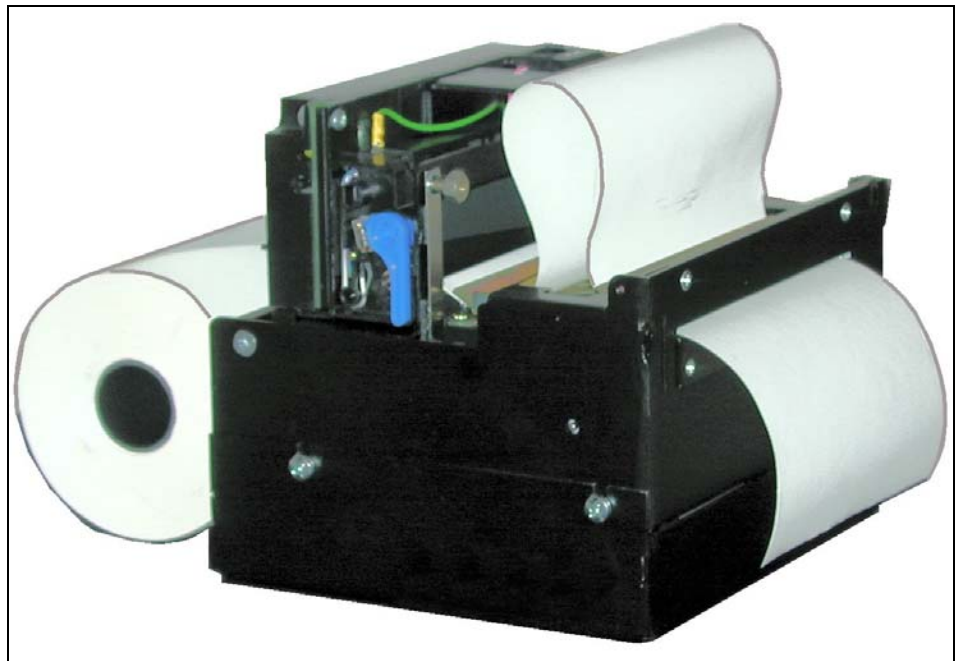


TTP 7000 Kiosk Printer

Technical Manual



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REVISION HISTORY

Edition D, major changes

Status reporting for ESC ENQ 2 corrected

Status indicator LED-blink signals added

Retract and retain option added

Edition E, major changes

Added emphasis on fixed page length for landscape mode.

New commands added, (ESC L n) (EM)

Edition F, major changes

Added features up to firmware version 2.30

1 INTRODUCTION

1.1 About this manual

This manual contains the information required to install the printer and to run it from a host computer such as a PC.

Chapter 5 gives the applicable control codes and escape sequences supported by the printer processor firmware.

Other chapters of the manual contain information about the printer error codes, communications parameters, test print functions, specifications, replacement parts, etc.

1.2 Updating

This manual will be updated as, from time to time, printer functions and features may be added or amended. You will always find the latest edition on our web site (<http://www.swecoin.se>). You can order printed copies of the current manual by e-mail, fax, or phone.

If you require functions not found in the manual edition at your disposal, you are welcome to consult one of our representatives for information.

2 PRODUCT PRESENTATION

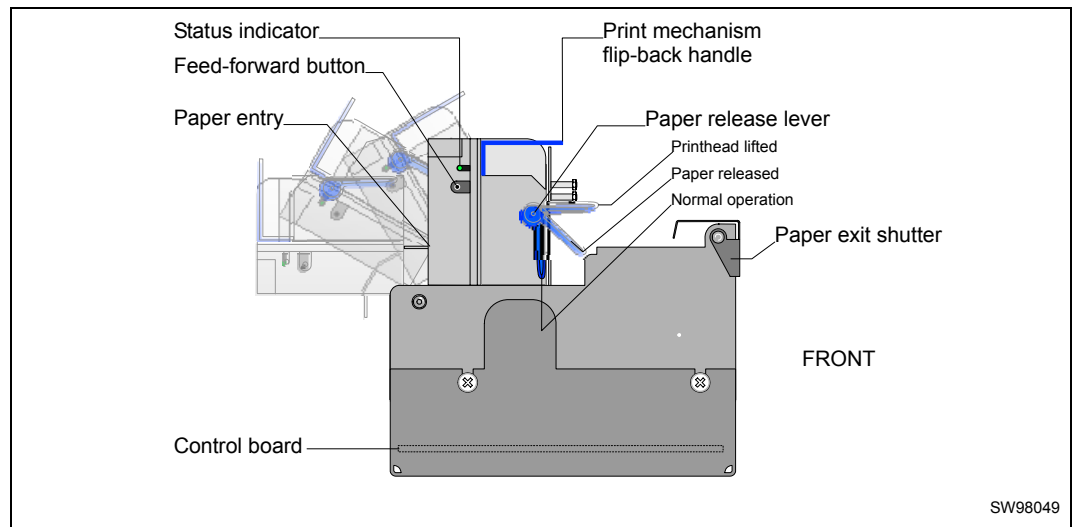


Figure 1. Printer exterior, side view

The TTP 7000 is a kiosk printer using direct thermal printing. The print speed is up to 75 mm per second.

