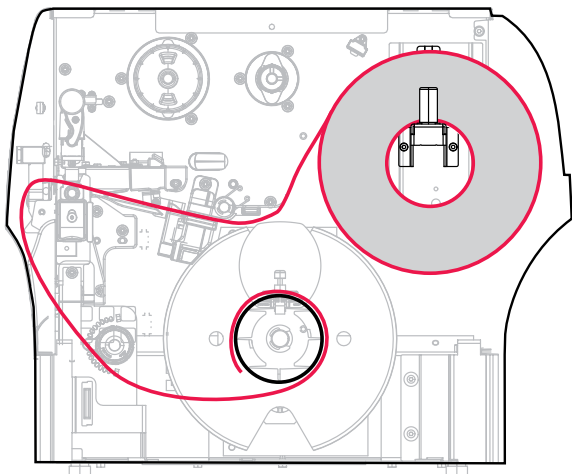
Rear Feed

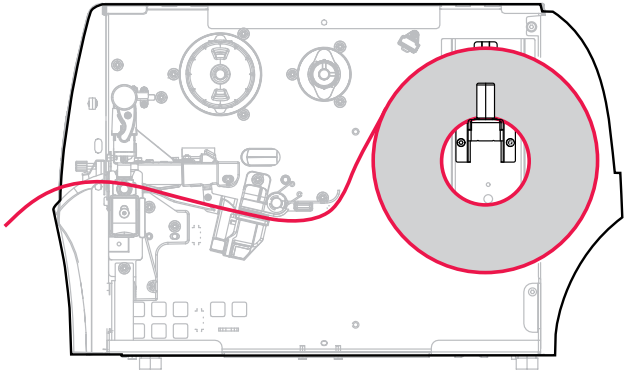


Bottom Feed

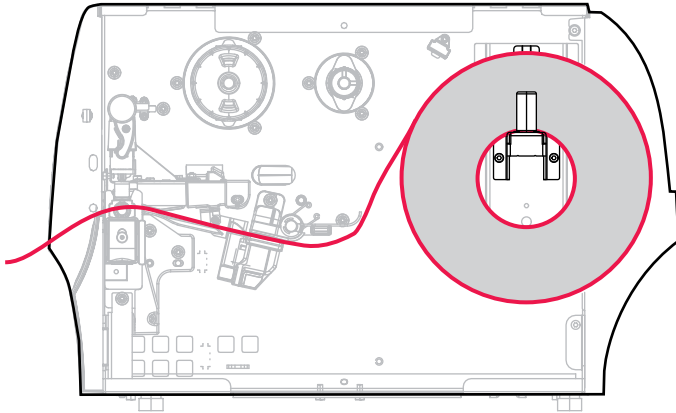


5. Which collection method are you using? (See [Determining the Label Collection Method](#) on page 28.)

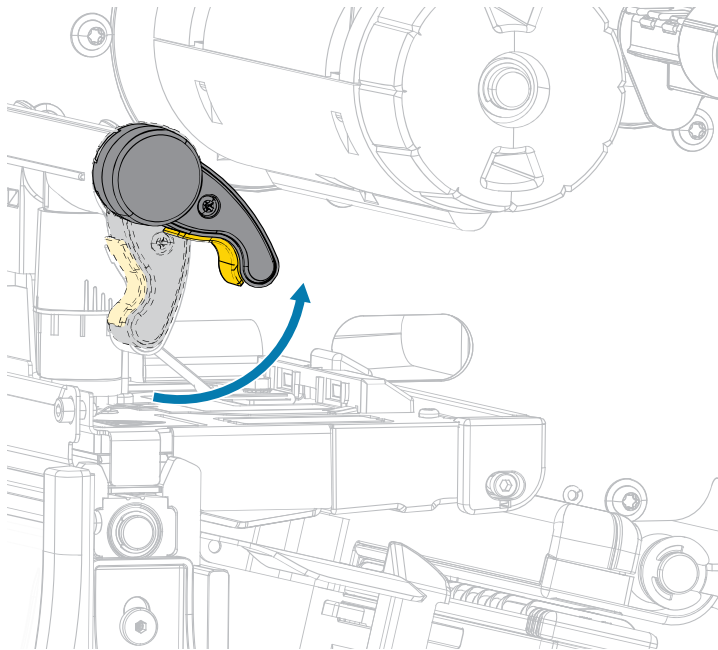
| If using... | Then... |
|---|--|
| <p>Tear Off</p>  | <p>Continue with Using Tear-Off Mode on page 35.</p> |
| <p>Peel Off (with or without liner take-up)</p>  | <p>Continue with Using Peel-Off Mode (with or without Liner Take-Up) on page 39.</p> |
| <p>Rewind</p>  | <p>Continue with Using Rewind Mode on page 49.</p> |

| If using... | Then... |
|--|--|
| <p data-bbox="334 258 602 289">Cutter or Delayed Cut</p>  <p>The diagram shows a top-down view of the printer's internal mechanism. A red line represents the paper path, starting from the left, moving right, then looping around a central component (likely a cutter or a roller) which is highlighted with a red circle. The rest of the printer's internal components are shown in a light gray outline.</p> | <p data-bbox="1146 258 1518 352">Continue with Using Cutter Mode or Delayed Cut Mode on page 57.</p> |

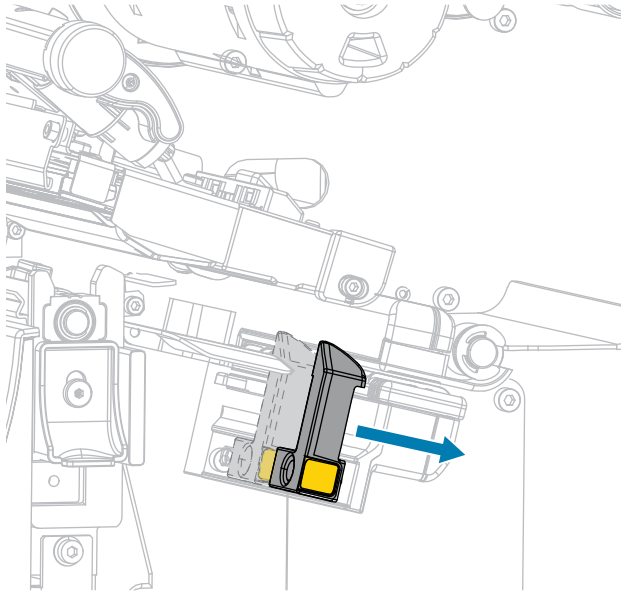
Using Tear-Off Mode



1. If you have not already done so, follow the instructions in the section [Inserting the Media into the Printer](#) on page 31.
2. Open the printhead assembly by rotating the printhead-open lever upward.

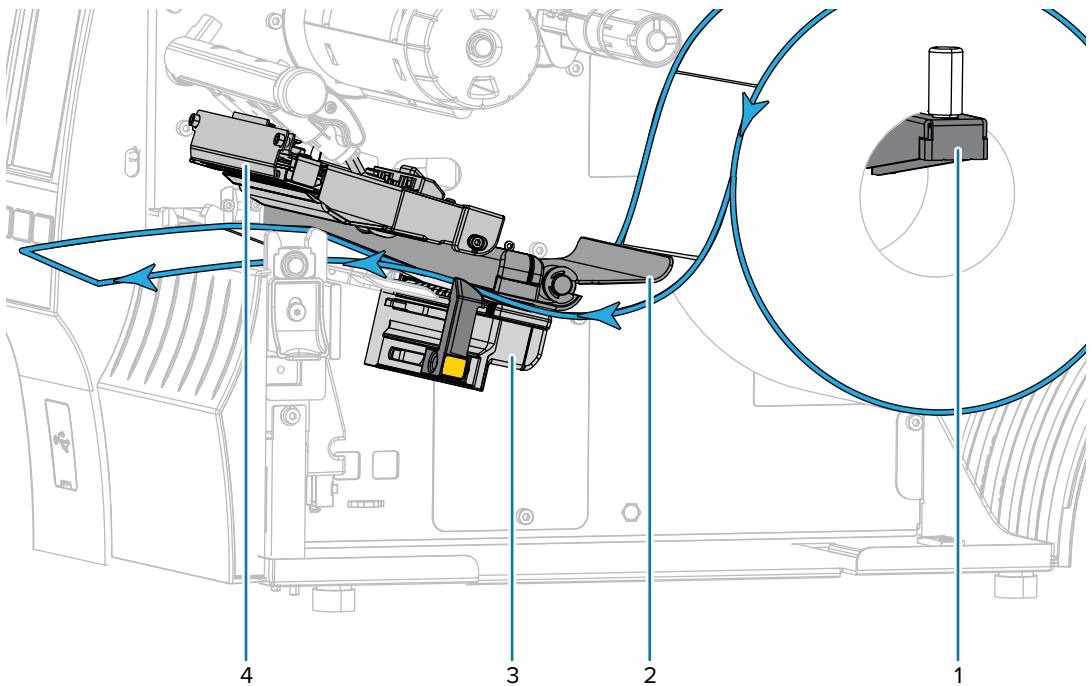


3. Slide the media guide all the way out.

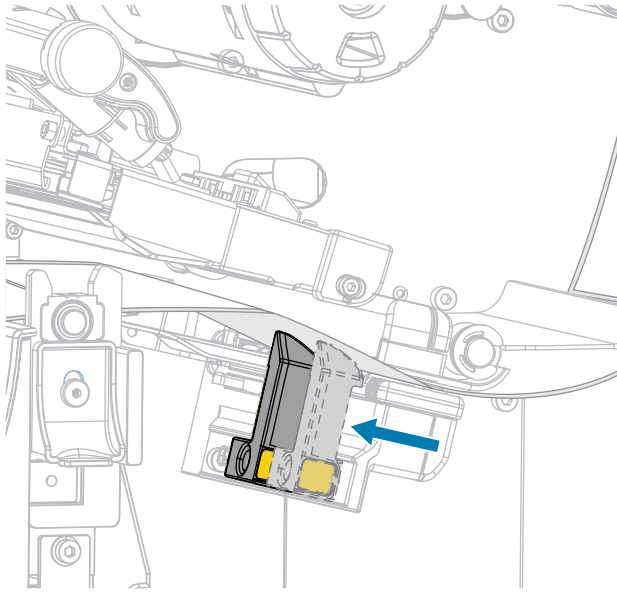


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

4. From the media hanger (1), feed the media under the dancer assembly (2), through the media sensor (3), and under the printhead assembly (4). Slide the media back until it touches the inside back wall of the media sensor.



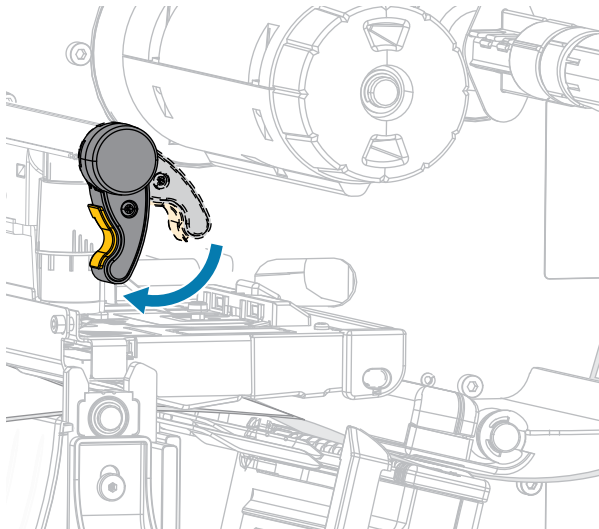
- Slide in the media guide until it just touches the edge of the media.



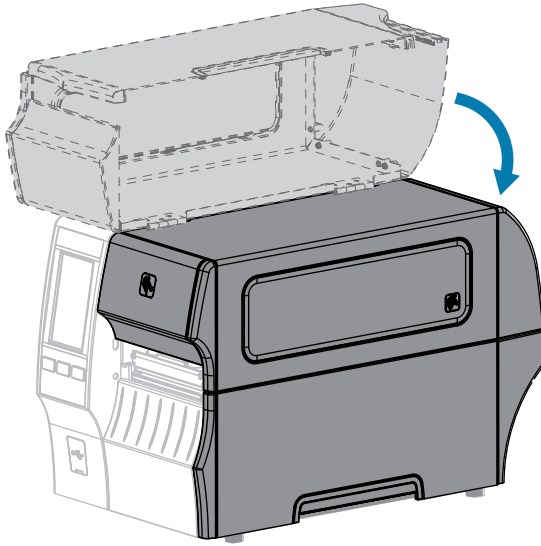
- Does the media that you are using require ribbon for printing? If you are not sure, see [Ribbon](#) on page 10.

| If using... | Then... |
|---|---|
| Direct Thermal media (no ribbon needed) | Continue with step 7 on page 37. |
| Thermal Transfer media (ribbon needed) | If you have not already done so, load ribbon in the printer using the instructions in Loading the Ribbon on page 62, then continue on to step 7 on page 37. |

- Rotate the printhead-open lever downward until it locks the printhead in place.



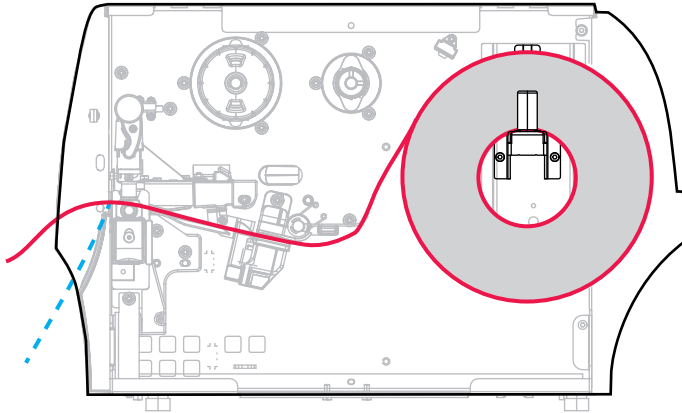
8. Close the media door.



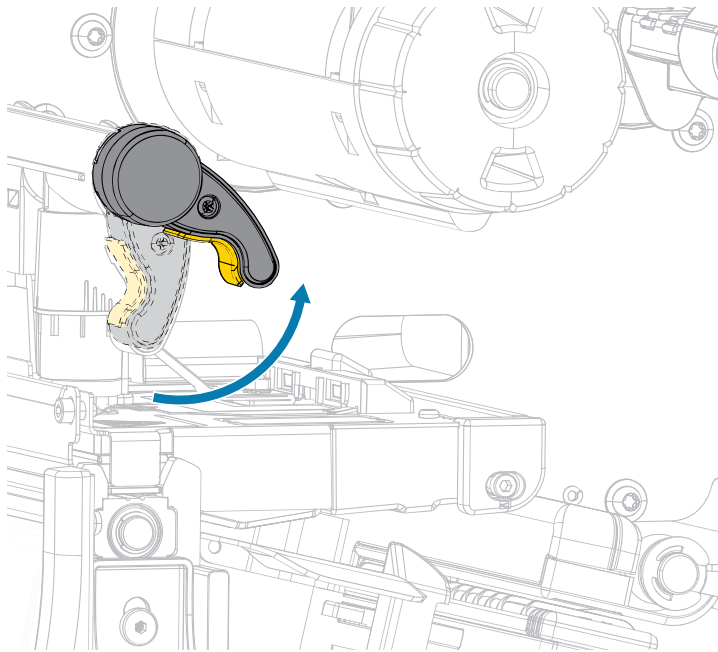
9. Set the printer to the appropriate collection method that is compatible with your printer (see [Print Menu > Label Position > Collection Method](#)).
10. Press **PAUSE** to exit pause mode and enable printing.
The printer may perform a label calibration or feed a label, depending on your settings.
11. For optimal results, calibrate the printer (see [Calibrating the Ribbon and Media Sensors](#) on page 118).
12. Verify that your printer is able to print a configuration label by holding both the **FEED** and **CANCEL** keys for 2 seconds.

Media loading in Tear-Off mode is complete.

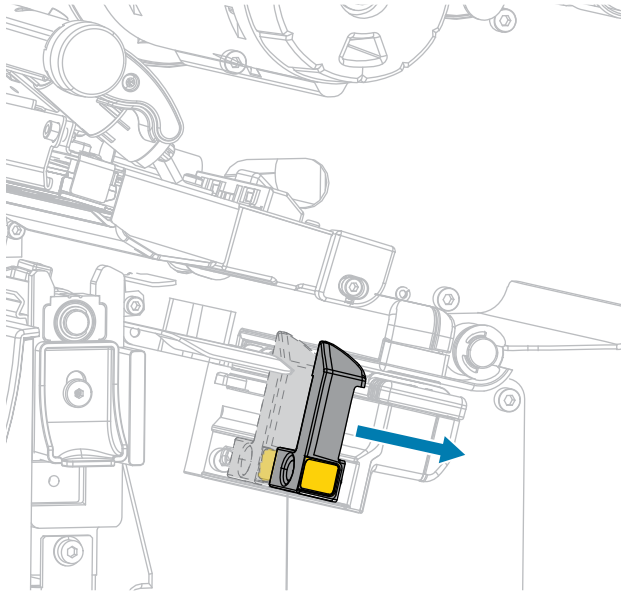
Using Peel-Off Mode (with or without Liner Take-Up)



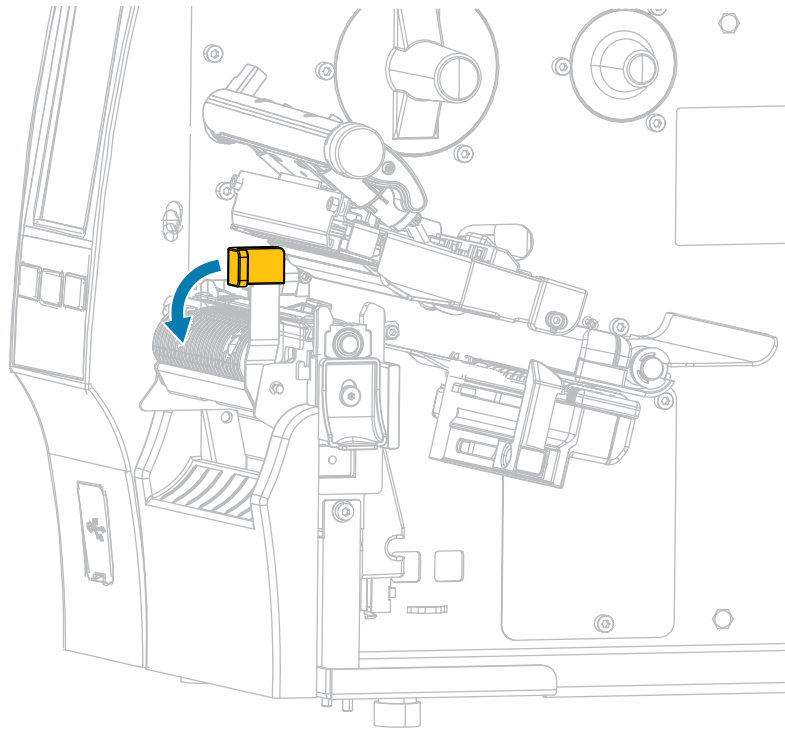
1. If you have not already done so, follow the instructions in the section [Inserting the Media into the Printer](#) on page 31.
2. Open the printhead assembly by rotating the printhead-open lever upward.



3. Slide the media guide all the way out.

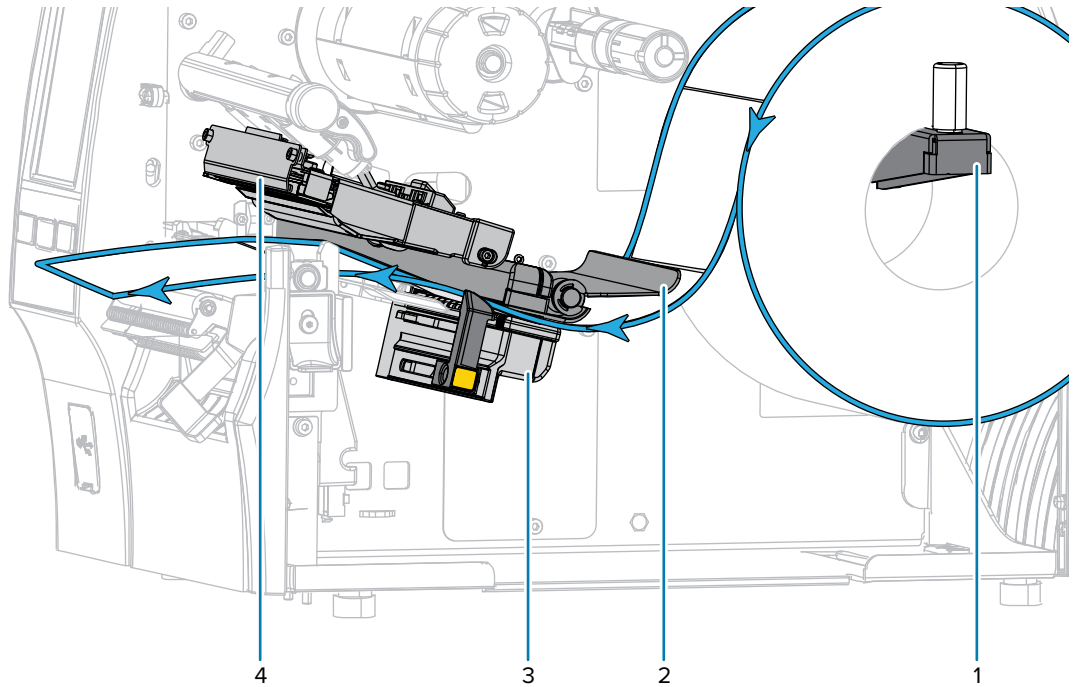


4. Push down the peel-off mechanism release lever to open the peel assembly.

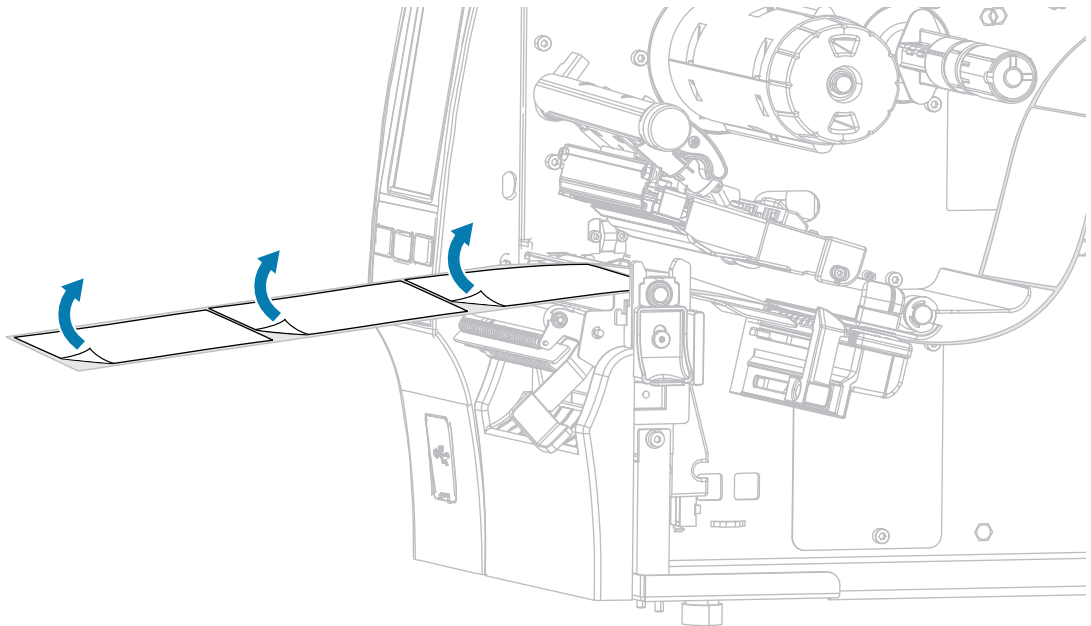


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

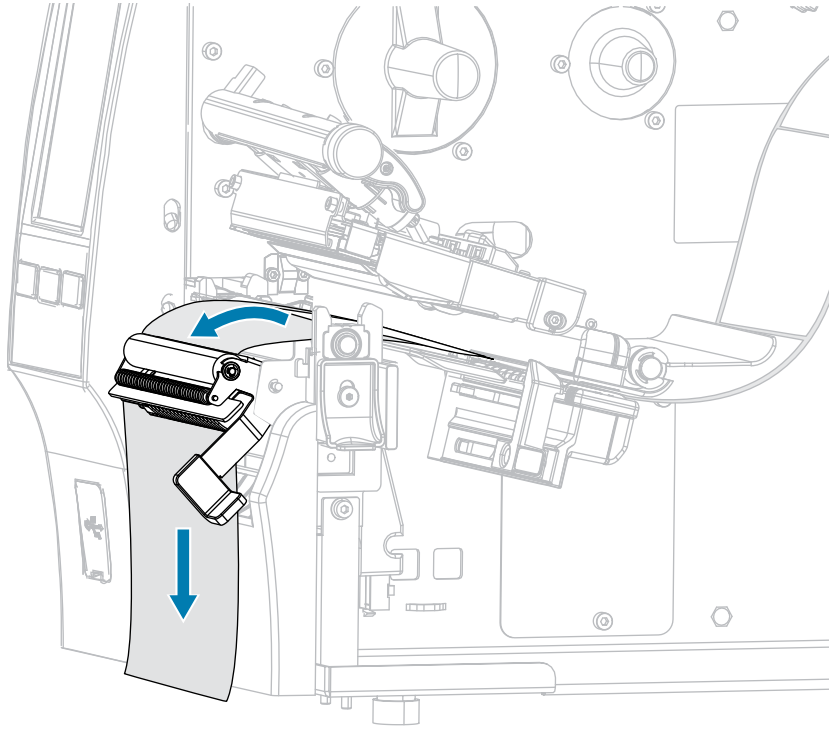
5. From the media hanger (1), feed the media under the dancer assembly (2), through the media sensor (3), and under the printhead assembly (4). Slide the media back until it touches the inside back wall of the media sensor.



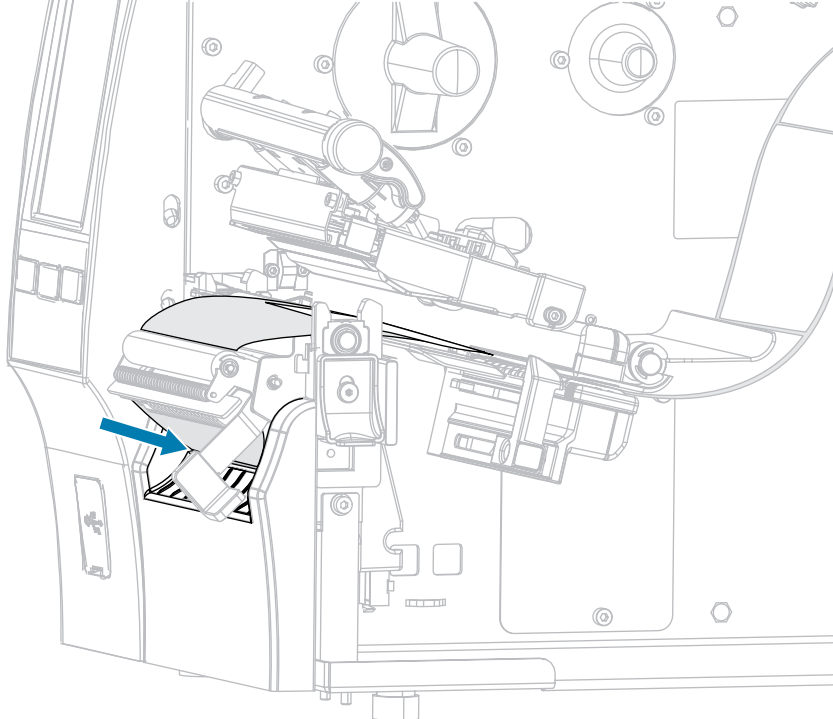
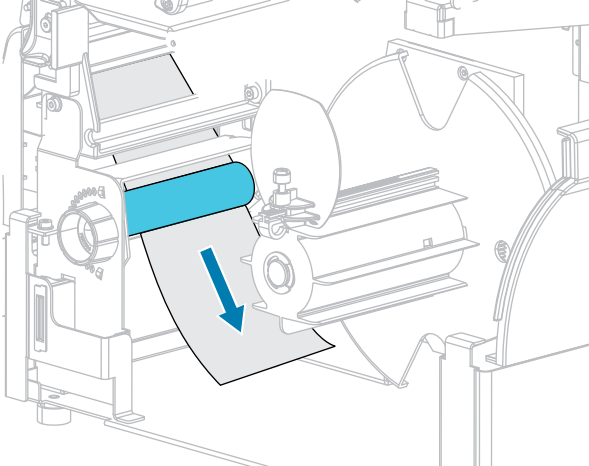
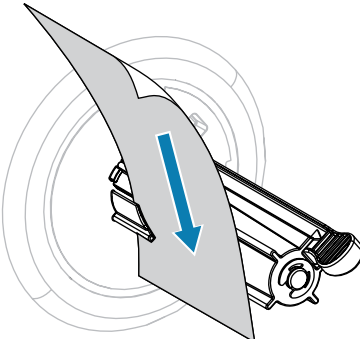
6. Extend approximately 18 in. (500 mm) of media out of the printer. Remove and discard the labels from this exposed media, leaving just the liner.

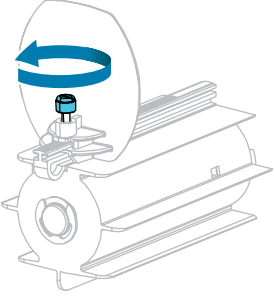
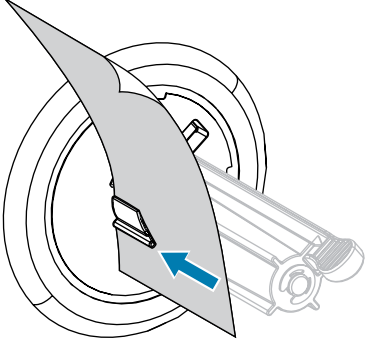
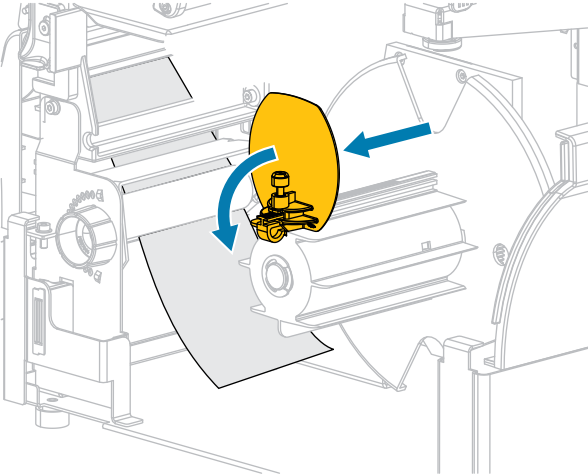
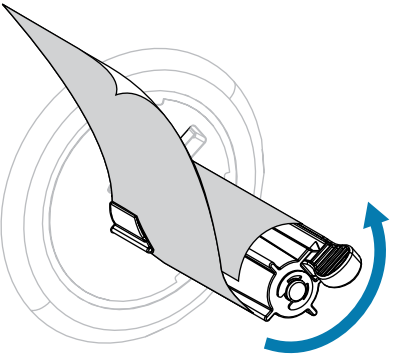
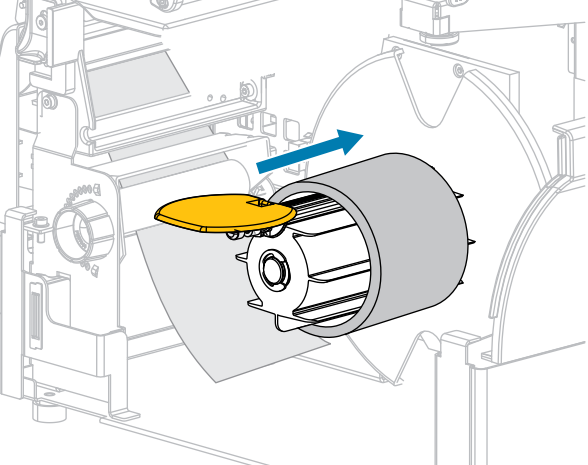


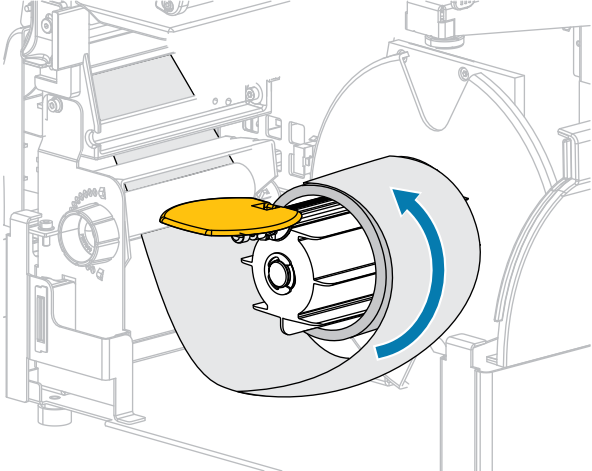
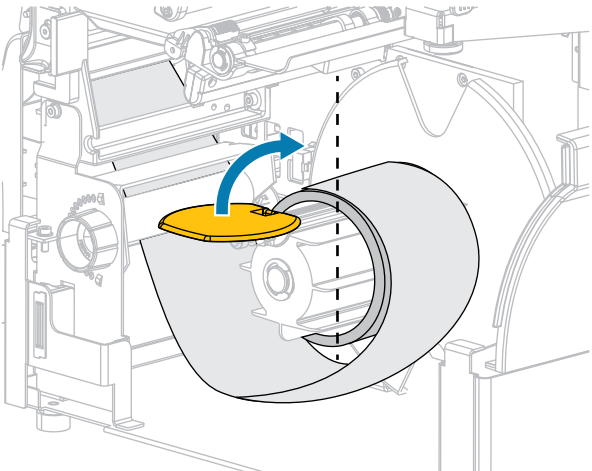
7. Feed the liner behind the peel assembly. Make sure that the end of the liner falls outside of the printer.

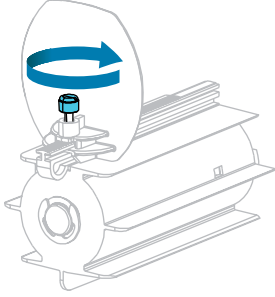


8. Complete this step only if you want to use Peel-Off mode with Liner Take-Up. Your printer must have the Liner Take-Up option or the Rewind option installed. Follow the instructions for your printer option. (If you are not using Liner Take-Up, skip this step and proceed to step 9 on page 46.)

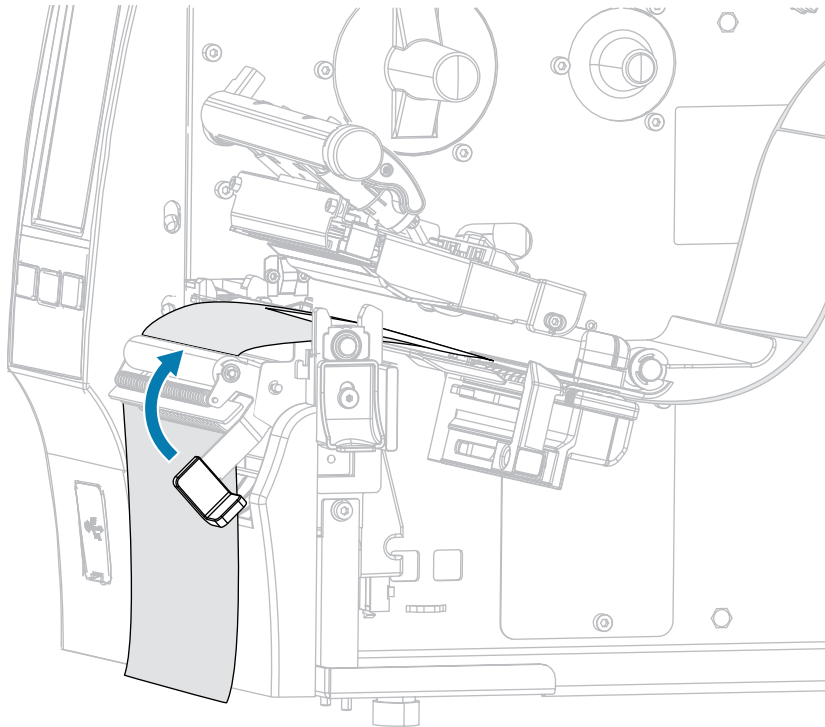
| Rewind Option | Liner Take-Up Option |
|--|---|
| <p>a. For both the Rewind option and the Liner Take-Up option: Thread the liner into the slot below the peel assembly.</p> | |
|  | |
| <p>b. Feed the liner under the media alignment roller.</p>  | <p>b. Slide the liner into the slot in the liner take-up spindle.</p>  |

| Rewind Option | Liner Take-Up Option |
|---|---|
| <p>c. Loosen the thumbscrew on the rewind media guide.</p>  | <p>c. Push the liner back until it touches the back plate of the liner take-up spindle assembly.</p>  |
| <p>d. Slide the rewind media guide all the way out, and then fold it down.</p>  | <p>d. Wrap the liner around the liner take-up spindle and turn the spindle counterclockwise to tighten the liner.</p>  <p>For the Liner Take-Up option, loading of the liner is complete. Continue on to step 9 on page 46.</p> |
| <p>e. Slide an empty core onto the rewind spindle.</p>  | |

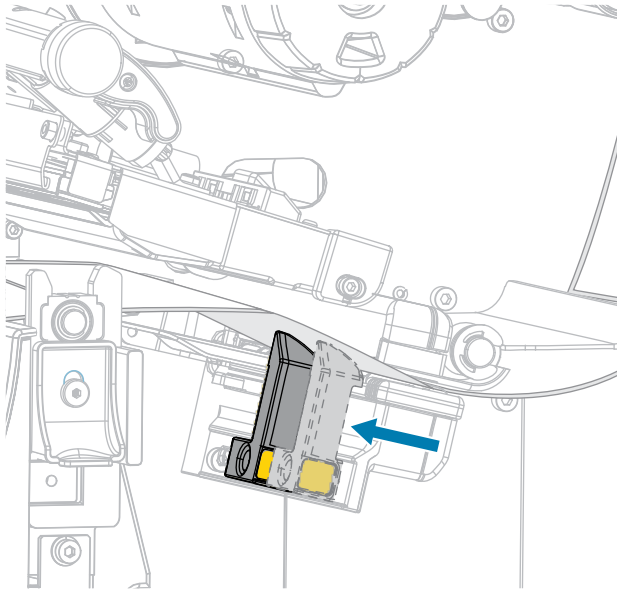
| Rewind Option | Liner Take-Up Option |
|--|----------------------|
| <p>f. Wrap the liner around the core as shown, and then turn the rewind spindle to tighten the media.</p> <p>Ensure that the edge of the media is flush against the backplate of the rewind spindle.</p>  | |
| <p>g. Fold up the rewind media guide, and then slide it in until it touches the liner.</p>  | |

| Rewind Option | Liner Take-Up Option |
|--|----------------------|
| <p data-bbox="354 247 992 279">h. Tighten the thumbscrew on the rewind media guide.</p>  <p data-bbox="354 611 1013 667">Loading of the liner is complete. Continue with step 9 on page 46.</p> | |

9. Close the peel assembly using the peel-off mechanism release lever.



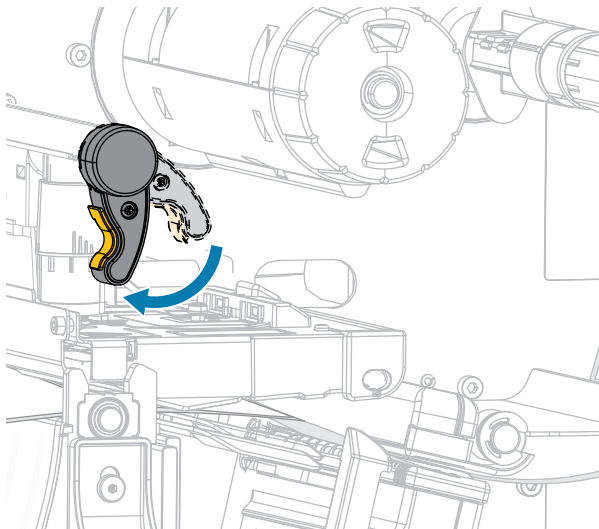
10. Slide in the media guide until it just touches the edge of the media.



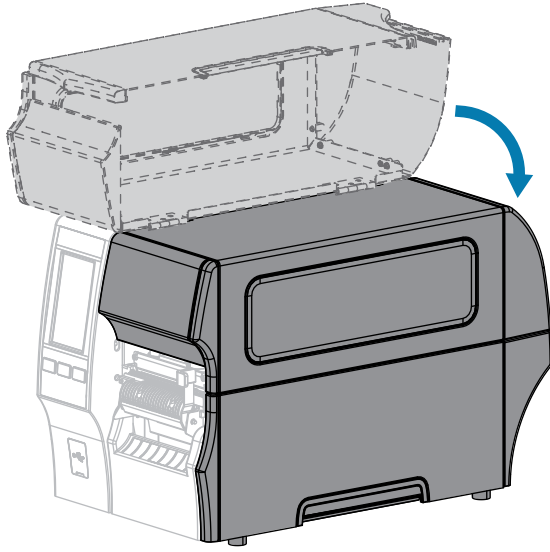
11. Does the media that you are using require ribbon for printing? If you are not sure, see [Ribbon](#) on page 10.

| If using... | Then... |
|---|---|
| Direct Thermal media (no ribbon needed) | Continue with step 12 on page 47. |
| Thermal Transfer media (ribbon needed) | <p>a. If you have not already done so, load ribbon in the printer. (See Loading the Ribbon on page 62.)</p> <p>b. Continue with step 12 on page 47.</p> |

12. Rotate the printhead-open lever downward until it locks the printhead in place.



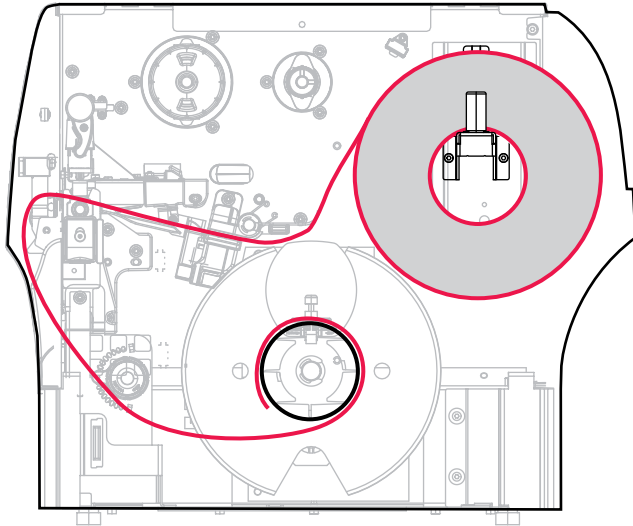
13. Close the media door.



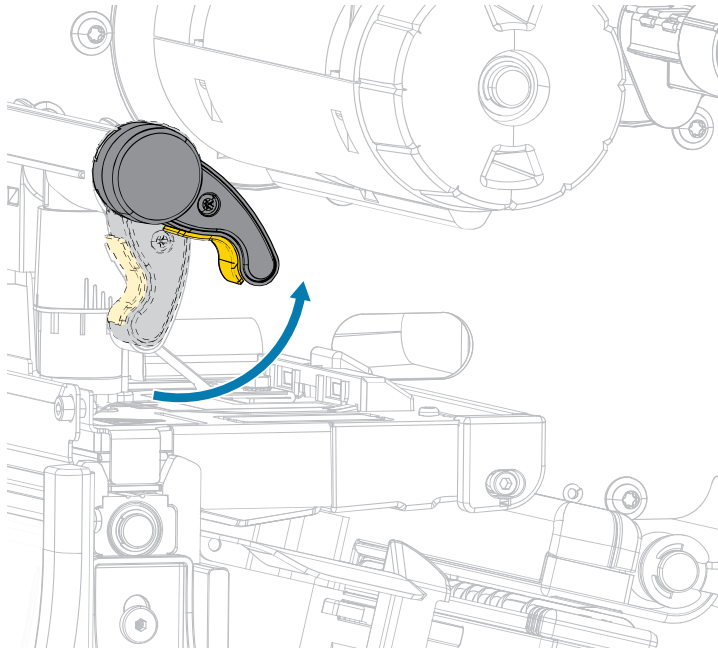
14. Set the printer to the appropriate collection method (see [Print > Label Position > Collection Method](#)).
15. Press **PAUSE** to exit pause mode and enable printing.
The printer may perform a label calibration or feed a label, depending on your settings.
16. For optimal results, calibrate the printer (see [Calibrating the Ribbon and Media Sensors](#) on page 118).
17. Verify that your printer is able to print a configuration label by holding both the **FEED** and **CANCEL** keys for 2 seconds.

Media loading in Peel-Off mode is complete.

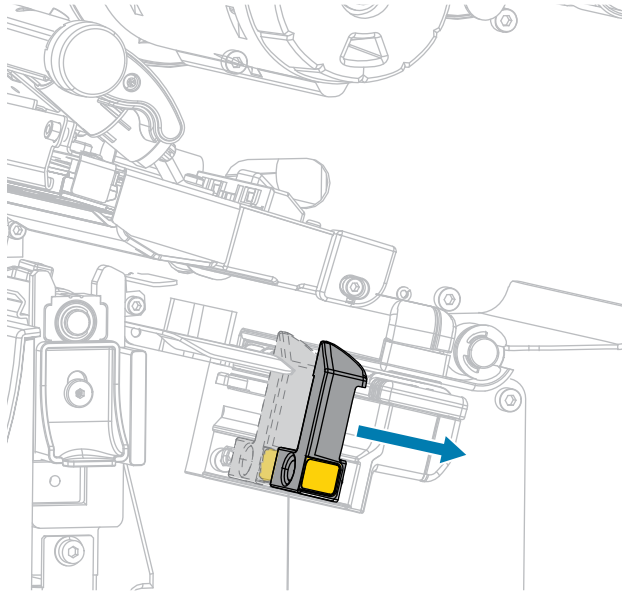
Using Rewind Mode



1. If you have not already done so, follow the instructions in [Inserting the Media into the Printer](#) on page 31.
2. Open the printhead assembly by rotating the printhead-open lever upward.

