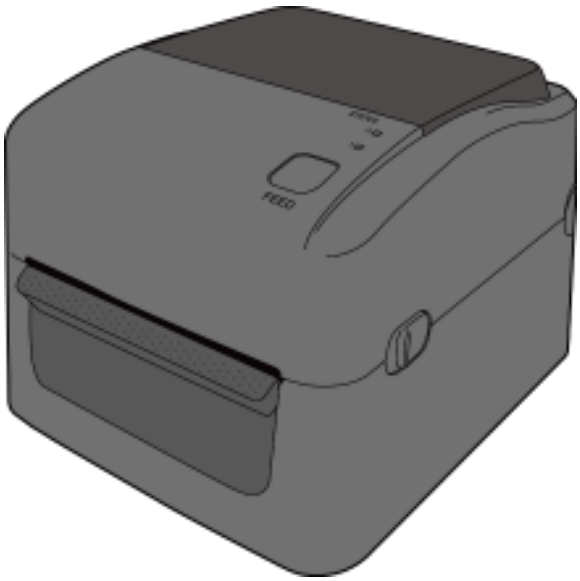
WS4 Series Printer

Operator Manual

WS408DT / WS412DT
WS408TT / WS412TT



WS4-r04-27-02-17OM

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FCC ID

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

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions in this manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Statement for Optional RF module

This device complies with RF radiation exposure limits set forth for an uncontrolled environment.

The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all people and must not be collocated or operating in conjunction with any other antenna or transmitter.

Bluetooth/Wireless LAN Communication

Compliance Statement

This product has been certified for compliance with the relevant radio interference regulations of your country or region. To make sure continued compliance, do not:

- Disassemble or modify this product.
- Remove the certificate label (serial number seal) affixed to this product.

Use of this product near microwave and/or other Wireless LAN equipment, or where static electricity or radio interference is present, may shorten the communication distance, or even disable communication.

WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(for USA only)

Liability Disclaimer

SATO Corporation takes steps to assure that the company's published engineering specifications and manuals are correct; however, errors do occur. SATO reserves the right to correct any such errors and disclaims any resulting liability. In no event shall SATO or anyone else involved in the creation, production, or delivery of the accompanying product (including hardware and software) be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or the results of use of or inability to use such product, even if SATO has been advised of the possibility of such damages.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Safety Precautions

This section describes how to use the printer safely. Be sure to read the following information carefully before using the printer.

Pictographic Symbols

This operator manual and the printer labels use a variety of pictographic symbols. These symbols emphasize the safe and correct use of the printer and to prevent injury to others and property damage. The explanation of the symbols is as follows. Be sure to understand these symbols well before you read the main text.

WARNING

Ignoring the instructions marked by this symbol and erroneously operating the printer could result in death or serious injury.

CAUTION

Ignoring the instructions marked by this symbol and erroneously operating the printer could result in injury or property damage.

The △ pictograph means “Caution is required.” A specific warning symbol is contained inside this pictograph (The symbol at left is for electric shock).

The ⃠ pictograph means “Should not be done.” What is specifically prohibited is contained in or near the pictograph (The symbol at left means “Disassembly prohibited”).

The ● pictograph means “Must be done.” What is specifically to be done is contained in the pictograph (The symbol at left means “Unplug the power cord from the outlet”).

⚠ **WARNING**

Do not set on an unstable area

- Do not set on an unstable area, such as a wobbly table or slanted area or an area subject to strong vibration. If the printer falls off or topples over, it could injure someone.

Do not place containers full of water or other liquid on the printer

- Do not place flower vases, cups, or other containers holding liquids, such as water or chemicals, or small metal objects near the printer. If they are spilled and get inside the printer, immediately turn off the power switch, unplug the power cord from the outlet and contact your SATO reseller or technical support center. Using the printer in this condition could cause a fire or electric shock.

Do not put objects inside the printer

- Do not insert or drop in metal or burnable objects inside the printer's openings (cable outlets, etc.). If foreign objects do get inside the printer, immediately turn off the power switch, unplug the power cord from the outlet, and contact your SATO reseller or technical support center. Using the printer in this condition could cause a fire or electric shock.

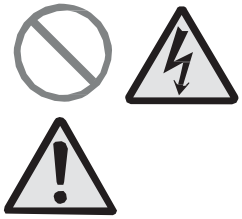
Do not use other than the specified voltage

- Do not use other than the specified voltage. Doing so could result in fire or electric shock.

Always ground the connections

- Always connect the printer's ground wire to a ground. Not grounding the ground wire could result in electric shock.

Handling of the power cord



- Do not damage, break, or modify the power cord. Also, do not place heavy objects on the power cord, heat it, or pull it because doing so could damage the power cord and cause a fire or electric shock.
- If the power cord becomes damaged (core is exposed, wires broken, etc.), contact your SATO reseller or technical support center. Using the power cord in this condition could cause a fire or electric shock.
- Do not modify, excessively bend, twist, or pull the power cord. Using the power cord in such a condition could cause a

fire or electric shock.

When the printer has been dropped or broken

- If the printer is dropped or broken, immediately turn off the power switch, unplug the power cord from the outlet, and contact your SATO reseller or technical support center. Using the printer in this condition could cause a fire or electric shock.

Do not use the printer when something is abnormal about it

- Continuing to use the printer in the event something is abnormal about it, such as smoke or unusual smells coming from it, could result in fire or electric shock. Immediately turn off the power switch, unplug the power cord from the outlet, and contact your SATO reseller or technical support center for repairs. It is dangerous for the customer to try to repair it, so absolutely do not attempt repairs on your own.

Do not disassemble the printer

- Do not disassemble or modify the printer. Doing so could result in fire or electric shock. Ask your SATO reseller or technical support center to conduct internal inspections, adjustments, and repairs.

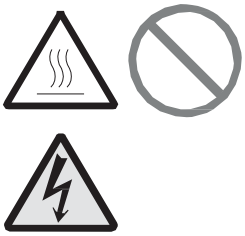
Regarding the cutter

- Do not touch the cutter with your hands or do not put something into the cutter. Doing so could result in an injury.

Using the head cleaning fluid

- Use of flame or heat around the head cleaning fluid is prohibited. Absolutely do not heat it or subject it to flames.
- Keep the fluid out of reach of children to prevent them from accidentally drinking it. If the fluid is drunk, immediately consult with a physician.

Print head



- The print head is hot after printing. Be careful not to get burned when replacing media or cleaning immediately after printing.
- Touching the edge of the print head with bare hands could result in injury. Be careful not to become injured when replacing media or cleaning.
- The customer should not replace the print head. Doing so

could result in injury, burns or electric shock.

⚠ **CAUTION**

Do not place in areas with high humidity

- Do not place the printer in areas with high humidity or where condensation forms. If condensation forms, immediately turn off the power switch and do not use the printer until it dries. Using the printer while condensation is on it could result in electric shock.

Carrying the Printer

- When moving the printer, always unplug the power cord from the outlet and check to make sure all external wires are disconnected before moving it. Moving the printer with the wires still connected could damage the cords or connecting wires and result in a fire or electrical shock.
- Do not carry the printer with media loaded in it. The media could fall out and cause an injury.
- When setting the printer on the floor or a stand, make sure not to get your fingers or hands pinched under the printer feet.

Power supply

- Do not operate the power switch or plug in/ unplug the power cord with wet hands. Doing so could result in electric shock.

Power cord

- Keep the power cord away from hot devices. Getting the power cord close to hot devices could cause the cord's covering to melt and cause a fire or electric shock.

- When unplugging the power cord from the outlet, be sure to hold it by the plug. Pulling it by the cord could expose or break the core wires and cause a fire or electric shock.
- The power cord set that comes with the printer is especially made for this printer. Do not use it with any other electrical devices.

Top cover

- Be careful not to get your fingers pinched when opening or closing the top cover. Also be careful the top cover does not slip off and drop.

Loading media

- When loading media roll, be careful not to get your fingers pinched between the media roll and the supply unit.

When not using the printer for a long time

- When not using the printer for a long time, unplug the power cord from the outlet to maintain safety.

During maintenance and cleaning

- When maintaining and cleaning the printer, unplug the power cord from the outlet to maintain safety.

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1 Introduction

Thank you for purchasing a SATO WS printer. This manual provides information about how to set up and operate your printer, load the media and solve common problems.

1.1 Features

- **Various Connectivity Options** USB, Ethernet, RS232
- **Easy Operation** One-button design for easy control
- **Fast Print Speed** Max 6 inches/sec for the WS408 model
- **Wireless Connection** Connect to a Wireless 802.11 LAN or Bluetooth® printing environment with optional interface installed
- **USB Host Connection** The USB host port allows you to use a USB flash drive for storage or updating printer firmware

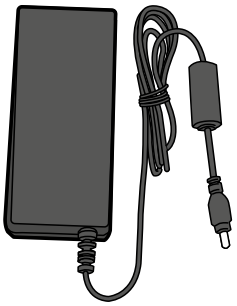
1.2 Unpacking

Make sure all of the following items are included in your package.

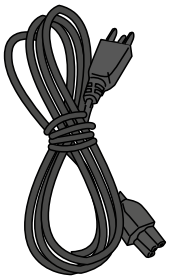
SATO WS Printer

User Documents

(Quick Guide, Warranty, etc.)



Power Supply



AC Power Cord

TT Model Only:

Core Adapter Shafts

TT Model Only:

Paper Support Roller

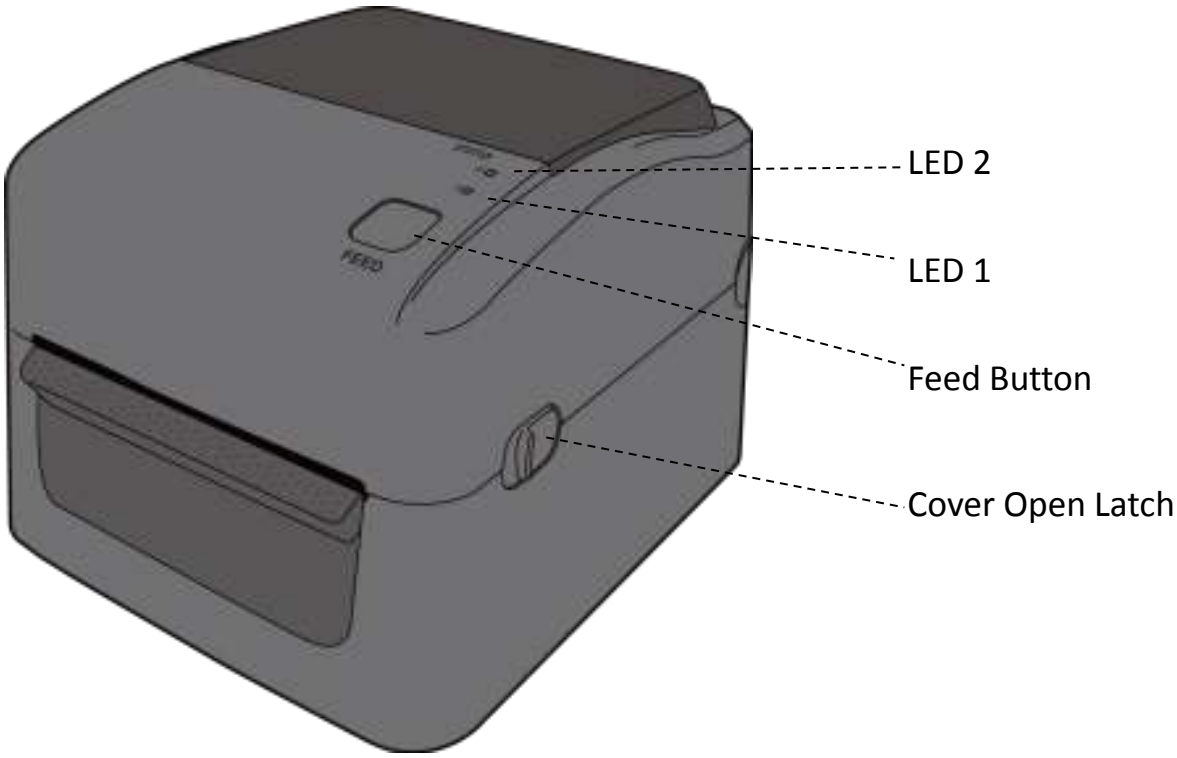
When you receive the printer, open the package immediately and inspect for shipping damage. If you discover any damage, contact the shipping company and file a claim. SATO is not responsible for any damage incurred during shipping. Save all package materials for the shipping company to inspect.

Note: If any item is missing, please contact your local dealer.

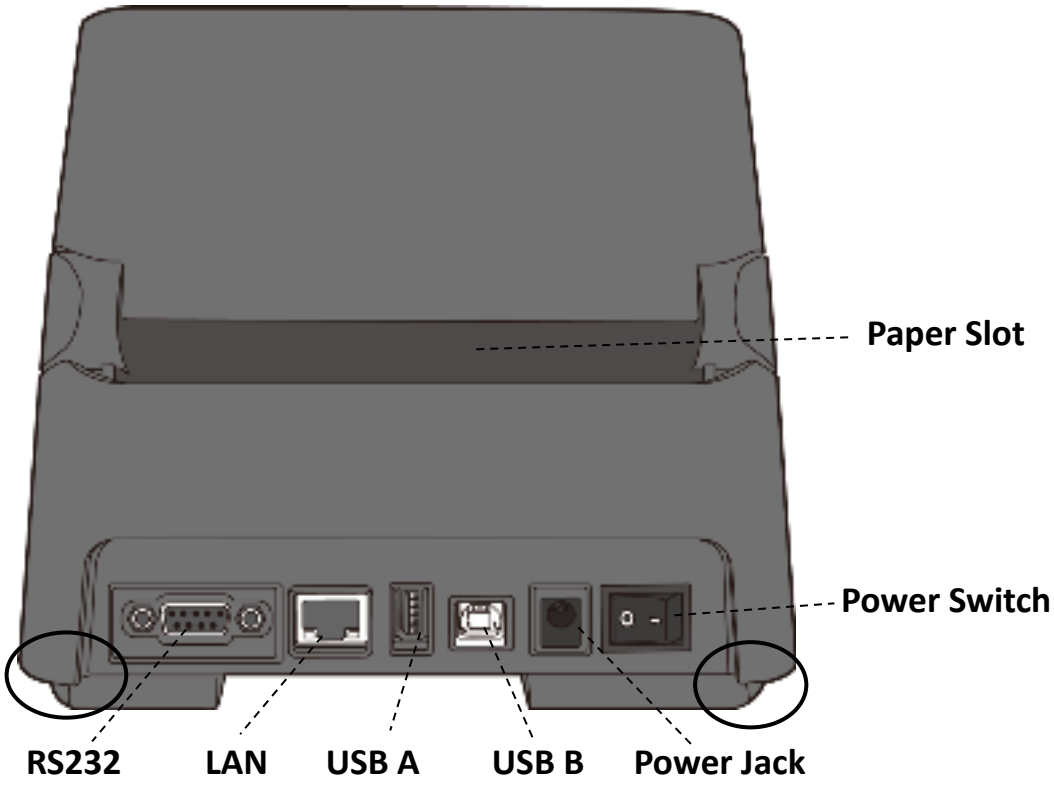
1.3 Understand Your Printer

1.3.1 WS4 Direct Thermal (DT) Model

1.3.1.1 Perspective View



1.3.1.2 Back View



Caution: The areas indicated by the ellipse have sharp edges. To avoid injury, be careful not to touch them when handling the printer.

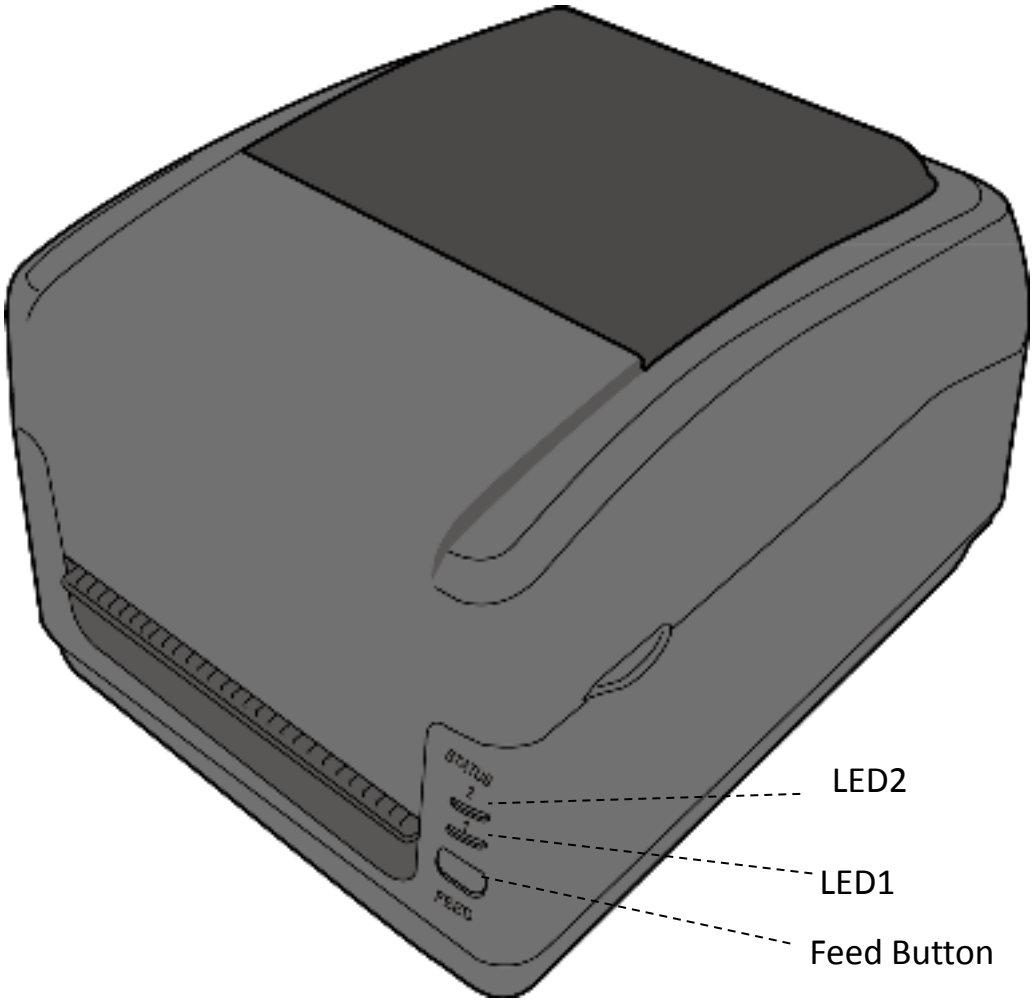
Caution: To avoid injury, be careful not to trap your fingers in the Paper Slot while opening or closing the Top Cover.

1.3.1.3 Interior View

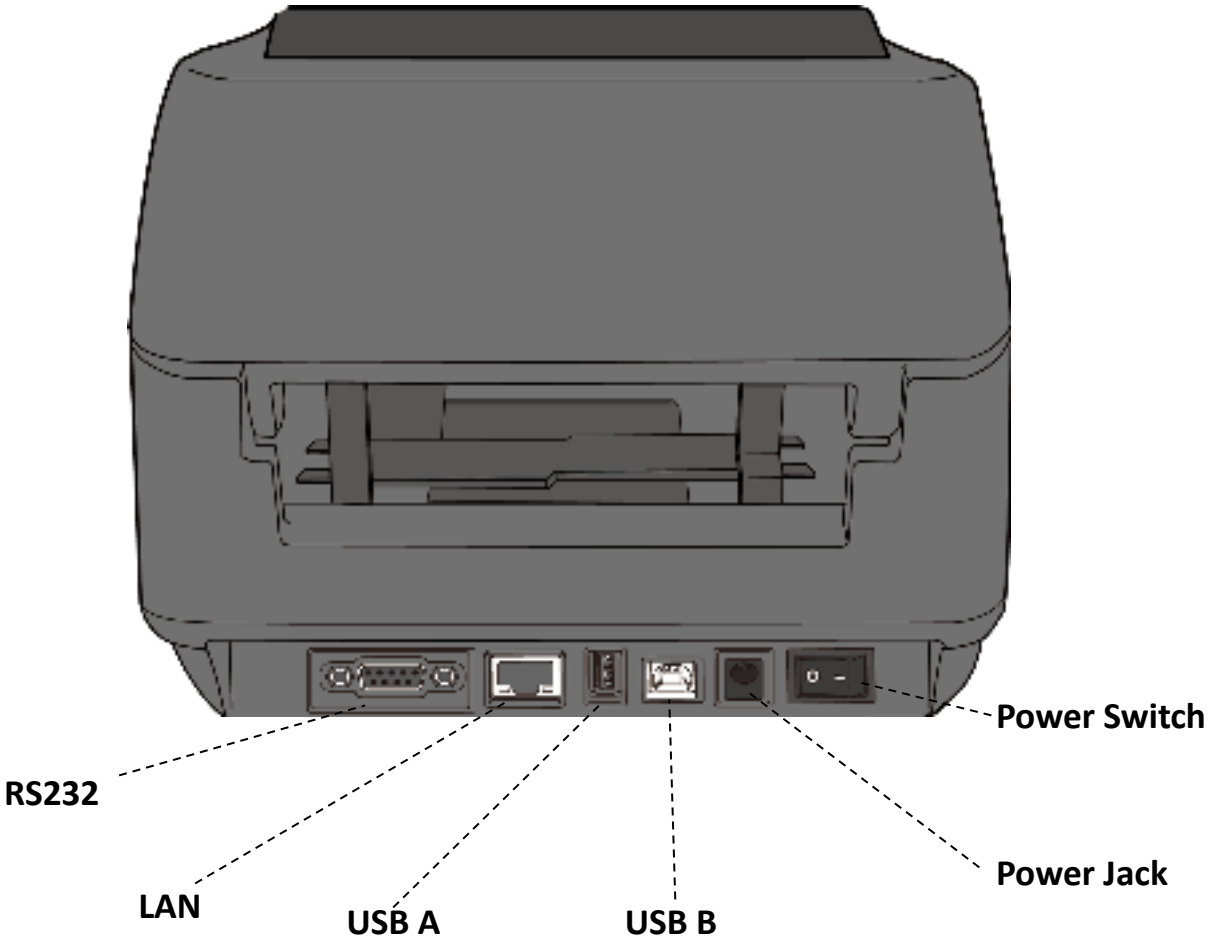
Warning: The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

1.3.2 WS4 Thermal Transfer (TT) Model

1.3.2.1 Perspective View



1.3.2.2 Back View

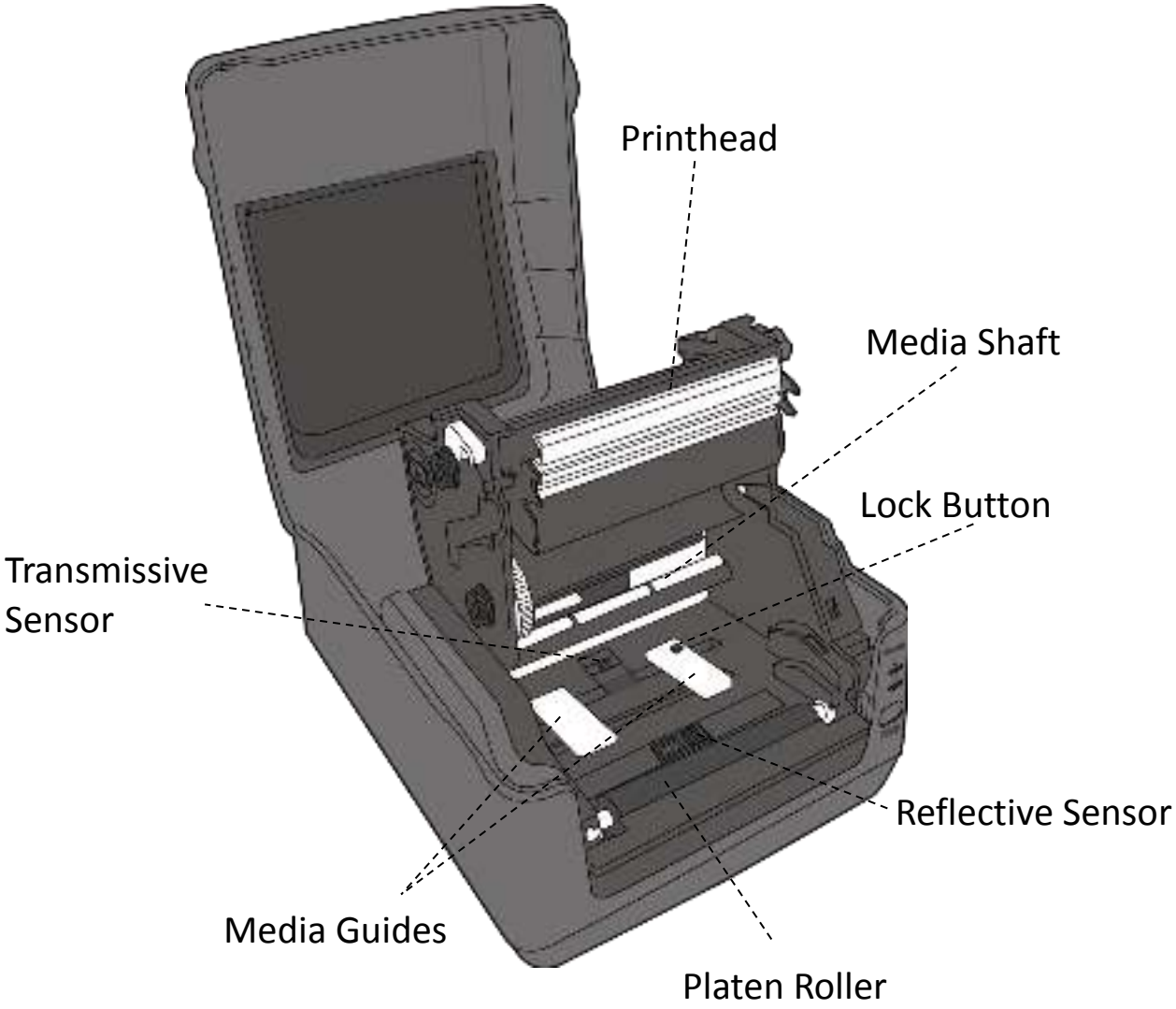


Caution: The areas indicated by the ellipse have sharp edges. To avoid injury, be careful not to touch them when handling the printer.

