WS4 TT Series Printer

Operator Manual

WS408TT / WS412TT

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.

Bluetooh/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.

Contents

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

- **Easy Operation**　One-button design for easy control

- **Fast Print Speed**　Max 6 inches/sec for the WS408 model

- **Wireless LAN Connection**　Build a Wireless LAN printing environment with Bluetooth

- **External Memory**　The extra USB port allows you to use a USB flash drive for storage

1.2 Unpacking

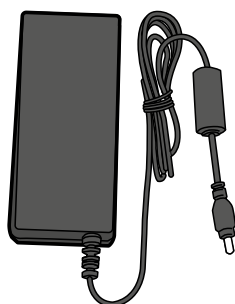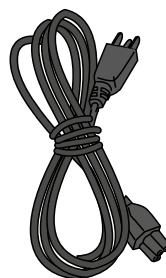Make sure all of the following items are included in your package.
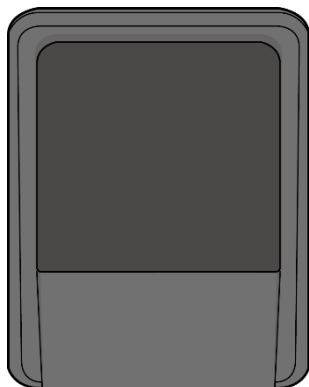
SATO WS Printer

User Documents

(Quick Guide, Warranty, etc.)

AC Power Cord

Power Supply

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   Perspective View

LED2

LED1

Feed Button

1.3.2   Back View

RS232

LAN   **USB A**   **USB B**

Power Switch

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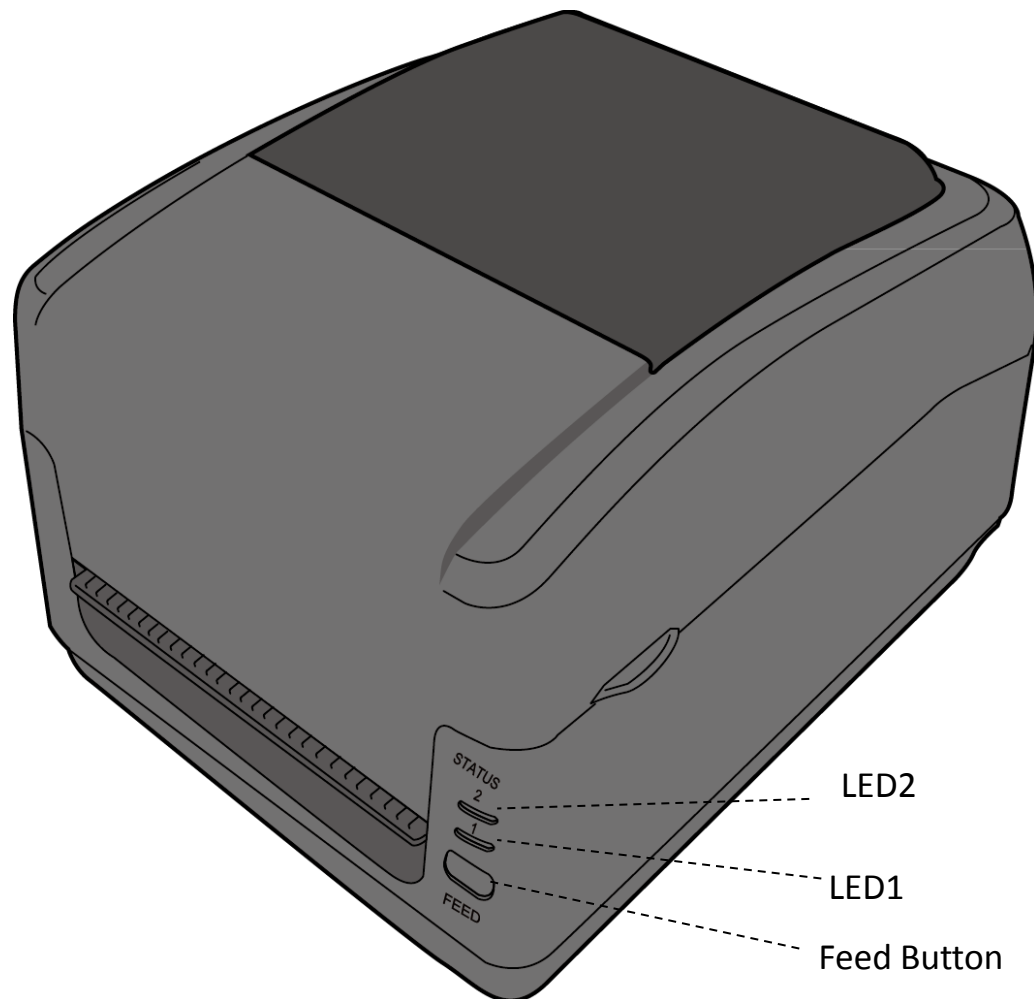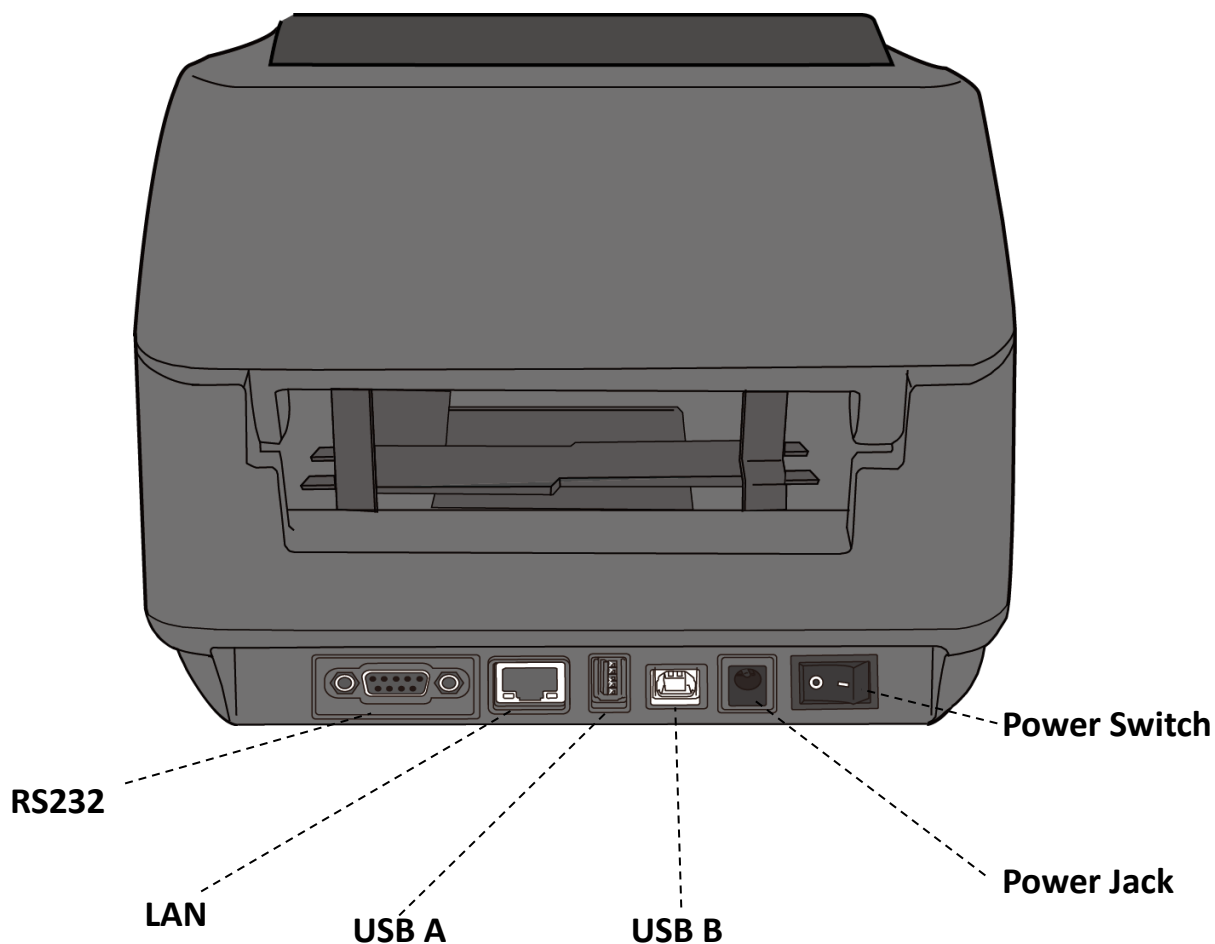
⚠	**Caution:** The areas indicated by the ellipse have sharp edges. To avoid injury, be careful not to touch them when handling the printer.

