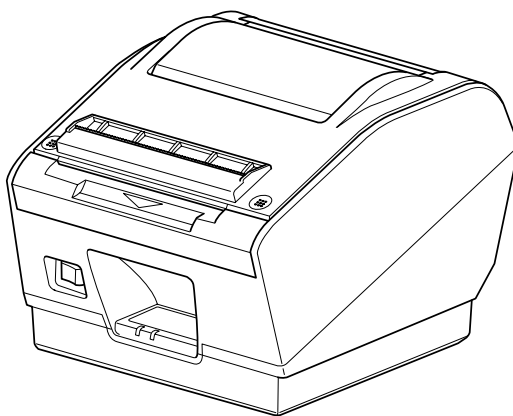


***Label PRINTER***  
**TSP828L SERIES**

***Hardware Manual***



**star** 

**Federal Communications Commission  
Radio Frequency Interference  
Statement**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: 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 instruction manual, 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.

For compliance with the Federal Noise Interference Standard, this equipment requires a shielded cable.

This statement will be applied only for the printers marketed in U.S.A.

**Statement of  
The Canadian Department of Communications  
Radio Interference Regulationst**

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The above statement applies only to printers marketed in Canada.

***Trademark acknowledgments***

TSP828L: Star Micronics Co., Ltd.

***Notice***

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- The contents of this manual are subject to change without notice.
- All efforts have been made to ensure the accuracy of the contents of this manual at the time of going to press. However, should any errors be detected, STAR would greatly appreciate being informed of them.
- The above notwithstanding, STAR can assume no responsibility for any errors in this manual.

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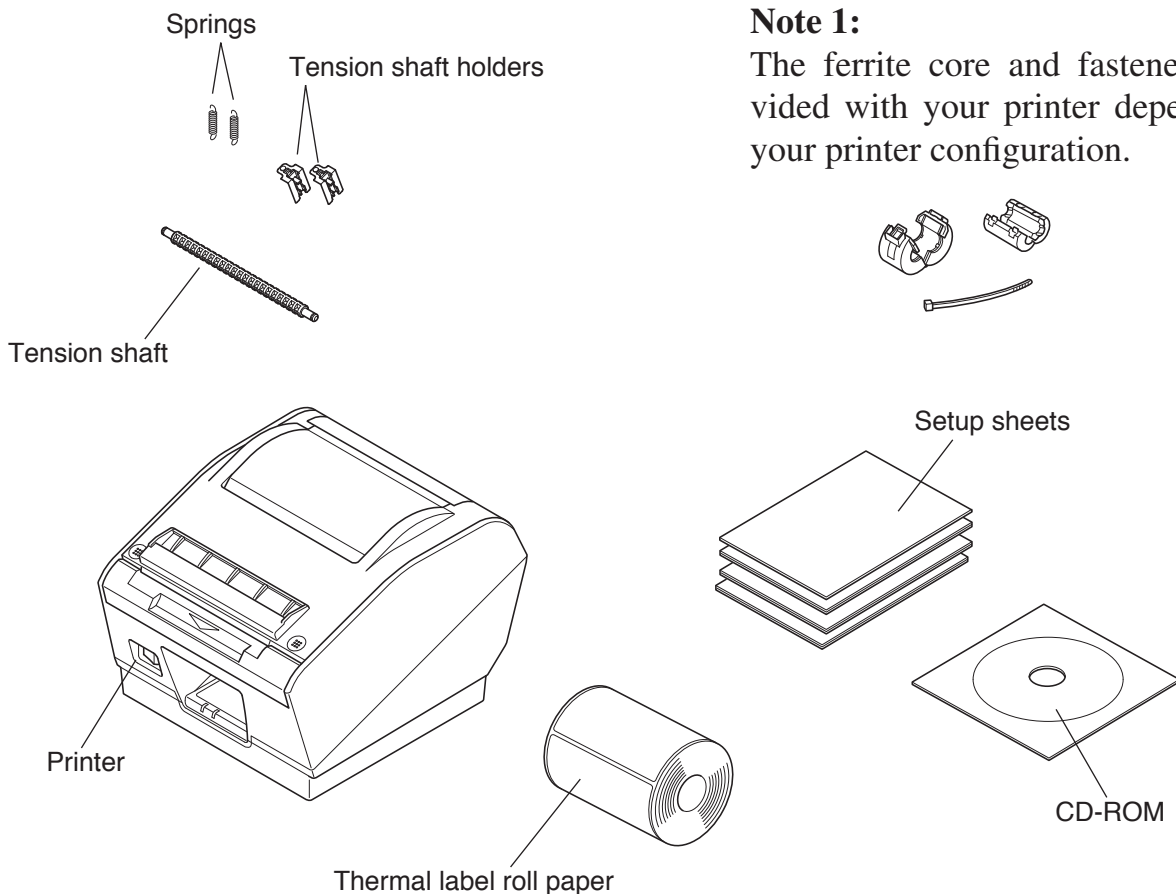
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Please access the following URL  
<http://www.star-m.jp/eng/dl/dl02.htm>  
for the latest revision of the manual.

# 1. Unpacking and Installation

## 1-1. Unpacking

After unpacking the unit, check that all the necessary accessories are included in the package.



### Note 1:

The ferrite core and fastener provided with your printer depend on your printer configuration.

### Note 2:

When using a thermal label roll paper, do not install the tension bar, two tension folders, and two springs; otherwise, a paper jam could result.

**Fig. 1-1 Unpacking**

If anything is missing, contact the dealer where you bought the printer and ask them to supply the missing part. Note that it is a good idea to keep the original box and all the packing materials just in case you need to pack the printer up again and send it somewhere at a later date.

## Choosing a place for the printer

Before actually unpacking the printer, you should take a few minutes to think about where you plan to use it. Remember the following points when doing this.

- ✓ Choose a firm, level surface where the printer will not be exposed to vibration.
- ✓ The power outlet you plan to connect to for power should be nearby and unobstructed.
- ✓ Make sure that the printer is close enough to your host computer for you to connect the two.
- ✓ Make sure that the printer is not exposed to direct sunlight.
- ✓ Make sure that the printer is well away from heaters and other sources of extreme heat.
- ✓ Make sure that the surrounding area is clean, dry, and free of dust.
- ✓ Make sure that the printer is connected to a reliable power outlet. It should not be on the same electric circuit as copiers, refrigerators, or other appliances that cause power spikes.
- ✓ Make sure that the room where you are using the printer is not too humid.

### WARNING

- ✓ Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise. Immediately unplug the equipment and contact your dealer for advice.
- ✓ Never attempt to repair this product yourself. Improper repair work can be dangerous.
- ✓ Never disassemble or modify this product. Tampering with this product may result in injury, fire, or electric shock.

### CAUTION

- ✓ When using a thermal label roll paper, do not install the tension bar, two tension folders, and two springs; otherwise, a paper jam could result.

## 2. Parts Identification and Nomenclature

### Printer cover

Open this cover to load or replace paper. Do not open the cover while printing.

### Front cover

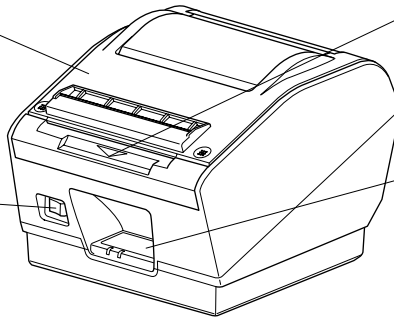
Push the center of the front cover to open the printer cover.

### Power switch

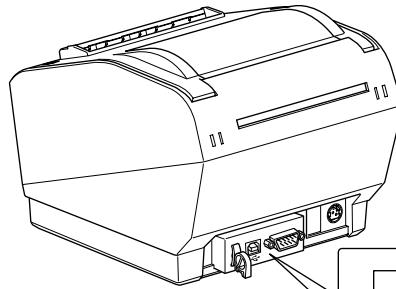
Used to turn on/off power to the printer.

### Control panel

Features LED indicators to indicate printer status and switches to operate the printer.



## Dual Interface Model



### USB interface

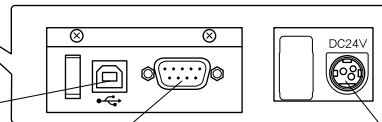
For connection to a host computer. However, it cannot be connected concurrently with RS-232.

### RS-232 interface

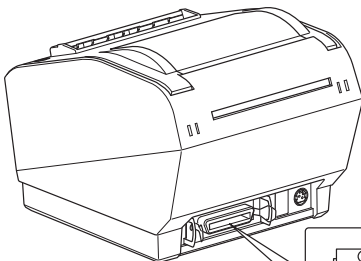
For connection to a host computer. However, it cannot be connected concurrently with USB.

### Power connector

For connection of the AC adapter. Never unplug the AC adapter while the printer is on.

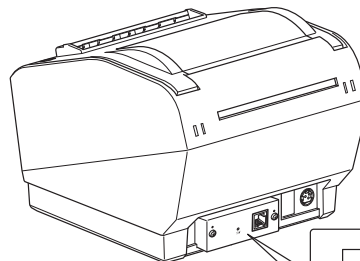
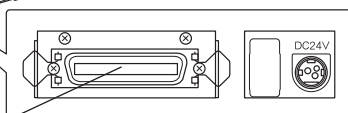


## Parallel Interface Model Ethernet Interface Model



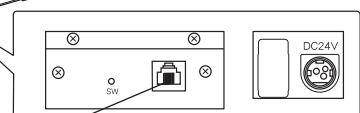
### Parallel interface

For connection to a host computer.



### Ethernet interface

For connection to a host computer.

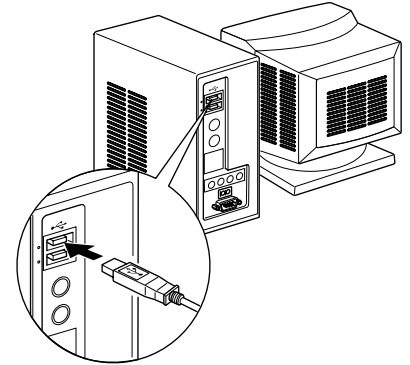


## 3. Setup

### 3-1. Connecting the Cable to the PC

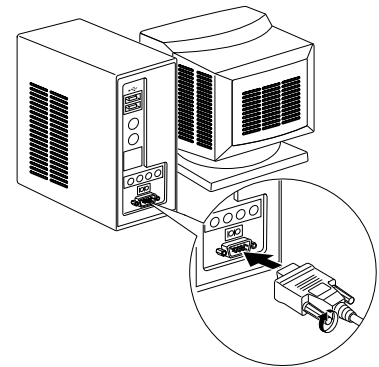
#### 3-1-1. USB Interface cable

Connect the USB interface cable to a USB port of your PC.



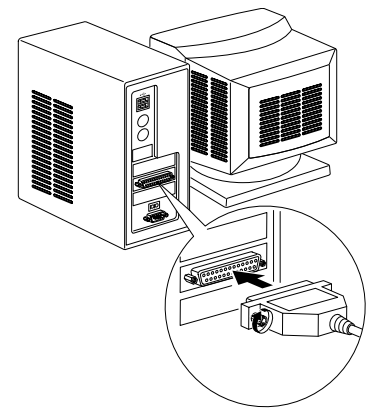
#### 3-1-2. RC-232 Interface Cable

Connect the RC-232 interface cable to a RS-232 port of your PC.



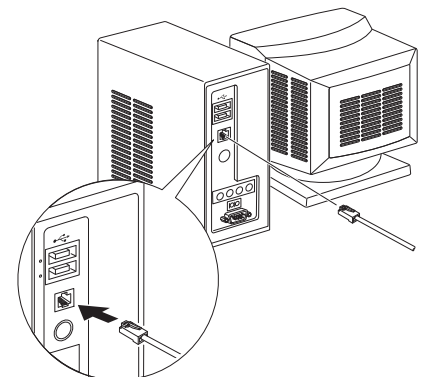
#### 3-1-3. Parallel Interface Cable

Connect the parallel interface cable to a parallel port of your PC.



#### 3-1-4. Ethernet Interface cable

Connect the ethernet interface cable to a ethernet port of your PC.

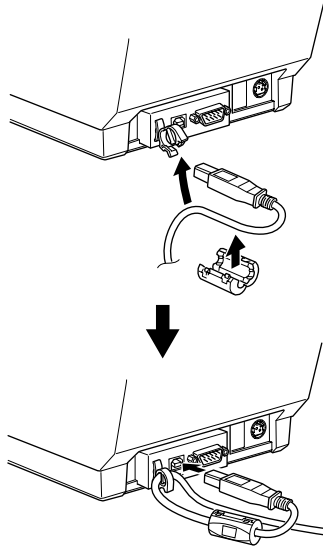


## 3-2. Connecting the Cable to the Printer

Note that the interface cable is not provided. Please use a cable that meets specifications.

### 3-2-1. USB Interface Cable

Affix the ferrite core onto the USB cable as shown in the illustration below and make sure to pass the cable through the cable support as shown in the illustration.



### 3-2-2. RS-232 Interface Cable

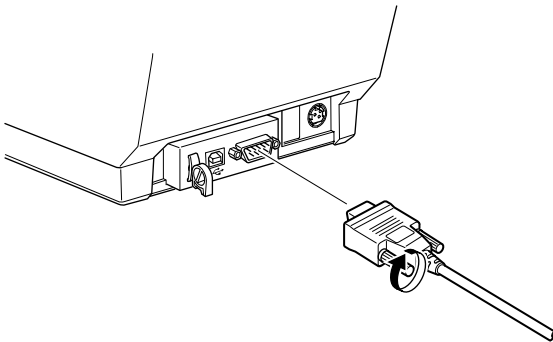
(1) Make sure the printer is turn off.

---

#### **⚠ CAUTION**

*Before connecting/disconnecting the interface cable, make sure that power to the printer and all the devices connected to the printer is turned off. Also make sure the power cable plug is disconnected from the AC outlet.*

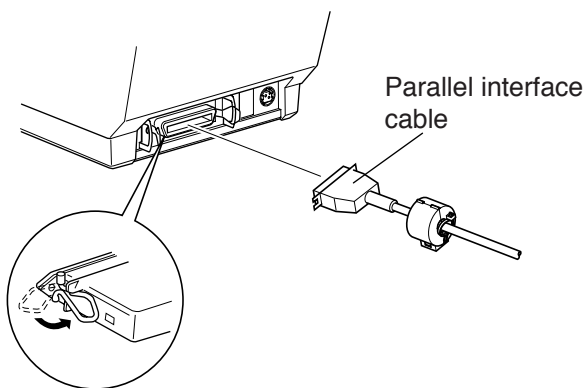
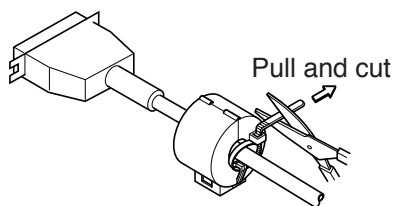
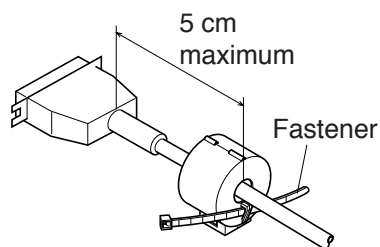
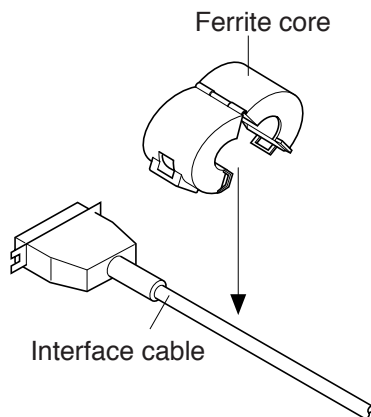
---



- (2) Connect the interface cable to the connector on the rear panel of the printer.
- (3) Tighten the connector screws.