The printer has an integrated control board that communicates with the host computer through an IEEE-1284 bi-directional parallel port, an USB port, or an optional serial port. Printer drivers for most versions of Microsoft Windows™ are available, and the printer is compatible with the Plug and Play standard. It is also possible to address the printer directly from the kiosk software without using Windows.

The loop generating presenter mechanism handles documents of various lengths. It holds the receipt until printed, then cuts and presents the complete receipt to the customer. A retract and retain option can retract uncollected receipts into a wastebasket inside the kiosk.

A flip-up print module gives the operator access to the paper path, and printhead, for maintenance purposes.

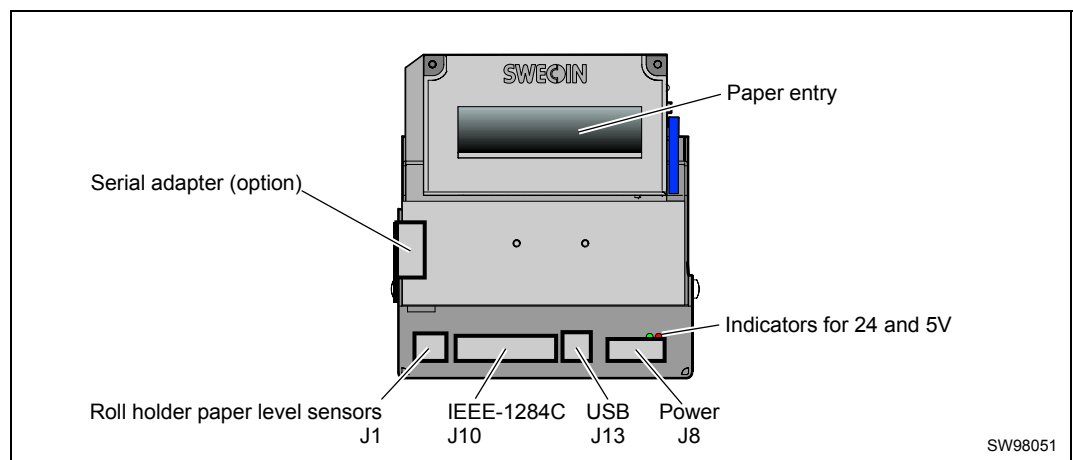


Figure 2. Printer exterior, rear view

2.1 Indicators

2.1.1 Status indicator

- The yellow status indicator (see Figure 1) has several functions:

ON constantly — the printer is operational

Blinks, pauses, blinks — indicates non-severe error. The number of blinks reflects the error code:

- 1 Presenter jam
- 2 Cutter stuck
- 3 No paper at head
- 4 Head up
- 5 Paper-feed error
- 6 Temp error

Flashes rapidly — indicates severe error. The printer must be reset to be operable again. Hold down the feed-forward button and the number of blinks will reflect the error code.

2.1.2 Control board indicators

The control board has two power indicators behind the power connector.

- Green indicator constantly ON: 24 V present
- Red indicator constantly ON: 5 V OK (generated on control board)

2.2 Feed-forward (FF) button

When you insert the paper through the paper entry the printer will feed it forward, cut and eject a receipt, then switch to on-line mode. Use the feed-forward button if you want to advance the paper forward further.

To feed paper:

1. Press and hold the button, paper-feed starts.
2. Release the button to stop paper feed.

You can also use the feed-forward button to print a self-test receipt. See page 17.

3 INSTALLATION

3.1 Installation considerations

The TTP 7000 printer should be installed in some kind of enclosure such as a self-service kiosk. The illustration below gives an example of a printer-mounting shelf. See also "Printer dimensions" on page 74.