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

1.3.3   Interior View I

Ribbon

Supply Wheel

Take-Up Wheel

Media Roll Holders

Module Release Latch

STATUS
2
1
FEED

1.3.4   Interior View II

Printhead

Media Shaft

Lock Button

Transmissive
Sensor

Reflective Sensor

Media Guides

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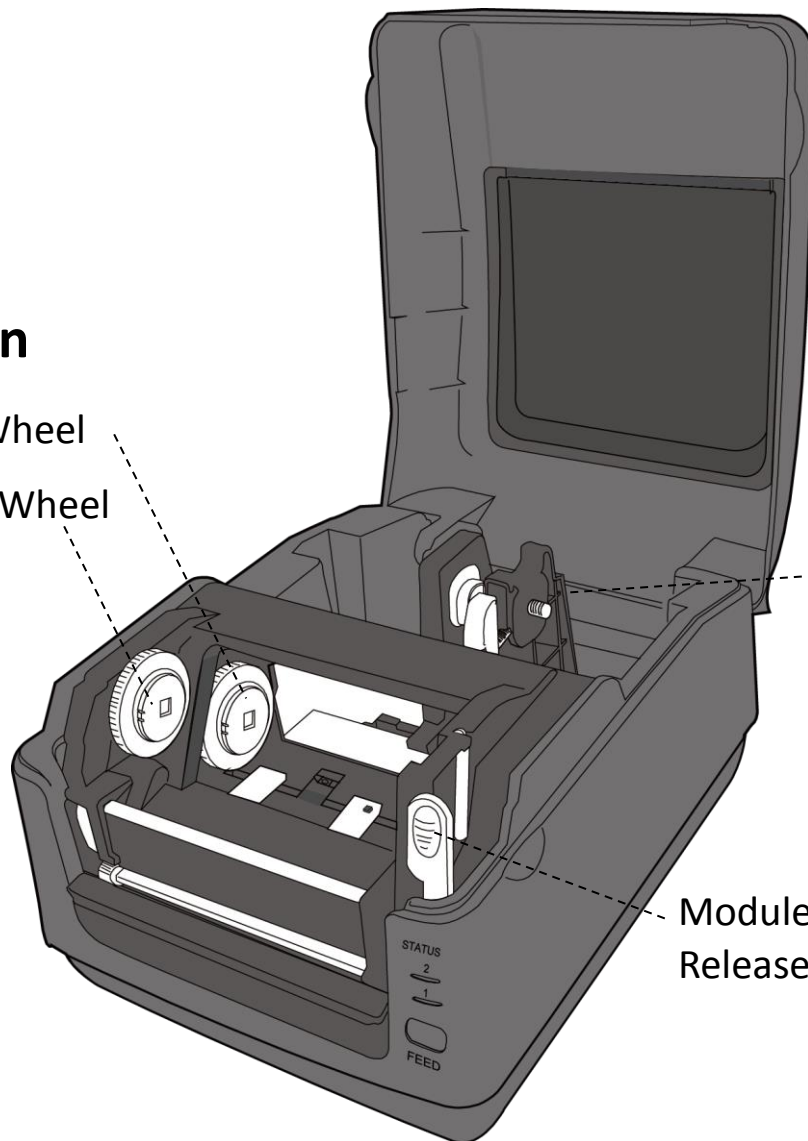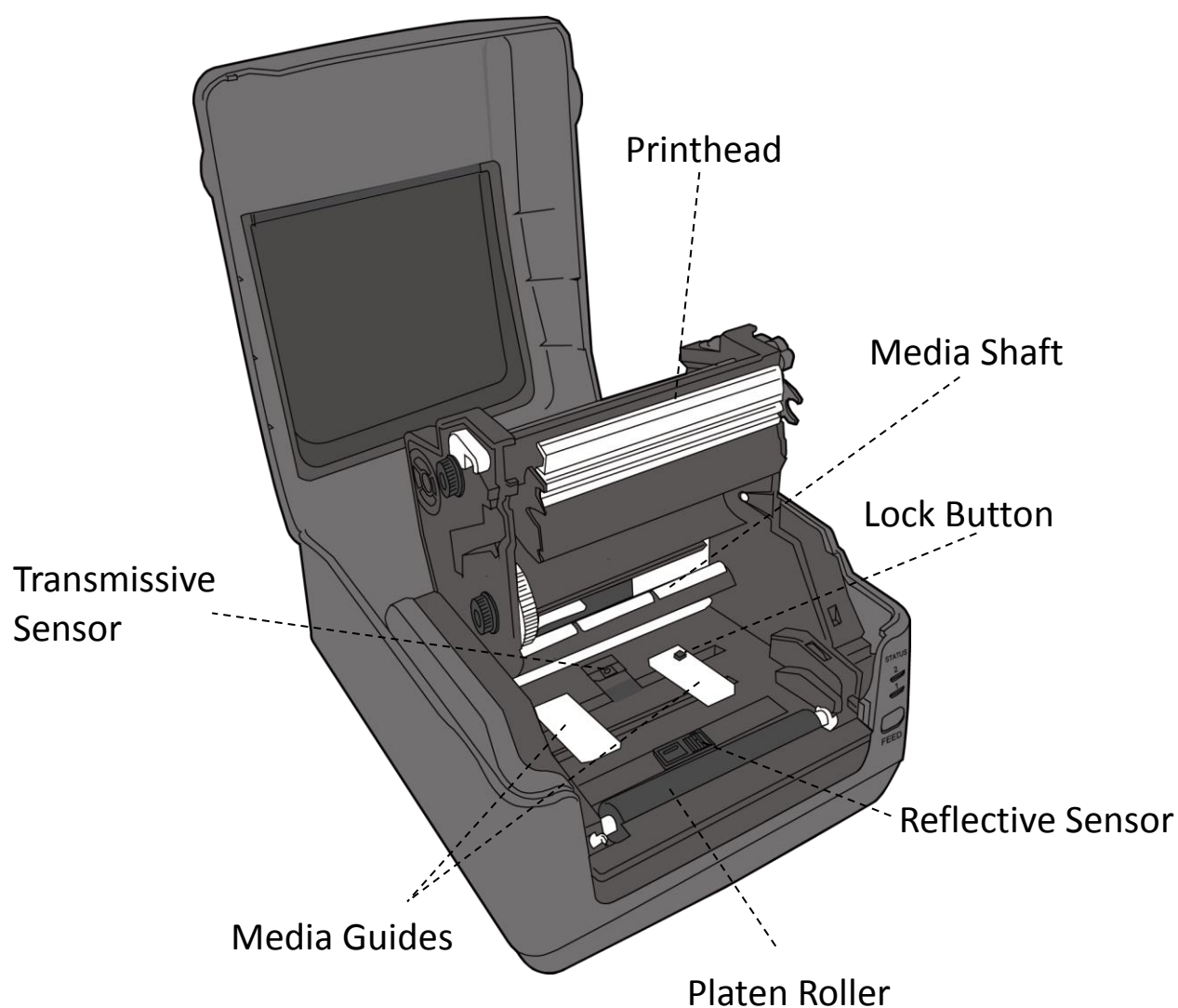
> **Warning:** The printhead becomes very hot during printing. Do not touch the printhead or touch around it directly after printing. By doing so you may get burnt.

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

7

		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.	V
* Red	Red *	Flash ROM on the CPU board error or USB memory error.	V
		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 glow 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	Resetting 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.
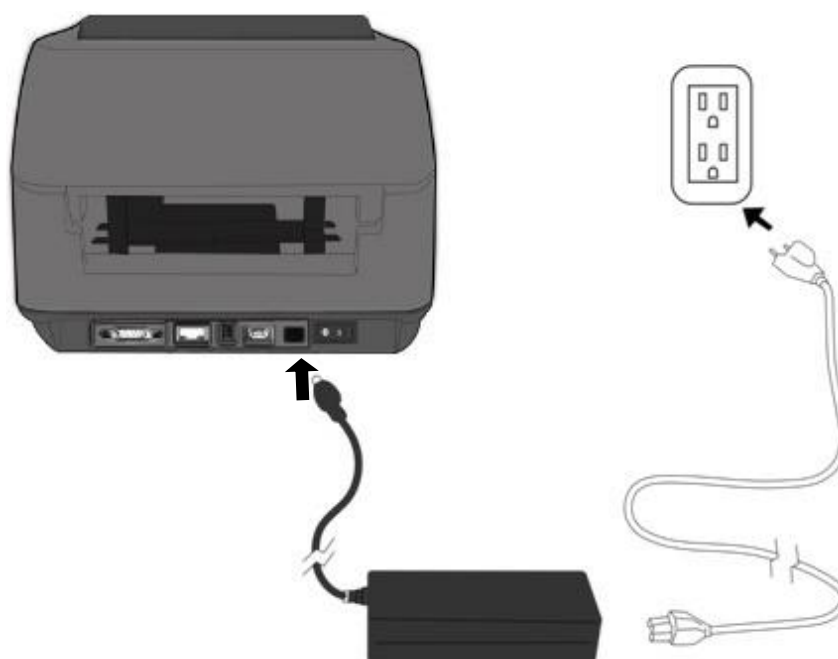
> ⚠️ **Warning:** Do not plug the AC power cord with wet hands, or operate the printer and the power supply in an area where they may get wet. Serious injury may result from these actions!

2.2 Turn On/Off Your Printer

When your printer is connected to a host (a computer), it is good 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.
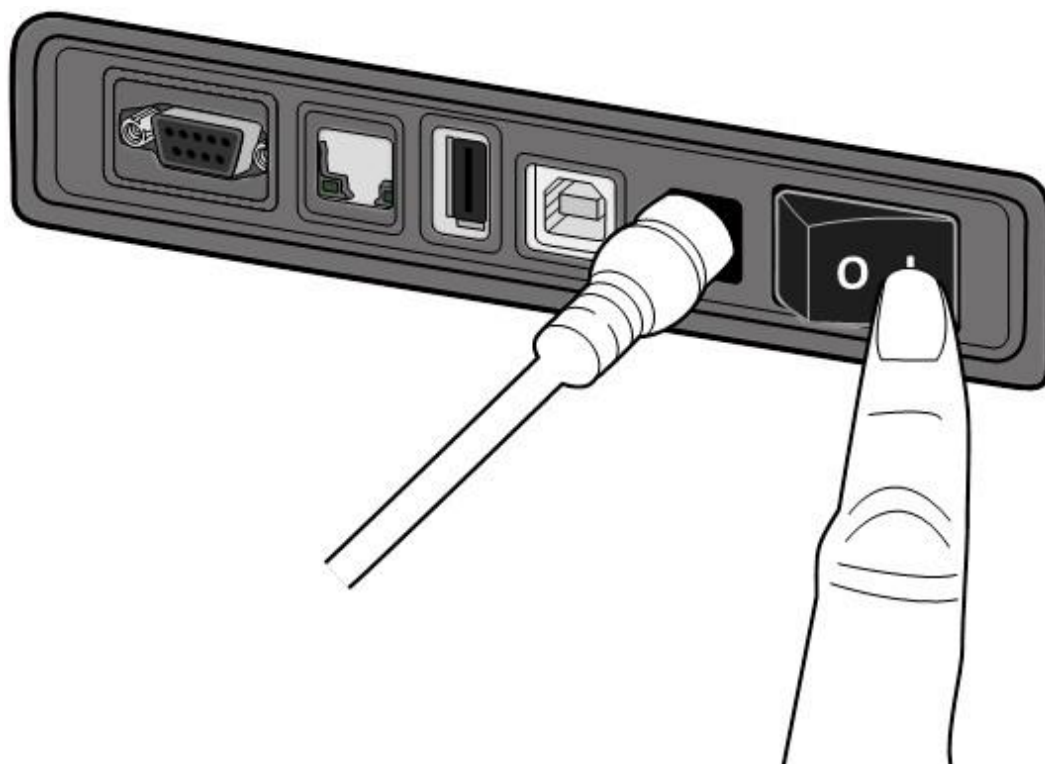
2. Both status lights glow solid orange for a few seconds and then LED 2 goes out, while LED 1 turns to solid green.