### 3-2-3. Parallel Interface Cable



- (1) Make sure the printer is turn off.
- (2) For only the parallel interface model, affix the ferrite core onto the cable as shown in the illustration below.

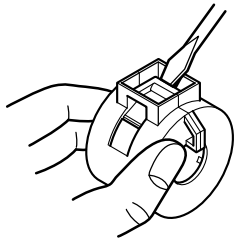
- (3) Pass the fastener through the ferrite core.

- (4) Loop the fastener around the cable and lock it. Use scissors to cut off any excess.

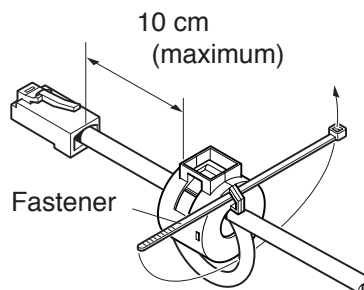
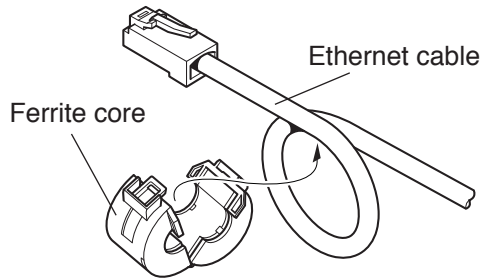
- (5) Connect the interface cable to the connector on the rear panel of the printer.
- (6) Fasten the connector clasps.

### 3-2-4. Connecting Ethernet Cable

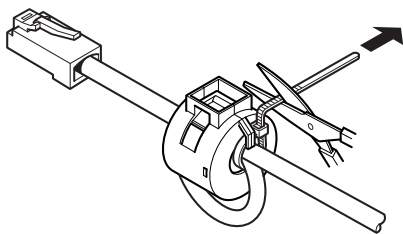
When using an Ethernet cable that is 10 cm or less, shielded cable is recommended.



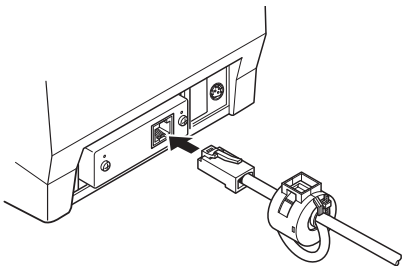
- (1) Make sure the printer is turned off.
- (2) Affix the ferrite core onto the ethernet cable as shown in the illustration.



- (3) Pass the fastener through the ferrite core.



- (4) Loop the fastener around the cable and lock it. Use scissors to cut off any excess.



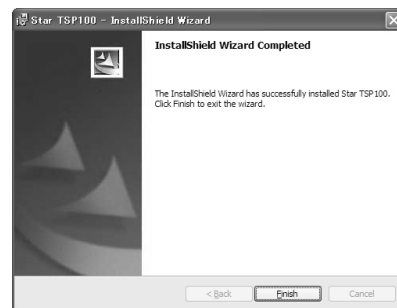
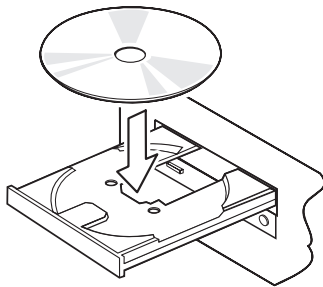
- (5) Connect the interface cable to the connector on the rear panel of the printer.

### 3-3. Installing the Printer Software

Here is the procedure for installing the printer driver and utility software, which are stored on the supplied CD-ROM.

The procedure applies to the Windows operating systems shown below.

- Windows 2000
  - Windows XP
  - Windows Vista
  - Windows 7
- (1) Turn ON the power to your PC to start Windows.
  - (2) Insert the supplied CD-ROM (Drivers and Utilities) into the CD-ROM drive.
  - (3) Follow the instructions that appear on the screen.
  - (4) The dialog shown in the illustration indicates that the procedure has been completed. Click “OK”.



The dialog that appears on the screen varies with your system. This completes the installation of the printer software. A message will appear, prompting you to restart. Restart Windows.

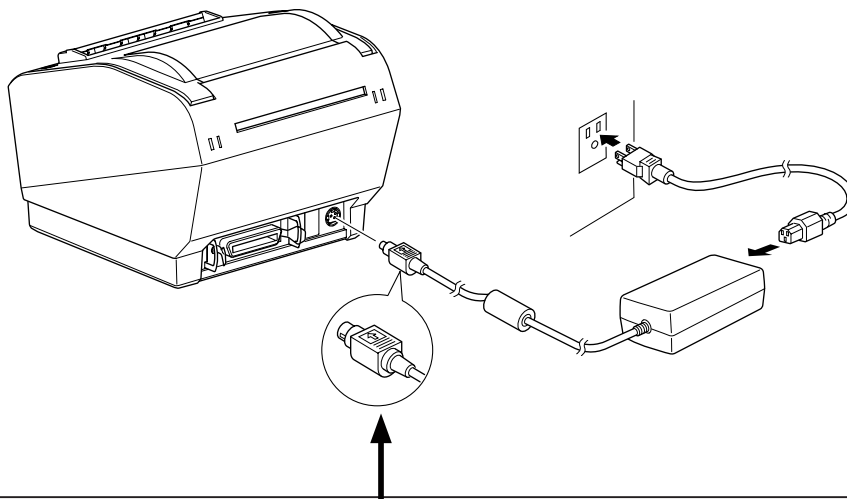
### 3-4. Connecting the AC Adapter

**Note:** Before connecting/disconnecting the AC adapter, make sure that power to the printer and all the devices connected to the printer are turned off. Also make sure the power cable plug is disconnected from the AC outlet.

- (1) Connect the AC adapter to the power cable.

**Note:** Use only the standard AC adapter and power cable.

- (2) Connect AC adapter to the connector on the printer.
- (3) Insert the power cable plug into an AC outlet.



---

#### **⚠ CAUTION**

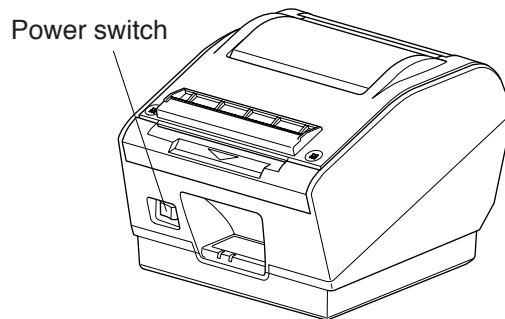
*When disconnecting the cable, take hold of the cable connector to pull it out. Releasing the lock makes it easy to disconnect the connector. Pulling the cable excessively could cause damage to the connector.*

---

### 3-5. Turning Power On

Make sure that the Power cord has been connected as described in 3-4.

Turn ON the power switch located on the front of the printer.  
The POWER lamp on the control panel will light up.



---

#### **⚠ CAUTION**

*We recommend that you unplug the printer from the power outlet whenever you do not plan to use it for long periods. Because of this, you should locate the printer so that the power outlet it is plugged into is nearby and easy to access.*

*When an Switch blind is affixed to the printer above the power switch, the ON/OFF marks of the power switch may be hidden. If this occurs, remove the power cord from the outlet to turn the printer OFF.*

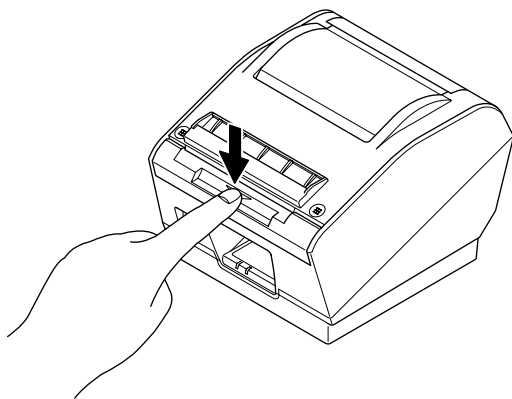
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## 3-6. Loading the Roll Paper

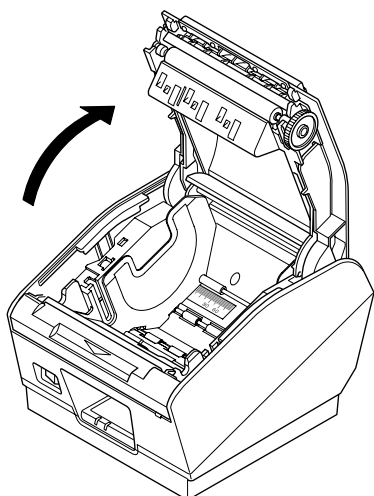
### 3-6-1. Thermal Label Roll Paper (Peel Mode)

#### CAUTION

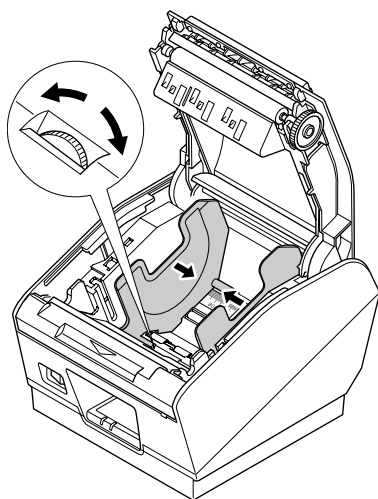
*When using a thermal label roll paper, do not install the tension bar, two tension folders, and two springs; otherwise, a paper jam could result.*



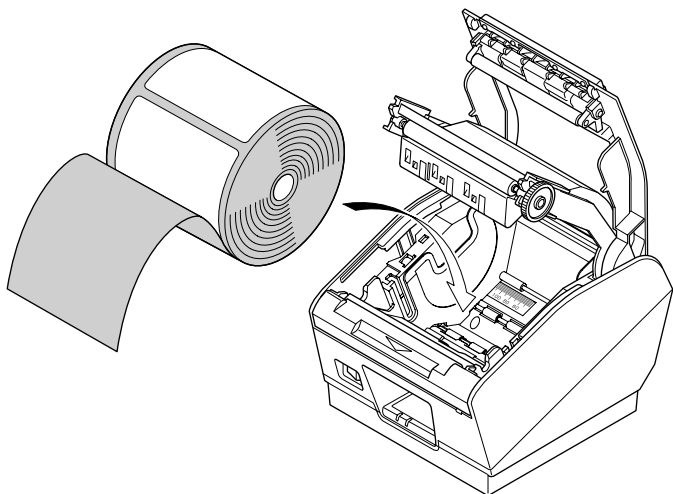
- (1) Check that dip switch 1-8 is ON (default: thermal label roll paper). See Chapter 9 for instructions on how to set the dip switches.
- (2) Turn ON the power switch of the printer.
- (3) Push the front cover downward.



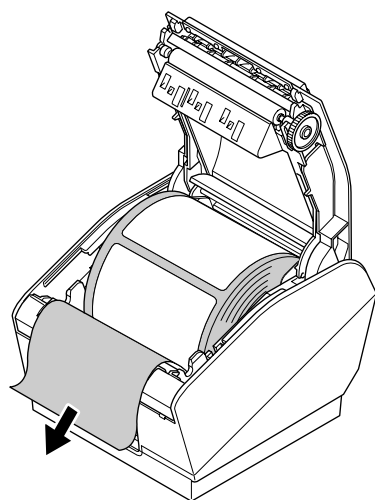
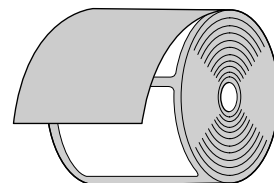
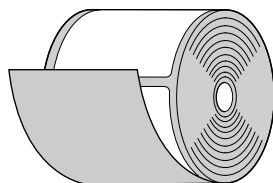
- (4) Open both the outer and inner printer covers.



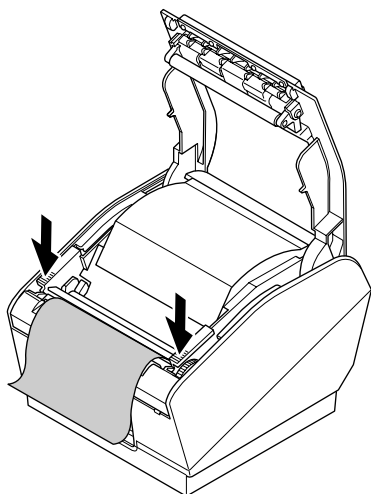
- (5) Adjust the roll paper guide to the width of the roll paper.



- (6) Peel off a label that is within 150 mm from the end of the roll paper, and place the roll paper in the direction shown.

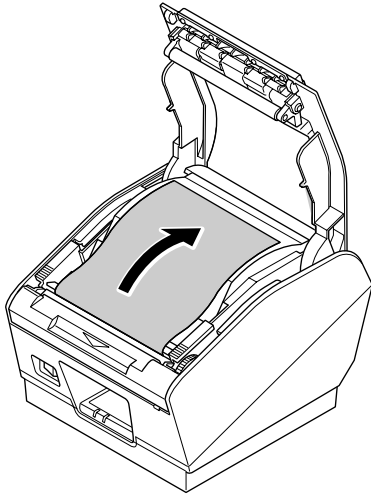


- (7) Pull out the end of the backing paper towards you.

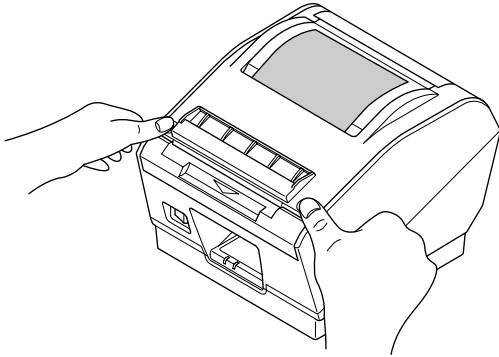


- (8) Close the inner cover, and firmly press both its ends.

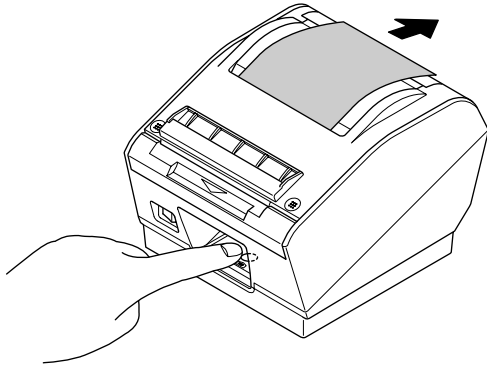
- (9) Turn the end of the backing paper backward.