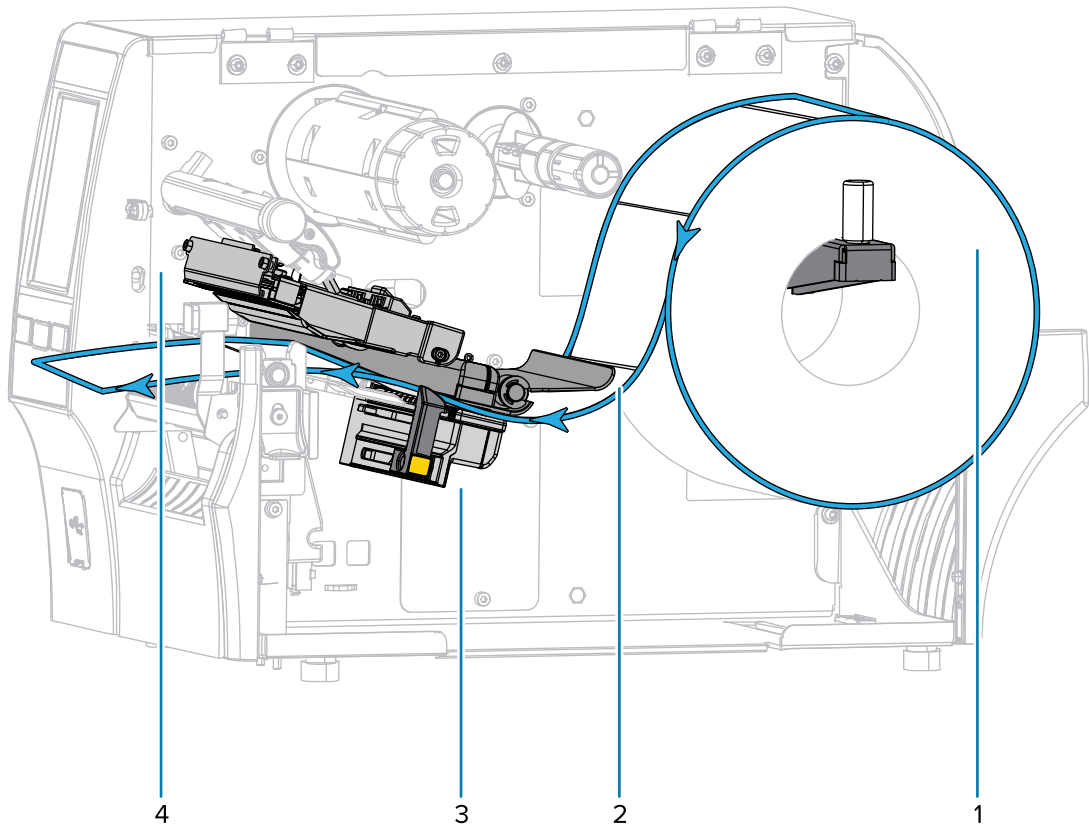


3. Slide the media guide all the way out.

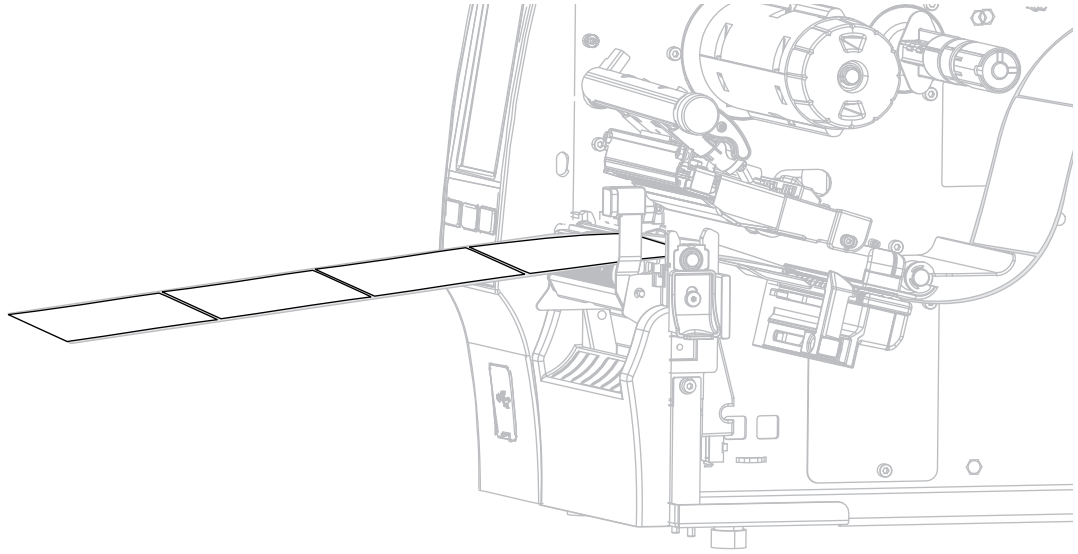


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

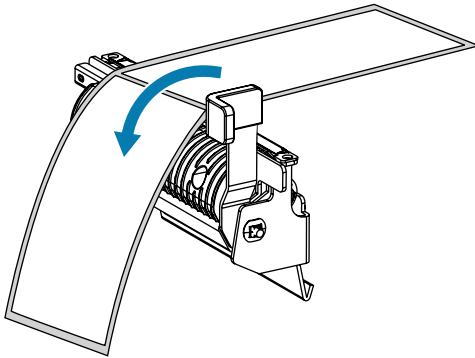
4. From the media hanger (1), feed the media under the dancer assembly (2), through the media sensor (3), and under the printhead assembly (4). Slide the media back until it touches the inside back wall of the media sensor.



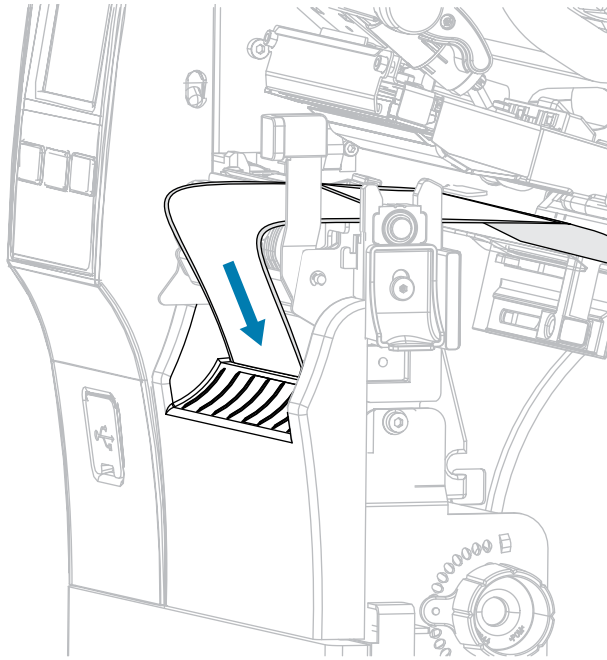
5. Extend approximately 18 in. (500 mm) of media out of the printer.



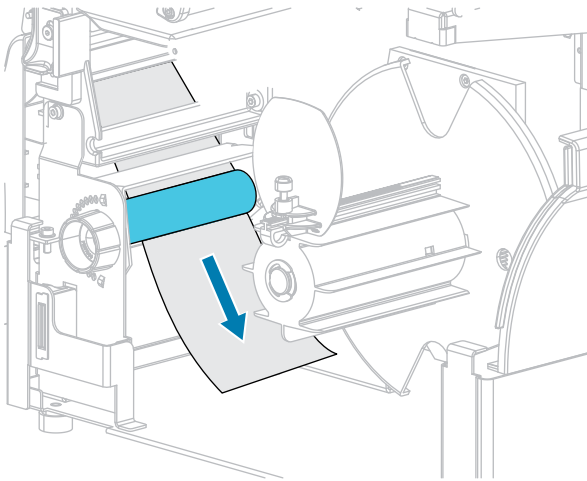
6. Feed the media over the peel assembly.



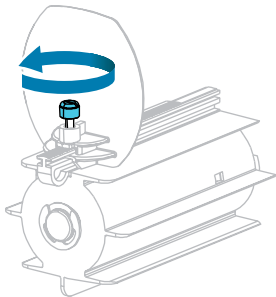
7. Thread the media into the slot below the peel assembly.



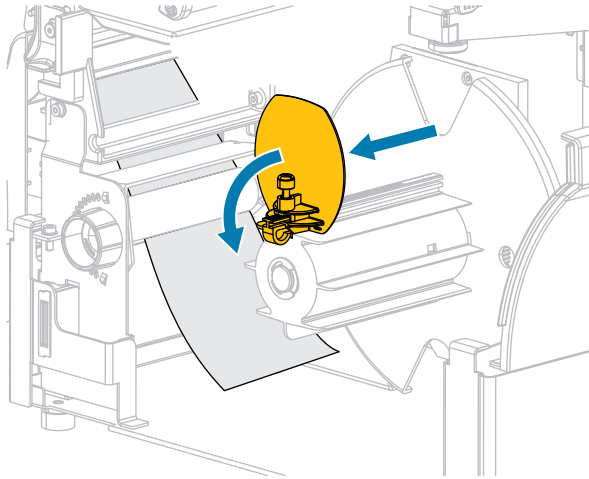
8. Feed the media under the media alignment roller.



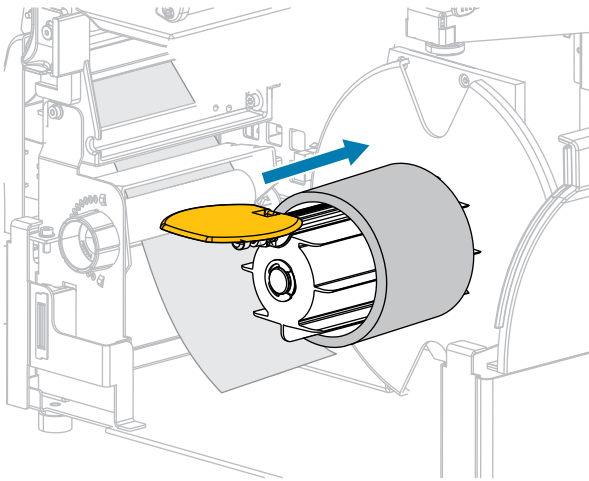
9. Loosen the thumbscrew on the rewind media guide.



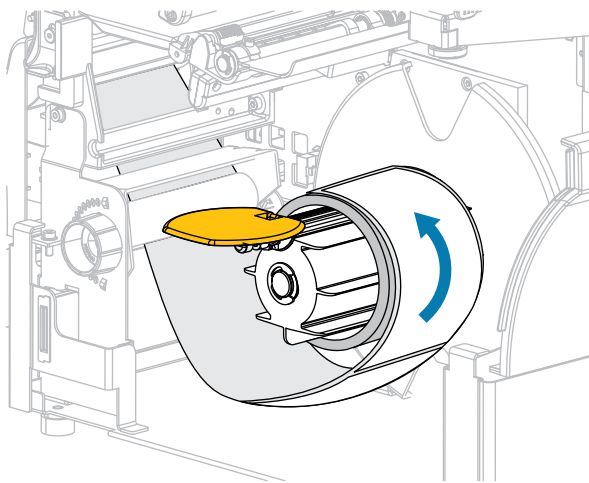
10. Slide the rewind media guide all the way out, and then fold it down.



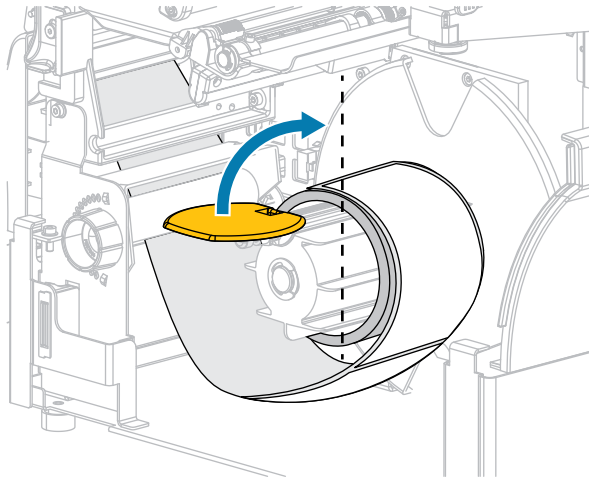
11. Slide an empty core onto the rewind spindle.



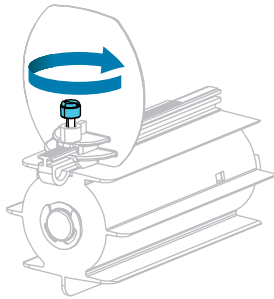
12. Wrap the media around the core as shown and turn the rewind spindle to tighten the media. Ensure that the edge of the media is flush against the backplate of the rewind spindle.



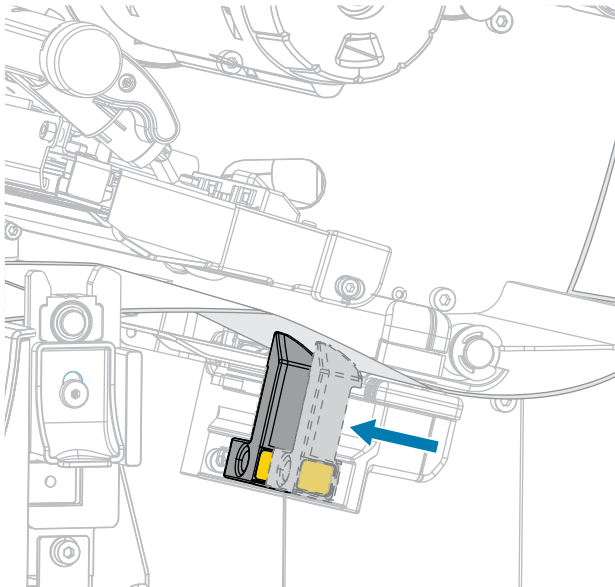
- 13.** Fold up the rewind media guide, and then slide it in until it touches the media.



- 14.** Tighten the thumbscrew on the rewind media guide.



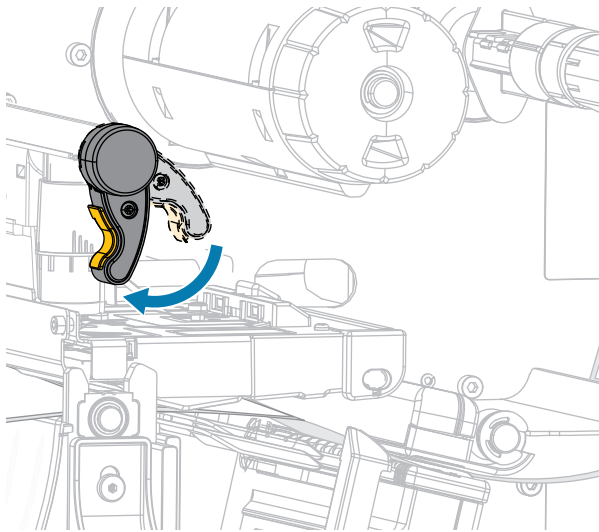
- 15.** Slide in the media guide until it just touches the edge of the media.



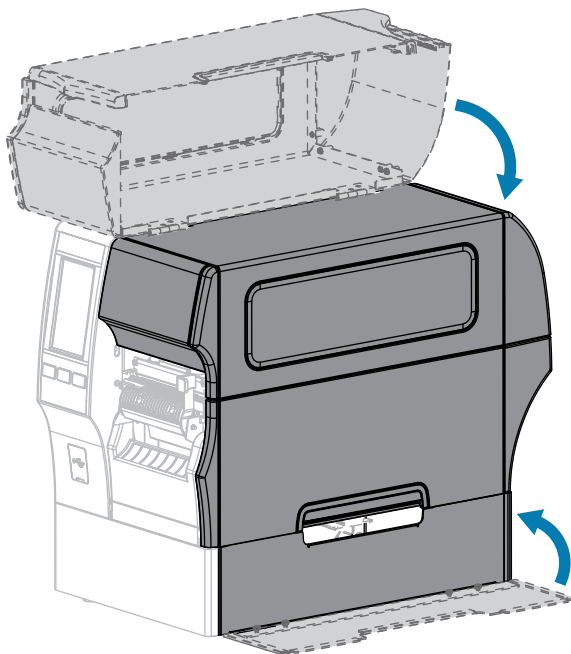
- 16.** Does the media that you are using require ribbon for printing? If you are not sure, see [Ribbon](#) on page 10.

| If using... | Then... |
|---|---|
| Direct Thermal media (no ribbon needed) | Continue with step 17 on page 55. |
| Thermal Transfer media (ribbon needed) | <p>a. If you have not already done so, load ribbon in the printer. (See Loading the Ribbon on page 62.)</p> <p>b. Continue with step 17 on page 55.</p> |

- 17.** Rotate the printhead-open lever downward until it locks the printhead in place.



- 18.** Close the media door and the rewind base door.



- 19.** Set the printer to Rewind mode. (For more information, see [Print > Label Position > Collection Method](#).)

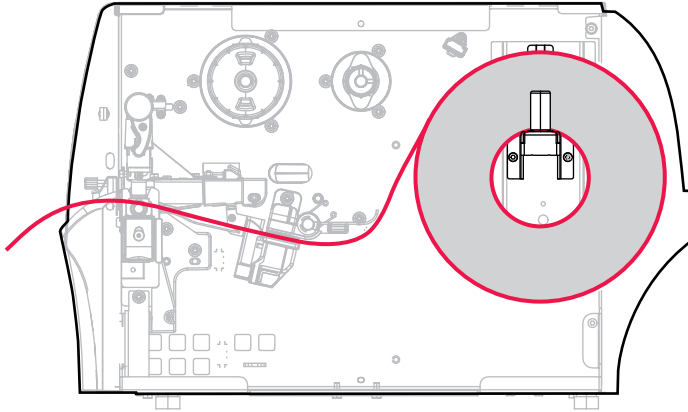
20. Press **PAUSE** to exit pause mode and enable printing.

The printer may perform a label calibration or feed a label, depending on your settings.

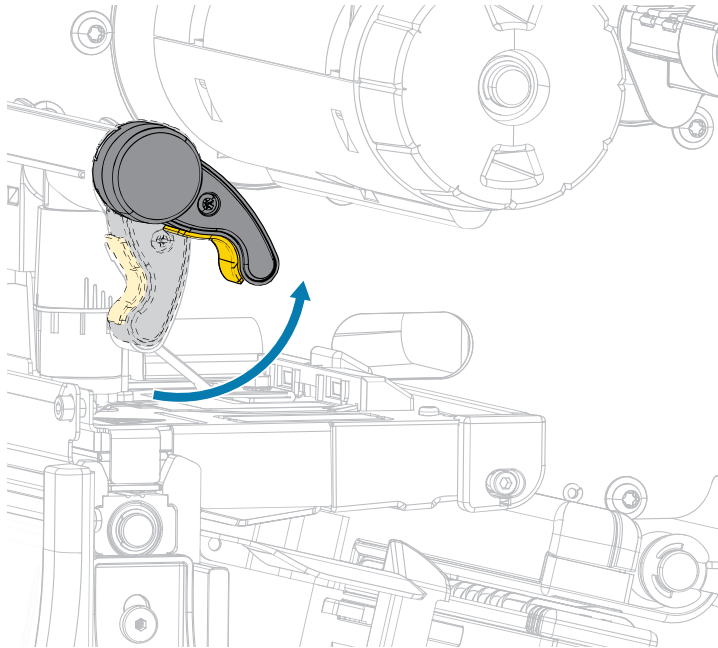
21. For optimal results, calibrate the printer. (See [Calibrating the Ribbon and Media Sensors](#) on page 118.)
22. Verify that your printer is able to print a configuration label by holding both the **FEED** and **CANCEL** keys for 2 seconds.

Media loading in Rewind mode is complete.

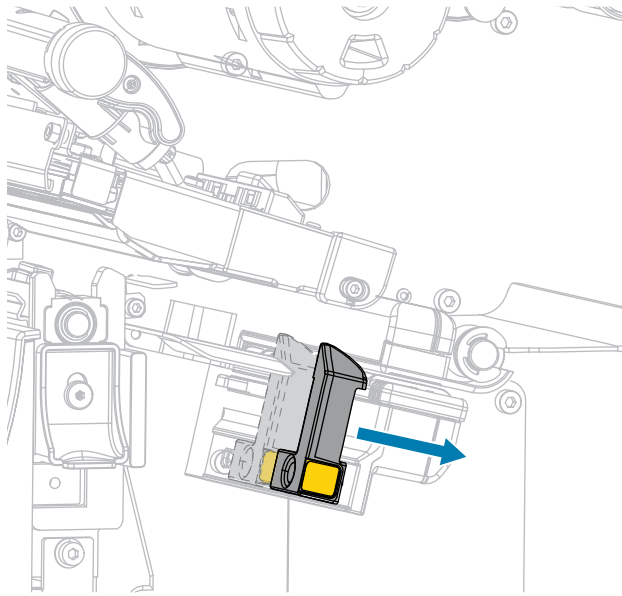
Using Cutter Mode or Delayed Cut Mode



1. If you have not already done so, follow the instructions in [Inserting the Media into the Printer](#) on page 31.
2. Open the printhead assembly by rotating the printhead-open lever upward.



3. Slide the media guide all the way out.

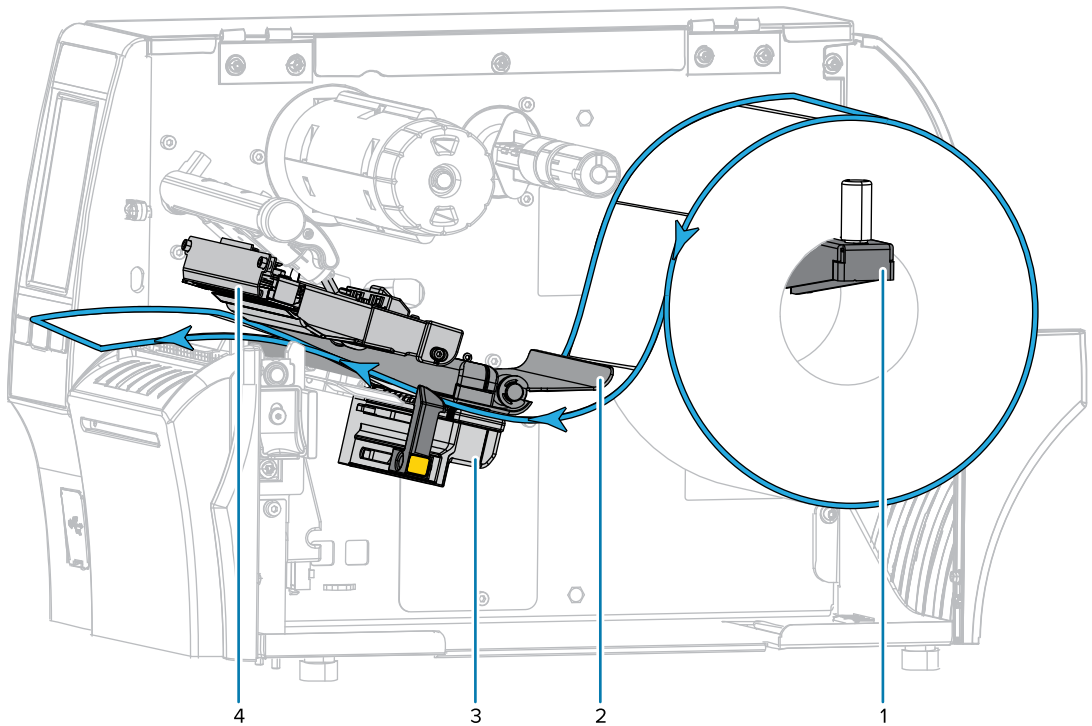


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

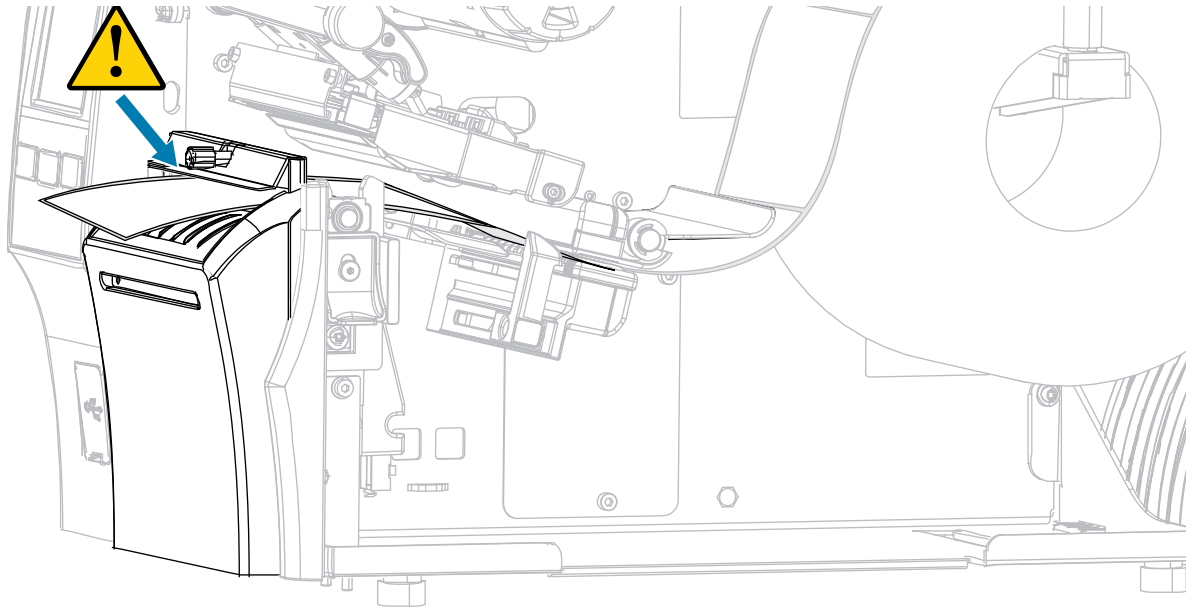
4. From the media hanger (1), feed the media under the dancer assembly (2), through the media sensor (3), and under the printhead assembly (4). Slide the media back until it touches the inside back wall of the media sensor.



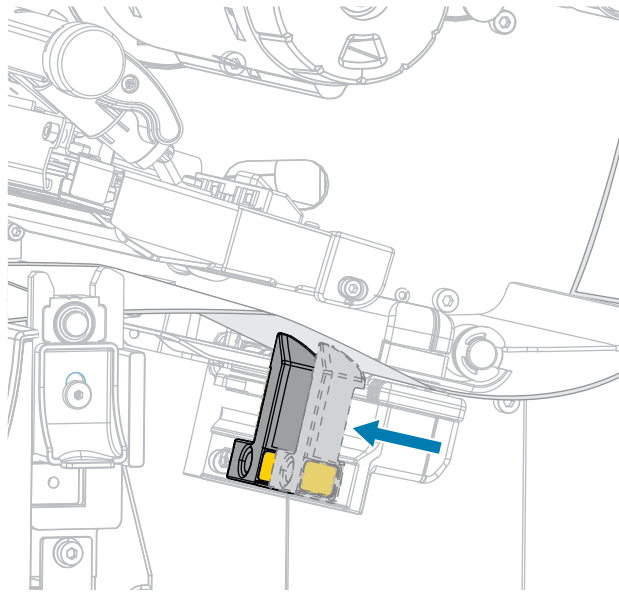
CAUTION: The cutter blade is sharp. Do NOT touch or rub the blade with your fingers.



5. Feed the media through the cutter.



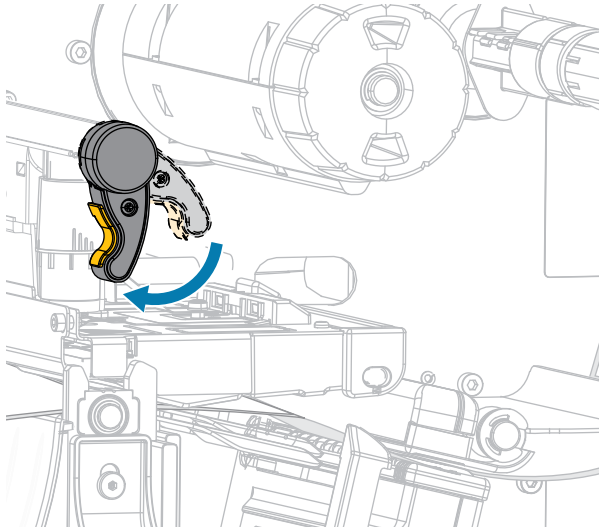
6. Slide in the media guide until it just touches the edge of the media.



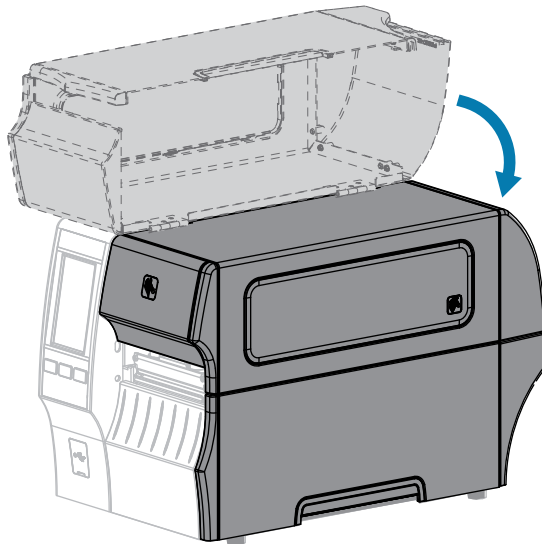
7. Does the media that you are using require ribbon for printing? If you are not sure, see [Ribbon](#) on page 10.

| If using... | Then... |
|---|--|
| Direct Thermal media (no ribbon needed) | Continue with step 8 on page 60. |
| Thermal Transfer media (ribbon needed) | If you have not already done so, load ribbon in the printer. See Loading the Ribbon on page 62. Continue with step 8 on page 60. |

8. Rotate the printhead-open lever downward until it locks the printhead in place.



9. Close the media door.



10. Set the printer to the appropriate collection method (for more information, see [Print > Label Position > Collection Method](#)).
11. Press **PAUSE** to exit pause mode and enable printing.
The printer may perform a label calibration or feed a label, depending on your settings.
12. For optimal results, calibrate the printer (see [Calibrating the Ribbon and Media Sensors](#) on page 118).
13. Verify that your printer is able to print a configuration label by holding both the **FEED** and **CANCEL** keys for 2 seconds.

Media loading in Cutter mode is complete.

Determining the Type of Ribbon to Use



NOTE: This section applies only to printers that have the Thermal Transfer option installed.

What kind of ribbon can I use?

Rolls of ribbon are wound with the coated surface of ink on the inside of the roll or on the outside of the roll. This printer with a standard Thermal Transfer option uses ribbon that is coated on the outside. An optional ribbon spindle is available to use ribbon that is coated on the inside. Contact your authorized Zebra reseller for ordering information.



If you are unsure which side of a particular roll of ribbon is coated, perform an adhesive test or a ribbon scratch test to determine which side is coated.

Performing an Adhesive Test

If you have labels available, perform the adhesive test to determine which side of a ribbon is coated. This method works well for ribbon that is already installed.

1. Peel a label from its liner.
2. Press a corner of the sticky side of the label to the outer surface of the roll of ribbon.
3. Peel the label off of the ribbon.
4. Observe the results.

Did flakes or particles of ink from the ribbon adhere to the label?

| If ink from the ribbon... | Then... | |
|-----------------------------|---|---|
| Adhered to the label | The ribbon is coated on the outside and it can be used in this printer. |  |
| Did not adhere to the label | The ribbon is coated on the inside and it cannot be used in the standard printer. To verify this result, repeat the test on the other surface of the roll of ribbon. |  |



Performing a Ribbon Scratch Test

Perform the ribbon scratch test when labels are unavailable.

1. Unroll a short length of ribbon.
2. Place the unrolled section of ribbon on a piece of paper with the outer surface of the ribbon in contact with the paper.
3. Scratch the inner surface of the unrolled ribbon with your fingernail.
4. Lift the ribbon from the paper.

5. Observe the results.

Did the ribbon leave a mark on the paper?

| If the ribbon... | Then... | |
|-----------------------------------|--|---|
| Left a mark on the paper | The ribbon is coated on the outside and it can be used in this printer. |  |
| Did not leave a mark on the paper | The ribbon is coated on the inside and it cannot be used in the standard printer. To verify this result, repeat the test on the other surface of the roll of ribbon. |  |

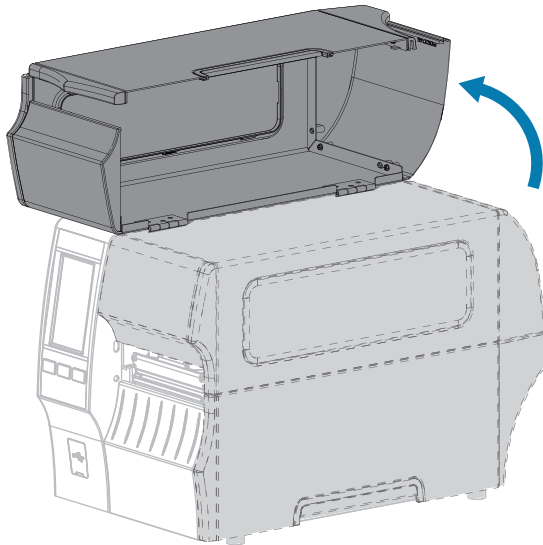
Loading the Ribbon



IMPORTANT: You are not required to turn off the printer power when working near an open printhead, but Zebra recommends it as a precaution. If you turn off the power, you will lose all temporary settings, such as label formats, and you must reload them before you resume printing.

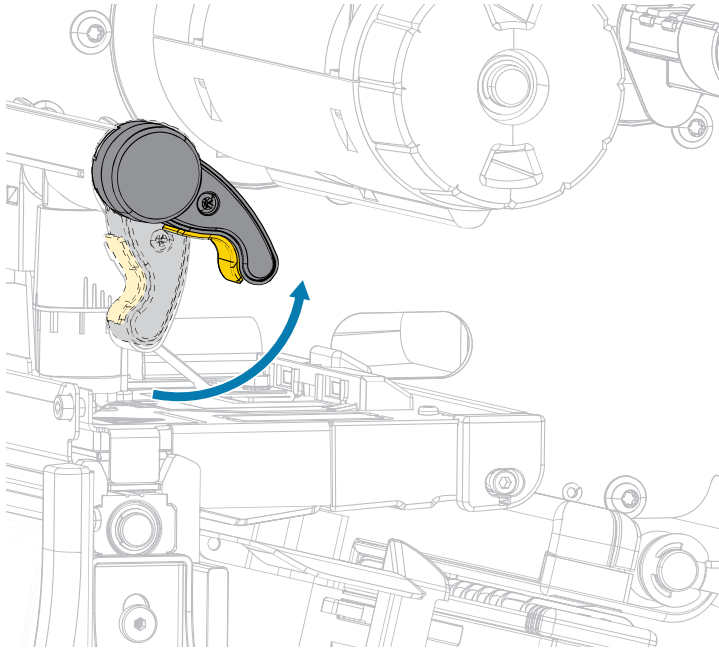
Use ribbon that is wider than the media to protect the printhead from wear. Ribbon must be coated on the outside for use in a standard printer. For more information, see [What kind of ribbon can I use?](#) on page 61.

1. Raise the media door.

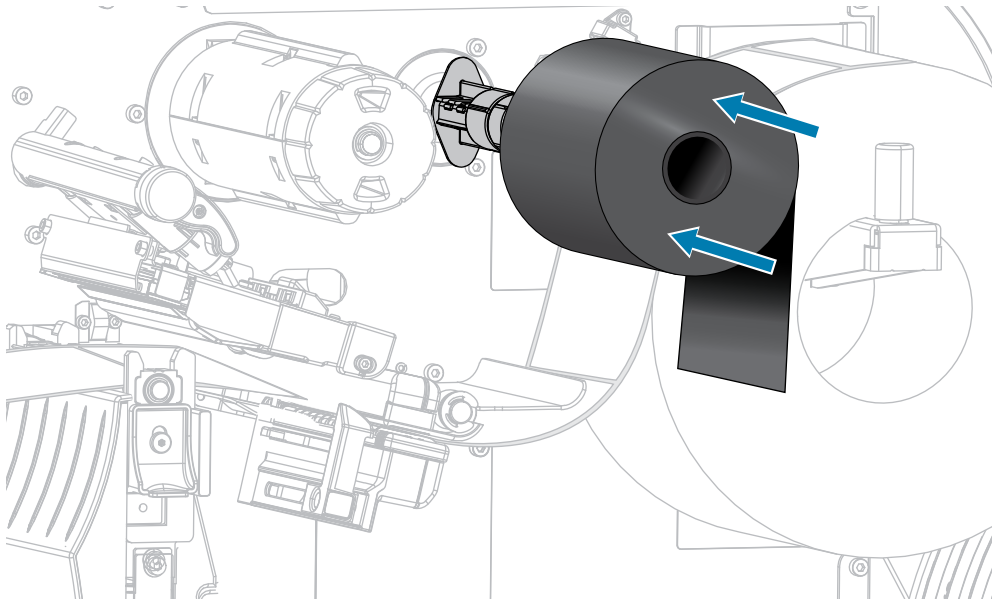


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

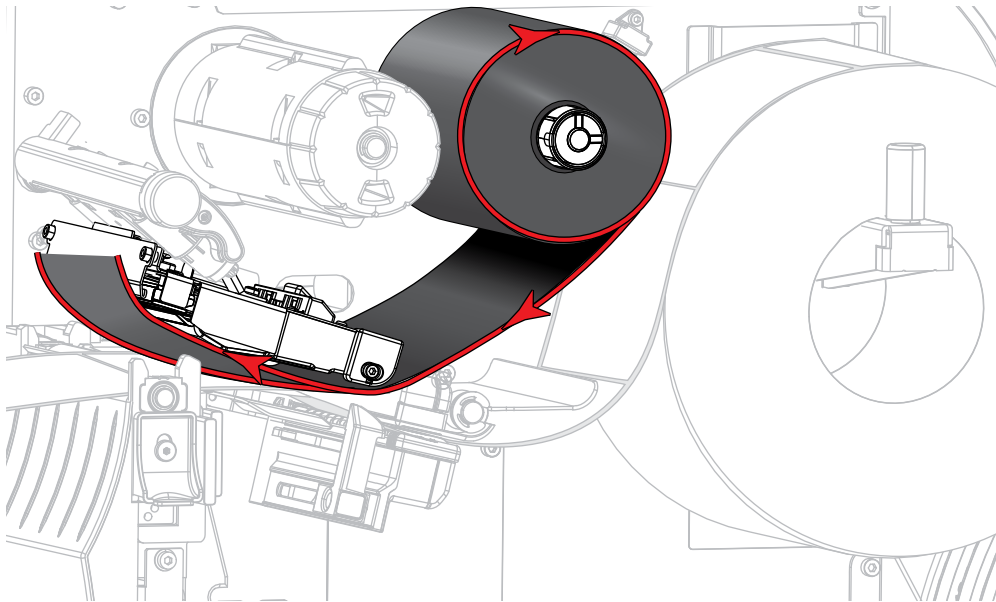
2. Open the printhead assembly by rotating the printhead-open lever upward.



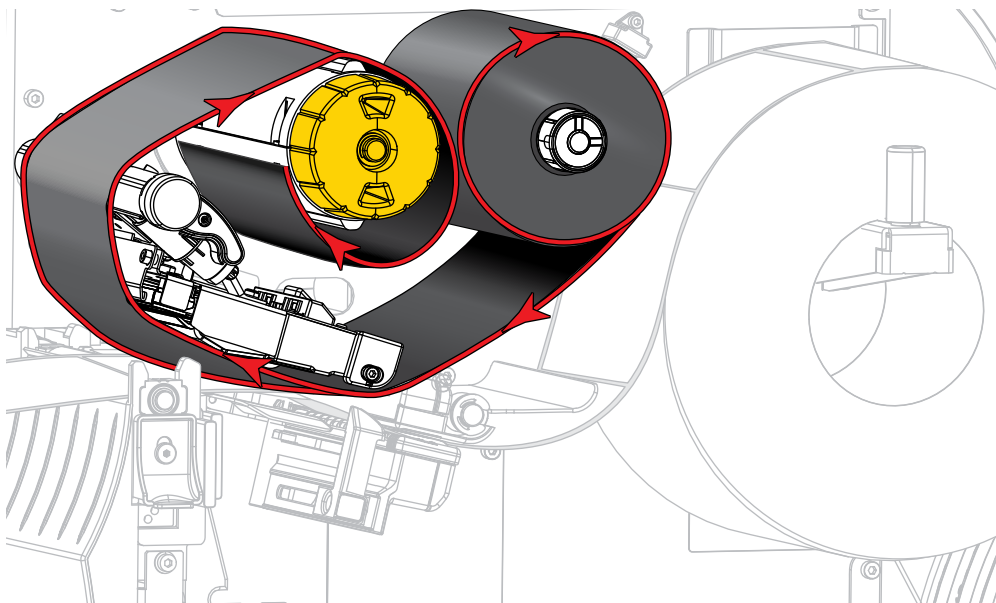
3. Place the roll of ribbon on the ribbon supply spindle with the loose end of the ribbon unrolling as shown. Push the roll back as far as it will go.



4. Bring the ribbon under the printhead assembly and around its left side, as shown.

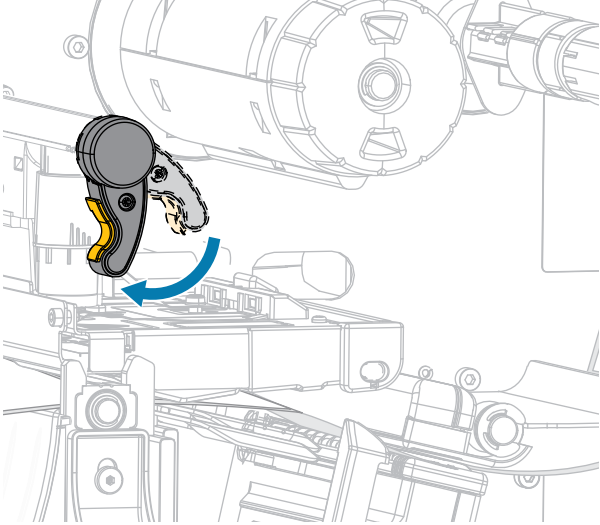
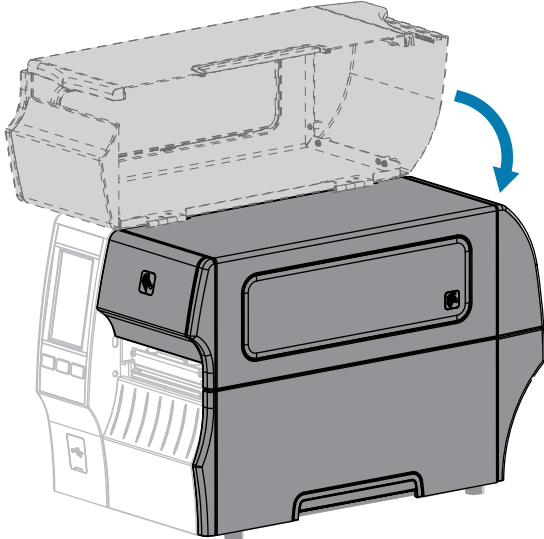


5. With the ribbon tracking as far back as it can under the printhead assembly, wrap the ribbon around the ribbon take-up spindle. Rotate the spindle several turns in the direction shown to tighten and align the ribbon.



6. Is media already loaded in the printer?

| If... | Then... |
|-------|--|
| No | Load media in the printer. (See Loading the Media on page 31.) |

| If... | Then... |
|-------|--|
| Yes | <p data-bbox="527 258 1477 289">a. Rotate the printhead-open lever downward until it locks the printhead in place.</p>  <p data-bbox="527 846 824 877">b. Close the media door.</p>  <p data-bbox="527 1451 1193 1482">c. Press PAUSE to exit pause mode and enable printing.</p> |

Running the Print Wizard and Printing a Test Label

The Print Wizard configures the printer, prints test labels, and adjusts print quality based on the results of the test labels.



IMPORTANT: When using the Wizards, do not send data to the printer from the host.

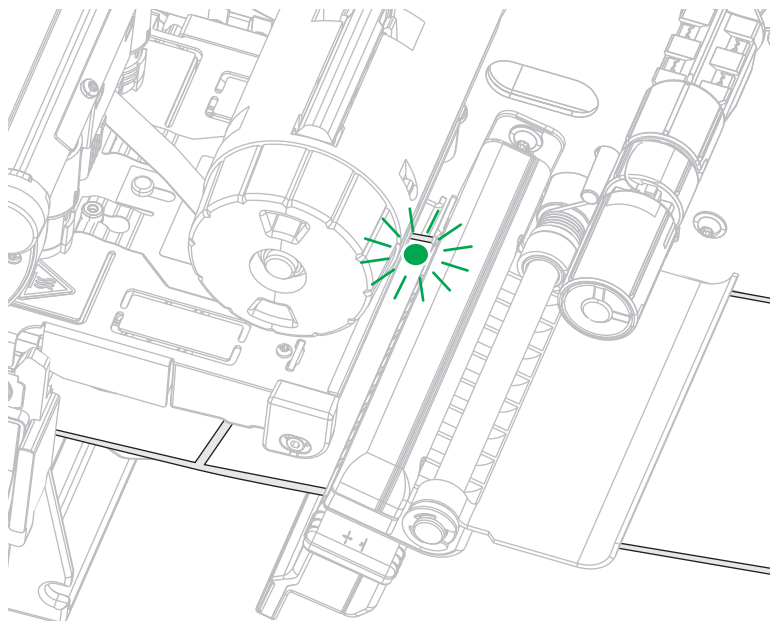
For optimal results, use full-width media running the **Print Wizard** or **Set All Wizard**. If the media is smaller than an image to be printed, the results may be truncated or print across multiple labels.

After you have completed the printer setup procedures and run the printer setup wizard, use this section to print a test label. Printing this label allows you to see if your connection is working and if you need to adjust any of the print settings.

1. On the Home screen, touch **Wizards > Print > Start Print**.
2. Follow the prompts to specify the following information:
 - print type (Thermal Transfer or Direct Thermal)
 - label type (Continuous, Gap/Notch, or Mark)
 - label width
 - collection method (tear off, peel-off, rewind, cutter, delayed cut, linerless peel, linerless rewind, linerless tear, or applicator)

After you have specified these, the wizard instructs you to load media and then to place a label over the media sensor.