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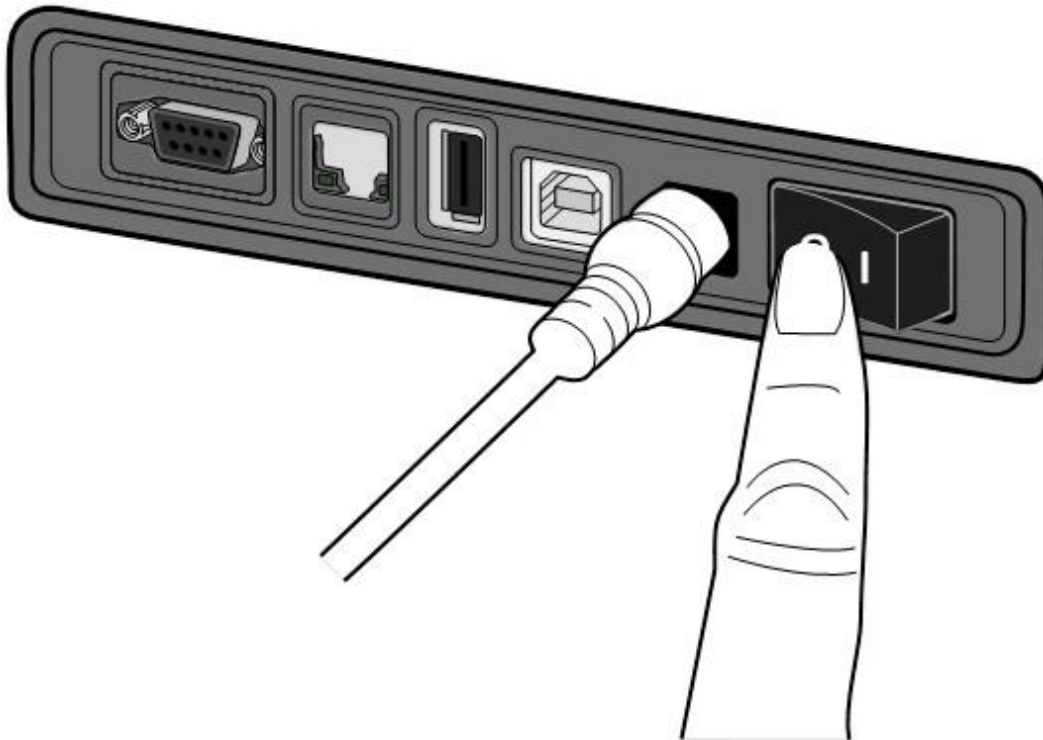
| ⚠ | **Caution:** Do not turn off your printer during data transmission. |

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.
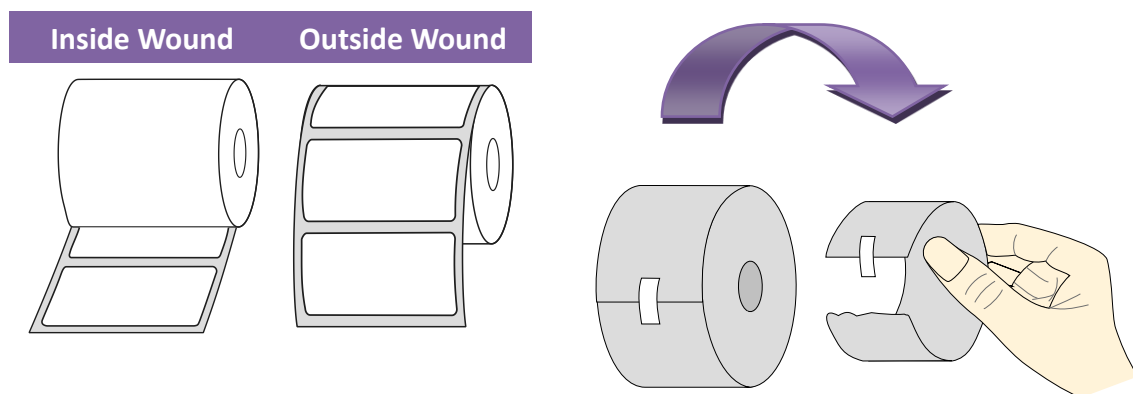
2.3.2   Place a Media Roll

1. Open the top cover of the printer.
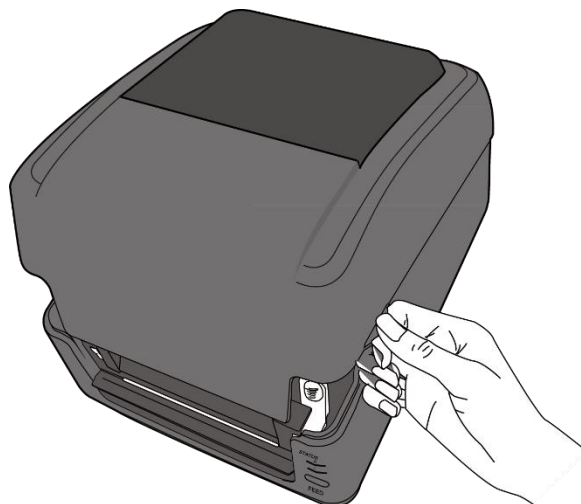
2. Press the holder lock on the **Media Roll Holders** to slide them outward and

   place the media roll between the holders. Adjust the media roll so its print

   side is facing up and make sure it is clamped tightly by the holders.

   Note   The default core holder is set for 1.5-inch inside diameter (ID). To
   install a 1-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.

Core Holder

1 inch

1.5 inch
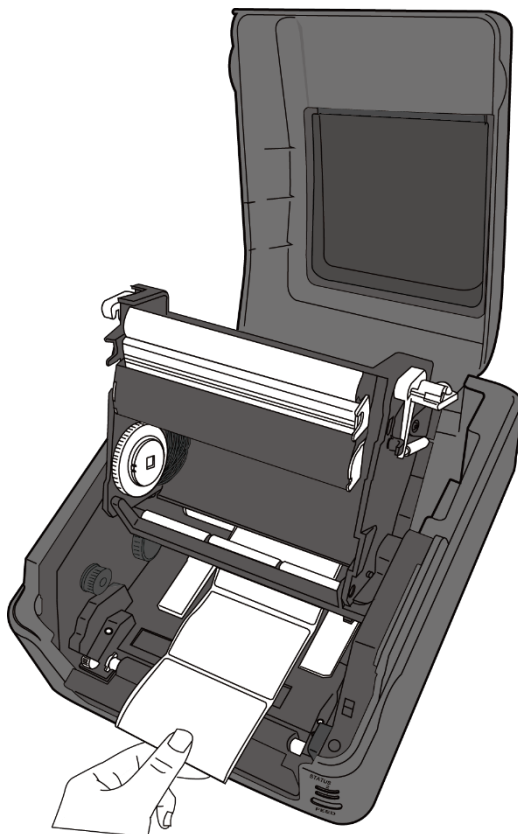
Holder Lock   Thumbscrew
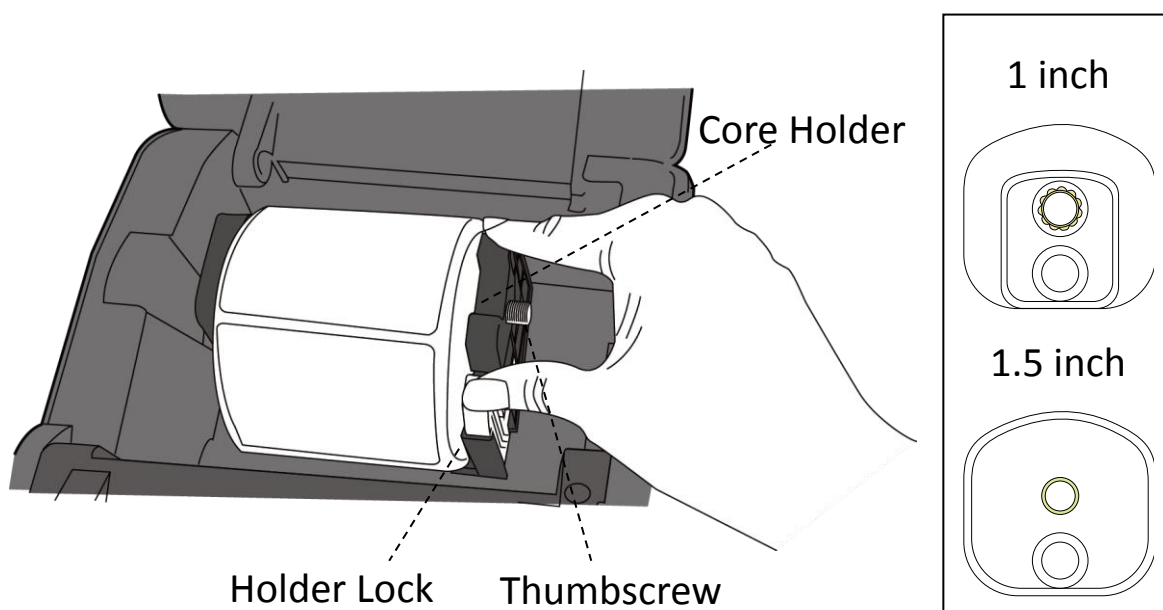
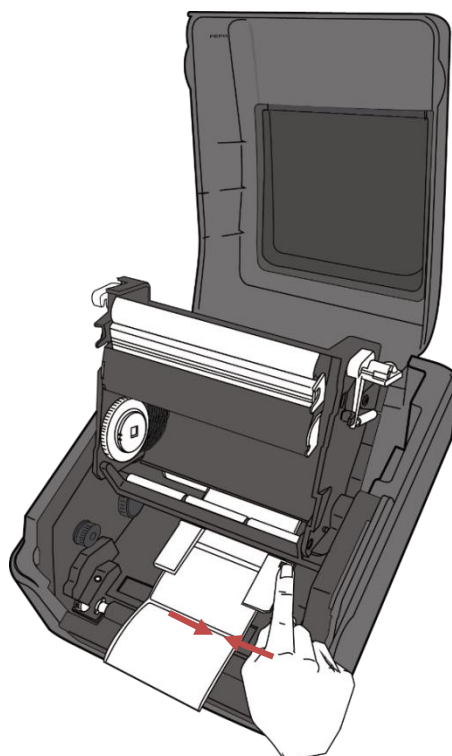3. Push the **Module Release Latch** to open the printer module.
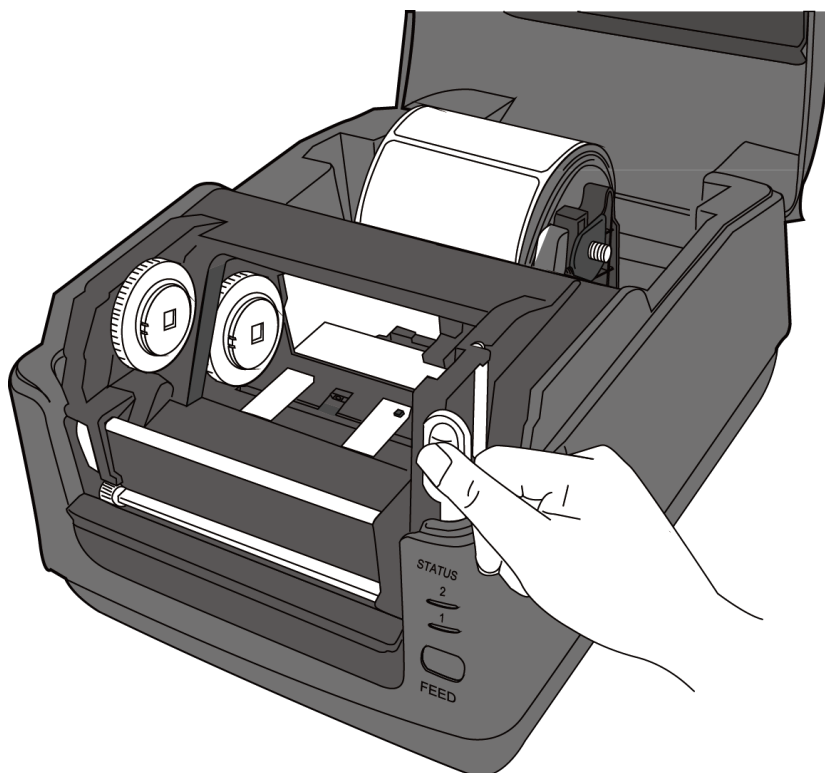
4. Press the **Lock** button on the **Media Guides** to slide them outward.
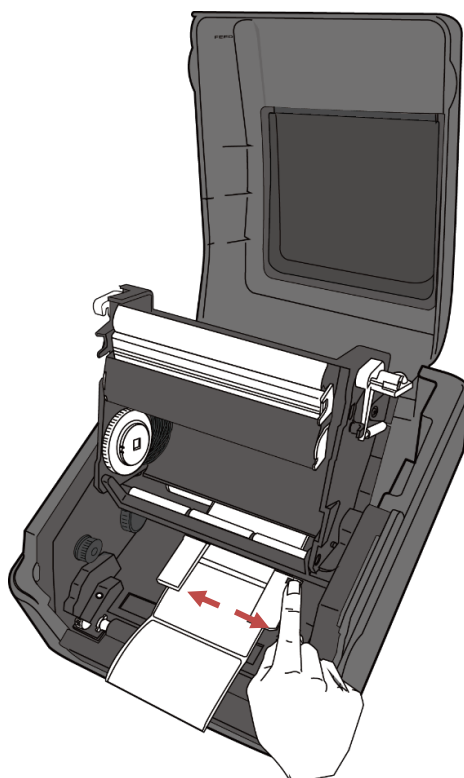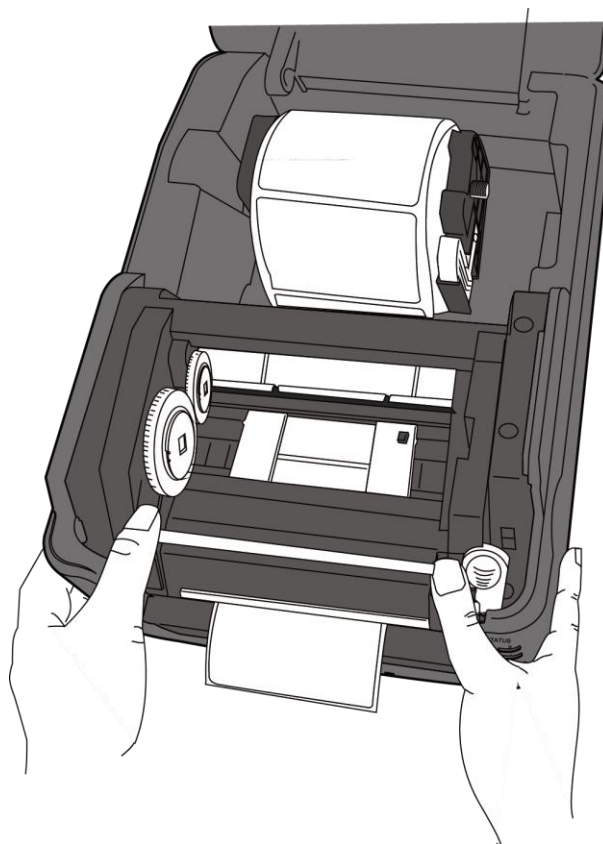
5. Pull the media until it reaches out of the printer.