- (10) Push both sides of the printer cover with your hands as shown, until the printer cover is securely closed.

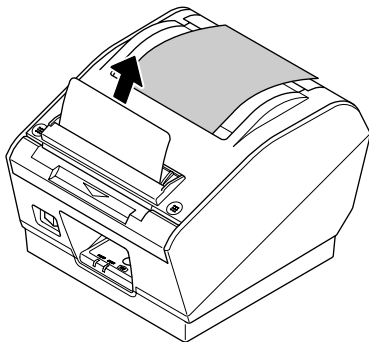


- (11) Gently pull the end of the backing paper to take up the slack in the roll paper.  
(12) Press the FEED button to bring up the leading edge of the roll paper.



**Note:** If the leading edge of a label is not detected after 300 mm or more of the roll is fed, the printer will determine that it is out of paper, and will stop. Redo the loading of the roll paper from the beginning.

- (13) After printing, the printer will eject a label as shown, and flash the (red) ERROR lamp.



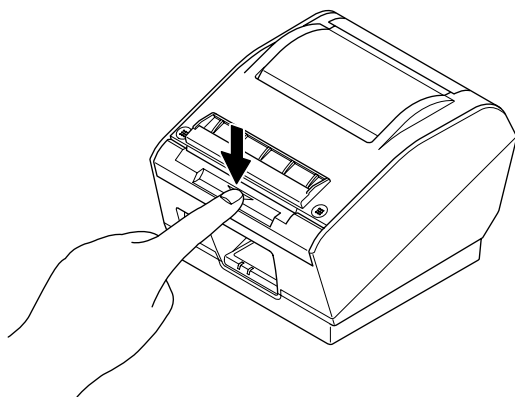
- (14) Remove the label. The ERROR lamp will go out when the label is removed.



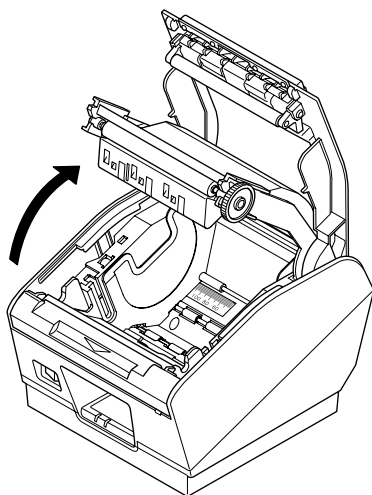
### 3-6-2. Thermal Label Roll Paper (Tear Bar Mode)

#### **CAUTION**

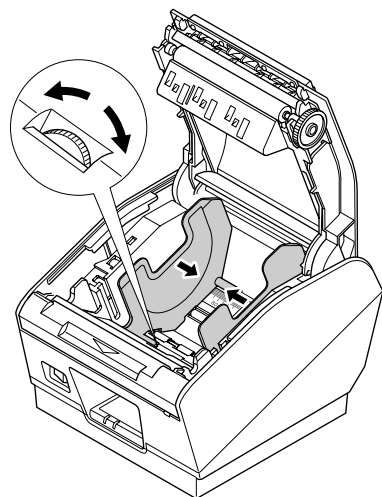
*When using a thermal label roll paper, do not install the tension bar, two tension folders, and two springs; otherwise, a paper jam could result.*



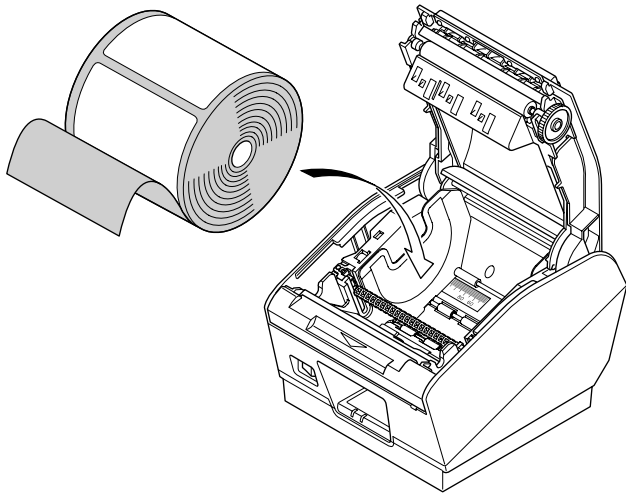
- (1) Check that dip switch 1-8 is ON (default: thermal label roll paper). See Chapter 9 for instructions on how to set the dip switches.
- (2) Turn ON the power switch of the printer.
- (3) Push the front cover downward.



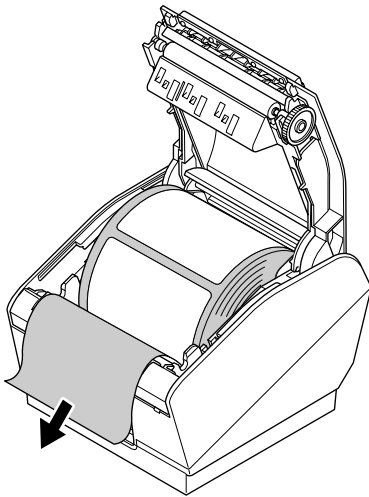
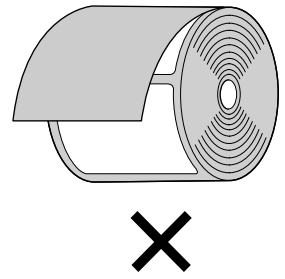
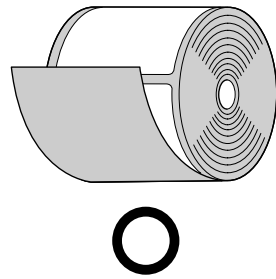
- (4) Open both the outer and inner printer covers.



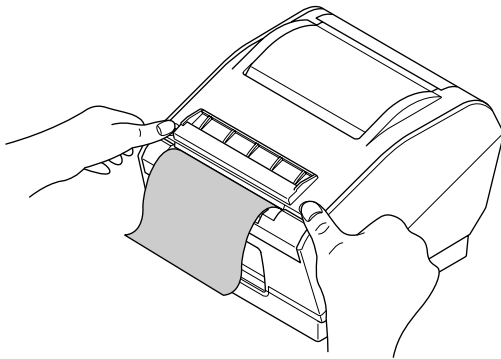
- (5) Adjust the roll paper guide to the width of the roll paper.



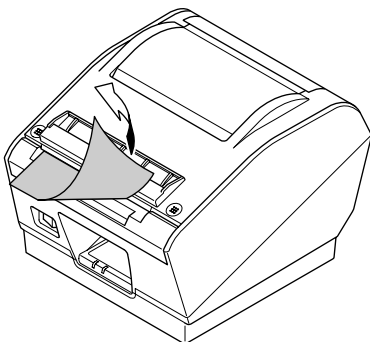
- (6) Peel off a label that is within 100 mm from the end of the roll paper, and place the roll paper in the direction shown.



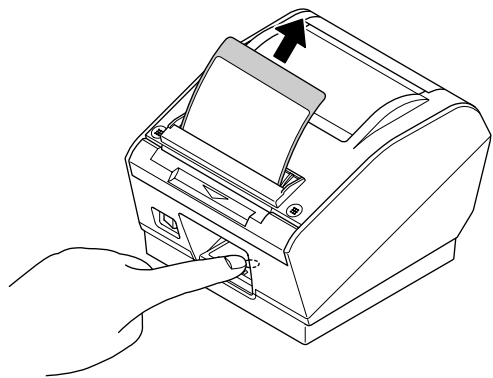
- (7) Pull out the end of the backing paper towards you.  
 (8) Check that the power switch is ON.



- (9) Leaving the backing paper as is, close both the outer and inner covers. Push both sides of the printer cover with your hands as shown, until the printer cover is securely closed.



- (10) Cut the portion of the backing paper, which extends from the front cover, along the tear bar.

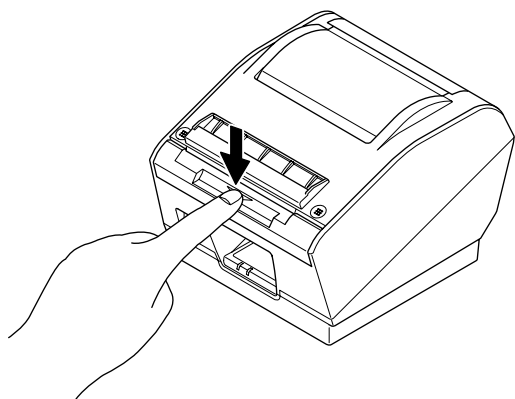


(11) Press the FEED button to bring up the leading edge of the roll paper.

**Note:** If the leading edge of a label is not detected after 300 mm or more of the roll is fed, the printer will determine that it is out of paper, and will stop. Redo the loading of the roll paper from the beginning.

(12) The printer will eject a label as shown.

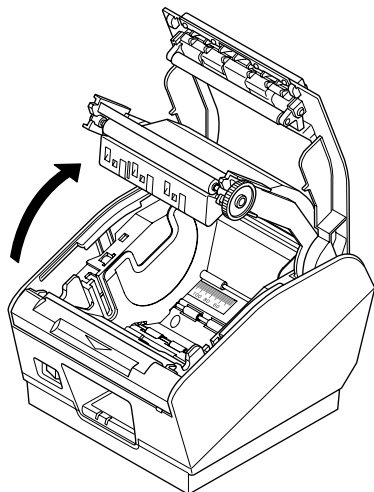
### 3-6-3. Thermal Roll Paper



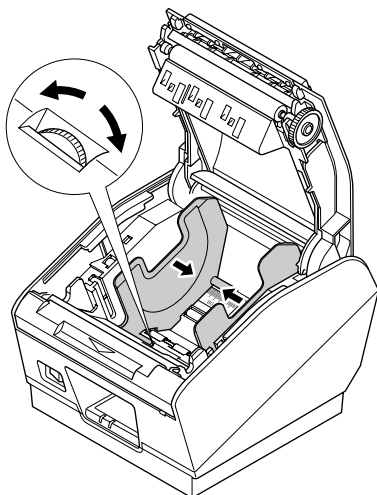
(1) Check that dip switch 1-8 is OFF (thermal roll paper).

(2) Turn ON the power switch of the printer.

(3) Push the front cover downward.



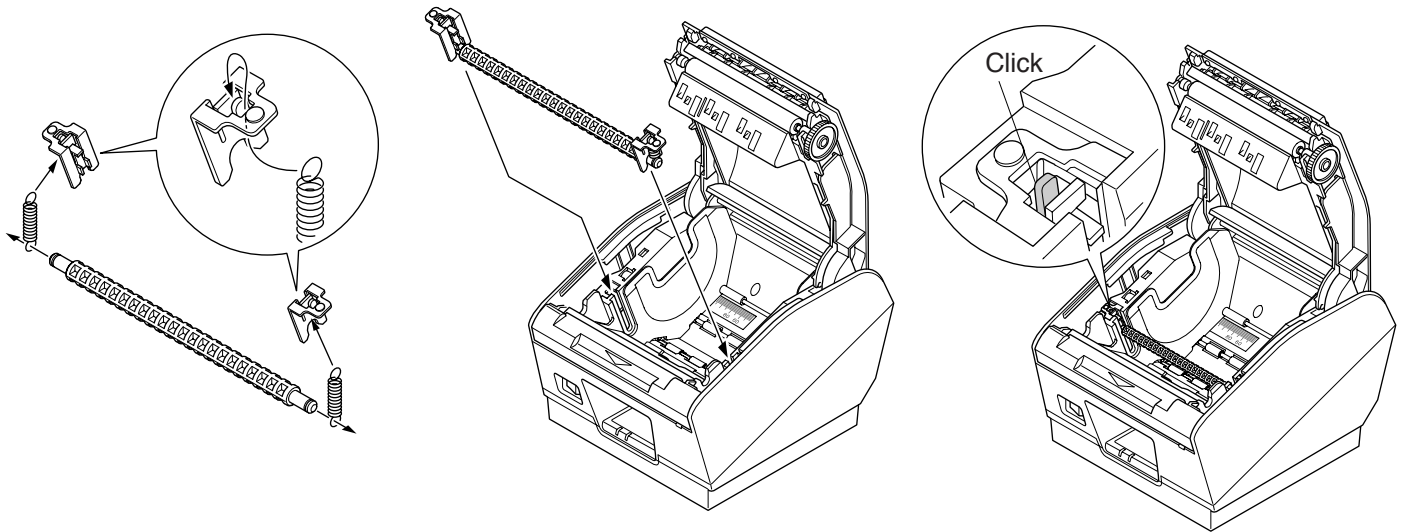
(4) Open both the outer and inner printer covers.



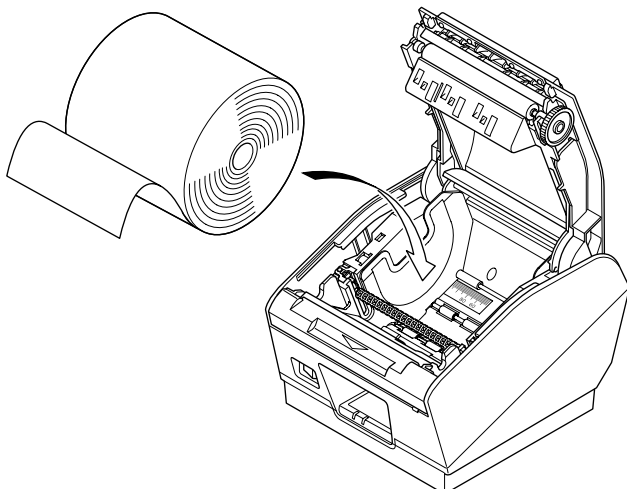
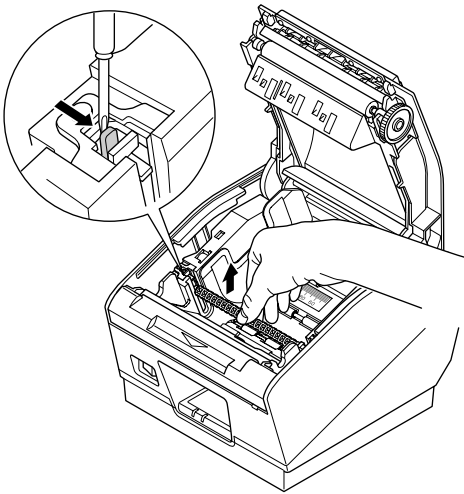
(5) Adjust the roll paper guide to the width of the roll paper.

- (6) If the thickness of the paper is 65 to 99  $\mu\text{m}$ , install the tension bar on the printer as shown. If the thickness of the paper is 100 to 150  $\mu\text{m}$ , it is not necessary to install the tension bar.