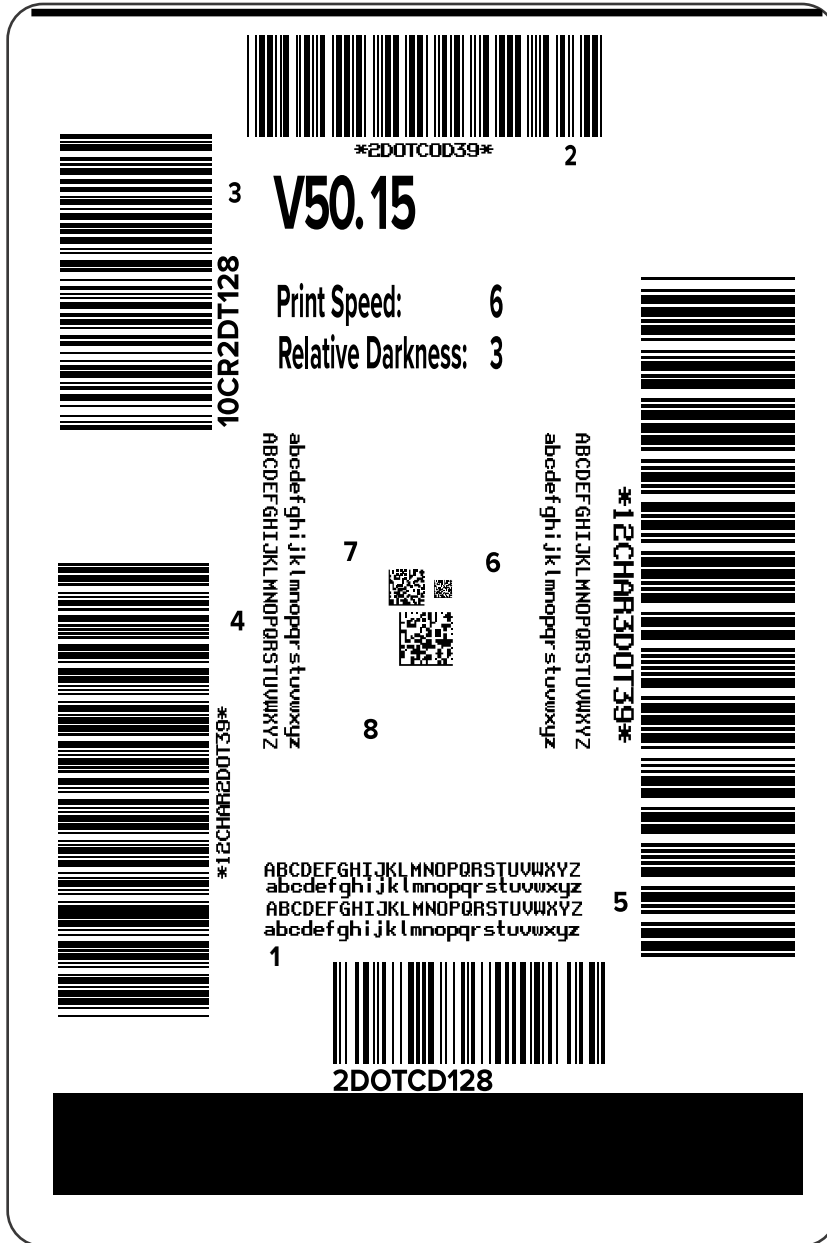
3. **Load media** so that a label is over the green light from the media sensor, and then touch the checkmark.



4. At the prompt, close the printhead, and then touch the next checkmark.
The printer calibrates and then asks if you would like to print a test label.
5. Follow the prompts until the printer completes auto calibration.

- 6. When asked to print a test label, touch the checkmark.

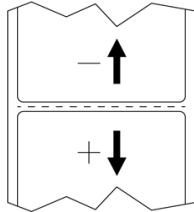
A test label similar to this one prints. If your labels are smaller than the image, only a portion of the test label will print.



7. Examine the position of the label over the tear bar. If necessary, shift the position of the media over the tear-off bar after printing.
 - If the space between labels falls on the tear bar, continue with the next step.
 - If the space between labels does not fall directly on the tear bar, shift the position of the media over the tear bar after printing.

Lower numbers move the media into the printer by the specified number of dots (the tear line moves closer to the edge of the label just printed).

Higher numbers move the media out of the printer (the tear line moves closer to the leading edge of the next label).



8. Examine the quality of the image on the test label. Is the quality of the barcode and text on the test label acceptable? See [Evaluating Barcode Quality](#) on page 142 for assistance.
 - If yes, touch the check mark, and then check what other issues may be affecting your print quality (see [Printing or Print Quality Issues](#) on page 157).
 - If no, adjust the print quality manually by changing darkness and speed settings through the printer's menu system, or run the [Print Quality Assistance wizard](#).

Using the Print Quality Assistance Wizard

1. Touch **Print Quality Assistance**.

The printer prompts for the number of test labels to print. The more labels you choose to print, the more choices that you will have available to decide on label quality. In general, if your test label from the previous wizard was acceptable, a lower number of test labels in this step will probably suffice.

2. Select a number of test labels to print.

The printer prints the specified number of test labels and prompts you for the preferred test label.

3. Decide which test label is the optimal quality. (Refer to [Evaluating Barcode Quality](#) on page 142 for assistance.) If none of the labels are acceptable, use the arrow to back up a screen in the wizard, and select a larger number of test labels.
4. In the list on the display, select the identifier for the test label with the specified quality, and then touch the checkmark.

The printer changes the darkness and speed to the levels used on the preferred test label.

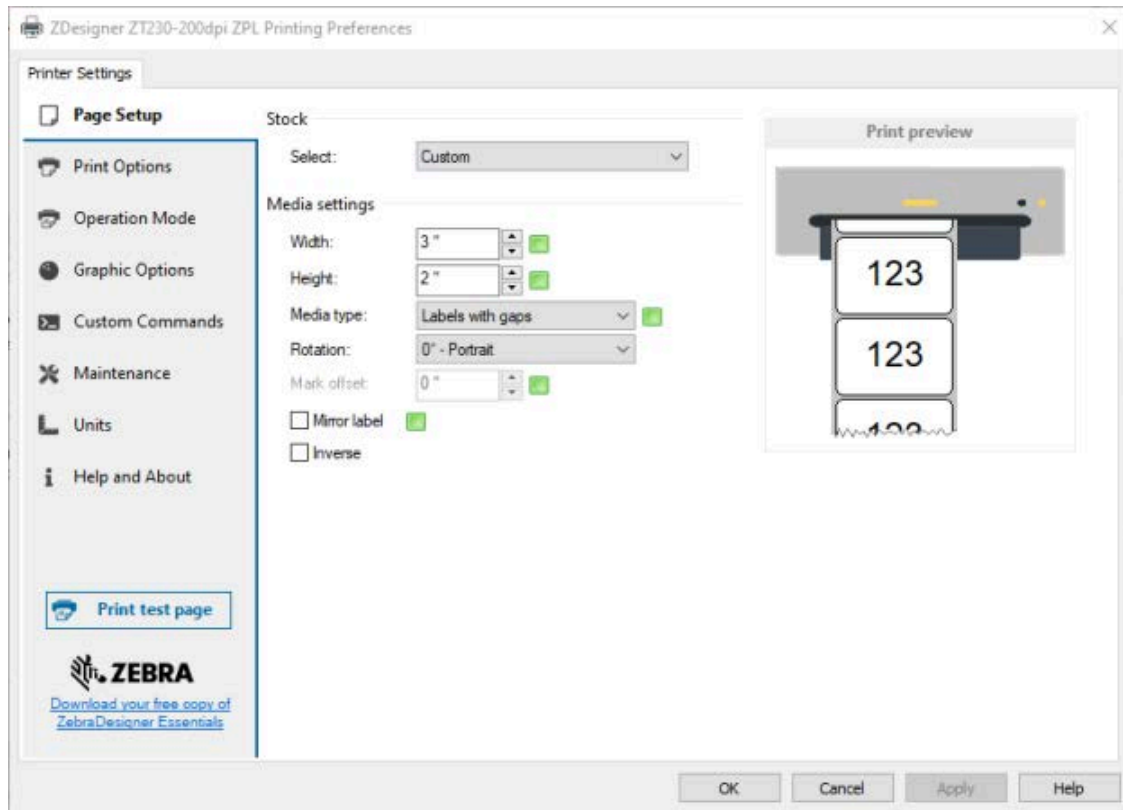
5. If necessary, see [Printing or Print Quality Issues](#) on page 157 to see what other issues may be affecting your print quality.

The print setup procedure is complete.

Installing Label Design Software

Select and install the software that you will use to create label formats for your printer.

One option is ZebraDesigner, which you can download from zebra.com/zebradesigner. You can choose to use ZebraDesigner Essentials for free or purchase ZebraDesigner Professional for a more robust toolset.



ZebraDesigner System Requirements

System requirements for the ZebraDesigner label-format design application are listed below:

- 32-bit or 64-bit Windows 10 desktop editions, Windows 11 desktop editions, Windows Server 2016, Windows Server 2019, Windows Server 2022 operating systems.
- CPU: Intel or compatible x86 family processor
- Memory: 2 GB or more RAM
- Hard drive: 1 GB of available disk space
- Microsoft.NET Framework Version 4.7.2
- Display: 1366 × 768 or higher resolution monitor
- ZDesigner printer drivers



NOTE: Remote Desktop Services and Virtual Machines are not supported.

Printer Configuration and Adjustment

This section assists you with configuration of the printer and adjustments to the printer.

Home Screen

The printer's Home screen shows you the printer's current status and allows you to access the printer's menus. You can rotate the image of the printer 360 degrees to view it from all angles.

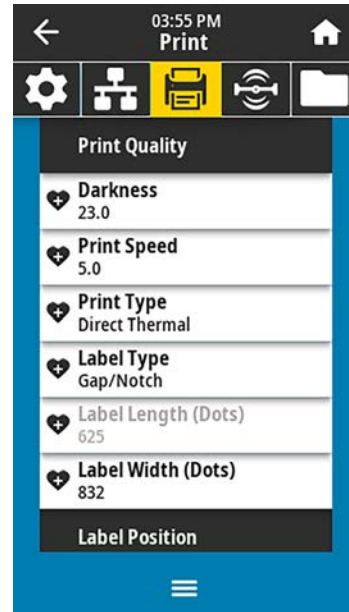


NOTE: If the background color of the Home screen is yellow or red, the printer is in an alert or error state. For more information, see [Alert and Error States](#).

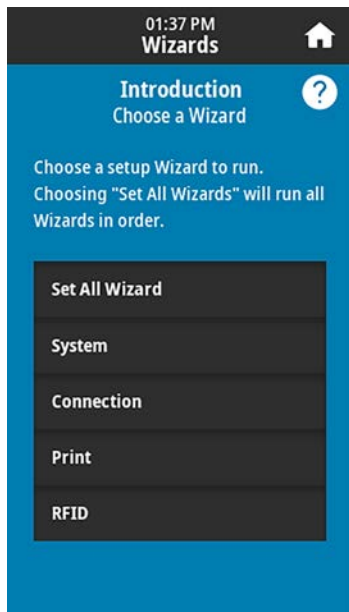
Printer Configuration and Adjustment

The following items are located on the Home screen **Print Status** tab:

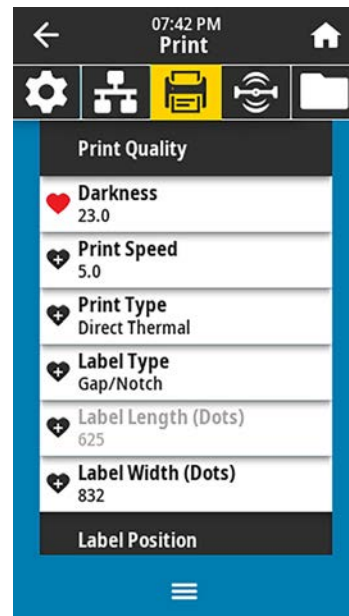
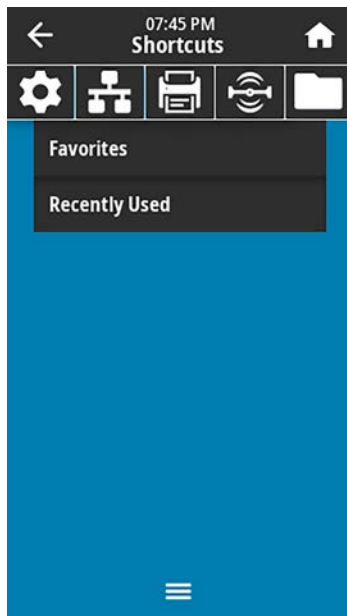
- **Menu**—Allows you to change the printer settings. See [User Menus](#).



- **Wizards**—Allows you to change printer settings by going through prompts. See [Printer Wizards](#).



- Shortcuts—Allows you to quickly access the most recent menu items and to save your favorites. Touch the darkened heart icon next to a menu item to save it to your list of favorites. Items in the favorites are shown in the order in which they were saved.



Changing Printer Settings

This section presents the printer settings that you can change and identifies the tools for changing them. These tools include the following:

- The Windows driver installed previously. (See [Changing Printer Settings through the Windows Driver](#) on page 72 for more information.)
- The printer wizards. (See [Printer Wizards](#) on page 73.)
- The printer's user menus (See [User Menus](#) on page 74 for more information.)
- ZPL and Set/Get/Do (SGD) commands (See the Zebra Programming Guide for more information.)
- The printer's web pages when the printer has an active wired or wireless print server connection (See the ZebraNet Wired and Wireless Print Servers User Guide for more information.)

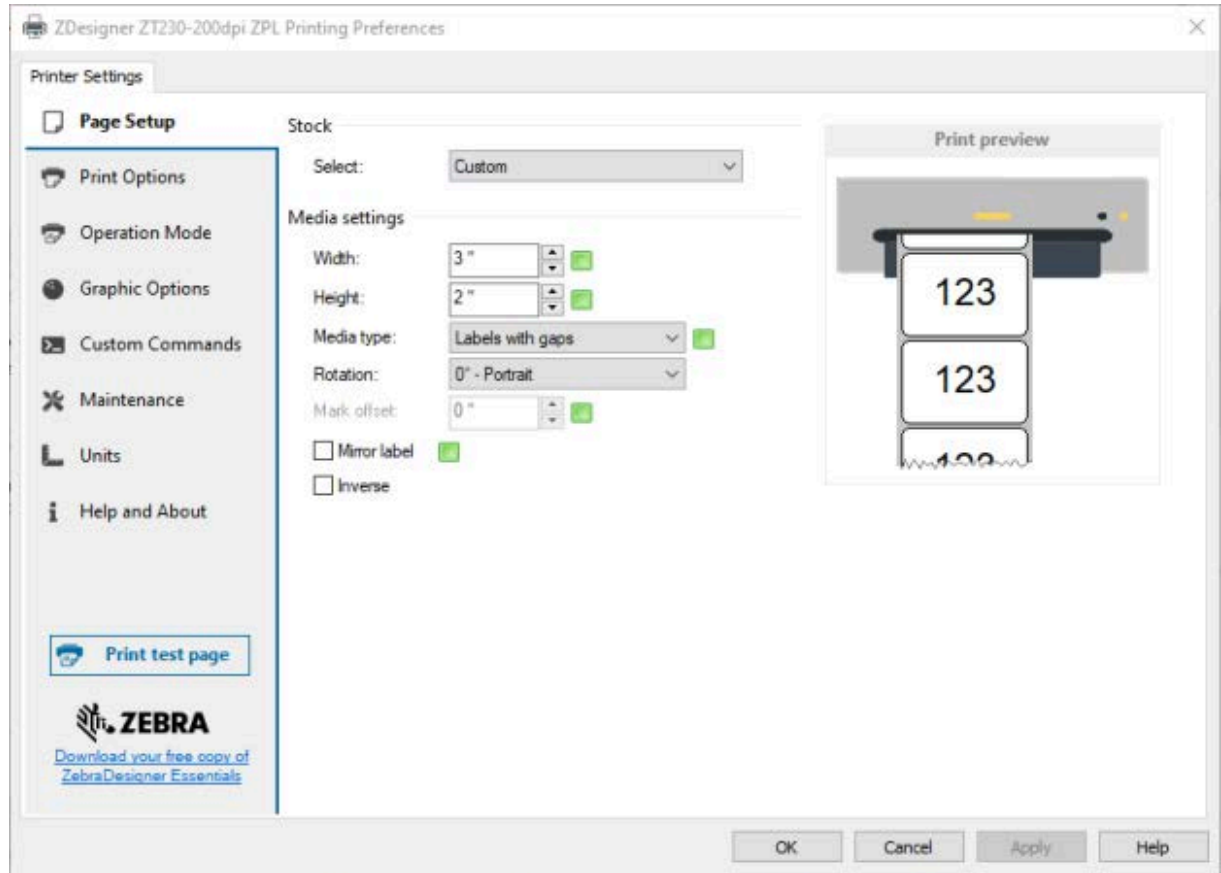
Copies of the referenced manuals are available at zebra.com/manuals.

Changing Printer Settings through the Windows Driver

1. From the Windows Start Menu, go to **Printers & Scanners**.
2. Click your printer in the list of available printers, and then click **Manage**.

3. Click **Printing Preferences**.

The ZDesigner window for your printer displays.



Printer Wizards

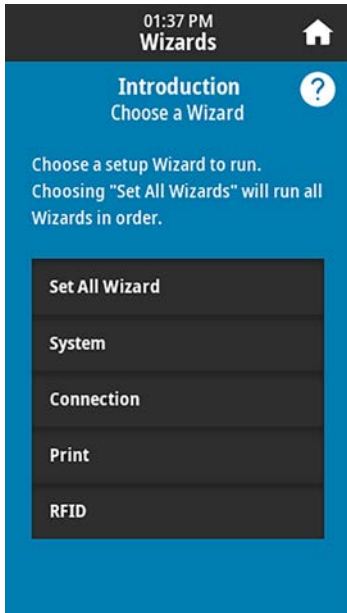
Printer wizards walk you through the setup process for various printer settings and features.

The following wizards are available:

- Set All Wizard—runs all the wizards in sequence.
- System Wizard—sets up non-print related operating system settings.
- Connection Wizard—configures the printer's connectivity options.
- Print Wizard—configures key printing parameters and features. See [Running the Print Wizard and Printing a Test Label](#) on page 66.
- RFID Wizard—sets up the RFID subsystem's operations.

On the Home screen, touch **Wizards** to see the available options.

For more information about individual settings set by any of the wizards, see [User Menus](#) on page 74.



IMPORTANT:

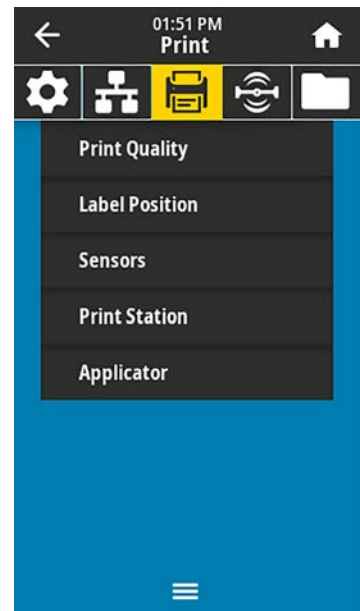
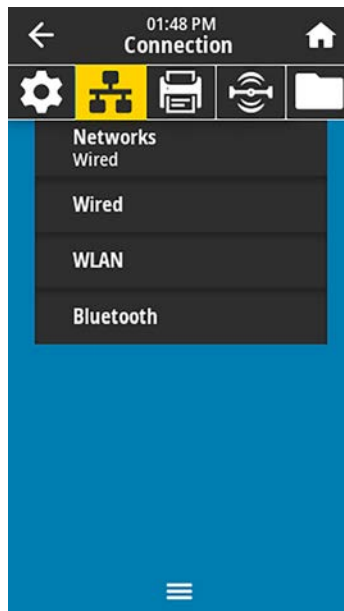
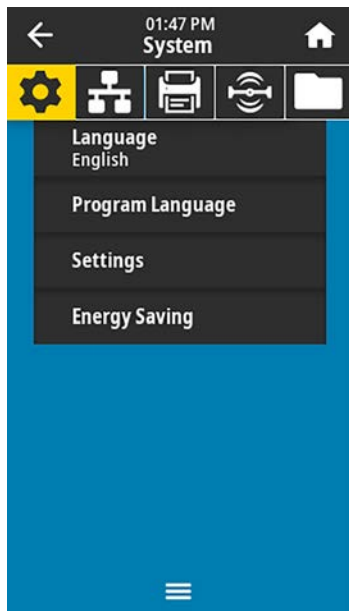
When using the Wizards, do not send data to the printer from the host.

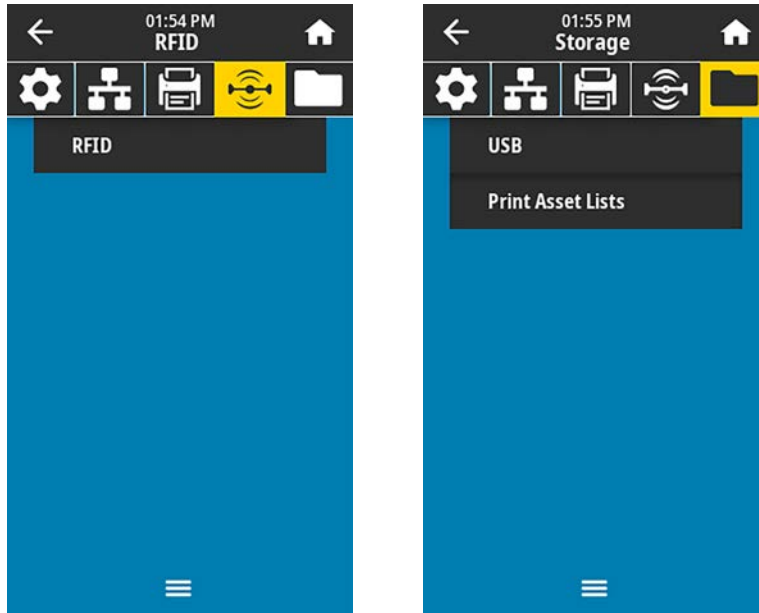
For optimal results, use full-width media running Print Wizard or Set All Wizards. If the media is shorter than an image to be printed, the image may be truncated or print across multiple labels.

User Menus

Use the printer's user menus to configure the printer as needed.

For detailed information on each of these menus, see [System Menu](#) on page 76, [Connection Menu](#) on page 85, [Print Menu](#) on page 99, [RFID Menu](#) on page 109, and [Storage Menu](#) on page 116.



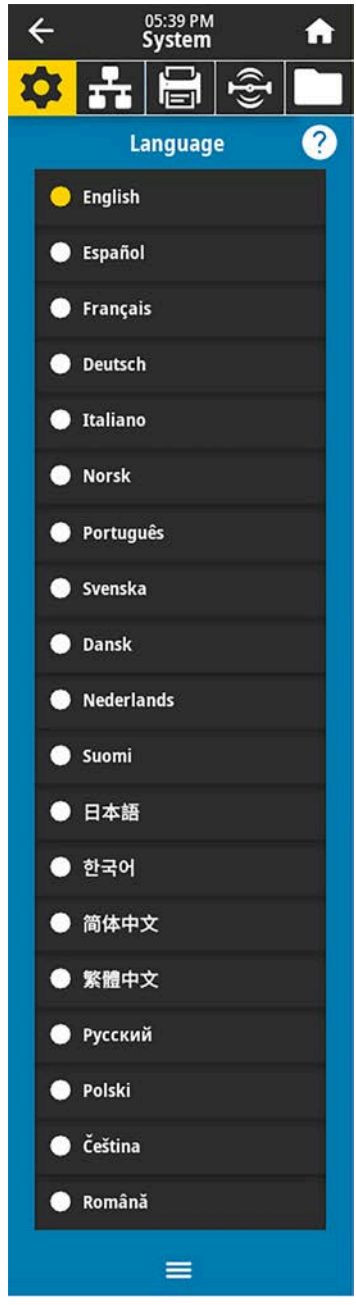


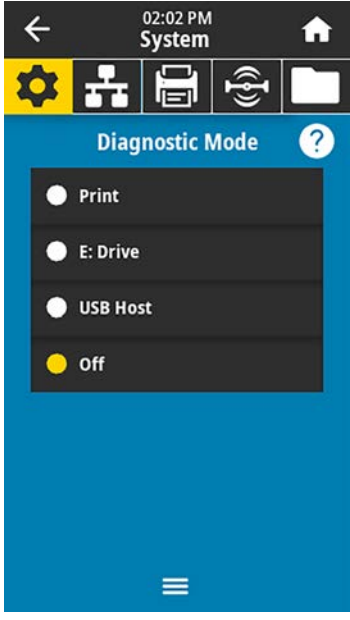

You can modify printer settings through the user menus or optionally using the methods listed below. (The user menu descriptions in this section include information on these optional methods where applicable.)

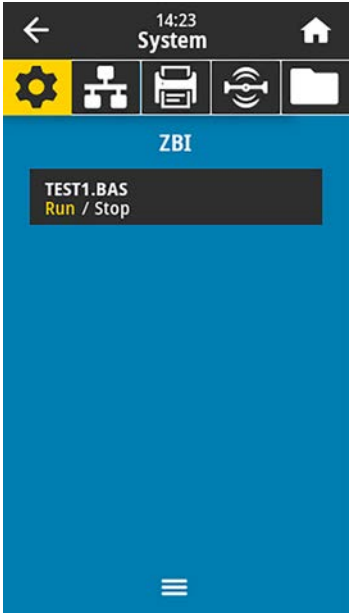
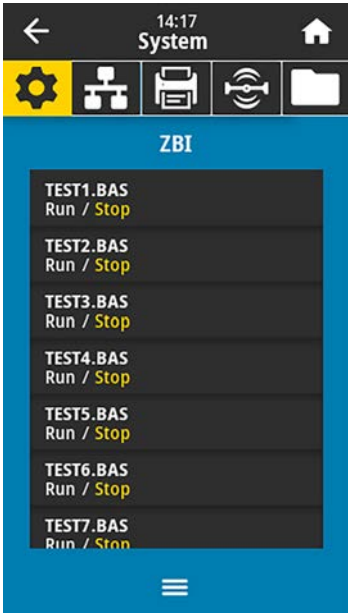
- ZPL and Set/Get/Do (SGD) commands. (See the Zebra Programming Guide at zebra.com/manuals for more information.)
- The printer's web pages, in cases where the printer has an active wired or wireless print server connection. (See the ZebraNet Wired and Wireless Print Servers User Guide at zebra.com/manuals for more information.)

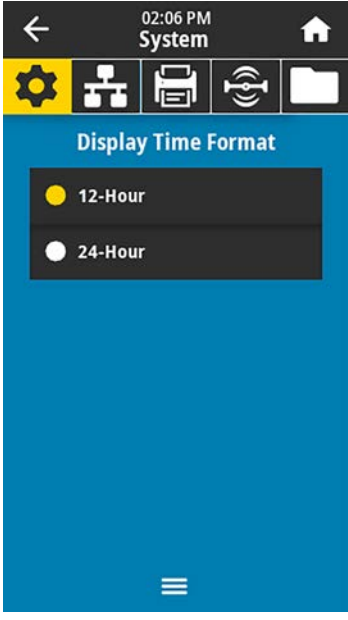
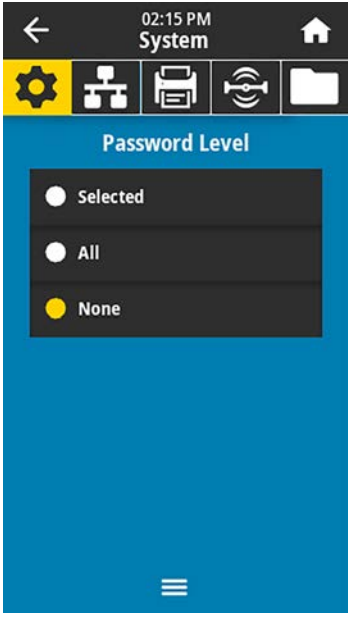
You can also use the printer's task wizards to change some settings (see [Printer Wizards](#) on page 73).

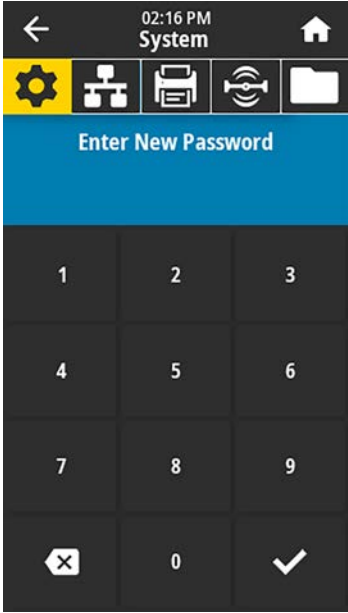

System Menu

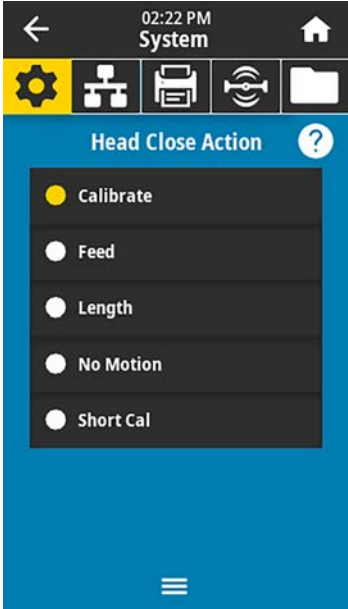
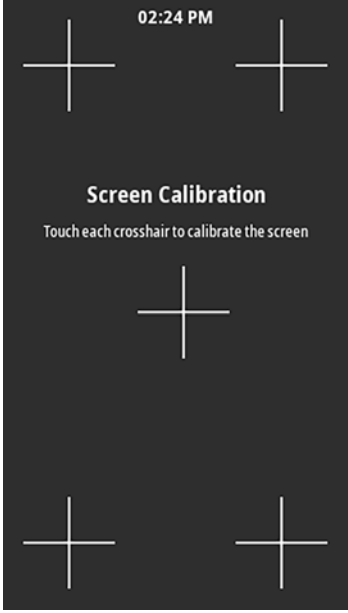
| Menu Display | Menu Option Description | |
|--|--|---|
|  | <p>System > Language</p> <p>If necessary, change the language that the printer displays. This change affects the words shown on the following:</p> <ul style="list-style-type: none"> the Home screen the user menus error messages the printer configuration label, the network configuration label, and other labels that you can select to print through the user menus | |
| | Accepted values: | <p>ENGLISH, SPANISH, FRENCH, GERMAN, ITALIAN, NORWEGIAN, PORTUGUESE, SWEDISH, DANISH, DUTCH, FINNISH, CZECH, JAPANESE, KOREAN, ROMANIAN, RUSSIAN, POLISH, SIMPLIFIED CHINESE, TRADITIONAL CHINESE</p> <p>The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read.</p> |
| | Related ZPL command(s): | ^KL |
| | SGD command used: | display.language |
| | Printer web page: | <p>View and Modify Printer Settings > General Setup > Language</p> |


| Menu Display | Menu Option Description | | | | | | | | | |
|--|---|--|------------------|-------------------|-------------------------|----------------------------------|-------------------|-------------------------|-----------------------|--|
|  | <p>System > Program Language > Diagnostic Mode</p> <p>Use this diagnostics tool to make the printer output hexadecimal values for all data received by the printer. (For more information, see Using Communication Diagnostics Mode on page 147.)</p> <table border="1" data-bbox="656 394 1526 873"> <tr> <td data-bbox="656 394 844 478">Accepted values:</td> <td data-bbox="844 394 1526 478">DISABLED, ENABLED</td> </tr> <tr> <td data-bbox="656 478 844 573">Related ZPL command(s):</td> <td data-bbox="844 478 1526 573">~JD to enable, ~JE to disable</td> </tr> <tr> <td data-bbox="656 573 844 688">SGD command used:</td> <td data-bbox="844 573 1526 688">device.diagnostic_print</td> </tr> <tr> <td data-bbox="656 688 844 873">Control panel key(s):</td> <td data-bbox="844 688 1526 873">Hold PAUSE + FEED for 2 seconds when the printer is in the Ready state.</td> </tr> </table> | | Accepted values: | DISABLED, ENABLED | Related ZPL command(s): | ~JD to enable, ~JE to disable | SGD command used: | device.diagnostic_print | Control panel key(s): | Hold PAUSE + FEED for 2 seconds when the printer is in the Ready state. |
| Accepted values: | DISABLED, ENABLED | | | | | | | | | |
| Related ZPL command(s): | ~JD to enable, ~JE to disable | | | | | | | | | |
| SGD command used: | device.diagnostic_print | | | | | | | | | |
| Control panel key(s): | Hold PAUSE + FEED for 2 seconds when the printer is in the Ready state. | | | | | | | | | |
|  | <p>System > Program Language > Virtual Device</p> <p>If any Virtual Device apps are installed on your printer, you may view or enable/disable them from this user menu.</p> <p>For more information about Virtual Devices, go to the User Guide for the appropriate Virtual Device, or contact your local reseller.)</p> | | | | | | | | | |

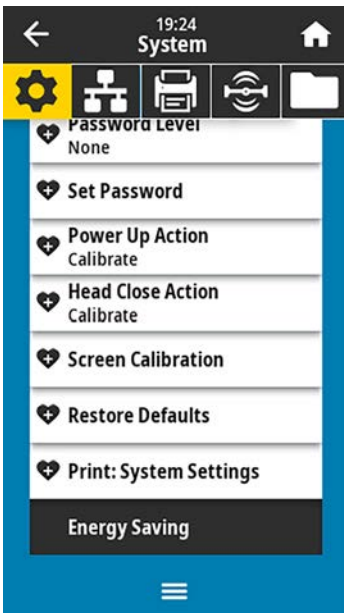
| Menu Display | Menu Option Description | |
|---|--|---|
|  | <p>System > Program Language > ZBI</p> <p>Zebra Basic Interpreter (ZBI 2.0™) is a programming option that may be purchased for your printer. If you would like to purchase this option, contact your Zebra reseller for more information.</p> <p>If ZBI programs have been downloaded to your printer, you may select one to run using this menu item. If no program exists on your printer, NONE is listed.</p> <p>When ZBI programs have been downloaded but none are running, the printer lists all available programs. To run one of them, touch Run (highlighted in white) under the program name.</p> <p>After a program is running, only that program is listed. Touch Stop (highlighted in white) to end the program.</p>  | |
| | <p>SGD command used:</p> | <p>zbi . key (identifies if the ZBI 2.0 option is enabled or disabled on the printer)</p> |



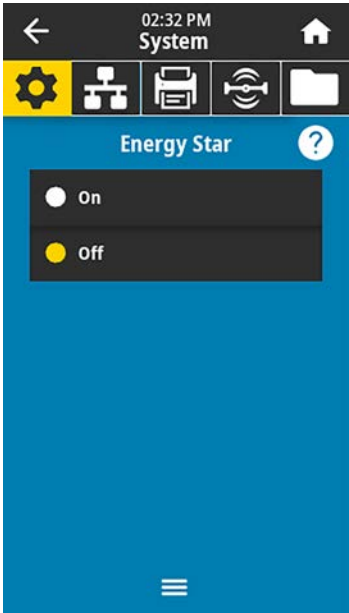
| Menu Display | Menu Option Description | |
|--|---|--------------------------------------|
|  | <p>System > Settings > Display Time Format Select the time format used by the printer.</p> | |
| | Accepted values: | 12-Hour, 24-Hour |
| | SGD command used: | device.idle_display_value |
|  | <p>System > Settings > Password Level Select the level of password protection for user menu items.</p> | |
| | Accepted values: | Selected, All, None |
| | Related ZPL command(s): | ^KP (to change the printer password) |

| Menu Display | Menu Option Description | | | | | | | | | |
|--|--|--|------------------|---|-------------------------|-----|-------------------|----------------------|-------------------|--|
|  | <p>System > Settings > Set Password</p> <p>Set a new printer password for menu items protected by the previous parameter. The default printer password is 1234.</p> <table border="1" data-bbox="656 363 1526 873"> <tr> <td data-bbox="656 363 846 449">Accepted values:</td> <td data-bbox="846 363 1526 449">Numerals 0-9</td> </tr> <tr> <td data-bbox="656 449 846 873">Related ZPL command(s):</td> <td data-bbox="846 449 1526 873">^KP</td> </tr> </table> | | Accepted values: | Numerals 0-9 | Related ZPL command(s): | ^KP | | | | |
| Accepted values: | Numerals 0-9 | | | | | | | | | |
| Related ZPL command(s): | ^KP | | | | | | | | | |
|  | <p>System > Settings > Power Up Action</p> <p>Set the action for the printer to take during the power-up sequence.</p> <table border="1" data-bbox="656 968 1526 1692"> <tr> <td data-bbox="656 968 846 1413">Accepted values:</td> <td data-bbox="846 968 1526 1413"> <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> </td> </tr> <tr> <td data-bbox="656 1413 846 1499">Related ZPL command(s):</td> <td data-bbox="846 1413 1526 1499">^MF</td> </tr> <tr> <td data-bbox="656 1499 846 1612">SGD command used:</td> <td data-bbox="846 1499 1526 1612">ezpl.power_up_action</td> </tr> <tr> <td data-bbox="656 1612 846 1692">Printer web page:</td> <td data-bbox="846 1612 1526 1692">View and Modify Printer Settings > Calibration</td> </tr> </table> | | Accepted values: | <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> | Related ZPL command(s): | ^MF | SGD command used: | ezpl.power_up_action | Printer web page: | View and Modify Printer Settings > Calibration |
| Accepted values: | <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> | | | | | | | | | |
| Related ZPL command(s): | ^MF | | | | | | | | | |
| SGD command used: | ezpl.power_up_action | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Calibration | | | | | | | | | |

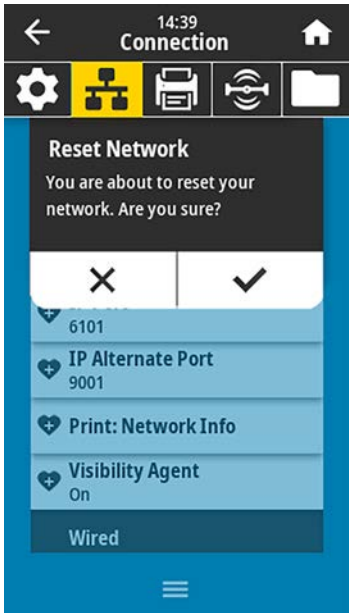

| Menu Display | Menu Option Description | | | | | | | | | |
|---|---|--|------------------|---|-------------------------|-----|-------------------|------------------------|-------------------|--|
|  | <p>System > Settings > Head Close Action Set the action for the printer to take when you close the printhead.</p> <table border="1"> <tr> <td data-bbox="656 331 846 774">Accepted values:</td> <td data-bbox="846 331 1526 774"> <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> </td> </tr> <tr> <td data-bbox="656 774 846 858">Related ZPL command(s):</td> <td data-bbox="846 774 1526 858">^MF</td> </tr> <tr> <td data-bbox="656 858 846 974">SGD command used:</td> <td data-bbox="846 858 1526 974">ezpl.head_close_action</td> </tr> <tr> <td data-bbox="656 974 846 1060">Printer web page:</td> <td data-bbox="846 974 1526 1060">View and Modify Printer Settings > Calibration</td> </tr> </table> | | Accepted values: | <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> | Related ZPL command(s): | ^MF | SGD command used: | ezpl.head_close_action | Printer web page: | View and Modify Printer Settings > Calibration |
| Accepted values: | <p>CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.</p> <p>FEED—Feeds the labels to the first registration point.</p> <p>LENGTH—Determines the label length using current sensor values, and feeds the media to the next web.</p> <p>NO MOTION—Tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web.</p> <p>SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.</p> | | | | | | | | | |
| Related ZPL command(s): | ^MF | | | | | | | | | |
| SGD command used: | ezpl.head_close_action | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Calibration | | | | | | | | | |
|  | <p>System > Settings > Screen Calibration Touch each crosshair to calibrate the screen.</p> | | | | | | | | | |

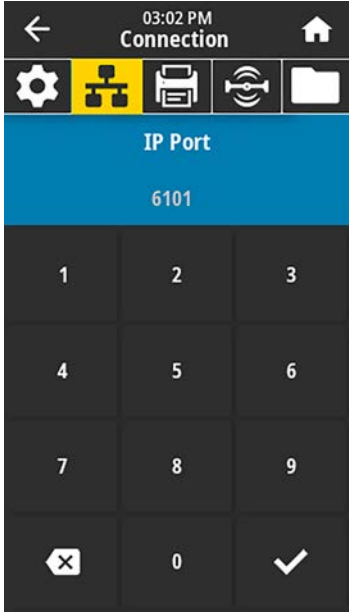
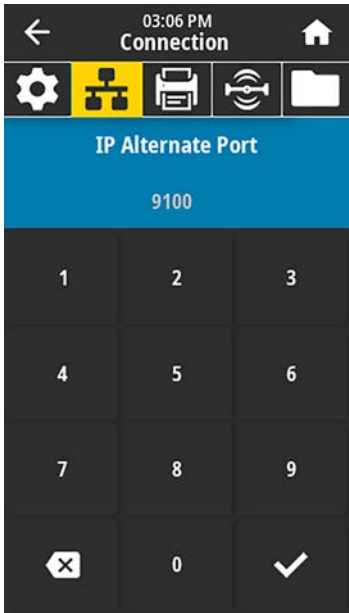

| Menu Display | Menu Option Description | |
|---|--|---|
|  | <p>System > Settings > Restore Defaults</p> <p>Restore specific printer, print server, and network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually. This menu item is available through two user menus with different default values for each.</p> | |
| | <p>Accepted values:</p> | <p>PRINTER—Restores all printer settings other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.</p> <p>NETWORK—Reinitializes the printer’s wired or wireless print server. With a wireless print server, the printer also re-associates with your wireless network.</p> <p>LAST SAVED—Loads settings from the last permanent save.</p> |
| | <p>Related ZPL command(s):</p> | <p>PRINTER— ^JUF NETWORK— ^JUN LAST SAVED— ^JUR</p> |
| | <p>Control panel key(s):</p> | <p>PRINTER—Hold FEED + PAUSE during printer power-up to reset the printer parameters to factory values.</p> <p>NETWORK—Hold CANCEL + PAUSE during printer power-up to reset the network parameters to factory values.</p> <p>LAST SAVED—N/A</p> |
| | <p>Printer web page:</p> | <p>PRINTER—View and Modify Printer Settings > Restore Default Configuration</p> <p>NETWORK—Print Server Settings > Reset Print Server</p> <p>LAST SAVED—View and Modify Printer Settings > Restore Saved Configuration</p> |


| Menu Display | Menu Option Description | |
|--|---|------------|
|  <p>The screenshot shows the printer's menu display. At the top, it says '19:24 System'. Below that are several icons: a gear (Settings), a printer (Print), a document with a checkmark (Check), a signal tower (Wireless), and a folder (Files). The 'Settings' icon is highlighted. Below the icons are several menu items, each with a heart icon: 'Password Level' (None), 'Set Password', 'Power Up Action' (Calibrate), 'Head Close Action' (Calibrate), 'Screen Calibration', 'Restore Defaults', and 'Print: System Settings' (which is highlighted in blue). At the bottom, there is an 'Energy Saving' option and a hamburger menu icon.</p> | <p>System > Settings > Print: System Settings</p> <p>Prints a printer configuration label. The following is a sample label.</p> <pre data-bbox="672 338 1013 1514"> PRINTER CONFIGURATION Zebra Technologies ZTC ZT620R-203dpi ZPL 76J162700886 +30.0..... DARKNESS 6.0 IPS..... PRINT SPEED -007..... TEAR OFF TEAR OFF..... PRINT MODE CONTINUOUS..... MEDIA TYPE TRANSMISSIVE..... SENSOR SELECT DIRECT-THERMAL..... PRINT METHOD 1344..... PRINT WIDTH 2000..... LABEL LENGTH P1085892/00005 2... PRINT HEAD ID 15.0IN 380MM..... MAXIMUM LENGTH MAINT. OFF..... EARLY WARNING CONNECTED..... USB CONNECTED BIDIRECTIONAL..... PARALLEL COMM. RS232..... SERIAL COMM. 9600..... BAUD 8 BITS..... DATA BITS NONE..... PARITY XON/XOFF..... HOST HANDSHAKE NONE..... PROTOCOL NORMAL MODE..... COMMUNICATIONS <-> ZEH..... CONTROL PREFIX <-> SEH..... FORMAT PREFIX <-> ZCH..... DELIMITER CHAR ZPL II..... ZPL MODE INACTIVE..... COMMAND OVERRIDE FEED..... MEDIA POWER UP LENGTH..... HEAD CLOSE DEFAULT..... BACKFEED +000..... LABEL TOP +0000..... LEFT POSITION OFF..... APPLICATOR PORT ENABLED..... ERROR ON PAUSE PULSE MODE..... START PRINT SIG DISABLED..... REPRINT MODE 080..... WEB SENSOR 090..... MEDIA SENSOR 255..... TAKE LABEL 027..... MARK SENSOR 027..... MARK MED SENSOR 000..... TRANS GAIN 005..... TRANS BASE 060..... TRANS LED 002..... MARK GAIN 100..... MARK LED DPCSWFXM..... MODES ENABLED MODES DISABLED 1344 8/MM FULL..... RESOLUTION 4.0..... LINK-OS VERSION V80.20.03 <-..... FIRMWARE 1.3..... XML SCHEMA 6.6.0 22.89..... HARDWARE ID 32768k..... R: RAM 524288k..... E: ONBOARD FLASH NONE..... FORMAT CONVERT MM/DD/YYYY 24HR..... IDLE DISPLAY 05/11/17..... RTC DATE 06:40..... RTC TIME ENABLED..... ZBI 2.1..... ZBI VERSION READY..... ZBI STATUS TM:MSE MICRO..... RFID READER 20.00.00.01..... RFID HW VERSION 01.03.00.18..... RFID F4 VERSION USA/CANADA..... RFID REGION CODE USA/CANADA..... RFID COUNTRY CODE RFID OK..... RFID ERR STATUS 16..... RFID READ PHR 16..... RFID WRITE PHR F0..... PROG. POSITION 0..... RFID VALID CTR 0..... RFID VOID CTR NONE..... ADAPTIVE ANTENNA A4..... RFID ANTENNA 570 LABELS..... NONRESET CNTR 570 LABELS..... RESET CNTR1 570 LABELS..... RESET CNTR2 2.798 IN..... NONRESET CNTR 2.798 IN..... RESET CNTR1 2.798 IN..... RESET CNTR2 7.107 CH..... NONRESET CNTR 7.107 CH..... RESET CNTR1 7.107 CH..... RESET CNTR2 001 WIRELESS..... SLOT 1 *** EMPTY..... SLOT 2 0..... MASS STORAGE COUNT 0..... HID COUNT OFF..... USB HOST LOCK OUT FIRMWARE IN THIS PRINTER IS COPYRIGHTED </pre> | |
| | <p>Related ZPL command(s):</p> | <p>~WC</p> |