6. Put the media under the **Media Shaft** and center it between the **Media Guides**.
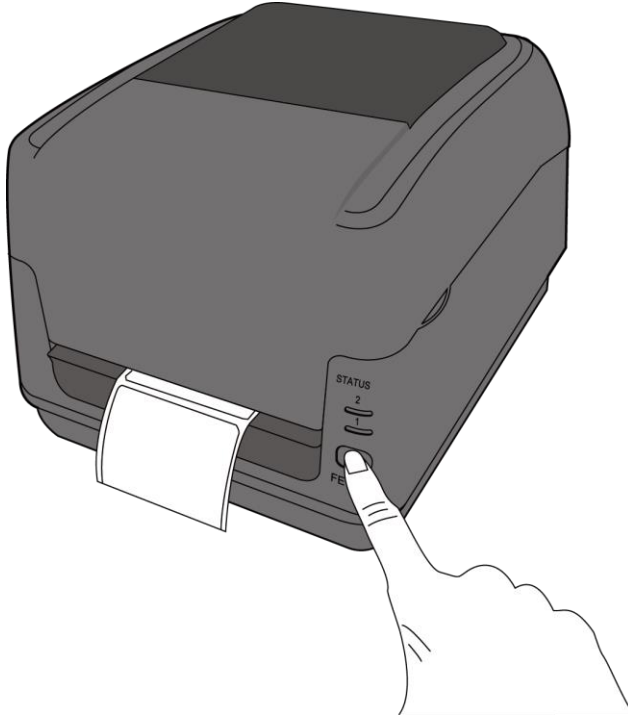
7. Close the printer module and press down firmly at its both sides, until you
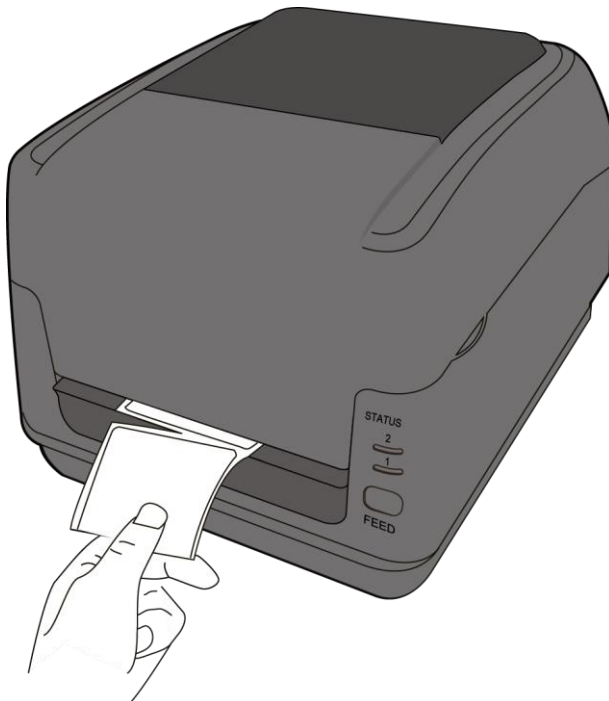
    hear a click.

2.3.4   Test Media Feed

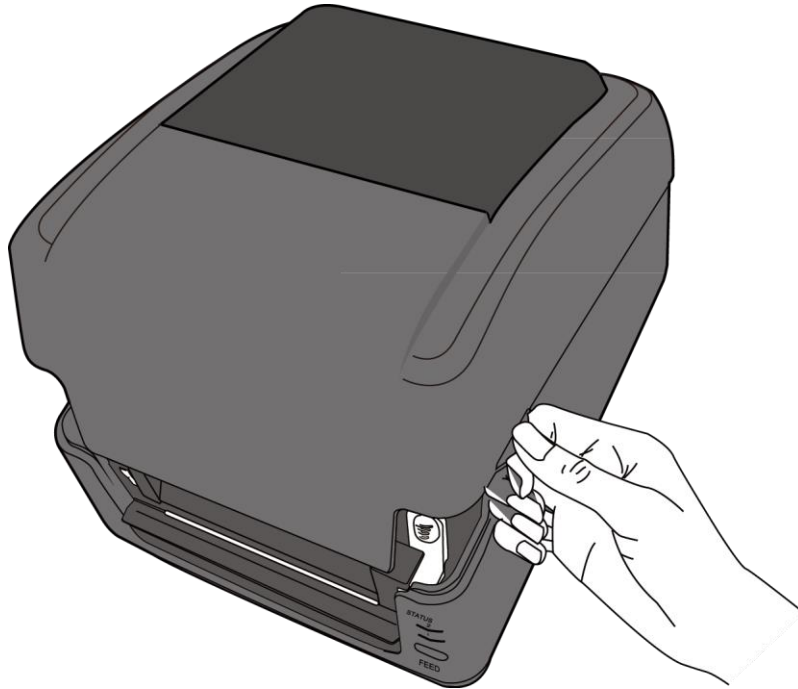1. Turn on the printer, and press the **FEED** button to feed a label.

2. Flip the media and tear it along the edge of the top cover.
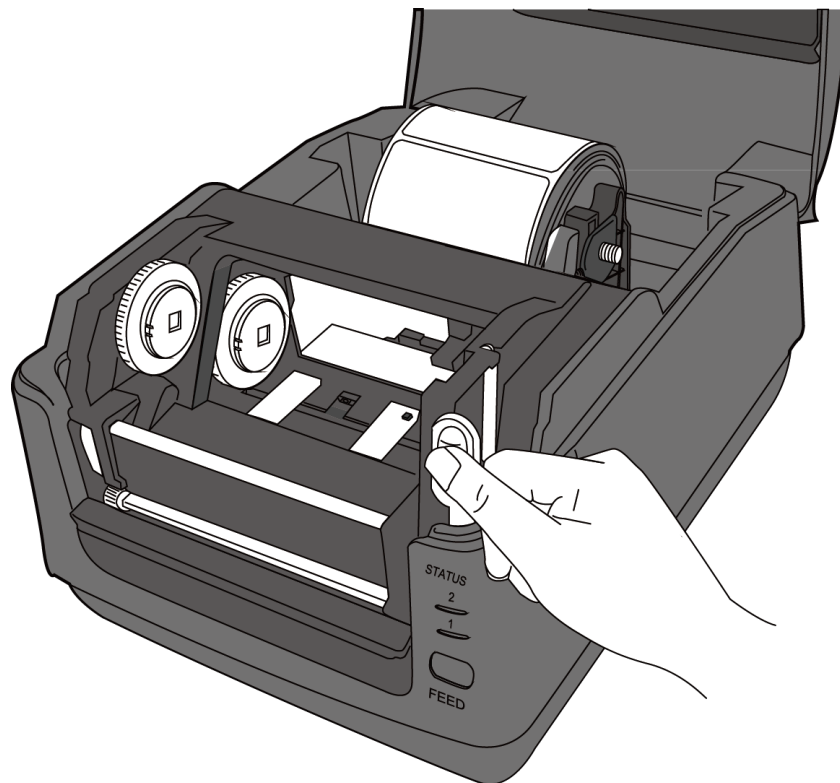
2.4 Placing Ribbon Roll
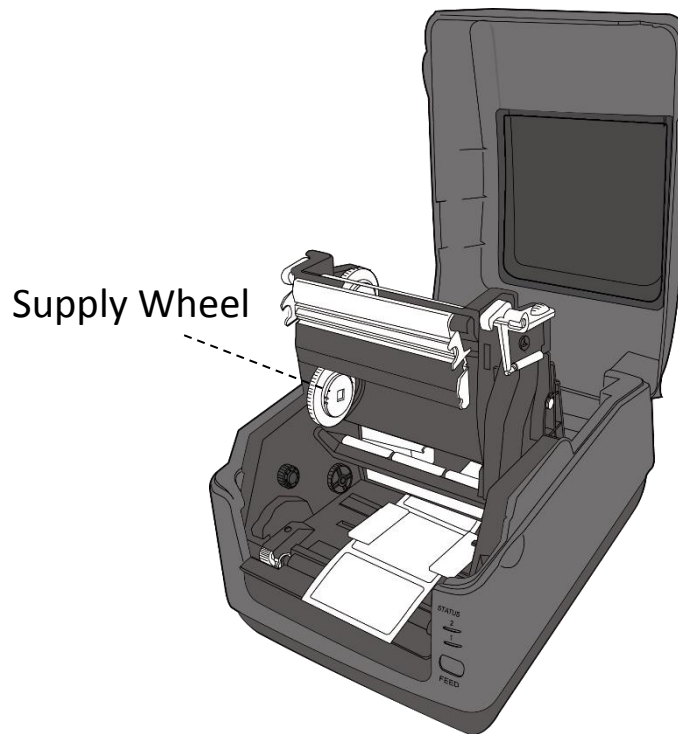
1. Open the top cover of the printer.