Caution: To avoid injury, be careful not to trap your fingers in the Paper Slot while opening or closing the Top Cover.

1.3.2.3 Interior View I

1.3.2.4 Interior View II



Warning: The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

1.4 Printer Lights

There are two LED lights that show the status of your printer.

1.4.1 Status Lights

Status lights help you check printer's condition. The following tables show the blinking speed of status lights and the conditions they indicate.

Symbol	Blinking Speed	Blinking Interval
**	Fast	0.5 Second
*	Slow	2 Seconds
* LED2 + *LED1	Slow	LED2 & LED1 Blinking Interval at same time
* LED2 + LED1*	Slow	LED2 & LED1 Blinking Interval at different timing

LED 2	LED 1	Description
Green	Green	The printer is ready to print.
Green	** Green	The printer is transmitting data.
* Green	* Green	In pause.
* Green	Green *	The printer is writing data to the flash or USB memory. The USB memory is being initialized.
Green	Orange	Head high temperature.
Green	** Orange	The print module is opened when the printer is turned on.
Orange	Orange	Paper jam.
** Orange	** Orange	The media is out when the print data is sent to the printer. Paper end.
** Orange	Orange **	Ribbon end or ribbon error (for thermal transfer models)
Red	Orange	The printhead is broken.
Red	*Orange	Communication error (RS-232C).
Red	**Orange	Cutter error (with optional cutter).
Red	Red	Cover (Thermal Head) open error during printing.
Red	* Red	An EEPROM for backup cannot be read or written properly.
		A command has been fetched from an odd address.
		Word data has been accessed from a place other than the boundary of the word data.

		Long word data has been accessed from a place other than the boundary of the long word data.
Red	** Red	Command error.
* Red	Red *	Flash ROM on the CPU board error or USB memory error.
		An erase error has occurred when formatting the USB memory.
		Unable to save files due to insufficient USB memory.

1.4.2 System Mode

The system mode consists of status light color combinations. It contains a list of commands for you to select and run.

To enter the system mode and run the command, do the following:

1. Turn off the printer.
2. Press and hold the **FEED** button and turn on the printer.
3. Both status lights illuminate solid orange for a few seconds. Next, they turn to green shortly and then turn to other colors.
4. When status lights show the color combination you need, release the **FEED** button immediately.
5. Press the **FEED** button to run the command.

The following table is the command list of the system mode.

LED 1	LED 2	Command
Green	Red	Transmissive Sensor Calibration
Green	Orange	Reflective Sensor Calibration
Red	Red	Reset Your Printer
Red	Orange	Reserved
Orange	Red	Reserved
Orange	Green	Self-Test

2 Get Started

This chapter describes how to set up your printer.

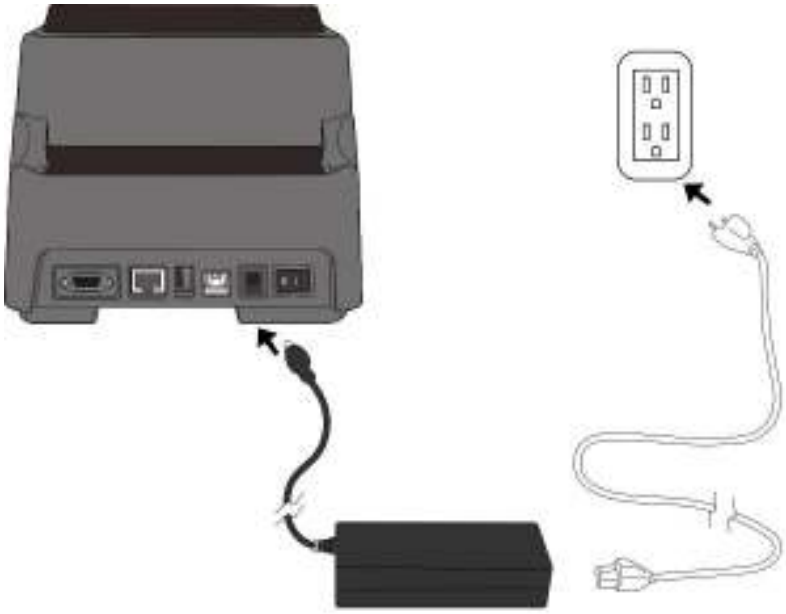
Caution: Do not use your printer in areas exposed to splashing water or any other liquid.

Caution: Do not drop your printer, or place it in an area subject to humidity, vibration or shock.

2.1 Attach the Power Cord

1. Make sure the power switch is set to the **OFF** position.
2. Insert the power supply's connector into the printer power jack.
3. Insert the AC power cord into the power supply.
4. Plug the other end of the AC power cord into the wall socket.

Important: Use only power supplies listed in the user instructions.



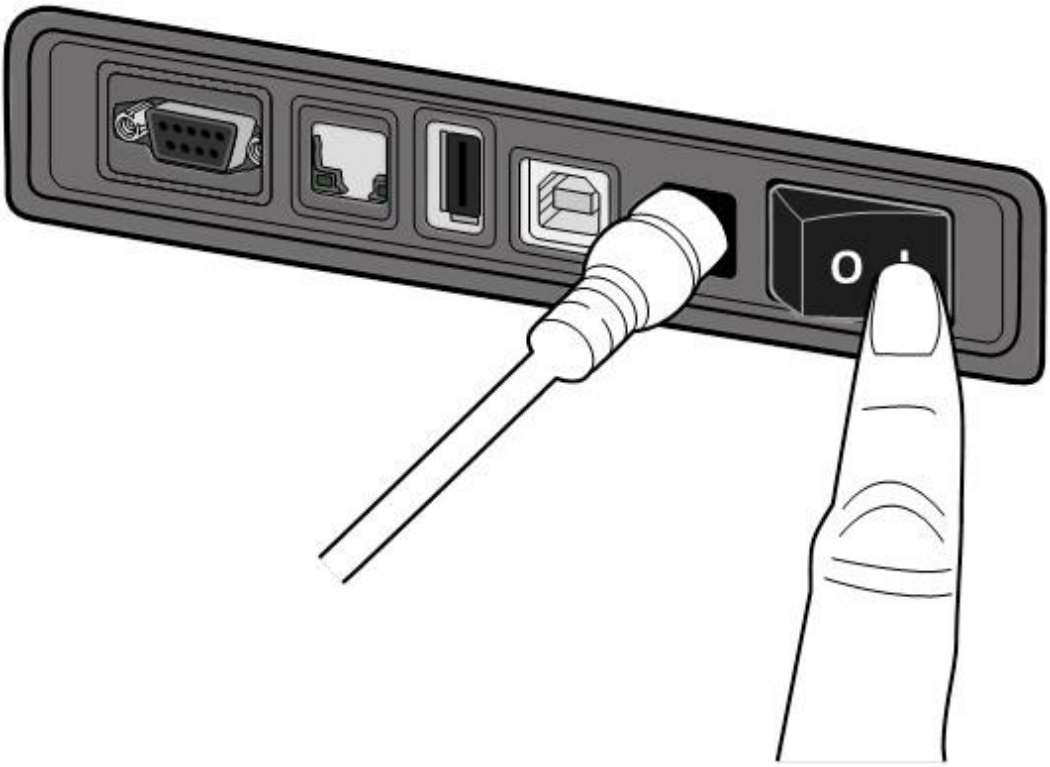
Warning: Do not plug the AC power cord with wet hands or operate the printer and the power supply in an area where they may get wet. Serious injury may result from these actions!

2.2 Turn On/Off Your Printer

When your printer is connected to a host (a computer), it is best practice to turn on the printer before turning on the host, and turn off the host before turning off the printer.

2.2.1 Turn On Your Printer

1. To turn on your printer, turn on the **Power Switch** as below. The “I” is the **ON** position.

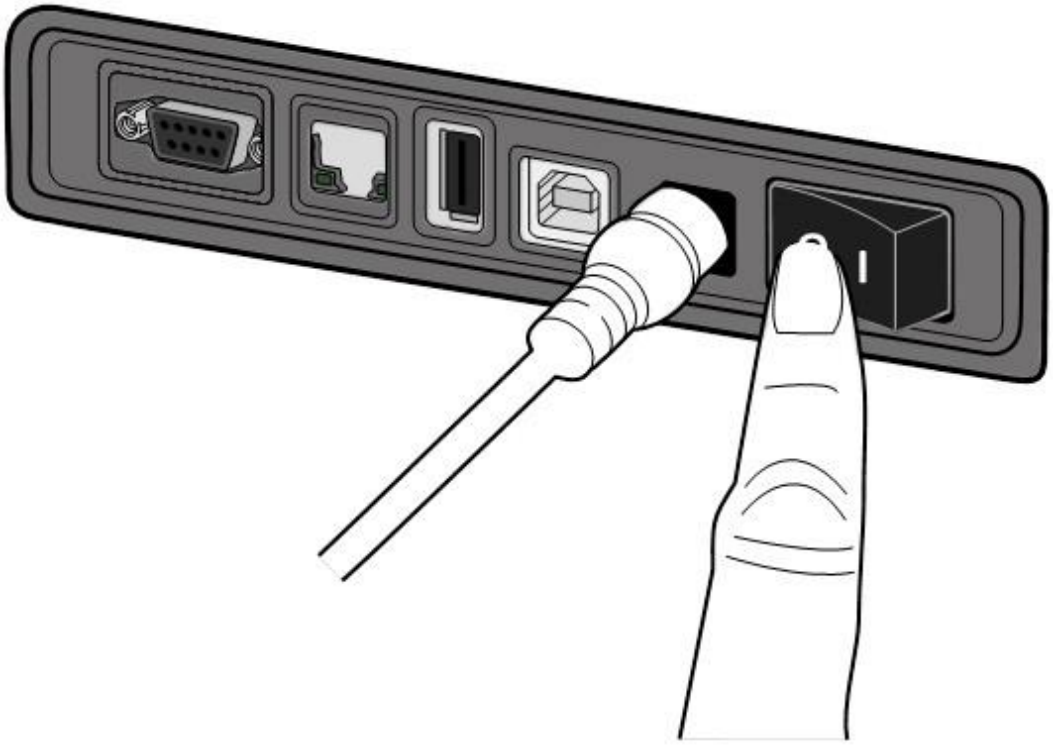


2. Both status lights illuminate solid orange for a few seconds, and then LED 2 goes out, while LED 1 turns to solid green.

Note: If you connect the printer to the internet or insert a USB drive before turning on the printer, it will take longer for the printer to enter the online mode (LED 1 glows solid green) after you turn it on.

2.2.2 Turn Off Your Printer

1. Make sure LED 2 is off and LED 1 is solid green before turning off the printer.
2. To turn off your printer, turn off the **Power Switch** as below. The “O” is the **OFF** position.



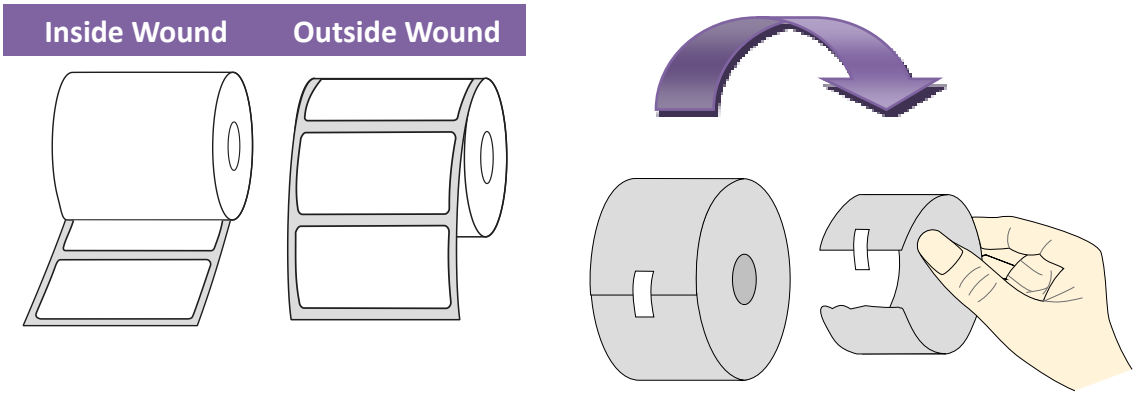
Caution: Do not turn off your printer during data transmission.

2.3 Load Media

There are various types and sizes for the media roll. Load the applicable media to satisfy your need.

2.3.1 Prepare Media

The inside wound and outside wound media roll can be loaded into the printer the same way. In case the media roll is dirty during shipping, handling or storage, remove the outside length of the media. It helps avoid dragging adhesive and dirty media between the printhead and platen roller.



2.3.2 Place a Media Roll and Test Media Feed

2.3.2.1 Place a Media Roll for DT Model

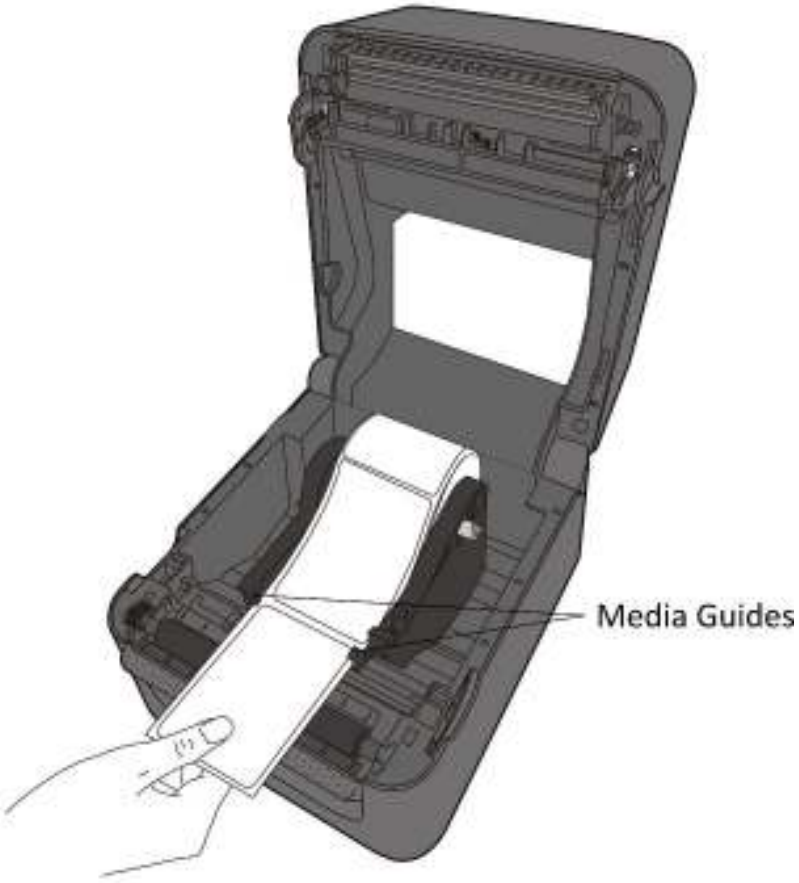
1. Open the top cover of the printer.

2. Press the holder lock on the **Media Roll Holders** to slide them outward and place the media roll between the holders. Make sure the print side is up and the media roll is clamped tightly by the holders.

   Note The default core holder is set for 1-inch inside diameter (ID). To install a 1.5-inch ID media roll, use your hand or a coin to loosen two thumbscrews on both holders, flip the core holders horizontally and secure them back.

3. Pull the media until it reaches out of the printer. Thread the media under the media guides.

Caution: Do not ship or carry the printer while the label roll is installed. Do not turn off your printer during data transmission.

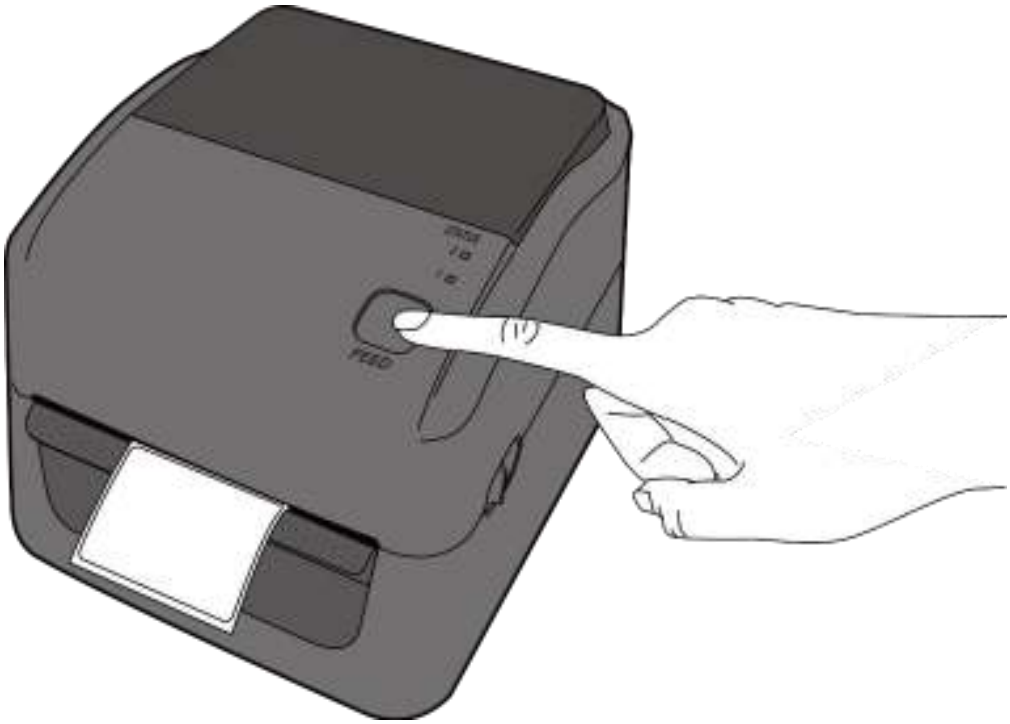


4. Close the top cover.

Warning: The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

2.3.2.2 Test Media Feed for DT Model

1. Turn on the printer and press the **FEED** button to feed a label.

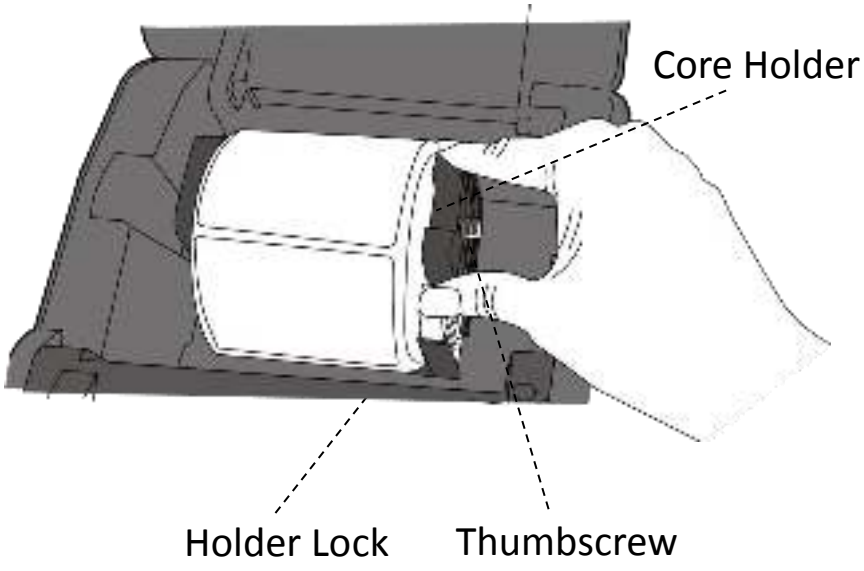


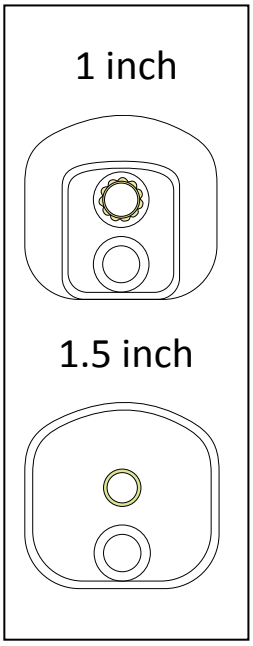
2. Flip the media and tear it along the edge of the top cover.