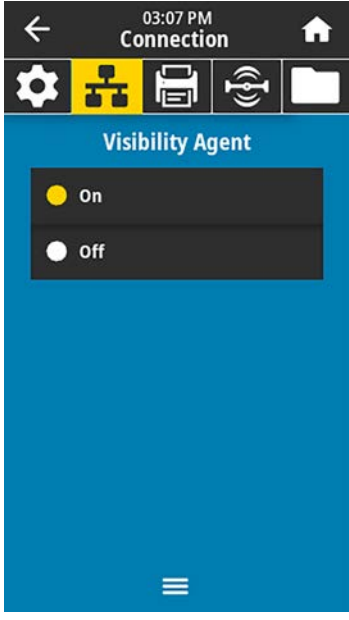

| Menu Display | Menu Option Description | |
|--|---|---|
| | Control panel key(s): | Do one of the following:* <ul style="list-style-type: none"> • Hold CANCEL during printer power-up. (Formerly called a CANCEL self test.) • Hold FEED + CANCEL for 2 seconds when the printer is in the Ready state.  NOTE: * Prints a printer configuration label and a network configuration label. |
| | Printer web page: | View and Modify Printer Settings > Print Listings on Label *  NOTE: * Prints a printer configuration label and a network configuration label. |
|  | System > Energy Saving > Energy Star When Energy Star mode is enabled, the printer goes into a “sleep” mode after a timeout period, thereby lowering power consumption. Press any button on the control panel to bring the printer back to an active state. | |
| Accepted values: | ON, OFF | |
| SGD command used: | <code>power.energy_star.enable</code> <code>power.energy_star_timeout</code> (to set the amount of idle time before Energy Star is invoked) | |


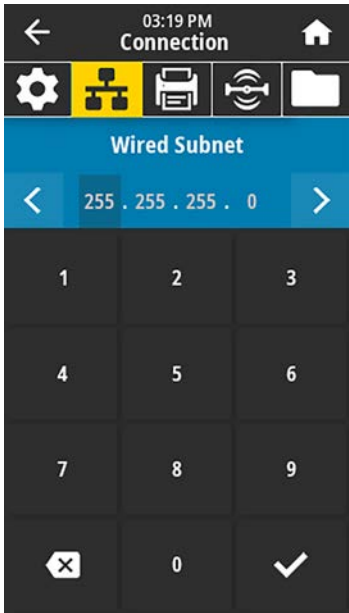
Connection Menu

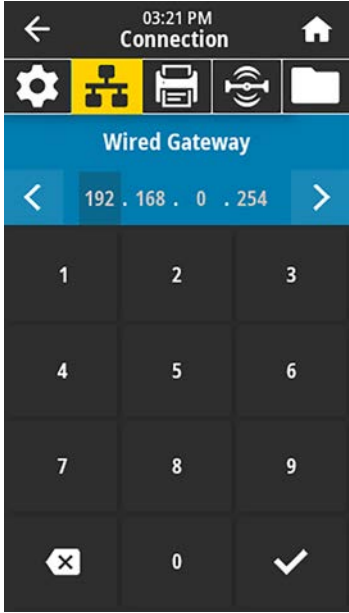

| Menu Display | Menu Option Description | |
|--|--|--|
|  | <p>Connection > Networks > Reset Network</p> <p>This option resets the wired or wireless print server and saves any changes that you made to any network settings.</p> <p>! IMPORTANT: You must reset the print server to allow changes to the network settings to take effect.</p> | |
| <p>Related ZPL command(s):</p> | <p>~WR</p> | |
| <p>SGD command used:</p> | <p>device.reset</p> | |
| <p>Printer web page:</p> | <p>Print Server Settings > Reset Print Server</p> | |
|  | <p>Connection > Networks > Primary Network</p> <p>View or modify whether the wired or wireless print server is considered primary. You may select which one is primary.</p> | |
| <p>Accepted values:</p> | <p>Wired, WLAN</p> | |
| <p>Related ZPL command(s):</p> | <p>^NC</p> | |
| <p>SGD command used:</p> | <p>ip.primary_network</p> | |

| Menu Display | Menu Option Description | | | |
|--|--|--|-------------------|--|
|  | <p>Connection > Networks > IP Port</p> <p>This printer setting refers to the internal wired print servers port number that the TCP print service is listening on. Normal TCP communications from the host should be directed to this port.</p> <table border="1" data-bbox="699 394 1524 510"> <tr> <td data-bbox="699 394 873 510">SGD command used:</td> <td data-bbox="873 394 1524 510"> internal_wired.ip.port wlan.ip.port </td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</p> | | SGD command used: | internal_wired.ip.port wlan.ip.port |
| SGD command used: | internal_wired.ip.port wlan.ip.port | | | |
|  | <p>Connection > Networks > IP Alternate Port</p> <p>This command sets the port number of the alternate TCP port.</p> <p> NOTE: Print servers supporting this command will monitor both the primary port and the alternate port for connections at the same time.</p> <table border="1" data-bbox="699 1094 1524 1209"> <tr> <td data-bbox="699 1094 873 1209">SGD command used:</td> <td data-bbox="873 1094 1524 1209"> internal_wired.ip.port_alternate wlan.ip.port_alternate </td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</p> | | SGD command used: | internal_wired.ip.port_alternate wlan.ip.port_alternate |
| SGD command used: | internal_wired.ip.port_alternate wlan.ip.port_alternate | | | |



| Menu Display | Menu Option Description | |
|---|--|--|
| | <p>Connection > Networks > Print: Network Info</p> <p>Prints the settings for any print server or Bluetooth device that is installed. The following is a sample label.</p> <pre> Network Configuration ----- Zebra Technologies ZTC ZT620R-203dpi ZPL 76J162700886 Wired..... PRIMARY NETWORK PrintServer..... LOAD LAN FROM? INTERNAL WIRED..... ACTIVE PRINTSRVR Wired* ALL..... IP PROTOCOL 192.168.000.017... IP ADDRESS 255.255.255.000... SUBNET 192.168.000.254... GATEWAY 000.000.000.000... WINS SERVER IP YES..... TIMEOUT CHECKING 300..... TIMEOUT VALUE 000..... ARP INTERVAL 9100..... BASE RAW PORT 9200..... JSON CONFIG PORT Wireless ALL..... IP PROTOCOL 000.000.000.000... IP ADDRESS 255.255.255.000... SUBNET 000.000.000.000... GATEWAY 000.000.000.000... WINS SERVER IP YES..... TIMEOUT CHECKING 300..... TIMEOUT VALUE 000..... ARP INTERVAL 9100..... BASE RAW PORT 9200..... JSON CONFIG PORT INSERTED..... CARD INSERTED 02dFH..... CARD MFG ID 8194H..... CARD PRODUCT ID ac:3f:a4:82:05:9c.. MAC ADDRESS YES..... DRIVER INSTALLED INFRASTRUCTURE... OPERATING MODE 12S..... ESSID 1.0..... CURRENT TX RATE OPEN..... WEP TYPE WPA PSK..... WLAN SECURITY 1..... WEP INDEX 000..... PDR SIGNAL LONG..... PREAMBLE NO..... ASSOCIATED ON..... PULSE ENABLED 15..... PULSE RATE OFF..... INTL MODE USA/CANADA..... REGION CODE USA/CANADA..... COUNTRY CODE 0x7FF..... CHANNEL MASK Bluetooth 4.3.1p1..... FIRMWARE 02/13/2015..... DATE on..... DISCOVERABLE 3.0/4.0..... RADIO VERSION on..... ENABLED ac:3f:a4:82:05:9d.. MAC ADDRESS 76J162700886..... FRIENDLY NAME no..... CONNECTED 1..... MIN SECURITY MODE nc..... CONN SECURITY MODE supported..... IOS FIRMWARE IN THIS PRINTER IS COPYRIGHTED </pre> | |
| <p>Related ZPL command(s):</p> | <p>~WL</p> | |
| <p>Control panel key(s):</p> | <p>Do one of the following:*</p> <ul style="list-style-type: none"> • Hold CANCEL during printer power-up. (Formerly called a CANCEL self test.) • Hold FEED + CANCEL for 2 seconds when the printer is in the Ready state. | |
| <p>Printer web page:</p> | <p>View and Modify Printer Settings > Print Listings on Label *</p> | |
| <p> NOTE: * Prints a printer configuration label and a network configuration label.</p> | | |


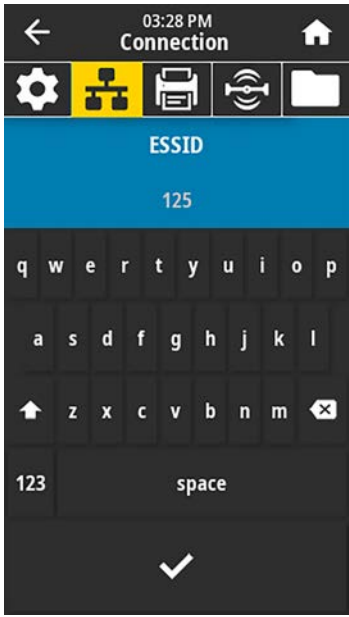
| Menu Display | Menu Option Description | | | | | | | | |
|--|--|------------------|--|-------------------------|--------------------------------|-------------------|--|-------------------|--|
|  <p>The screenshot shows the printer's menu interface. At the top, it displays the time '03:07 PM' and the title 'Connection'. Below this is a navigation bar with icons for settings, network, printer, wireless, and folder. The main content area is titled 'Visibility Agent' and features two radio button options: 'On' (selected) and 'Off'. A hamburger menu icon is visible at the bottom.</p> | <p>Connection > Networks > Visibility Agent</p> <p>When the printer is connected to a wired or wireless network, it will attempt to connect to Zebra’s Asset Visibility Service via the Cloud-based Zebra Printer Connector using an encrypted, certificate-authenticated web socket connection. The printer sends Discovery Data and Settings and Alerts Data. Data printed via any label formats is NOT transmitted.</p> <p>To opt out of this feature, disable this setting. (For more information, see the “Opting Out of the Asset Visibility Agent” application note at zebra.com.)</p> <table border="1"> <tr> <td data-bbox="704 600 873 680">Accepted values:</td> <td data-bbox="876 600 1521 680">ON, OFF</td> </tr> <tr> <td data-bbox="704 684 873 793">SGD command used:</td> <td data-bbox="876 684 1521 793">weblink.zebra_connector.enable</td> </tr> <tr> <td data-bbox="704 798 873 873">Printer web page:</td> <td data-bbox="876 798 1521 873">View and Modify Printer Settings > Network Configuration > Cloud Connect Settings</td> </tr> </table> | Accepted values: | ON, OFF | SGD command used: | weblink.zebra_connector.enable | Printer web page: | View and Modify Printer Settings > Network Configuration > Cloud Connect Settings | | |
| Accepted values: | ON, OFF | | | | | | | | |
| SGD command used: | weblink.zebra_connector.enable | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Configuration > Cloud Connect Settings | | | | | | | | |
|  <p>The screenshot shows the printer's menu interface. At the top, it displays the time '03:11 PM' and the title 'Connection'. Below this is a navigation bar with icons for settings, network, printer, wireless, and folder. The main content area is titled 'Wired IP Protocol' and features a list of radio button options: 'All' (selected), 'BOOTP', 'DHCP', 'DHCP And BOOTP', 'Gleaning Only', 'RARP', and 'Permanent'. A help icon (?) is visible in the top right of the menu area. A hamburger menu icon is visible at the bottom.</p> | <p>Connection > Wired > Wired IP Protocol</p> <p>This parameter indicates if the user (permanent) or the server (dynamic) selects the wired print server’s IP address. When a dynamic option is chosen, this parameter tells the method(s) by which this print server receives the IP address from the server.</p> <p>IMPORTANT: You must reset the print server to allow changes to the network settings to take effect. (See Connection > Networks > Reset Network.)</p> <table border="1"> <tr> <td data-bbox="704 1199 873 1274">Accepted values:</td> <td data-bbox="876 1199 1521 1274">ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT</td> </tr> <tr> <td data-bbox="704 1278 873 1354">Related ZPL command(s):</td> <td data-bbox="876 1278 1521 1354">^ND</td> </tr> <tr> <td data-bbox="704 1358 873 1476">SGD command used:</td> <td data-bbox="876 1358 1521 1476">internal_wired.ip.protocol</td> </tr> <tr> <td data-bbox="704 1480 873 1556">Printer web page:</td> <td data-bbox="876 1480 1521 1556">View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</td> </tr> </table> | Accepted values: | ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT | Related ZPL command(s): | ^ND | SGD command used: | internal_wired.ip.protocol | Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings |
| Accepted values: | ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | |
| SGD command used: | internal_wired.ip.protocol | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings | | | | | | | | |


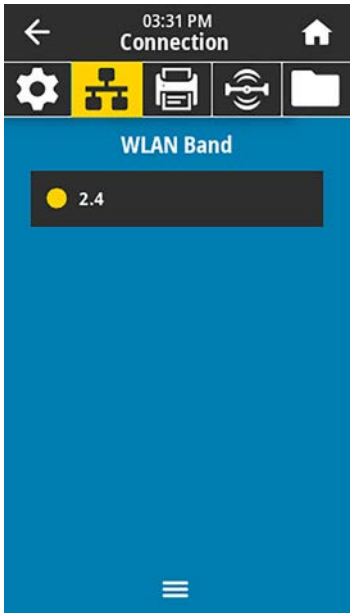
| Menu Display | Menu Option Description | |
|--|--|--|
|  <p>The screenshot shows the printer's menu interface. At the top, it displays the time '03:12 PM' and the title 'Connection'. Below this is a navigation bar with icons for settings, network, printer, wireless, and home. The main menu item is 'Wired IP Address', which is highlighted in blue. Below the title, the current IP address '192 . 168 . 0 . 13' is shown. A numeric keypad is visible below, with digits 1-9, 0, a backspace key (X), and a confirmation key (checkmark).</p> | <p>Connection > Wired > Wired IP Address</p> <p>View and, if necessary, change the printer's wired IP address.</p> <p>To save changes to this setting, set Connection > Wired > Wired IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> | |
|  <p>The screenshot shows the printer's menu interface. At the top, it displays the time '03:19 PM' and the title 'Connection'. Below this is a navigation bar with icons for settings, network, printer, wireless, and home. The main menu item is 'Wired Subnet', which is highlighted in blue. Below the title, the current subnet mask '255 . 255 . 255 . 0' is shown. A numeric keypad is visible below, with digits 1-9, 0, a backspace key (X), and a confirmation key (checkmark).</p> | <p>Connection > Wired > Wired Subnet</p> <p>View and, if necessary, change the wired subnet mask.</p> <p>To save changes to this setting, set Connection > Wired > Wired IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> | |
| <p>Accepted values:</p> | <p>000 to 255 for each field</p> | |
| <p>Related ZPL command(s):</p> | <p>^ND</p> | |
| <p>SGD command used:</p> | <p>internal_wired.ip.addr</p> | |
| <p>Printer web page:</p> | <p>View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</p> | |
| <p>Accepted values:</p> | <p>000 to 255 for each field</p> | |
| <p>Related ZPL command(s):</p> | <p>^ND</p> | |
| <p>SGD command used:</p> | <p>internal_wired.ip.netmask</p> | |
| <p>Printer web page:</p> | <p>View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</p> | |

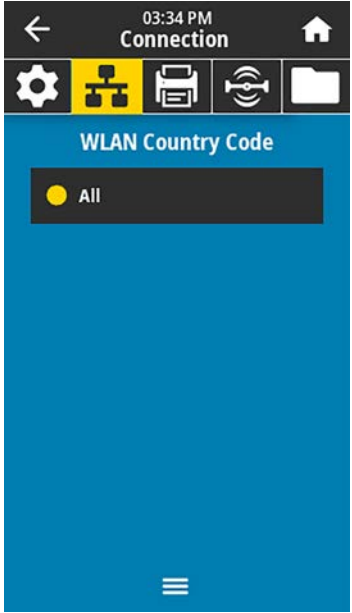

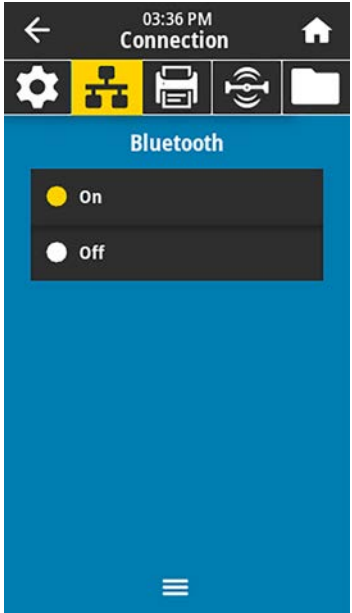
| Menu Display | Menu Option Description | | | | | | | | | |
|--|---|--|-------------------|---------------------------|-------------------------|--|-------------------|---------------------------|-------------------|--|
|  | <p>Connection > Wired > Wired Gateway</p> <p>View and, if necessary, change the default wired gateway.</p> <p>To save changes to this setting, set Connection > Wired > Wired IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> <table border="1" data-bbox="699 436 1526 871"> <tr> <td data-bbox="699 436 873 520">Accepted values:</td> <td data-bbox="876 436 1526 520">000 to 255 for each field</td> </tr> <tr> <td data-bbox="699 525 873 604">Related ZPL command(s):</td> <td data-bbox="876 525 1526 604">^ND</td> </tr> <tr> <td data-bbox="699 609 873 718">SGD command used:</td> <td data-bbox="876 609 1526 718">internal_wired.ip.gateway</td> </tr> <tr> <td data-bbox="699 722 873 871">Printer web page:</td> <td data-bbox="876 722 1526 871">View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</td> </tr> </table> | | Accepted values: | 000 to 255 for each field | Related ZPL command(s): | ^ND | SGD command used: | internal_wired.ip.gateway | Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings |
| Accepted values: | 000 to 255 for each field | | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | | |
| SGD command used: | internal_wired.ip.gateway | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings | | | | | | | | | |
|  | <p>Connection > Wired > Wired MAC Address</p> <p>View the Media Access Control (MAC) address of the wired print server. This value cannot be modified.</p> <table border="1" data-bbox="699 1003 1526 1509"> <tr> <td data-bbox="699 1003 873 1113">SGD command used:</td> <td data-bbox="876 1003 1526 1113">internal_wired.mac_addr</td> </tr> <tr> <td data-bbox="699 1117 873 1509">Printer web page:</td> <td data-bbox="876 1117 1526 1509">View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings</td> </tr> </table> | | SGD command used: | internal_wired.mac_addr | Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings | | | | |
| SGD command used: | internal_wired.mac_addr | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings | | | | | | | | | |

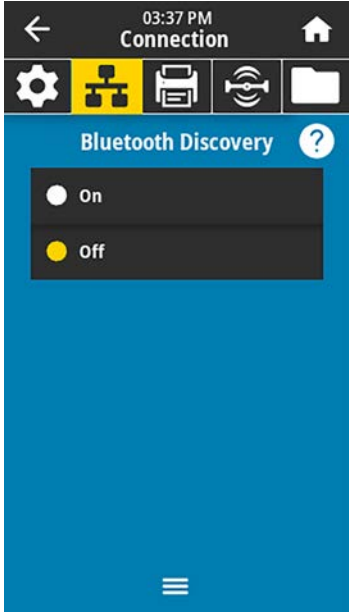
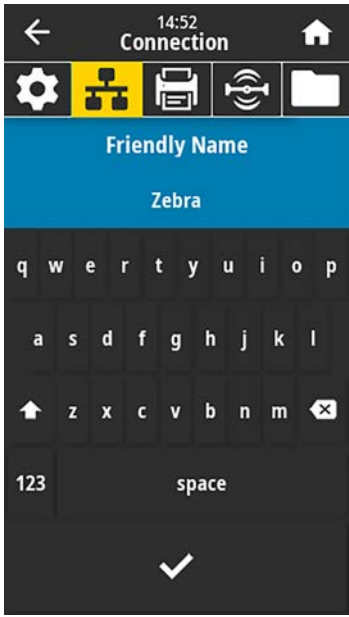
| Menu Display | Menu Option Description | | | | | | | | |
|--|--|------------------|--|-------------------------|-----|-------------------|-----------------------|-------------------|---|
|  | <p>Connection > WLAN > WLAN IP Protocol</p> <p>This parameter indicates if the user (permanent) or the server (dynamic) selects the wireless print server's IP address. When a dynamic option is chosen, this parameter tells the method(s) by which this print server receives the IP address from the server.</p> <p> NOTE: You must reset the print server to allow changes to the network settings to take effect. (See Connection > Networks > Reset Network).</p> <table border="1" data-bbox="701 552 1526 915"> <tr> <td>Accepted values:</td> <td>ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^ND</td> </tr> <tr> <td>SGD command used:</td> <td>wlan.ip.protocol</td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | Accepted values: | ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT | Related ZPL command(s): | ^ND | SGD command used: | wlan.ip.protocol | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup |
| Accepted values: | ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP & BOOTP, PERMANENT | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | |
| SGD command used: | wlan.ip.protocol | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | | |
|  | <p>Connection > WLAN > WLAN IP Address</p> <p>View and, if necessary, change the printer's wireless IP address. To save changes to this setting, set Connection > WLAN > WLAN IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> <table border="1" data-bbox="701 1121 1526 1549"> <tr> <td>Accepted values:</td> <td>000 to 255 for each field</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^ND</td> </tr> <tr> <td>SGD command used:</td> <td>ip.addr, wlan.ip.addr</td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | Accepted values: | 000 to 255 for each field | Related ZPL command(s): | ^ND | SGD command used: | ip.addr, wlan.ip.addr | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup |
| Accepted values: | 000 to 255 for each field | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | |
| SGD command used: | ip.addr, wlan.ip.addr | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | | |

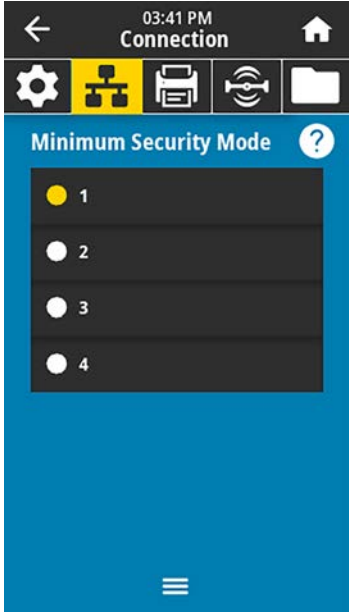
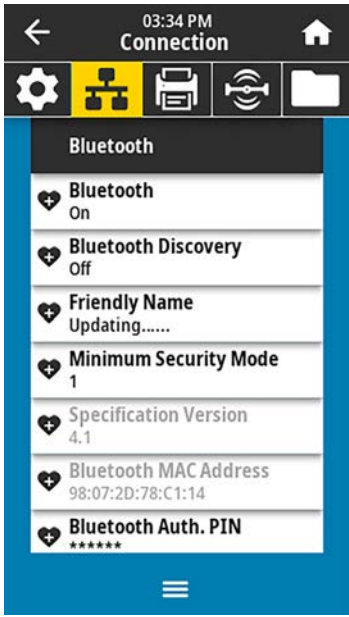
| Menu Display | Menu Option Description | | | | | | | | | |
|--|---|--|------------------|---------------------------|-------------------------|-----|-------------------|-----------------|-------------------|---|
|  | <p>Connection > WLAN > WLAN Subnet</p> <p>View and, if necessary, change the wireless subnet mask.</p> <p>To save changes to this setting, set Connection > WLAN > WLAN IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> <table border="1" data-bbox="699 436 1526 871"> <tr> <td data-bbox="699 436 873 520">Accepted values:</td> <td data-bbox="876 436 1526 520">000 to 255 for each field</td> </tr> <tr> <td data-bbox="699 525 873 609">Related ZPL command(s):</td> <td data-bbox="876 525 1526 609">^ND</td> </tr> <tr> <td data-bbox="699 613 873 718">SGD command used:</td> <td data-bbox="876 613 1526 718">wlan.ip.netmask</td> </tr> <tr> <td data-bbox="699 722 873 871">Printer web page:</td> <td data-bbox="876 722 1526 871">View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | | Accepted values: | 000 to 255 for each field | Related ZPL command(s): | ^ND | SGD command used: | wlan.ip.netmask | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup |
| Accepted values: | 000 to 255 for each field | | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | | |
| SGD command used: | wlan.ip.netmask | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | | | |
|  | <p>Connection > WLAN > WLAN Gateway</p> <p>View and, if necessary, change the default wireless gateway.</p> <p>To save changes to this setting, set Connection > WLAN > WLAN IP Protocol to PERMANENT, and then reset the print server (see Connection > Networks > Reset Network).</p> <table border="1" data-bbox="699 1071 1526 1509"> <tr> <td data-bbox="699 1071 873 1155">Accepted values:</td> <td data-bbox="876 1071 1526 1155">000 to 255 for each field</td> </tr> <tr> <td data-bbox="699 1159 873 1243">Related ZPL command(s):</td> <td data-bbox="876 1159 1526 1243">^ND</td> </tr> <tr> <td data-bbox="699 1247 873 1352">SGD command used:</td> <td data-bbox="876 1247 1526 1352">wlan.ip.gateway</td> </tr> <tr> <td data-bbox="699 1356 873 1509">Printer web page:</td> <td data-bbox="876 1356 1526 1509">View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | | Accepted values: | 000 to 255 for each field | Related ZPL command(s): | ^ND | SGD command used: | wlan.ip.gateway | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup |
| Accepted values: | 000 to 255 for each field | | | | | | | | | |
| Related ZPL command(s): | ^ND | | | | | | | | | |
| SGD command used: | wlan.ip.gateway | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | | | |

| Menu Display | Menu Option Description | | | | | | | |
|--|--|--|-------------------|--|-------------------|---|-------------------|---|
|  | <p>Connection > WLAN > WLAN MAC Address</p> <p>View the Media Access Control (MAC) address of the wireless print server. This value cannot be modified.</p> <table border="1" data-bbox="699 363 1526 871"> <tr> <td data-bbox="699 363 873 478">SGD command used:</td> <td data-bbox="873 363 1526 478">wlan.mac_addr</td> </tr> <tr> <td data-bbox="699 478 873 871">Printer web page:</td> <td data-bbox="873 478 1526 871">View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | | SGD command used: | wlan.mac_addr | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | |
| SGD command used: | wlan.mac_addr | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | |
|  | <p>Connection > WLAN > ESSID</p> <p>The Extended Service Set Identification (ESSID) is an identifier for your wireless network. Specify the ESSID for the current wireless configuration.</p> <table border="1" data-bbox="699 1035 1526 1509"> <tr> <td data-bbox="699 1035 873 1119">Accepted values:</td> <td data-bbox="873 1035 1526 1119">32-character alphanumeric string (default 125)</td> </tr> <tr> <td data-bbox="699 1119 873 1234">SGD command used:</td> <td data-bbox="873 1119 1526 1234">wlan.essid</td> </tr> <tr> <td data-bbox="699 1234 873 1509">Printer web page:</td> <td data-bbox="873 1234 1526 1509">View and Modify Printer Settings > Network Communications Setup > Wireless Setup</td> </tr> </table> | | Accepted values: | 32-character alphanumeric string (default 125) | SGD command used: | wlan.essid | Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup |
| Accepted values: | 32-character alphanumeric string (default 125) | | | | | | | |
| SGD command used: | wlan.essid | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Network Communications Setup > Wireless Setup | | | | | | | |


| Menu Display | Menu Option Description | |
|--|--|-----------------------------|
|  | <p>Connection > WLAN > WLAN Security Select the security type being used on your WLAN.</p> | |
| | <p>Related ZPL command(s):</p> | <p>^WX</p> |
| | <p>SGD command used:</p> | <p>wlan.security</p> |
|  | <p>Connection > WLAN > WLAN Band Set a preferred band to connect with via WiFi.</p> | |
| | <p>Accepted values:</p> | <p>2.4, 5, None</p> |
| | <p>SGD command used:</p> | <p>wlan.band_preference</p> |
| <p>Printer web page:</p> | <p>View and Modify Printer Settings > Network Communications Setup > Wireless Encryption Setup</p> <p>View and Modify Printer Settings > Network Communications > Wireless Setup</p> | |

| Menu Display | Menu Option Description | |
|--|--|--|
|  | <p>Connection > WLAN > WLAN Country Code</p> <p>The country code defines the regulatory country for which the wireless radio is currently configured.</p> <p> IMPORTANT: The list of country codes is specific to each printer and depends on the printer model and its wireless radio configuration. The list is subject to change, addition, or deletion with any firmware update, at any time, without notice.</p> <p>To determine the country codes available on your printer, issue the <code>! U1 getvar "wlan"</code> command to return all commands related to WLAN settings. Locate the <code>wlan.country.code</code> command in the results and view the country codes available for your printer.</p> | |
| <p>SGD command used:</p> | <p><code>wlan.country_code</code></p> | |
|  | <p>Connection > Bluetooth > Bluetooth</p> <p>Select if the printer is “Discoverable” for Bluetooth device pairing.</p> | |
| <p>Accepted values:</p> | <p>ON—Enables the Bluetooth radio. OFF—Disables the Bluetooth radio.</p> | |
| <p>SGD command used:</p> | <p><code>bluetooth.enable</code></p> | |


| Menu Display | Menu Option Description | | | | | |
|--|---|--|------------------|--|-------------------|-------------------------|
|  | <p>Connection > Bluetooth > Bluetooth Discovery Select if the printer is “Discoverable” for Bluetooth device pairing.</p> <table border="1" data-bbox="699 331 1526 871"> <tr> <td data-bbox="699 331 873 426">Accepted values:</td> <td data-bbox="876 331 1526 426">ON—Enables Bluetooth discoverable mode. OFF—Disables Bluetooth discoverable mode.</td> </tr> <tr> <td data-bbox="699 430 873 871">SGD command used:</td> <td data-bbox="876 430 1526 871">bluetooth.discoverable</td> </tr> </table> | | Accepted values: | ON—Enables Bluetooth discoverable mode. OFF—Disables Bluetooth discoverable mode. | SGD command used: | bluetooth.discoverable |
| Accepted values: | ON—Enables Bluetooth discoverable mode. OFF—Disables Bluetooth discoverable mode. | | | | | |
| SGD command used: | bluetooth.discoverable | | | | | |
|  | <p>Connection > Bluetooth > Friendly Name This command sets the friendly name, which is used during service discovery. For changes to take effect, you must power cycle the printer or issue the <code>device.reset</code> command (see Connection > Networks > Reset Network). If you do not set a friendly name, the setting will default to the printer serial number.</p> <table border="1" data-bbox="699 1140 1526 1509"> <tr> <td data-bbox="699 1140 873 1224">Accepted values:</td> <td data-bbox="876 1140 1526 1224">17-character text string</td> </tr> <tr> <td data-bbox="699 1228 873 1509">SGD command used:</td> <td data-bbox="876 1228 1526 1509">bluetooth.friendly_name</td> </tr> </table> | | Accepted values: | 17-character text string | SGD command used: | bluetooth.friendly_name |
| Accepted values: | 17-character text string | | | | | |
| SGD command used: | bluetooth.friendly_name | | | | | |

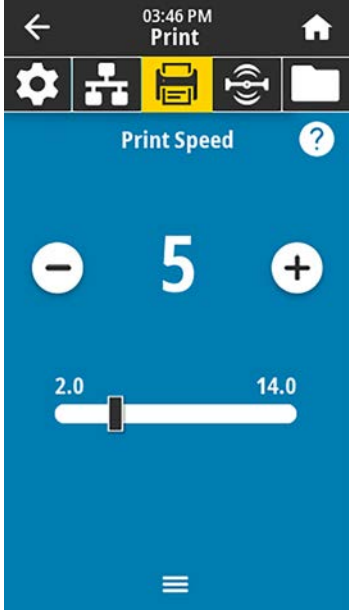
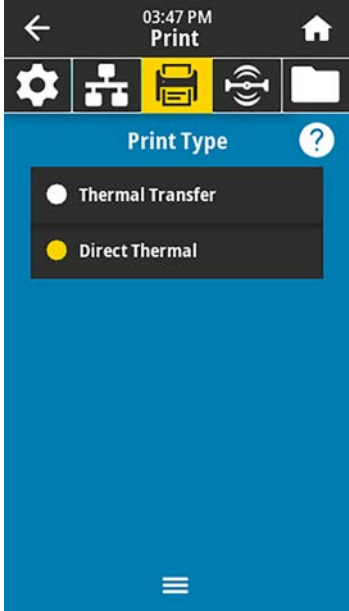
| Menu Display | Menu Option Description | |
|--|--|---------------------------------|
|  | <p>Connection > Bluetooth > Minimum Security Mode</p> <p>This printer setting parameter sets the Bluetooth Minimum Security mode. Minimum Security Mode provides for different levels of security, depending on the printer radio version and printer firmware. See the Zebra Programming Guide at zebra.com/manuals for more information.</p> | |
| | Accepted values: | 1, 2, 3, 4 |
| | SGD command used: | bluetooth.minimum_security_mode |
|  | <p>Connection > Bluetooth > Specification Version</p> <p>This parameter displays the Bluetooth library version number.</p> | |
| | SGD command used: | bluetooth.version |

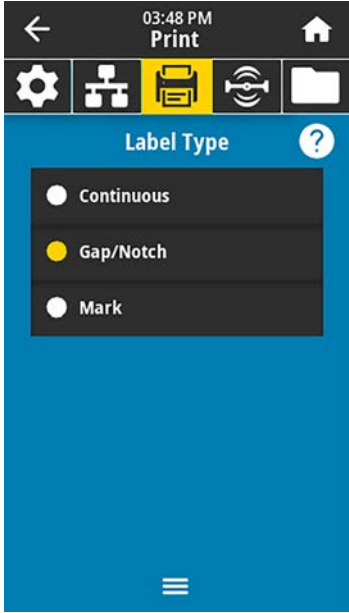
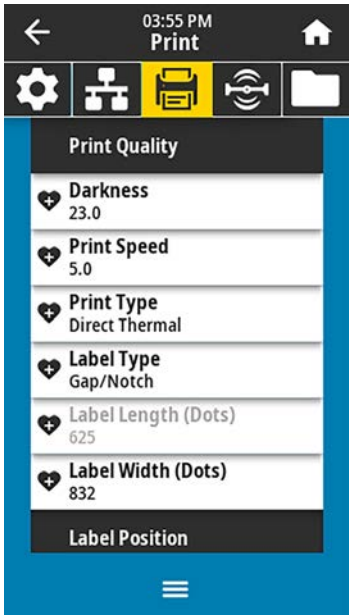
| Menu Display | Menu Option Description | | | |
|-------------------|---|--|-------------------|---|
| | <p>Connection > Bluetooth > MAC Address This parameter displays the Bluetooth device address.</p> <table border="1" data-bbox="698 331 1526 873"> <tr> <td data-bbox="698 331 873 873">SGD command used:</td> <td data-bbox="873 331 1526 873">bluetooth.address</td> </tr> </table> | | SGD command used: | bluetooth.address |
| SGD command used: | bluetooth.address | | | |
| | <p>Connection > Bluetooth > Bluetooth Auth. PIN Set the PIN used when Bluetooth authentication is enabled.</p> <table border="1" data-bbox="698 968 1526 1509"> <tr> <td data-bbox="698 968 873 1509">SGD command used:</td> <td data-bbox="873 968 1526 1509"> bluetooth.bluetooth_pin (to set the PIN) bluetooth.authentication (to enable authentication) </td> </tr> </table> | | SGD command used: | bluetooth.bluetooth_pin (to set the PIN) bluetooth.authentication (to enable authentication) |
| SGD command used: | bluetooth.bluetooth_pin (to set the PIN) bluetooth.authentication (to enable authentication) | | | |

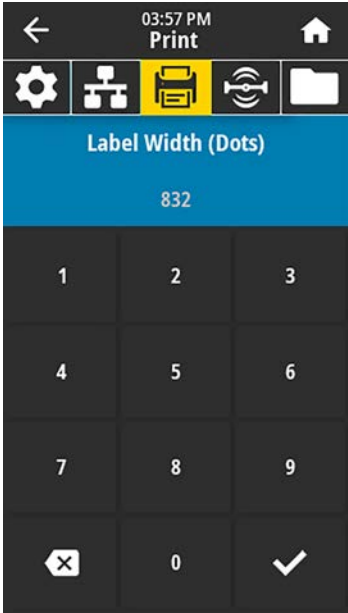

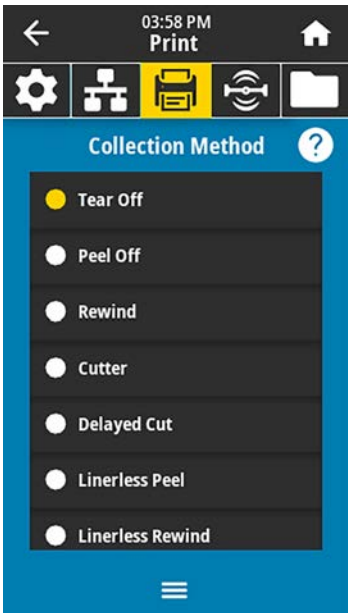
| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>Connection > Bluetooth > Bluetooth Bonding</p> <p>Controls whether the Bluetooth stack will “bond” or save link keys for devices that successfully connect to the printer.</p> | |
| <p>Accepted values:</p> | <p>ON—Enables Bluetooth bonding. OFF—Disables Bluetooth bonding.</p> | |
| <p>SGD command used:</p> | <p>bluetooth.bonding</p> | |

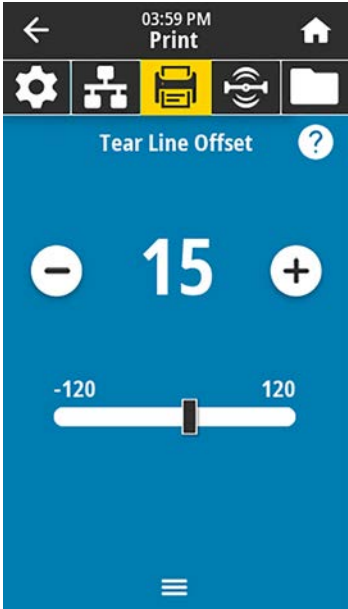
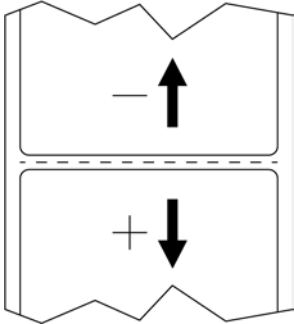
Print Menu

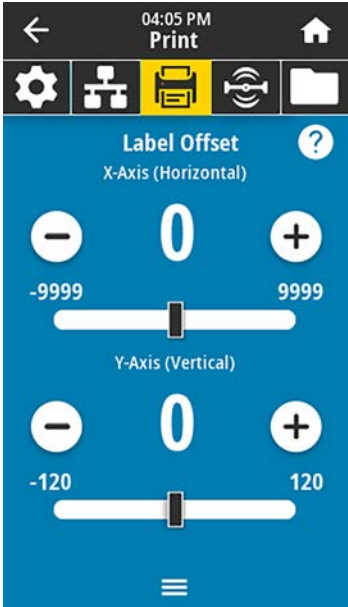
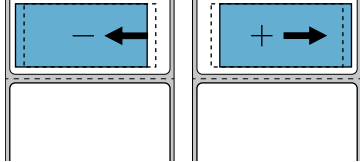
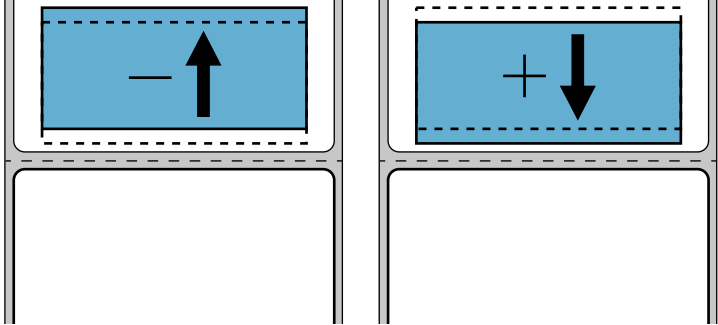
| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>Print > Print Quality > Darkness</p> <p>Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely.</p> | |
| <p>Accepted values:</p> | <p>0.0 to 30.0</p> | |
| <p>Related ZPL command(s):</p> | <p>^MD ^SD</p> | |
| <p>SGD command used:</p> | <p>print.tone</p> | |
| <p>Printer web page:</p> | <p>View and Modify Printer Settings > General Setup > Darkness</p> | |

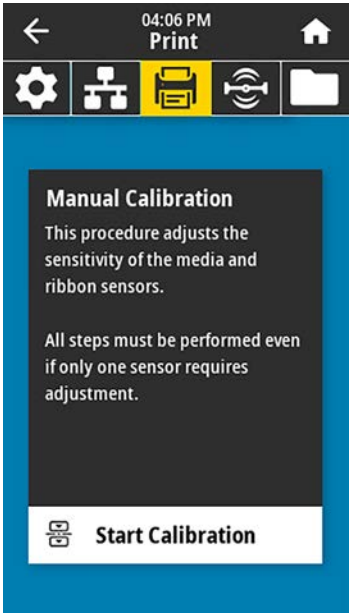
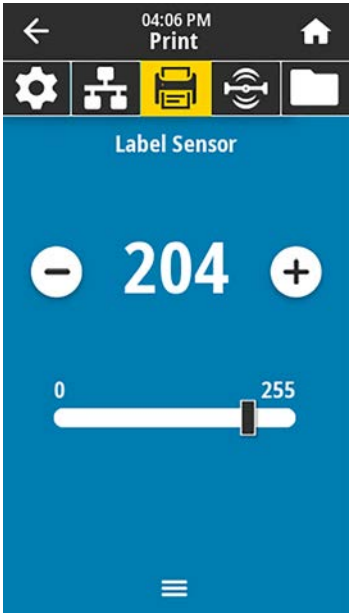
| Menu Display | Menu Option Description | | | | | | | |
|--|--|--|------------------|---|-------------------------|-----|-------------------|-------------------|
|  | <p>Print > Print Quality > Print Speed</p> <p>Select the speed, in inches per second (ips), for printing a label. Slower print speeds typically yield better print quality.</p> <table border="1" data-bbox="701 363 1526 651"> <tr> <td>Accepted values:</td> <td>2 to 6 ips</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^PR</td> </tr> <tr> <td>SGD command used:</td> <td>media.speed</td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > General Setup > Print Speed</p> | | Accepted values: | 2 to 6 ips | Related ZPL command(s): | ^PR | SGD command used: | media.speed |
| Accepted values: | 2 to 6 ips | | | | | | | |
| Related ZPL command(s): | ^PR | | | | | | | |
| SGD command used: | media.speed | | | | | | | |
|  | <p>Print > Print Quality > Print Type</p> <p>Specify if the printer needs to use ribbon for printing.</p> <table border="1" data-bbox="701 978 1526 1350"> <tr> <td>Accepted values:</td> <td> <ul style="list-style-type: none"> Thermal Transfer—Uses ribbon and thermal transfer media. Direct Thermal—Uses direct thermal media and no ribbon. </td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^MT</td> </tr> <tr> <td>SGD command used:</td> <td>ezpl.print_method</td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > Media Setup > Print Method</p> | | Accepted values: | <ul style="list-style-type: none"> Thermal Transfer—Uses ribbon and thermal transfer media. Direct Thermal—Uses direct thermal media and no ribbon. | Related ZPL command(s): | ^MT | SGD command used: | ezpl.print_method |
| Accepted values: | <ul style="list-style-type: none"> Thermal Transfer—Uses ribbon and thermal transfer media. Direct Thermal—Uses direct thermal media and no ribbon. | | | | | | | |
| Related ZPL command(s): | ^MT | | | | | | | |
| SGD command used: | ezpl.print_method | | | | | | | |

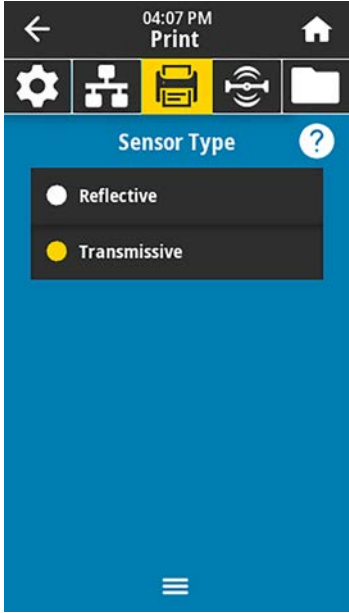
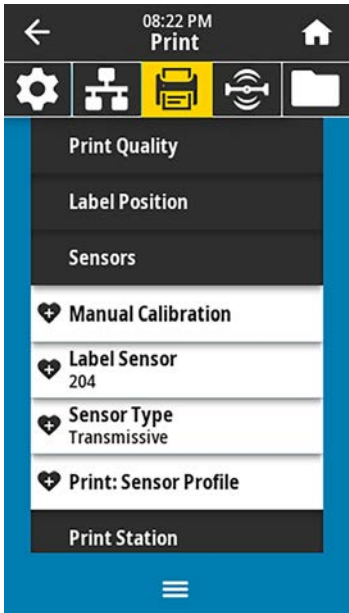
| Menu Display | Menu Option Description | | | | | | | | |
|--|--|------------------|---|-------------------------|-----|-------------------|-----------------|-------------------|--|
|  | <p>Print > Print Quality > Label Type</p> <p>Select the type of media that you are using.</p> <table border="1"> <tr> <td data-bbox="704 338 873 554">Accepted values:</td> <td data-bbox="876 338 1521 554">Continuous, Gap/Notch, Mark If you select Continuous, you must include a label length in your label format (^LL if you are using ZPL). If you select Gap/Notch or Mark for various noncontinuous media, the printer feeds media to calculate the label length.</td> </tr> <tr> <td data-bbox="704 558 873 638">Related ZPL command(s):</td> <td data-bbox="876 558 1521 638">^MN</td> </tr> <tr> <td data-bbox="704 642 873 751">SGD command used:</td> <td data-bbox="876 642 1521 751">ezpl.media_type</td> </tr> <tr> <td data-bbox="704 756 873 865">Printer web page:</td> <td data-bbox="876 756 1521 865">View and Modify Printer Settings > Media Setup > Media Type</td> </tr> </table> | Accepted values: | Continuous, Gap/Notch, Mark If you select Continuous , you must include a label length in your label format (^LL if you are using ZPL). If you select Gap/Notch or Mark for various noncontinuous media, the printer feeds media to calculate the label length. | Related ZPL command(s): | ^MN | SGD command used: | ezpl.media_type | Printer web page: | View and Modify Printer Settings > Media Setup > Media Type |
| Accepted values: | Continuous, Gap/Notch, Mark If you select Continuous , you must include a label length in your label format (^LL if you are using ZPL). If you select Gap/Notch or Mark for various noncontinuous media, the printer feeds media to calculate the label length. | | | | | | | | |
| Related ZPL command(s): | ^MN | | | | | | | | |
| SGD command used: | ezpl.media_type | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Media Setup > Media Type | | | | | | | | |
|  | <p>Print > Print Quality > Label Length</p> <p>View the calibrated label length in dots. This value cannot be modified.</p> | | | | | | | | |