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

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

Supply Wheel

4. Do the following to install both rolls:

• To load the supply roll, align the notches on the left side and press the roll to the

  supply hub and then press the right side of the roll to the hole.
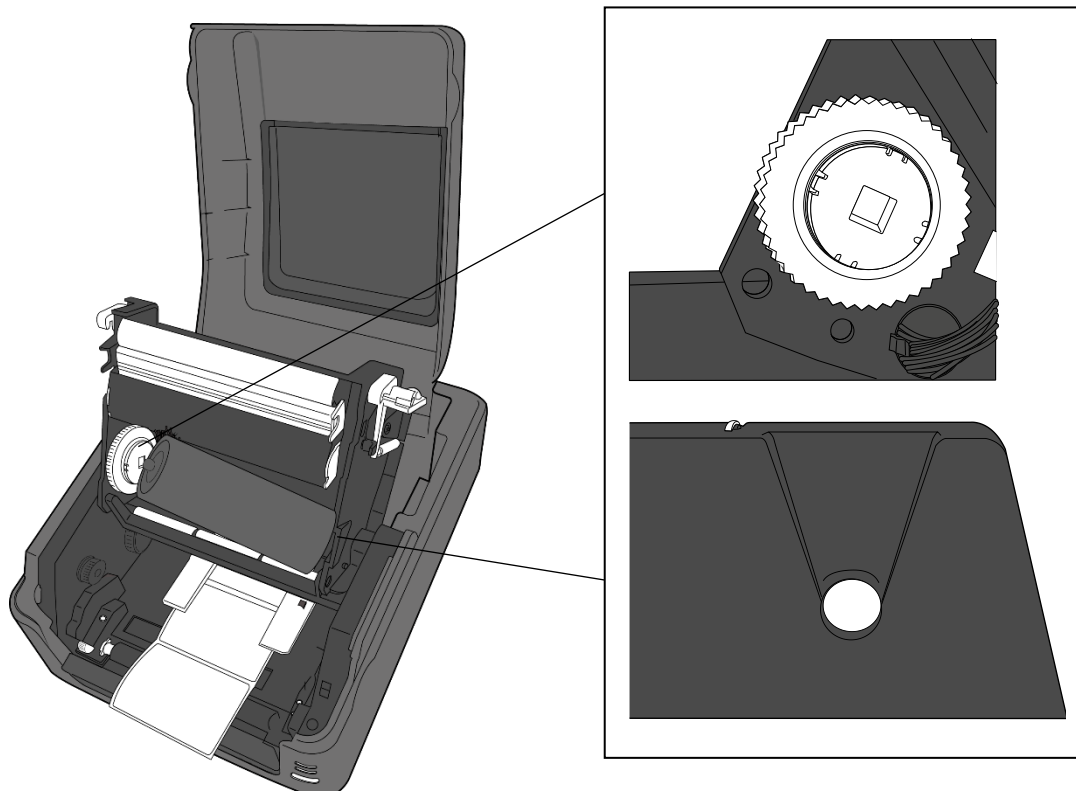
- To load the take-up roll, align the notches on the left side and press the roll to

  the take-up hub and then press the right side of the roll to the hole.
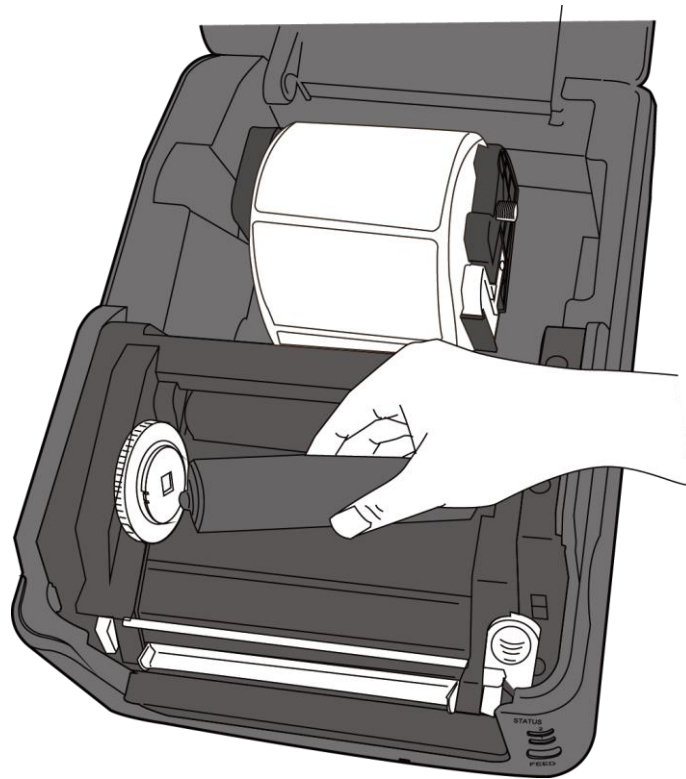
5. Pull the ribbon from the supply roll and tape it on the take-up roll.
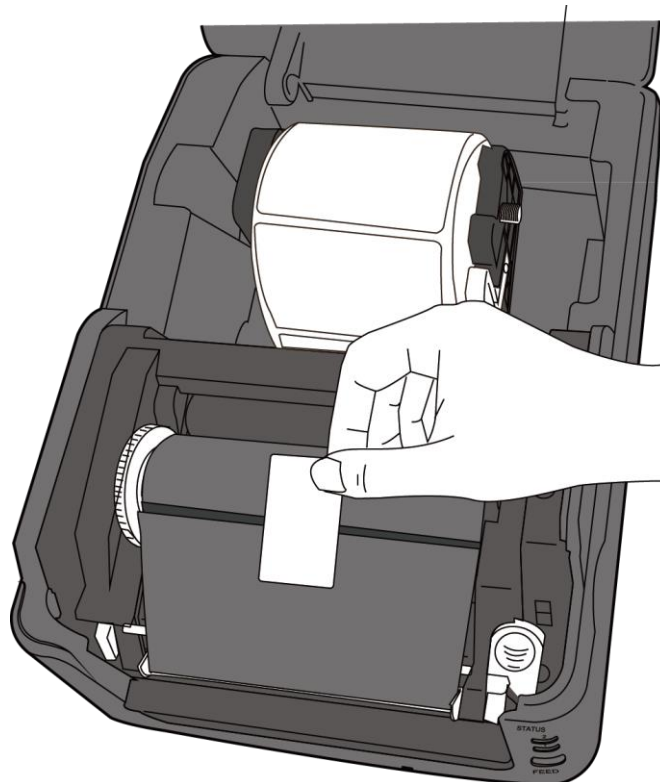
6. Close the printer module and press down firmly at its both sides, until you hear a

    click.
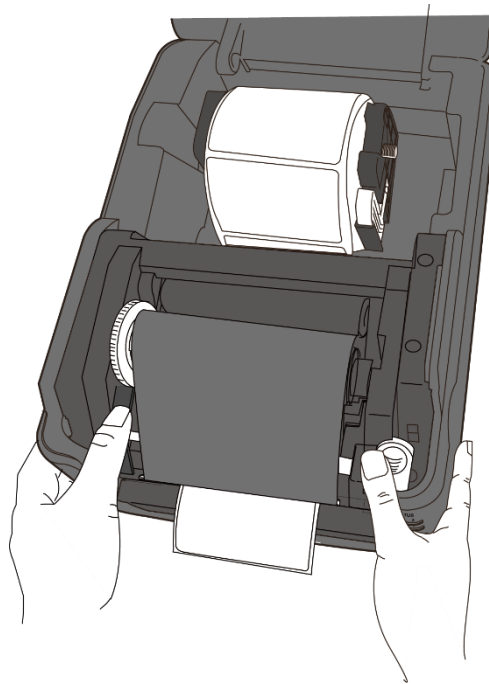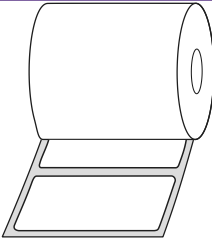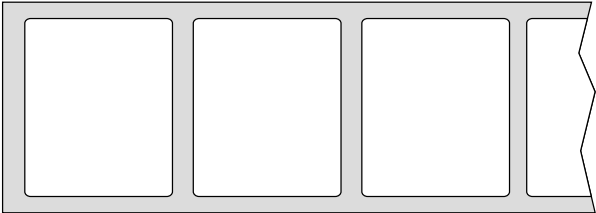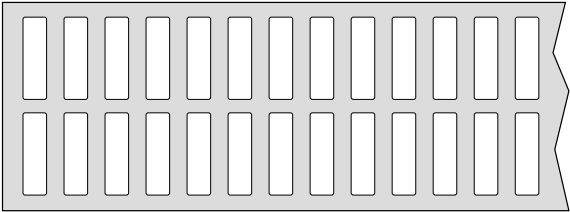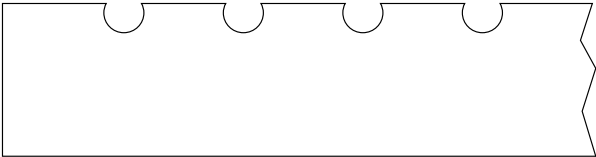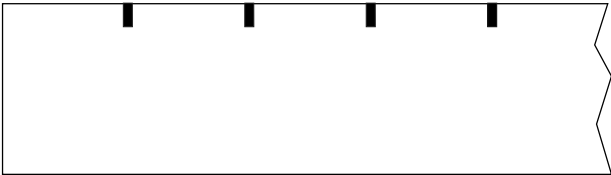
7. Rotate the **Take-Up Wheel** to straighten the ribbon and reduce its wrinkles.
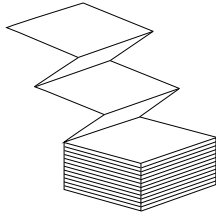
> **Note:** For the supply hub, the ribbon wind direction can be coated side in (CSI) or coated side out (CSO); for the take-up hub, the wind direction must be CSO.