2.3.2.3 Place a Media Roll for TT Model

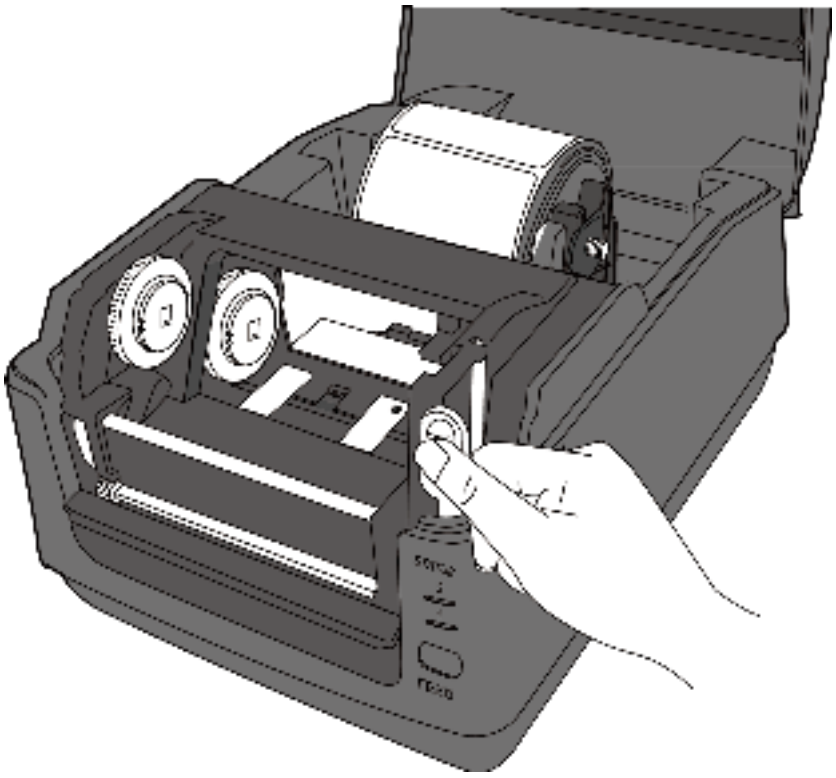
1. Open the top cover of the printer.

2. Press the switch lock on the **Media Roll Holders** to slide them outward and place the media roll between the holders. Adjust the media roll so its print side is facing up and make sure it is clamped tightly by the holders.

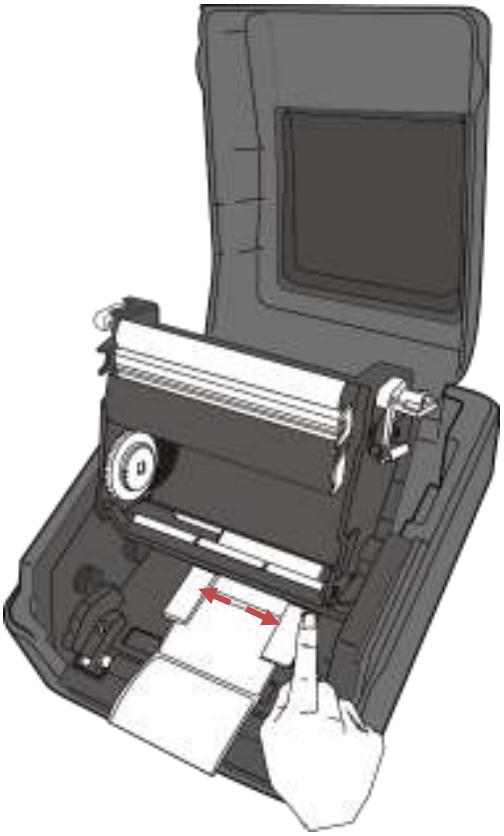




3. Push the **Module Release Latch** to open the printer module.

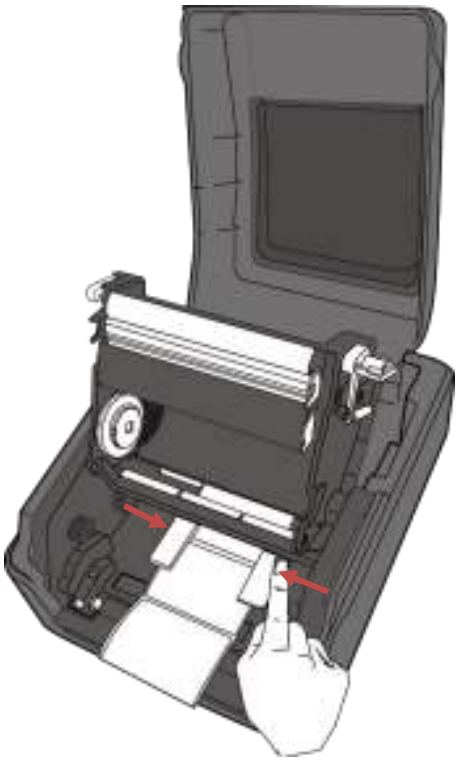


4. Press the **Lock** button on the **Media Guides** to slide them outward.

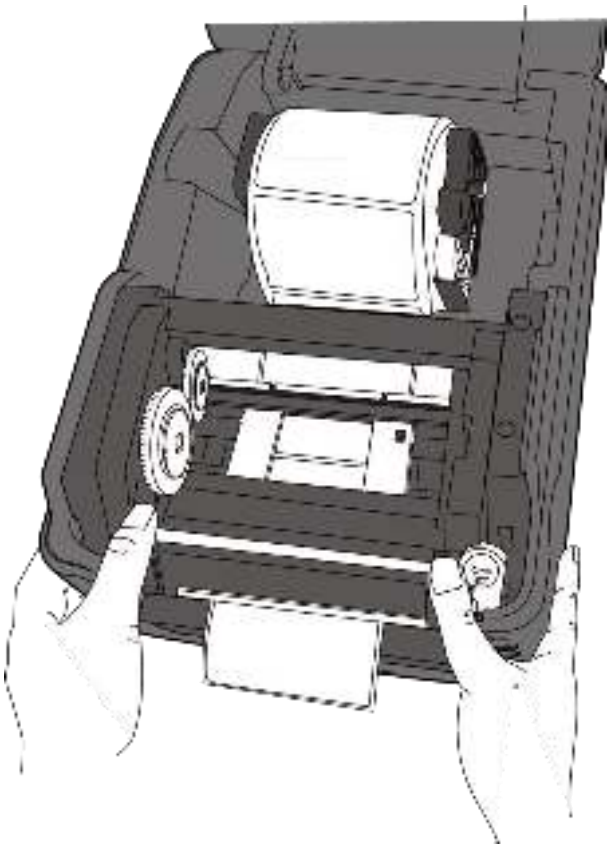


5. Pull the media until it reaches out of the printer.

6. Put the media under the **Media Shaft** and center it between the **Media Guides**.



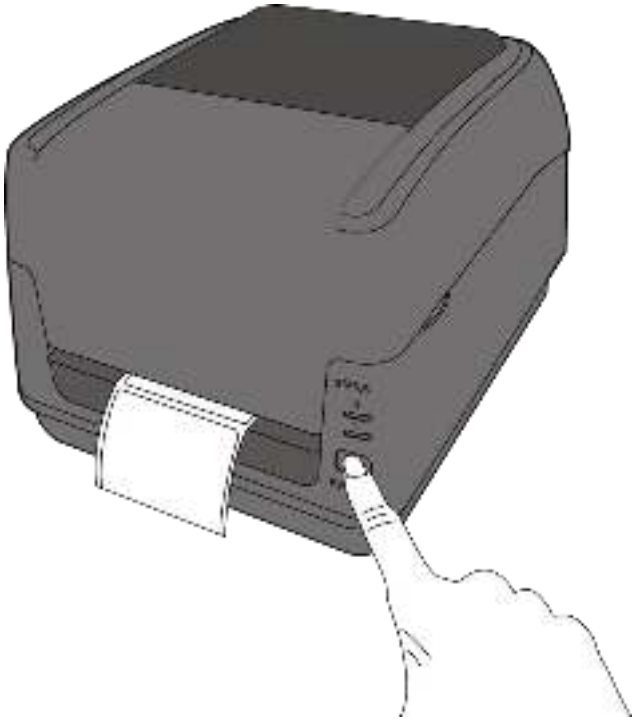
7. Close the printer module and press down firmly at its both sides, until you hear a click.



Warning: The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

2.3.2.4 Test Media Feed for TT Model

1. Turn on the printer, and press the **FEED** button to feed a label.

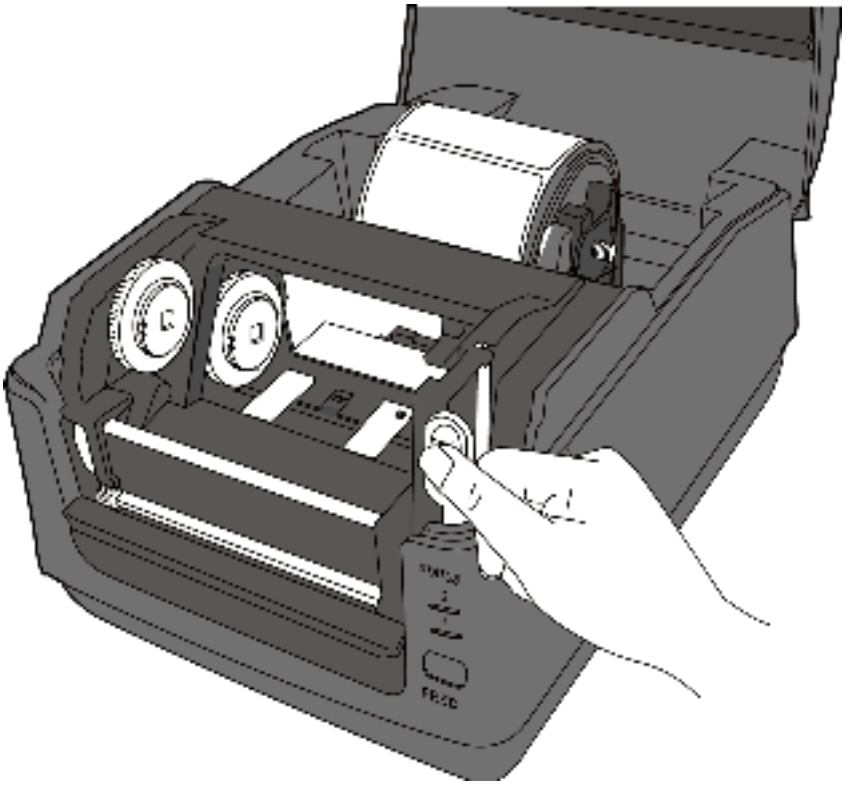


2. Flip the media and tear it along the edge of front cover.

2.4 Placing Ribbon for TT Model

1. Open the top cover of the printer.

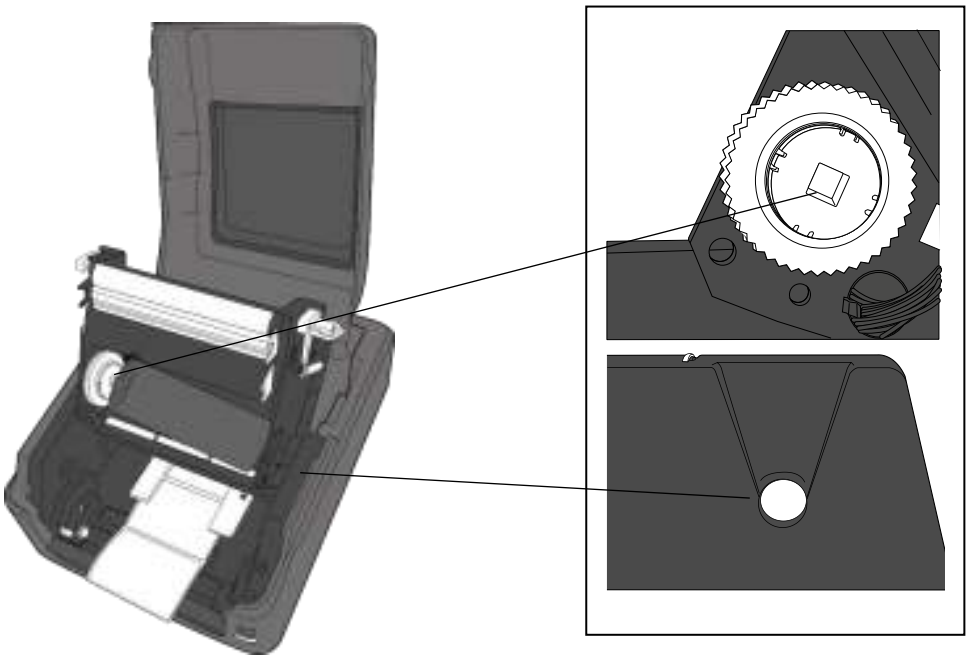
2. Push the **Module Release Latch** to open the printer module.



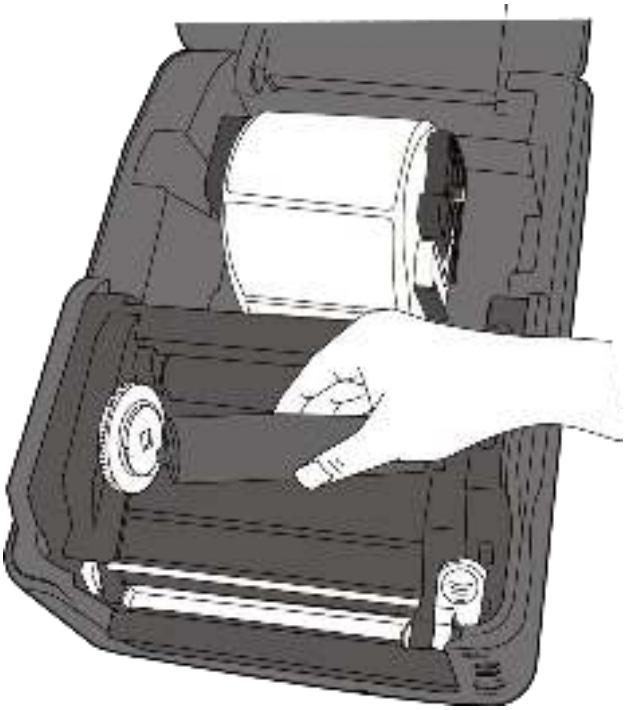
3. Lift the printer module to reveal the **Supply Wheel**.

4. Do the following to install both rolls:

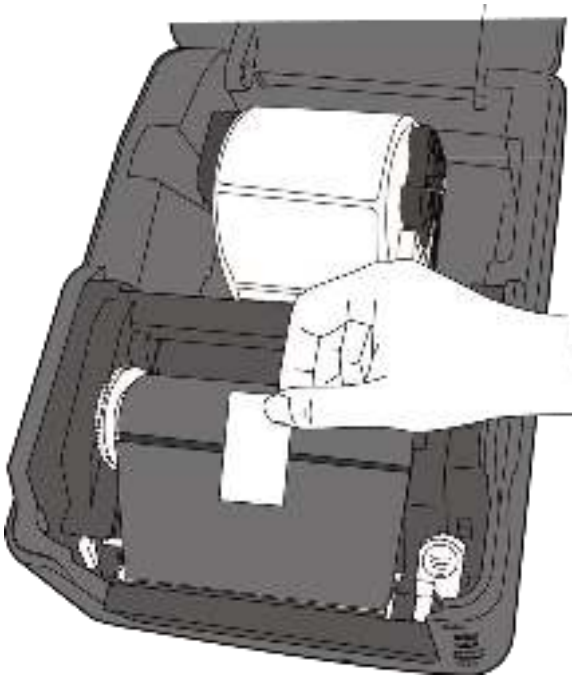
- To load the supply roll, set the ribbon roll on the core adapter shaft. Then, align the notches on the left side of the roll to the hole on the supply wheel and place the other end of the roll into the hole on the right.



- To load the take-up roll, set the empty ribbon core on the core adapter shaft. Then, align the notches on the left side of the roll to the hole on the take-up wheel and place the other end of the roll into the hole on the right.



5. Pull the ribbon from the supply roll and tape it on the empty ribbon core.



6. Close the printer module and press down firmly at its both sides, until you hear a click.

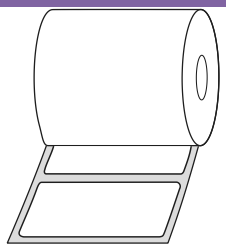
7. Rotate the **Take-Up Wheel** to straighten the ribbon and reduce its wrinkles.

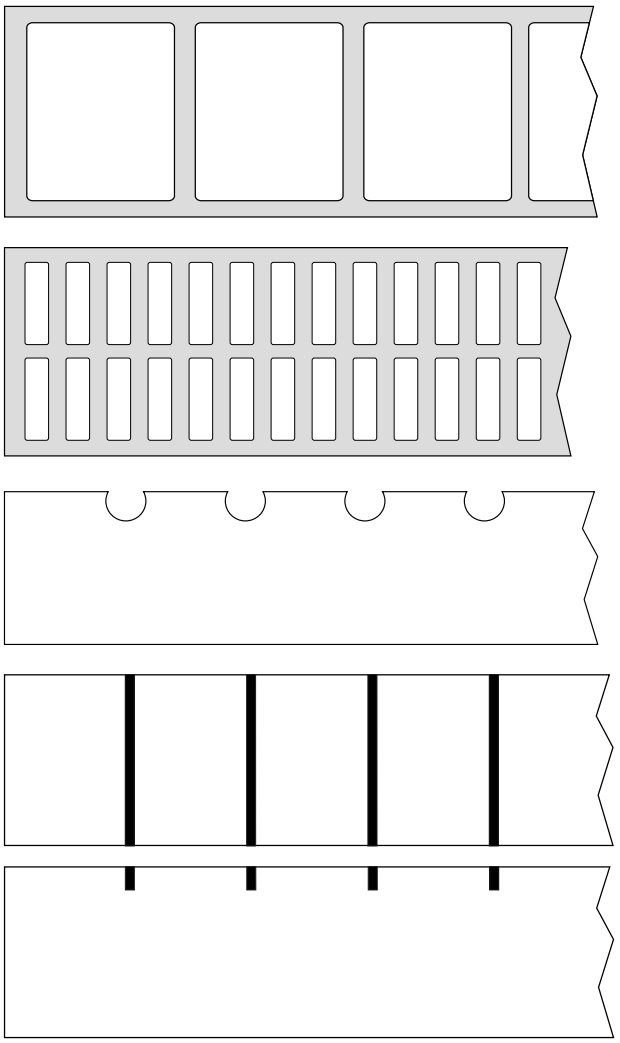
Note: For the supply hub, the ribbon wind direction can be coated side in (CSI) or coated side out (CSO); for the take-up hub, the wind direction must be CSO.

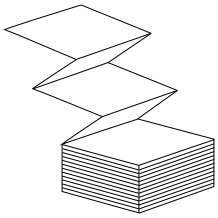
Warning: The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

2.5 Media Types

Your printer supports various media types, including non-continuous media, continuous media, and fanfold media. The following table provides details about them. For optimal print performance and durability, please use SATO-certified label and ribbon supplies on this printer.

Media Type	Looks Like	Description
Non-Continuous Media		Non-continuous media is the typical media for bar code printing. Labels and tags are made of various materials, such as paper, fabric or cardstock and are separated by gaps, holes, notches or black marks. Many labels are self-adhesive with liners, while some are linerless.



Media Type	Looks Like	Description
Fanfold Media		Fanfold media is in continuous form, but it can be used as non-continuous media, because its labels are separated by folds. Some fanfold media also has black marks or liners. For fanfold media installation, take the following steps. 1. Pass the fan-folded media through the opened window at the rear of the unit. 2. While holding the holder lock, adjust the width of the media holder to match the media size. After pulling out the media, pass the media through the media guides and place the leading edge of the media on top of the platen roller. 3. Close the top cover.

3 Printer Operation

This chapter provides information about printer operation.

3.1 Media Sensor Calibration

You need to calibrate the media sensor to print properly. WS printers provide transmissive and reflective sensor calibration. Take the following steps to use them.

1. Make sure the media is properly loaded, the print module is closed and the printer's power switch is set to the **OFF** position.
2. Press and hold the **FEED** button and turn on the printer.
3. Both status lights illuminate solid orange for a few seconds. Next, they turn to green shortly and then turn to other colors. Do one of the following to select the sensor:

- If you want to calibrate the transmissive sensor, when LED 1 turns to green and LED 2 turns to red, release the **FEED** button immediately.
- If you want to calibrate the reflective sensor, when LED 1 turns to green and LED 2 turns to orange, release the **FEED** button immediately.

4. Press the **FEED** button. The media calibration is complete after the printer feeds 3-4 labels and stops.

3.2 Self-Test

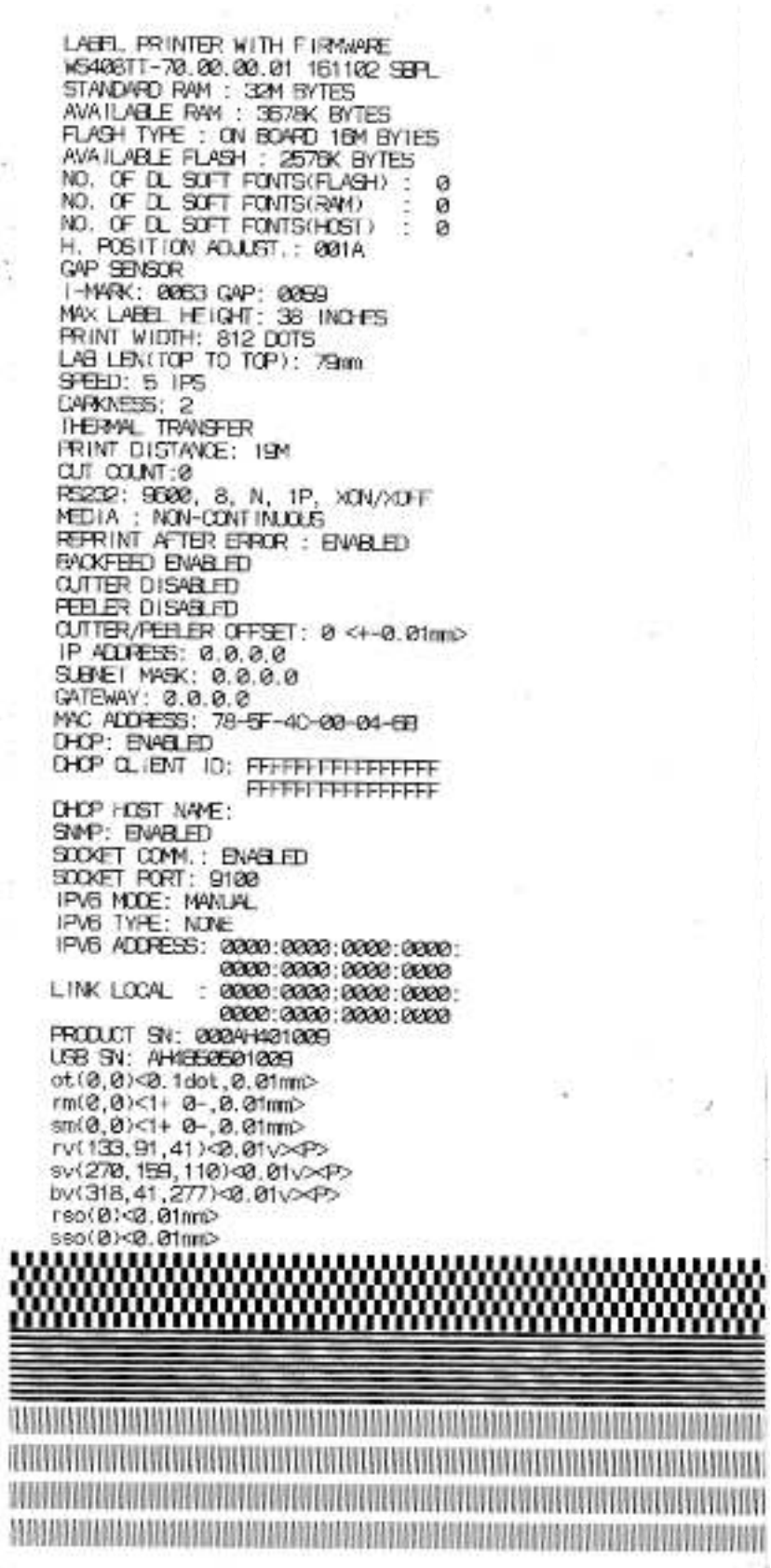
The printer can run a self-test to print a configuration label, which helps you understand current settings of the printer.