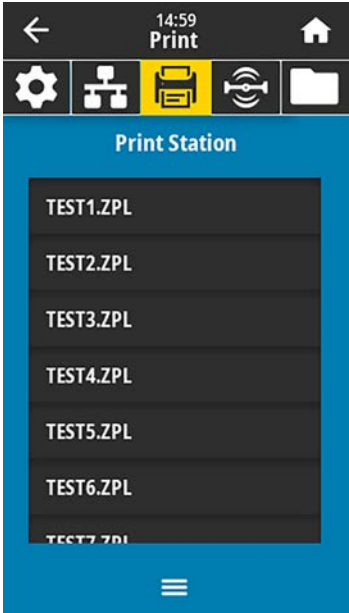

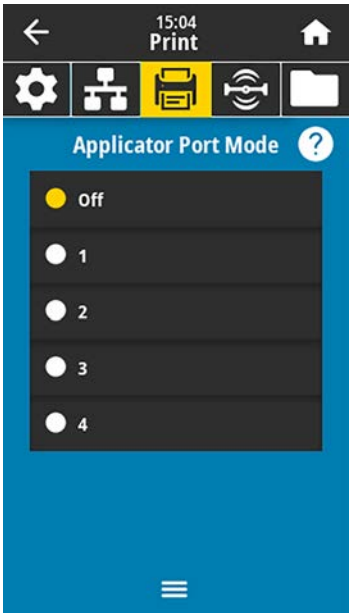
| Menu Display | Menu Option Description |
|---|--|
|  | <p>Print > Print Quality > Label Width (Dots)</p> <p>Specify the width of the labels being used, in dots. The default value is the maximum width for the printer, based on the printhead's DPI value.</p> <p>Accepted values:</p> <p> NOTE: Setting the width too narrow can result in portions of a label format not being printed on the media. Setting the width too wide wastes formatting memory and can cause the printer to print beyond the label and onto the platen roller. This setting can affect the horizontal position of the label format if the image was inverted using the ^POI ZPL II command.</p> <p>ZT411 203 dpi = 0002 to 832 ZT411 300 dpi = 0002 to 1248 ZT411 600 dpi = 0002 to 2496 ZT421 203 dpi = 0002 to 1344 ZT421 300 dpi = 0002 to 1984</p> <p>Related ZPL command(s): ^PW</p> <p>SGD command used: ezpl.print_width</p> <p>Printer web page: View and Modify Printer Settings > Media Setup > Print Width</p> |
|  | <p>Print > Label Position > Collection Method</p> <p>Select a collection method that is compatible with the options available on your printer.</p> <p>Accepted values: Tear Off, Peel Off, Rewind, Cutter, Delayed Cut, Linerless Peel, Linerless Rewind, Linerless Tear, Applicator, Linerless Cut, Linerless Delayed Cut</p> <p>Related ZPL command(s): ^MM</p> <p>SGD command used: media.printmode</p> <p>Printer web page: View and Modify Printer Settings > General Setup > Print Mode</p> |

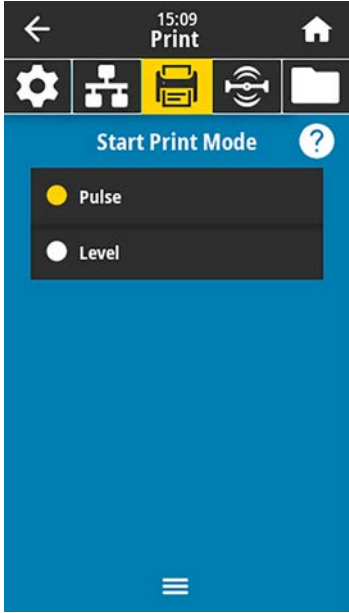
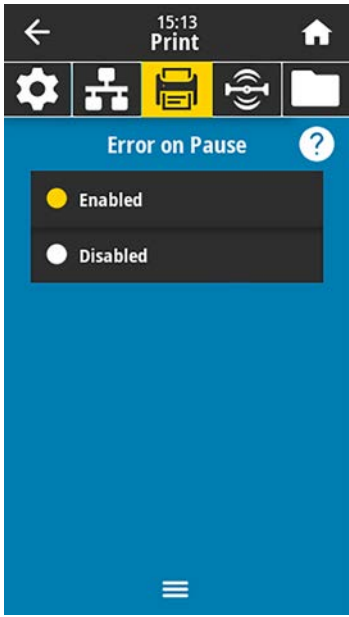
| Menu Display | Menu Option Description | |
|---|---|--|
|  | <p>Print > Label Position > Tear Line Offset</p> <p>If necessary, shift the position of the media over the tear-off bar after printing.</p> <ul style="list-style-type: none"> • Lower numbers move the media into the printer by the specified number of dots (the tear line moves closer to the edge of the label just printed). • Higher numbers move the media out of the printer (the tear line moves closer to the leading edge of the next label).  | |
| Accepted values: | -120 to +120 | |
| Related ZPL command(s): | ~TA | |
| SGD command used: | ezpl.tear_off | |
| Printer web page: | View and Modify Printer Settings > General Setup > Tear Off | |

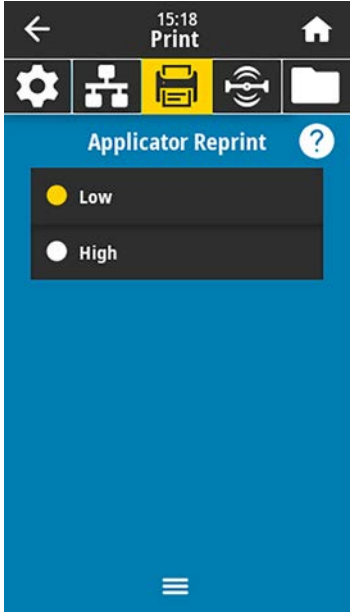
| Menu Display | Menu Option Description | | | | | | | | |
|---|--|------------------|---------------|-------------------------|-----|-------------------|-------------------|-------------------|--|
|  | <p>Print > Label Position > Label Offset</p> <p>If necessary, shift the position of the image horizontally or vertically on the label.</p> <p>Horizontal</p> <ul style="list-style-type: none"> Negative numbers move the left edge of the image toward the left edge of the label by the number of dots selected. Positive numbers move the edge of the image toward the right edge of the label.  <table border="1" data-bbox="699 751 1526 1123"> <tr> <td>Accepted values:</td> <td>-9999 to 9999</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^LS</td> </tr> <tr> <td>SGD command used:</td> <td>zpl.left_position</td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > Advanced Setup > Left Position</td> </tr> </table> | Accepted values: | -9999 to 9999 | Related ZPL command(s): | ^LS | SGD command used: | zpl.left_position | Printer web page: | View and Modify Printer Settings > Advanced Setup > Left Position |
| Accepted values: | -9999 to 9999 | | | | | | | | |
| Related ZPL command(s): | ^LS | | | | | | | | |
| SGD command used: | zpl.left_position | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > Advanced Setup > Left Position | | | | | | | | |
| | <p>Vertical</p> <ul style="list-style-type: none"> Lower numbers move the image higher on the label (toward the printhead). Higher numbers move the image farther down on the label (away from the printhead) by the specified number of dots.  <table border="1" data-bbox="699 1682 1526 1843"> <tr> <td>Accepted values:</td> <td>-120 to +120</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^LT</td> </tr> </table> | Accepted values: | -120 to +120 | Related ZPL command(s): | ^LT | | | | |
| Accepted values: | -120 to +120 | | | | | | | | |
| Related ZPL command(s): | ^LT | | | | | | | | |

| Menu Display | Menu Option Description | |
|---|--|--|
| | Printer web page: | View and Modify Printer Settings > General Setup > Label Top |
|  | <p>Print > Sensors > Manual Calibration</p> <p>Calibrate the printer to adjust the sensitivity of the media and ribbon sensors.</p> <p>For complete instructions on how to perform a calibration procedure, see Calibrating the Ribbon and Media Sensors on page 118.</p> | |
| | Related ZPL command(s): | ~JC |
| | SGD command used: | ezpl.manual_calibration |
| | Control panel key(s): | Hold PAUSE + FEED + CANCEL for 2 seconds to initiate calibration. |
| | Printer web page: | <p>The calibration procedure cannot be initiated through the web pages. See the following web page for settings that are set during sensor calibration:</p> <p>View and Modify Printer Settings > Calibration</p> <p>! IMPORTANT: Do not change these settings unless you are told to do so by Zebra Technical Support or by an authorized service technician.</p> |
|  | <p>Print > Sensors > Label Sensor</p> <p>Set the sensitivity of the label sensor.</p> <p>! IMPORTANT: This value is set during sensor calibration. Do not change these settings unless you are told to do so by Zebra Technical Support or by an authorized service technician.</p> | |
| | Accepted values: | 0 to 255 |
| | SGD command used: | ezpl.label_sensor |
| | Printer web page: | View and Modify Printer Settings > Calibration |

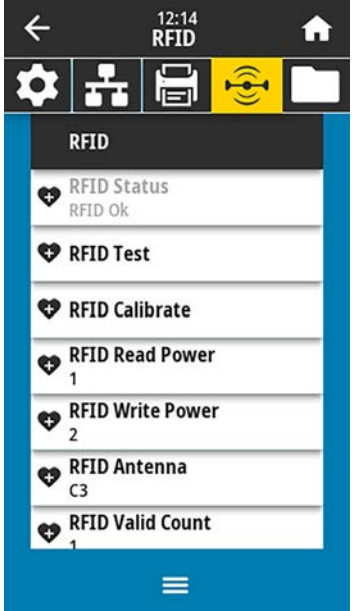
| Menu Display | Menu Option Description | | | | | | | |
|--|---|--|-------------------------|--------------------------|-------------------------|---|-------------------|----------------------|
|  | <p>Print > Sensors > Sensor Type</p> <p>Select the media sensor that is appropriate for the media that you are using. The reflective sensor typically is used only for black mark media. The transmissive sensor is typically used for other media types.</p> <table border="1" data-bbox="699 430 1526 709"> <tr> <td>Accepted values:</td> <td>TRANSMISSIVE, REFLECTIVE</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^JS</td> </tr> <tr> <td>SGD command used:</td> <td>device.sensor_select</td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > Media Setup</p> | | Accepted values: | TRANSMISSIVE, REFLECTIVE | Related ZPL command(s): | ^JS | SGD command used: | device.sensor_select |
| Accepted values: | TRANSMISSIVE, REFLECTIVE | | | | | | | |
| Related ZPL command(s): | ^JS | | | | | | | |
| SGD command used: | device.sensor_select | | | | | | | |
|  | <p>Print > Sensors > Print: Sensor Profile</p> <p>Shows the sensor settings compared to actual sensor readings. To interpret the results, see Sensor Profile on page 146.</p> <table border="1" data-bbox="699 1003 1526 1165"> <tr> <td>Related ZPL command(s):</td> <td>~JG</td> </tr> <tr> <td>Control panel key(s):</td> <td>Hold FEED + CANCEL during printer power-up.</td> </tr> </table> <p>Printer web page: View and Modify Printer Settings > Print Listings on Label ></p> | | Related ZPL command(s): | ~JG | Control panel key(s): | Hold FEED + CANCEL during printer power-up. | | |
| Related ZPL command(s): | ~JG | | | | | | | |
| Control panel key(s): | Hold FEED + CANCEL during printer power-up. | | | | | | | |

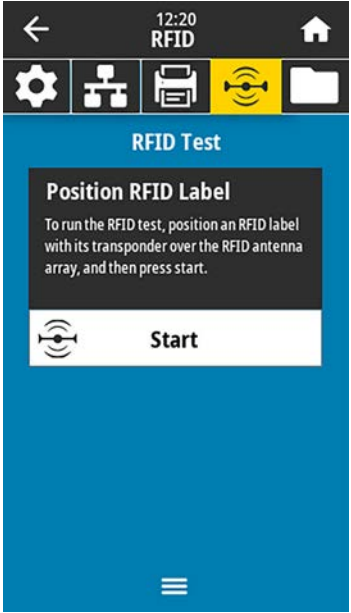
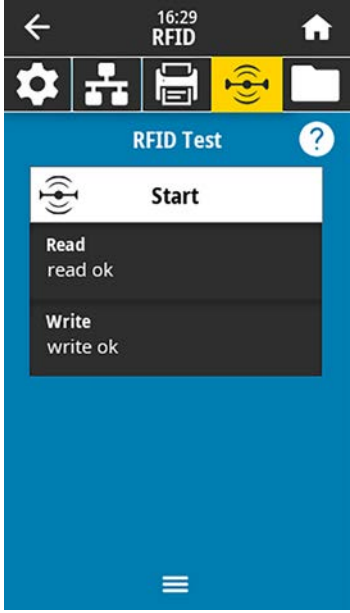
| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>Print > Print Station</p> <p>Use this menu item to fill in variable fields in a label format and print the label using a Human Input Device (HID), such as a USB keyboard, scale, or barcode scanner. A suitable label format must be stored on the E: drive of the printer to use this option. See the exercises in Using a USB Host Port and the Print Touch Feature on page 171 for an exercise using this capability.</p> <p>When you plug an HID into one of the printer’s USB host ports, use this user menu to select a form on the printer’s E: drive. After you have been prompted to fill in each variable $\wedge FN$ field on the form, you can specify the desired quantity of labels to print.</p> <p>For more information about using the $\wedge FN$ command or the SGD commands related to this feature, see the Zebra Programming Guide at zebra.com/manuals for more information.</p> <p> NOTE: This menu item can be used only if a USB device is connected to a USB host port on the printer.</p> | |
| <p>SGD command used:</p> | <pre>usb.host.keyboard_input (must be set to ON) usb.host.template_list usb.host.fn_field_list usb.host.fn_field_data usb.host.fn_last_field usb.host.template_print_amount</pre> | |
|  | <p>Print > Applicator > Applicator Port Mode</p> <p>Controls the way in which the applicator port’s “End Print” signal functions.</p> <p>Accepted values:</p> <ul style="list-style-type: none"> Off 1 = End Print signal normally high, and low only when the printer is moving the label forward. 2 = End Print signal normally low, and high only when the printer is moving the label forward. 3 = End Print signal normally high, and low for 20 ms when a label has been printed and positioned. 4 = End Print signal normally low, and high for 20 ms when a label has been printed and positioned. <p>Related ZPL command(s): $\wedge JJ$</p> <p>SGD command used:</p> <pre>device.applicator.end_print</pre> | |

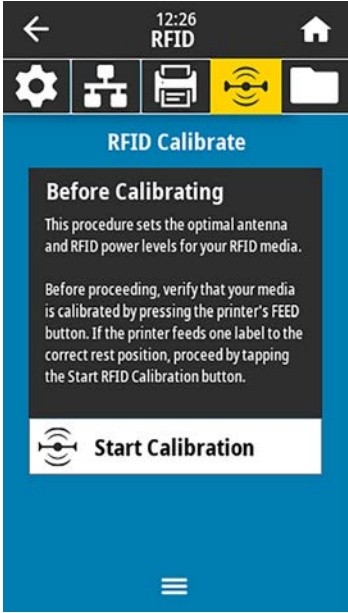

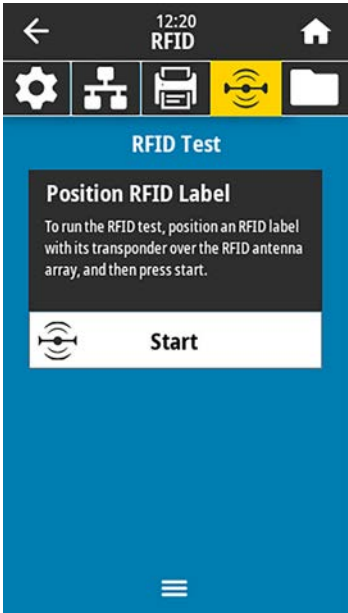
| Menu Display | Menu Option Description | | | | | | |
|--|---|------------------|--|-------------------------|----------------------------------|-------------------|---|
|  | <p>Print > Applicator > Start Print Mode</p> <p>Determines if the applicator port’s “Start Print” signal is in level mode or pulse mode.</p> <table border="1" data-bbox="699 367 1526 583"> <tr> <td data-bbox="699 367 873 583">Accepted values:</td> <td data-bbox="876 367 1526 583"> Pulse—Start Print signal must be deasserted before it can be asserted for the next label. Level—Start Print signal does not need to be deasserted to print the next label. As long as the Start Print signal is low and a label is formatted, a label prints. </td> </tr> </table> <table border="1" data-bbox="699 588 1526 667"> <tr> <td data-bbox="699 588 873 667">Related ZPL command(s):</td> <td data-bbox="876 588 1526 667">^JJ</td> </tr> </table> <table border="1" data-bbox="699 672 1526 871"> <tr> <td data-bbox="699 672 873 871">SGD command used:</td> <td data-bbox="876 672 1526 871">device.applicator.start_print</td> </tr> </table> | Accepted values: | Pulse—Start Print signal must be deasserted before it can be asserted for the next label. Level—Start Print signal does not need to be deasserted to print the next label. As long as the Start Print signal is low and a label is formatted, a label prints. | Related ZPL command(s): | ^JJ | SGD command used: | device.applicator.start_print |
| Accepted values: | Pulse—Start Print signal must be deasserted before it can be asserted for the next label. Level—Start Print signal does not need to be deasserted to print the next label. As long as the Start Print signal is low and a label is formatted, a label prints. | | | | | | |
| Related ZPL command(s): | ^JJ | | | | | | |
| SGD command used: | device.applicator.start_print | | | | | | |
|  | <p>Print > Applicator > Error on Pause</p> <p>Determines how applicator port errors are treated by the printer. Enabling this feature also causes the “Service Required” pin to be asserted.</p> <table border="1" data-bbox="699 1039 1526 1119"> <tr> <td data-bbox="699 1039 873 1119">Accepted values:</td> <td data-bbox="876 1039 1526 1119">ENABLED, DISABLED</td> </tr> </table> <table border="1" data-bbox="699 1123 1526 1234"> <tr> <td data-bbox="699 1123 873 1234">SGD command used:</td> <td data-bbox="876 1123 1526 1234">device.applicator.error_on_pause</td> </tr> </table> <table border="1" data-bbox="699 1239 1526 1509"> <tr> <td data-bbox="699 1239 873 1509">Printer web page:</td> <td data-bbox="876 1239 1526 1509">View and Modify Printer Settings > Advanced Setup > Error on Pause</td> </tr> </table> | Accepted values: | ENABLED, DISABLED | SGD command used: | device.applicator.error_on_pause | Printer web page: | View and Modify Printer Settings > Advanced Setup > Error on Pause |
| Accepted values: | ENABLED, DISABLED | | | | | | |
| SGD command used: | device.applicator.error_on_pause | | | | | | |
| Printer web page: | View and Modify Printer Settings > Advanced Setup > Error on Pause | | | | | | |

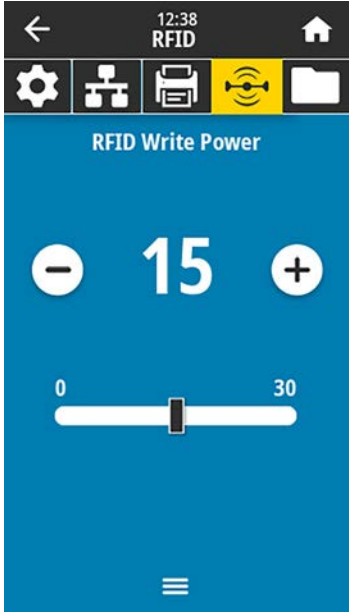
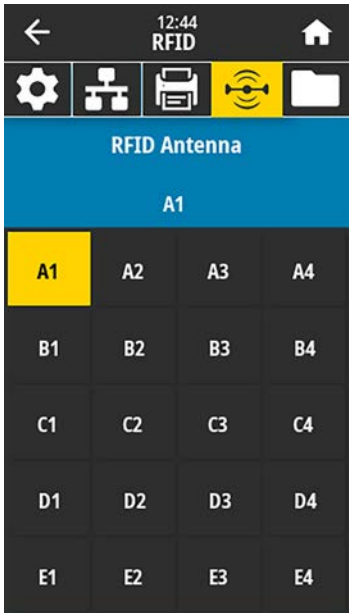
| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>Print > Applicator > Applicator Reprint</p> <p>Specifies if a high or low value is required for an applicator to reprint a label.</p> <p>Enables or disables the ~PR command, which when enabled reprints the last printed label. It also enables the Reprint button on the Home screen.</p> | |
| <p>Related ZPL command(s):</p> | <p>^JJ and ~PR</p> | |
| <p>SGD command used:</p> | <p>device.applicator.reprint</p> | |

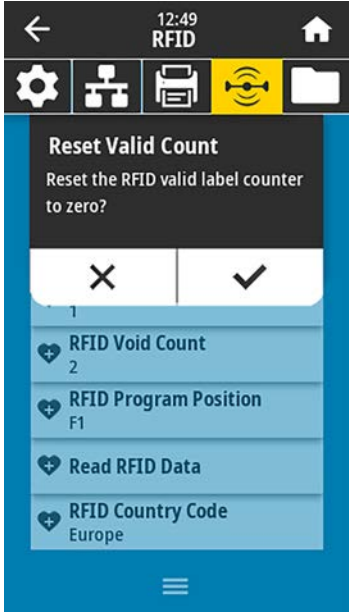
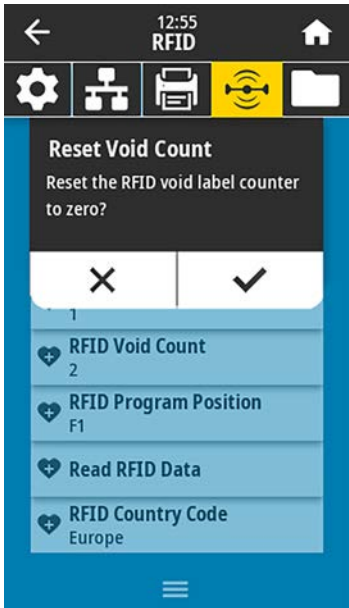
RFID Menu

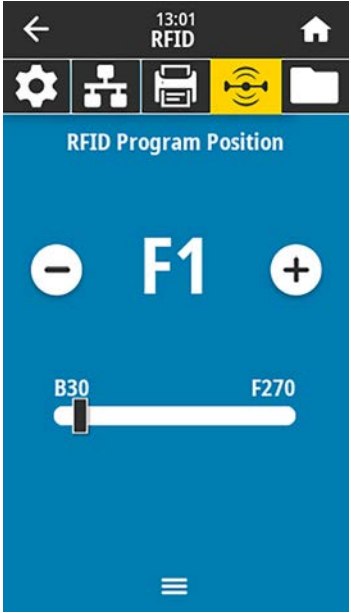
| Menu Display | Menu Option Description | |
|---|---|--|
|  | <p>RFID > RFID Status</p> <p>Display the status of the RFID subsystem of the printer.</p> | |
| <p>Related ZPL command(s):</p> | <p>^HL or ~HL</p> | |
| <p>SGD command used:</p> | <p>rfid.error.response</p> | |


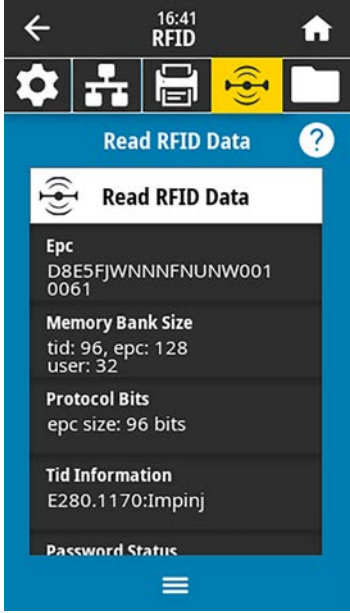
| Menu Display | Menu Option Description | |
|---|---|--|
|  | <p>RFID > RFID Test</p> <p>During the RFID test, the printer attempts to read and write to a transponder. No printer movement occurs with this test.</p> <p>To test an RFID label:</p> <ol style="list-style-type: none"> 1. Position the RFID label with its transponder over the RFID antenna array. 2. Touch Start. <p>The results of the test appear on the display.</p>  | |
| | <p>SGD command used:</p> | <p><code>rfid.tag.test.content</code> and <code>rfid.tag.test.execute</code></p> |

| Menu Display | Menu Option Description | | | | | | | | |
|---|--|-------------------------|---------|-------------------------|--------------------|-------------------|--------------------------|-------------------|--|
|  | <p>RFID > RFID Calibrate</p> <p>Initiate tag calibration for RFID media. (This is not the same as media and ribbon calibration.)</p> <p>During the process, the printer moves the media, calibrates the RFID tag position, and determines the optimal settings for the RFID media being used.</p> <p>These settings include the programming position, the antenna element to use, and the read/write power level to use. (See RFID Programming Guide 3 for more information.)</p> <p> NOTE: Before running this command, load the printer with RFID media, calibrate your printer, close the printhead, and feed at least one label to make sure that tag calibration will begin from the correct position.</p> <p>Leave all transponders before and after the tag that is being calibrated. This allows the printer to determine RFID settings which do not encode the adjacent tag. Allow a portion of media to extend out the front of the printer to allow for backfeed during the tag calibration procedure.</p> <table border="1" data-bbox="699 900 1526 1098"> <tr> <td>Related ZPL command(s):</td> <td>^HR</td> </tr> <tr> <td>SGD command used:</td> <td>rfid.tag.calibrate</td> </tr> </table> | Related ZPL command(s): | ^HR | SGD command used: | rfid.tag.calibrate | | | | |
| Related ZPL command(s): | ^HR | | | | | | | | |
| SGD command used: | rfid.tag.calibrate | | | | | | | | |
|  | <p>RFID > Read Power</p> <p>If the desired read power is not achieved through RFID tag calibration, a value may be specified.</p> <table border="1" data-bbox="699 1226 1526 1732"> <tr> <td>Accepted values:</td> <td>0 to 30</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^RW</td> </tr> <tr> <td>SGD command used:</td> <td>rfid.reader_1.power.read</td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > RFID Setup > RFID READ PWR</td> </tr> </table> | Accepted values: | 0 to 30 | Related ZPL command(s): | ^RW | SGD command used: | rfid.reader_1.power.read | Printer web page: | View and Modify Printer Settings > RFID Setup > RFID READ PWR |
| Accepted values: | 0 to 30 | | | | | | | | |
| Related ZPL command(s): | ^RW | | | | | | | | |
| SGD command used: | rfid.reader_1.power.read | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > RFID Setup > RFID READ PWR | | | | | | | | |




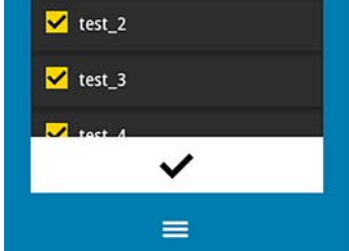
| Menu Display | Menu Option Description | | | | | | | | | |
|--|--|--|------------------|--|-------------------------|-----|-------------------|---|-------------------|---|
|  | <p>RFID > RFID Write Power</p> <p>If the desired write power is not achieved through RFID tag calibration, a value may be specified.</p> <table border="1"> <tr> <td>Accepted values:</td> <td>0 to 30</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^RW</td> </tr> <tr> <td>SGD command used:</td> <td><code>rfid.reader_1.power.write</code></td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > RFID Setup > RFID WRITE PWR</td> </tr> </table> | | Accepted values: | 0 to 30 | Related ZPL command(s): | ^RW | SGD command used: | <code>rfid.reader_1.power.write</code> | Printer web page: | View and Modify Printer Settings > RFID Setup > RFID WRITE PWR |
| Accepted values: | 0 to 30 | | | | | | | | | |
| Related ZPL command(s): | ^RW | | | | | | | | | |
| SGD command used: | <code>rfid.reader_1.power.write</code> | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > RFID Setup > RFID WRITE PWR | | | | | | | | | |
|  | <p>RFID > RFID Antenna</p> <p>If the desired antenna is not achieved through RFID tag calibration, a value may be specified.</p> <table border="1"> <tr> <td>Accepted values:</td> <td>A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4 D1, D2, D3, D4 E1, E2, E3, E4</td> </tr> <tr> <td>Related ZPL command(s):</td> <td>^RW</td> </tr> <tr> <td>SGD command used:</td> <td><code>rfid.reader_1.antenna_port</code></td> </tr> <tr> <td>Printer web page:</td> <td>View and Modify Printer Settings > RFID Setup > RFID ANTENNA</td> </tr> </table> | | Accepted values: | A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4 D1, D2, D3, D4 E1, E2, E3, E4 | Related ZPL command(s): | ^RW | SGD command used: | <code>rfid.reader_1.antenna_port</code> | Printer web page: | View and Modify Printer Settings > RFID Setup > RFID ANTENNA |
| Accepted values: | A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4 D1, D2, D3, D4 E1, E2, E3, E4 | | | | | | | | | |
| Related ZPL command(s): | ^RW | | | | | | | | | |
| SGD command used: | <code>rfid.reader_1.antenna_port</code> | | | | | | | | | |
| Printer web page: | View and Modify Printer Settings > RFID Setup > RFID ANTENNA | | | | | | | | | |



| Menu Display | Menu Option Description | | | | |
|--|--|-------------------------|-----|-------------------|-------------------------------|
|  | <p>RFID > RFID Valid Count Resets the RFID valid label counter to zero.</p> <table border="1" data-bbox="708 331 1518 865"> <tr> <td data-bbox="708 331 873 415">Related ZPL command(s):</td> <td data-bbox="873 331 1518 415">~RO</td> </tr> <tr> <td data-bbox="708 415 873 865">SGD command used:</td> <td data-bbox="873 415 1518 865">odometer.rfid.valid_resetable</td> </tr> </table> | Related ZPL command(s): | ~RO | SGD command used: | odometer.rfid.valid_resetable |
| Related ZPL command(s): | ~RO | | | | |
| SGD command used: | odometer.rfid.valid_resetable | | | | |
|  | <p>RFID > RFID Void Count Resets the RFID void label counter to zero.</p> <table border="1" data-bbox="708 966 1518 1491"> <tr> <td data-bbox="708 966 873 1050">Related ZPL command(s):</td> <td data-bbox="873 966 1518 1050">~RO</td> </tr> <tr> <td data-bbox="708 1050 873 1491">SGD command used:</td> <td data-bbox="873 1050 1518 1491">odometer.rfid.void_resetable</td> </tr> </table> | Related ZPL command(s): | ~RO | SGD command used: | odometer.rfid.void_resetable |
| Related ZPL command(s): | ~RO | | | | |
| SGD command used: | odometer.rfid.void_resetable | | | | |

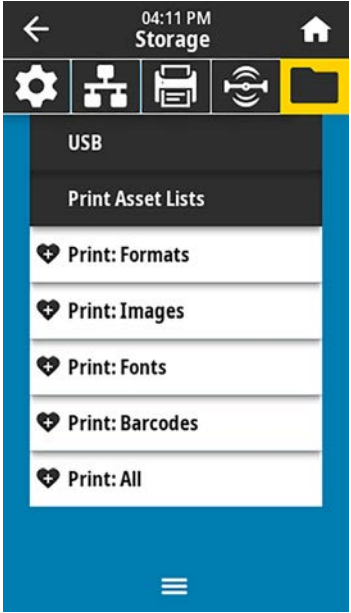
| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>RFID > RFID Program Position</p> <p>If the desired programming position (read/write position) is not achieved through RFID tag calibration, a value may be specified.</p> | |
| | <p>Accepted values:</p> | <p>F0 to Fxxx (where xxx is the label length in millimeters or 999, whichever is less)—The printer feeds the label forward for the specified distance and then begins programming.</p> <p>B0 to B30—The printer backfeeds the label for the specified distance and then begins programming. To account for the backfeed, allow empty media liner to extend out of the front of the printer when using a backward programming position.</p> |
| | <p>Related ZPL command(s):</p> | <p>^RS</p> |
| | <p>SGD command used:</p> | <p><code>rfid.position.program</code></p> |
| | <p>Printer web page:</p> | <p>View and Modify Printer Settings > RFID Setup > PROGRAM POSITION</p> |

| Menu Display | Menu Option Description | |
|---|--|--|
|  | <p>RFID > Read RFID Data</p> <p>Read and return the specified tag data from the RFID tag located over the RFID antenna. No printer movement occurs while tag data is being read. The printhead can be open or closed.</p> <p>To read and display the information stored on an RFID tag:</p> <ol style="list-style-type: none"> 1. Position the RFID label with its transponder over the RFID antenna. 2. Touch Read RFID Data. <p>The results of the test are shown on the display.</p>  | |
| | Related ZPL command(s): | ^RF |
| | SGD command used: | rfid.tag.read.content rfid.tag.read.execute |

Storage Menu

| Menu Display | Menu Option Description | |
|---|---|----------------------------|
|  | <p>Storage > USB > Copy: Files to USB</p> <p>Select files from the printer to store on a USB Flash drive.</p> <p>To copy files from the printer to a USB Flash drive:</p> <ol style="list-style-type: none"> 1. Insert a USB flash drive into the printer's USB host port. The printer lists available files. 2. Touch the box next to the desired files. Select All is also available. 3. Touch the check mark to copy the selected files. | |
|  | <p>SGD command used:</p> | <p>usb.host.write_list</p> |
|  | <p>Storage > USB > Copy: Files to Printer</p> <p>Select files to copy to the printer from a USB Flash drive.</p> <p>To copy files to the printer from a USB Flash drive:</p> <ol style="list-style-type: none"> 1. Insert a USB flash drive into the printer's USB host port. The printer lists available files. 2. Touch the box next to the desired files. Select All is also available. 3. Touch the check mark to copy the selected files. | |
|  | <p>SGD command used:</p> | <p>usb.host.read_list</p> |

| Menu Display | Menu Option Description | | | | | |
|--|--|--|-------------------------|--|-------------------|--|
|  <p>The screenshot shows the printer's 'Storage' menu at 17:47. The menu options are: 'Copy: Files to USB', 'Copy: Files to Printer', 'Copy: Configuration to USB' (highlighted with a blue border), 'Print: From USB', and 'Print Asset Lists'. A navigation bar at the bottom contains a back arrow, a home icon, and a hamburger menu icon.</p> | <p>Storage > USB > Copy: Configuration to USB</p> <p>Use this function to copy the printer's configuration information to a USB mass storage device, such as a USB Flash drive, that is plugged into one of the printer's USB host ports. This makes the information accessible without having to print physical labels.</p> <table border="1" data-bbox="699 430 1526 879"> <tr> <td data-bbox="699 430 873 510">Related ZPL command(s):</td> <td data-bbox="873 430 1526 510">^HH—Returns the printer configuration information returned to the host computer.</td> </tr> <tr> <td data-bbox="699 514 873 879">Printer web page:</td> <td data-bbox="873 514 1526 879"> <p>Printer Home Page > View Printer Configuration (to view printer configuration information on your web browser)</p> <p>View and Modify Printer Settings > Print Listings on Label (to print the configuration information on labels)</p> </td> </tr> </table> | | Related ZPL command(s): | ^HH—Returns the printer configuration information returned to the host computer. | Printer web page: | <p>Printer Home Page > View Printer Configuration (to view printer configuration information on your web browser)</p> <p>View and Modify Printer Settings > Print Listings on Label (to print the configuration information on labels)</p> |
| Related ZPL command(s): | ^HH—Returns the printer configuration information returned to the host computer. | | | | | |
| Printer web page: | <p>Printer Home Page > View Printer Configuration (to view printer configuration information on your web browser)</p> <p>View and Modify Printer Settings > Print Listings on Label (to print the configuration information on labels)</p> | | | | | |
|  <p>The screenshot shows the 'Print: From USB' screen at 17:41. It displays a list of files under the heading 'Printer Files' with the instruction 'Select all the files you want to copy.' The files listed are 'Select All', 'test_1', 'test_2', 'test_3', and 'test_4', each with a checked checkbox. A large checkmark is visible at the bottom of the list. The navigation bar at the bottom is the same as in the previous screenshot.</p> | <p>Storage > USB > Print: From USB</p> <p>Select files to print from a USB Flash drive.</p> <p>To print files from a USB Flash drive:</p> <ol style="list-style-type: none"> 1. Insert a USB flash drive into the printer's USB host port. The printer lists available files. 2. Touch the box next to the desired files. Select All is also available. 3. Touch the check mark to print the selected files. <table border="1" data-bbox="699 1249 1526 1520"> <tr> <td data-bbox="699 1249 873 1520">SGD command used:</td> <td data-bbox="873 1249 1526 1520">usb.host.read_list</td> </tr> </table> | | SGD command used: | usb.host.read_list | | |
| SGD command used: | usb.host.read_list | | | | | |

| Menu Display | Menu Option Description | |
|---|---|--|
|  | <p>Storage > Print Asset Lists Print the specified information on one or more labels.</p> | |
| | <p>Accepted values:</p> | <p>Formats—Prints the available formats stored in the printer’s RAM, Flash memory, or optional memory card.</p> <p>Images—Prints the available images stored in the printer’s RAM, Flash memory, or optional memory card.</p> <p>Fonts—Prints the available fonts in the printer, including standard printer fonts plus any optional fonts. Fonts may be stored in RAM or Flash memory.</p> <p>Barcodes—Prints the available barcodes in the printer. Barcodes may be stored in RAM or Flash memory.</p> <p>All—Prints the previous labels plus the printer configuration label and the network configuration label.</p> |
| | <p>Related ZPL command(s):</p> | <p>^WD</p> |
| | <p>Printer web page:</p> | <p>View and Modify Printer Settings > Print Listings on Label</p> |

Calibrating the Ribbon and Media Sensors

Printer calibration adjusts the sensitivity of the media and ribbon sensors. It also helps ensure proper alignment of the image being printed and optimal print quality.

Perform calibration in the following situations:

- You switched to a different size or type of ribbon or media.
- The printer experiences any of the following issues:
 - skips labels
 - the printed image wanders/drifts either side to side or up and down
 - ribbon is not being detected when it is installed or when it runs out
 - non-continuous labels are being treated as continuous

Performing Auto Calibration

You can set the printer to perform an auto calibration (**CALIBRATE**) or a short calibration (**SHORT CAL**) using the **POWER UP ACTION** or **HEAD CLOSE ACTION** parameters.

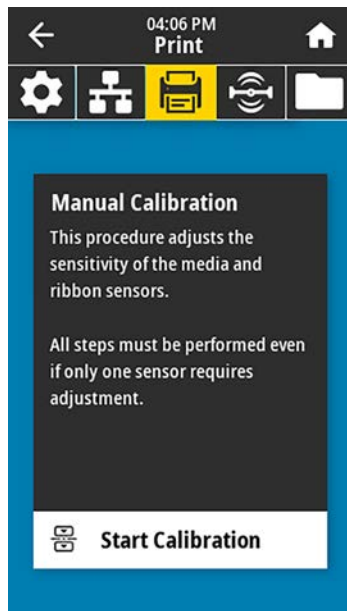
- **CALIBRATE**—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.
- **SHORT CAL**—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.

See [Power-Up Action](#) or [Head-Close Action](#) for details.

Performing Manual Sensor Calibration

You may need to manually calibrate the printer if you see issues with the print output.

1. Touch **Print > Sensors > Manual Calibration**.



2. Touch **Start Calibration**.
3. Follow the steps in the calibration procedure as prompted.



IMPORTANT: Follow the calibration procedure exactly as presented. You may press and hold **CANCEL** at any step in the procedure to cancel the calibration process.

4. When calibration is complete, press **PAUSE** to exit pause mode and enable printing.

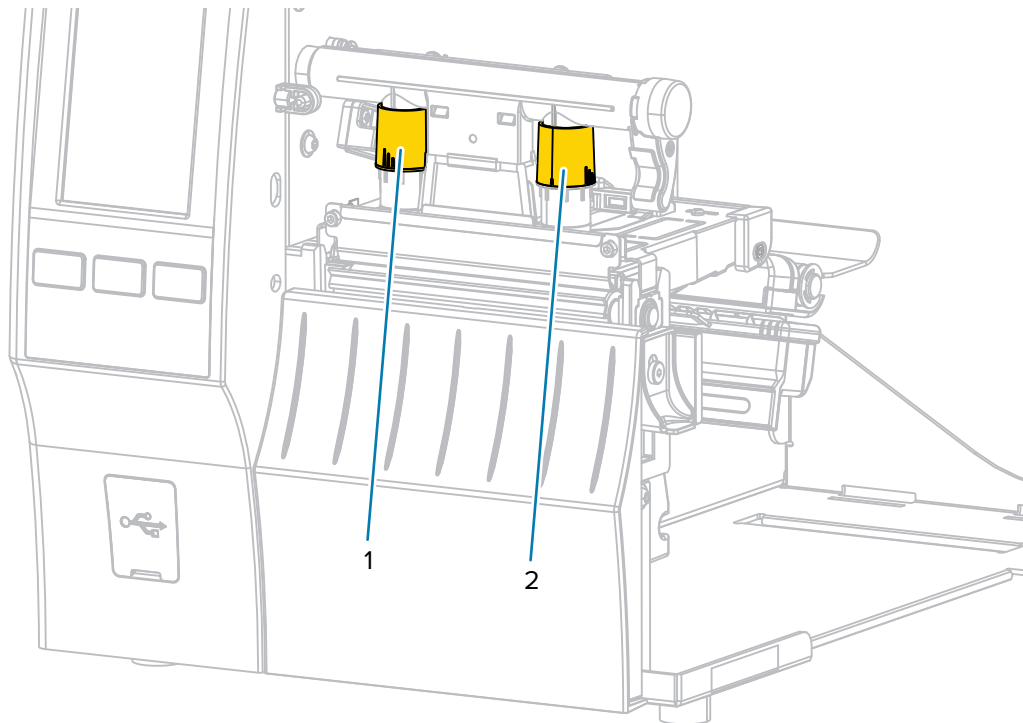
Adjusting the Printhead Pressure

You may need to adjust printhead pressure if:

- printing is too light on one side
- you use thick media, or
- if the media drifts from side to side during printing

Use the inside and outside printhead pressure adjustment dials to set the printhead pressure. Set the pressure to the lowest level necessary to achieve good print quality. The setting marks on these dials range from 1 to 4.

Figure 2 Printhead Pressure Adjustment Dials



Begin with the pressure settings for your printer model and media width as specified in the following table, and make adjustments to the inside dial (1) and the outside dial (2) as necessary.