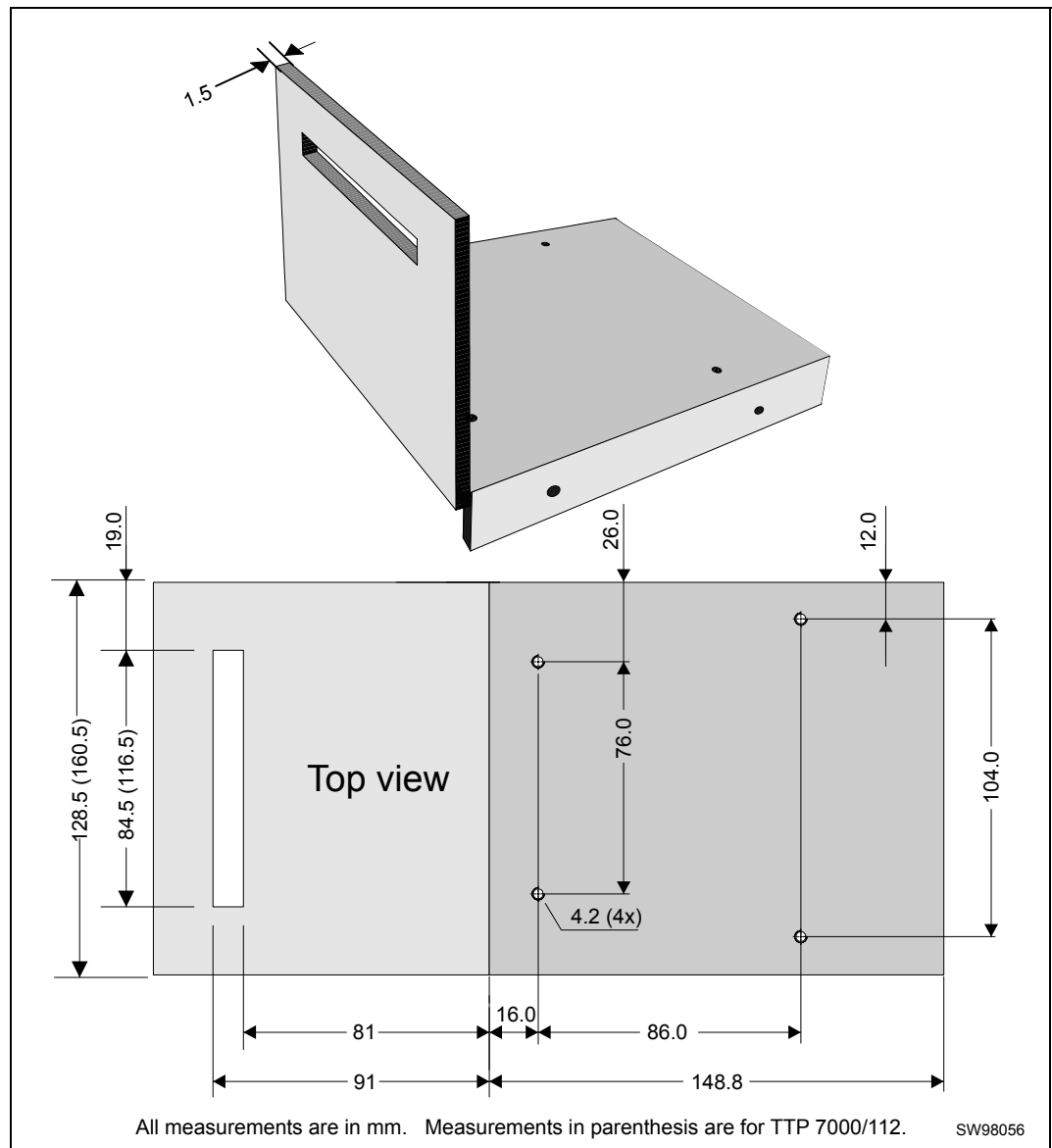


Figure 3. Example of a simple shelf for fastening a standard printer

Additional space is required for paper replenishment and paper jam removal. Consider mounting the printer on a movable platform so that the printer can be maintained outside the printer enclosure.

3.1.1 Electrostatic discharges, and earth currents

Preventing ESD and earth currents from affecting the printer operation requires proper connection of the printer chassis to protective earth through a mounting platform or through a separate earth conductor.

3.1.2 Ambient light

There is an optical sensor just inside the paper exit at the front of the printer.

To ensure proper printer operation, design the printer enclosure so that it prevents direct sunlight or light from indoor lamps from reaching the sensor through the paper exit.

3.2 Connecting to the computer

3.2.1 Using the parallel interface

Connect the printer to the parallel port of the computer to be used.

Connector J10 is an IEEE-1284 type C, 36-pole mini Centronics, with clip latches. See Table 10 for pin assignment of J10.

Use only certified cables marked IEEE-1284. See page 77 for Swecoin ordering number. You can also use commercially available cables such as AMP 158393-3.