Perform the following steps to run the self-test:

1. Turn off the printer.
2. Press and hold the **FEED** button and turn on the printer.
3. Both status lights glow solid orange for a few seconds. Next, they turn to green shortly and then turn to other colors. When LED 1 turns to orange and LED 2 turns to green, release the **FEED** button.
4. Press the **FEED** button to print a configuration label.

3.2.1 DT Model Test Print

3.2.2 TT Model Test Print



3.3 Reset Your Printer

By resetting your printer, you can return your printer to factory defaults. This can help you solve some problems caused by settings changed when printing from driver or sending commands.

Perform the following steps to reset your printer:

1. Turn off the printer.
2. Press and hold the **FEED** button and turn on the printer.
3. Both status lights illuminate solid orange for a few seconds. Next, they turn to green shortly and then turn to other colors. When both lights turn to red, release the **FEED** button immediately.
4. Press and hold the **FEED** button for 3 seconds and release it. Both status lights blink red three times, and turn to solid orange for a few seconds. After the printer is reset, LED 2 goes out while LED 1 turns to solid green.

Important: In step 4, if you do not hold the **FEED** button long enough, LED 2 will blink orange three times while LED 1 goes out. It means the printer is not reset.

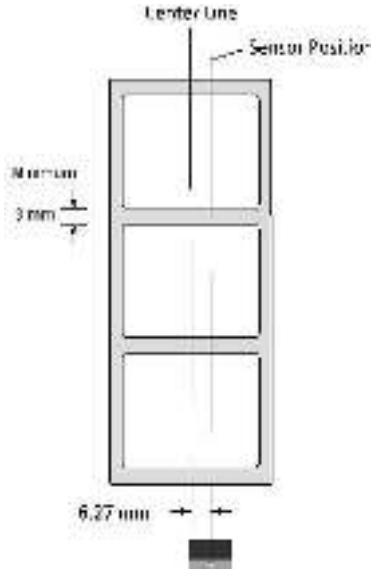
3.4 Media Sensing

WS printers offer two types of media sensor: transmissive and reflective. They are used for detecting specific media types.

3.4.1 Transmissive Sensor

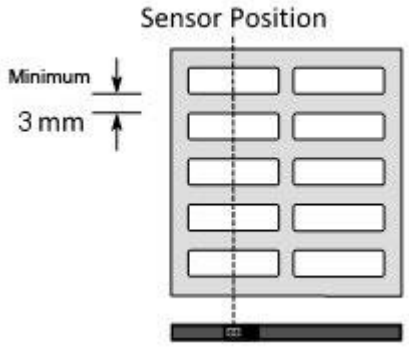
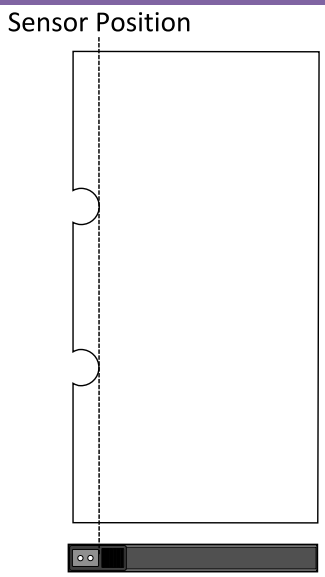
The transmissive sensor is fixed and placed near the center of the printhead. It is used for detecting gaps across the entire width of the label.

Single Column



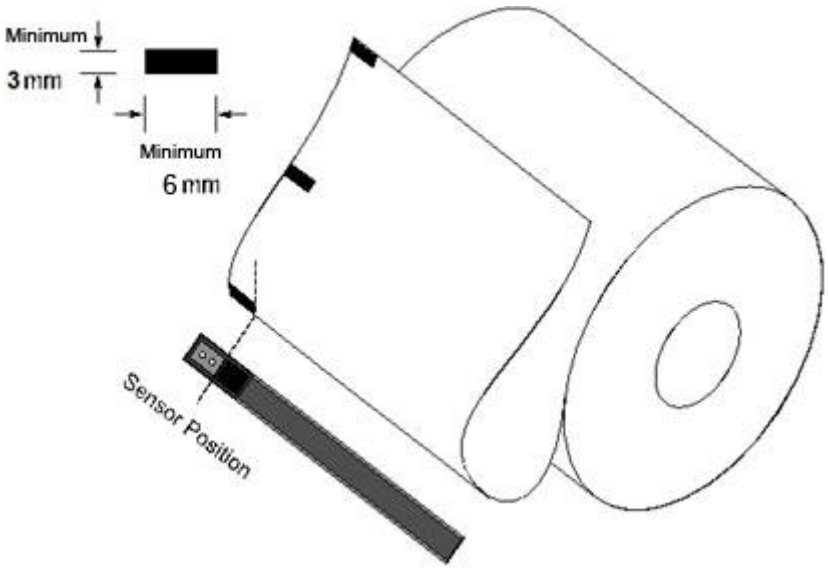
3.4.2 Reflective Sensor

The reflective sensor is movable within the entire width of the media. It detects gaps, notches and black marks not located at the center of the media.

Multi Columns	Notch
	

Black Mark

Flip the media so the black-mark side is facing down to align with the sensor.



4 Maintenance

This chapter describes routine cleaning procedure.

4.1 Cleaning

To maintain print quality and prolong the printer's life, you need to perform routine maintenance. Daily maintenance should be done for high volume printing, and weekly for low volume printing. Use a cleaning kit to clean the printer regularly. You can purchase a cleaning kit from a SATO reseller or technical service center.

Caution: Always turn off the printer before cleaning.

4.1.1 Printhead

It is essential to keep printhead clean if you want the best print quality. We strongly recommend that you clean the printhead when you load a new media roll. If the printer is operated in critical environment or the print quality declines, you will need to clean the printhead more frequently.

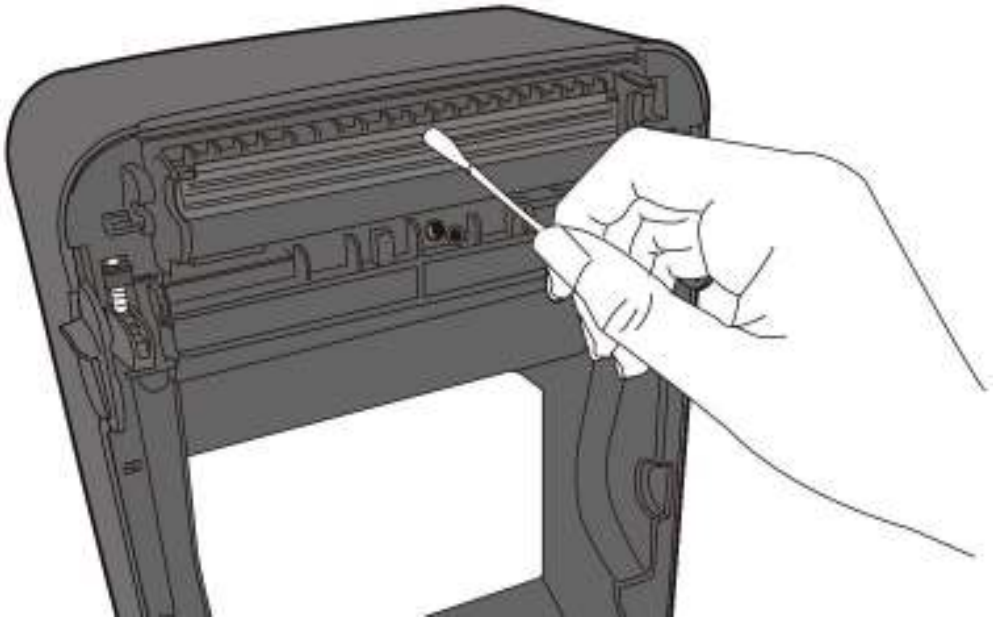
Keep in mind these things before you clean:

- Keep the water away in case of corrosion on heating elements.
- If you just finished printing, wait until the printhead cools down.
- Do not touch the printhead with bare hands or hard objects.

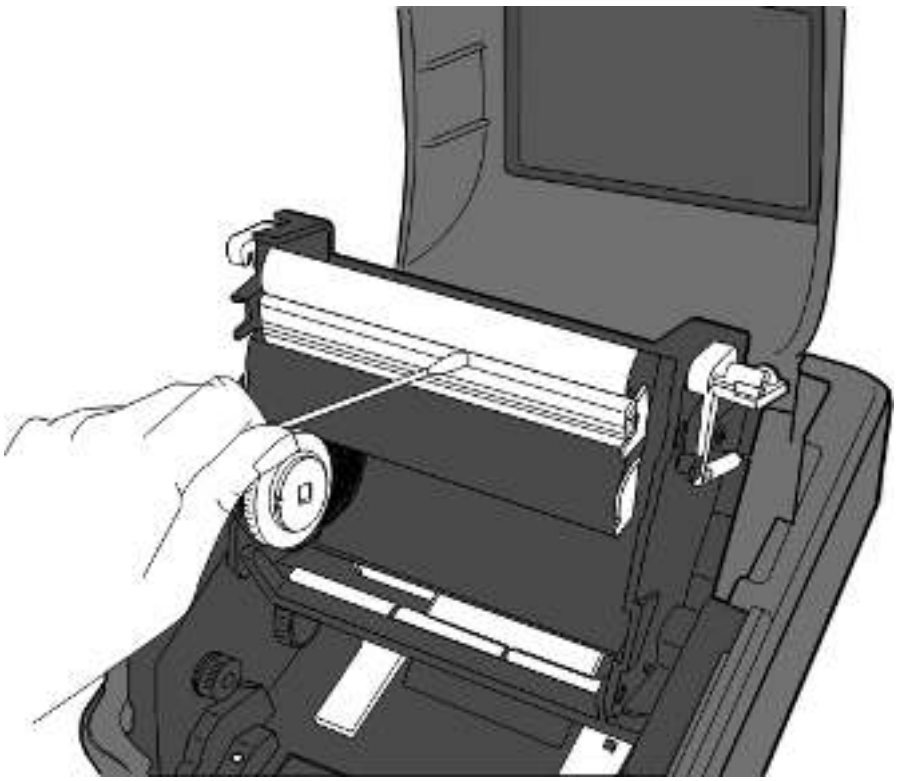
Cleaning steps:

1. Moisten a soft cloth or a cotton swab with cleaning liquid.
2. Gently wipe the printhead in one direction. That is, wipe it only from left to right or vice versa. Do not wipe back-and-forth, in case dust or dirt attaches to the printhead again.

DT Model Print Head Cleaning



TT Model Print Head Cleaning

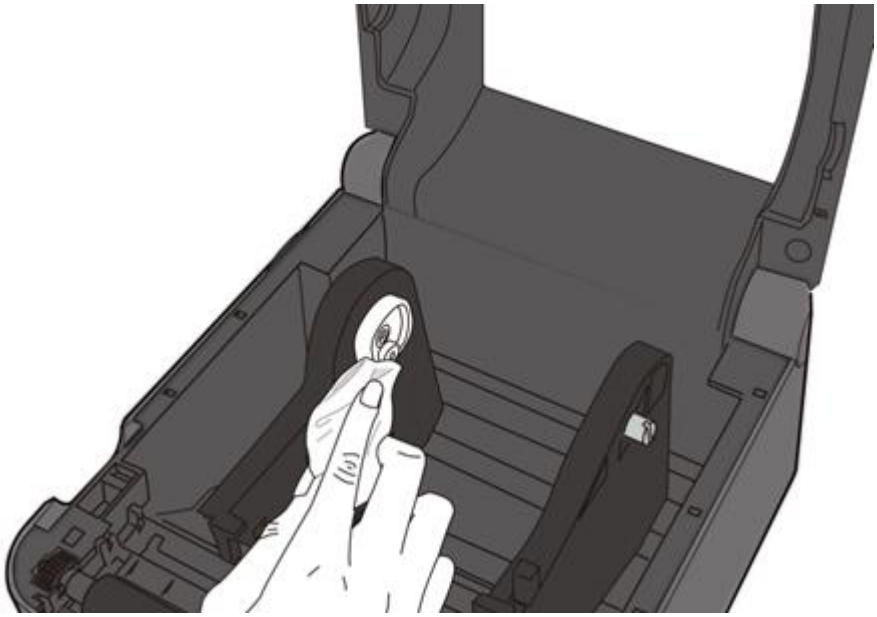


Important: Printhead warranty becomes void if printhead's serial number is removed, altered, defected, or made illegible, under any circumstance.

4.1.2 Media Housing

Use a soft cloth to clean the dust, dirt or debris built up on the **Media Roll Holders**, **Media Guides** and media path.

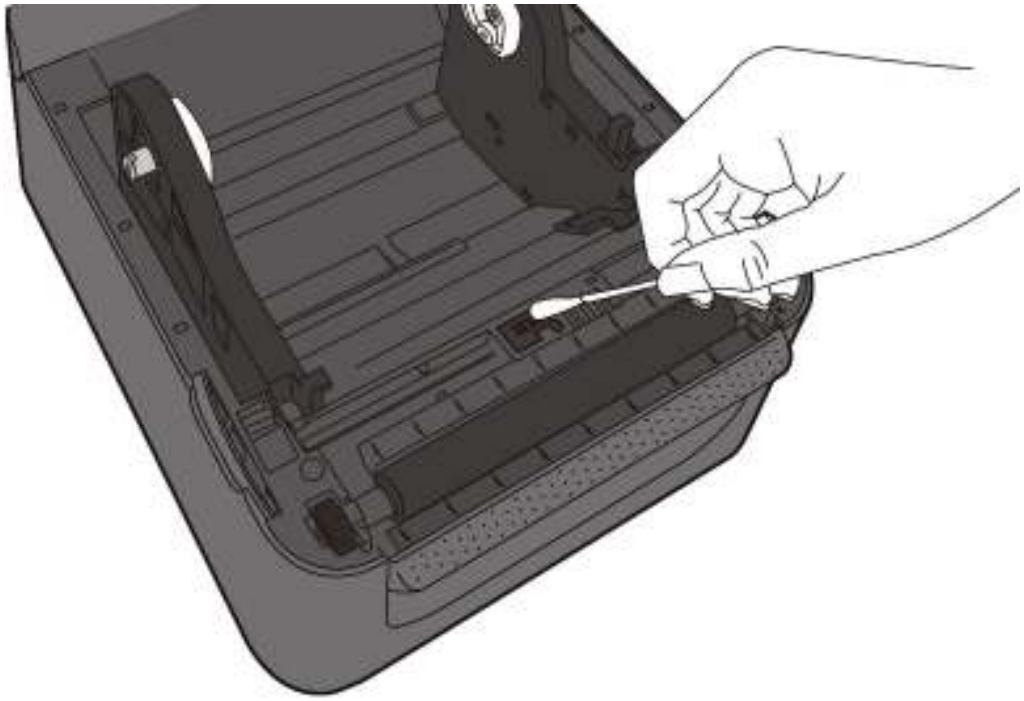
1. Moisten a soft cloth with cleaning liquid.
2. Wipe the **Media Roll Holders** to clean dust.
3. Wipe the **Media Guides** to clean dust and dirt.
4. Wipe the media path to clean paper debris.



4.1.3 Label Sensor

Media sensors may not be able to detect the media correctly if it becomes dirty.

1. Moisten a soft cloth or a cotton swab with cleaning liquid.
2. Gently brush sensors to remove the dust away.
3. Use a dry cloth to clean the residue.

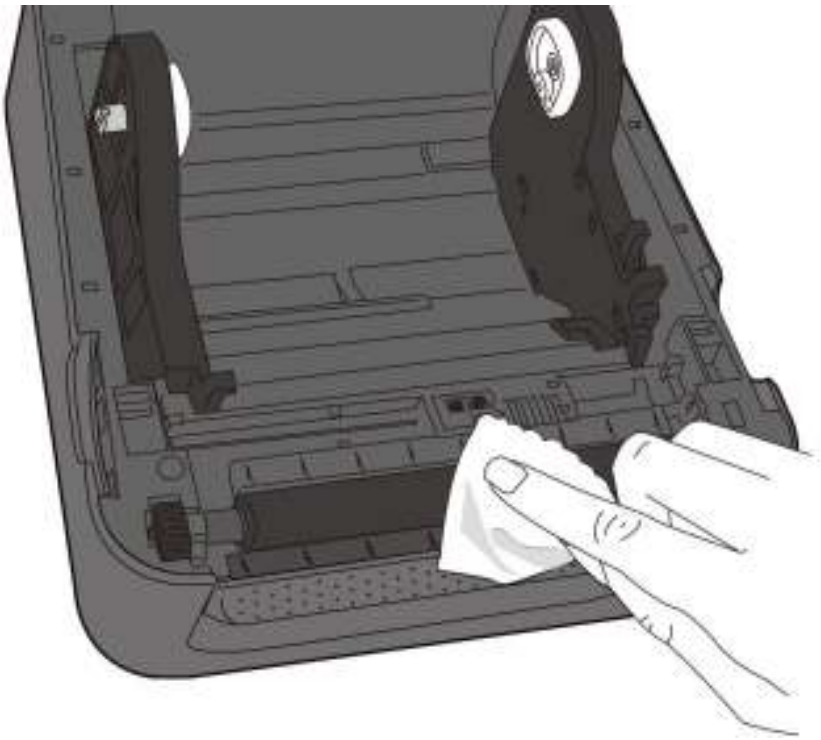


4.1.4 Platen Roller

The platen roller is also important for print quality. Dirty platen roller may damage the printhead. Clean the platen roller right away if the adhesive, dirt or dust accumulates on it. For excessive dirt / stuck labels, the platen roller should be removed.

1. Moisten a soft cloth with cleaning liquid.
2. Gently wipe the platen roller to remove the dust and adhesive.

DT Platen Roller Cleaning



TT Platen Roller Cleaning

5 Troubleshooting

This chapter provides information about printer operational related problems and recommended suggestions to resolve the issue.

5.1 Printer Issues

The printer won't power on

- Did you attach the AC power cord?
- Make sure the power supply's connector is inserted into the printer power jack.
- Check the power connection from the wall socket to the printer. Connect the power cord/AC Adapter in another outlet or test with other electrical devices to verify AC power is present.
- Disconnect the printer from the wall socket, and connect it again.

The printer turns itself off

- Turn on the printer again.
- Make sure the power supply's connector and the power cord are properly and securely plugged.
- Make sure the power supply and the power cord are not damaged.
- Use the applicable power supply.
- If the printer keeps turning itself off, check the socket and make sure it has enough power for the printer.

The printer does not feed the media out

- The media is not loaded correctly. See Section 2.3, "Loading Media" to reload the media.
- If there is a paper jam, clear it.
- Make sure print module is securely latched.
- Replace the platen roller.

5.2 Media Issues

The media is out

- Load a new media roll. See section 2.3, “Loading Media” to reload the media.

The paper is jammed

- Open the printer and clear the jammed paper.
- Make sure the paper is held properly by the **Media Guides**.

The printing position is not correct

- Did you use the correct media sensor type for printing?
- The media is not loaded correctly. See Section 2.3, “Loading Media” to reload the media.
- The media sensor needs to be calibrated. See Section 3.1, “Media Sensor Calibration” to calibrate the sensor.
- The media sensor is dirty. Clean the media sensor.
- Replace the platen roller.

Nothing is printed

- The media is not loaded correctly. See Section 2.3, “Loading Media” to reload the media.
- The print data might not be sent successfully. Make sure the interface is set correctly in the printer driver, and send the print data again.

The print quality is poor

- The printhead is dirty. Clean the printhead.
- The platen roller is dirty. Clean the platen roller.
- Adjust the print darkness or lower the print speed.
- The media is incompatible for the printer. Use SATO-approved media roll instead.

5.3 Ribbon Issues for TT Model

The ribbon is out

- Load a new ribbon roll. See Section 2.4, “Placing Ribbon” to reload the ribbon.

The ribbon is broken

- Check the print darkness and adjust it if it is too high, and take the following steps to fix the broken ribbon:
- Unload the ribbon supply roll and take-up roll from the printer.
- Pull the ribbon from the supply roll so it overlaps the broken end of the take-up roll.
- Tape the overlapped parts together.
- Reload both rolls into the printer.

The ribbon is “printed out” with the media

- The ribbon is not loaded correctly. See Section 2.4, “Loading Ribbon” to reload the ribbon.
- The printhead temperature is too high. Reload the ribbon and print a configuration label to check the settings (see Section 3.2, “Self Test and Dump mode”). If the print darkness is very high, adjust it in printer preference, or reset your printer (see Section 3.3, “Reset Your Printer”).

The ribbon is wrinkled

1. Make sure the ribbon is loaded correctly.
2. Rotate the **Take-Up Wheel** to straighten the ribbon.

5.4 Other Issues

There are broken lines in the printed label

- The printhead is dirty. Clean the printhead (see Section 4.1.1 “Printhead”).

An error occurred when writing data to the USB memory

- Did you insert the USB drive?
- Make sure the USB drive is plugged securely into the port.
- The USB drive might be broken. Replace it with another one. Only up to 16GB is supported.

The printer is unable to save files due to insufficient USB memory

- Delete the files on your USB drive to free some space or replace your USB drive with an empty one.

The cutter is experiencing issues

- If there is a paper jam, clear it.
- The cutter has become loose. Fix the cutter in position and tighten it.
- The cutter blade is not sharp anymore. Replace your cutter with a new one.
- Make sure you use approved media.