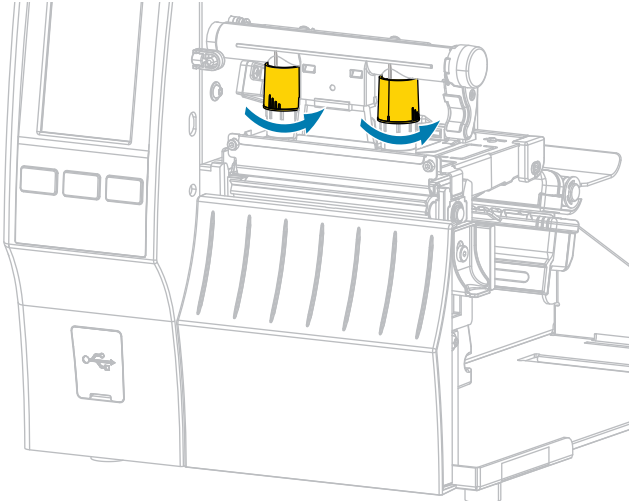
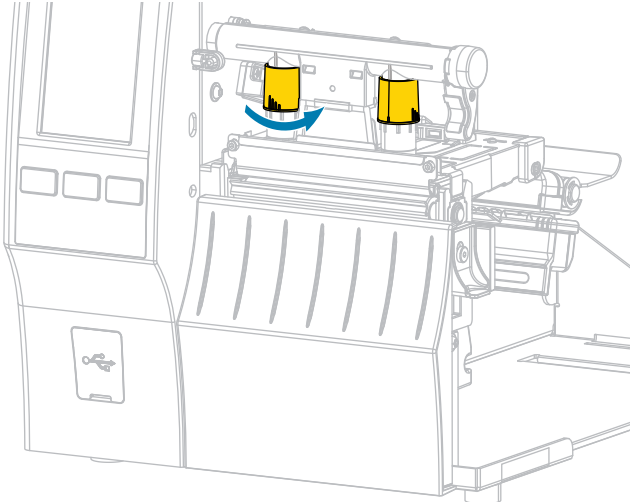
Table 3 Pressure Setting Starting Points

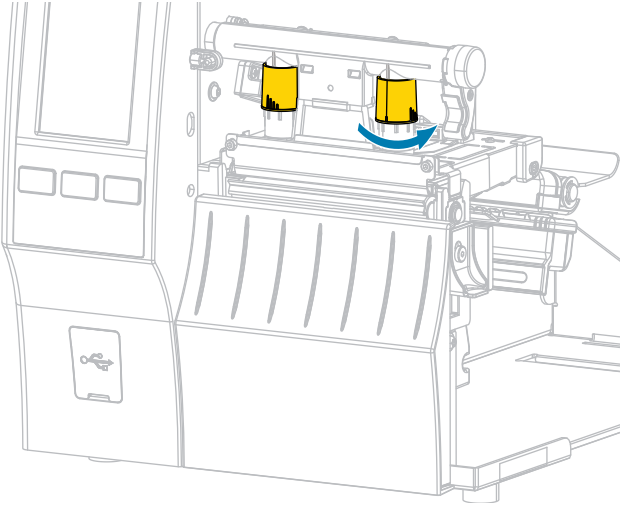
| Printer | Media Width | Inside Dial Setting | Outside Dial Setting |
|---------|-------------------|---------------------|----------------------|
| ZT411 | 1 in. (25 mm) | 4 | 1 |
| | 2 in. (51 mm) | 3 | 1 |
| | 3 in. (76 mm) | 2.5 | 1.5 |
| | ≥ 3.5 in. (89 mm) | 2 | 2 |

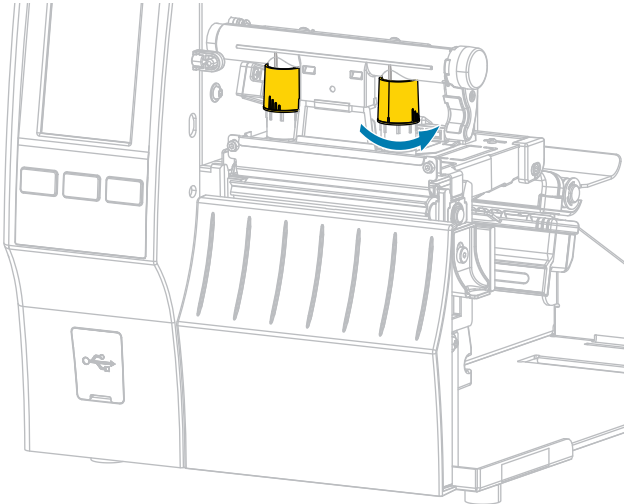
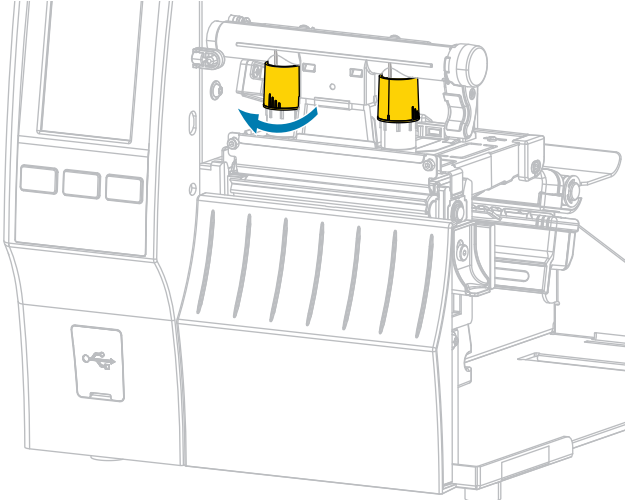
Table 3 Pressure Setting Starting Points (Continued)

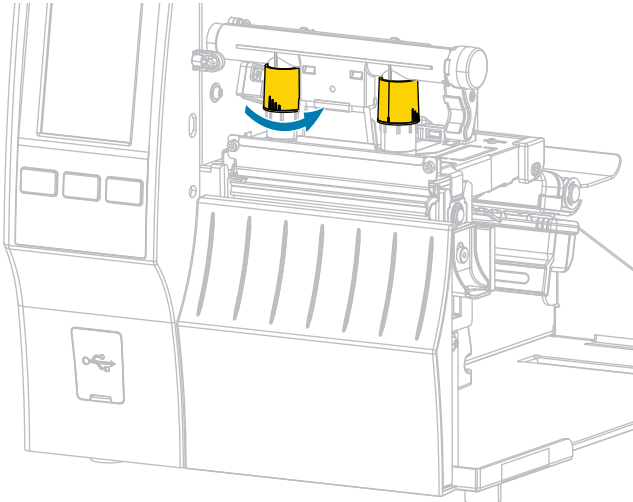
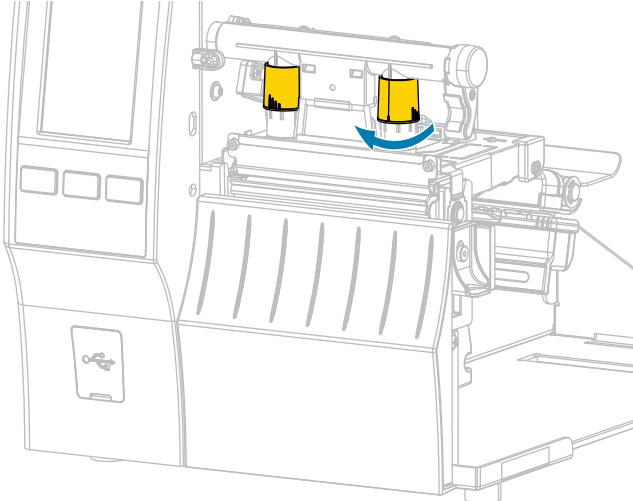
| Printer | Media Width | Inside Dial Setting | Outside Dial Setting |
|---------|------------------|---------------------|----------------------|
| ZT421 | 2 in. (51 mm) | 4 | 1 |
| | 3 in. (76 mm) | 3.5 | 1 |
| | 4 in. (102 mm) | 3 | 2 |
| | ≥ 5 in. (127 mm) | 2.5 | 2.5 |

If necessary, adjust the printhead pressure adjustment dials as follows:

| If the media... | Then... |
|---|--|
| Requires higher pressure to print well | <p>Increase both dials one position.</p>  |
| Prints too lightly on the left side of the label. | <p>Increase the inside dial setting one position.</p>  |

| If the media... | Then... |
|--|--|
| Prints too lightly on the right side of the label. | <p data-bbox="630 245 1159 279">Increase the outside dial setting one position.</p>  |

| If the media... | Then... |
|----------------------------|---|
| Shifts left while printing | <p data-bbox="630 247 1159 279">Increase the outside dial setting one position.</p>  <p data-bbox="630 810 672 835">OR</p> <p data-bbox="630 852 1154 884">Decrease the inside dial setting one position.</p>  |

| If the media... | Then... |
|-----------------------------|---|
| Shifts right while printing | <p data-bbox="630 247 1141 275">Increase the inside dial setting one position.</p>  <p data-bbox="630 808 670 835">OR</p> <p data-bbox="630 850 1170 877">Decrease the outside dial setting one position.</p>  |

Adjusting the Sensor Position

The transmissive media sensor assembly consists of two parts:

- Light source (lower part of the media sensor)
- Light sensor (upper part of the media sensor)

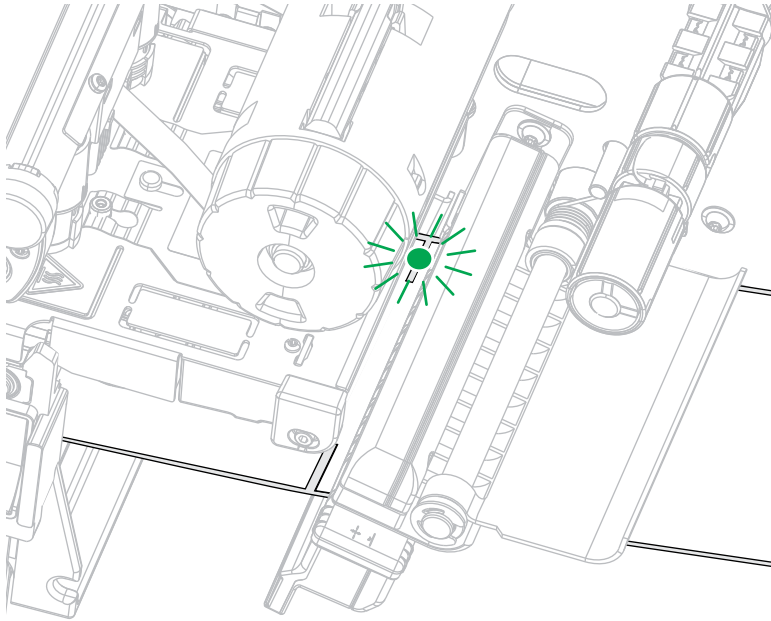
The media passes between these two parts.

Adjust the position of the sensor only if the printer cannot detect the top of the labels. If that occurs, the printer display shows a "media out error" despite media being loaded.

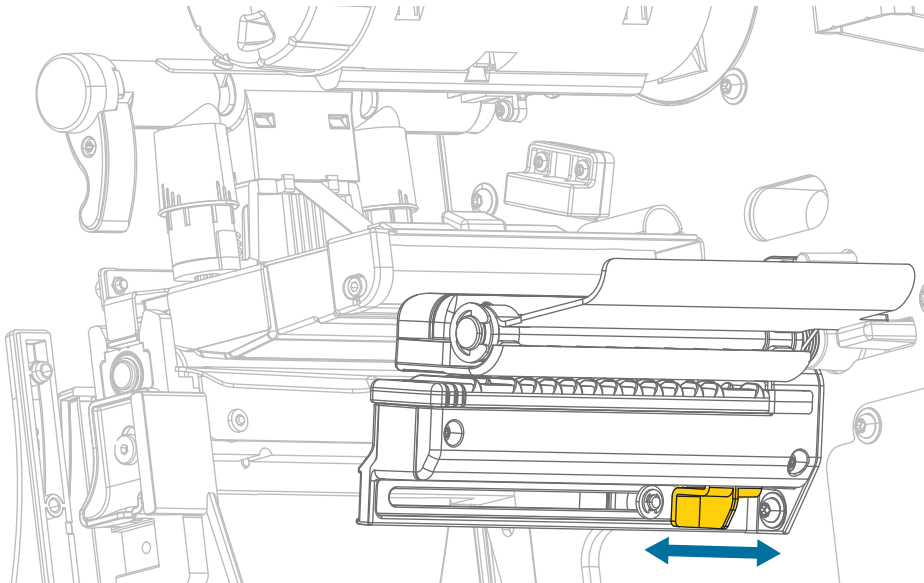
For non-continuous media with a notch or hole, the sensor must be positioned directly at the notch or hole.

1. Remove the ribbon so you can clearly see the media path.

2. Load the media so that the green light from the media sensor is shining through a gap, notch, or hole.



3. If necessary, slide the media sensor horizontally using the media sensor adjustment.



Routine Maintenance

This section provides routine cleaning and maintenance procedures.

Cleaning Schedule and Procedures

Routine preventive maintenance is a crucial part of normal printer operation. By taking good care of your printer, you can minimize potential problems and achieve/maintain the desired print quality standards.

Over time, the movement of media or ribbon across the printhead wears through the protective ceramic coating, exposing and eventually damaging the print elements (dots). To avoid abrasion:

- Clean the printhead frequently.
- Minimize printhead pressure and burn temperature (darkness) settings by optimizing the balance between the two.
- When using Thermal Transfer mode, ensure that the ribbon is either as wide or wider than the media. This is to avoid exposing printhead elements to the more abrasive label material.



IMPORTANT: Zebra is not responsible for damage caused by the use of cleaning fluids on this printer.

Specific cleaning procedures are included in this section. Follow the recommended cleaning schedule listed in the table below.




NOTE: These recommended cleaning intervals are intended as guidelines only. You may have to clean more often depending on your specific application and the media you use for printing.

Table 4 Recommended Cleaning Schedule

| Area | Method | Interval |
|--|----------|--|
| Printhead (see Cleaning the Printhead and Platen Roller on page 129) | Solvent* | Direct Thermal Mode: After every roll of media (or 500 feet of fanfold media). |
| Platen roller | Solvent* | Thermal Transfer Mode: After every roll of ribbon. |
| Media sensors | Air blow | |
| Ribbon sensor | Air blow | |
| Media path | Solvent* | |
| Ribbon path | Solvent* | |

Table 4 Recommended Cleaning Schedule (Continued)

| Area | | Method | Interval |
|--|---|-----------------------|---|
| Pinch roller (part of Peel-Off option) | | Solvent* | |
| Cutter module | If cutting continuous, pressure-sensitive media | Solvent* | After every roll of media (or more often, depending upon your application and media). |
| | If cutting tag stock or label liner material | Solvent* and air blow | After every two or three rolls of media. |
| Tear-off/peel-off bar | | Solvent* | Once a month. |
| Take-label sensor | | Air blow | Once every six months. |
|  <p>NOTE: * Zebra recommends using the Preventive Maintenance Kit (p/n 47362 or p/n 105950-035 - multipack). In place of the Preventive Maintenance Kit, you may use a lint-free cloth dipped in 99.7% isopropyl alcohol. For 600 dpi printers, use Save-a-Printhead cleaning film. This specially-coated material removes contamination buildup without damaging the printhead. Call your authorized reseller or distributor for more information.</p> | | | |

Clean the Exterior, the Media Compartment, and the Sensors

Over time, dust, grime, and other debris may build up on the outside and inside of your printer, particularly in a harsh operating environment.

Clean the Printer Exterior

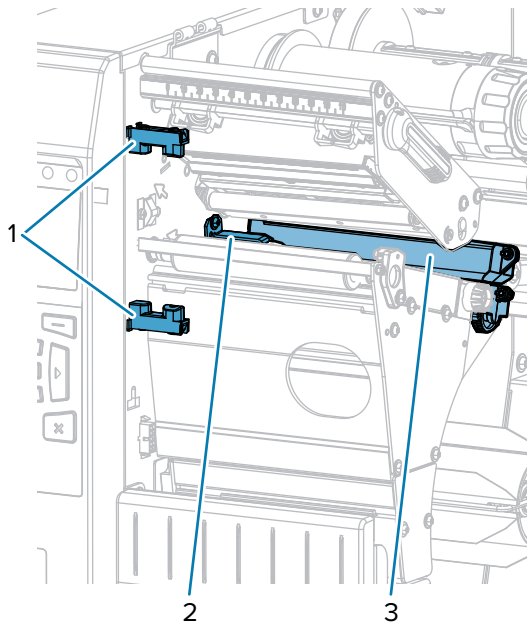
You may clean the exterior surfaces of the printer with a lint-free cloth and a small amount of a mild detergent, if necessary. Do not use harsh or abrasive cleaning agents or solvents.



IMPORTANT: Zebra is not responsible for damage caused by the use of cleaning fluids on this printer.

Cleaning the Media Compartment and Sensors

1. Brush, air blow, or vacuum any accumulated paper lint and dust away from the media and ribbon paths.
2. Brush, air blow, or vacuum any accumulated paper lint and dust away from the sensors.



| | |
|---|-------------------|
| 1 | Take-label sensor |
| 2 | Ribbon sensor |
| 3 | Media sensor |

Cleaning the Printhead and Platen Roller

Inconsistent print quality, such as voids in the barcode or graphics, may indicate a dirty printhead. For the recommended cleaning schedule, see [Cleaning Schedule and Procedures](#) on page 126.



IMPORTANT:

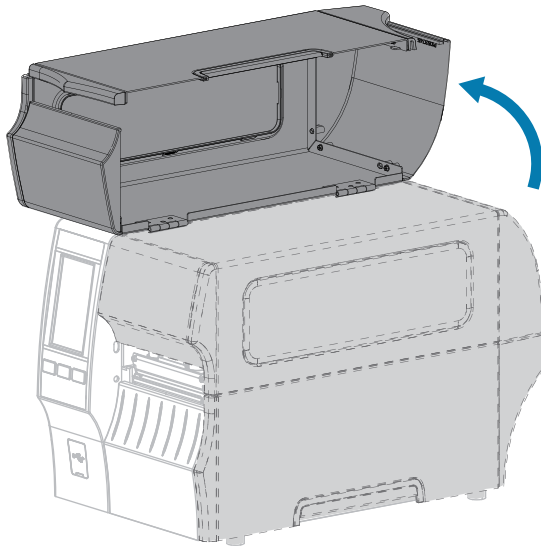
While you are not required to turn off printer power when working near an open printhead, Zebra recommends it as a precaution.

If you turn off power, you will lose all temporary settings, such as label formats, and you must reload them before you resume printing.



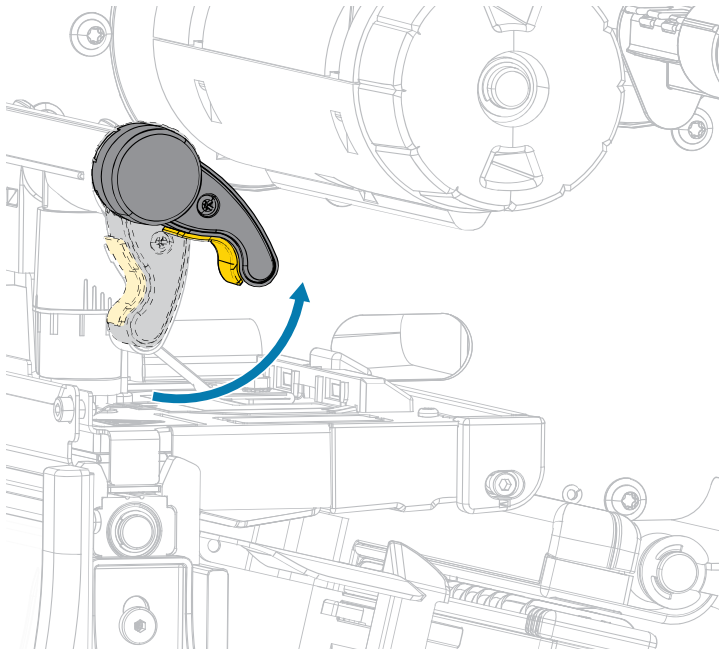
CAUTION—ESD: Before touching the printhead assembly, discharge any built-up static electricity by touching the metal printer frame or by using an anti-static wrist-strap and mat.

1. Raise the media door.

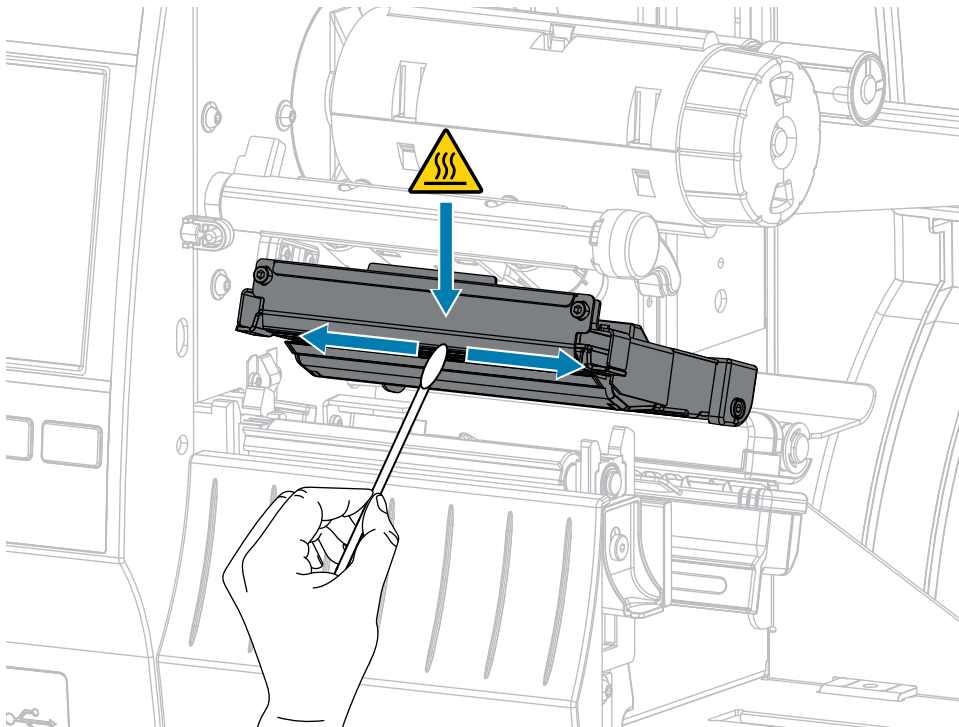


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

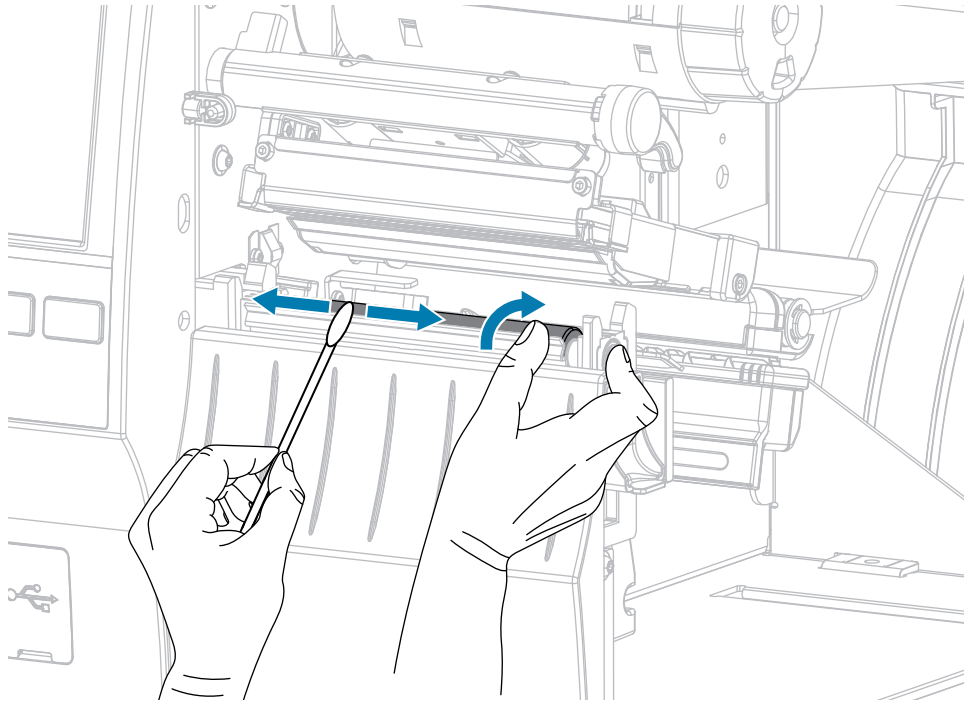
2. Open the printhead assembly by rotating the printhead-open lever upward.



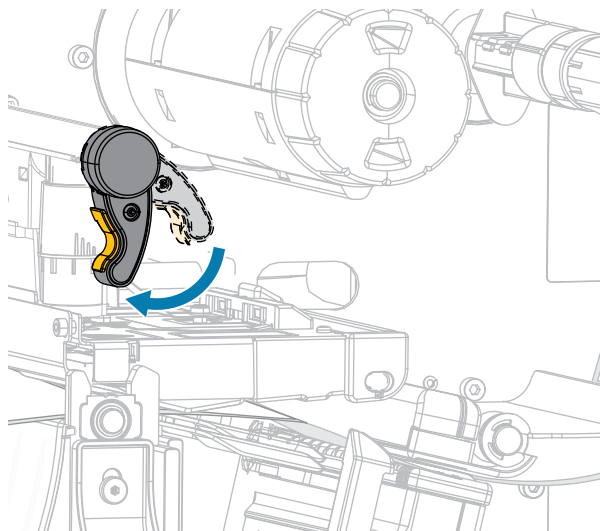
3. Remove the ribbon (if used) and the media.
4. Using the swab from a Zebra Preventive Maintenance Kit, wipe along the brown strip on the printhead assembly from end to end. In place of the Preventive Maintenance Kit, you may use a clean swab dipped in 99.7% isopropyl alcohol. Allow the solvent to evaporate.



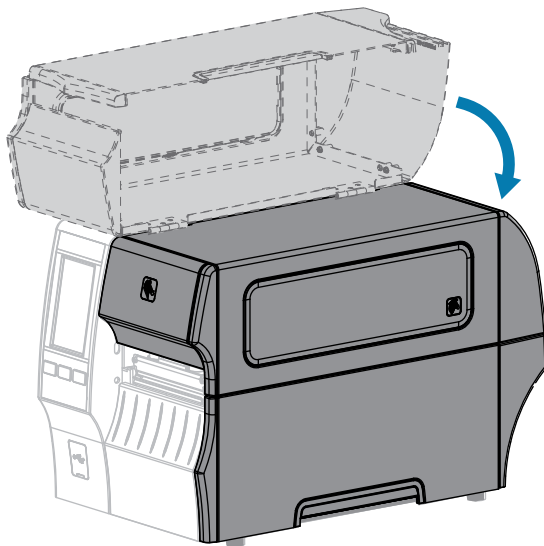
5. While manually rotating the platen roller, clean it thoroughly with the swab. Allow the solvent to evaporate.



6. Reload the ribbon (if used) and the media. For instructions, see [Loading the Ribbon](#) on page 62 or [Loading the Media](#) on page 31.
7. Rotate the printhead-open lever downward until it locks the printhead in place.



8. Close the media door.



The printer is ready to operate.

9. Press **PAUSE** to exit pause mode and enable printing.

The printer may perform a label calibration or feed a label, depending on your settings.



NOTE:

If performing this procedure does not improve print quality, try cleaning the printhead with Save-A-Printhead cleaning film. This specially coated material removes contamination buildup without damaging the printhead.

Call your authorized Zebra reseller for more information.

Cleaning and Lubricating the Cutter Module

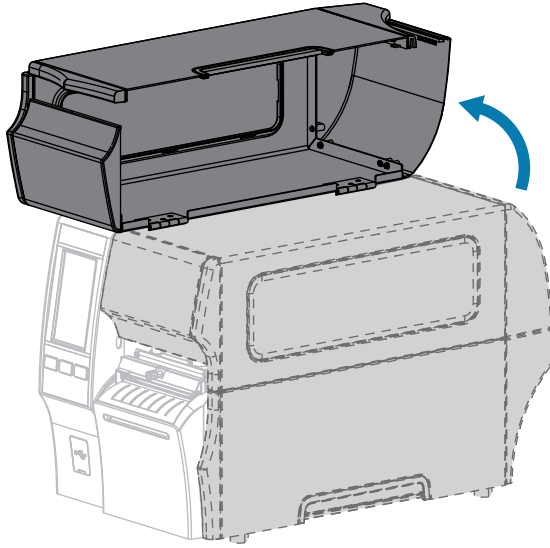
If the cutter is not cutting the labels cleanly or if it jams with labels, clean the cutter blades. After cleaning the blades, apply lubrication to them to help extend the life of your cutter module.



CAUTION—ELECTRIC SHOCK: Turn off the printer (●) and disconnect it from the power source before performing the following procedure.

1. Turn off (●) the printer and disconnect the AC power cord.

2. Raise the media door.

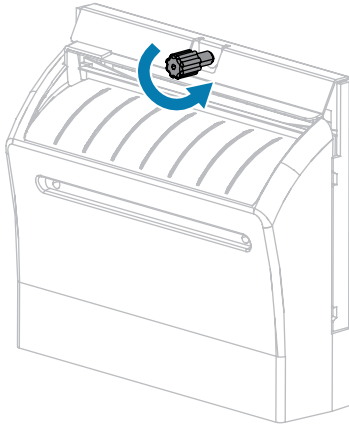


3. Remove media that is loaded through the cutter module.

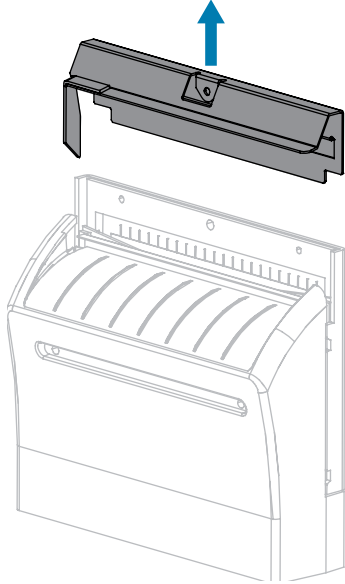


CAUTION: The cutter blade is sharp. Do not touch or rub the blade with your fingers.

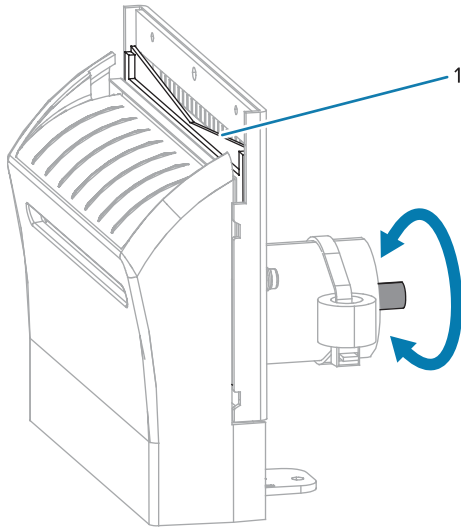
4. Loosen and remove the thumbscrew and lock washer on the cutter shield.



5. Remove the cutter shield.

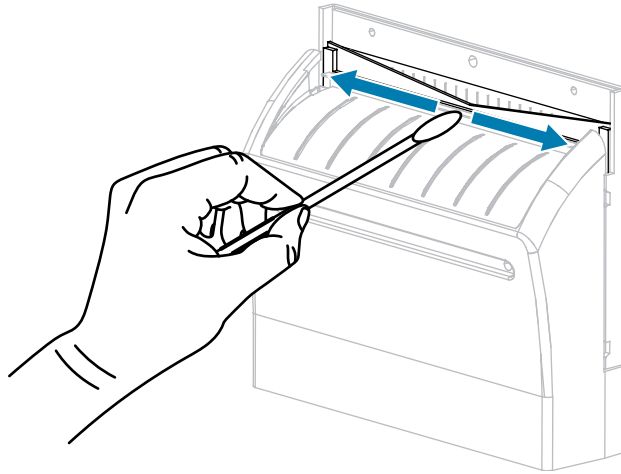


6. If necessary, rotate the cutter motor thumbscrew to fully expose the V-shaped cutter blade (1).

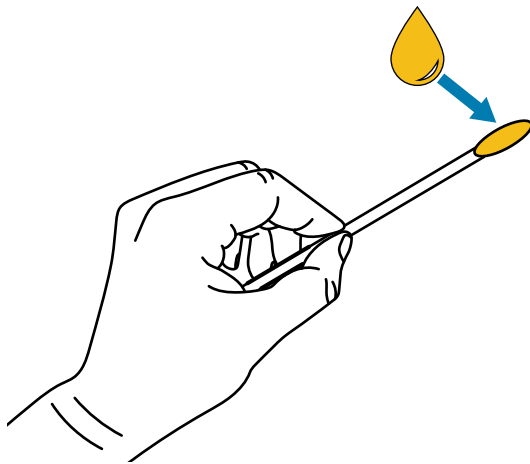


Routine Maintenance

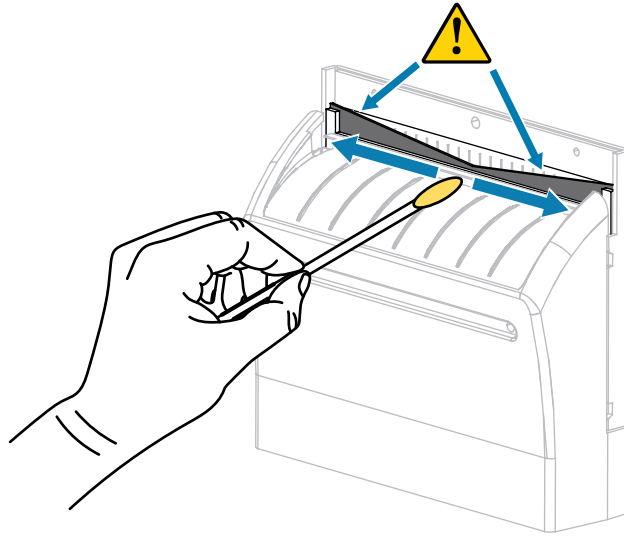
7. Using the swab from the Preventive Maintenance Kit (part number 47362), wipe along the upper cutting surface and the cutter blade. In place of the Preventive Maintenance Kit, you may use a clean swab dipped in 99.7% isopropyl alcohol. Allow the solvent to evaporate.



8. When the solvent has evaporated, soak a clean swab in a general-purpose, higher-viscosity silicone or PTFE oil lubricant.

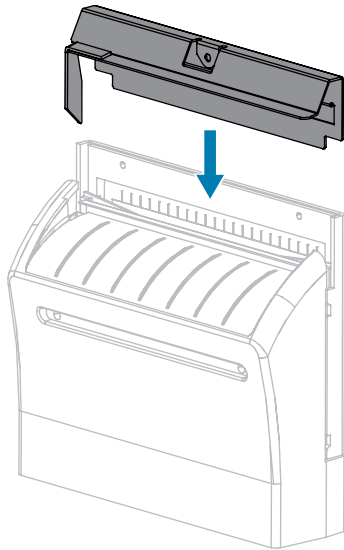


9. Apply an even layer along all exposed surfaces of both cutter blades. Remove any excess oil so that none of it comes in contact with the printhead or platen roller.

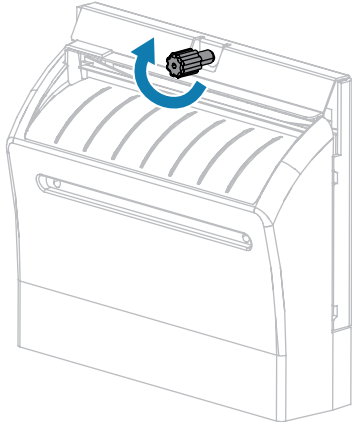


CAUTION: The cutter blade is sharp. For operator safety, replace the cutter shield.

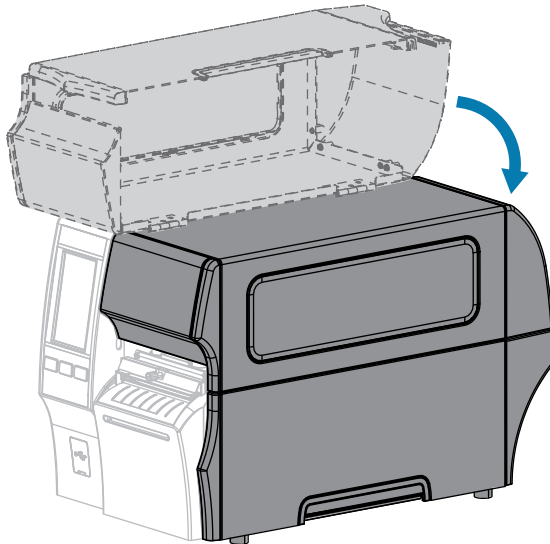
10. Replace the cutter shield.



11. Secure it with the thumbscrew and lock washer that you removed earlier.



12. Close the media door.



13. Plug the printer into its power source, and then turn on (I) the printer.
The cutter blade returns to its operating position.
14. If the cutter continues to perform unsatisfactorily, contact an authorized service technician for assistance.

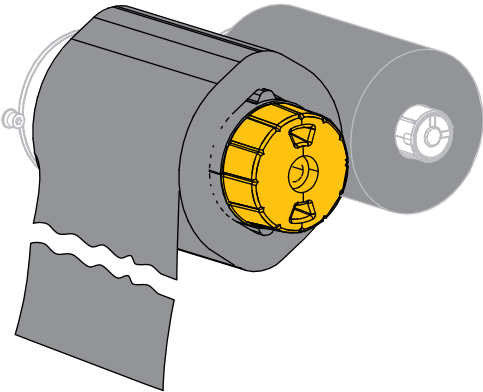

Removing Used Ribbon

At minimum, remove used ribbon from the ribbon take-up spindle each time you change the roll of ribbon.

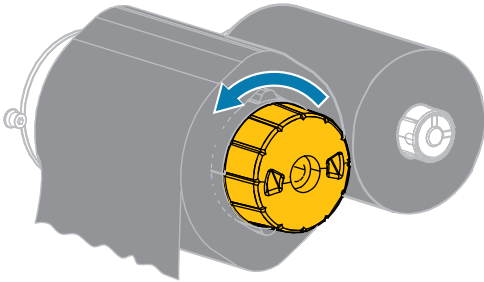
With ribbon that is half or less the width of the printhead, remove used ribbon each time you load a new roll of media. This ensures that uneven pressure on the ribbon take-up spindle does not interfere with the ribbon release bars on the spindle.

To remove used ribbon, complete these steps:

- 1. Has the ribbon run out?

| If the ribbon... | Then |
|------------------|--|
| Ran out | Continue with step 2 on page 138. |
| Did not run out | Cut or break the ribbon before the ribbon take-up spindle.   CAUTION—PRODUCT DAMAGE: Do not cut the ribbon directly on the ribbon take-up spindle. Doing so may damage the spindle. |

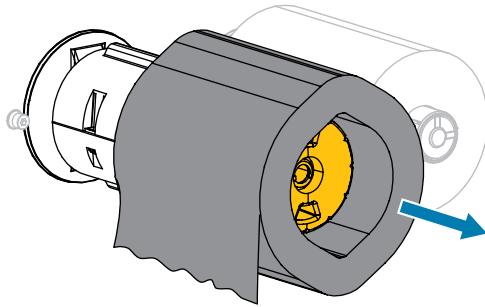
- 2. While holding the ribbon take-up spindle, turn the ribbon release knob to the left until it stops.



The ribbon release bars pivot down, easing the spindle’s grip on the used ribbon.

- 3. After the ribbon release bars have pivoted down, if possible, turn the ribbon take-up spindle one full turn to the right to help loosen the ribbon on the spindle.

4. Slide the used ribbon off the ribbon take-up spindle and discard.



Replacing Printer Components

Some printer components, such as the printhead and platen roller, may wear out over time and can be replaced easily. Regular cleaning may extend the life of some of these components.

See [Cleaning Schedule and Procedures](#) on page 126 for the recommended cleaning intervals.

Ordering Replacement Parts

Zebra printers are designed to work only with genuine Zebra printheads, thus maximizing safety and print quality. Contact your authorized Zebra reseller for part ordering information.

Recycling Printer Components



The majority of this printer's components are recyclable. The printer's main logic board may include a battery that you should dispose of properly.

Do not dispose of any printer components in unsorted municipal waste. Please dispose of the battery according to your local regulations, and recycle the other printer components according to your local standards. For more information, see zebra.com/environment.

Storing the Printer

If you are not placing the printer into immediate operation, repackage it using the original packing materials. You may store the printer under the following conditions:

- Temperature: –40°F to 140°F (–40°C to 60°C)
- Relative humidity: 5% to 85% non-condensing

Lubrication

The only lubrication needed for this printer is for the cutter module. Follow the instructions in [Cleaning and Lubricating the Cutter Module](#) on page 132.



NOTE: Do not lubricate any other parts of the printer.



CAUTION—PRODUCT DAMAGE: Some commercially available lubricants will damage the finish and the mechanical parts if used on this printer.

Diagnostics and Troubleshooting

This section provides diagnostic tests and other information that may help you to optimize printing or to troubleshoot issues with your printer.

Go to zebra.com/zt400 for access to videos and additional online information designed to assist you.

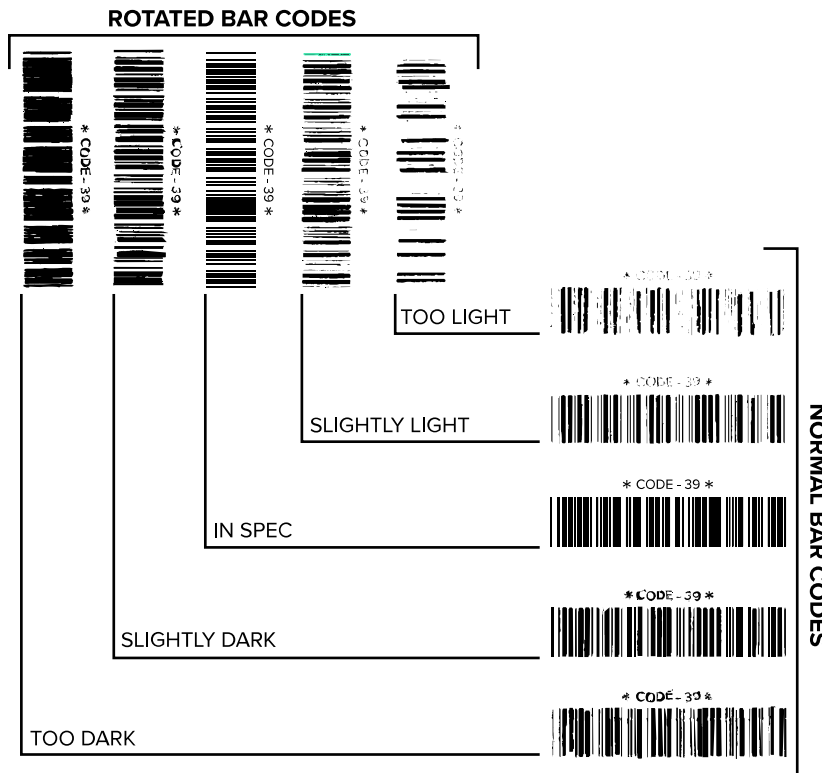


Evaluating Barcode Quality

The figure below shows how printer settings such as darkness and print speed can affect the quality of the printed barcodes.

Set the print darkness to the lowest setting that delivers good print quality. The Print Quality Assistant in [Running the Print Wizard and Printing a Test Label](#) on page 66 can help you determine the most optimal settings.

Figure 3 Barcode Darkness Comparison



| Appearance | Description |
|----------------------|---|
| Too dark labels | <p>Fairly obvious. These may be readable but are not “in-spec.”</p> <ul style="list-style-type: none"> • The normal barcode bars increase in size. • The openings in small alphanumeric characters may fill in with ink. • Rotated barcode bars and spaces run together. |
| Slightly dark labels | <p>Not as obvious as the too-dark labels.</p> <ul style="list-style-type: none"> • The normal barcode will be "in-spec". • Small alphanumeric characters will be bold, and may appear slightly filled in. • The rotated barcode spaces are small when compared to the “in-spec” code, possibly making the code unreadable. |

| Appearance | Description |
|-----------------------|--|
| "In-spec" labels | <p>Whether or not a label is "in-spec" can only be confirmed by a verifier, but they typically exhibit some visible characteristics.</p> <ul style="list-style-type: none"> • The normal barcode will have complete, even bars along with clear, distinct spaces. • The rotated barcode will have complete, even bars along with clear, distinct spaces. Although it may not look as good as a slightly dark barcode, the barcode will be "in-spec." • In both normal and rotated styles, small alphanumeric characters will look complete. |
| Slightly light labels | <p>In some cases, these are preferred to slightly dark ones for "in-spec" barcodes.</p> <ul style="list-style-type: none"> • Both normal and rotated barcodes will be "in spec", but small alphanumeric characters may not be complete. |
| Too light labels | <p>These are obvious.</p> <ul style="list-style-type: none"> • Both normal and rotated barcodes have incomplete bars and spaces. • Small alphanumeric characters are unreadable. |

Configuration Labels

Two of the most commonly used printer diagnostic items are the printer and network configuration labels (see [Figure 4 Sample Printer Configuration Label](#) on page 144 and [Figure 5 Sample Network Configuration Label](#) on page 144 in this section).

Analyzing the information on these labels can help you to troubleshoot potential issues.