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.

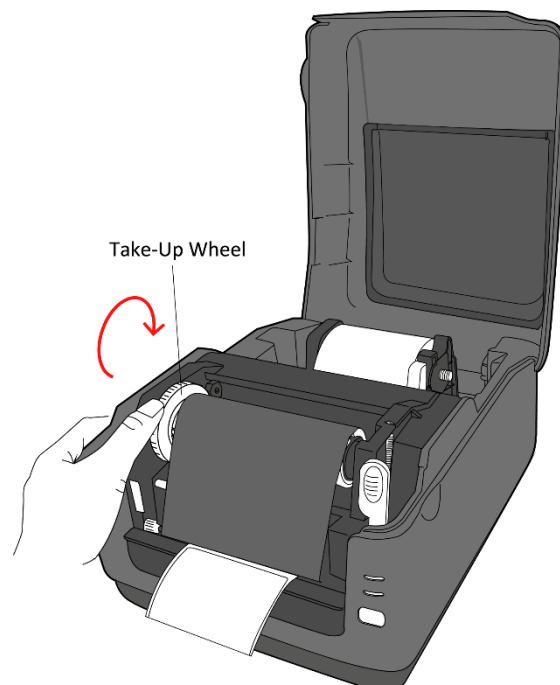| Media Type	Looks Like	Description
Non-Continuous Media		Non-continuous media is the typical media for barcode printing. Labels and tags are made of various materials, such as paper, fabric or cardstock and are separated by gaps, holes, notches or black marks. Many labels are self-adhesive with liners,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

3 Printer Operation

This chapter provides information about printer operation.

3.1 Media Sensor Calibration

You will want the printer to work properly before starting your print jobs. To do this, you need to calibrate the media sensor. 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 glow 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.

Do the following 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.

Your configuration label should look like this:

```
LABEL PRINTER WITH FIRMWARE
WS408TT-70.00.00.01 161102 SBPL
STANDARD RAM : 32M BYTES
AVAILABLE RAM : 3678K BYTES
FLASH TYPE : ON BOARD 16M BYTES
AVAILABLE FLASH : 2576K BYTES
NO. OF DL SOFT FONTS(FLASH) :  0
NO. OF DL SOFT FONTS(RAM)   :  0
NO. OF DL SOFT FONTS(HOST)  :  0
H. POSITION ADJUST.: 001A
GAP SENSOR
I-MARK: 0063 GAP: 0059
MAX LABEL HEIGHT: 38 INCHES
PRINT WIDTH: 812 DOTS
LAB LEN(TOP TO TOP): 79mm
SPEED: 5 IPS
DARKNESS: 2
THERMAL TRANSFER
PRINT DISTANCE: 19M
CUT COUNT:0
RS232: 9600, 8, N, 1P, XON/XOFF
MEDIA : NON-CONTINUOUS
REPRINT AFTER ERROR : ENABLED
BACKFEED ENABLED
CUTTER DISABLED
PEELER DISABLED
CUTTER/PEELER OFFSET: 0 <+-0.01mm>
IP ADDRESS: 0.0.0.0
SUBNET MASK: 0.0.0.0
GATEWAY: 0.0.0.0
MAC ADDRESS: 78-5F-4C-00-04-6B
DHCP: ENABLED
DHCP CLIENT ID: FFFFFFFFFFFFFFFF
                FFFFFFFFFFFFFFFF
DHCP HOST NAME:
SNMP: ENABLED
SOCKET COMM.: ENABLED
SOCKET PORT: 9100
IPV6 MODE: MANUAL
IPV6 TYPE: NONE
IPV6 ADDRESS: 0000:0000:0000:0000:
              0000:0000:0000:0000
LINK LOCAL  : 0000:0000:0000:0000:
              0000:0000:0000:0000
PRODUCT SN: 000AH401009
USB SN: AH4B50501009
ot(0,0)<0.1dot,0.01mm>
rm(0,0)<1+ 0-,0.01mm>
sm(0,0)<1+ 0-,0.01mm>
rv(133,91,41)<0.01v><P>
sv(270,159,110)<0.01v><P>
bv(318,41,277)<0.01v><P>
rso(0)<0.01mm>
sso(0)<0.01mm>
```

3.3 Reset Your Printer

By resetting your printer, you can return your printer to the state it was in when you receive it. This can help you solve some problems caused by settings changed during the printing.
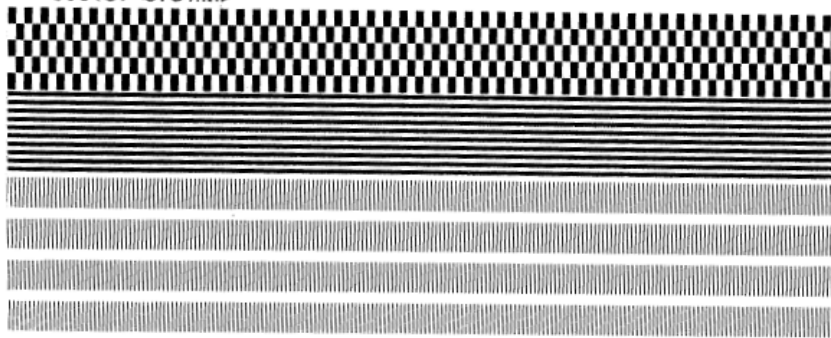
Do the following to reset your printer:

1. Turn off the printer.

2. Press and hold the **FEED** button and turn on the printer.

3. Both status lights glow 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.
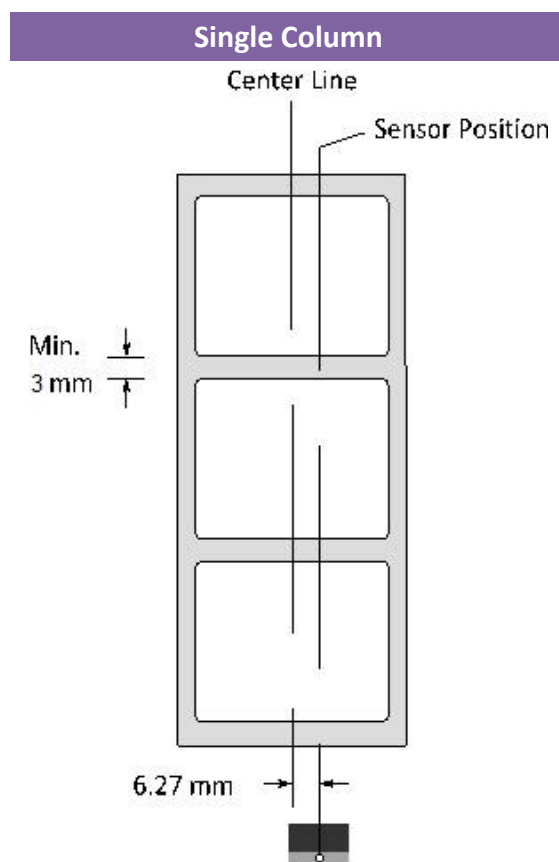
3.4.2   Reflective Sensor

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.
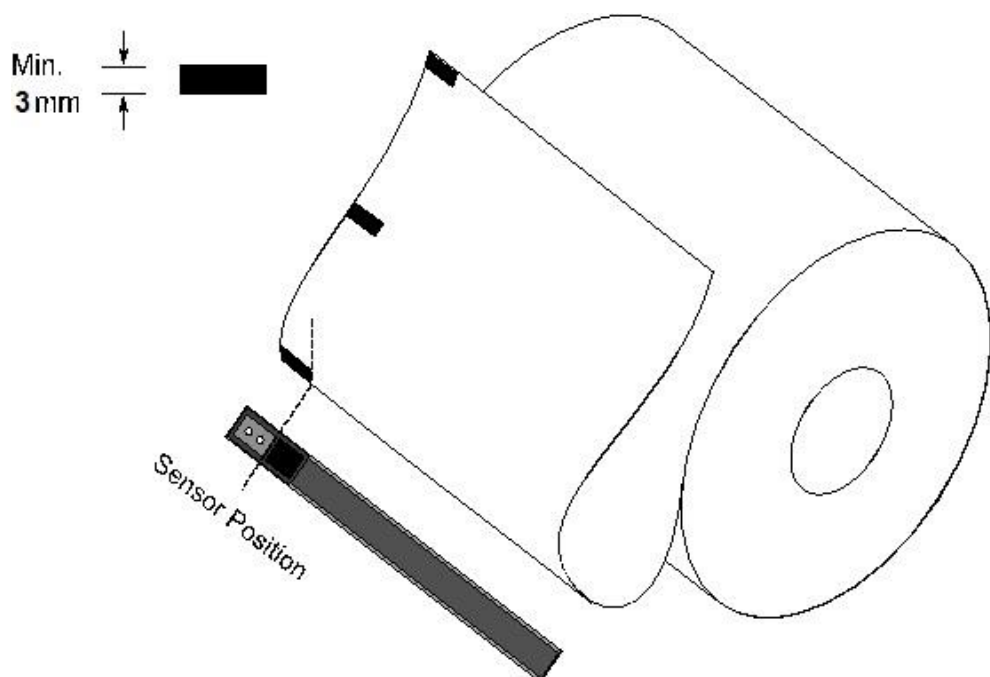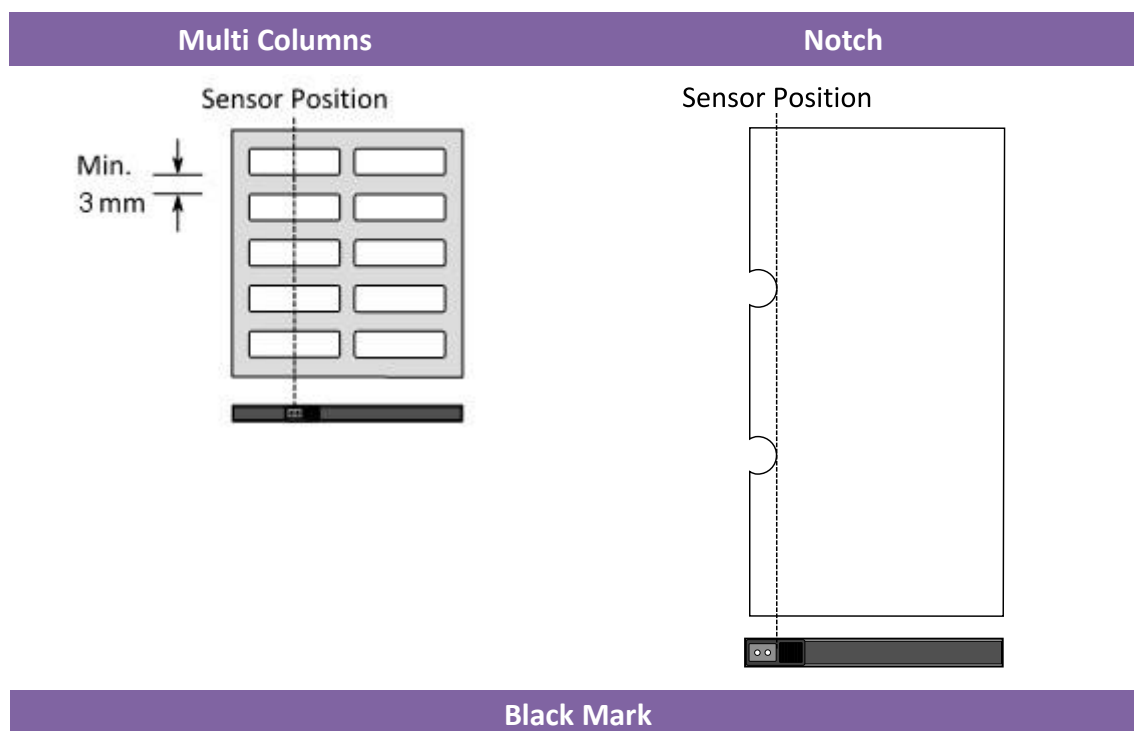
4 Maintenance

This chapter describes routine cleaning procedure.