The printhead temperature is extremely high

- The printhead temperature is controlled by the printer. If it is extremely high the printer will stop printing automatically until the printhead is cooled down. After that, the printer will resume printing automatically, if there is any unfinished print job.

The printhead is broken

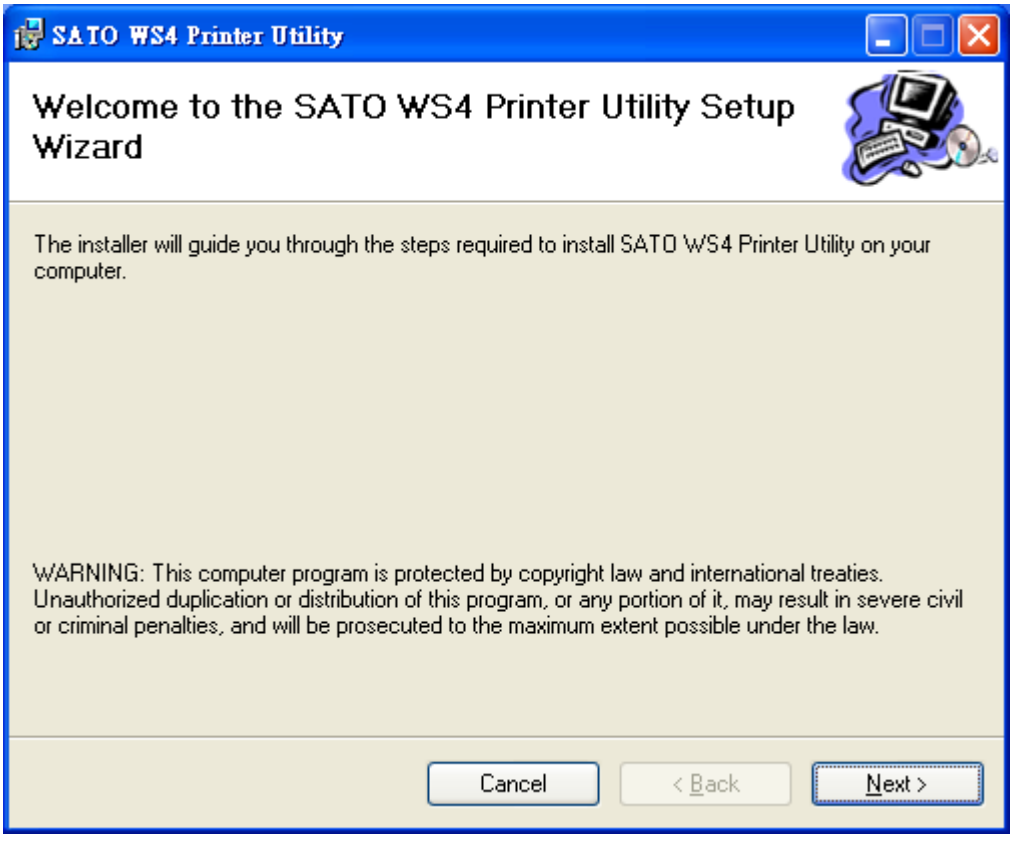
- Contact your local dealer for assistance.

6 Set Up Interface Connection by SATO WS4 Printer Utility

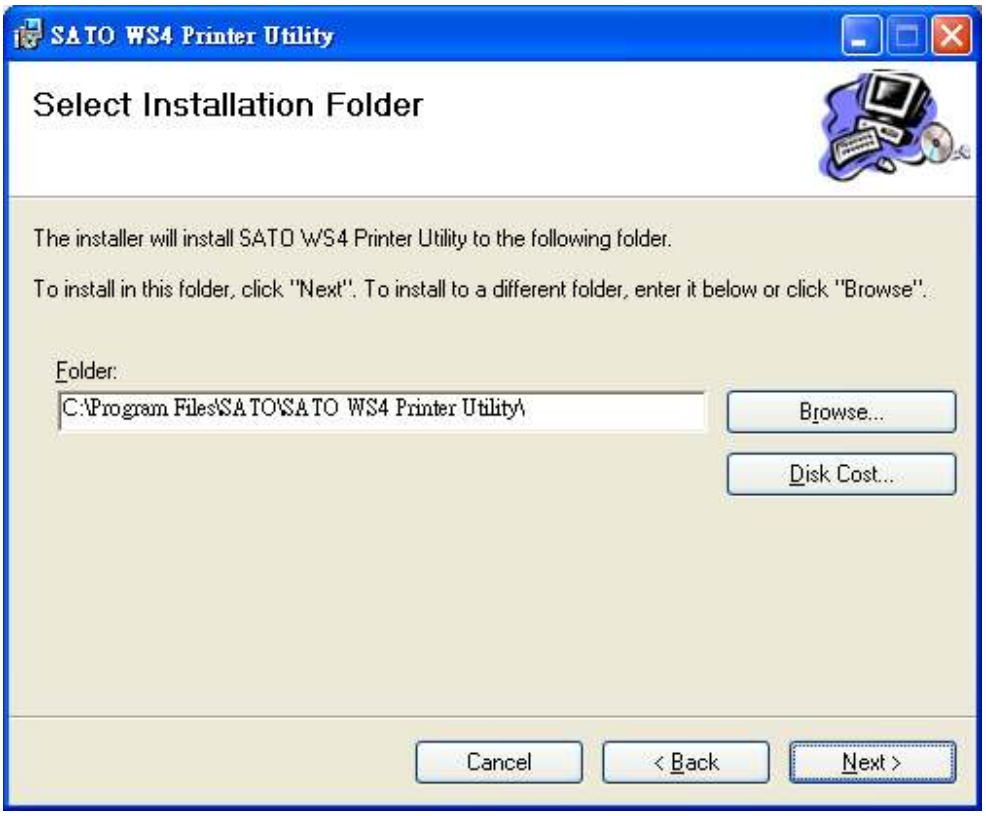
SATO WS4 Printer Utility provides a user-friendly interface to configure your printer. You can define properties, update firmware and send commands in SATO WS4 Printer Utility.

6.1 Install SATO WS4 Printer Utility

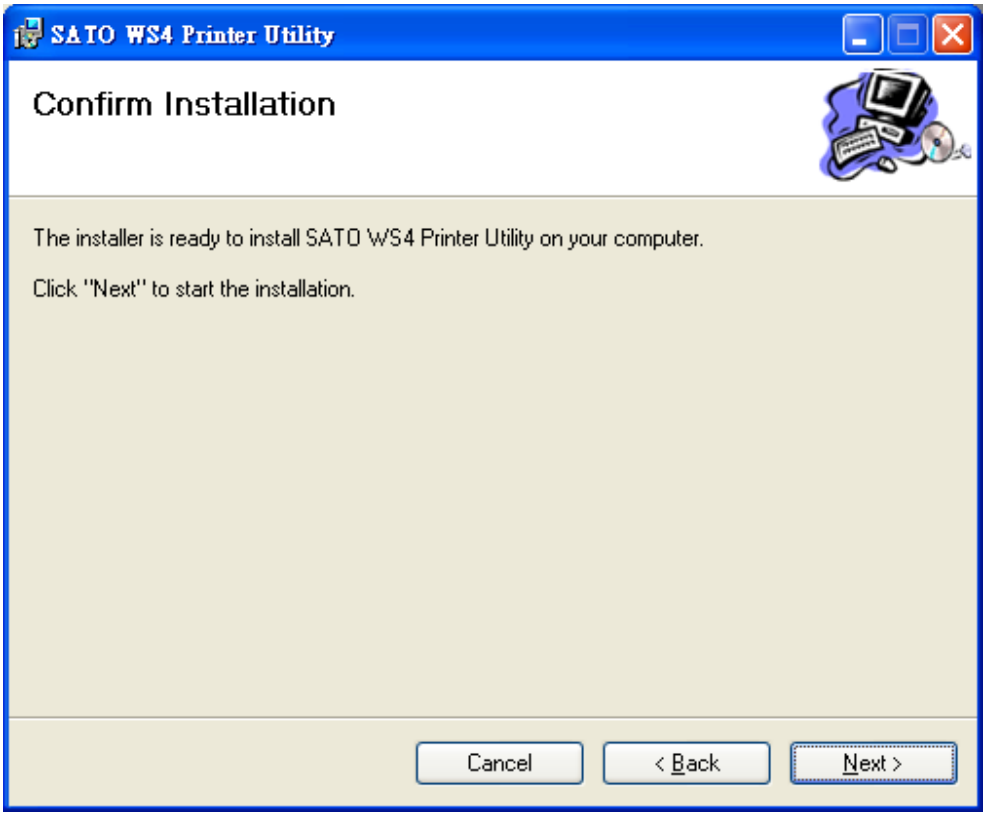
1. Download the SATO WS4 Printer Utility from your local SATO Resources website and start the installation process.
2. Locate the installation file on the CD and click it.
3. In the **SATO WS4 Printer Utility** dialog box, click **Next**.



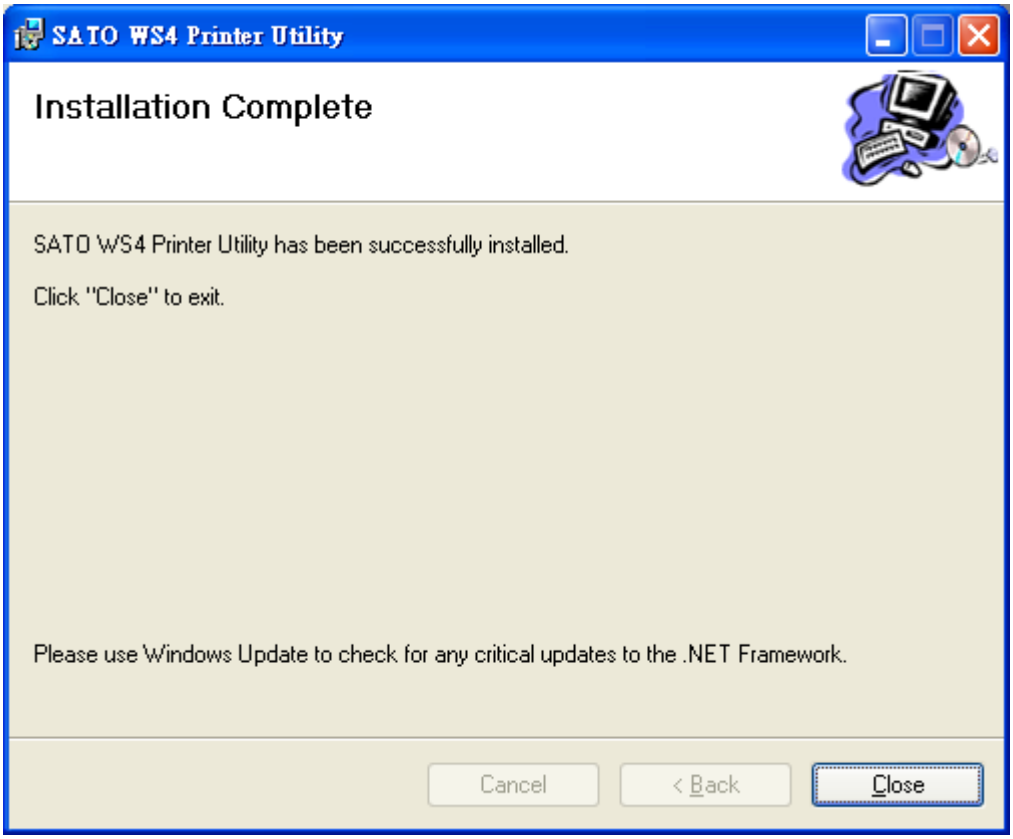
4. In this dialog box, follow the instructions to choose the installation path and then click **Next**.



5. In this dialog box, click **Next**.

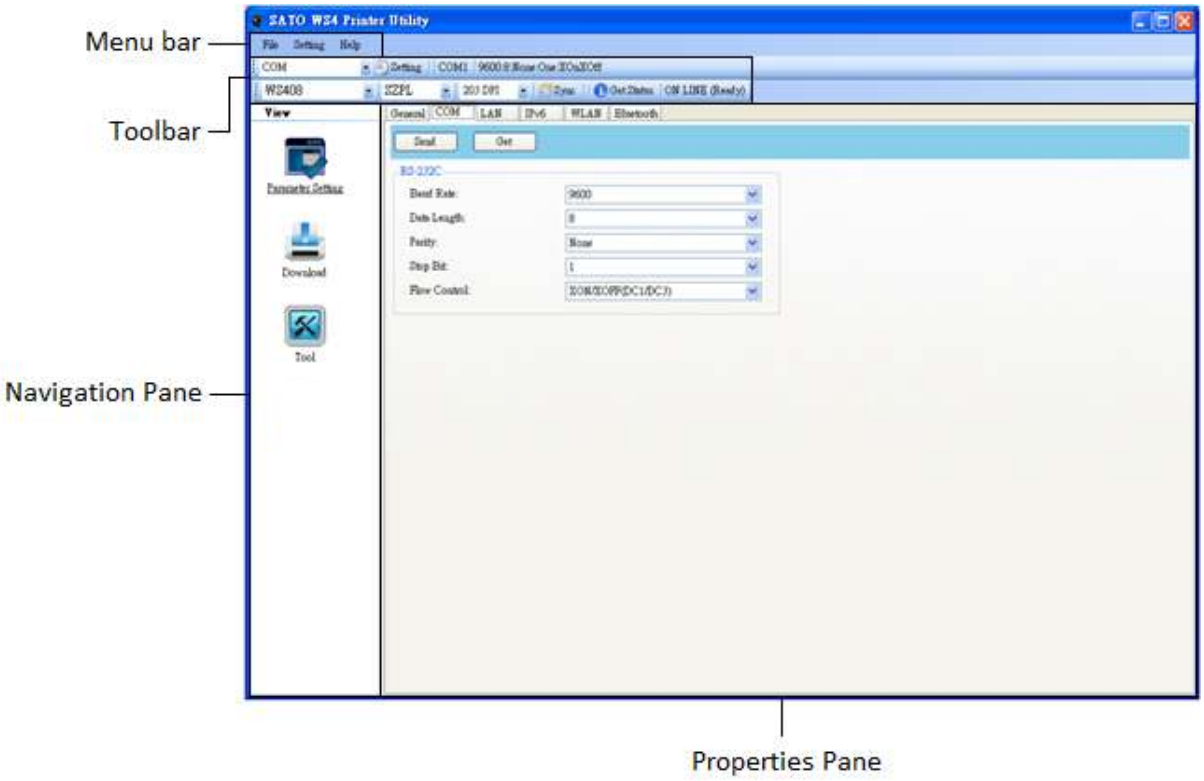


6. After the installation of SATO WS4 Printer Utility is complete, click **Close**.



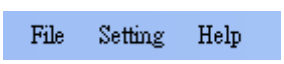
6.2 Using the SATO WS4 Printer Utility

Start SATO WS4 Printer Utility. Its interface looks like this:



- **Menu bar** It includes SATO WS4 Printer Utility menus.
- **Toolbar** It provides ports, port settings, emulation languages, printer dpi and printer status.
- **Navigation Pane** You can switch between the listed items to view their tabs.
- **Properties Pane** You can view and manage printer properties or perform tasks.

6.2.1 Menu Bar

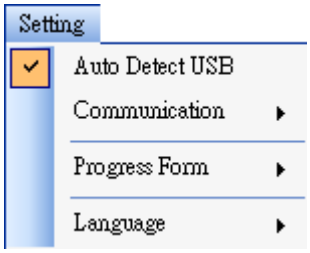


There are three menus in the menu bar: **File**, **Setting** and **Help**.

File

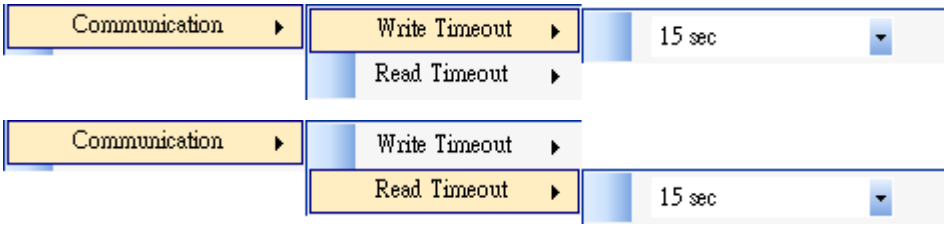
- **Export** Export your printer settings to an XML file, including all parameters, port settings and firmware information.
- **Import** Import printer settings from an XML file.
- **Exit** Exit SATO WS4 Printer Utility.

Setting



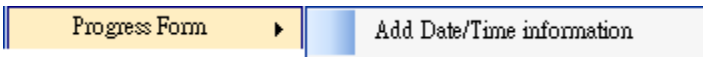
- **Auto Detect USB** When you connect your printer to a computer with a USB cable, SATO WS4 Printer Utility automatically detects it and shows the USB information in the **Port Name** and **Port Information**. By default, it is enabled.

- **Communication**



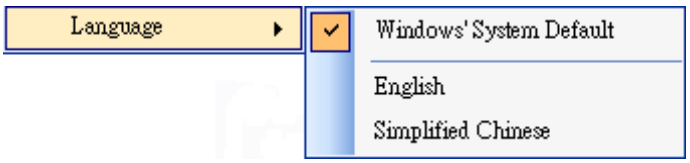
It includes **Write Timeout** and **Read Timeout**. They determine how long your computer (or other devices) waits printer's response when it attempts to write or read data to your printer. The default value is 15 seconds, meaning that the computer waits 15 seconds and displays an error message if it doesn't receive any response.

- **Progress Form**



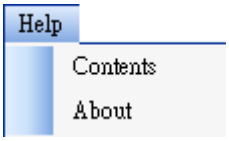
When **Add Date/Time information** is enabled, the current date and time are added into the message in the **Download Firmware** dialog box.

- **Language**



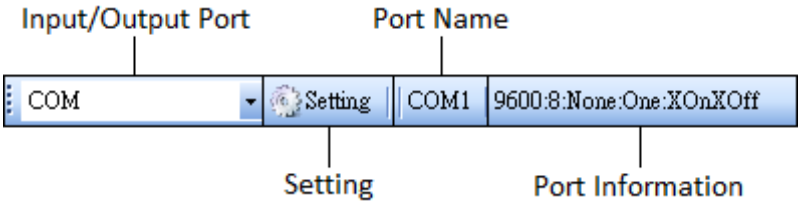
It is the language of SATO WS4 Printer Utility interface. You can select **Windows's System Default**, **English** or **Simplified Chinese**. By default, it uses your system default.

Help



- **Contents** The help content of SATO WS4 Printer Utility. You can press F1 to display it.
- **About** The version and copyright information about SATO WS4 Printer Utility.

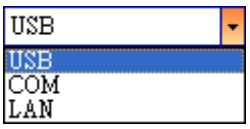
6.2.2 Toolbar



The toolbar has two rows. The first row includes three items.

- **Input/Output Port** The port you use for the data transmission between the computer and your printer.
- **Setting** You can click it to configure the port settings.
- **Port Name** It shows the port name.
- **Port Information** It shows the port information.

SATO WS4 Printer Utility provides three ports for data transmission.



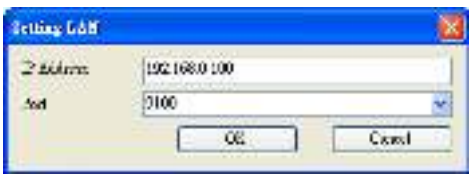
- **USB**

It shows the USB information in the **Port Name** and **Port Information** as soon as the computer detects your printer. By default, the computer automatically detects the **USB** port. You can select the printer you want if your computer is connected to multiple printers via USB. Click **Search** to search the hot-plugging USB printer.

- **COM**

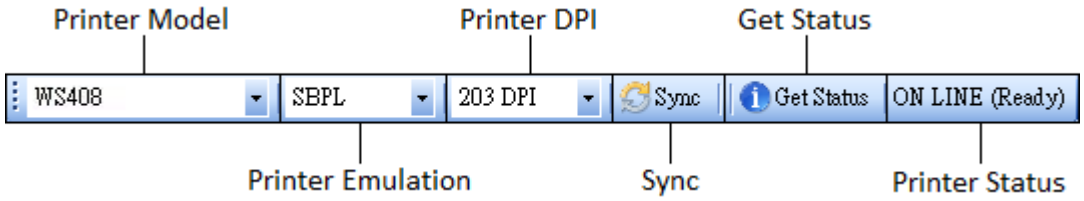
It is the serial port and related to the **COM** tab in **Parameter Setting**. The settings of the **COM** port need to be the same as those in the **COM** tab, except for **Port Name**, which lets you select the **COM** port you want if your computer is connected to multiple printers via COM. If you want to reset all of COM settings, click **Default**.

- **LAN**



It is the Ethernet port and related to the **LAN** tab in **Parameter Setting**. It supports IPv4 and IPv6 addresses. For more information about Setting up a network connection, see *Set up LAN connection*, *Set up IPv6*

connection and *Set up WLAN connection*.



The second row of the toolbar includes six items.

- **Printer Model** Printer models.
- **Printer Emulation** The emulation language of your printer. The emulation you choose affects the tabs displayed in the **Properties** pane.
- **Printer DPI** The print resolution of your printer. It provides 203 dpi and 300 dpi.
- **Sync** Get the current settings of **Printer Model**, **Printer Emulation** and **Printer DPI** from your printer.
- **Get Status** Detect if your printer is ready for use.
- **Printer Status** It shows the result of **Get Status**.

Printer Status

Status	Description
ON LINE (Ready)	The top cover (head) was closed in the online mode.
HEAD OPEN	The top cover (head) was opened in the online mode.
ON LINE (Operating)	The printer is operating.
ACCESSED BY OTHER	Exclusively accessed by other host.
PAUSE	In pause.
ON LINE (Waiting for Stripping)	Waiting for stripping.
COMMAND ERROR	A command error was found while analyzing the command.
COMMS ERROR	A parity error, overrun error or framing error occurred during the RS-232C transmission.
PAPER JAM	A paper jam occurred during paper feed.

Status	Description
CUTTER ERROR	The cutter is experiencing issues.
NO PAPER	The label has run out.
HEAD OPEN ERROR	Attempt to feed or issue the label with the top cover (head) open.
HEAD ERROR	A broken pin has been found on the thermal head.
EXCESS HEAD TEMP	The thermal head temperature has become excessively high.
NO PAPER (Last label has been issued)	The last label has been issued properly and the label has run out.
MEMORY WRITE ERROR	An error has occurred while writing data into the flash ROM or USB memory.
FORMAT ERROR	An erase error has occurred in formatting the flash ROM or USB memory.
MEMORY FULL	Saving failed because of the insufficient capacity of the flash ROM or USB memory.
SAVING	In font or PC command save mode. (to flash ROM or to USB memory)
	The flash ROM or USB memory is being initialized.
SAVING ERROR	An EEPROM for backup cannot be read or written properly.
UPDATING FIRMWARE NOW	The printer is updating firmware.
BLUETOOTH ERROR	Bluetooth initialization error.
	Bluetooth setting parameter error.
WIRELESSLAN ERROR	WirelessLAN initialization error.
	WirelessLAN setting parameter error.
UPDATING FIRMWARE ERROR	An error occurred during the firmware update.
UNKNOWN	The status is unknown.