Figure 4 Sample Printer Configuration Label

To print a Printer Configuration label, touch **Menu > Settings > Print System Settings**.

| PRINTER CONFIGURATION | |
|---|--------------------|
| Zebra Technologies ZTC ZT620R-203dpi ZPL 76J162700886 | |
| +30.0..... | DARKNESS |
| 6.0 IPS..... | PRINT SPEED |
| -007..... | TEAR OFF |
| TEAR OFF..... | PRINT MODE |
| CONTINUOUS..... | MEDIA TYPE |
| TRANSMISSIVE..... | SENSOR SELECT |
| DIRECT-THERMAL..... | PRINT METHOD |
| 1344..... | PRINT WIDTH |
| 2000..... | LABEL LENGTH |
| P1085892/00005 2.. | PRINT HEAD ID |
| 15.0IN 380MM..... | MAXIMUM LENGTH |
| MAINT. OFF..... | EARLY WARNING |
| CONNECTED..... | USB COMM. |
| BIDIRECTIONAL..... | PARALLEL COMM. |
| RS232..... | SERIAL COMM. |
| 9600..... | BAUD |
| 8 BITS..... | DATA BITS |
| NONE..... | PARITY |
| XON/XOFF..... | HOST HANDSHAKE |
| NONE..... | PROTOCOL |
| NORMAL MODE..... | COMMUNICATIONS |
| < > 7EH..... | CONTROL PREFIX |
| < > 5EH..... | FORMAT PREFIX |
| < > 2CH..... | DELIMITER CHAR |
| ZPL II..... | ZPL MODE |
| INACTIVE..... | COMMAND OVERRIDE |
| FEED..... | MEDIA POWER UP |
| LENGTH..... | HEAD CLOSE |
| DEFAULT..... | BACKFEED |
| +000..... | LABEL TOP |
| +0000..... | LEFT POSITION |
| OFF..... | APPLICATOR PORT |
| ENABLED..... | ERROR ON PAUSE |
| PULSE MODE..... | START PRINT SIG |
| DISABLED..... | REPRINT MODE |
| 080..... | WEB SENSOR |
| 090..... | MEDIA SENSOR |
| 255..... | TAKE LABEL |
| 027..... | MARK SENSOR |
| 027..... | MARK MED SENSOR |
| 000..... | TRANS GAIN |
| 005..... | TRANS BASE |
| 060..... | TRANS LED |
| 002..... | MARK GAIN |
| 100..... | MARK LED |
| DPCSINFM..... | MODES ENABLED |
| 1344 8/MM FULL..... | MODES DISABLED |
| 4.0..... | RESOLUTION |
| V80.20.03 <-..... | LINK-OS VERSION |
| 1.3..... | FIRMWARE |
| 6.8.0 22.89..... | XML SCHEMA |
| 32768k.....R: | HARDWARE ID |
| 524288k.....E: | RAM |
| NONE..... | ONBOARD FLASH |
| MV/00/YY 24HR..... | FORMAT CONVERT |
| 05/11/17..... | IDLE DISPLAY |
| 06:40..... | RTC DATE |
| ENABLED..... | RTC TIME |
| 2.1..... | ZBI |
| READY..... | ZBI VERSION |
| TM:MBE MICRO..... | ZBI STATUS |
| 20.00.00.01..... | RFID READER |
| 01.03.00.18..... | RFID HW VERSION |
| USA/CANADA..... | RFID FW VERSION |
| USA/CANADA..... | RFID REGION CODE |
| USA/CANADA..... | RFID COUNTRY CODE |
| RFID OK..... | RFID ERR STATUS |
| 16..... | RFID READ PAR |
| 16..... | RFID WRITE PAR |
| F0..... | PROG. POSITION |
| 0..... | RFID VALID CTR |
| 0..... | RFID VOID CTR |
| NONE..... | ADAPTIVE ANTENNA |
| A4..... | RFID ANTENNA |
| 570 LABELS..... | NONRESET CNTR |
| 570 LABELS..... | RESET CNTR1 |
| 570 LABELS..... | RESET CNTR2 |
| 2,798 IN..... | NONRESET CNTR |
| 2,798 IN..... | RESET CNTR1 |
| 2,798 IN..... | RESET CNTR2 |
| 7,107 CM..... | NONRESET CNTR |
| 7,107 CM..... | RESET CNTR1 |
| 7,107 CM..... | RESET CNTR2 |
| 001 WIRELESS..... | SLOT 1 |
| *** EMPTY..... | SLOT 2 |
| 0..... | MASS STORAGE COUNT |
| 0..... | HID COUNT |
| OFF..... | USB HOST LOCK OUT |
| FIRMWARE IN THIS PRINTER IS COPYRIGHTED | |

Figure 5 Sample Network Configuration Label

To print a Network Configuration label, touch **Menu > Networks > Print: Network Info**.

| Network Configuration | |
|---|--------------------|
| Zebra Technologies ZTC ZT620R-203dpi ZPL 76J162700886 | |
| Wired..... | PRIMARY NETWORK |
| PrintServer..... | LOAD LAN FROM? |
| INTERNAL WIRED..... | ACTIVE PRINTSRVR |
| Wired* | |
| ALL..... | IP PROTOCOL |
| 192.168.000.017.... | IP ADDRESS |
| 255.255.255.000.... | SUBNET |
| 192.168.000.254.... | GATEWAY |
| 000.000.000.000.... | WINS SERVER IP |
| YES..... | TIMEOUT CHECKING |
| 300..... | TIMEOUT VALUE |
| 000..... | ARP INTERVAL |
| 9100..... | BASE RAW PORT |
| 9200..... | JSON CONFIG PORT |
| Wireless | |
| ALL..... | IP PROTOCOL |
| 000.000.000.000.... | IP ADDRESS |
| 255.255.255.000.... | SUBNET |
| 000.000.000.000.... | GATEWAY |
| 000.000.000.000.... | WINS SERVER IP |
| YES..... | TIMEOUT CHECKING |
| 300..... | TIMEOUT VALUE |
| 000..... | ARP INTERVAL |
| 9100..... | BASE RAW PORT |
| 9200..... | JSON CONFIG PORT |
| INSERTED..... | CARD INSERTED |
| 02dfH..... | CARD MFG ID |
| 9134H..... | CARD PRODUCT ID |
| ac:3f:a4:82:05:9c.. | MAC ADDRESS |
| YES..... | DRIVER INSTALLED |
| INFRASTRUCTURE..... | OPERATING MODE |
| 125..... | ESSID |
| 1.0..... | CURRENT TX RATE |
| OPEN..... | WEP TYPE |
| WPA PSK..... | WLAN SECURITY |
| 1..... | WEP INDEX |
| 000..... | POOR SIGNAL |
| LONG..... | PREAMBLE |
| NO..... | ASSOCIATED |
| ON..... | PULSE ENABLED |
| 15..... | PULSE RATE |
| OFF..... | INTL MODE |
| USA/CANADA..... | REGION CODE |
| USA/CANADA..... | COUNTRY CODE |
| 0x7FF..... | CHANNEL MASK |
| Bluetooth | |
| 4.3.1p1..... | FIRMWARE |
| 02/13/2015..... | DATE |
| on..... | DISCOVERABLE |
| 3.0/4.0..... | RADIO VERSION |
| on..... | ENABLED |
| ac:3f:a4:82:05:9d.. | MAC ADDRESS |
| 76J162700886..... | FRIENDLY NAME |
| no..... | CONNECTED |
| 1..... | MIN SECURITY MODE |
| no..... | CONN SECURITY MODE |
| supported..... | IDS |
| FIRMWARE IN THIS PRINTER IS COPYRIGHTED | |

PAUSE Self Test

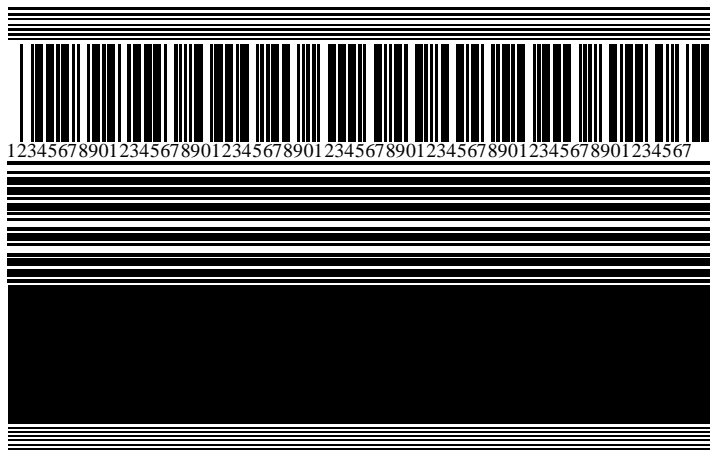
This self test can be used to provide the test labels required when making adjustments to the printer's mechanical assemblies or to determine if any printhead elements are not working.

[Figure 6 PAUSE Test Label](#) on page 145 shows a sample printout.

1. Turn off (**O**) the printer.
2. Press and hold **PAUSE** while turning on (**I**) the printer. Hold **PAUSE** until the first control panel light turns off.

The initial self test prints 15 labels at the printer's slowest speed, and then automatically pauses the printer. Each time **PAUSE** is pressed, an additional 15 labels print. (See sample label below.)

Figure 6 PAUSE Test Label



While the printer is paused:

- Pressing **CANCEL** alters the self test. Each time **PAUSE** is pressed, 15 labels print at 6 in. (152 mm) per second.
 - Pressing **CANCEL** again alters the self test a second time. Each time **PAUSE** is pressed, 50 labels print at the printer's slowest speed.
 - Pressing **CANCEL** again alters the self test a third time. Each time **PAUSE** is pressed, 50 labels print at 6 in. (152 mm) per second.
 - Pressing **CANCEL** again alters the self test a fourth time. Each time **PAUSE** is pressed, 15 labels print at the printer's maximum speed.
3. To exit this self test at any time, press and hold **CANCEL**.

Sensor Profile

Tap **Menu > Print > Sensors > Print: Sensor Profile** to print a sensor profile image. The image will extend across several actual labels or tags.

Use the sensor profile image to troubleshoot the following situations:

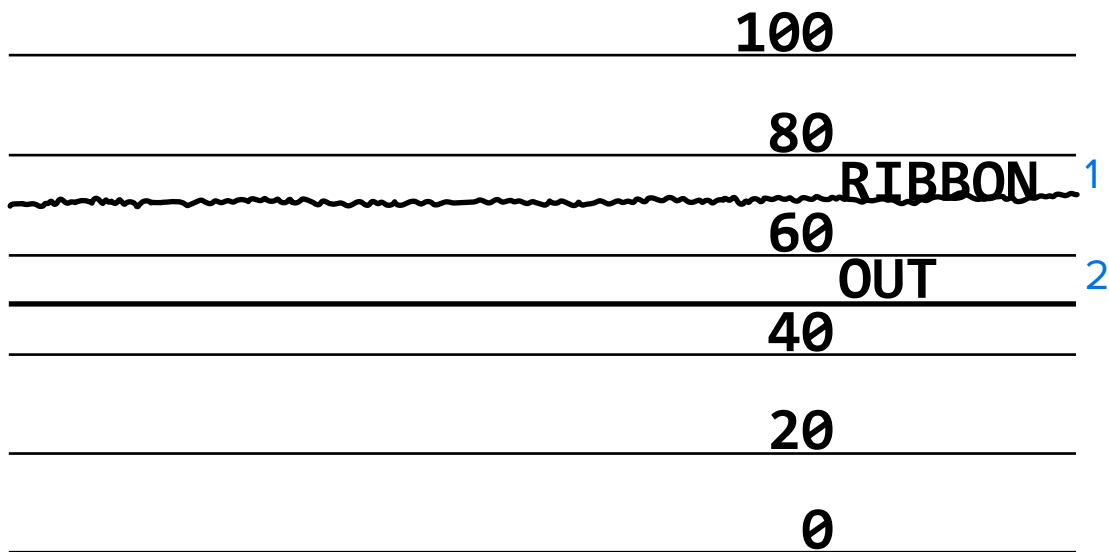
- The printer experiences difficulty in determining gaps (web) between labels.
- The printer incorrectly identifies preprinted areas on a label as gaps (web).
- The printer cannot detect ribbon.

Compare your results to the examples shown in this section. If the sensitivity of the sensors must be adjusted, calibrate the printer. (See [Calibrating the Ribbon and Media Sensors](#) on page 118.)

Ribbon Sensor Profile

See [Figure 7 Sensor Profile \(Ribbon Section\)](#) on page 146. The line labeled RIBBON (1) on the sensor profile indicates the ribbon sensor readings. The ribbon sensor threshold setting is indicated by OUT (2). If the ribbon readings are below the threshold value, the printer does not acknowledge that ribbon is loaded.

Figure 7 Sensor Profile (Ribbon Section)



Media Sensor Profile

See [Figure 8 Media Sensor Profile \(Gap/Notch Media\)](#) on page 147 and [Figure 9 Media Sensor Profile \(Black Mark Media\)](#) on page 147. The line labeled MEDIA (1) on the sensor profile indicates the media sensor readings. The media sensor threshold settings are indicated by WEB (2). The media out threshold is indicated by OUT (3). The upward or downward spikes (4) indicate divisions between labels (the web, notch, or black mark), and the lines between the spikes (5) indicate where labels are located.

If you compare the sensor profile printout to a length of your media, the spikes should be the same distance apart as the gaps on the media. If the distances are not the same, the printer may be having difficulty determining where the gaps are located.

Figure 8 Media Sensor Profile (Gap/Notch Media)

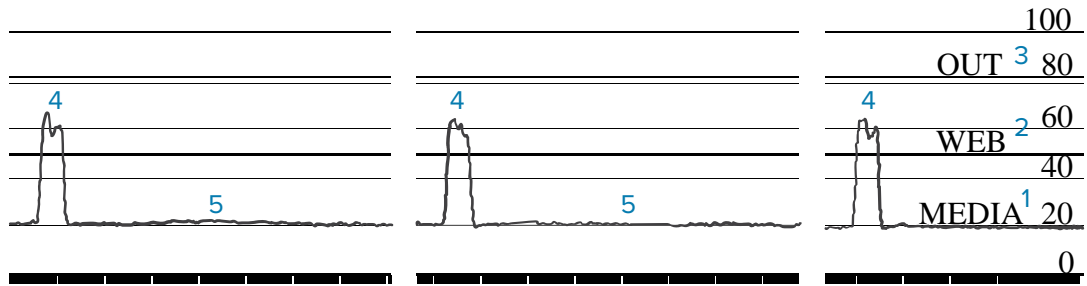
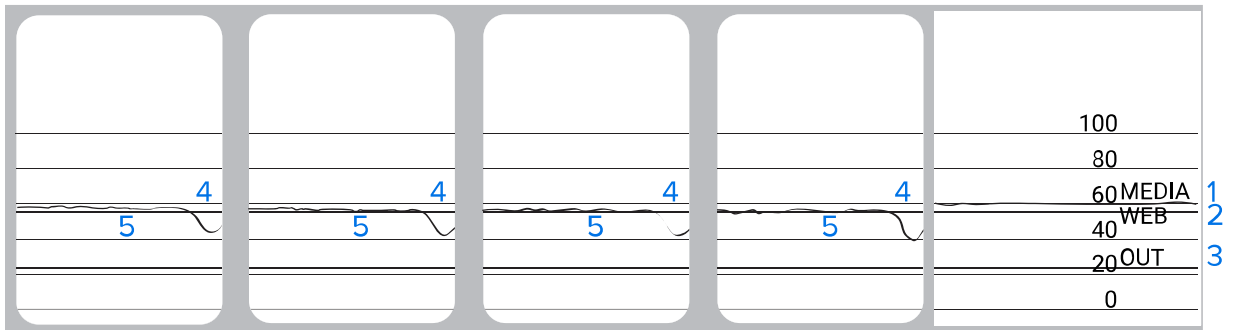


Figure 9 Media Sensor Profile (Black Mark Media)



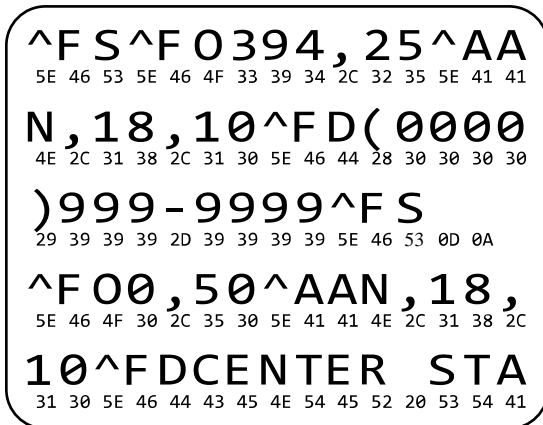
Using Communication Diagnostics Mode

The communication diagnostics test is a troubleshooting tool for checking the interconnection between the printer and the host computer. When the printer is in diagnostics mode, it prints all data received from the host computer as straight ASCII characters with the hex values below the ASCII text. The printer prints all characters received, including control codes such as CR (carriage return). [Figure 10 Sample Communications Diagnostics Mode Label](#) on page 147 shows a typical test label from this test.



NOTE: The test label prints upside-down.

Figure 10 Sample Communications Diagnostics Mode Label



1. Set the label width equal to or less than the actual media width being used for the test. Tap **Menu > Print > Print Quality > Label Width** to access the label width setting.
2. Tap **Menu > System > Program Language**, and set the **Diagnostic Mode** option to **ENABLED**.
The printer enters diagnostics mode and prints any data received from the host computer on a test label.
3. Check the test label for error codes. For any errors, check that your communication parameters are correct.
Errors show on the test label as follows:
 - FE indicates a framing error.
 - OE indicates an overrun error.
 - PE indicates a parity error.
 - NE indicates noise.
4. To exit this self test and return to normal operation, power cycle the printer or set the Diagnostic Mode option to **DISABLED**.

Loading Defaults or Last Saved Values

Restoring the printer to default values or to the last saved values can help if things are not working as expected.

Touch **Menu > System > Restore Defaults** to see the available options.



RESTORE PRINTER

Restores all printer settings other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.

RESTORE NETWORK

Reinitializes the printer's wired or wireless print server. With a wireless print server, the printer also re-associates with your wireless network.

RESTORE LAST SAVED

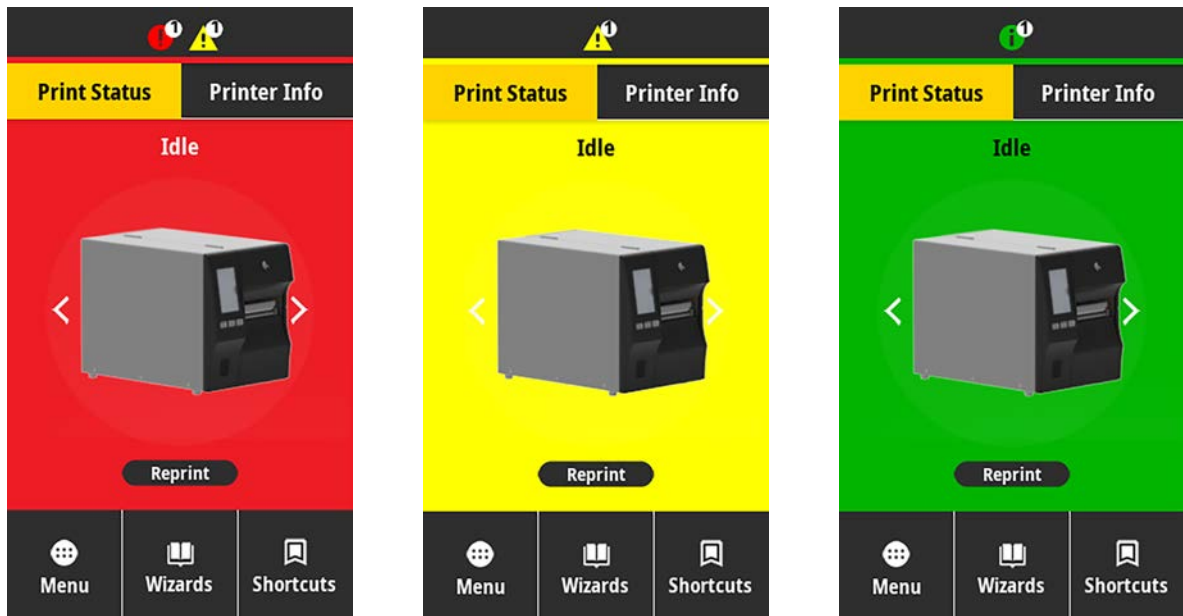
Loads settings from the last permanent save.

See [System > Settings > Restore Defaults](#) for additional ways to restore these values.

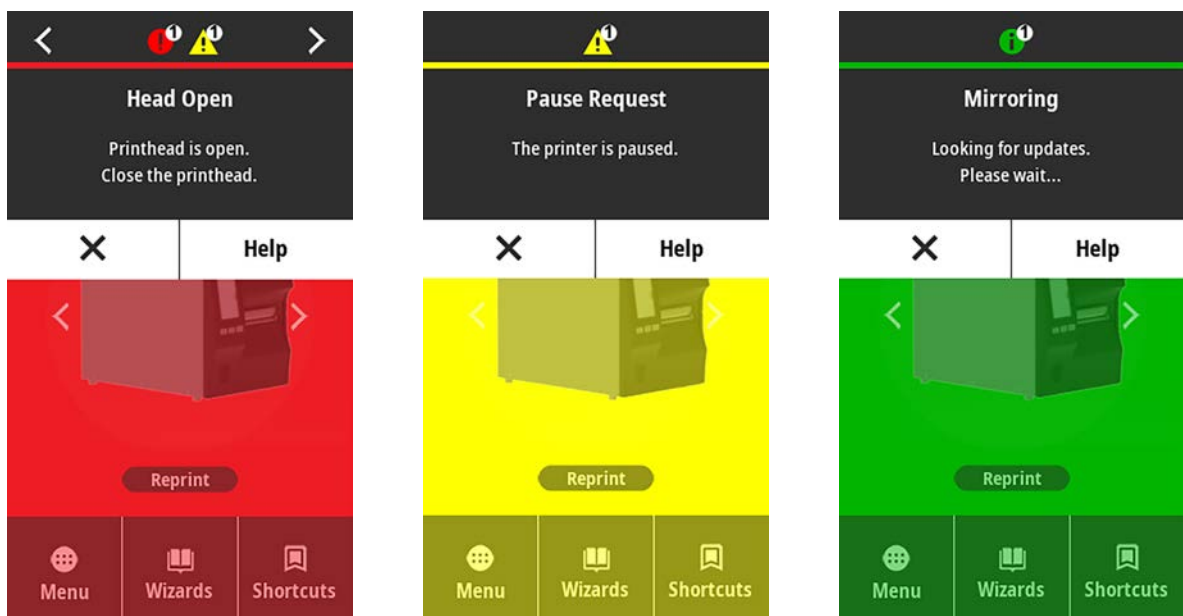
Alert and Error States

If the background color of the Home screen changes, you may need to take an action to restore the printer to a Ready status.

- Red and yellow backgrounds typically halt printing until the issue is resolved.
- Informational messages with a green background usually disappear without user intervention, and printing continues as normal.





Touch the icons in the bar at the top of the Home screen to view the error, alert, or informational message. See [Alerts and Error Messages](#) on page 150 for recommended actions.





Alerts and Error Messages

| Display/Indicator Lights | Possible Causes | Recommended Solutions |
|--|--|---|
| Head Open Printhead is open. Close the printhead. | The printhead is not fully closed. | Close the printhead completely. |
| | The printhead open sensor is not working properly. | Call a service technician to replace the sensor. |
| Media Out Media is out. Load additional media. | The media is not loaded or is loaded incorrectly. | Load media correctly. See Loading the Media on page 31. |
| | Misaligned media sensor. | Check the position of the media sensor. |
| | The printer is set for non-continuous media, but continuous media is loaded. | <ol style="list-style-type: none"> 1. Install the proper media type, or reset printer for the current media type. 2. Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| Paper Jam Media jammed. Check the media. | There is an issue with the media in the media path. | <ol style="list-style-type: none"> 1. Check for media that is loaded incorrectly or stuck to components in the media path. 2. Check if media is wrapped around the platen roller. Carefully remove any labels. If necessary, clean the platen roller to remove adhesive (see Cleaning the Printhead and Platen Roller on page 129). |
| Ribbon Out Ribbon is out. Replace the ribbon. | In thermal transfer mode: <ul style="list-style-type: none"> • ribbon is not loaded • ribbon is loaded incorrectly • the ribbon sensor is not detecting ribbon • media is blocking the ribbon sensor | <ol style="list-style-type: none"> 1. Load ribbon correctly. See Loading the Ribbon on page 62. 2. Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |

| Display/Indicator Lights | Possible Causes | Recommended Solutions |
|--|--|---|
| | In thermal transfer mode, the printer did not detect the ribbon even though it is loaded correctly. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118 or load printer defaults by touching Menu > System > Settings > Restore Defaults > Restore Printer . |
| | If you are using direct thermal media, the printer is waiting for ribbon to be loaded because it is incorrectly set for thermal transfer mode. | Set the printer for Direct Thermal mode. See Print > Print Quality > Print Type . |
| <p style="text-align: center;">Ribbon In</p> <p style="text-align: center;">Ribbon was detected in Direct Thermal mode. Remove the ribbon.</p> | Ribbon is loaded, but the printer is set for direct thermal mode. | Ribbon is not required with direct thermal media. If you are using direct thermal media, remove the ribbon. This error message will not affect printing. |
| | | If the message persists with no ribbon in the printer, Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| | | If you are using thermal transfer media, which requires ribbon, set the printer for Thermal Transfer mode. See Determining the Label Collection Method on page 28. |
| <p style="text-align: center;">Head Identification Failed</p> <p style="text-align: center;">Printhead is not a Zebra Certified Product Replace the Printhead</p> | The printhead was replaced with one that is not a genuine Zebra printhead. | Install a genuine Zebra printhead. |
| <p style="text-align: center;">Head Element Out</p> <p style="text-align: center;">A printhead element failed. The printhead may need to be replaced.</p> | A printhead element is no longer working. | If the location of the failed element affects printing, replace the printhead. |

| Display/Indicator Lights | Possible Causes | Recommended Solutions |
|---|---|--|
| <p>Replace Printhead Replace the printhead.</p> | The printhead is nearing the end of its life and should be replaced. | Replace the printhead. |
| <p>Head Maintenance Needed Clean the printhead.</p> | The printhead needs to be cleaned. | Follow the cleaning instructions in Cleaning the Printhead and Platen Roller on page 129. |
| <p>Head Over Temp Printhead is too hot. All printing is halted.</p> | <p> CAUTION: HOT SURFACE: The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> | |
| | <p>The printhead is over temperature.</p> | <p>Allow the printer to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.</p> <p>If this error persists, consider changing where the printer is located or using a slower print speed.</p> |
| <p>The printer shows one of these messages, or it cycles back and forth between them:</p> <p>Head Under Temp Printhead is too cold. All printing is halted.</p> <p>Head Thermistor Fault Faulty thermistor detected. Replace the printhead.</p> | <p> CAUTION: HOT SURFACE: An improperly connected printhead data or power cable can cause these error messages. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> | |
| | <p>The printhead data cable is not properly connected.</p> | <p>Call a service technician to hook up the printhead properly.</p> |
| | <p>The printhead has a faulty thermistor.</p> | <p>Call a service technician to replace the printhead.</p> |

| Display/Indicator Lights | Possible Causes | Recommended Solutions |
|--|---|---|
| <p>Head Under Temp Printhead is too cold. All printing is halted.</p> |  <p>CAUTION: HOT SURFACE: An improperly connected printhead data or power cable can cause this error message. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> | |
| | <p>The printhead temperature is approaching its lower operating limit.</p> | <p>Continue printing while the printhead reaches the correct operating temperature. If the error remains, the environment may be too cold for proper printing. Relocate the printer to a warmer area.</p> |
| | <p>The printhead data cable is not properly connected.</p> | <p>Call a service technician to hook up the printhead properly.</p> |
| | <p>The printhead has a faulty thermistor.</p> | <p>Call a service technician to replace the printhead.</p> |
| <p>Cutter Error A cutter error occurred. Restart the printer.</p> |  <p>CAUTION: The cutter blade is sharp. Do not touch or rub the blade with your fingers.</p> | |
| | <p>The cutter blade is in the media path.</p> | <p>Turn off the printer power and unplug the printer. Inspect the cutter module for debris and clean as needed following the cleaning instructions in Cleaning and Lubricating the Cutter Module on page 132.</p> |
| <p>Out of Memory Storing XXX XXX not stored. Out of memory.</p> | <p>There is not enough memory to perform the function specified.</p> | <p>Free up some of the printer's memory by adjusting the label format or printer parameters. One way to free up memory is to adjust the print width to the actual width of the label instead of leaving the print width set to the default.</p> |
| | | <p>Ensure that the data is not directed to a device that is not installed or is unavailable.</p> |
| | | <p>If the problem persists, call a service technician.</p> |

Indicator Lights

The indicator lights located above the printer's display also communicate the printer's status.

Table 5 Status of Printer As Shown by Indicator Lights









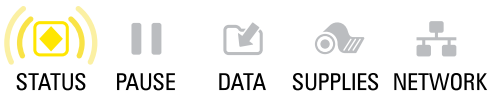
| Indicator Lights | What they indicate |
|---|--|
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady green (other lights steady yellow for 2 seconds during printer power-up). The printer is ready.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>PAUSE light steady yellow. The printer is paused.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady red. SUPPLIES light steady red. The media supply is out. The printer needs attention and cannot continue without user intervention.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady red. SUPPLIES light flashing red. The ribbon supply is out. The printer needs attention and cannot continue without user intervention.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady yellow. SUPPLIES light flashing yellow. The printer is in Direct Thermal mode, which does not require ribbon; however, ribbon is installed in the printer.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady red. PAUSE light steady yellow. The printhead is open. The printer needs attention and cannot continue without user intervention.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light steady yellow. The printhead is over temperature.  CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.</p> |
|  <p>STATUS PAUSE DATA SUPPLIES NETWORK</p> | <p>STATUS light flashing yellow. Indicates one of the following:</p> <ul style="list-style-type: none"> The printhead is under temperature. The power supply is over temperature. The main logic board (MLB) is over temperature. |

Table 5 Status of Printer As Shown by Indicator Lights (Continued)































































| Indicator Lights | What they indicate |
|---|--|
|      STATUS PAUSE DATA SUPPLIES NETWORK | STATUS light steady red. PAUSE light steady red. DATA light steady red. The printhead was replaced with one that is not a genuine Zebra printhead. Install a genuine Zebra printhead to continue. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | STATUS light flashing red. The printer is unable to read the dpi setting of the printhead. |
| Printers with a ZebraNet wired Ethernet option | |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light off. No Ethernet link is available. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light steady green. A 100 Base-T link was found. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light steady yellow. A 10 Base-T link was found. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light steady red. An Ethernet error condition exists. The printer is not connected to your network. |
| Printers with a ZebraNet wireless option | |
|      STATUS PAUSE DATA SUPPLIES NETWORK       STATUS PAUSE DATA SUPPLIES NETWORK       STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light off. A radio was found during power-up. The printer is attempting to associate with the network. The light flashes red while the printer associates with the network. The light then flashes yellow while the printer is authenticating with the network. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light steady green. The radio is associated with your network and authenticated, and the WLAN signal is strong. |
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light flashing green. The radio is associated with your network and authenticated, but the WLAN signal is weak. |

Table 5 Status of Printer As Shown by Indicator Lights (Continued)

| Indicator Lights | What they indicate |
|---|---|
|      STATUS PAUSE DATA SUPPLIES NETWORK | NETWORK light steady red. A WLAN error condition exists. The printer is not connected to your network. |

Troubleshooting

Use this information to troubleshoot issues with the printer.

Printing or Print Quality Issues

| Issue | Possible Cause | Recommended Solution |
|---|--|--|
| Barcode Does Not Scan | | |
| The barcode printed on a label does not scan. | The barcode is not within specifications because the printer is set at an incorrect darkness level. | <ol style="list-style-type: none"> 1. Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. 2. If necessary, manually adjust the darkness or print speed settings. <ul style="list-style-type: none"> • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. <p>Access the darkness and print speed settings from the Home screen by touching Menu > Print > Print Quality.</p> 3. If the issue is not resolved, check the printhead pressure and toggle position. See Adjusting the Printhead Pressure on page 120 |
| | There is not enough blank space around the barcode. | Leave at least 1/8 in. (3.2 mm) between the barcode and other printed areas on the label and between the barcode and the edge of the label. |
| Wrong Image Size | | |
| My label prints too small (or too large) | The wrong printer driver is being used, or other settings are not correct for your printing application. | Check the printer driver or software communications settings (if applicable) for your connection. You may wish to reinstall the printer driver following the instructions in Connecting the Printer to a Device on page 13. |
| Poor Print Quality | | |
| Smudge marks on labels | The media or ribbon is not designed for high-speed operation. | Replace supplies with those recommended for high-speed operation. For more information, see zebra.com/supplies . |

| Issue | Possible Cause | Recommended Solution |
|--|--|---|
| Poor results with thick labels | The print line is not at an optimal position for your media. | Refer to the Maintenance Manual for instructions on how to adjust the print line for thick media. |
| Print Consistently Too Light or Too Dark | | |
| Printing is too light or too dark over the entire label | The media or ribbon is not designed for high-speed operation. | Replace supplies with those recommended for high-speed operation. For more information, see zebra.com/supplies . |
| | The printer is set at an incorrect darkness level. | <p>For optimal print quality, set the darkness to the lowest possible setting for your application.</p> <ol style="list-style-type: none"> 1. Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. 2. If necessary, manually adjust the darkness or print speed settings. <ul style="list-style-type: none"> • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. <p>Access the darkness and print speed settings from the Home screen by touching Menu > Print > Print Quality.</p> |
| | You are using an incorrect combination of media and ribbon for your application. | Switch to a different type of media or ribbon to try to find a compatible combination. If necessary, consult your authorized Zebra reseller or distributor for information and advice. |
| | Incorrect printhead pressure. | Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120. |
| Printing is too light or too dark on one side of the label | Uneven printhead pressure. | Adjust the printhead pressure as needed for good print quality. See Adjusting the Printhead Pressure on page 120 |

| Issue | Possible Cause | Recommended Solution |
|--|--|--|
| General print quality issues | The printer is set at an incorrect print speed or darkness level. Keep in mind that printer settings may be affected by the driver or software being used. | <p>For optimal print quality, set the print speed and the darkness to the lowest possible settings for your application.</p> <ol style="list-style-type: none"> 1. Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. 2. If necessary, manually adjust the darkness or print speed settings. <ul style="list-style-type: none"> • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. <p>Access the darkness and print speed settings from the Home screen by touching Menu > Print > Print Quality.</p> |
| | You are using an incorrect combination of labels and ribbon for your application. | <p>Switch to a different type of media or ribbon to try to find a compatible combination.</p> <p>If necessary, consult your authorized Zebra reseller or distributor for information and advice.</p> |
| | The printhead is dirty. | Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129. |
| | Incorrect or uneven printhead pressure. | Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120. |
| | The label format is scaling a font that is not scalable. | Check the label format for font issues. |
| Angled Gray Lines on Blank Labels | | |
| Fine, angular gray lines on blank labels | Wrinkled ribbon. | See wrinkled ribbon causes and solutions in Miscellaneous Issues on page 167. |
| Missing Print | | |
| Long tracks of missing print on several labels | Print element damaged. | Call a service technician for assistance. |
| | Wrinkled ribbon. | See wrinkled ribbon causes and solutions in Ribbon Issues on page 161. |
| Loss of Registration | | |

| Issue | Possible Cause | Recommended Solution |
|---|--|--|
| Loss of printing registration on labels Excessive vertical drift in top-of-form registration | The platen roller is dirty. | Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129. |
| | Media guides are positioned improperly. | Ensure that the media guides are properly positioned. See Loading the Media on page 31. |
| | The media type is set incorrectly. | Set the printer for the correct media type (gap/notch, continuous, or mark). |
| | The media is loaded incorrectly. | Load media correctly. See Loading the Media on page 31. |
| Misregistration/skips labels | The printer is not calibrated. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| | Improper label format. | Check your label format, and correct it as necessary. |
| Misregistration and misprint of one to three labels | The platen roller is dirty. | Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129. |
| | Media does not meet specifications. | Use media that meets specifications. See Media Specifications on page 192. |
| Vertical drift in top-of-form position | The printer is out of calibration. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| | The platen roller is dirty. | Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129. |
| Horizontal movement in placement of the label image. | The previous labels were torn off incorrectly. | Pull down and to the left when tearing off labels so that the tear-off bar assists in tearing through the label backing. Pulling up or down and to the right can shift the media sideways. |
| Vertical image or label drift | The printer is using non-continuous labels but is configured in continuous mode. | Set the printer for the correct media type (gap/notch, continuous, or mark) and calibrate the printer, if necessary. See Calibrating the Ribbon and Media Sensors on page 118. |
| | The media sensor is calibrated improperly. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| | The platen roller is dirty. | Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129. |
| | Improper printhead pressure settings (toggles). | Adjust the printhead pressure to ensure proper functionality. See Adjusting the Printhead Pressure on page 120. |

| Issue | Possible Cause | Recommended Solution |
|-------|--|---|
| | The media or ribbon is loaded incorrectly. | Ensure that the media and ribbon are loaded correctly. See Loading the Ribbon on page 62 and Loading the Media on page 31. |
| | Incompatible media. | You must use media that meets the printer specifications. Ensure that the interlabel gaps or notches are 2 to 4 mm and consistently placed. See Media Specifications on page 192. |

Ribbon Issues

For videos of some common procedures, go to zebra.com/zt400.



| Issue | Possible Cause | Recommended Solution |
|-------------------------|--|--|
| Broken Ribbon | | |
| Broken or melted ribbon | Darkness setting too high. | <ol style="list-style-type: none"> Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. If necessary, manually adjust the darkness or print speed settings. <ul style="list-style-type: none"> Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. Slower print speeds typically yield better print quality. <p>Access the darkness and print speed settings from the Home screen by touching Menu > Print > Print Quality.</p> Clean the printhead thoroughly. See Cleaning the Printhead and Platen Roller on page 129. |
| | The ribbon is coated on the wrong side and cannot be used in this printer. | Replace the ribbon with one coated on the correct side. For more information, see Determining the Type of Ribbon to Use on page 61. |

| Issue | Possible Cause | Recommended Solution |
|---|--|---|
| Wrinkled Ribbon | | |
| Wrinkled ribbon | Ribbon was loaded incorrectly. | Load the ribbon correctly. See Loading the Ribbon on page 62. |
| | Incorrect burn temperature. | <ol style="list-style-type: none"> 1. Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. 2. If necessary, manually adjust the darkness or print speed settings. <ul style="list-style-type: none"> • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. <p>Access the darkness and print speed settings from the Home screen by touching Menu > Print > Print Quality.</p> |
| | Incorrect or uneven printhead pressure. | Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120. |
| | Media not feeding properly; “walking” from side to side. | Make sure that media is snug by adjusting the media guide, or call a service technician. |
| | The printhead or platen roller may be installed incorrectly. | Call a service technician. |
| Ribbon Detection Issues | | |
| The printer does not detect when the ribbon runs out. | The printer may have been calibrated without ribbon or without the ribbon loaded properly. | <ol style="list-style-type: none"> 1. Make sure that ribbon is loaded correctly so that it can be detected by the ribbon sensor. Under the printhead, the ribbon should track all the way back, near the printer’s firewall. See Loading the Ribbon on page 62. 2. Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| In thermal transfer mode, the printer did not detect the ribbon even though it is loaded correctly. | | |
| The printer indicates that ribbon is out, even though ribbon is loaded correctly. | The printer was not calibrated for the label and ribbon being used. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |

RFID Issues

| Issue | Possible Cause | Recommended Solution |
|--------------------------------------|--|--|
| Printer Stops at RFID Inlay | | |
| The printer stops at the RFID inlay. | The printer calibrated the label length only to the RFID inlay instead of to the interlabel gap. | <ol style="list-style-type: none"> 1. Tap Menu > System > Settings, and then select FEED for the Power Up and Head Close actions. 2. Manually calibrate the printer. See Performing Manual Sensor Calibration on page 119. |
| Voided Labels | | |
| The printer voids every label. | The printer is not calibrated for the media being used. | Manually calibrate the printer. See Performing Manual Sensor Calibration on page 119.) |
| | You are using an RFID label with a tag type that is not supported by your printer. | These printers support only Gen 2 RFID labels. For more information, refer to RFID Programming Guide 3, or contact an authorized Zebra RFID reseller. |
| | The printer is unable to communicate with the RFID reader. | <ol style="list-style-type: none"> 1. Turn off (O) the printer. 2. Wait 10 seconds. 3. Turn on (I) the printer. 4. If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the printer. Contact Technical Support or an authorized Zebra RFID service technician for assistance. |
| | Radio frequency (RF) interference from another RF source. | Do one or more of the following as necessary: <ul style="list-style-type: none"> • Move the printer away from fixed RFID readers or other RF sources. • Make sure that the media door is closed at all times during RFID programming. |
| | The settings are incorrect in your label designer software. | The software settings override the printer settings. Make sure that the software and printer settings match. |


| Issue | Possible Cause | Recommended Solution |
|---|--|--|
| | You are using an incorrect programming position, particularly if the tags being used are within printer specifications. | <p>Do one or more of the following as necessary:</p> <ul style="list-style-type: none"> • Check the RFID programming position or the program position setting in your label designer software. If the position is incorrect, change the setting. • Restore the RFID programming position back to the default value. <p>For more information, refer to RFID Programming Guide 3. For transponder placement details, go to zebra.com/transponders.</p> |
| | You are sending RFID ZPL or SGD commands that are incorrect. | Check your label formats. For more information, refer to RFID Programming Guide 3. |
| Low yields. Too many RFID tags per roll are voided. | The RFID labels are not within specifications for the printer, which means that the transponder is not in an area that can be programmed consistently. | <p>Make sure that the labels meet transponder placement specifications for your printer. See zebra.com/transponders for transponder placement information.</p> <p>For more information, refer to RFID Programming Guide 3, or contact an authorized Zebra RFID reseller.</p> |
| | Incorrect read and write power levels. | Change the RFID read and write power levels. For instructions, refer to RFID Programming Guide 3. |
| | Radio frequency (RF) interference from another RF source. | <p>Do one or more of the following as necessary:</p> <ul style="list-style-type: none"> • Move the printer away from fixed RFID readers. • Make sure that the media door is closed at all times during RFID programming. |
| | The printer is using outdated printer firmware and reader firmware versions. | Go to zebra.com/firmware for updated firmware. |
| Other RFID Issues | | |


| Issue | Possible Cause | Recommended Solution |
|--|---|---|
| <p>RFID parameters do not appear in Setup mode, and RFID information does not appear on the printer configuration label.</p> <p>The printer does not void RFID labels that are not programmed correctly.</p> | <p>The printer was powered off (O) and then back on (I) too quickly for the RFID reader to initialize properly.</p> | <p>Wait at least 10 seconds after turning the printer power off before turning it back on.</p> <ol style="list-style-type: none"> 1. Turn off (O) the printer. 2. Wait 10 seconds. 3. Turn on (I) the printer. 4. Check for the RFID parameters in Setup mode or for RFID information on a new configuration label. |
| | <p>An incorrect version of printer or reader firmware was loaded on the printer.</p> | <ol style="list-style-type: none"> 1. Verify that the correct firmware version is loaded on your printer. For more information, refer to RFID Programming Guide 3. 2. Download the correct printer or reader firmware if necessary. 3. If the problem persists, contact Technical Support. |
| | <p>The printer is unable to communicate with the RFID subsystem.</p> | <ol style="list-style-type: none"> 1. Turn off (O) the printer. 2. Wait 10 seconds. 3. Turn on (I) the printer. 4. If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the printer. Contact Technical Support or an authorized service technician for assistance. |
| <p>The DATA light flashes indefinitely after you attempt to download printer or reader firmware.</p> | <p>The download was not successful. For optimal results, cycle power on the printer before downloading any firmware.</p> | <ol style="list-style-type: none"> 1. Turn off (O) the printer. 2. Wait 10 seconds. 3. Turn on (I) the printer. 4. Attempt to download the firmware again. 5. If the problem persists, contact Technical Support. |

Communications Issues

| Issue | Possible Cause | Recommended Solution |
|--|---|---|
| Label Formats Not Recognized | | |
| A label format was sent to the printer but was not recognized. The DATA light does not flash. | The communication parameters are incorrect. | Check the printer driver or software communications settings (if applicable) for your connection. You may wish to reinstall the printer driver following the instructions in Connecting the Printer to a Device on page 13. |
| A label format was sent to the printer but was not recognized. The DATA light flashes but no printing occurs. | The prefix and delimiter characters set in the printer do not match the ones in the label format. | Verify the prefix and delimiter characters using the following SGD commands. Modify the values if necessary. <ul style="list-style-type: none"> • ! U1 getvar "zpl.format_prefix" • ! U1 getvar "zpl.delimiter" |
| | Incorrect data is being sent to the printer. | Check the communication settings on the computer. Ensure that they match the printer settings. If the problem persists, check the label format. |
| Labels Stop Printing Correctly | | |
| A label format was sent to the printer. Several labels print, then the printer skips, misplaces, misses, or distorts the image on the label. | The serial communication settings are incorrect. | Ensure that the flow control settings match. |
| | | Check the communication cable length. See Communication Interface Specifications on page 185 for requirements. |
| | | Check the printer driver or software communications settings (if applicable). |

Miscellaneous Issues

| Issue | Possible Cause | Recommended Solution |
|---|---|--|
| Issues with the Display | | |
| The control panel display shows a language that I cannot read | The language parameter was changed through the control panel or a firmware command. | <ol style="list-style-type: none"> 1. On the Home screen, touch Menu (the icon on the bottom-left).  <ol style="list-style-type: none"> 2. Touch the top selection on the screen. 3. Scroll through the language selections under this menu option. The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read. 4. Touch the language that you want to display to select it. 5. Touch the Home icon to return to the Home screen. |
| The display is missing characters or parts of characters | The display may need replacing. | Call a service technician. |
| The USB Host Port Is Not Acknowledging a USB Device | | |
| The printer is not acknowledging a USB device or is not reading the files on a USB device that is plugged into the USB host port. | The printer currently supports USB drives only up to 1 TB in size. | Use a USB drive that is 1 TB or smaller. |
| | The USB device may require its own external power. | If your USB device requires external power, make sure that it is plugged into a working power supply. |
| Printer Parameters Are Not Set As Expected | | |
| Changes in parameter settings did not take effect. OR Some parameters changed unexpectedly. | A firmware setting or command prevented the ability to change the parameter. | Check your label formats or the settings of the software that you use to send formats to the printer. If necessary, refer to the Programming Guide for ZPL, ZBI, Set-Get-Do, Mirror, and WML or call a service technician. A copy of the manual is available at zebra.com/manuals . |
| | A command in a label format changed the parameter back to the previous setting. | |
| IP Address Changing | | |

| Issue | Possible Cause | Recommended Solution |
|---|--|---|
| <p>My printer reassigns a new IP address to the print server after the printer has been off for a while.</p> | <p>The settings for your network are causing the network to reassign a new IP address.</p> | <p>If the printer changing IP addresses causes issues for you, follow these steps to assign it a static IP address:</p> <ol style="list-style-type: none"> 1. Find out what values need to be assigned to the IP address, subnet mask, and gateway for your print server (wired, wireless, or both). 2. Change the appropriate IP protocol value to PERMANENT. 3. Change the values for the IP address, subnet mask, and gateway for the appropriate print server to what you want them to remain. 4. Reset the network by touching Menu > Connections > Networks > Reset Network and then touching the checkmark to save the changes. |
| <p>Cannot Connect through Wired or Wireless Connections</p> | | |
| <p>I manually entered a wireless IP address, subnet, and gateway on my printer, but it won't connect to my wired or wireless network.</p> | <p>The printer's network must be reset after values are changed.</p> | <p>Reset the network by touching Menu > Connections > Networks > Reset Network and then touching the checkmark to save the changes.</p> |
| | <p>An ESSID value has not been specified.</p> | <ol style="list-style-type: none"> 1. For a wireless connection, specify the ESSID value that matches the value used by your wireless router using the following Set/Get/Do command: <pre>! U1 setvar "wlan.essid" "value"</pre> where "value" is the ESSID (sometimes called a network SSID) for your router. You can look on the back of your router for a sticker with the router's default information. <p> NOTE: If the information has been changed from the default, check with your network administrator for the ESSID value to use.</p> <ol style="list-style-type: none"> 2. If the printer still does not connect, reset the network by touching Menu > Connections > Networks > Reset Network and then touching the checkmark to save the changes, and then power-cycle the printer. |

| Issue | Possible Cause | Recommended Solution |
|---|--|--|
| | The ESSID or other value was not specified correctly. | <ol style="list-style-type: none"> 1. Print a network configuration label and verify that your values are correct. 2. Make corrections as necessary. 3. Reset the network by touching Menu > Connections > Networks > Reset Network and then touching the checkmark to save the changes. |
| Calibration Issues | | |
| Auto Calibrate failed. | The media or ribbon is loaded incorrectly. | Ensure that the media and ribbon are loaded correctly. See Loading the Ribbon on page 62 and Loading the Media on page 31. |
| | The sensors could not detect the media or ribbon. | Calibrate the printer manually. See Performing Manual Sensor Calibration on page 119. |
| | The sensors are dirty or positioned improperly. | Ensure that the sensors are clean and properly positioned. |
| | The media type is set incorrectly. | Set the printer for the correct media type (gap/notch, continuous, or mark). |
| Non-continuous labels are being treated as continuous labels. | The printer was not calibrated for the media being used. | Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118. |
| | The printer is configured for continuous media. | Set the printer for the correct media type (gap/notch, continuous, or mark). |
| Printer Locks Up | | |
| All indicator lights are on, nothing is on the display, and the printer locks up. | Internal electronic or firmware failure. | Power cycle the printer. If the problem persists, call a service technician. |
| The printer locks up while booting up. | Main logic board failure. | |

Servicing the Printer

If you have a problem using the printer, contact your facility's technical or systems support. If there is a problem with the printer, they will contact the Zebra Global Customer Support Center at zebra.com/support.

Gather the following information before contacting Zebra Global Customer Support:

- Serial number of the unit
- Model number or product name
- Firmware version number

Zebra responds to calls by e-mail, telephone, or fax within the time limits set forth in service agreements. If your problem cannot be solved by Zebra Global Customer Support, you may need to return your equipment for servicing and will be given specific directions.