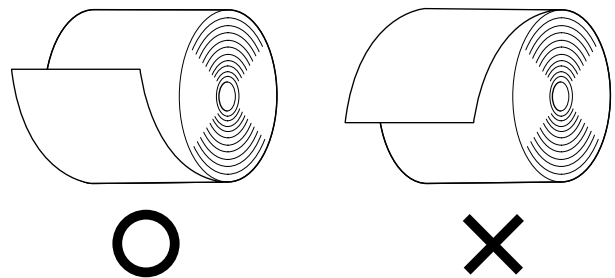
**Note:** Firmly press the tension bar until it clicks into place.



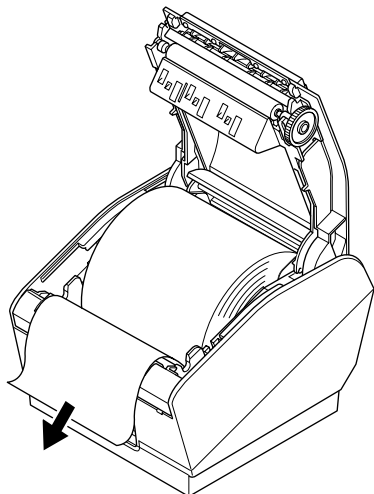
**Note:** To remove the tension bar, use a slot screwdriver to undo the clips at each end of the tension bar, as shown. Then, remove the tension bar.



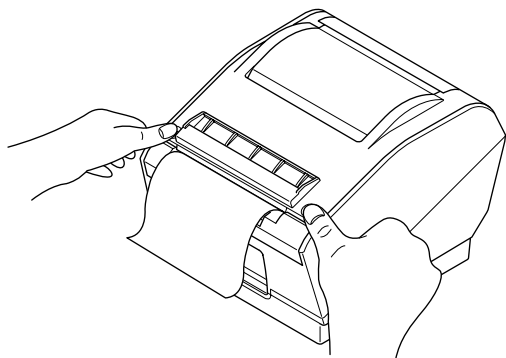
- (7) Place the roll paper in the direction shown.



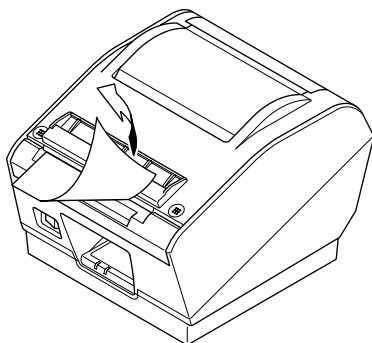
- (8) Pull out the end of the roll paper towards you.



- (9) Leaving the paper as is, close both the outer and inner covers. Push both sides of the printer cover with your hands as shown, until the printer cover is securely closed.



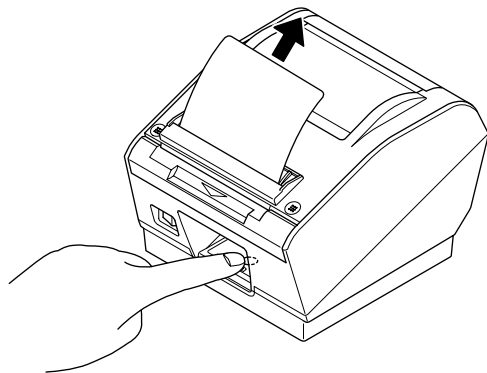
- (10) Cut the portion of the paper that extends from the front cover.



- (11) Press the FEED button to bring up the leading edge of the roll paper.

**Note:** If the leading edge of a label is not detected after 300 mm or more of the roll is fed, the printer will determine that it is out of paper, and will stop. Redo the loading of the roll paper from the beginning.

- (12) The printer will eject a label as shown.



### Caution Symbol



*This symbol is placed near the thermal print head to indicate that it may be hot. Never touch the thermal print head immediately after the printer has been used. Let the thermal print head cool for a few minutes before touching it.*

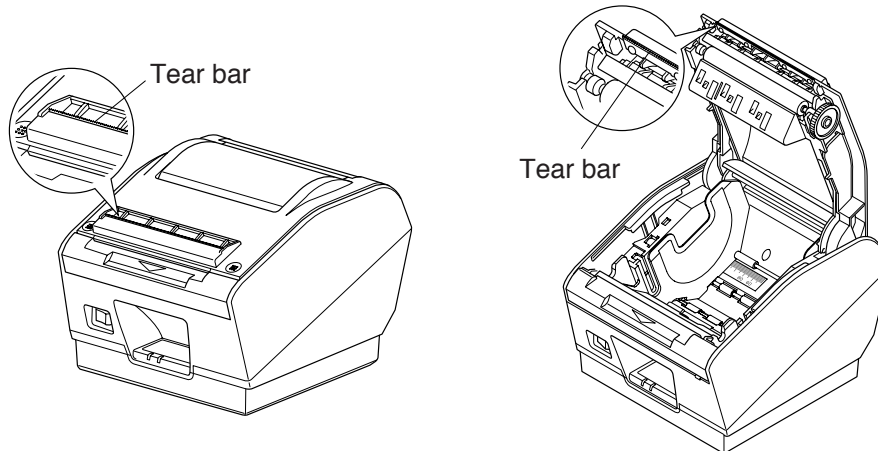


*This symbol is placed near the thermal print head to indicate that it is easily damaged. Observe the precautions for handling electrostatic sensitive devices.*

---

## **⚠ WARNING**

- *Do not touch the tear bar blade.*
  - *There is a tear bar blade inside the paper outlet slot. Not only should you not put your hand in the paper outlet slot while printing is in progress, never put your hand into the outlet even when printing is not in progress.*



- *During and immediately after printing, the area around the thermal head is very hot. Do not touch it, as you could be burned.*
- 

## **⚠ CAUTION**

- *Do not push the front cover and open the printer cover when printing is in progress.*
  - *Do not push the front cover while pressing on the printer cover with your hand.*
  - *Do not pull out paper while the printer cover is closed.*
  - *The heating element and the driver IC of the thermal head are easily damaged. Do not touch them with metal objects, sandpaper, etc.*
  - *Printing quality may suffer if the thermal head heating element becomes soiled by being touched with your hands. Do not touch the thermal head heating element.*
  - *There is a risk of damage to the driver IC of the thermal head from static electricity. Never directly touch the IC.*
  - *The printing quality and working life of the thermal head cannot be guaranteed if any paper other than that recommended is used. In particular, paper containing Sodium, Potassium, Chlorine may drastically reduce the working life of the thermal head. Please exercise caution.*
  - *Do not operate the printer if there is moisture on the front surface of the head from condensation, etc.*
  - *Do not change the width of the roll paper, as this will substantially reduce the use life of the thermal head and printing quality.*
  - *Do not switch to thermal roll paper after using thermal label roll paper because the deterioration of the thermal head and the accumulation of adhesive residue may negatively affect print quality.*
  - *Because short labels peel easily, the detached labels could stray away from the outlet slot. To prevent this from occurring, use the command, memory switch, or printer driver to reduce the printing speed. For instructions on the command and the memory switch, see the separate Specification Manual. For instructions on the printer driver, see the software manual on the CD-ROM.*
-



## 4. Thermal Roll Paper Specification

When consumable parts have run out, use those specified below.

**Note:**

Access the following URL for the information of the recommended paper.

<http://www.star-m.jp/eng/dl/dl02.htm>

### 4-1. Thermal Label Roll Paper

- Backing paper width:  $45 \pm 0.5$  mm to  $112 \pm 0.5$  mm
- Paper thickness:  $190 \mu\text{m}$  maximum
- Roll paper outer dimensions
  - Roll diameter:  $\phi 110$  mm maximum roll diameter
  - Overall width:  $45 \pm 0.5$  mm to  $112 \pm 0.5$  mm
- Core inner/outer diameters: core inner diameter  $\phi 25.4 \pm 1$  mm / core outer diameter  $\phi 32 \pm 1$  mm
- Finished state of label roll paper:

Make sure the finished state of the label roll paper meets the following conditions:

  - 1) Face the label surface of the (thermal) label paper outward of the roll.
  - 2) Do not allow the core to protrude from the ends of the label roll paper.
  - 3) Do not secure the tail end of the label roll paper with glue or tape. Do not fold the tail end of the paper.
  - 4) Do not allow the label roll paper to unravel.
  - 5) Do not allow the label roll paper to become deformed at its outer diameter or core.

- Recommended label paper:

Manufacturer	Product name	Quality features/applications	Thickness ( $\mu\text{m}$ )			Adhesion type
			Base material	Separator	Total thickness	
Lintec	LD2114	High sensitivity, for handheld	65	50	115	High adhesion
Lintec	LD3330	High sensitivity, for distribution	87	65	152	High adhesion
Lintec	LD3180	High sensitivity, for distribution	82	65	147	Low adhesion
Lintec	LD9102	Virtual adhesive thermal	117	65	182	High adhesion
Lintec	LD5530	High sensitivity, for measurement	85	65	150	High adhesion
Ojitac	GS75/P22/G6W	High sensitivity	80	60	140	High adhesion
Ricoh	150LA-1	High sensitivity, for foods	—	—	—	High adhesion

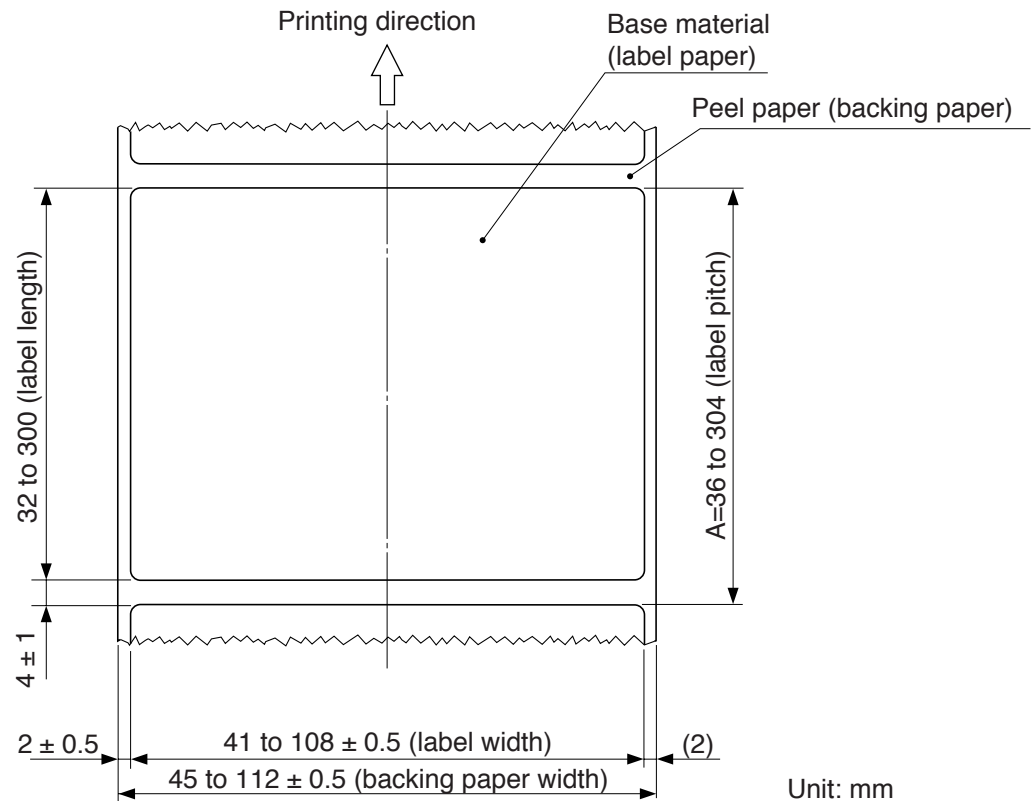
Manufacturer	Product name	Print density setting n	Print speed setting n
Lintec	LD2114	3 (default)	2
Lintec	LD3330	2	0 (default)
Lintec	LD3180	1	0 (default)
Lintec	LD9102	0	0 (default)
Lintec	LD5530	0	2
Ojitac	GS75/P22/G6W	2	0 (default)
Ricoh	150LA-1	3 (default)	0 (default)

### Print Density and Speed Settings

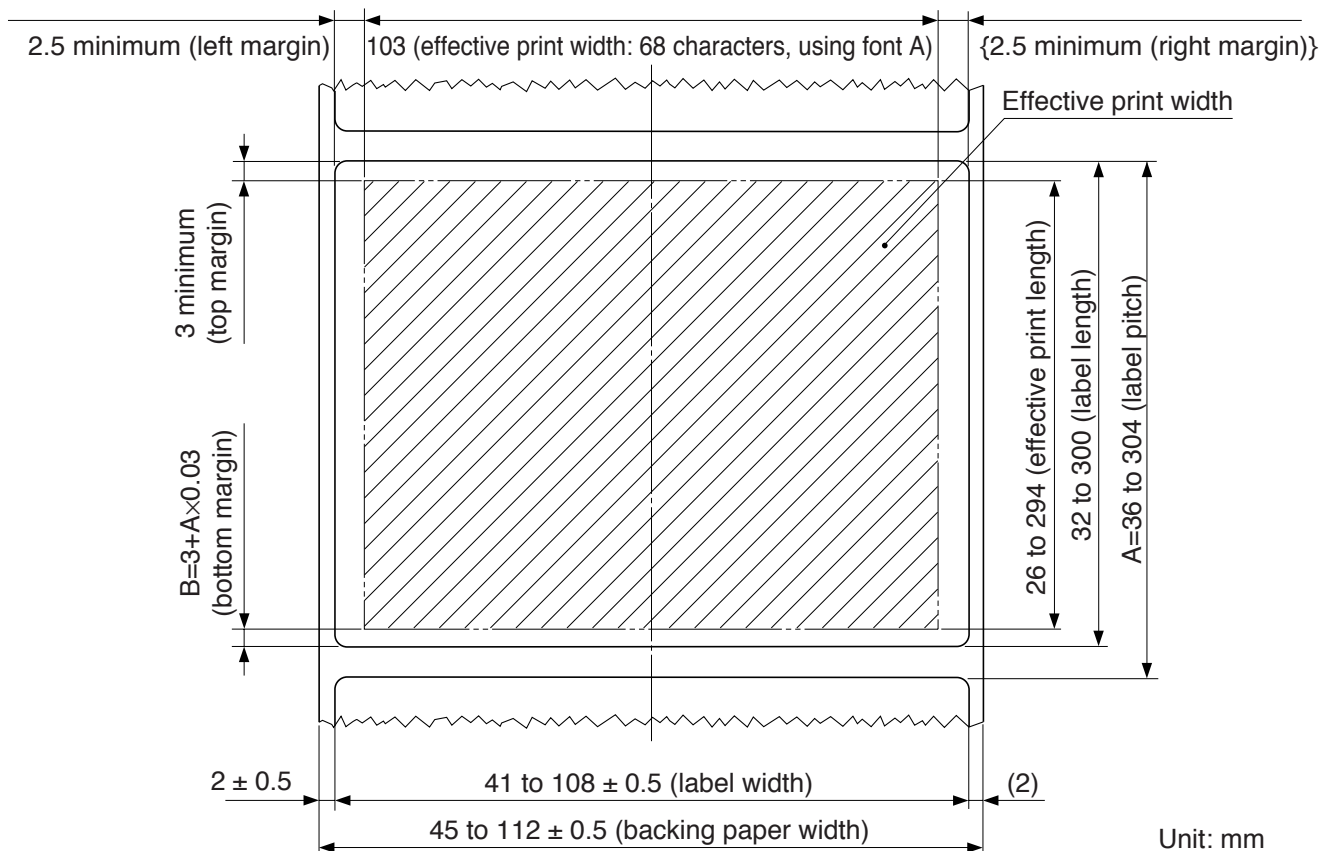
Depending on the type and thickness of the paper, it may be necessary to change the settings for print density / speed. To change the settings, use the print density setting command <ESC><RS> 'd' n and print speed setting command <ESC><RS> 'r' n. Refer to the separate Specification Manual for details.