6.2.3 Navigation Pane

The **Navigation** pane includes four items: **Parameter Setting**, **Download**, **Tool** and **Font**. Each item has its own tabs, and each tab has a **Send**, **Get**, **Add** or **Delete** button (Some of them only have **Send**). **Send** is to send your settings to your printer; **Get** is to get the current settings of your printer; **Add** is to add file to the

list object; **Delete** is to delete file from the list object. You can also right-click in the **Properties** pane and select **Send**, **Get**, **Add** or **Delete** in the shortcut menu. Each time you click **Send**, your printer restarts to apply the change.

Important: You can send data via all ports, but can only get data via the **USB**, **COM** and **LAN** ports.

Parameter Setting

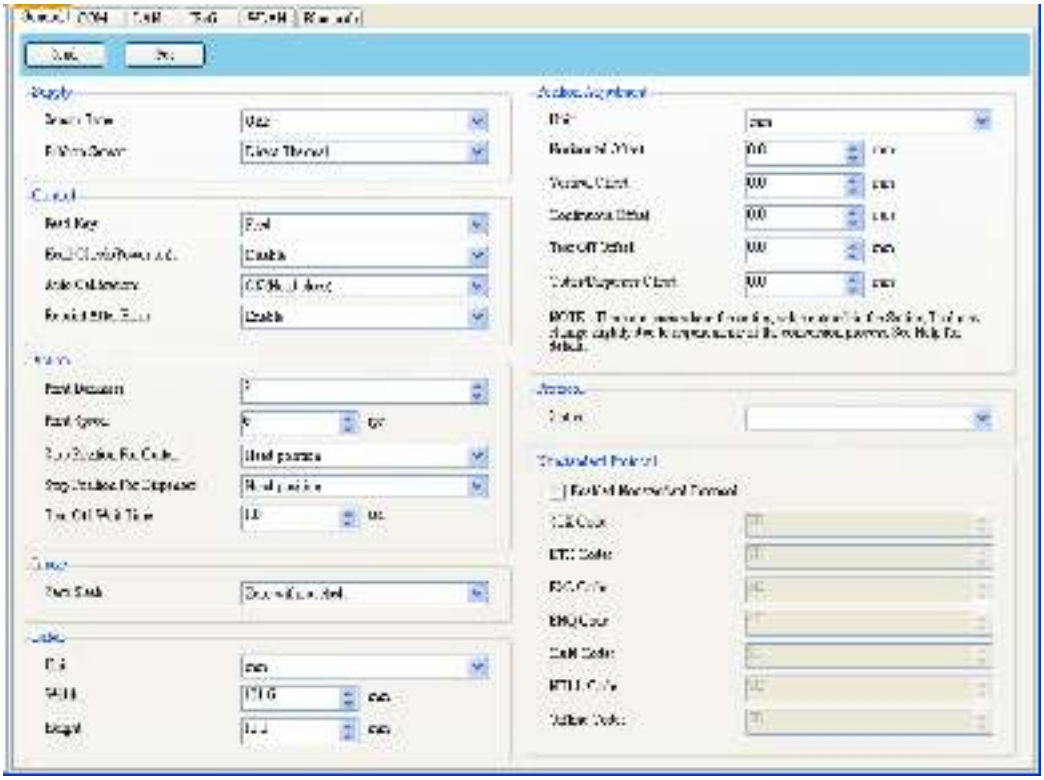
Parameter Setting is used to configure printer settings. It includes six tabs: **General**, **COM**, **LAN**, **IPv6**, **WLAN** and **Bluetooth**.

General

The **General** tab provides general printer settings. It is related to the emulation language you choose. Each language provides its own properties.

- SBPL

SBPL provides settings grouped in the **Supply**, **Control, Action, Image, Label, Position Adjustment, Protocol** and **Nonstandard Protocol** area.



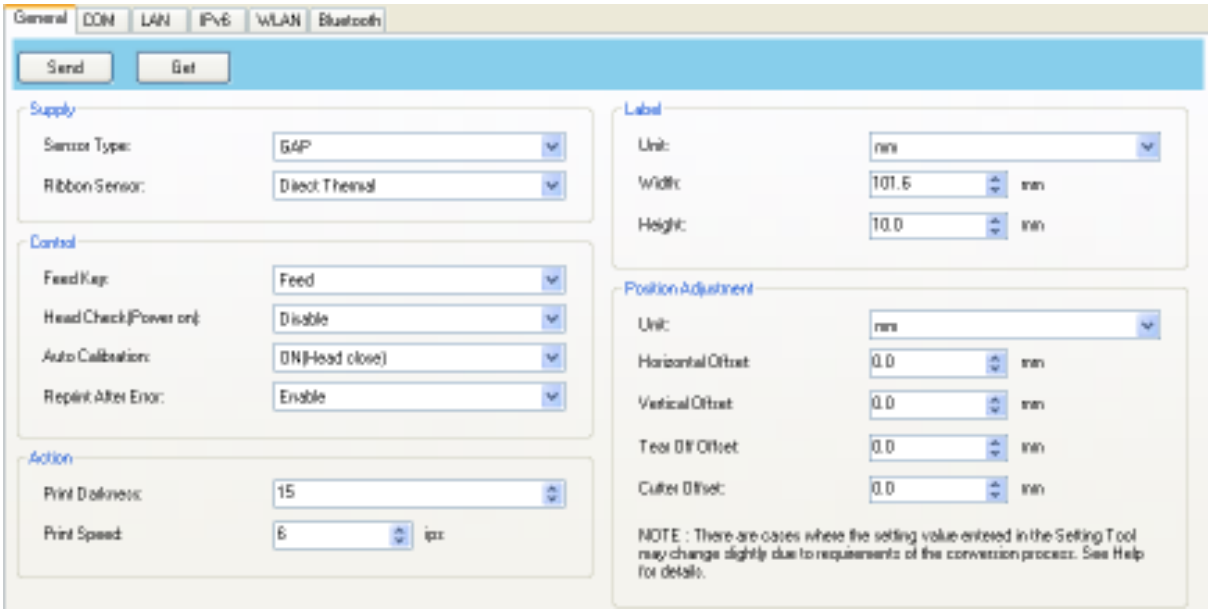
Property Name	Description
Sensor Type	It is the media sensor you are using. It includes **I-MARK**, **GAP** and **None**. When you perform media calibration, the sensor is set to the one you select.
Ribbon Sensor	**Thermal Transfer** Your printer uses the ribbon sensor to detect the ribbon, it is mean **Thermal Transfer** (TT). **Direct Thermal** Disable the ribbon sensor, it is mean **Direct Thermal** (DT).
Feed Key	It defines the action of the **FEED** button. **Feed** Your printer feeds a blank label each time the button is pressed. **Reprint** Your printer reprints the last label each time the button is pressed.
Head Check(Power on)	**Enable** Your printer checks broken pins on the printhead automatically once your printer is turned on. **Disable** Disable the auto head check.
Auto Calibration	**ON (Power on)** Your printer automatically calibrates media using a media sensor once it restarts or is turned on. **ON (Head close)** Your printer automatically calibrates media using a media sensor every time you close the print module when the printer is turned on.

Property Name	Description
	ON (Power on and Head close) Your printer automatically calibrates media using a media sensor after power on and every time you close the print module when the printer is turned on. **OFF** You need to manually calibrate media using a media sensor as you change the media, or your printer won't work properly.
Reprint After Error	**Enable** Your printer when caused by the error condition. The label is reprinted as soon as the error condition is corrected. **Disable** Disable the reprint after error.
Print Darkness	Adjust the darkness relative to the current darkness setting. The range is +1~ +5, and the value is adjustable in increments of ± 1.
Print Speed	Determine the media speed during printing. The range is +2 ~ +6, and the value is adjustable in increments of ± 1 ips.
Stop Position for Cutter	**Blank** Printer does not install cutter module. **Head Position** Stop the paper forward on the head position. **Cutter Position** Stop the paper forward on the cutter position.
Stop Position for Dispenser	**Blank** Printer does not install dispenser module. **Head Position** Stop the paper forward on the head position. **Dispense Position** Stop the paper forward on the dispenser position.
Tear Off Wait Time	Your printer moves the paper forward in a predefined time after printing, and pulls the paper back in a predefined length once the printing begins again.
Zero Slash	Display a zero with or without a slash through it.
Unit(Label)	**mm** Change the unit of **label** to millimeter. **inch** Change the unit of **label** to inch.
Width	Set the print width.
Height	Set the length of the label when using continuous media.
Unit (Position Adjustment)	**mm** Change the unit of **Position Adjustment** to millimeter.

Property Name	Description
	Inch Change the unit of **Position Adjustment** to inch. **dots** Change the unit of **Position Adjustment** to dots.
Horizontal Offset	Move the print position horizontally. The positive number is left, and the negative number is right.
Vertical Offset	Move the print position vertically. The positive number is forward, and the negative number is backward.
Continuous Offset	Adjust the continuous offset at which the continues label is cut.
Tear Off Offset	Adjust the rest position of the media after a label is printed, which changes the position at which the label is torn or cut.
Cutter/Dispenser Offset	Adjust the cutter/dispenser offset position at which the label is peel or cut.
Status	This is communication protocol for SBPL. **Status 3** is Enq response and **Status 4** is for the communication via driver.
STX Code	When you use non-standard code, you can set the code in this section.
ETX Code	When you use non-standard code, you can set the code in this section.
ESC Code	When you use non-standard code, you can set the code in this section.
ENQ Code	When you use non-standard code, you can set the code in this section.
CAN Code	When you use non-standard code, you can set the code in this section.
NULL Code	When you use non-standard code, you can set the code in this section.
Offline Code	When you use non-standard code, you can set the code in this section.

- SDPL, SEPL, SIPL, SZPL and AUTO

SDPL, SEPL, SIPL, SZPL and **AUTO** provides settings grouped in the **Supply**, **Control, Action, Label** and **Position Adjustment** area.

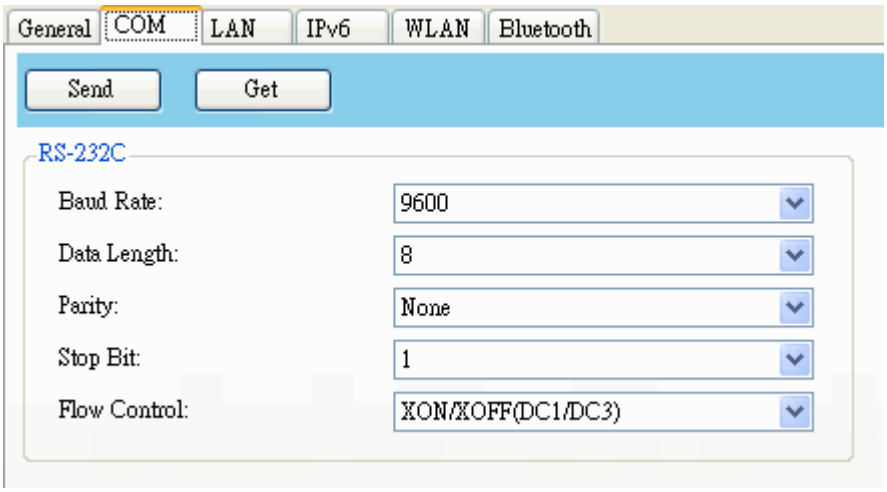


Property Name	Description
Sensor Type	It is the media sensor you are using. It includes **I-MARK**, **GAP** and **None**. When you perform media calibration, the sensor is set to the one you select.
Ribbon Sensor	**Thermal Transfer** Your printer uses the ribbon sensor to detect the ribbon, it is mean **Thermal Transfer** (TT). **Direct Thermal** Disable the ribbon sensor, it is mean **Direct Thermal** (DT).
Feed Key	It defines the action of the **FEED** button. **Feed** Your printer feeds a blank label each time the button is pressed. **Reprint** Your printer reprints the last label each time the button is pressed.
Head Check (Power on)	**Enable** Your printer checks broken pins on the printhead automatically once your printer is turned on. **Disable** Disable the auto head check.
Auto Calibration	**ON (Power on)** Your printer automatically calibrates media using a media sensor once it restarts or is turned on. **ON (Head close)** Your printer automatically calibrates

Property Name	Description
	media using a media sensor every time you close the print module when the printer is turned on. **ON (Power on and Head close)** Your printer automatically calibrates media using a media sensor after power on and every time you close the print module when the printer is turned on. **OFF** You need to manually calibrate media using a media sensor as you change the media, or your printer won't work properly.
Reprint After Error	**Enable** Your printer when caused by the error condition. The label is reprinted as soon as the error condition is corrected. **Disable** Disable the reprint after error.
Print Darkness	Adjust the darkness relative to the current darkness setting. The range is 0 ~ +30, and the value is adjustable in increments of ± 1.
Print Speed	Determine the media speed during printing. The range is +2 ~ +6, and the value is adjustable in increments of ± 1 ips.
Unit(Label)	**mm** Change the unit of **label** to millimeter. **inch** Change the unit of **label** to inch.
Width	Set the print width.
Height	Set the length of the label when using continuous media.
Unit(Position Adjustment)	**mm** Change the unit of **Position Adjustment** to millimeter. **Inch** Change the unit of **Position Adjustment** to inch. **dots** Change the unit of **Position Adjustment** to dots.
Horizontal Offset	Move the print position horizontally. The positive number is left, and the negative number is right.
Vertical Offset	Move the print position vertically. The positive number is forward, and the negative number is backward.
Tear Off Offset	Adjust the rest position of the media after a label is printed, which changes the position at which the label is torn or cut.
Cutter Offset	Adjust the cutter offset position at which the label is peel or cut.

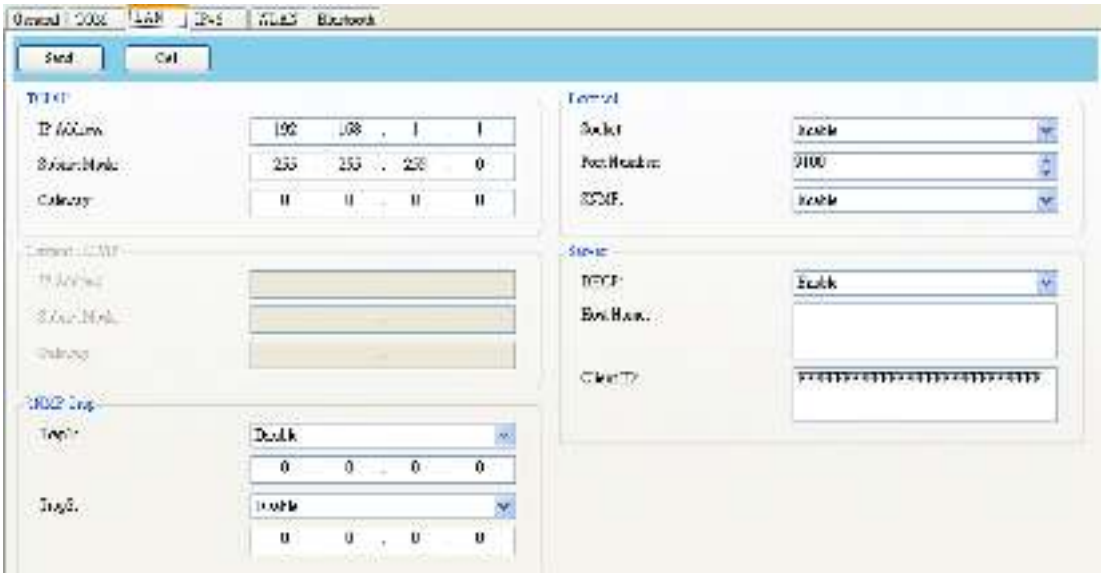
6.2.4 COM

The **COM** tab provides the settings of the RS-232C port. When you use COM as your port, make sure the settings in the **COM** tab are the same as the port settings, or your printer won't work properly.



6.2.5 LAN

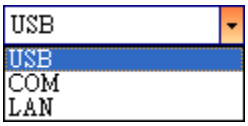
The **LAN** tab provides network settings, including **TCP/IP**, **Current TCP/IP**, **Protocol**, **Server** and **SNMP Trap**.



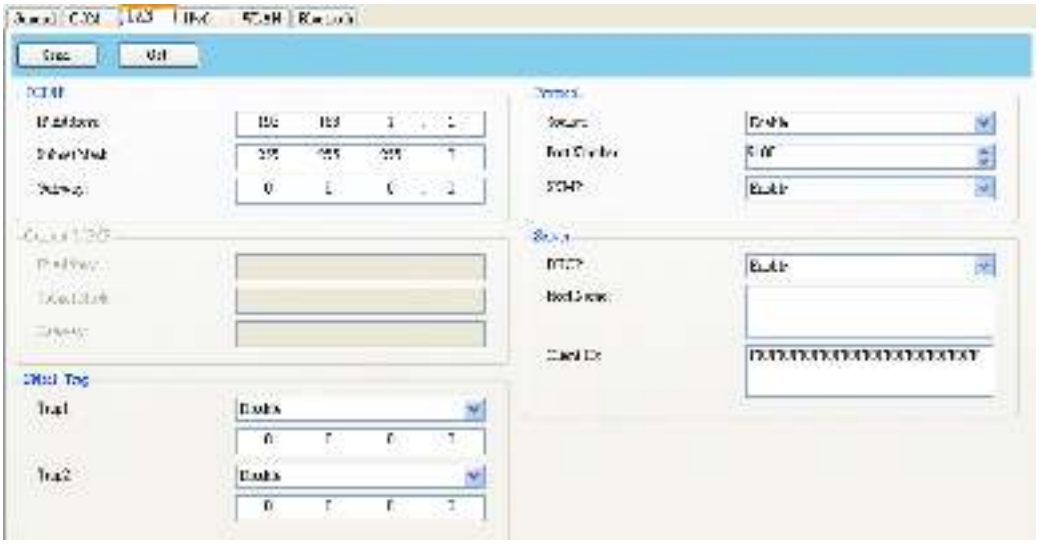
Set Up LAN Connection

If you want to use the **LAN** port to transfer data, you need to set up the network connection in the **LAN** tab.

1. Connect your printer and computer to a network device (hub, switch or router) with Ethernet cables.
2. In the **Input/Output Port** list, click **USB** or **COM**.

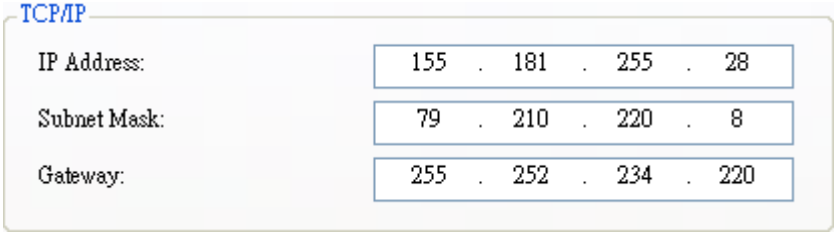


3. In the **Navigation** pane, click **Parameter Setting**, and click the **LAN** tab.

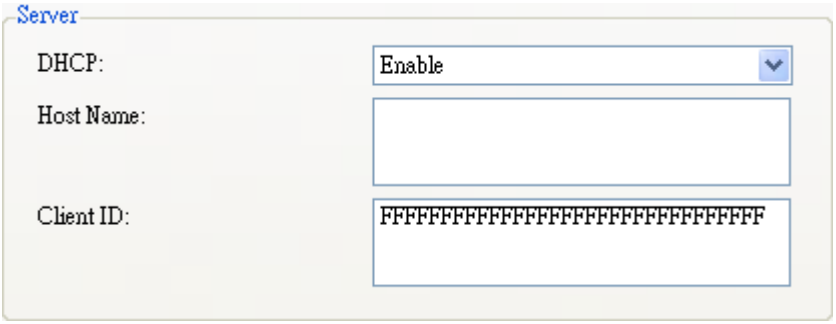


4. Do one of the following to configure your TCP/IP settings:

- If you have a static IP address, fill the **IP Address**, **Subnet Mask** and **Gateway** box under **TCP/IP** according to your network settings and click **Send**.



- If you don't have a static IP address, make sure **DHCP** is enabled and click **Send.**

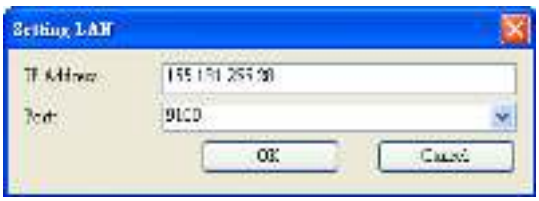


5. After your printer restarts, click **Get** to get the TCP/IP information of your printer. If you are using a static IP address, you'll get the same TCP/IP settings as it is in the previous step; if you are using DHCP, The DHCP server will automatically populate the **IP Address**, **Subnet Mask** and **Gateway** boxes under **Current TCP/IP**.

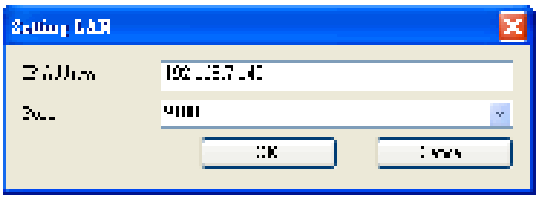
6. In the **Input/Output Port** list, click **LAN**, and click **Setting**.

7. In the **Setting LAN** dialog box, do one of the following to configure your IP address:

- If you are using a static IP address, in the **IP Address** box, enter the IP address under **TCP/IP** in the **LAN** tab, and then click **OK**.



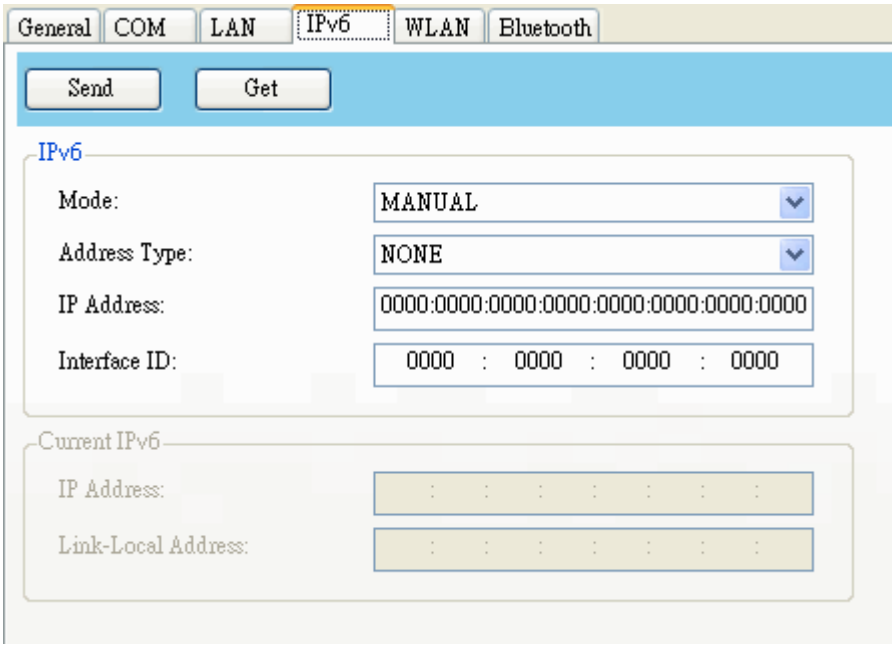
- If you are using a dynamic IP address provided by DHCP, in the **IP Address** box, enter the IP address under **Current TCP/IP** in the **LAN** tab, and then click **OK**.