If you purchased your product from a Zebra business partner, please contact that business partner for support.

Shipping the Printer

If you must ship the printer:

1. Turn off (O) the printer, and disconnect all cables.
2. Remove any media, ribbon, or loose objects from the printer interior.
3. Close the printhead.
4. Carefully pack the printer into the original container or a suitable alternate container to avoid damage during transit.

A shipping container can be purchased from Zebra if the original packaging has been lost or destroyed.



NOTE:

Zebra is not responsible for any damages incurred during shipment if an approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

Using a USB Host Port and the Print Touch Feature

The exercises presented here will help you learn how to use a USB host port and the printer's Print Touch feature with an Android™-based NFC-enabled device (such as a smartphone or a tablet).

Some SGD commands are listed as part of these exercises for advanced users.

Items Required for the Exercises

To perform the exercises in this document, you will need:

- a USB Flash drive (sometimes called a “thumb drive” or “memory stick”) that is up to 1 Terabyte (1 TB).



NOTE: The printer will not recognize drives larger than 1 TB.

- a USB keyboard
- the various files listed in [Files for Completing the Exercises](#) on page 172
- the free Zebra Utilities app for your smartphone (search for Zebra Tech in the Google Play store)

Files for Completing the Exercises

Most of the files you need to complete the exercises in these section are available zebra.com in the form of a .ZIP file located [here](#). Copy these files to your computer before you begin the exercises. Where possible, the contents of the files are shown. Contents of files that include coded content—which cannot be viewed either as text or as an image—are not included.

File 1: ZEBRA.BMP



File 2: SAMPLELABEL.TXT

This simple label format prints the Zebra logo and a line of text at the end of the mirroring exercise.

```
^XA
^FO100,75^XGE:zebra.bmp^FS
^FO100,475^A0N,50,50^FDMirror from USB Completed^FS
^XZ
```

File 3: LOGO.ZPL

File 4: USBSTOREDFILE.ZPL

This label format prints an image and text. This file will be stored on the USB memory device at the root level so that it can be printed.

```
CT~~CD,~CC^~CT~
^XA~TA012~JSN^LT0^LH0,0^JMA^PR4,4~SD15^LRN^CI0^XZ
~DG000.GRF,07680,024,,[image data]
^XA
^LS0
^SL0
^BY3,3,91^FT35,250^BCN,,Y,N^FC%,{,#{^FD%d/%m/%Y^FS
^FT608,325^XG000.GRF,1,1^FS
^FT26,75^A0N,28,28^FH\^FDThis label was printed from a format stored^FS
^FT26,125^A0N,28,28^FH\^FDOn a USB Flash Memory drive. ^FS
^BY3,3,90^FT33,425^BCN,,Y,N
^FD>:Zebra Technologies^FS
^PQ1,0,1,Y^XZ
^XA^ID000.GRF^FS^XZ
```

File 5: VLS_BONKGRF.ZPL

File 6: VLS_EIFFEL.ZPL

File 7: KEYBOARDINPUT.ZPL

This label format, used for the USB keyboard input exercise, does the following:

- creates a barcode with the current date, based on your Real-Time Clock (RTC) setting
- prints the Zebra logo graphic
- prints fixed text
- ^FN prompts you to enter your name, and the printer prints what you entered

```
^XA
^CI28
^BY2,3,91^FT38,184^BCN,,Y,N^FC%,{,#{^FD%d/%m/%Y^FS
^FO385,75^XGE:zebra.bmp^FS
^FT40,70^A0N,28,28^FH\^FDThis label was printed using a keyboard input. ^FS
^FT35,260^A0N,28,28^FH\^FDThis label was printed by:^FS
^FT33,319^A0N,28,28^FN1"Enter Name"^FS
^XZ
```

File 8: SMARTDEVINPUT.ZPL

This is the same label format as the previous label, only with different text printing. This format is used for the smart device input exercise.

```
^XA
^CI28
^BY2,3,91^FT38,184^BCN,,Y,N^FC%,{,#{^FD%d/%m/%Y^FS
^FO385,75^XGE:zebra.bmp^FS
^FT40,70^A0N,28,28^FH\^FDThis label was printed using a smart device input.
^FS
^FT35,260^A0N,28,28^FH\^FDThis label was printed by:^FS
^FT33,319^A0N,28,28^FN1"Enter Name"^FS
^XZ
```

File 9: Firmware File

You may want to download a firmware file for your printer and copy it to your computer for use during the exercises. You may omit doing this if you wish.

You can download the latest firmware file from zebra.com/firmware.

USB Host

Your printer may be equipped with one or two USB host ports on the front panel. A USB host port allows you to connect USB devices—such as a keyboard, scanner, or USB Flash drive—to the printer. The exercises in this section will teach you how to perform USB mirror, how to transfer files to and from the printer, and how to provide information for which you are prompted and then print a label using that information.



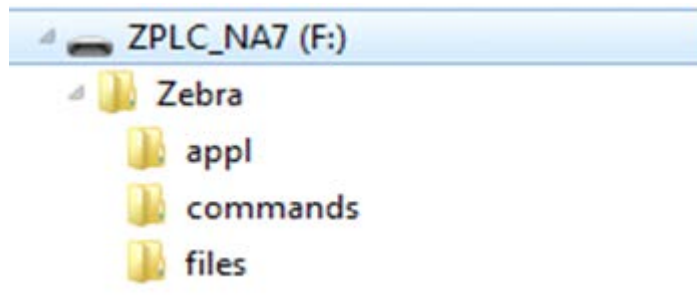
IMPORTANT: When using a USB host port, files should be named only with 1 to 16 alphanumeric characters (A, a, B, b, C, c, ..., 0, 1, 2, 3, ...). Do not use Asian characters, Cyrillic characters, or accented characters in file names.



NOTE: Some functions may not work properly if there are underscores in a file name. Use periods instead.

Exercise 1: Copy Files to a USB Flash Drive and Perform USB Mirror

1. On your USB Flash Drive, create the following:



- a folder called `Zebra`
 - in that folder, three subfolders:
 - `appl`
 - `commands`
 - `files`
2. In the `/appl` folder, place a copy of the latest firmware for your printer.
 3. In the `/files` folder, place the following file:

[File 1: ZEBRA.BMP](#) on page 172
 4. In the `/commands` folder, place the following files:
 - [File 2: SAMPLELABEL.TXT](#) on page 172
 - [File 3: LOGO.ZPL](#) on page 172
 5. Insert the USB Flash drive into a USB host port on the front of your printer.
 6. Observe the control panel and wait.

The following should happen:

- If the firmware on the USB Flash drive is different than what is on the printer, the firmware downloads to the printer. The printer then restarts and prints a printer configuration label. (If there

is no firmware on the USB Flash drive or if the firmware version is the same, the printer skips this action.)

- The printer downloads the files in the /files folder and briefly shows the names of the files that are downloading on the display.
- The printer executes any files in the /commands folder.
- The printer restarts and then displays this message: MIRROR PROCESSING FINISHED

7. Remove the USB Flash drive from the printer.

| Advanced User Information | |
|--|--|
| See the Zebra® Programming Guide for more information about these commands. | |
| To enable/disable mirroring: | ! U1 setvar "usb.mirror.enable" "value" Values: "on" or "off" |
| To enable/disable automatic mirroring that occurs when a USB Flash drive is inserted into the USB host port: | ! U1 setvar "usb.mirror.auto" "value" Values: "on" or "off" |
| To specify the number of times that the mirror operation will be repeated if it fails: | ! U1 setvar "usb.mirror.error_retry" "value" Values: 0 to 65535 |
| To change the path to the location on the USB device from which mirror files are retrieved: | ! U1 setvar "usb.mirror.appl_path" "new_path" Default: "zebra/appl" |
| To change the path to the location on the printer from which mirror files are retrieved: | ! U1 setvar "usb.mirror.path" "path" Default: "zebra" |
| To enable/disable the ability to use the USB port: | ! U1 setvar "usb.host.lock_out" "value" Values: "on" or "off" |

Exercise 2: Print a Label Format from a USB Flash Drive

The Print USB File option allows you to print files from a USB mass storage device, such as a USB Flash drive. Only printable files (.ZPL and .XML) may be printed from the USB mass storage device, and the files must be located at the root level, not in a directory.

1. Copy the following files to your USB Flash drive:

- [File 4: USBSTOREDFILE.ZPL](#) on page 172
- [File 5: VLS_BONKGRF.ZPL](#) on page 172
- [File 6: VLS_EIFFEL.ZPL](#) on page 172

2. Insert the USB Flash drive into a USB host port on the front of your printer.

3. Tap **Menu > Storage > USB > Print: From USB.**



The printer loads any executable files and processes them. The available files are listed. **SELECT ALL** is available to print all files on the USB Flash drive.

4. Select `USBSTOREDFILE.zpl`.
5. Touch the checkmark to copy the files.

The label prints.

Exercise 3: Copy Files to/from a USB Flash Drive

The Copy USB File option allows you to copy files from a USB mass storage device to the printer's Flash memory E: drive.

1. Copy the following files to the root directory of your USB Flash drive.
 - [File 7: KEYBOARDINPUT.ZPL](#) on page 173
 - [File 8: SMARTDEVINPUT.ZPL](#) on page 173



NOTE: Do not put these files into a subfolder.

2. Insert the USB Flash drive into a USB host port on the front of your printer.

3. Tap **Menu > Storage > USB > Copy: Files to Printer.**



The printer loads any executable files and processes them. The available files are listed. (If desired, you can use **Select All** to copy all the available files from the USB Flash drive.)

4. Select the files `STOREFMT.ZPL` and `STOREFMTM1.ZPL`.
5. Touch the checkmark to copy the files.

The printer stores the files in `E:` memory.

6. Remove the USB Flash drive from the USB host port.

You can now copy these files from the printer to a USB Flash drive by tapping **Menu > Storage > USB > Copy: Files to USB.**



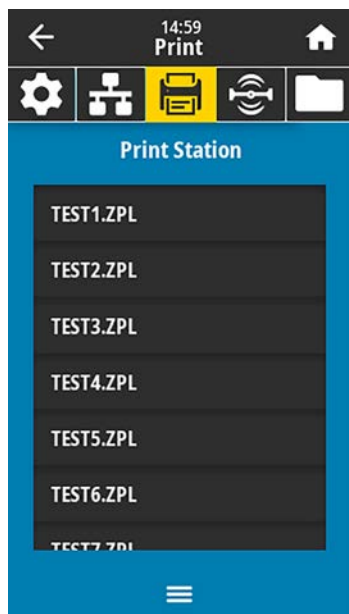
The option **SELECT ALL** is available to store all the available files from the printer to the USB Flash drive. Any .ZPL file that is copied will be post-processed so that the contents of the file will be suitable to be sent to a printer for normal execution.

Exercise 4: Enter Data for a Stored File with a USB Keyboard and Print a Label

The Print Station feature allows you to use a USB Human Interface Device (HID), such as a keyboard or a barcode scanner, to enter ^FN field data into a *.ZPL template file.

1. After performing [Exercise 3: Copy Files to/from a USB Flash Drive](#) on page 176, plug a USB keyboard into a USB host port.
2. Tap **Menu > Print > Print Station**.

The printer loads any executable files and processes them. The available files are listed.



3. Select the file **KEYBOARDINPUT.ZPL**.

The printer accesses the file and prompts you for the information in the ^FN fields in the file. In this case, it prompts you for your name.

4. Type your name on the keyboard, and then press **<ENTER>**.

The printer prompts for the number of labels to print.

5. Specify the desired quantity of labels, then press **<ENTER>** again.

The specified number of labels is printed, with your name in the appropriate fields.

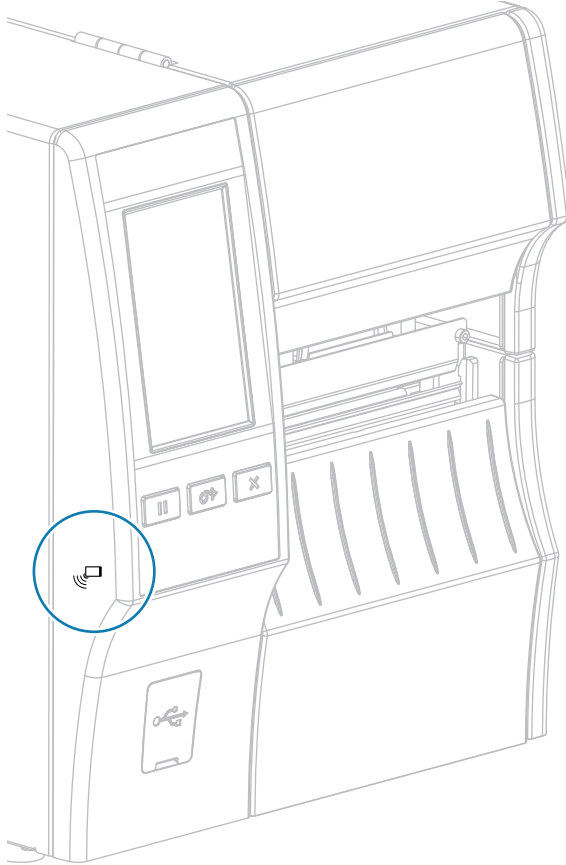
Print Touch/Near Field Communication (NFC)

The Zebra Print Touch feature allows you to touch an Android™-based, NFC-enabled device (such as a smart phone or tablet) to the printer's NFC logo ([Figure 11 NFC Logo Location](#) on page 179) to pair the device to the printer. This capability allows you to use your device to provide information for which you are prompted and then print a label using that information.



IMPORTANT: Some devices may not support NFC communication with the printer until you alter their settings. If you encounter difficulties, consult your service provider or your smart device manufacturer for more information.

Figure 11 NFC Logo Location



Exercise 5: Enter Data for a Stored File with a Smart Device and Print a Label

The steps in this exercise may vary somewhat based on:

- your smart device
- your service provider
- whether you already have the free Zebra Utilities app installed on your smart device.

Refer to the Zebra Bluetooth User Guide for specific instructions for configuring your printer to use a Bluetooth interface. A copy of this manual is available at zebra.com/manuals.

1. If you do not have the Zebra Utilities app installed on your device, go to the app store for your device, search for the Zebra Utilities app, and install it.

2. Pair your smart device with the printer by holding the smart device next to the NFC icon on the printer.



- a) If necessary, access the Bluetooth information about your printer using your smart device. For instructions, refer to the manufacturer's documentation for your device.
- b) If necessary, select the Zebra printer's serial number to pair it with the device.
- c) After your smart device has been detected by the printer, the printer may prompt you to accept or reject the pairing. If necessary, tap **ACCEPT**. Some smart devices will pair with the printer without this prompt.

The printer and your device are paired.

3. Start the Zebra Utilities app on your device.

The Zebra Utilities main menu displays.



4. Perform these steps if you have an Apple device:
 - a) Tap the **Settings** icon in the lower-right corner.



- b) Change the setting for **Get Labels From Printer** to **ON**.
- c) Tap **Done**.

5. Tap **Files.**

The smart device gets data from the printer and displays it.



NOTE: This retrieval process may take a minute or more to complete.

6. Scroll through the formats shown and select `E : SMARTDEVINPUT . ZPL`.

Based on the `^FN` field in the label format, the smart device prompts you for your name.

7. Enter your name at the prompt.


8. Change the quantity of labels to print, if desired.

9. Tap **PRINT to print the label.**

Specifications


This section lists general printer specifications, printing specifications, ribbon specifications, and media specifications.

General Specifications

| | | ZT411 | ZT421 |
|--|-----------|--|-------------------|
| Height* | | 12.8 in.(325 mm) | 12.8 in. (325 mm) |
| Width | | 10.7 in. (272 mm) | 13.2 in. (335 mm) |
| Depth | | 19.7 in. (500 mm) | 19.7 in. (500 mm) |
| Weight | | 36 lb (16 kg) | 40 lb (18 kg) |
| Temperature | Operating | Thermal Transfer: 40°F to 105°F (5° to 40°C) Direct Thermal: 32°F to 105°F (0° to 40°C) | |
| | Storage | -40°F to 140°F (-40° to 60°C) | |
| Relative Humidity | Operating | 20% to 85%, non-condensing | |
| | Storage | 5% to 85%, non-condensing | |
| Memory | | 256 MB RAM (8 MB user available) 512 MB Flash (64 MB user available on-board Flash) | |
|  NOTE: * Applies to base printer model. Dimensions may vary depending on configuration, such as adding optional rewind. | | | |

Power Specifications

The following are typical values. Actual values vary from unit to unit and are affected by such things as the options installed and the printer settings

| | ZT411 | ZT421 |
|--|--------------------------------|--------------------------------|
| Electrical | 100–240 VAC, 50-60 Hz | |
| Power consumption | 120 VAC, 60 Hz | |
| Inrush Current | < 35A peak8A RMS (half cycle) | < 40A peak8A RMS (half cycle) |
| Energy Star Off Power (W) | 0.08 | 0.08 |
| Energy Star Sleep Power (W) | 4.14 | 4.14 |
| Print Power* (W) | 98 | 215 |
| Print Power* (VA) | 108 | 261 |
| Power consumption | 230 VAC, 50 Hz | |
| Inrush Current | < 80A peak12A RMS (half cycle) | < 90A peak15A RMS (half cycle) |
| Energy Star Off Power (W) | 0.18 | 0.18 |
| Energy Star Sleep Power (W) | 4.26 | 4.26 |
| Print Power* (W) | 97 | 209 |
| Print Power* (VA) | 127 | 261 |
|  NOTE: * Printing Pause self test labels at 6 ips with 4x6-in. or 6.5x4 in. labels, darkness 10, and direct thermal media. | | |

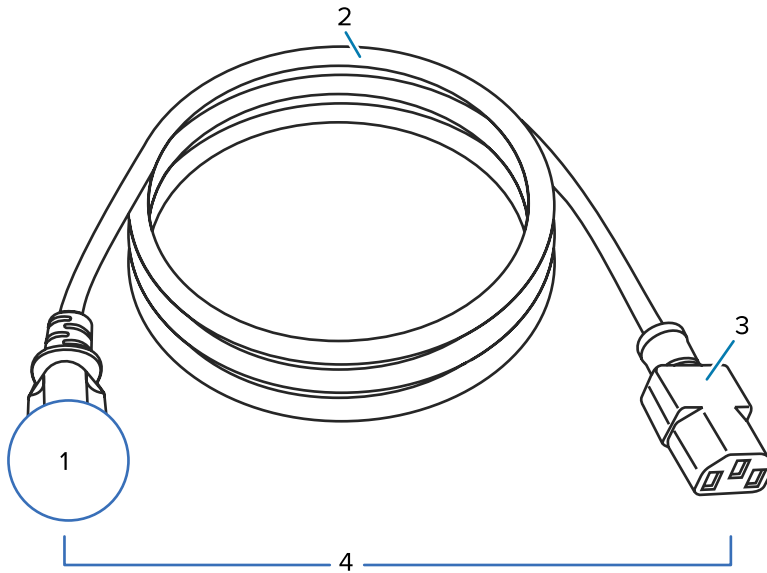
Power Cord Specifications

Depending on how your printer was ordered, a power cord may or may not be included. If one is not included, or if the one that is included is not suitable for your requirements, see [Figure 12 Power Cord Specifications](#) on page 184.



CAUTION—PRODUCT DAMAGE: For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific, three-conductor grounded plug configuration.

Figure 12 Power Cord Specifications



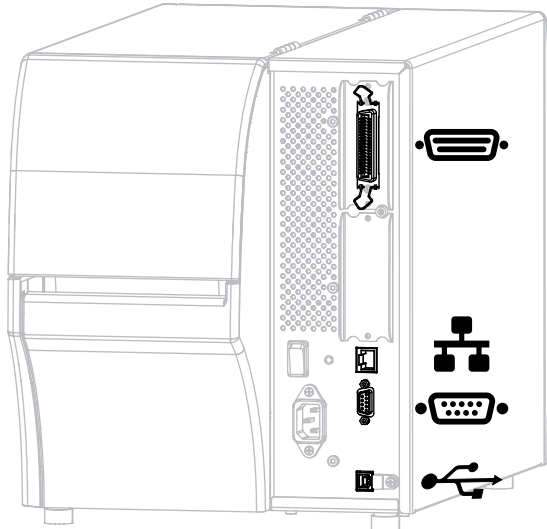
| | |
|---|--|
| 1 | AC power plug for your country—This should bear the certification mark of at least one of the known international safety organizations (see Figure 13 International Safety Organization Certification Symbols on page 184). The chassis ground (earth) must be connected to ensure safety and reduce electromagnetic interference. |
| 2 | 3-conductor HAR cable or other cable approved for your country. |
| 3 | IEC 320 connector—This should bear the certification mark of at least one of the known international safety organizations (see Figure 13 International Safety Organization Certification Symbols on page 184). |
| 4 | Length \leq 9.8 ft. (3 m). Rating 10 Amp, 250 VAC. |





Figure 13 International Safety Organization Certification Symbols



Communication Interface Specifications

Figure 14 Location of Communication Interfaces



| | | | |
|---|---------------|---|--------------------------------------|
|  | Parallel port |  | Internal wired Ethernet print server |
|  | Serial port |  | USB port |



NOTE: You must supply all data cables for your application. The use of cable strain relief clamps is recommended.

Ethernet cables do not require shielding, but all other data cables must be fully shielded and fitted with metal or metalized connector shells. Unshielded data cables may increase radiated emissions above the regulated limits.

To minimize electrical noise pickup in the cable:

- Keep data cables as short as possible.
- Do not bundle the data cables tightly with the power cords.
- Do not tie the data cables to power wire conduits.

Standard Connections

The ZT411/ZT421 printers support a variety of standard connections.

Bluetooth® Version 4.1

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

Part Number: ZTxxxxxx - xxxxxxxxx

If the ending string of the part number (xxxxxxx) begins with the letter P, your printer does NOT include this feature.

| | |
|-------------------------------|---|
| Limitations and requirements | Many mobile devices can communicate with the printer within a 30-foot radius of the printer. |
| Connections and configuration | Refer to the Zebra Bluetooth User Guide for specific instructions for configuring your printer to use a Bluetooth interface. This manual is available at zebra.com/manuals . |

Two USB Host Ports

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

Part Number: ZTxxxxxx - xxxxxxxxx

If the ending string of the part number (xxxxxxx) begins with the letter P, your printer does NOT include this feature.

| | |
|-------------------------------|--|
| Limitations and requirements | You can plug only one device into each of the printer's two USB host ports. You cannot use a third device by plugging it into a USB port on one of the devices, nor can you use an adapter to split a USB host port on the printer to accept more than one device at a time. |
| Connections and configuration | No additional configuration is necessary. |

Zebra PrintTouch/Near Field Communication (NFC)

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

Part Number: ZTxxxxx - xxxxxxxx

If the ending string of the part number (xxxxxxx) begins with the letter P, your printer does NOT include this feature.

| | |
|-------------------------------|---|
| Limitations and requirements | NFC communication must be initiated by touching your device to the appropriate location on the printer. |
| Connections and configuration | Some devices may not support NFC communication with the printer until you alter their settings. |

USB 2.0 Data Interface

| | |
|-------------------------------|---|
| Limitations and requirements | A maximum cable length of 16.4 ft (5 m). |
| Connections and configuration | No additional configuration is necessary. |

Wired 10/100 Internal Ethernet Print Server

| | |
|-------------------------------|--|
| Limitations and requirements | <ul style="list-style-type: none"> • The printer must be configured to use your LAN. • A second wired print server can be installed in the bottom option slot. |
| Connections and configuration | Refer to the ZebraNet Wired and Wireless Print Servers User Guide for configuration instructions. This manual is available at zebra.com/manuals . |

RS-232/C Serial Data Interface

| | |
|-------------------------------|---|
| Specifications | <ul style="list-style-type: none"> • 2400 to 115000 baud • parity, bits/character • 7 or 8 data bit • XON-XOFF, RTS/CTS, or DTR/DSR handshake protocol required • 750mA at 5 V from pins 1 and 9 |
| Limitations and requirements | <p>You must use a null-modem cable to connect to the printer or a null-modem adapter if using a standard modem cable.</p> <ul style="list-style-type: none"> • Maximum cable length of 50 ft (15.24 m). • You may need to change printer parameters to match the host computer. |
| Connections and configuration | <p>The baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control must match those of the host computer.</p> |

Optional Connections

The ZT411/ZT421 printers support these connectivity options.

Wireless print server

| | |
|-------------------------------|--|
| Specifications | See Wireless Specifications on page 189 for details. |
| Limitations and requirements | <ul style="list-style-type: none"> • Can print to the printer from any computer on your Wireless Local Area Network (WLAN). • Can communicate with the printer through the printer's web pages. • The printer must be configured to use your WLAN. • Can be installed only in the top option slot. |
| Connections and configuration | <p>Refer to the ZebraNet Wired and Wireless Print Servers User Guide for configuration instructions. A copy of this manual is available at zebra.com/manuals.</p> |

IEEE 1284 Bidirectional Parallel data interface

| | |
|-------------------------------|---|
| Limitations and requirements | <ul style="list-style-type: none"> • Maximum cable length of 10 ft, (3 m). • Recommended cable length of 6 ft. (1.83 m). • No printer parameter changes required to match the host computer. • Can be installed in either the top or bottom option slot. • An IEEE 1284 cable is required. |
| Connections and configuration | <p>No additional configuration is necessary.</p> |

Applicator interface

Requirements Must have a DB15F connector.

External ZebraNet 10/100 Print Server

Requirements Must have the parallel data interface option.

Wireless Specifications

Antenna Information

Type

- Chip antenna gain 1.69dBi
- Omni directional antenna gain 3dBi @ 2.4GHz; 5dBi @ 5GHz
- PCBA antenna gain = -30dBi @ 900MHz

WLAN Specifications

| | |
|-------------------------------------|--|
| 802.11 b | <ul style="list-style-type: none"> • 2.4 GHz • DSSS (DBPSK, DQPSK, and CCK) • RF power 17.77 dBm (EIRP) |
| 802.11 g | <ul style="list-style-type: none"> • 2.4 GHz • OFDM (16-QAM and 64-QAM with BPSK, and QPSK) • RF power 18.61 dBm (EIRP) |
| 802.11 n | <ul style="list-style-type: none"> • 2.4 GHz • OFDM (16-QAM and 64-QAM with BPSK, and QPSK) • RF power 18.62 dBm (EIRP) |
| 802.11 a/n | <ul style="list-style-type: none"> • 5.15-5.25 GHz, 5.25-5.35 GHz, 5.47-5.725 GHz • OFDM (16-QAM and 64-QAM with BPSK and QPSK) • RF power 17.89 dBm (EIRP) |
| 802.11 ac | <ul style="list-style-type: none"> • 5.15-5.25 GHz, 5.25-5.35 GHz, 5.47-5.725 GHz • OFDM (16-QAM and 64-QAM with BPSK and QPSK) • RF power 13.39 dBm (EIRP) |
| Bluetooth 4.1 + Low Energy (LE) | <ul style="list-style-type: none"> • 2.4 GHz • FHSS (BDR/EDR), GFSK (Bluetooth Low Energy) • RF power 9.22 dBm (EIRP) |
| Bluetooth Classic + Low Energy (LE) | <ul style="list-style-type: none"> • 2.4 GHz • FHSS (BDR/EDR), DSSS (Bluetooth LE) • RF power 9.22 dBm (EIRP) |
| RFID M6e Radio Module | <ul style="list-style-type: none"> • 865-928 MHz • FHSS • RF power 27.893 dBm |

Printing Specifications

| | ZT411 | ZT421 |
|------------------|------------------------------|---------------------------------|
| Print resolution | 203 dpi (dots/in.)/8 dots/mm | 203 dpi (dots/in.) 8 dots/mm |
| | 300 dpi/12 dots/mm | 300 dpi 12 dots/mm |

Specifications


| | | ZT411 | ZT421 |
|--|--------------------------|---|---|
| | | 600 dpi/24 dots/mm | N/A |
| Maximum print width | 203 dpi | 4.09 in. (104 mm) | 6.6 in. (168 mm) |
| | 300 dpi | 4.09 in. (104 mm) | 6.6 in. (168 mm) |
| | 600 dpi | 4.09 in. (104 mm) | N/A |
| Programmable constant print speeds | 203 dpi | 2.4 in. to 14 in. (61 mm to 356 mm) per second in 1-in. (25.4 mm) increments | 2.4 in. to 12 in. (61 mm to 305 mm) per second in 1-in. (25.4 mm) increments |
| | 300 dpi | 2.4 in. to 10 in. (61 mm to 254 mm) per second in 1-in. (25.4 mm) increments | 2.4 in. to 10 in. (61 mm to 203 mm) per second in 1-in. (25.4 mm) increments |
| | 600 dpi | 1.5 in. to 4 in. (38 mm to 102 mm) per second in 1-in. (25.4 mm) increments | N/A |
| Dot size (nominal) (width x length) | 203 dpi | 0.0049 in. x 0.0049 in. (0.125 mm x 0.125 mm) | 0.0049 in. x 0.0049 in. (0.125 mm x 0.125 mm) |
| | 300 dpi | 0.0033 in. x 0.0039 in. (0.084 mm x 0.099 mm) | 0.0033 in. x 0.0039 in. (0.084 mm x 0.099 mm) |
| | 600 dpi | 0.0016 in. x 0.0016 in. (0.042 mm x 0.042 mm) | N/A |
| First dot location (measured from the inside edge of the media) | 203 dpi | 0.14 in. \pm 0.05 in. (3.5 mm \pm 1.25 mm) | 0.10 in. \pm 0.035 in. (2.5 mm \pm 0.9mm) |
| | 300 dpi | 0.08 in. \pm 0.05 in. (2.1 mm \pm 1.25 mm) | 0.10 in. \pm 0.035 in. (2.5 mm \pm 0.9mm) |
| | 600 dpi | 0.08 in. \pm 0.05 in. (2.1 mm \pm 1.25 mm) | N/A |
| Barcode modulus (X) dimension | | | |
| Picket fence (nonrotated) orientation | 203 dpi | 4.9 mil to 49 mil | 5 mil to 50 mil |
| | 300 dpi | 3.3 mil to 33 mil | 3.3 mil to 33 mil |
| | 600 dpi | 1.6 mil to 16 mil | N/A |
| Ladder (rotated) orientation | 203 dpi | 4.9 mil to 49 mil | 5 mil to 50 mil |
| | 300 dpi | 3.9 mil to 39 mil | 3.9 mil to 39 mil |
| | 600 dpi | 1.6 mil to 16 mil | N/A |
| Vertical registration | all print speeds and dpi | \pm 1.0 mm | \pm 1.0 mm |

Media Specifications

| | | | ZT411 | ZT421 |
|---|---------|----------------------------------|---|--------------------------|
| Label length | Minimum | Non-RFID | | |
| | | Tear-off | 0.5 in. (12.7 mm) | 0.5 in. (12.7 mm) |
| | | Peel-off | 0.5 in. (12.7 mm) | 0.5 in. (12.7 mm) |
| | | Rewind | 0.5 in. (12.7 mm) | 0.5 in. (12.7 mm) |
| | | Cutter | 1.0 in. (25.4 mm) | 1.0 in. (25.4 mm) |
| | RFID | Varies for each transponder type | | |
| | Maximum | 200 or 300 dpi | 39 in. (991 mm) | 39 in. (991 mm) |
| | | 600 dpi | 20 in. (508 mm) | N/A |
| Maximum continuous media print length | | 200 dpi | 157 in. (3988 mm) | 102 in. (2590 mm) |
| | | 300 dpi | 73 in. (1854 mm) | 45 in. (1143 mm) |
| | | 600 dpi | 39 in. (991 mm) | N/A |
| Label width | Minimum | Non-RFID | 1.0 in. (25.4 mm) | 2 in. (51 mm) |
| | | RFID | Varies for each transponder type | |
| | Maximum | Tear/Cutter | 4.5 in. (114 mm) | 7.0 in. (178 mm) |
| | | Peel/Rewind | 4.25 in. (108 mm) | 6.75 in. (171 mm) |
| Total thickness (includes liner, if any) | | Minimum | 0.0023 in. (0.058 mm) | 0.0023 in. (0.058 mm) |
| | | Maximum | 0.010 in. (0.25 mm) | |
| Maximum roll outside diameter | | | 8 in. (203 mm) -- on a 3-in. (76-mm) inside diameter core | |
| Inter-label gap | | Minimum | 0.079 in. (2 mm) | |
| | | Preferred | 0.118 in. (3 mm) | |
| | | Maximum | 0.157 in. (4 mm) | |
| Ticket/tag notch size (width x length) | | | 0.25 in. x 0.12 in. (6 mm x 3 mm) | |
| Hole diameter | | | 0.125 in. (3.18 mm) | |
| Notch or hole position (centered from inner media edge) | | Minimum | 0.15 in. (3.8 mm) | |
| | | Maximum | 2.25 in. (57 mm) | 3.5 in. (90 mm) |
| Density, in Optical Density Units (ODU) (black mark) | | | > 1.0 ODU | |
| Maximum media density | | | ≤ 0.5 ODU | |
| Transmissive media sensor (fixed position) | | | 7/16 in. (11 mm) from inside edge | |

Ribbon Specifications

Standard printers use ribbon that is coated on the outside. An optional ribbon spindle is available to use ribbon that is coated on the inside. Contact your authorized Zebra reseller for ordering information.

| | ZT411 | ZT421 |
|---|-------------------|-------------------|
| Ribbon width MINIMUM* | 2 in.** (51 mm**) | 2 in.** (51 mm**) |
| Ribbon width MAXIMUM | 4.33 in. (110 mm) | 6.85 in. (174 mm) |
| Ribbon length MAXIMUM | 1476 ft (450 m) | |
| Ribbon core inside diameter | 1 in. (25 mm) | |
| Ribbon roll outside diameter MAXIMUM | 3.2 in. (81.3 mm) | |
|  NOTE: * Zebra recommends using ribbon that is at least as wide as the media to protect the printhead from wear. ** Depending on your application, you may be able to use ribbon narrower than 2 in. (51 mm), as long as the ribbon is wider than the media being used. To use a narrower ribbon, test the ribbon's performance with your media to assure that you get the desired results. | | |

Glossary

alphanumeric

Indicating letters, numerals, and characters such as punctuation marks.

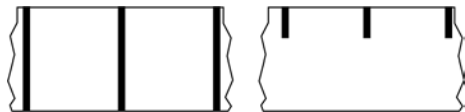
backfeed

When the printer pulls the media and ribbon (if used) backward into the printer so that the beginning of the label to be printed is properly positioned behind the printhead. Backfeed occurs when operating the printer in Tear-Off and Applicator modes.

barcode

A code by which alphanumeric characters can be represented by a series of adjacent stripes of different widths. Many different code schemes exist, such as the universal product code (UPC) or Code 39.

black mark media



Media with registration marks found on the underside of the print media that act as start-of-label indications for the printer. The reflective media sensor is typically the preferred choice for use with black mark media.

Contrast this with [continuous media](#) on page 195 or [gap/notch media](#) on page 197.

calibration (of a printer)

A process in which the printer determines some basic information needed to print accurately with a particular [media](#) on page 198 and [ribbon](#) on page 200 combination. To do this, the printer feeds some media and ribbon (if used) through the printer and senses whether to use the [direct thermal](#) on page 196 or [thermal transfer](#) on page 202 print method, and (if using [non-continuous media](#) on page 199) the length of individual labels or tags.

collection method

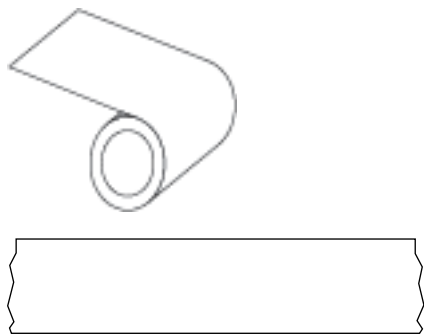
Select a media collection method that is compatible with your printer options. Selections include tear-off, peel-off, cutter, and rewind. The basic media and ribbon loading instructions are the same for all collection methods with some additional steps necessary for using any media collection options.

configuration

The printer configuration is a group of operating parameters specific to the printer application. Some parameters are user selectable, while others are dependent on the installed options and mode of operation. Parameters may be switch selectable, control panel programmable, or downloaded as ZPL II commands. A configuration label listing all the current printer parameters may be printed for reference.

continuous media

Label or tag-stock media that does not have gaps, holes, notches, or black marks to indicate label separations. The media is one long piece of material wound into a roll. This allows the image to be printed anywhere on the label. Sometimes a cutter is used to cut apart individual labels or receipts.



Contrast this with [black mark media](#) on page 194 or [gap/notch media](#) on page 197.

core diameter

The inside diameter of the cardboard core at the center of a roll of media or ribbon.

diagnostics

Information about which printer functions are not working that is used for troubleshooting printer problems.

die-cut media

A type of label stock that has individual labels stuck to a media liner. The labels may be lined up against each other or separated by a small distance. Typically the material surrounding the labels has been removed. (See [non-continuous media](#) on page 199.)

direct thermal

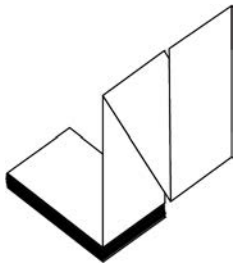
A printing method in which the printhead presses directly against the media. Heating the printhead elements causes a discoloration of the heat-sensitive coating on the media. By selectively heating the printhead elements as the media moves past, an image is printed onto the media. No ribbon is used with this printing method.

Contrast this with [thermal transfer](#) on page 202.

direct thermal media

Media that is coated with a substance that reacts to the application of direct heat from the printhead to produce an image.

fanfold media



Non-continuous media that comes folded in a rectangular stack. Fanfold media is either [gap/notch media](#) on page 197 or [black mark media](#) on page 194.

Contrast this with [roll media](#) on page 201.

firmware

This is the term used to specify the printer's operating program. This program is downloaded to the printer from a host computer and stored in [FLASH memory](#) on page 196. Each time the printer power is turned on, this operating program starts. This program controls when to feed the [media](#) on page 198 forward or backward and when to print a dot on the label stock.

FLASH memory

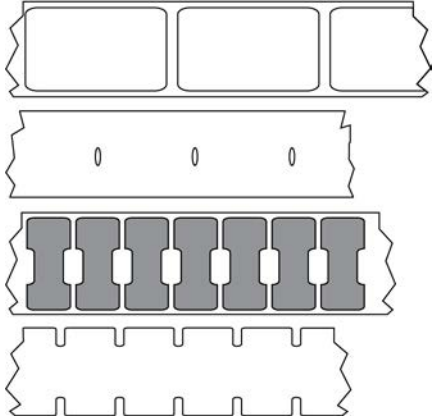
[Non-volatile memory](#) that maintains the stored information intact when power is off. This memory area is used to store the printer's operating program. Can also be used to store optional printer fonts, graphic formats, and complete label formats.

font

A complete set of [alphanumeric](#) on page 194 characters in one style of type. Examples include CG Times™, CG Triumvirate Bold Condensed™.

gap/notch media

Media that contains a separation, notch, or hole, indicating where one label/printed format ends and the next begins.



Contrast this with [black mark media](#) on page 194 or [continuous media](#) on page 195.

ips (inches-per-second)

The speed at which the label or tag is printed. Many Zebra printers can print from 1 ips to 14 ips.

label

An adhesive-backed piece of paper, plastic, or other material on which information is printed. A non-continuous label has a defined length, as opposed to a continuous label or a receipt which can have a varying length.

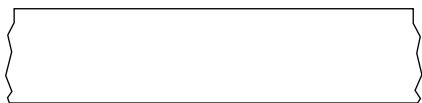
label backing (liner)

The material on which labels are affixed during manufacture and which is discarded or recycled.

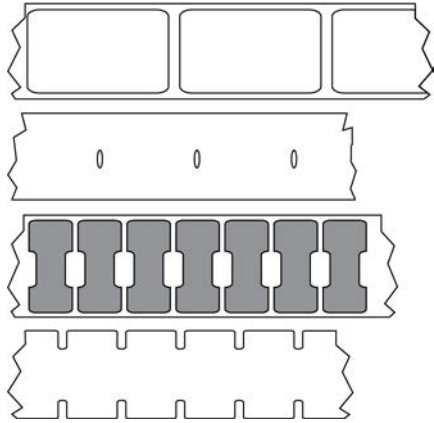
label type

The printer recognizes the following label types.

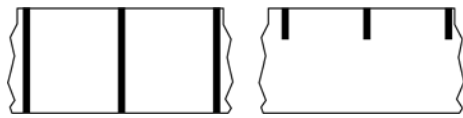
Continuous



Gap/Notch



Mark



LED (light emitting diode)

Indicators of specific printer status conditions. Each LED is either off, on, or blinking depending on the feature being monitored.

linerless media

Linerless media does not use backing to keep the layers of labels on a roll from sticking to one another. It is wound like a roll of tape, with the sticky side of one layer in contact with the non-sticky surface of the one below it. Individual labels may be separated by perforations, or they can be cut apart. Because there is no liner, more labels can potentially fit on a roll, cutting down the need to change media as often. Linerless media is considered an environmentally-friendly option because no backing is wasted, and the cost per label can be considerably less than that of standard labels.

LCD (liquid crystal display)

A backlit display that provides the user with either operating status during normal operation or option menus when configuring the printer to a specific application.

mark media

See [black mark media](#) on page 194.

media

Material onto which data is printed by the printer. Types of media include: tag stock, die-cut labels, continuous labels (with and without media liner), non-continuous media, fanfold media, and roll media.

media sensor

This sensor is located behind the printhead to detect the presence of media and, for [non-continuous media](#) on page 199, the position of the web, hole, or notch used to indicate the start of each label.

media supply hangar

The stationary arm that supports the media roll.

non-continuous media

Media that contains an indication of where one label/printed format ends and the next one begins. [Gap/notch media](#) and [black mark media](#) on page 194 are types of non-continuous media. Contrast this with [continuous media](#) on page 195.

non-volatile memory

Electronic memory that retains data even when the power to the printer is turned off.

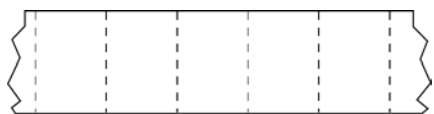
notched media

A type of tag stock containing a cutout area that can be sensed as a start-of-label indicator by the printer. This is typically a heavier, cardboard-like material that is either cut or torn away from the next tag. See [gap/notch media](#) on page 197.

peel-off mode

A mode of operation in which the printer peels a printed label away from the backing and allows the user to remove it before another label is printed. Printing pauses until the label is removed.

perforated media



Media with perforations that allow the labels or tags to be separated from each other easily. The media may also have black marks or other separations between labels or tags.

print speed

The speed at which printing occurs. For thermal transfer printers, this speed is expressed in terms of [ips \(inches-per-second\)](#) on page 197.

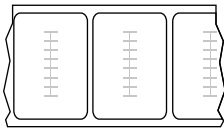
print type

The print type specifies whether the type of [media](#) on page 198 being used requires [ribbon](#) on page 200 to print. [thermal transfer](#) on page 202 media requires ribbon while [direct thermal](#) on page 196 media does not.

printhead wear

The degradation of the surface of the printhead and/or the print elements over time. Heat and abrasion can cause printhead wear. Therefore, to maximize the life of the printhead, use the lowest print darkness setting (sometimes called burn temperature or head temperature) and the lowest printhead pressure necessary to produce good print quality. In the [thermal transfer](#) on page 202 printing method, use [ribbon](#) on page 200 that is as wide or wider than the media to protect the printhead from the rough media surface.

Radio frequency identification (RFID) "smart" media



Each RFID label has an RFID transponder (sometimes called an "inlay"), made of a chip and an antenna, embedded between the label and the liner. The shape of the transponder varies by manufacturer and is visible through the label. All "smart" labels have memory that can be read, and many have memory that can be encoded.

RFID media can be used in a printer that is equipped with an RFID reader/encoder. RFID labels are made from the same materials and adhesives as non-RFID labels.

receipt

A receipt is a variable length printout. One example of a receipt is in retail stores, where each purchased item occupies a separate line on the printout. Therefore, the more items purchased, the longer the receipt.

registration

Alignment of printing with respect to the top (vertical) or sides (horizontal) of a label or tag.

ribbon

Ribbon is a thin film that is coated on one side with wax, resin, or wax resin (usually called ink), which is transferred to the media during the [thermal transfer](#) process. Ink is transferred onto the media when heated by the small elements within the printhead.

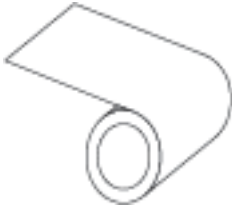
Ribbon is only used with the thermal transfer print method. [Direct thermal media](#) does not use ribbon. When ribbon is used, it must be as wide as or wider than the media being used. If the ribbon is narrower than the media, areas of the printhead are unprotected and subject to premature wear. Zebra ribbons have a coating on the back that protects the printhead from wear.

ribbon wrinkle

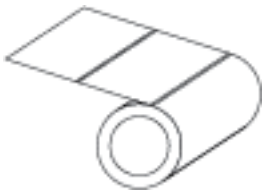
A wrinkling of the ribbon caused by improper alignment or improper printhead pressure. This wrinkle can cause voids in the print and/or the used ribbon to rewind unevenly. This condition should be corrected by performing adjustment procedures.

roll media

Media that comes supplied rolled onto a core (usually cardboard). It can be continuous (no separations between labels)



or non-continuous (some type of separation between labels).



Contrast this with [fanfold media](#) on page 196.

supplies

A general term for media and ribbon.

symbology

The term generally used when referring to a barcode.

tag stock

A type of media having no adhesive backing but featuring a hole or notch by which the tag can be hung on something. Tags are usually made of cardboard or other durable material and are typically perforated between tags. Tag stock can come on rolls or in a fanfold stack. (See [gap/notch media](#) on page 197.)

tear-off mode

A mode of operation in which the user tears the label or tag stock away from the remaining media by hand.

thermal transfer

A printing method in which the printhead presses an ink or resin coated ribbon against the media. Heating the printhead elements causes the ink or resin to transfer onto the media. By selectively heating the printhead elements as the media and ribbon move past, an image is printed onto the media.

Contrast this with [direct thermal](#) on page 196.

void

A space on which printing should have occurred, but did not due to an error condition such as wrinkled ribbon or faulty print elements. A void can cause a printed barcode symbol to be read incorrectly or not at all.

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