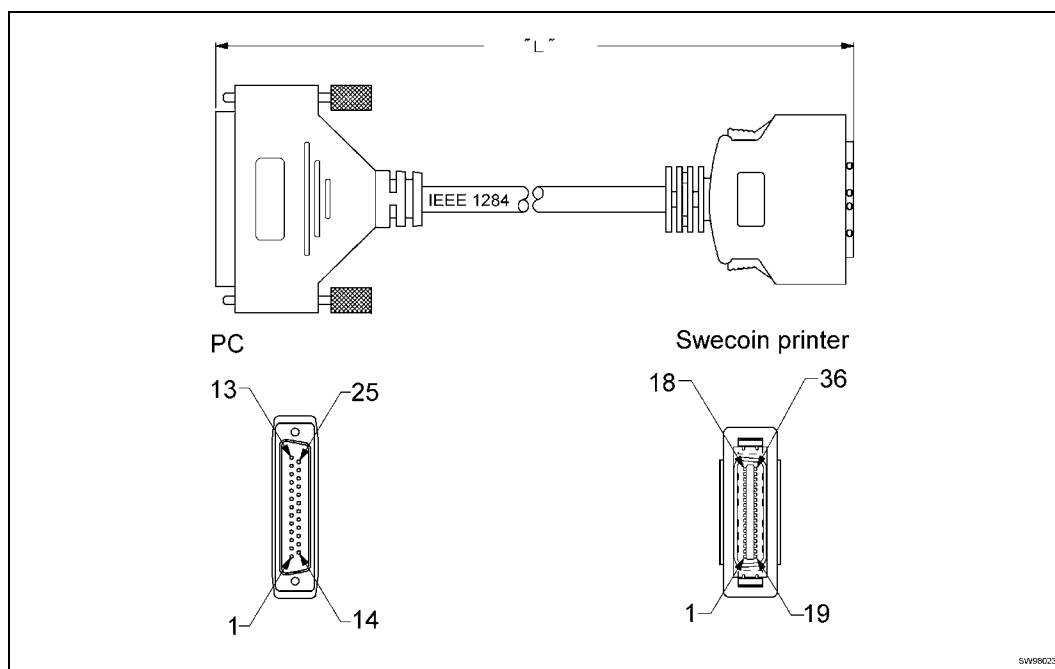



Figure 4. IEEE-1284 cable with type A and type C connectors

3.2.2 Using the USB interface¹

Connect J13 of the printer to the USB port of the computer or the USB hub to be used. USB connectors are recognized by the following symbol: .

Connector J13 is a 4-pin USB type B connector. See Table 14 for pin assignment.

A suitable cable is available from Swecoin, see page 77 for ordering number. You can also use commercially available cables such as AMP 621775-4.

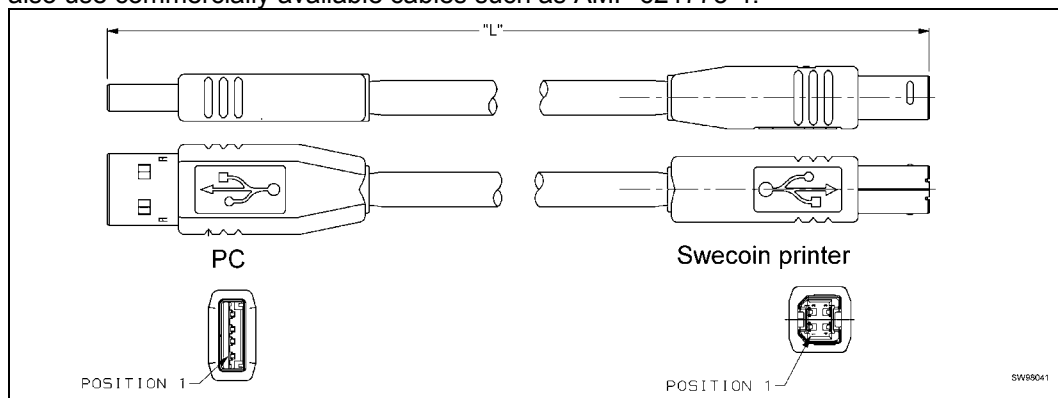


Figure 5. USB cable with type A and type B connectors

3.2.3 Using a serial adapter

1. Loosen the control board module, see Control board, Removal on page 65.
2. Connect the serial adapter to J4 on the control board.
3. Fasten the control board module, see Control board, replacement on page 65.
4. Fasten the serial adapter with the two screws on the right hand side of the printer.