Note: When DHCP is enabled and your printer is idle for a long time, the IP address of your printer may change. Click **Get** to get the new IP address if you find the current IP address is not working.

6.2.6 IPv6

The **IPv6** tab provides IPv6 settings, including **IPv6** and **Current IPv6**.

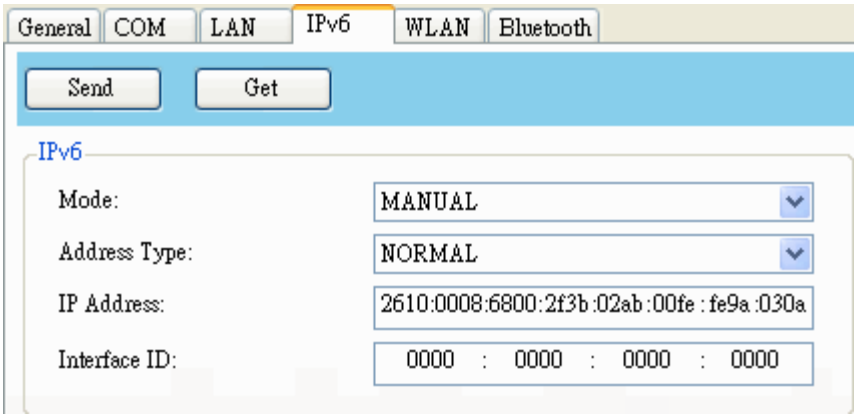


Set Up IPv6 Connection

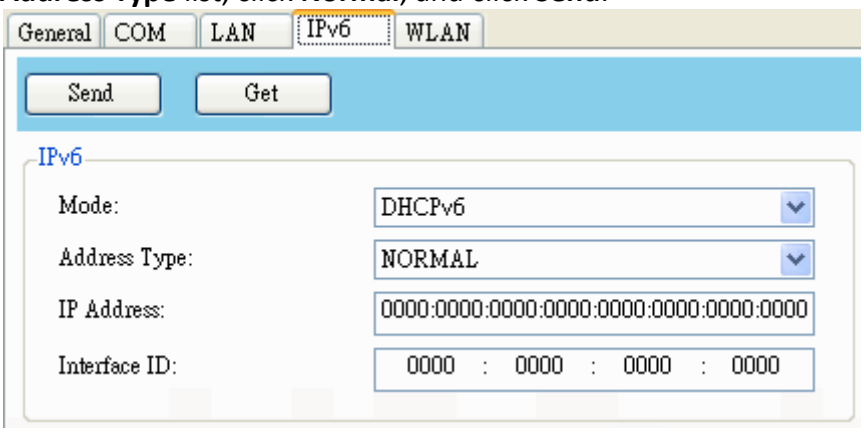
Before you set up IPv6, make sure you have IPv6 connectivity.

1. Do one of the following to configure your IPv6 settings:

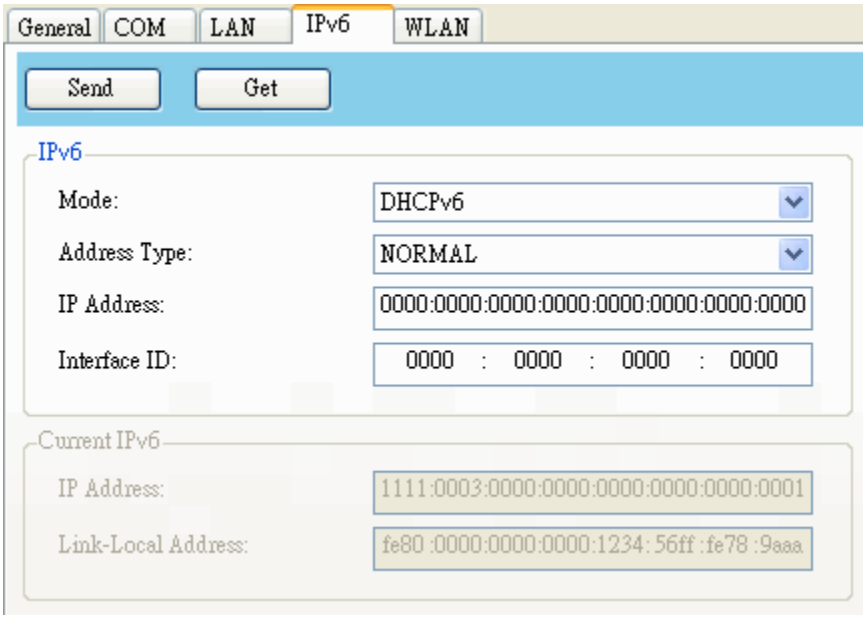
- If you have a static IPv6 address, in the **Mode** list, click **MANUAL**; in the **IP Address** box, enter your IPv6 address, and click **Send**.



- If you don't have a static IPv6 address, in the **Mode** list, click **DHCPv6**; in the **Address Type** list, click **Normal**, and click **Send**.



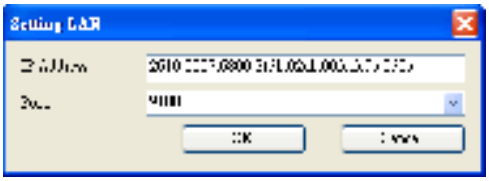
2. After your printer restarts, click **Get** to get its IPv6 information. If you are using a static IPv6 address, you'll get the same settings as it is in the previous step; if you are using DHCPv6, the DHCPv6 server will automatically populate the **IP Address** and **Link-Local Address** boxes under **Current IPv6**.



3. In the **Input/Output Port** list, click **LAN**, and click **Setting**.

4. In the **Setting LAN** dialog box, do one of the following to configure your IP address:

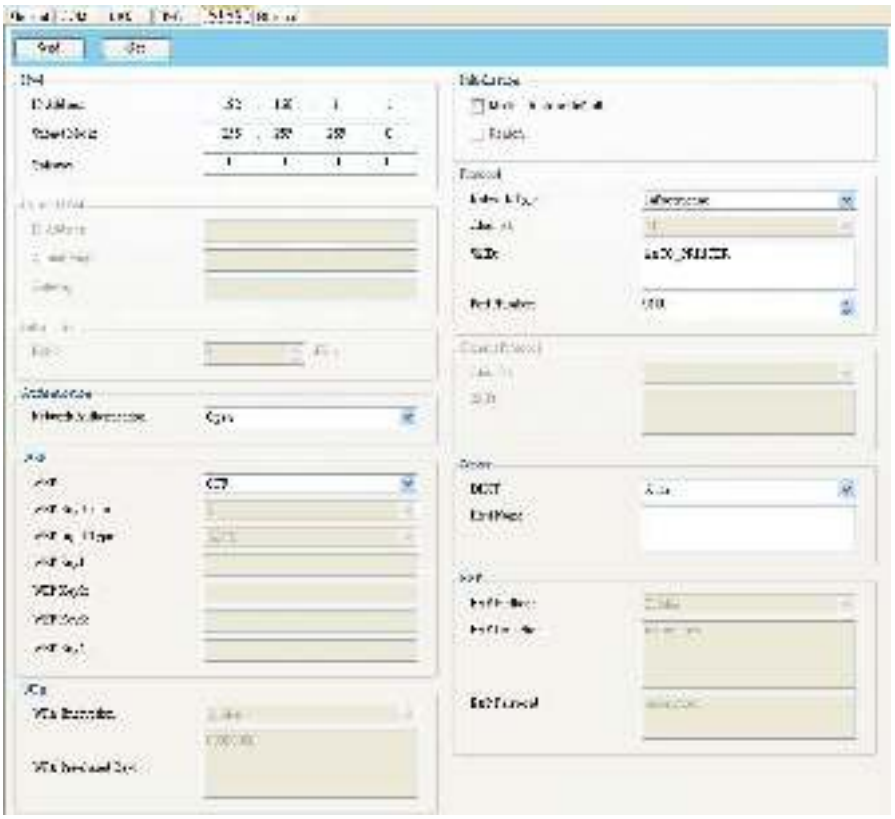
- If you are using a static IP address, in the **IP Address** box, enter the IP address under **IPv6** in the **IPv6** tab and click **OK**.
- If you are using a dynamic IP address provided by DHCPv6, in the **IP Address** box, enter the IP address under **Current IPv6** in the **IPv6** tab and click **OK**.



Note: If your IPv6 address has consecutive zeros, you can use a double-colon to compress them. For example, if your address is 2607:f0d0:1002:0051:0000:0000:0000:0006, you can shorten it like this: 2607:f0d0:1002:0051::0006. Remember that the double-colon can appear only once in the address. The leading zeros in a section can also be removed, so the shortest version of your address can be written as 2607:f0d0:1002:51::6.

6.2.7 WLAN

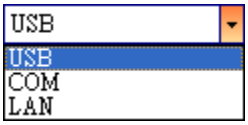
The **WLAN** tab provides wireless network settings, including **IPv4**, **Current IPv4**, **Authentication**, **Information**, **WEP**, **WPA**, **Initialization**, **Protocol**, **Current Protocol**, **Server** and **EAP**.



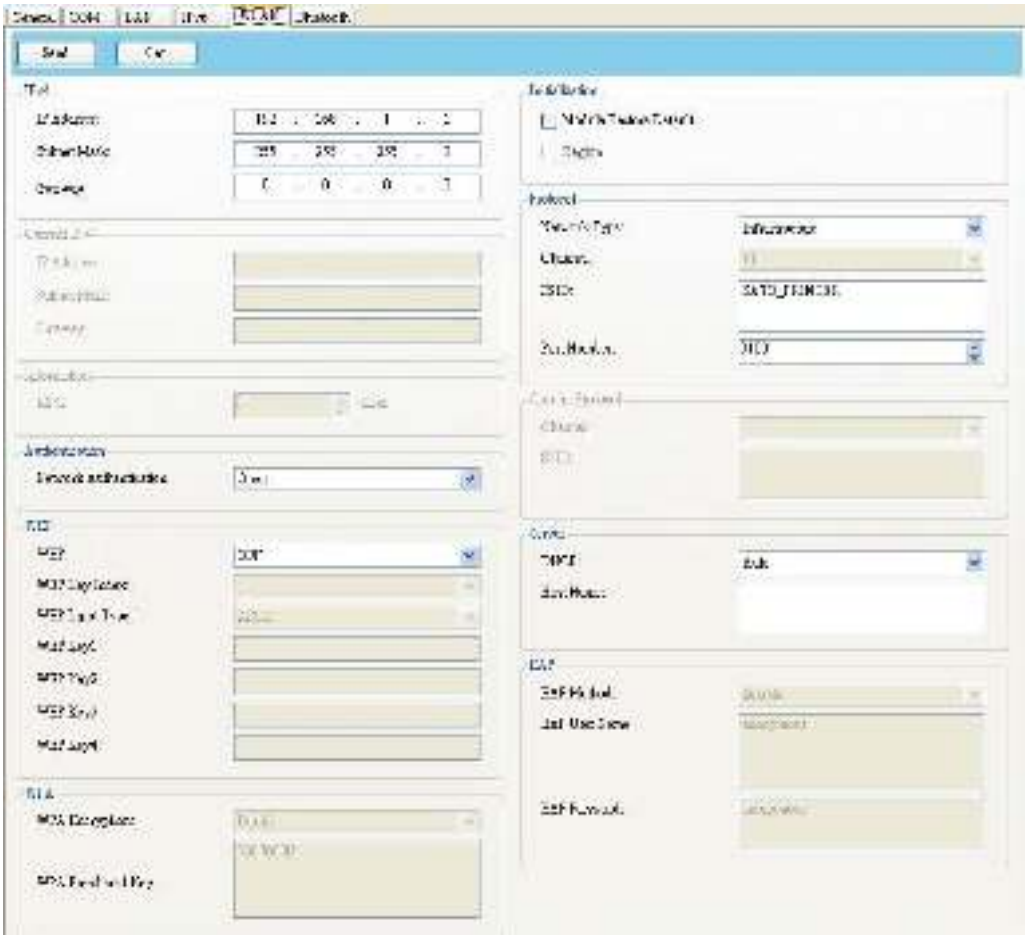
Set Up WLAN Connection

Before you set up a wireless LAN connection, make sure your computer has connected to a wireless network.

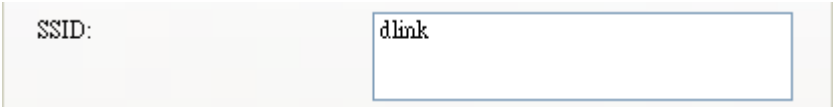
1. In the **Input/Output Port** list, click **USB** or **COM**.



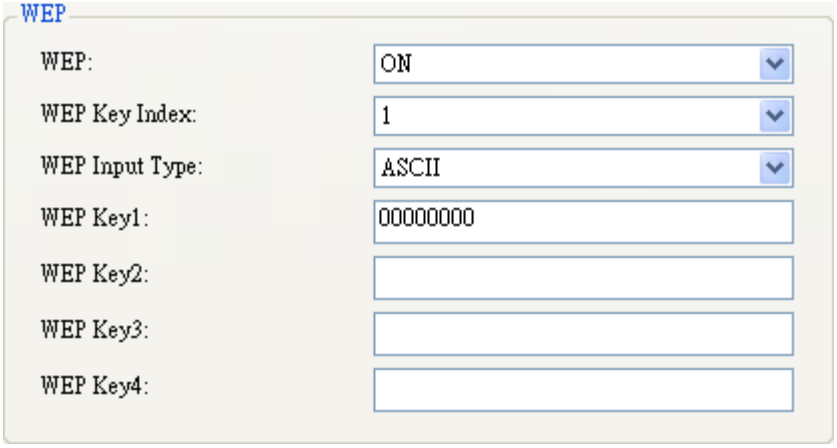
2. In the **Navigation** pane, click **Parameter Setting** and click the **WLAN** tab.



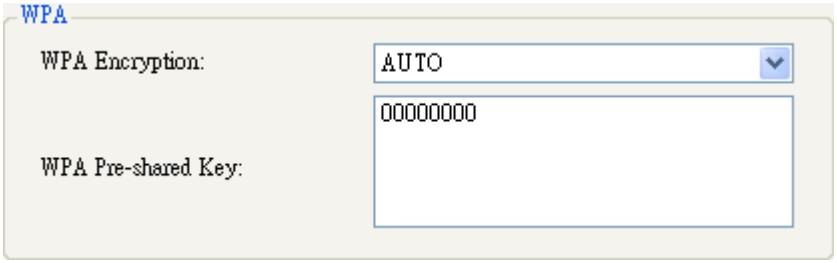
3. In the **SSID** box, enter the network name you've connected and do one of the following to enter your password:



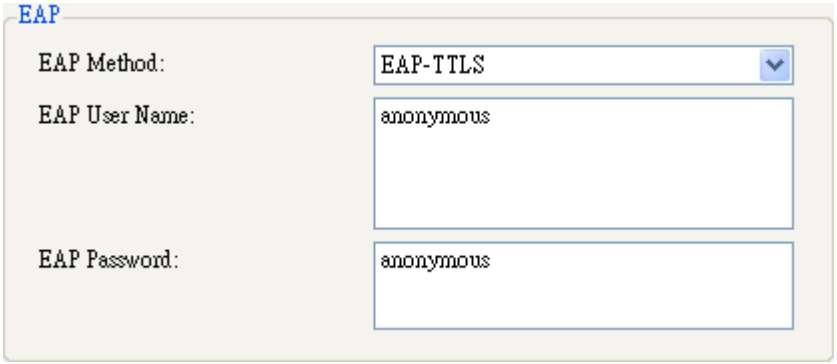
- If you're using **Open** and **WEP** is on, choose your WEP password type in the **WEP Input Type** list. Next, enter your WEP password in one of the **WEP Key** box, and select the key you want to use from the **WEP Key Index** list.



- If you're using **WPA-Personal** or **WPA2 Personal**, enter your password in the **WPA Pre-Shared Key** box.

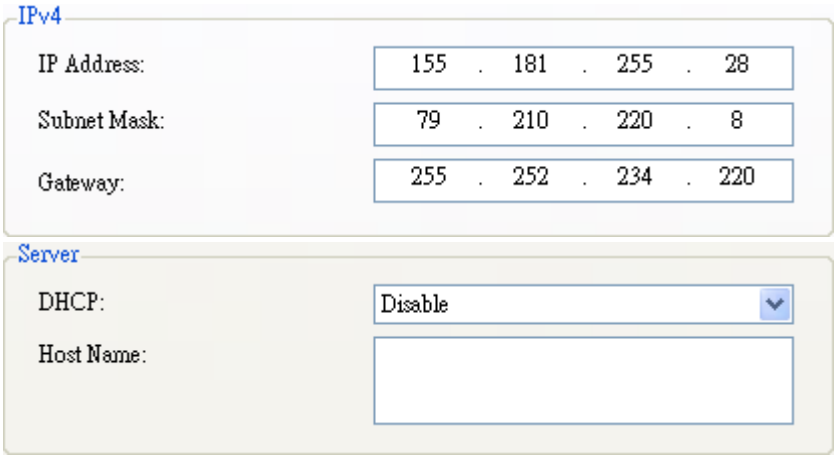


- If you're using **802.1X**, **WPA-Enterprise** or **WPA2 Enterprise**, choose your EAP authentication method in the **EAP Method** list, and enter your username and password in **EAP User Name** and **EAP Password** boxes respectively. If you're using TTLS mode, you can choose the TTLS encryption method from the **TTLS Method** list.

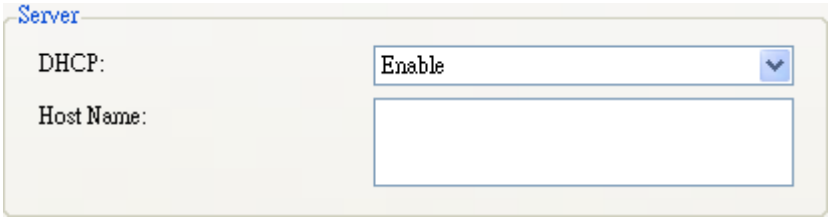


4. Do one of the following to configure your IPv4 settings:

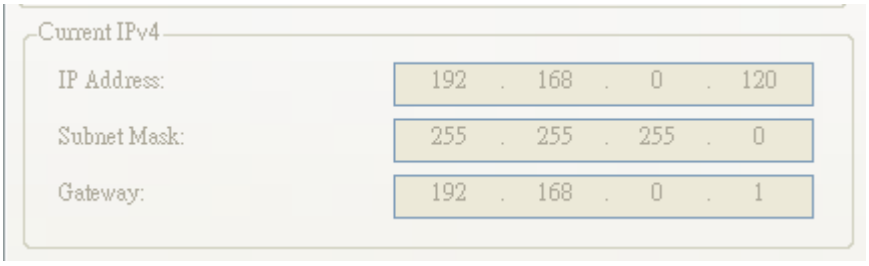
- If you have a static IP address, fill the **IP Address**, **Subnet Mask** and **Gateway** box under **IPv4** according to your network settings, make sure **DHCP** is disabled and click **Send**.



- If you don't have a static IP address, make sure **DHCP** is enabled and click **Send.**



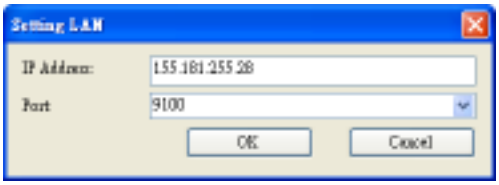
5. After your printer restarts, click **Get** to get the IPv4 information of your printer. If you are using a static IP address, you'll get the same settings as it is in the previous step; if you are using DHCP, the DHCP server will automatically populate the **IP Address**, **Subnet Mask** and **Gateway** boxes under **Current IPv4**.



6. In the **Input/Output Port** list, click **LAN**, and click **Setting**.

7. In the **Setting LAN** dialog box, do one of the following to configure your IP address:

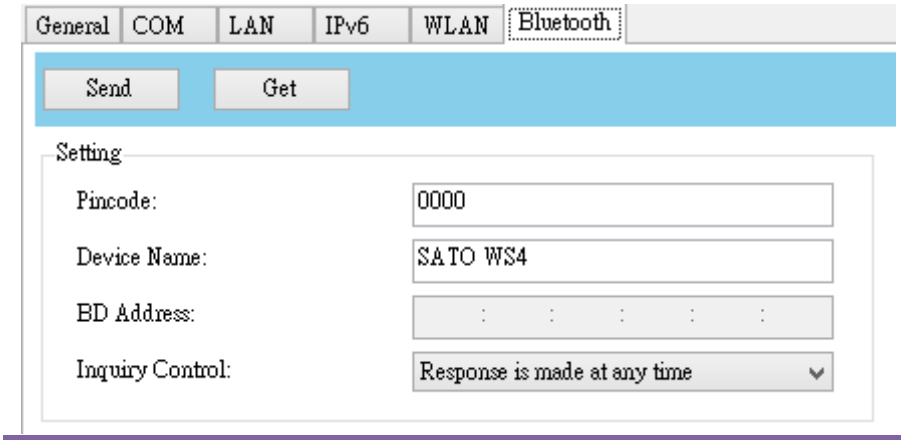
- If you are using a static IP address, in the **IP Address** box, enter the IP address under **IPv4** in the **WLAN** tab and click **OK**.



- If you are using a dynamic IP address provided by DHCP, in the **IP Address** box, enter the IP address under **Current IPv4** in the **WLAN** tab and click **OK**.

6.2.8 Bluetooth

The **Bluetooth** tab provides Bluetooth settings.



Property Name	Description
Pin Code	The Bluetooth PIN code of your printer. The new PIN code takes effect when you reconnect your printer to your computer.
Device Name	The Bluetooth device name of your printer. The new device name takes effect after you reconnect your printer to your computer.
BD Address	The Bluetooth MAC address of your printer.
Inquiry Control	It determines how your printer is detected by other Bluetooth devices. **Response is made at any time** Your printer is always detectable. **No response** Your printer is not detectable. **Response only within 60sec after a power on** Your printer is detectable in 60 seconds after it is turned on.