- Recommended label paper specifications:  
Use roll paper that meets the conditions below.



- Effective printing range:  
The printable range of label paper is shown below.



- Black Mark Specifications

- (1) Black mark pitch

Set the black mark pitch A to be within a range of 36 to 304 mm.

- (2) Black mark dimensions

Set the black mark dimensions to be printed in accordance with the recommended black mark label paper specifications below.

- (3) PCS value

Set the PCS value for the black mark to be printed to a minimum of 0.90.

**Note:** If the PCS value for the black mark does not meet the specification above, the printer could malfunction, such as skipping pages or detecting page lengths improperly.

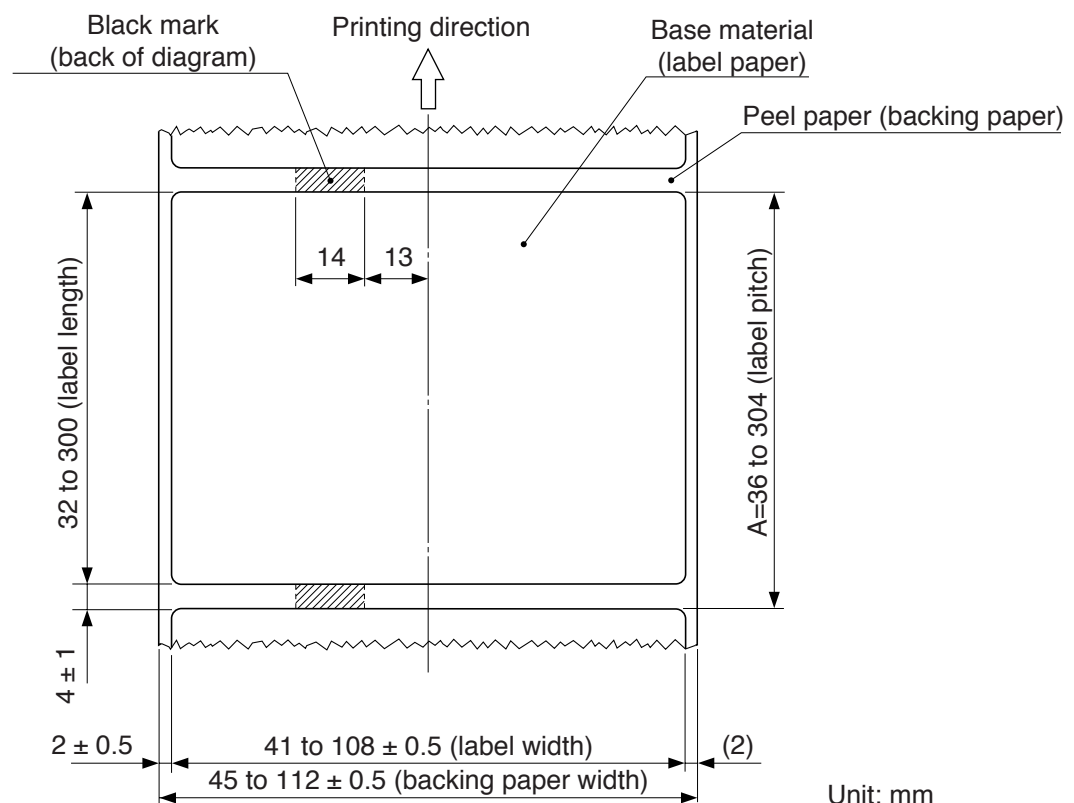
- (4) Bottom margin

Make sure to provide an ample bottom margin, extending from the back end of the printing range to next printed black mark. Without providing an ample bottom margin, the printer could malfunction, such as skipping pages. Make sure the printing range setting does not exceed the black mark pitch.

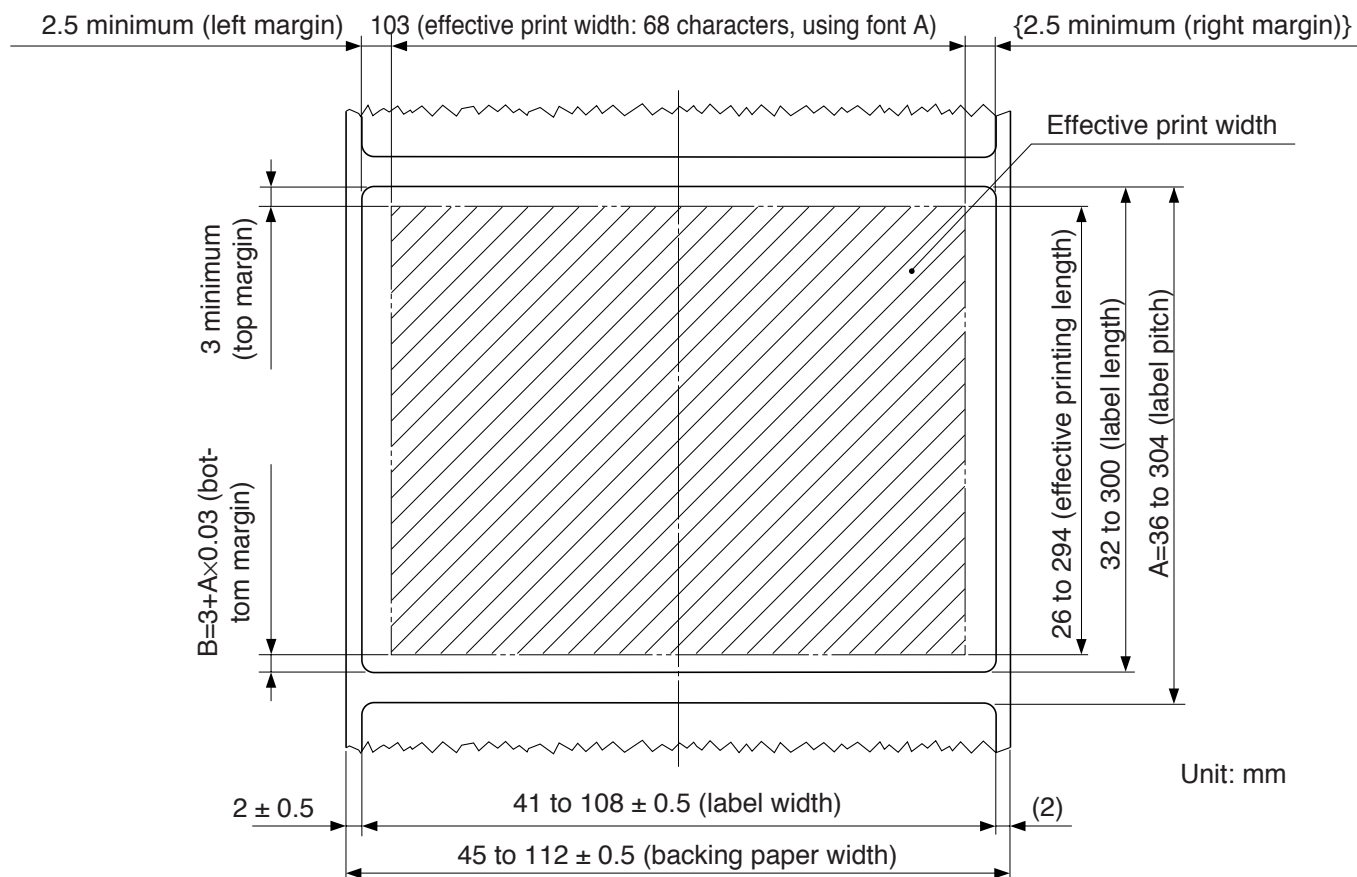
The bottom margin must be set by considering the following: the printing accuracy of the black mark pitch, print leading accuracy (standard printing position  $\pm 2$  mm), printer installed ambient temperature, and extent of part wear. We recommend that you set the printing range by securing the bottom margin as indicated below.

Bottom margin (dimension B)  $\geq 3$  mm + (dimension A  $\times 3\%$ )

- (5) Recommended black mark label paper specifications.



(6) Effective printing range when using label paper with black mark specifications.



## 4-2. Thermal Roll Paper

- Paper width:  $45 \pm 0.5$  mm to  $112 \pm 0.5$  mm
- Paper thickness:  $65 \mu\text{m}$  to  $150 \mu\text{m}$
- Roll paper outer dimensions  
Roll diameter:  $\phi 110$  mm maximum roll diameter  
Overall width:  $45 \pm 0.5$  mm to  $112 \pm 0.5$  mm
- Core inner/outer diameters:
  - (1) When  $65 \mu\text{m} \leq \text{paper thickness} \leq 75 \mu\text{m}$   
core inner diameter  $\phi 12 \pm 1$ /core outer diameter  $\phi 18 \pm 1$   
or core inner diameter  $\phi 25.4 \pm 1$  mm/core outer diameter  $\phi 32 \pm 1$  mm
  - (2) When  $76 \mu\text{m} \leq \text{paper thickness} \leq 150 \mu\text{m}$   
core inner diameter  $\phi 25.4 \pm 1$  mm/core outer diameter  $\phi 32 \pm 1$  mm
- Finished state of roll paper:  
Make sure the finished state of the roll paper meets the following conditions:
  - 1) Face the coloring surface of the thermal roll paper outward of the roll.
  - 2) Do not allow the core to protrude from the ends of the thermal roll paper.
  - 3) Do not secure the tail end of the thermal roll paper with glue or tape. Do not fold the tail end of the paper.
  - 4) Do not allow the thermal roll paper to unravel.
  - 5) Do not allow the thermal roll paper to become deformed at its outer diameter or core.
- Recommended thermal paper:

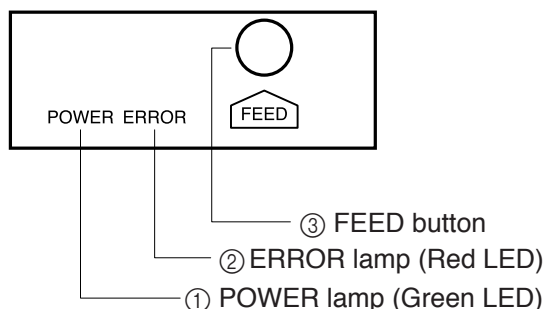
Manufacturer	Product name	Quality features/applications	Thickness ( $\mu\text{m}$ )	Print density setting n	Print speed setting n
Mitsubishi Paper Mills Limited	P220AG	Normal type	65	3 (default)	0 (default)
	PB670/PB770	2-color type red-black/blue-black	87	3 (default)	0 (default)

### Print Density and Speed Settings

Depending on the type and thickness of the paper, it may be necessary to change the settings for print density / speed. To change the settings, use the print density setting command <ESC><RS> 'd' n and print speed setting command <ESC><RS> 'r' n. Refer to the separate Specification Manual for details.

## 5. Control Panel and Other Functions

### 5-1. Control Panel



- ① POWER lamp (Green LED)  
Lights when the power is ON.
- ② ERROR lamp (Red LED)  
Indicates various errors in combination with POWER lamp.
- ③ FEED button  
Press the FEED button to feed roll paper.

### 5-2. Errors

#### 1) Automatically recoverable errors

Error Description	POWER Lamp	ERROR Lamp	Recovery Conditions
Head high temperature detection	Flashes at 0.5-second intervals	Off	Automatically recovered after the print head has cooled.
Cover open error	On	On	Close the printer cover. Then, press the FEED button.
Label/black mark detection error or paper out error	On	Flashes at 0.5 second intervals	Replace the label roll paper or the black mark roll paper. Then, press the FEED button.
Label page error	On	Flashes at 1 second intervals	Replace the label roll paper or change the transmission data.
Peeler sensor error	On	Flashes at 0.125 second intervals	Discard the peeled label.

## 2) Non-recoverable errors

Error Description	POWER Lamp	ERROR Lamp	Recovery Conditions
Head thermistor error	Off	Flashes at 1.5-second intervals	This is not a recoverable error.
Power voltage error	Off	Flashes at 2-second intervals	This is not a recoverable error.
EEPROM error	Off	Flashes at 0.75-second intervals	This is not a recoverable error.
Flash access error	Off	Flashes at 0.5-second intervals	This is not a recoverable error.
SRAM error	Off	Flashes at 1-second intervals	This is not a recoverable error.

### Note:

- 1) If a non-recoverable error occurs, turn the power OFF immediately.
- 2) If a non-recoverable error occurs, please consult the dealer for repairs.

## 5-3. Self-Printing

### 5-3-1. Test Printing

Place the thermal label roll paper or thermal roll paper on the printer.

Turn the power ON while holding the FEED button depressed. The printer will run a test print according to the Ver. No., DIP switch settings, and memory switch settings.

```
*** TSP800L Ver1.0
Interface : Parallel
-- Dip Switch 1 --
Sw   12345678
On   *****
Off
-- Memory Switch --
      FEDCBA9876543210  HEX.
<0>  0000000000000000  0000
<1>  0000000000000000  0000
<2>  0000000000000000  0000
<3>  0000000000000000  0000
<4>  0000000000000000  0000
<7>  0000000000000000  0000
<8>  0000000000000000  0000
<9>  0000000000000000  0000
```

### 5-3-2. Hexadecimal Dump Mode

Place the thermal roll paper on the printer.

Open the printer cover, then turn the power on while holding the FEED button.

When the cover is closed, “\*\*\* HEX DUMP PRINTING \*\*\*” is printed, and the printer enters the Hexadecimal Dump Mode.

Each of the signals sent from the computer to the printer will be printed out in hexadecimal code.

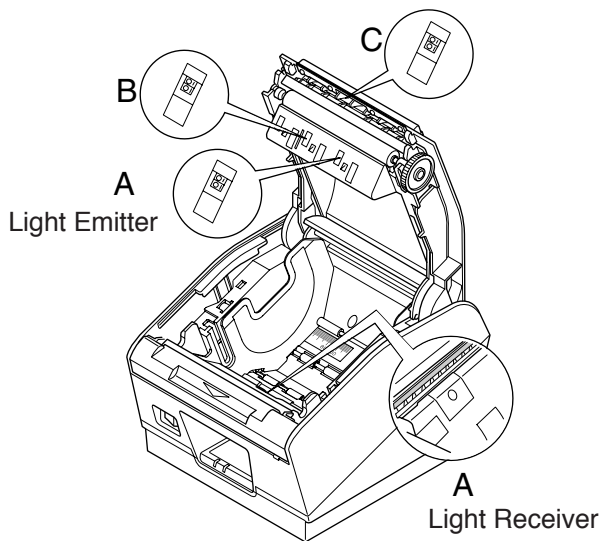
This function allows you to check if a control code sent to the printer by the program being used is correct or not. The final line is not printed if its data is less than one full line. However, if the FEED button is pushed, the final line is printed. To turn off the mode, it is necessary to turn off the printer completely.