4.1 Cleaning

To maintain print quality and prolong the printer's life, you need to perform some routine maintenance. Daily maintenance should be done for high volume printing, and weekly for low volume printing.

> ⚠️ **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 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 finish 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 ethyl alcohol.
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.
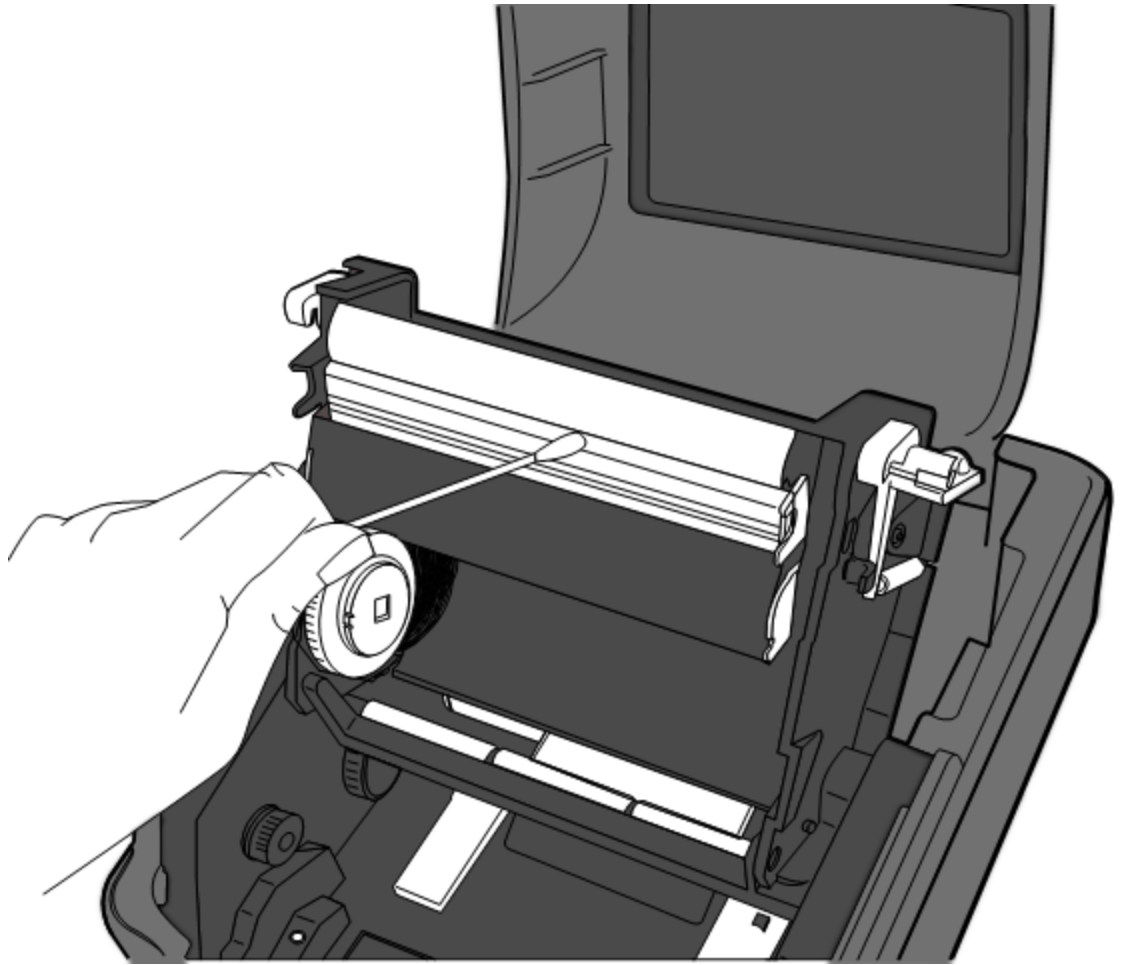
> **Note:** Printhead warranty becomes void if printhead's serial number is removed, altered, defected or made illegible, under every circumstance.

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 ethyl alcohol.
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.
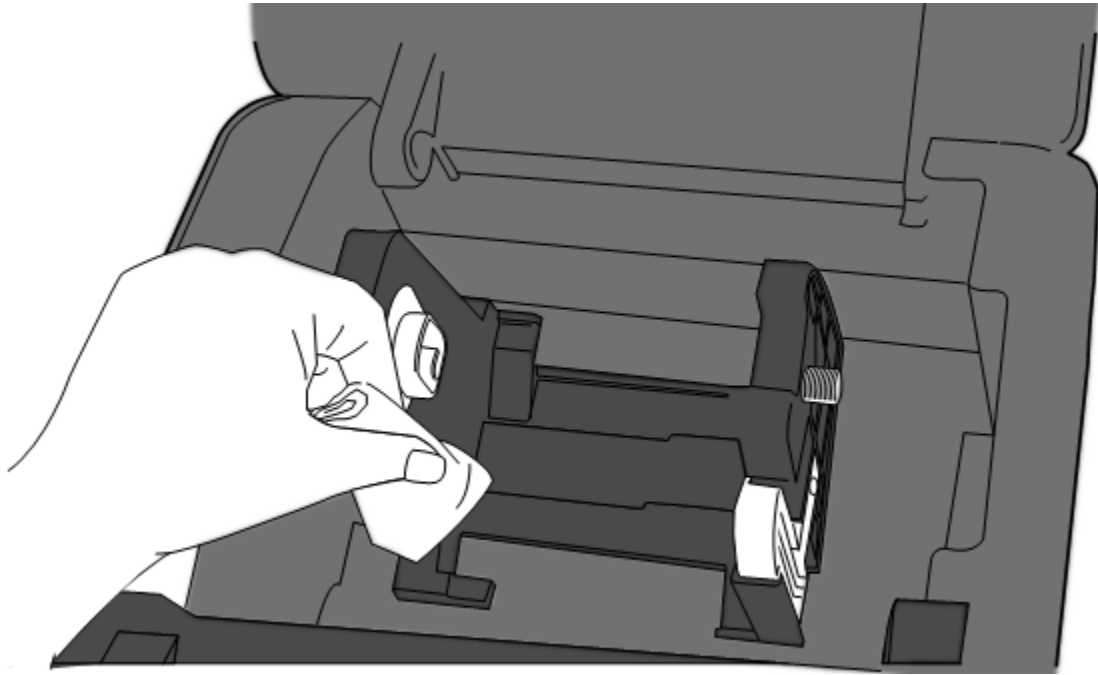
4.1.3 Sensor

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 absolute ethyl alcohol.
2. Gently brush sensors to remove the dust away.
3. Use a dry cloth to clean the residue.
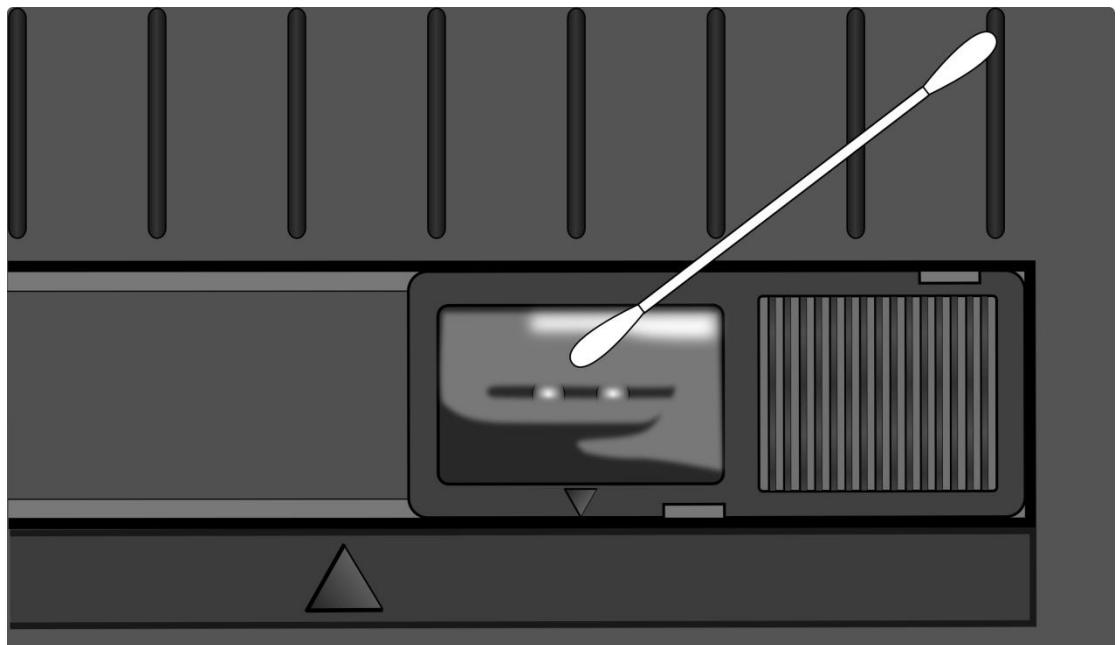
4.1.4   Platen Roller

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.