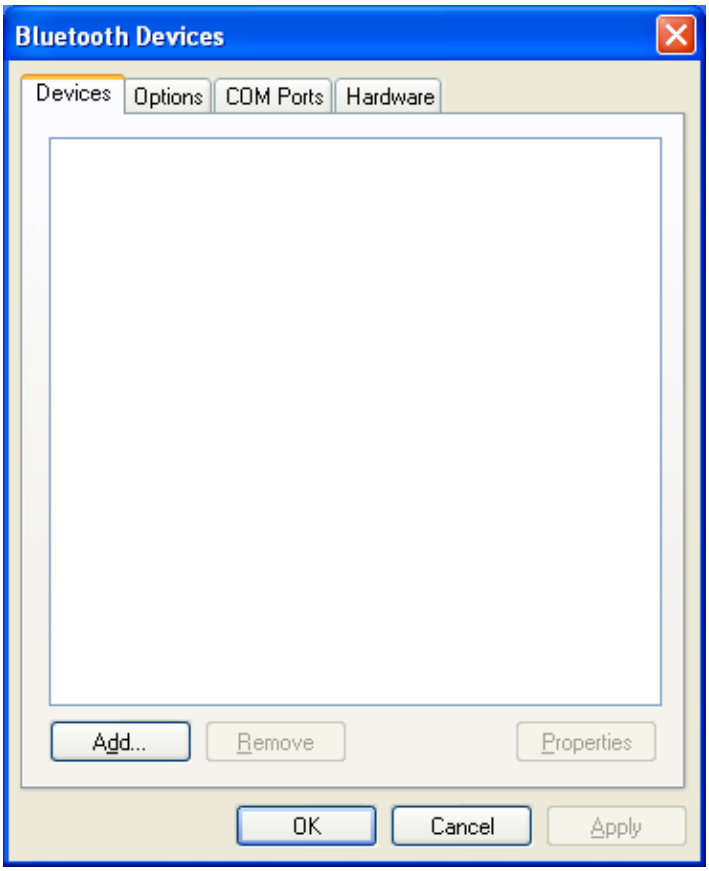
Set Up Bluetooth Connection

Before you use Bluetooth to connect your printer, make sure your computer or device has a built-in Bluetooth adapter. If your computer doesn't have it, get an adapter and plug it into the USB port. The Bluetooth setup screen may vary depending on your computer or device. In this article, we use a Windows XP computer as an example.

Do the following to set up a Bluetooth connection for your printer:

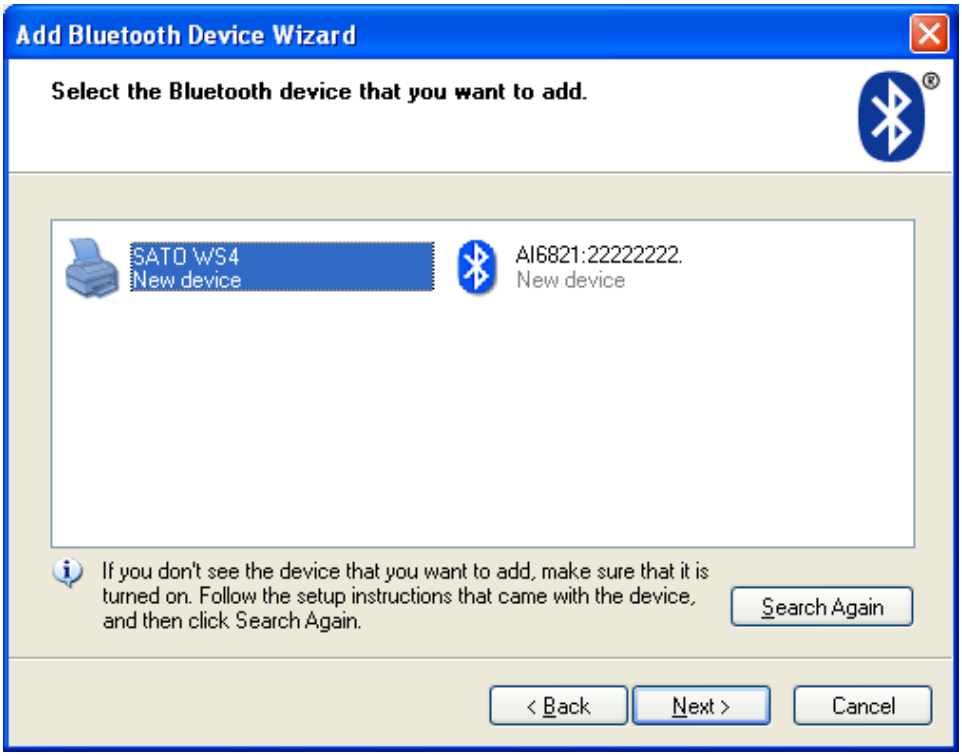
1. Click the Bluetooth icon in the notification area (system tray).

2. In the **Bluetooth Devices** dialog box, click **Add**.



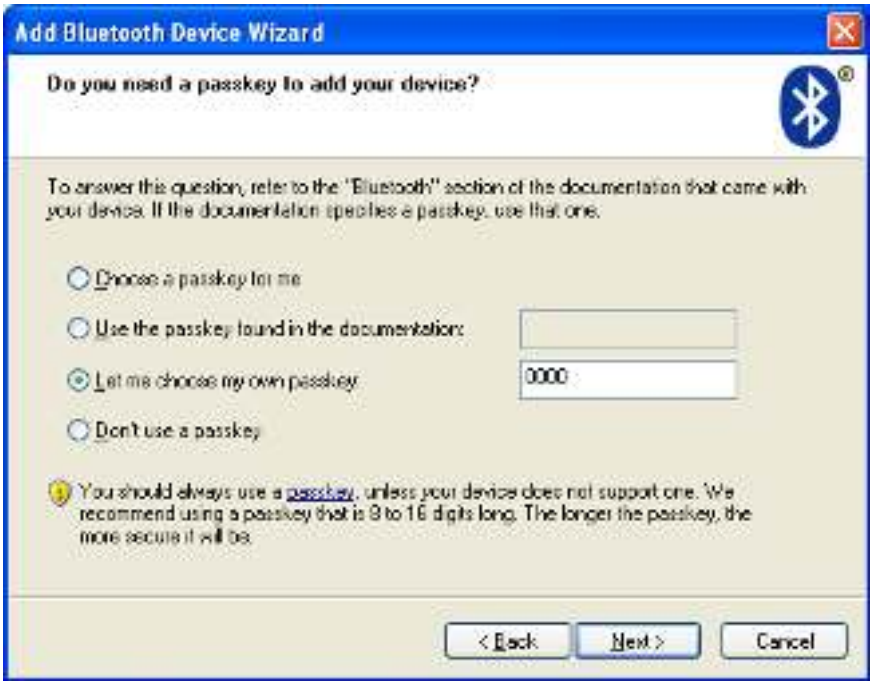
3. In the **Add Bluetooth Device Wizard** dialog box, select the **My device is set up and ready to be found** check box, and click **Next**.

4. Click **SATO WS4**, and click **Next**.



5. Click **Let me choose my own passkey**. The default key is **0000**. After entering

the key, click **Next**.



6. The computer will try to connect the printer. If it succeeds, you'll see the successful message. Take a note of the outgoing COM port and click **Finish**.

   Note If you forget the port number, in the **Bluetooth Devices** dialog box, click the **COM Ports** tab to see the virtual COM port assigned to your printer.

7 Specifications

This chapter provides specifications for the printer. Specifications are subject to change without notice.

7.1 Printer

Model	WS408DT	WS412DT	WS408TT	WS412TT
Print Method	Direct Thermal		Direct Thermal or Thermal Transfer	
Resolution	203 dpi (8 dots/mm)	300 dpi (12 dots/mm)	203 dpi (8 dots/mm)	300 dpi (12 dots/mm)
Media Alignment	Center Alignment			
Operation Mode	Standard: Continuous, Tear Off Optional: Full Cutter, Dispenser			
Sensor	Gap Sensor (Transmissive, Fixed) - Factory Default Sensor I-Mark Sensor Head Open Switch Ribbon Sensor			
Print Speed	2, 3, 4, 5, 6 inches/sec (50.8, 76.2, 101.6, 127, 152.4 mm/sec)	2, 3, 4 inches/sec (50.8, 76.2, 101.6 mm/sec)	2, 3, 4, 5, 6 inches/sec (50.8, 76.2, 101.6, 127, 152.4 mm/sec)	2, 3, 4 inches/sec (50.8, 76.2, 101.6 mm/sec)
	2 &3 ips for dispenser mode		2 &3 ips for dispenser mode	
Print Darkness	Darkness level – SBPL: 1~5 Default: SBPL 3		Default: SBPL 2	
Max Printable Area	Length 999 mm (39.33") x Width 104 mm (4.01")			

Model	WS408DT	WS412DT	WS408TT	WS412TT
Non Printable Area	Pitch Direction (excluding liner) - Top: 1.5 mm (0.06"), Bottom: 1.5 mm (0.06") Width Direction (excluding liner) - Left: 1.5 mm (0.06"), Right: 1.5 mm (0.06")			
Interface	STD Model: USB (Type A and Type B), Ethernet, RS232C LAN Model: USB (Type A and Type B), Ethernet			
Optional Interface	Bluetooth, Wireless LAN			
Accessories	Dispenser, Full Cutter, External Unwinder			
CPU	32bit RISC			
On-Board Memory	Standard Memory (Flash ROM): 16 MB User Memory: 2 MB Standard Memory (SDRAM): 32 MB			
External Memory	USB: Max 16 GB			
Panel	2 LED, 1 Button			
LED	1st LED: Red and Green (Various Combinations: Orange) 2nd LED: Red and Green (Various Combinations: Orange)			
Font	Bitmap: XS, XU, XM, XB, XL, OCR-A, OCR-B Scalable: CG Times, CG Triumvirate			

7.2 Media

Model		WS408DT	WS412DT	WS408TT	WS412TT
Media Size					
Continuous	**Pitch**	10 ~ 996 mm (0.39" ~ 39.21")		10 ~ 996 mm (0.39" ~ 39.21")	
	Pitch including liner	13 ~ 999 mm (0.51" ~ 39.33")		13 ~ 999 mm (0.51" ~ 39.33")	
	Width	25.4 ~ 115 mm (1" ~ 4.52")		25.4 ~ 115 mm (1" ~ 4.52")	
	Width including liner	28.4 ~ 118 mm (1.11” ~ 4.64”)		28.4 ~ 118 mm (1.11” ~ 4.64”)	
Tear Off	**Pitch**	25.4 ~ 996 mm (1" ~ 39.21")		TT: 25.4 ~ 996 mm (1" ~ 39.21") DT: 30 ~ 996 mm (1.18" ~ 39.21")	
	Pitch including liner	28.4 ~ 999 mm (1.11” ~ 39.33”)		TT: 28.4 ~ 999 mm (1.11" ~ 39.33") DT: 33 ~ 999 mm (1.29" ~ 39.33")	
	Width	25.4 ~ 115 mm (1” ~ 4.52”)		25.4 ~ 115 mm (1” ~ 4.52”)	
	Width including liner	28.4 ~ 118 mm (1.11” ~ 4.64”)		28.4 ~ 118 mm (1.11” ~ 4.64”)	
Dispenser	**Pitch**	25.4 ~ 152.4 mm (1” ~ 6”)		TT: 25.4 ~ 152.4 mm (1” ~ 6”) DT: 35 ~ 152.4 mm (1.37" ~ 6")	
	Pitch including liner	28.4 ~ 155.4 mm (1.11” ~ 6.11”)		TT: 28.4 ~ 155.4 mm (1.11” ~ 6.11”) DT: 38 ~ 155.4 mm (1.49" ~ 6.11")	
	Width	25.4 ~ 115 mm (1” ~ 4.52”)		25.4 ~ 115 mm (1” ~ 4.52”)	
	Width including liner	28.4 ~ 118 mm (1.11” ~ 4.64”)		28.4 ~ 118 mm (1.11” ~ 4.64”)	
Cutter	**Pitch**	25.4 ~ 996 mm (1" ~ 39.21")		TT: 25.4 ~ 996 mm (1" ~ 39.21") DT: 35 ~ 996 mm (1.37" ~ 39.21")	
	Pitch including liner	28.4 ~ 999 mm (1.11” ~ 39.33”)		TT: 28.4 ~ 999 mm (1.11" ~ 39.33") DT: 38 ~ 999 mm (1.49" ~ 39.33")	
	Width	25.4 ~ 115 mm (1” ~ 4.52”)		25.4 ~ 115 mm (1” ~ 4.52”)	
	Width including liner	28.4 ~ 118 mm (1.11” ~ 4.64”)		28.4 ~ 118 mm (1.11” ~ 4.64”)	

Model		WS408DT	WS412DT	WS408TT	WS412TT
Media Thickness		0.06 ~ 0.19 mm (0.0024” ~ 0.0074”)			
Max Roll Diameter		Max Roll Diameter Size: 127 mm (5 inches)			
Max Roll Diameter for Unwinder		203.2 mm (8 inches)			
Media Type		Direct Thermal Label, Direct Thermal Tag, Roll Paper (Inside Wound or Outside Wound), Fanfold Paper			
Ribbon Size	**Length**	0.5" Core : Max 100 m 1" Core: Max 300 m			
	Width	40 ~ 110 mm (1.57" ~ 4.33")			
Ribbon Type		Wax, Wax-Resin, Resin Coated Side In or Coated Side Out			

7.3 Barcodes

Barcodes	
One Dimensional Barcodes	UPC-A
	UPC-E
	JAN/EAN
	CODE39
	CODE93
	CODE128
	GS1-128 (UCC/EAN128)
	CODABAR (NW-7)
	ITF
	Industrial 2of5
	MSI
	UPC add-on code
	POSTNET
	GS1 DataBar Omnidirectional
	GS1 DataBar Truncated
	GS1 DataBar Stacked
	GS1 DataBar Stacked Omnidirectional
	GS1 DataBar Limited
	GS1 DataBar Expanded
	GS1 DataBar Expanded Stacked
Two Dimensional Barcodes	QR Code
	PDF417 (including MicroPDF)
	DataMatrix (ECC200)
	GS1 DataMatrix
	MaxiCode
Composite Symbol	EAN-13 Composite (CC-A/CC-B)
	EAN-8 Composite (CC-A/CC-B)
	UPC-A Composite (CC-A/CC-B)
	UPC-E Composite (CC-A/CC-B)
	GS1 DataBar Composite (CC-A/CC-B)
	GS1 DataBar Truncated Composite (CC-A/CC-B)
	GS1 DataBar Stacked Composite (CC-A/CC-B)
	GS1 DataBar Expanded Stacked Composite

Barcodes	
	(CC-A/CC-B) GS1 DataBar Expanded Composite (CC-A/CC-B) GS1 DataBar Stacked Omnidirectional Composite (CC-A/CC-B) GS1 DataBar Limited Composite (CC-A/CC-B) GS1-128 Composite (CC-A/CC-B/CC-C)

7.4 Ethernet

Properties	Description
Port	RJ-45
Speed	10Base-T/100Base-T (Auto Detecting)
Protocol	ARP, IP, ICMP, UDP, TCP, HTTP, DHCP, Socket, LPR, IPv4, IPv6, SNMPv2
Mode	TCP Server/Client, UDP Client
Technology	HP Auto-MDIX, Auto-Negotiation

7.5 Wireless LAN

Properties		Wireless LAN I/F		
Hardware	Protocol	IEEE802.11b/g/n		
	Enabled Device	WS4 Series		
	Operating Temperature	-4 degF (-20 degC) ~ 185 degF (+85 degC)		
	Destination	USA		Europe
	Frequency (Center Channel)	2412 ~ 2462 MHz		2412 ~ 2472 MHz
	Channel	1 ~ 11 ch		1 ~ 13 ch
	Spacing	5 MHz		
	Transmission Speed/ Modulation	IEEE 802.11b	Transmission Method	Conforming to IEEE 802.11b DSSS method
			Channel	Depending on the country
			Data Transmission Speed/Modulation	11/5.5 Mbps: CCK 2 Mbps: DQPSK 1 Mbps: DBPSK
		IEEE 802.11g	Transmission Method	Conforming to IEEE 802.11g OFDM method DSSS method
			Channel	Depending on the country
			Data Transmission Speed/Modulation	54/48 Mbps: 64 QAM 36/24 Mbps: 16 QAM 18/12 Mbps: QPSK

Properties		Wireless LAN I/F		
		IEEE 802.11n	Transmission Method	9/6 Mbps: BPSK Conforming to IEEE802.11n OFDM method
			Channel	US)1-11ch (JP/DE)1-13ch
			Data Transmission Speed/Modulation	20MHz : 6.5M / 7.2M / 13M / 14.4M / 19.5M / 21.7M / 26M /28.9M / 39M / 43.3M / 52M / 57.8M / 58.5M / 65M / 72.2M(Auto-sensing)
	Antenna	External antenna		
	Aerial power	802.11b	Max +15 dBm	
		802.11g	Max +17 dBm	
		802.11n	Max +17 dBm	
Software	Connection mode	Infrastructure, Adhoc		
	Default IP Address	192.168.1.1		
	Default Subnet Mask	255.255.255.0		
	Default ESSID	SATO_PRINTER		
	Default DHCP	Enable		
	Security	IEEE 802.11i		
	Cryptography	WEP (64/128bit), TKIP (WPA), AES (WPA2)		
	Authorization	Shared Key, Open System, PSK, PEAP, TLS,TTLS, LEAP, EAP-FAST		
	Protocol (*)	TCP/IP,Socket, LPD（LPR）, DHCP		
	Wireless LAN Parameter and Status Monitor	Parameter: Command (Printer Utility)		

7.6 Bluetooth

Properties	Bluetooth I/F
Standard	Bluetooth 2.1 + EDR or later
Enable Device	WS Series
Operating Temperature	41°F (5°C) ~ 104°F (40°C)
Storage Temperature	-4°F (-20°C) ~ 140°F (60°C)
Operating Humidity	25 ~ 85 % Non-condensing R.H
Storage Humidity	10 ~ 90 % Non-condensing R.H
Connection Form	Only one-to-one connection is supported.
Support Profile	Serial Port Profile (SPP) PIN code is supported.
Class of Radio Transmission	CLASS 2
Transmission Method	Bi-directional (Half-duplex)
Flow Control	Credit based flow control
Operating Mode	Slave Mode
Transmission Distance	3 m (360 degrees)
SR Mode in Page/Inquiry Scanning	R1 Scan Interval 1.28 sec. Scan Window 22.5 msec.
RF Frequency Range	2402 ~ 2480 MHz
Nominal Output Power	+4 dBm (2.51 mW) MAX

7.7 Electrical and Operating Environment

Properties	Range
Power Supply	Voltage: AC 100 V ~ 240 V ± 10 % (full range) Frequency: 50 Hz - 60 Hz ± 5 %
Power Consumption	DT Model: 60W TT Model: 90W
Temperature	Operating: 5 °C ~ 40 °C Storage: -20 °C ~ 60 °C
Humidity	Operating: 25 %RH ~ 85 %RH (non-condensing) Storage: 10 %RH ~ 90 %RH (non-condensing)

7.8 Physical Dimension

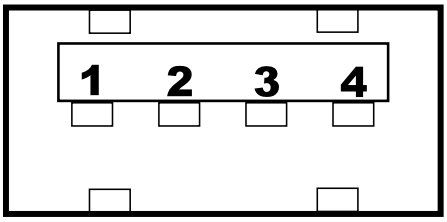
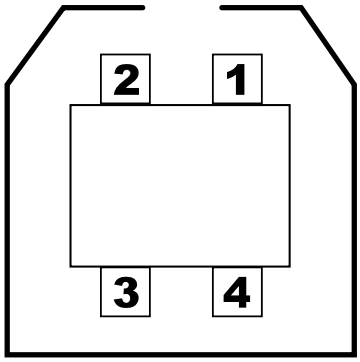
Model	WS408DT	WS412DT	WS408TT	WS412TT
Size	W 183.8 mm x D 225.9 mm x H 166.0 mm		W 220.6 mm x D 278.5 mm x H 187.5 mm	
Weight	Approx. 1.74kg		Approx. 2.48 kg	

7.9 Interfaces

This section provides information about IO port specifications for the printer.

7.9.1 USB

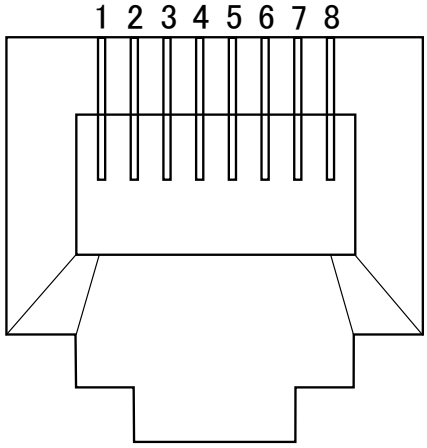
There are two common USB connectors. Typically, type A is found on hosts and hubs; type B is found on devices and hubs. The figure below shows their pinouts.

Type A	Type B
	

Pin	Signal	Description
1	VBUS	+5V
2	D-	Differential data signaling pair -
3	D+	Differential data signaling pair +
4	Ground	Ground

7.9.2 Ethernet

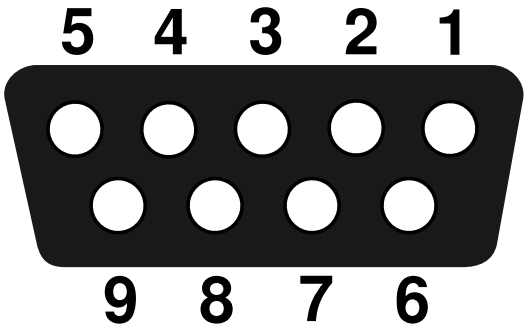
The Ethernet uses RJ-45 cable, which is 8P8C (8-Position 8-Contact). The figure below shows its pinout.



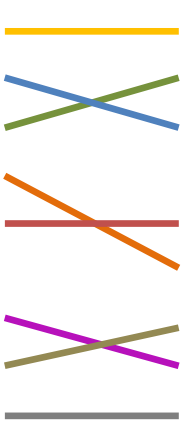
Pin	Signal
1	Transmit+
2	Transmit-
3	Receive+
4	Reserved
5	Reserved
6	Receive-
7	Reserved
8	Reserved

7.9.3 RS-232C

The RS-232C on the printer is DB9 female. It transmits data bit by bit in asynchronous start-stop mode. The figure below shows its pinout.



Pin	Signal	Description
1	+5V	Provide 5V Power
2	RxD	Receive
3	TxD	Transmit
4	NC	No Connection
5	GND	Ground
6	Hi	Pull High
7	RTS NC	Request to Send
8	CTS	Clear to Send
9	Hi	Pull High

Properties	Description
Data Transmission Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Parity	Odd, Even or None
Data Bits	7 or 8 Bits
Stop Bits	1 or 2 Bits
Flow Control	XON/XOFF, RTS or None
Default Parameters	9600 bps, No Parity, 8 Data Bits, 1 Stop Bit, XON/XOFF

Host (DB9)				Printer (DB9)	
Signal	**Description**	**Pin**	**Pin**	**Description**	**Signal**
CD	Carrier Detect	1	1	Provide 5V Power	+5V
RxD	Receive	2	2	Receive	RxD
TxD	Transmit	3	3	Transmit	TxD
DTR	Data Terminal Ready	4	4	No Connection	NC
GND	Ground	5	5	Ground	GND
DSR	Data Set Ready	6	6	Pull High	Hi
RTS	Request to Send	7	7	Request to Send	RTS
CTS	Clear to Send	8	8	Clear to Send	CTS
CI		9	9	Pull High	Hi