\*\*\* HEX DUMP PRINTING \*\*\*

```
20 21 22 23 24 25 26 27      !'#$%&'
28 29 2A 2B 2C 2D 2E 2F      ()*+,-./
30 31 32 33 34 35 36 37      01234567
38 39 3A 3B 3C 3D 3E 3F      89:;<=>?
40 41 42 43 44 45 46 47      @ABCDEFGH
48 49 4A 4B 4C 4D 4E 4F      IJKLMNOP
50 51 52 53 54 55 56 57      PQRSTUVWXYZ
```

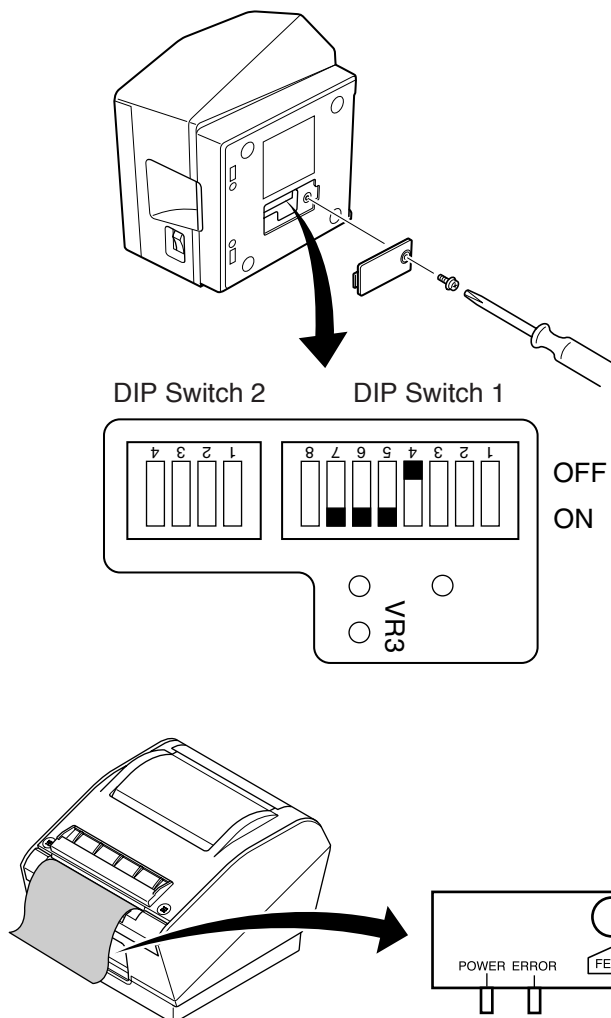
## 5-4. Adjusting the Sensors

This printer is equipped with three types of paper sensors.



- A. Label roll paper transmission type sensor  
This sensor detects the presence of the backing paper for the label roll paper. Because this sensor is affected by the thickness and the color of the backing paper of the label roll paper, the sensor might require an adjustment, depending on the label roll paper that is used.
- B. Label paper reflection type sensor  
This sensor detects the presence of the label roll paper and the black mark.
- C. Label roll paper peeler sensor  
This sensor detects the presence of the label roll paper that has been peeled.

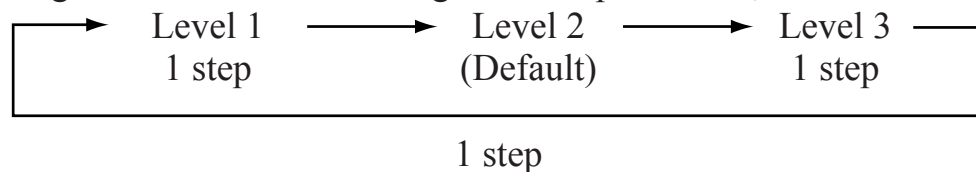
### 5-4-1. Adjusting the label roll paper transmission type sensor



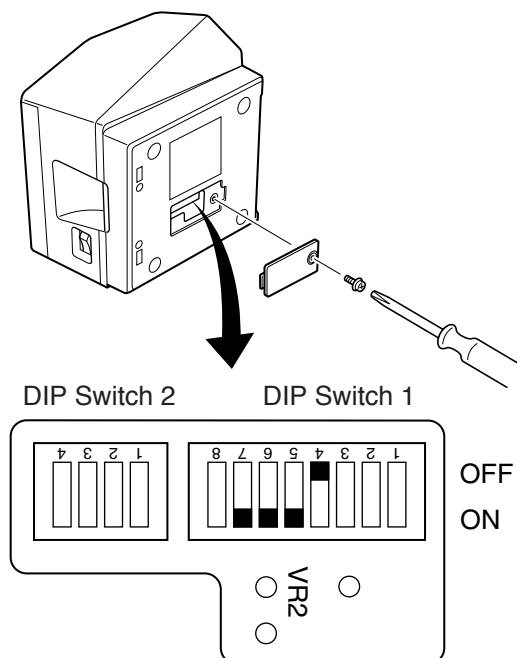
- (1) Set the backing paper of the label roll paper against the label roll paper transmission type sensor. Then, close the printer cover. It is the backing paper, not the label portion, which must be set against the label roll paper transmission type sensor.
- (2) Turn OFF the power to the printer. (For safety, unplug the power cable from the outlet.)
- (3) Undo the screw and remove the dip switch cover from the bottom of the printer.
- (4) To activate the sensor adjustment mode, use a pointed object to set the dip switches as follows:  
DSW 1-4 = OFF, DSW 1-5 = ON,  
DSW 1-6 = ON, DSW 1-7 = ON
- (5) Turn ON the power switch of the printer. The two lamps will flash on the control panel to indicate that the sensor adjustment mode has been activated.

- (6) If the two lamps remain ON after flashing, it means that the sensor is adjusted properly and does not require further adjustment.
- (7) If both the ERROR and POWER lamps are OFF, use a plastic slot screwdriver to turn and adjust the VR3 knob to a position in which both the ERROR and POWER lamps are ON. If the adjustment has been successful, proceed to (10).
- (8) If the adjustment has not been successful, press the FEED button. The two lamps on the control panel will flash to indicate that the light emitting level of the sensor has been changed by one step. Then, as in (7), turn and adjust the VR3 knob to a position in which both the ERROR and POWER lamps are ON. If the adjustment has been successful, proceed to (10).
- (9) If the adjustment has not been successful, press the FEED button again. The two lamps on the control panel will flash to indicate that the light emitting level of the sensor has been changed by one step. Then, as in (7), turn and adjust the VR3 knob to a position in which both the ERROR and POWER lamps are ON. If the adjustment has been successful, proceed to (10). If the adjustment has not been successful, have the printer repaired.
- (10) Turn OFF the power switch.
- (11) Set the dip switch SW1-4 to ON.
- (12) Return the dip switches SW1-5, SW1-6, and SW1-7 to their original settings.

The light emitting level of the sensor changes one step at a time, as shown below.

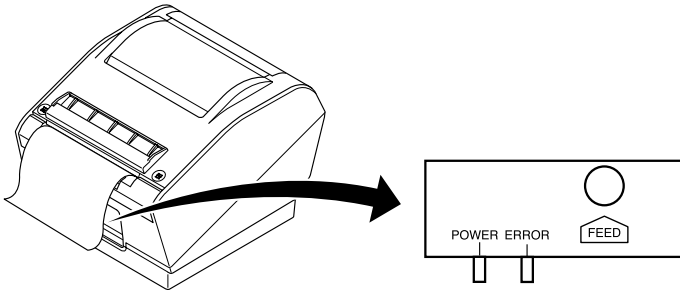


#### 5-4-2. Adjusting the reflection type sensor



- (1) Set the roll paper against the reflection type sensor. Then, close the printer cover. Either thermal label roll paper or thermal roll paper is acceptable. However, if it has black marks, set the roll paper in such a way that a black mark is not placed against the sensor.
- (2) Turn OFF the power to the printer. (For safety, unplug the power cable from the outlet.)
- (3) Undo the screw and remove the dip switch cover from the bottom of the printer.
- (4) To activate the sensor adjustment mode, use a pointed object to set the dip switches as follows:  
 DSW 1-4 = OFF, DSW 1-5 = ON,  
 DSW 1-6 = ON, DSW 1-7 = ON

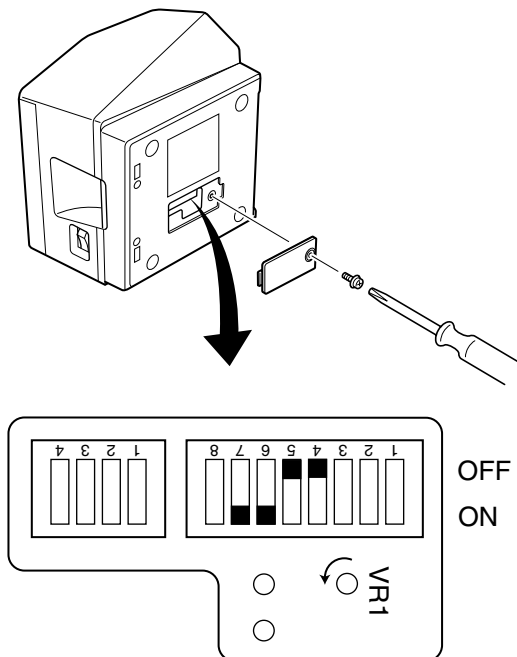




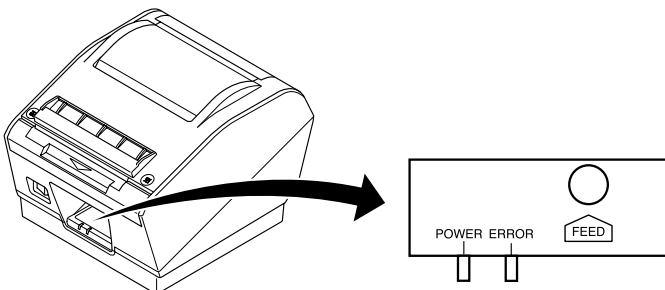
- (5) Press and hold the FEED button, and turn ON the power switch of the printer. The two lamps will flash on the control panel to indicate that the sensor adjustment mode has been activated. After the lamps flash, release your finger from the button.

- (6) If the two lamps remain ON after flashing, it means that the sensor is adjusted properly and does not require further adjustment. Proceed to (8).
- (7) If both the ERROR and POWER lamps are OFF, turn and adjust the VR2 knob to a position in which both lamps are ON. If the adjustment has not been successful, have the printer repaired.
- (8) Turn OFF the power switch and set the dip switch SW1-4 to ON.
- (9) Return the dip switches SW1-5, SW1-6, and SW1-7 to their original settings.

### 5-4-3. Adjusting the label roll paper peeler sensor



- (1) Remove the roll paper from the printer. Verify that there is no paper in the vicinity of the peeler sensor, and close the printer cover.
- (2) Turn OFF the power to the printer. (For safety, unplug the power cable from the outlet.)
- (3) Undo the screw and remove the dip switch cover from the bottom of the printer.
- (4) To activate the sensor adjustment mode, use a pointed object to set the dip switches as follows:  
DSW 1-4 = OFF, DSW 1-5 = OFF,  
DSW 1-6 = ON, DSW 1-7 = ON



- (5) Turn ON the power switch of the printer. The two lamps will flash on the control panel to indicate that the sensor adjustment mode has been activated.

- (6) After the lamps have flashed, turn the VR1 knob fully counterclockwise. The adjustment has been completed if the POWER lamp is ON. Proceed to (8). The ERROR lamp may be ON or OFF.
- (7) If the POWER lamp is not ON, turn and adjust the VR1 knob to a position in which both the ERROR and POWER lamps are ON. If the adjustment has been successful, proceed to (8). If the adjustment has not been successful, have the printer repaired.
- (8) Turn OFF the power switch and set the dip switch SW1-4 to ON.
- (9) Return the dip switches SW1-5, SW1-6, and SW1-7 to their original settings.

## 6. Preventing and Clearing Paper Jams

### 6-1. Preventing Paper Jams

The paper should not be touched during ejection and printing.

Pressing or pulling the paper during ejection may cause a paper jam or line feed failure.

### 6-2. Removing Paper Jam

If a paper jam occurs, clear it as described below.

- (1) Set the power switch to off to turn off power to the printer.
- (2) Push the front cover and open the printer cover.
- (3) Remove the jammed paper.

---

#### **CAUTION**

*Take care not to damage the printer when removing the jammed paper.*

*Since it is easy to damage the thermal head in particular, take care not to touch it.*

---

- (4) Position the roll paper straight and close the printer cover gently.

**Note 1:** Make sure that the paper is positioned straight. If the printer cover is closed with the paper skewed, a paper jam may result.

**Note 2:** Lock the printer cover by pressing down on the sides. Do not try to close it by pressing down on the center. The cover may not lock properly.

- (5) Set the power switch to on to turn on power to the printer. Make sure that the ERROR LED is not lit.

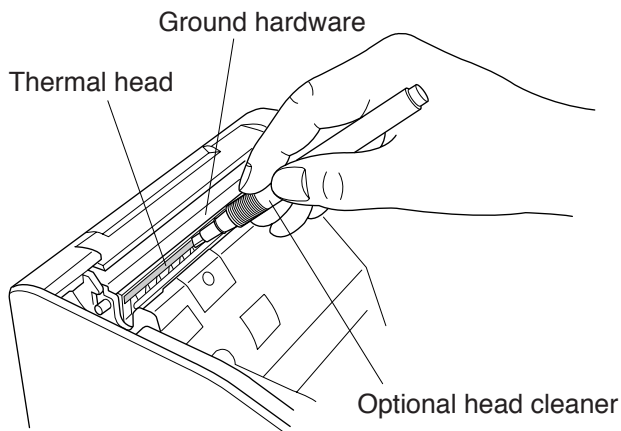
**Note:** While the ERROR LED is lit, the printer will not accept any commands such as the print command, so make sure that the printer cover is locked properly.

## 7. Periodic Cleaning

At times, the printer might leave some characters partially unprinted due to paper particles or debris from the adhesive used on label paper. As a preventive measure, clean the printer regularly every month or after printing 200,000 lines.

### 7-1. Cleaning the Thermal Head and Ground Hardware

Use the optional head cleaner as shown to remove the grime from the thermal head. A cotton swab or soft cloth dipped in an alcohol solution (such as ethanol, methanol, or isopropyl alcohol) may be used instead of the head cleaner. Follow the cleaning instructions below.