1. Moisten a soft cloth with absolute ethyl alcohol.
2. Gently wipe the platen roller to remove the dust and adhesive.
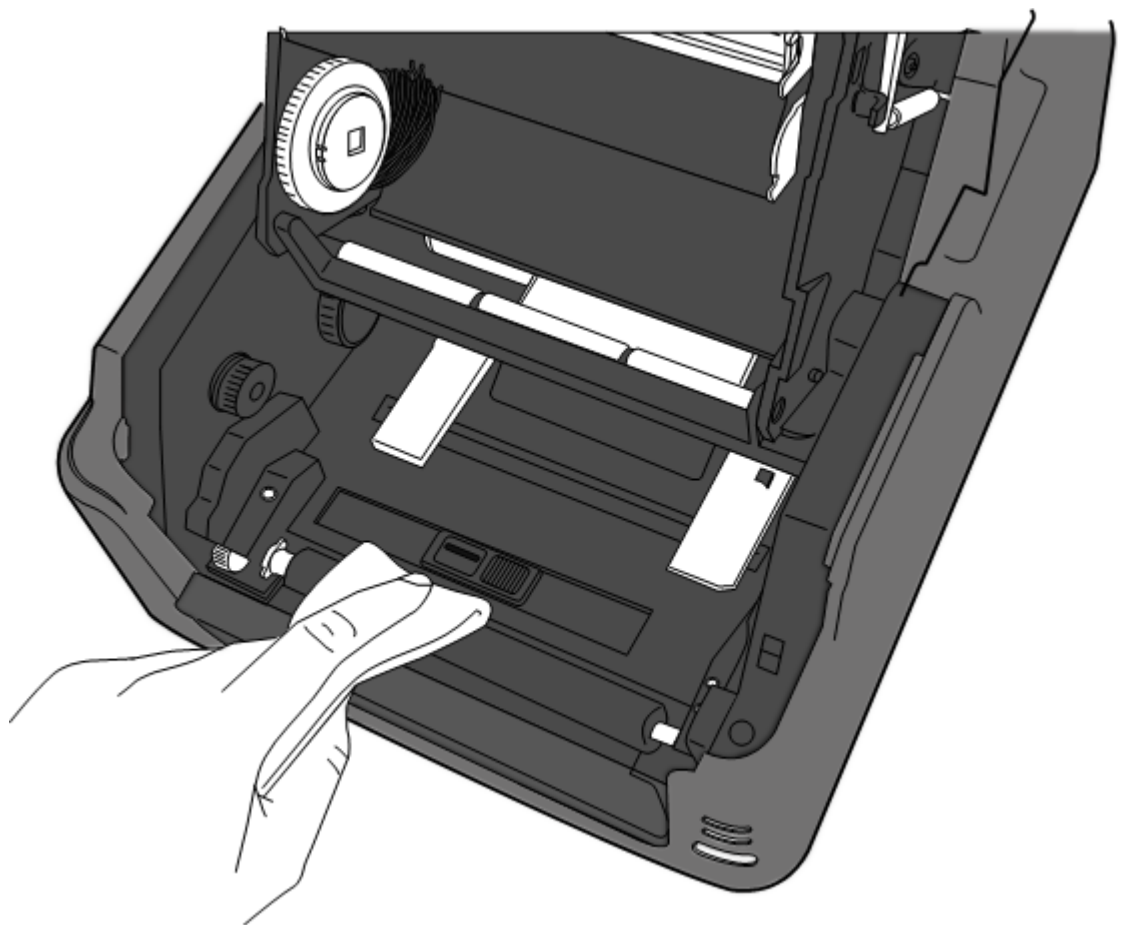
5 Troubleshooting

This chapter provides the information about printer problems and solutions.

5.1 Printer Issues

The printer is not turned 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. Test the power cord and the socket with other electrical devices.

- Disconnect the printer from the wall socket, and connect it again.

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.

I accidentally press the feed button while the printer module is opened

- Close the printer module and press the **FEED** button.

5.2 Media Issues

The media is out

- Load a new media roll.

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 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.

Nothing is printed

- The media is not loaded correctly. See Section 2.3, "Loading Media" to reload the media.

- The ribbon is not loaded correctly. See Section 2.4, "Loading Ribbon" to reload the ribbon.

- 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 ribbon. Use the compatible media instead.

■   The media is incompatible for the printer. Use Toshiba-approved media roll

    instead.

5.3 Ribbon Issues

The ribbon is out

■   Load a new ribbon roll.

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, "Restore Your Printer to Factory Settings").

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 ribbon is wrinkled. Adjust or reload the ribbon or print a few labels until the wrinkled part goes away.

- The printhead is dirty. Clean the printhead.

An error occurred when writing data to the USB memory

- Did you insert the USB drive?

- Make sure the USB drive is plugged tightly into the port.

- The USB drive might be broken. Replace it with another one.

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.

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 cool 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   Specifications

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

6.1   Printer

Model	WS408TT	WS412TT
Print method	Direct Thermal and Thermal Transfer	
Resolution	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	Media Sensor — Gap Sensor (Transmissive, Fixed) - Factory Default Sensor I-Mark Sensor (Reflective, Movable) 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 ips for dispenser mode	2, 3, 4 inches/sec (50.8, 76.2, 101.6 mm/sec) 2 &3 ips for dispenser mode
	Do not set Print Speed to 4 ips or higher speed, when the dispenser module is installed and the dispenser cover is open.	
Print Darkness	Darkness level – SBPL: 1~5 Default – SBPL: 2	
Max Printable Area	Length 999 mm x Width 104 mm	Length 999 mm x Width 104 mm
Non-Printable Area	Pitch Direction - Top: 1.5 mm, Bottom: 1.5 mm (excluding liner) Width Direction - Left: 1.5 mm, Right: 1.5 mm (excluding liner)	
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	

Model	WS408TT	WS412TT
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	

6.2 Media and Ribbon

Properties	Description
Media Size	**Continuous Mode** Length (TT): 10 ~ 996 mm (including liner 13 ~ 999 mm) Length (DT): 10 ~ 996 mm (including liner 13 ~ 999 mm) Width: 25.4 ~ 115 mm (including liner 28.4 ~ 118 mm) **Tear-Off Mode** Length (TT): 25.4 ~ 996 mm (including liner 28.4 ~ 999 mm) Length (DT): 30 ~ 996 mm (including liner 33 ~ 999 mm) Width: 25.4 ~ 115 mm (including liner 28.4 ~ 118 mm) **Dispenser Mode** Length (TT): 25.4 ~ 152.4 mm (including liner 28.4 ~ 155.4 mm) Length (DT): 35 ~ 152.4 mm (including liner 38 ~ 155.4 mm) Width: 25.4 ~ 115 mm (including liner 28.4 ~ 118 mm) **Cutter Mode** Length (TT): 25.4 ~ 996 mm (including liner 28.4 ~ 999 mm) Length (DT) : 35 ~ 996 mm (including liner 38 ~ 999 mm) Width: 25.4 ~ 115 mm (including liner 28.4 ~ 118 mm) Media Thickness: 0.06 ~ 0.19 mm Max Roll Diameter Size: 127 mm (5 inches) Max Roll Diameter Size for External Unwinder: 203.2 mm (8 inches)
Media Type	Thermal Transfer Label Thermal Transfer Tag Direct Thermal Label Direct Thermal Tag Roll Paper (Face-Out/Face-In) Fanfold Paper
Ribbon Size	Length: 100 m (φ Core Size: 0.5 inch), Max 300 m (φ Core Size: 1 inch) Width: 40 ~ 110 mm
Ribbon Type	Wax, Wax-Resin, Resin Coated Side In or Coated Side Out

6.3 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)

Barcodes

GS1 DataBar Expanded Stacked Composite (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)

6.4 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

6.5 Wireless LAN

	Properties	Wireless LAN I/F		
Hardware	Protocol	IEEE 802.11 b/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 9/6 Mbps: BPSK

Properties			Wireless LAN I/F	
	IEEE 802.11n	Transmission Method	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	
	Security		IEEE 802.11i	
		Cryptography	WEP 128 bit, TKIP (WPA), AES (WPA2)	
		Authorization	Shared Key, Open System, PSK, PEAP, TLS,TTLS, LEAP, EAP-FAST	
	Protocol (*)		TCP/IP, Socket, DHCP	
	Wireless LAN Parameter and Status Monitor		Parameter: Command (Printer Utility)	

6.6 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

6.7 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	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)

6.8 Physical Dimension

Dimension	Size and Weight
Size	W 220.6 x D 278.5 x H 187.5
Weight	Approx. 2.48 kg

6.9   Interfaces

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

6.9.1   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
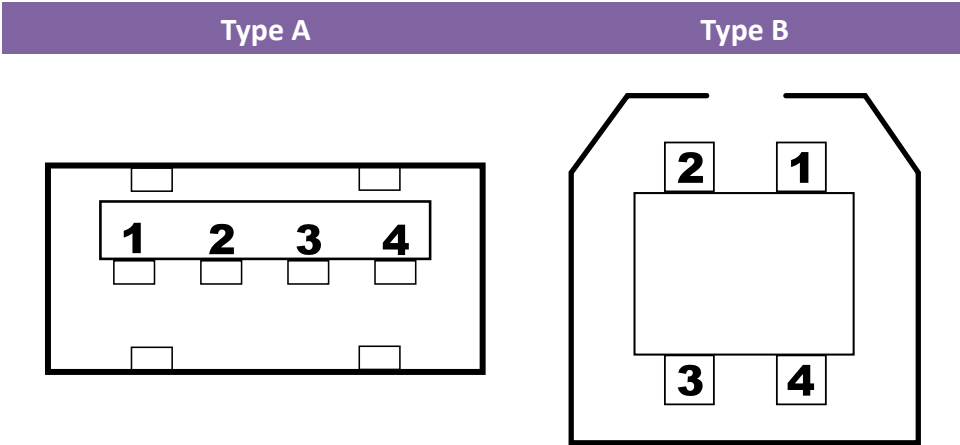
Pin	Signal	Description
1	VBUS	+5V
2	D-	Differential data signaling pair -
3	D+	Differential data signaling pair +
4	Ground	Ground

6.9.2   Ethernet

The Ethernet uses RJ-45 cable, which is 8P8C (8-Position 8-Contact). The figure below shows its pinout.
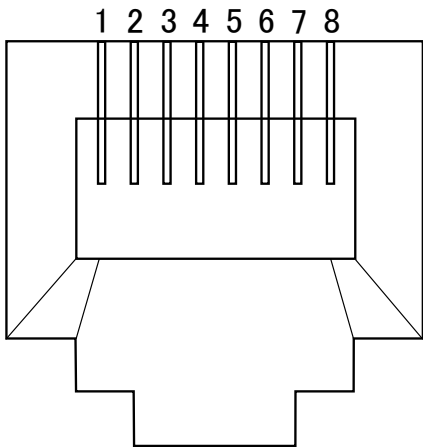
Pin	Signal
1	Transmit+
2	Transmit-
3	Receive+
4	Reserved
5	Reserved
6	Receive-
7	Reserved
8	Reserved

6.9.3   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.
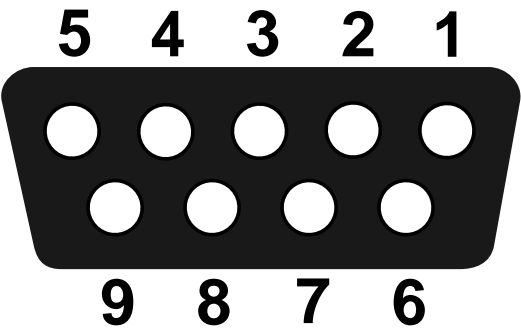
Pin	Signal	Description
1	+5V	Provide 5V Power
2	RxD	Receive
3	TxD	Transmit
4	NC	No Connection
5	GND	Ground
6	Hi	Pull High
7	RTS NC	Request to Send
8	CTS	Clear to Send
9	Hi	Pull High

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

7 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.