Connect a Swecoin serial cable, ordering No. 01659-000, between the printer and the computer to be used. We strongly recommend using the Swecoin cable because many incompatible cables are available.

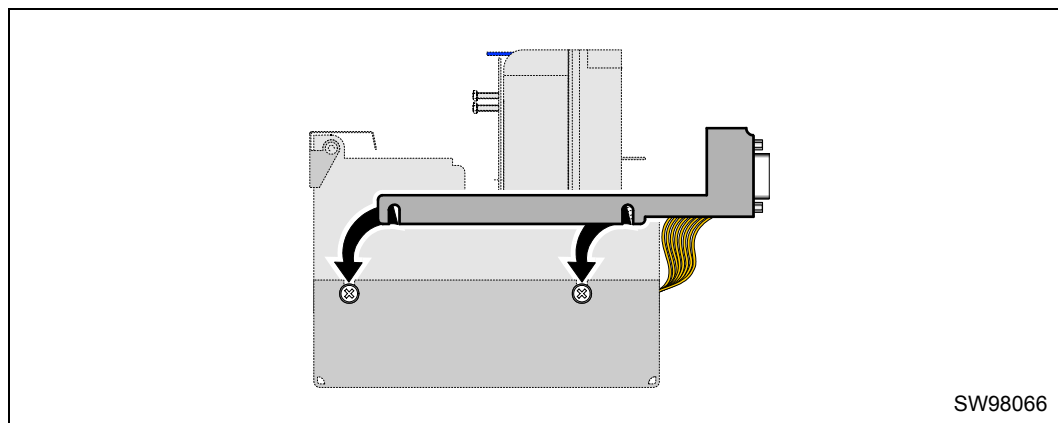


Figure 6. Fitting a serial adapter to the printer.

¹ The USB interface was implemented in hardware revision B. You can see the hardware revision on the self-test printout.

3.3 Connecting the power

Using the Swecoin power supply (see page 77 for ordering number):

1. Make sure the line voltage selector on the power supply is set to your local line voltage.
2. Connect the cable from the power supply to J8.
3. Connect the power cable to the line outlet.
4. Turn ON the power supply.

If you use another type of power supply unit, connect the voltages according to the following table. At the printer end of the cable, use an AMP Mate-N-Lok connector housing and two contact-sockets:

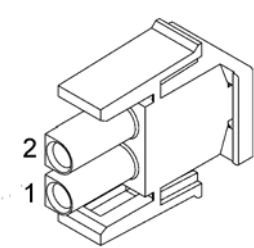

Pin	Function	AMP No. 350777-1	AMP No. 350689-1
1	+24 Vdc		
2	GND		

Table 1. Power connection

	80 mm paper width	112 mm paper width
Idle	150 mA	150 mA
Standard text printing	2.5 A average	3.5 A average
All black printing	8.5 A	11 A

Table 2. Current consumption

3.4 Making a test printout

You can make a self-test printout if you want to verify that the printer operates correctly. See " Self-test printout" on page 17.

3.5 Installing a printer driver

Printer drivers for most versions of Microsoft Windows™, Macintosh and Linux are available on the Swecoin web site <http://www.swecoin.se>, or on diskette from Swecoin. See page 2 for address, and page 77 for ordering number. Please follow the installation instructions that accompany the drivers.

3.6 Paper level sensors

The printer has inputs for one paper-near-end sensor, and one weekend sensor.

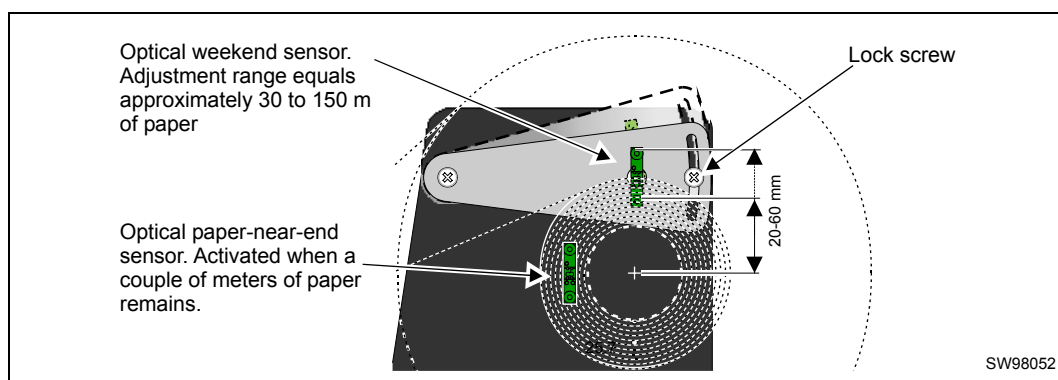


Figure 7. Sensors on 200 mm roll holder

The paper-near-end sensor alerts the system when a couple of meters of paper remain on the roll. The purpose of this sensor is to get an early alert so that you can replace the paper roll in time in remotely located kiosks.