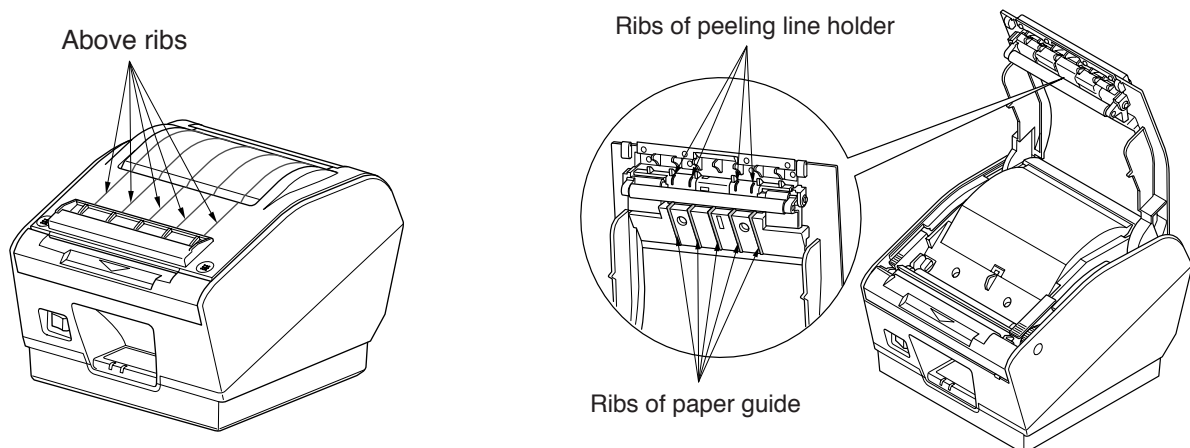
- (1) Cut off the power to the printer by turning OFF the power switch.
- (2) Push the front cover to open the printer cover.
- (3) Using the head cleaner, wipe off the black paper particles that have accumulated on the thermal head surface.
- (4) Likewise, use the head cleaner to wipe off the paper particles that have accumulated on the ground hardware above the thermal head.

#### Notes

- 1: Do not clean the thermal head immediately after printing, because the thermal head is hot.
- 2: While cleaning the thermal head, be careful not to create static electricity, which poses the risk of problems such as damage to the head.
- 3: Turn the power ON only after the alcohol solution has completely dried.

### 7-2. Cleaning the Printer Cover, Paper Guide, and Peeler Sensor

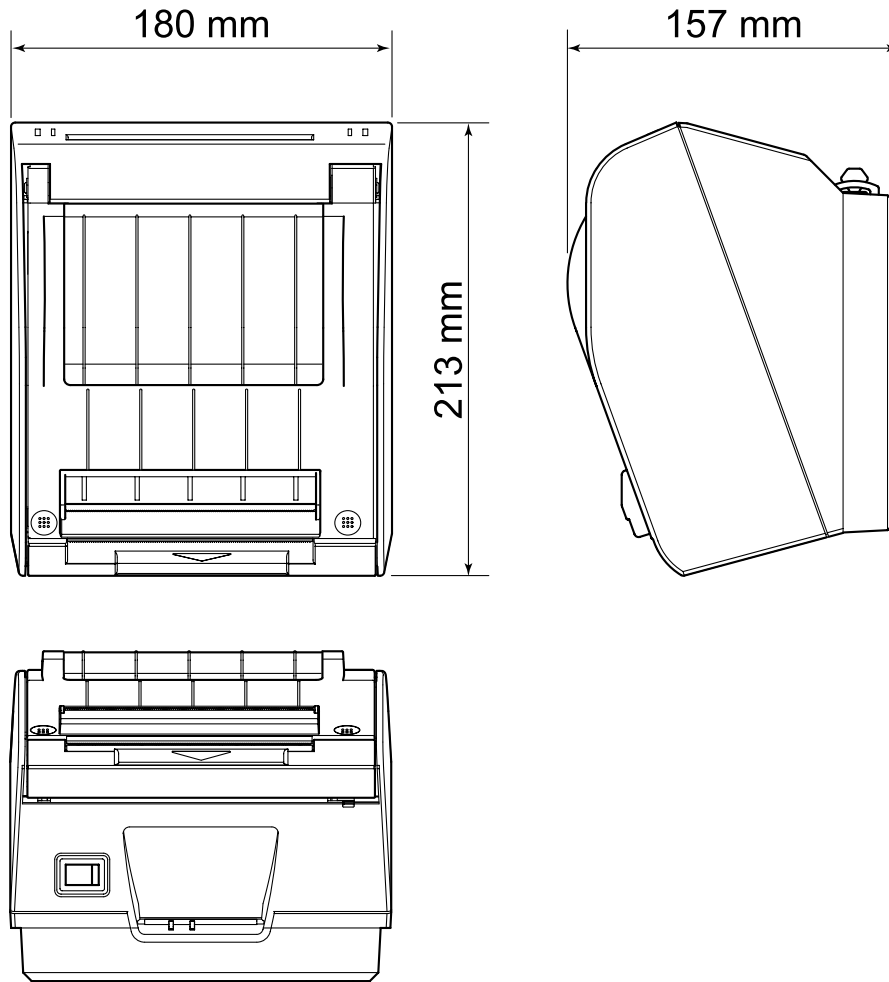
Using a cotton swab or soft cloth dipped in an alcohol solution (such as ethanol, methanol, or isopropyl alcohol), remove paper particles or glue debris from the areas shown below.



## 8. Specifications

### 8-1. General Specifications

- |                       |   |
|-----------------------|---|
| (1) Printing method   | Direct line thermal printing  |
| (2) Print speed       | Max. 150 mm/sec.  |
| (3) Dot density       | 203 dpi: 8 dots/mm (0.125 mm/dot)   |
| (4) Printing width    | Max. 104 mm   |
| (5) Roll paper        | Refer to chapter 4 for details on the recommended roll paper.<br>Paper width: $44.5 \pm 0.5$ mm to $111.5 \pm 0.5$ mm (thermal roll paper)<br>$43 \pm 0.5$ to $110 \pm 0.5$ mm (thermal label roll paper)<br>Roll diameter: $\phi 110$ mm or less |
| (6) Overall dimension | 180 (W) $\times$ 213 (D) $\times$ 157 (H) mm  |
| (7) Weight            | Approx. 2 kg (Not including the I/F board, paper roll or accessories)   |
| (8) Noise Approx.     | Approx. 57 dB (operating)   |



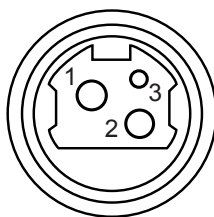
## 8-2. Interface

- Dual interface: RS-232 D-Sub 9 pin  
USB USB type-B connector
- Bidirectional parallel interface: IEEE 1284 compatibility and nibble modes
- Ethernet interface: Conforms to IEEE802.3, RJ-45 connector

## 8-3. Electrical Characteristics

- (1) Input: 100 to 240V AC, 50/60 Hz
- (2) Output: DC 24V  $\pm$  10%
- (3) Current Consumption Operating: Approx. 2.0 A (at ASCII printing)  
Peak: Approx. 10 A (at print duty 100%, for 10 seconds or less)  
Stand-by: Approx. 0.1 A
- (4) Power Connector

Pin No.	Function
1	Drive power (24V)
2	Signal GND
3	N.C.
Shell	Frame ground

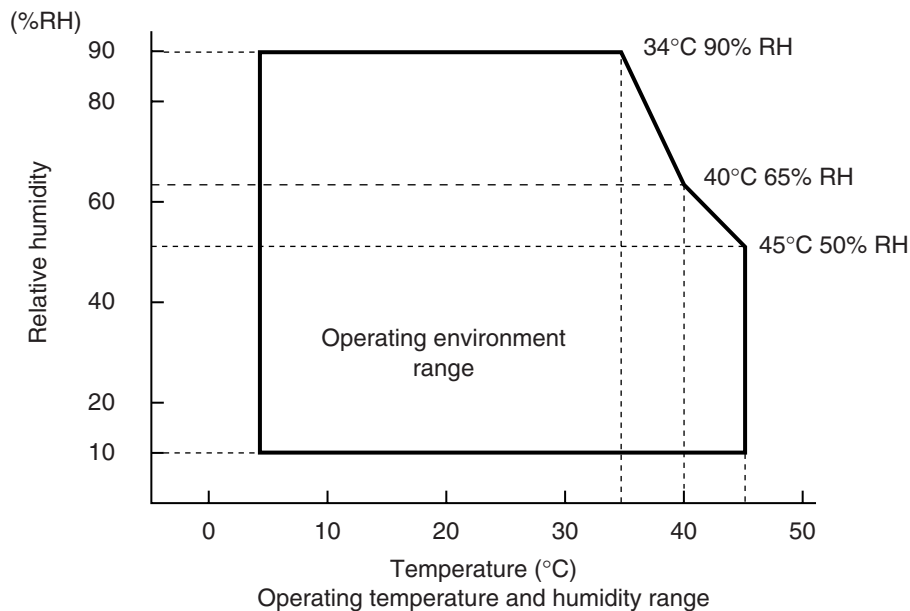


### Notes:

- When using a printer power supply other than the optional AC adaptor (PS60A series), be sure that the following cautions are observed.
- Use a power supply of DC 24 V  $\pm$  5% and more than 2.0 A (Max. 5.0 A Load within 10 sec.) with SELV output and LPS or Class 2 output approved by IEC60950-1.
- Be careful about installing the printer in an area where there is noise. Take the appropriate measures to protect against electrostatic AC line noise, etc.

## 8-4. Environmental Requirements

- (1) Operating  
Temperature 5°C to 45°C  
Humidity 10% to 90% RH (without condensation)



- (2) Transport/storage (except for paper)  
Temperature -20°C to 60°C  
Humidity 10% to 90% RH (without condensation)

## 8-5. Reliability

- 1) Life Mechanical: 15 million lines  
Head: 100 million pulses, 100 km ( $\pm 15\%$  max. average head resistance fluctuation)

<Conditions>

Average printing ratio: 12.5%

Standard printing density setting (monochrome printing mode)

- 2) MCBF: 37 million lines

The Mean Cycle Between Failure (MCBF) is defined to be the overall failure cycle, which includes random or wear failures that occur until the printer reaches its mechanical life of 15 million lines.

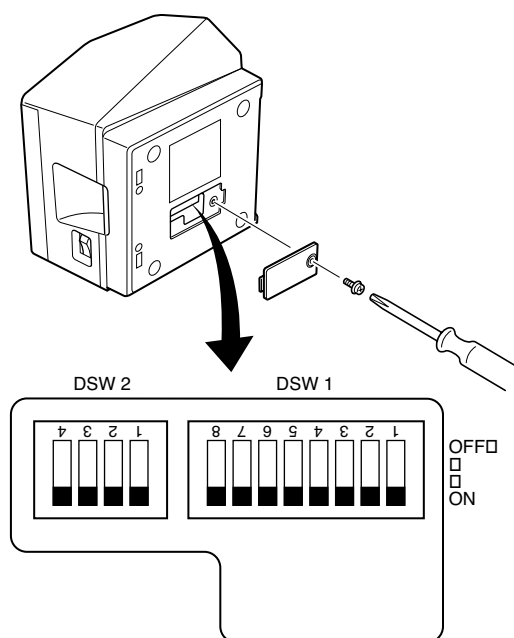
- \* As the mechanical remains at 15 million lines, the MCBF of 37 million lines does not indicate its useful life.
- \* All the reliability values indicated above are based on the use of the recommended thermal paper. No reliability can be guaranteed for the use of non-recommended thermal paper.

## 9. Dip Switch Setting

Two DIP switches are provided at the bottom of the printer, and can be set as given in the table below. Be sure to set the power switch to off before changing the settings. It is recommended to use a pointed item like a pen or flat-blade driver screw to change the settings. The settings will become effective when the power switch is set to on again.

The following is the procedure for changing the settings on DIP switches.

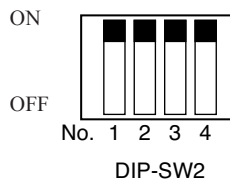
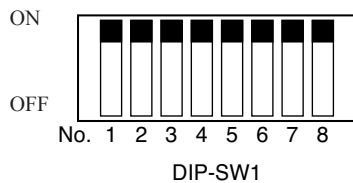
1. Make sure the printer is turned off.
2. Remove the screw from the DIP switch cover. Then take off the DIP switch cover, as shown in the illustration below.



3. Set the switches using a pointed tool, such as a pen or flat-blade screwdriver.
4. Replace the DIP switch cover. Then secure it with the screw.  
The new settings take effect when you turn on the printer.



## 9-1. Parallel Interface Type



DIP-SW 1

Switch	Function	ON	OFF
1-1	Command emulation	See table below	
1-2			
1-3	Should not be changed (Should be set to on)		
1-4	Sensor adjustment	Valid	Invalid
1-5	Pin #31 (INIT) reset signal	Valid	Invalid
1-6	Handshaking conditions (conditions for BUSY)	Offline or receive buffer full	Receive buffer full
1-7	Selection of detector for thermal label paper (*1)	Transmission type detector	Reflection type detector
1-8	Selection of roll paper (*2)	Thermal label roll paper	Thermal roll paper

The factory settings of DIP switch are all on.

### Emulation

Switch 1-1	Switch 1-2	Emulation
ON	ON	STAR Line Mode
OFF	ON	STAR Page Mode
ON	OFF	(reserved)
OFF	OFF	(reserved)

### Notes:

\*1) Only a reflection type detector may be used on thermal roll paper.

\*2) Two modes are available for the thermal label roll paper: a peeler mode and a tear bar mode (without using peeler). These modes are recognized automatically.

DIP-SW 2

Switch	Function	ON	OFF
2-1	Always ON	Should be set to on	
2-2			
2-3			
2-4			

The factory settings of DIP switch are all on.

## 9-2. Dual Interface Type

### <Switching the Dual Interface Modes>

The dual interface enables the connection of an RS-232 interface and a USB interface, although they cannot be connected concurrently.

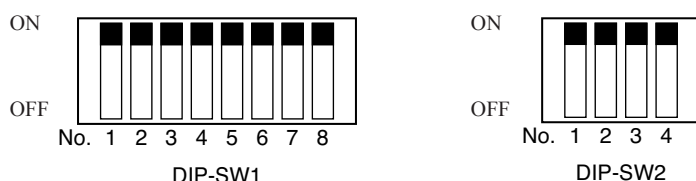
The printer starts with the RS-232 interface at the time its power is turned ON.

Afterwards, it will switch automatically to the USB interface if a USB cable that is connected to a computer is connected to the dual interface.

However, if a USB cable is connected to the printer while the power to the computer is OFF, the printer will not switch automatically to the USB interface connection.

Once the printer has recognized a USB connection, it will continue to assume this connection until its power is turned OFF, even if you disconnect the USB cable.

### 9-2-1. USB Interface Type



DIP-SW 1

Switch	Function	ON	OFF
1-1	Command emulation	See table below	
1-2			
1-3	Should not be changed (Should be set to on)		
1-4	Sensor adjustment	Valid	Invalid
1-5	USB mode	Printer Class	Vendor Class
1-6	Handshaking conditions (conditions for BUSY)	Offline or receive buffer full	Receive buffer full
1-7	Selection of detector for thermal label paper (*1)	Transmission type detector	Reflection type detector
1-8	Selection of roll paper (*2)	Thermal label roll paper	Thermal roll paper

The factory settings of DIP switch are all on.