The weekend sensor should alert when the remaining paper does not last over a weekend. A reason to use this sensor is that it is more expensive to get a serviceman out in a weekend or holiday, than it is to replace the roll before it is totally empty.

The Swecoin 110 mm and 150 mm paper roll holders are equipped with paper-near-end sensors, while the 200 mm roll holders have both paper-near-end and weekend sensors.

When installing the Swecoin roll holder just connect the cable from the roll holder to connector J1 at the back of the printer. See Figure 2 on page 6.

If you use custom designed roll holders, connect the sensors according to Figure 8

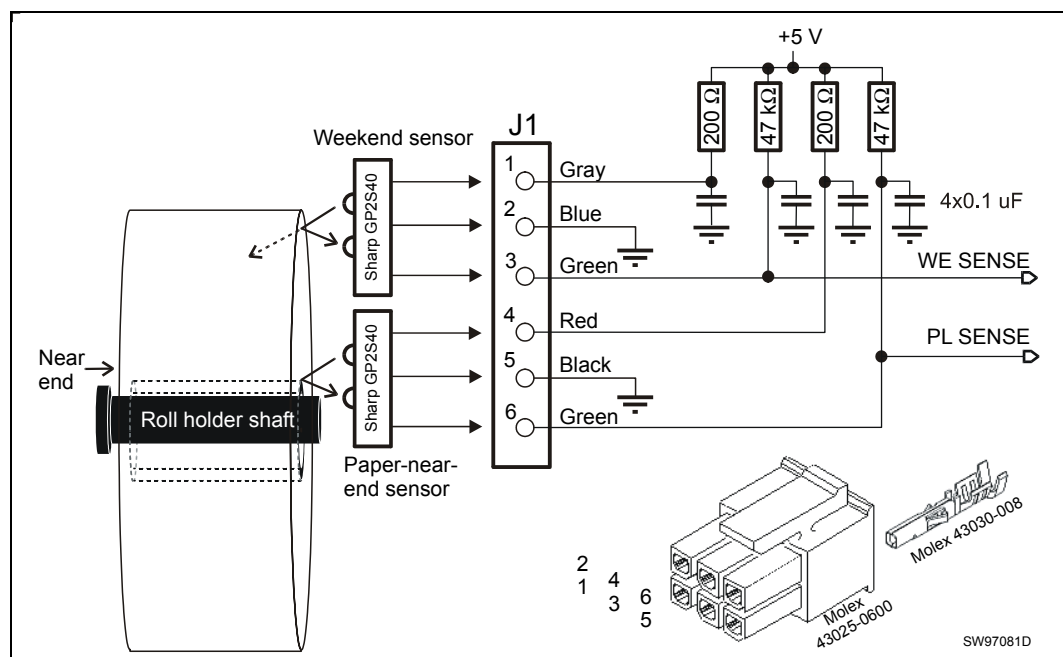


Figure 8. Paper-near-end sensor connection

4 OPERATION

4.1 Installing a paper roll

1. Turn the new paper roll as shown. The paper should be inserted into the printer with the temperature-sensitive side up.

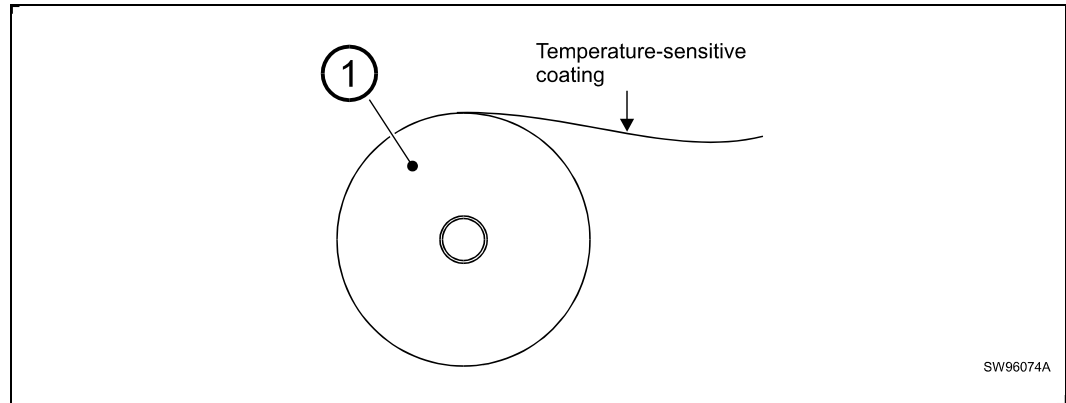


Figure 9. Turn the paper roll so that the paper leaves the roll from the top

2. Tear off a full turn of the paper (approximately 0.5 m) from the new paper roll.

⚠ CAUTION!