### Emulation

Switch 1-1	Switch 1-2	Emulation
ON	ON	STAR Line Mode
OFF	ON	STAR Page Mode
ON	OFF	(reserved)
OFF	OFF	(reserved)

#### Notes:

\*1) Only a reflection type detector may be used on thermal roll paper.

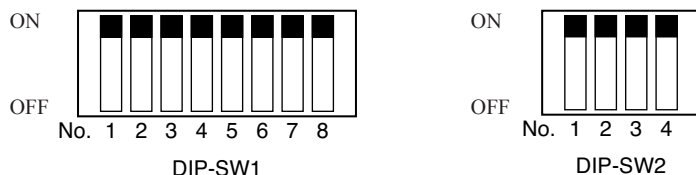
\*2) Two modes are available for the thermal label roll paper: a peeler mode and a tear bar mode (without using peeler). These modes are recognized automatically.

## DIP-SW 2

Switch	Function	ON	OFF
2-1	Always ON	Should be set to on	
2-2			
2-3			
2-4			

The factory settings of DIP switch are all on.

### 9-2-2. RS-232 Interface Type



## DIP-SW 1

Switch	Function	ON	OFF
1-1	Command emulation	See table below	
1-2			
1-3	Should not be changed (Should be set to on)		
1-4	Sensor adjustment	Valid	Invalid
1-5	Should not be changed (Should be set to on)		
1-6	Handshaking conditions (conditions for BUSY)	Offline or receive buffer full	Receive buffer full
1-7	Selection of detector for thermal label paper (*1)	Transmission type detector	Reflection type detector
1-8	Selection of roll paper (*2)	Thermal label roll paper	Thermal roll paper

The factory settings of DIP switch are all on.

### Emulation

Switch 1-1	Switch 1-2	Emulation
ON	ON	STAR Line Mode
OFF	ON	STAR Page Mode
ON	OFF	(reserved)
OFF	OFF	(reserved)

#### Notes:

\*1) Only a reflection type detector may be used on thermal roll paper.

\*2) Two modes are available for the thermal label roll paper: a peeler mode and a tear bar mode (without using peeler). These modes are recognized automatically.

## DIP-SW 2

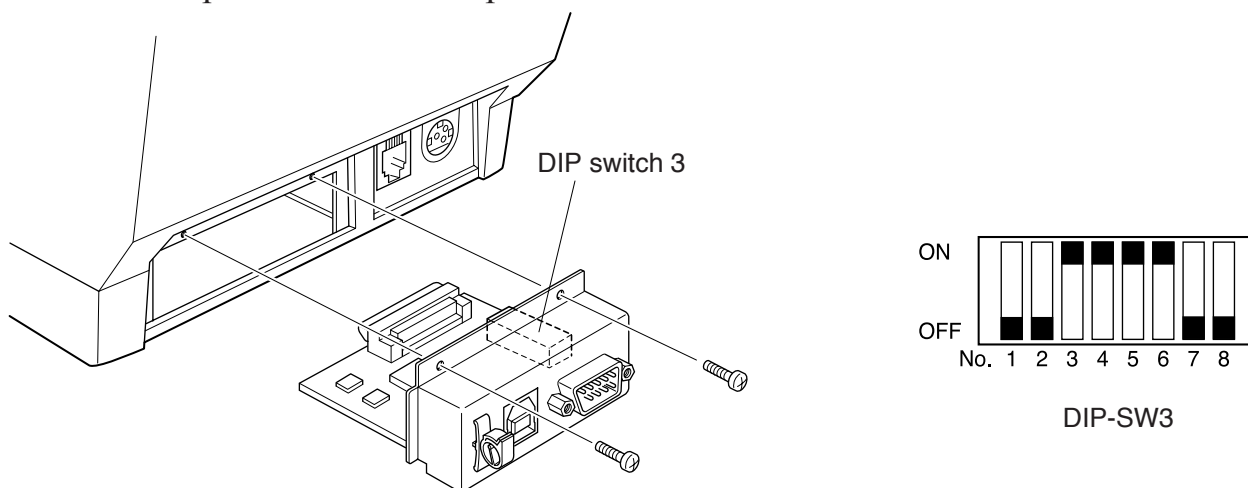
Switch	Function	ON	OFF
2-1	Always ON	Should be set to on	
2-2			
2-3			
2-4			

### ■ DIP Switch 3

The factory settings of DIP switch are all on.

The following is the procedure for changing the settings on DIP switch No. 3.

1. Turn off the printer and all components connected to it.
2. Remove the 2 screws.
3. Remove the dual interface board unit.
4. Change the setting of the DIP switches.
5. Replace the dual interface board unit.
6. Then secure it with the screws.
7. Turn on the printer and all components connected to it.



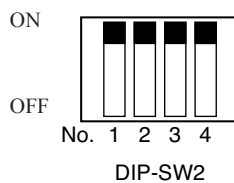
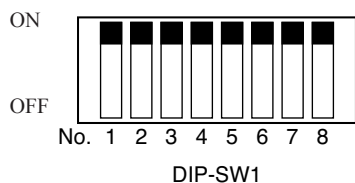
The factory settings of DIP switch are all on, except for switches 1, 2, 7 and 8.

### DIP-SW 3

Switch	Function	ON	OFF
3-1	Baud Rate	See table below	
3-2			
3-3	Data Length	8 bits	7 bits
3-4	Parity Check	Disabled	Enabled
3-5	Parity	Odd	Even
3-6	Handshake	DTR	XON/XOFF
3-7	Should not be changed (Should be set to off)	—	—
3-8			

Baud Rate	Switch 3-1	Switch 3-2
4800BPS	OFF	ON
9600BPS	ON	ON
19200BPS	ON	OFF
38400BPS	OFF	OFF

## 9-3. Ethernet Interface Type



DIP-SW 1

Switch	Function	ON	OFF
1-1	Command emulation	See table below	
1-2			
1-3	Should not be changed (Should be set to on)		
1-4	Sensor adjustment	Valid	Invalid
1-5	Should not be changed (Should be set to on)		
1-6	Handshaking conditions (conditions for BUSY)	Offline or receive buffer full	Receive buffer full
1-7	Selection of detector for thermal label paper (*1)	Transmission type detector	Reflection type detector
1-8	Selection of roll paper (*2)	Thermal label roll paper	Thermal roll paper

The factory settings of DIP switch are all on.

### Emulation

Switch 1-1	Switch 1-2	Emulation
ON	ON	STAR Line Mode
OFF	ON	STAR Page Mode
ON	OFF	(reserved)
OFF	OFF	(reserved)

### Notes:

\*1) Only a reflection type detector may be used on thermal roll paper.

\*2) Two modes are available for the thermal label roll paper: a peeler mode and a tear bar mode (without using peeler). These modes are recognized automatically.

DIP-SW 2

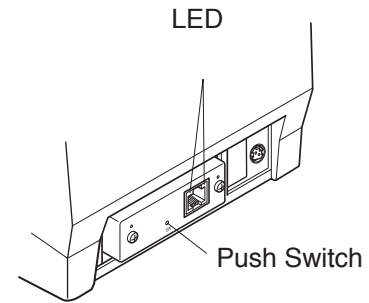
Switch	Function	ON	OFF
2-1	Always ON	Should be set to on	
2-2			
2-3			
2-4			

The factory settings of DIP switch are all on.

## ■ Initializing Settings

Set the push switch as described below to initialize the setting information.

Push the switch for one to five seconds while running under normal operating mode. The green and red LEDs will flash with a regular pattern. After that, push the switch once again in that state to turn OFF both of the red and green LEDs. This will return the settings of the interface board to their default, or ex-factory, settings. After the interface board has been initialized, the printer will automatically reboot itself.



## ■ LED Display

Green : Lights when other party connection is recognized as 100BASE-TX.

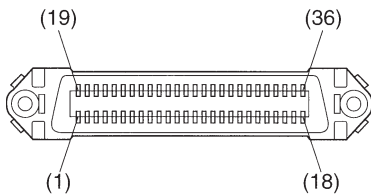
Red : Lights when packets are received.

## 10. Parallel Interface

The two-way parallel interface is compatible with the IEEE1284 compatibility mode and nibble mode. Refer to the separate specification manual for details.

**Table of Connection Signals for Each Mode**

Pin No.	Direction	Compatibility Mode Signal Name	Nibble Mode Signal Name
1	In	nStrobe	Host Clock
2	In/Out	Data0	Data0
3	In/Out	Data1	Data1
4	In/Out	Data2	Data2
5	In/Out	Data3	Data3
6	In/Out	Data4	Data4
7	In/Out	Data5	Data5
8	In/Out	Data6	Data6
9	In/Out	Data7	Data7
10	Out	nAck	PtrClk
11	Out	Busy	PtrBusy/Data3, 7
12	Out	PError	AckDataReq/Data2, 6
13	Out	Select	Xflag/Data1, 5
14		—	HostBusy
15		—	—
16		Signal GND	Signal GND
17		Frame GND	Frame GND
18	Out	+5V	+5V
19-30		Twisted Pair Return	Twisted Pair Return
31	In	nInit	nInit
32	Out	nFault	nDataAvail/Data0,4
33		External GND	—
34		Compulsion	—
35		—	—
36	In	nSelectIn	1284Active



This connector mates with an Amphenol 57-30360 connector

Parallel interface connector (printer side)

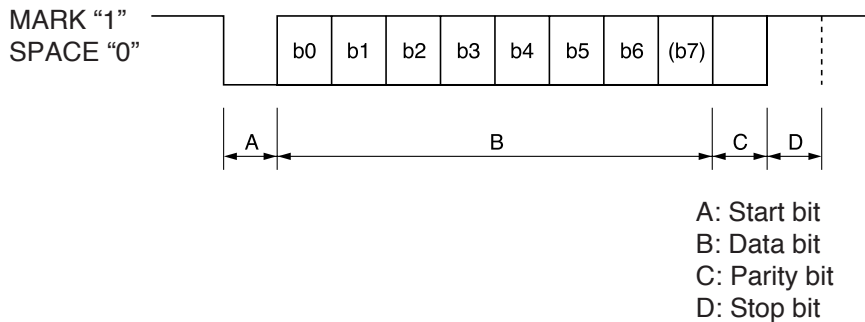


# 11. Dual Interface

## 11-1. RS-232 Interface

### 11-1-1. Interface Specifications

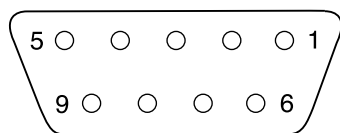
- ① Data transmission method: Asynchronous serial interface
- ② Baud rate: Selectable from 4800, 9600, 19200, 38400 bps  
(Refer to “9. DIP Switch Setting”).
- ③ Word length  
Start bit: 1 bit  
Data bit: 7 or 8 bits (selectable. Refer to “9. DIP Switch Setting”).  
Parity bit: Odd, even or none (selectable. Refer to “9. DIP Switch Setting”).  
Stop bit: 1 bit length
- ④ Signal polarity  
RS-232  
MARK: Logic “1” (−3V to −15V)  
SPACE: Logic “0” (+3V to +15V)



## 11-1-2. Connectors and Signal Names

### RS-232

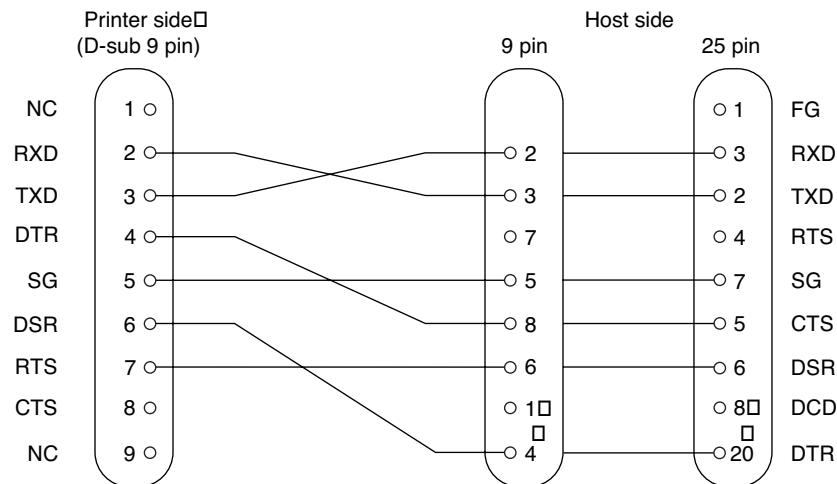
Pin No.	Signal name	Direction	Function
—	FG	—	Frame ground
1	N.C	—	Not used
2	RXD	IN	Receiving data
3	TXD	OUT	Transmission data
4	DTR	OUT	Indicates whether data receive from host is enabled or disabled. 1) DTR Communication Mode Space when receive is enabled. 2) X-On/X-Off Communication Mode Always space, except during following conditions: • Period between reset and communication enabled • During self printing
5	S-GND	—	Signal ground
6	DSR	IN	Status of this signal is not checked
7	RTS	OUT	Always space
8	CTS	IN	Status of this signal is not checked
9	N.C	—	Not used



D-sub 9 Pin

### 11-1-3. Cable Connections

The followings are a recommended interface cable connections.



**Note:** Use shielded wire less than 3 m in length.

## 11-2. USB Interface

### 11-2-1. USB Function

1. General Specification: Conforms to USB 2.0 Specifications
2. Communication Speed: USB Full Speed Mode (12 Mbps)
3. Communication Method: USB Bulk Transmission Mode
4. Power Specifications: USB Self-power Function

### 11-2-2. Connector

- USB Up-Stream Port Connector (USB Type-B)

## 12. Ethernet Interface

- |                           |  |
|---------------------------|--|
| 1. General Specification: | Conforms to IEEE802.3  |
| 2. Communication Media:   | 10 Base-T/100 Base-TX  |
| 3. Communication Speed:   | 10/100 Mbps  |
| 4. Protocol:              | TCP/IP   |
| 5. TCP/IP detail:         | ARP, RARP, BOOTP, DHCP, LPR, #9100, FTP,<br>HTTP, TELNET, TFTP |
| 6. Connector:             | RJ-45 (8-pin modular)  |

**Note:** Factory-set login password for administrator

One of the following protocols may be used for changing the settings on this product:

HTTP (web), TELNET, or FTP. To do so, it is necessary to log in using an administrator account for the product.

Use the following administrator account information on HTTP (web), TELNET, or FTP.

Administrator account name: “root” (required)

Password: “public” (required)

The password may be changed after logging in.

## 13. Memory Switch Settings

Each memory switch is stored in EEPROM. For details on the functions and settings of memory switches, see the separate Specification Manual.

The table below shows the factory settings for the memory switches.

Memory Switch	Hexadecimal Code
0	0000
1	0000
2	0000
3	0000
4	0000

### ***Warning!***

Changing the memory switch settings can cause the printer to fail to operate correctly.



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Please access the following URL  
<http://www.star-m.jp/eng/dl/dl02.htm>  
for the latest revision of the manual.

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