This is important since the outer end of the paper is usually fixed to the roll with some type of glue or self-adhesive substance that might otherwise cause paper jam or even printhead damage.

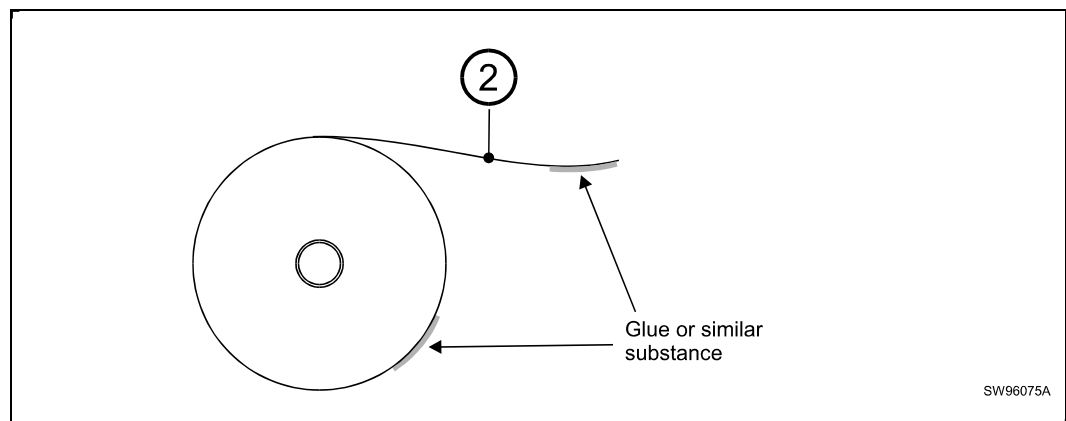


Figure 10. Tear off 0.5 m from the new paper roll

3. Make sure the printer is turned ON.

4. Cut the paper in a suitable angle:

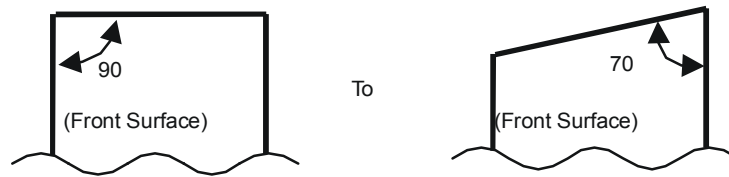


Figure 11. Suitable paper edge for auto load

NOTE 1! — The paper sensor is at the same side as the blue paper release lever (where the arrow points in Figure 12). If the paper is cut in a direction opposite to that as shown in the figure above, the sensor will not detect the paper.

5. Insert the paper through the paper entry opening at the back of the printer. The printer will now feed, cut and eject a receipt, and then automatically go on-line. ¹

NOTE 2! — In high temperature and high humidity, the paper may lose its stiffness resulting in paper jam at automatic paper loading. In such cases, load paper manually.



Figure 12. Insert the new paper

¹ TTP 7000/112 was designed for manual paper loading. A modification of the control board is required for auto loading. Such modification was introduced mid 2003. Auto loading was improved in firmware version 2.37 (see version history).

4.2 Clearing paper jams

Should a paper jam occur, follow the procedure below:

1. Tear off the paper close to the paper roll and flip back the print module.

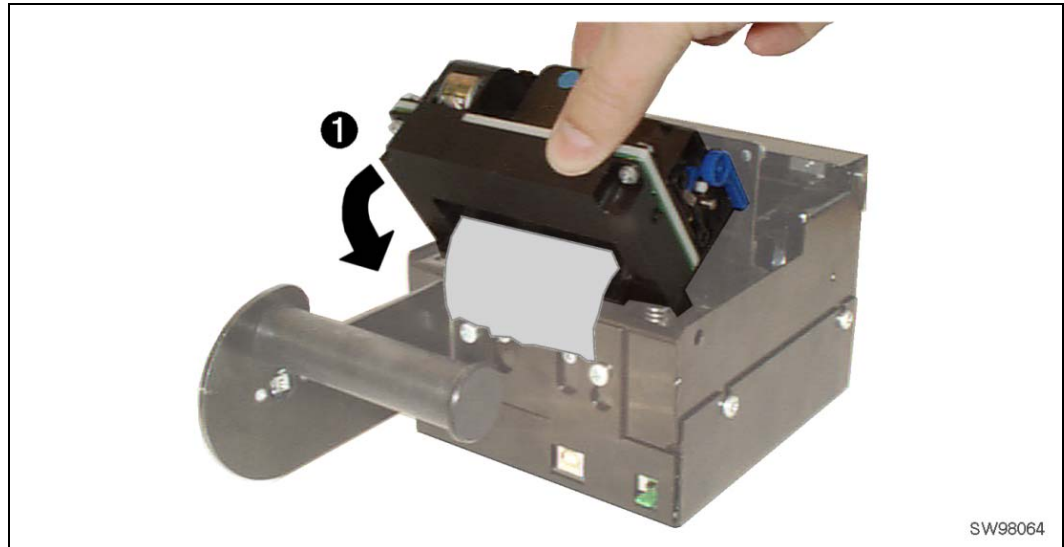


Figure 13. Flip open the print module

2. Lift the printhead by pushing the paper release lever upwards.
3. Remove any paper trash by gently pulling the paper up and out of the print module.

CAUTION! — Never pull paper backwards through the print mechanism.
This may destroy the print module

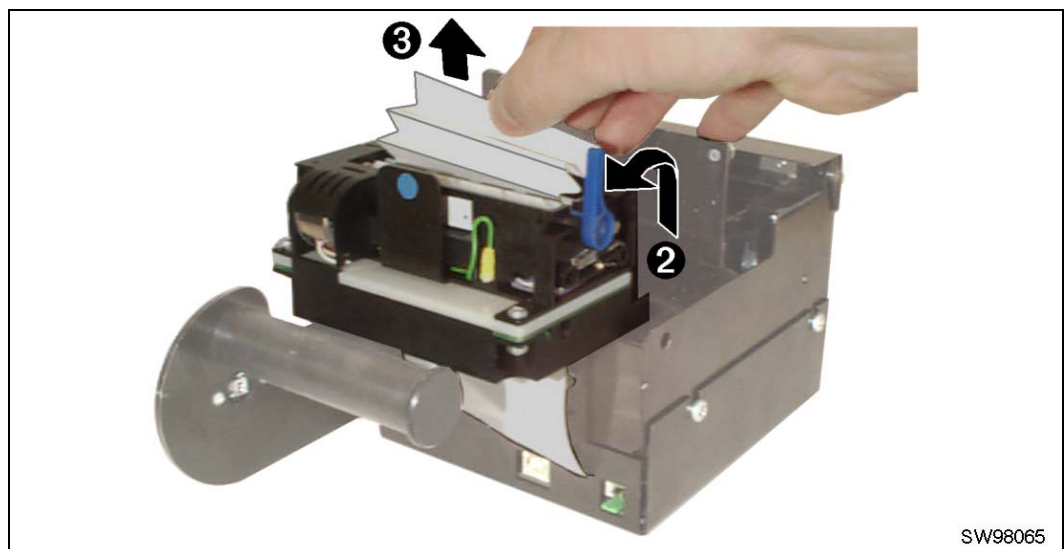


Figure 14. Remove paper trash

4.3 Self-test printout

1. Switch OFF the power.
2. Hold the feed-forward button depressed while powering ON the printer. Keep the button depressed for at least 5 seconds.

This produces a printout showing the firmware program version and date, control board revision number and serial number, name of loaded fonts and logotypes, parameter settings, and the set printhead burn.

3. Each successive press of the button will produce a test printout.
4. Switch the printer OFF and ON again to exit self-test mode.

5 PROGRAMMING

There are two completely different ways of setting up the receipt: Text oriented and driver oriented style.

Text oriented

The receipt can be seen as the page of a simple word processor. You send text and graphics to the printer, which prints the information in the same sequence as the data is received. Design features are limited to the font stored in the flash PROM of the printer.

Text and logotypes can also be printed landscape orientation.

There are two text cursors, one for portrait, and one for landscape. The start positions of the cursors are the upper left corner for the portrait cursor, and the upper left corner for the landscape cursor, see Figure 15. You can switch between these cursors at any time, the cursor will retain its last position on the ticket.

Driver oriented

When a Windows driver is used, you can use any Windows program to design the ticket with text, graphics, bar codes or whatever you want to print and in any orientation you want.

The Windows driver issues all the necessary commands. Only the cut-and-present and black-mark commands need to be specified by the programmer.

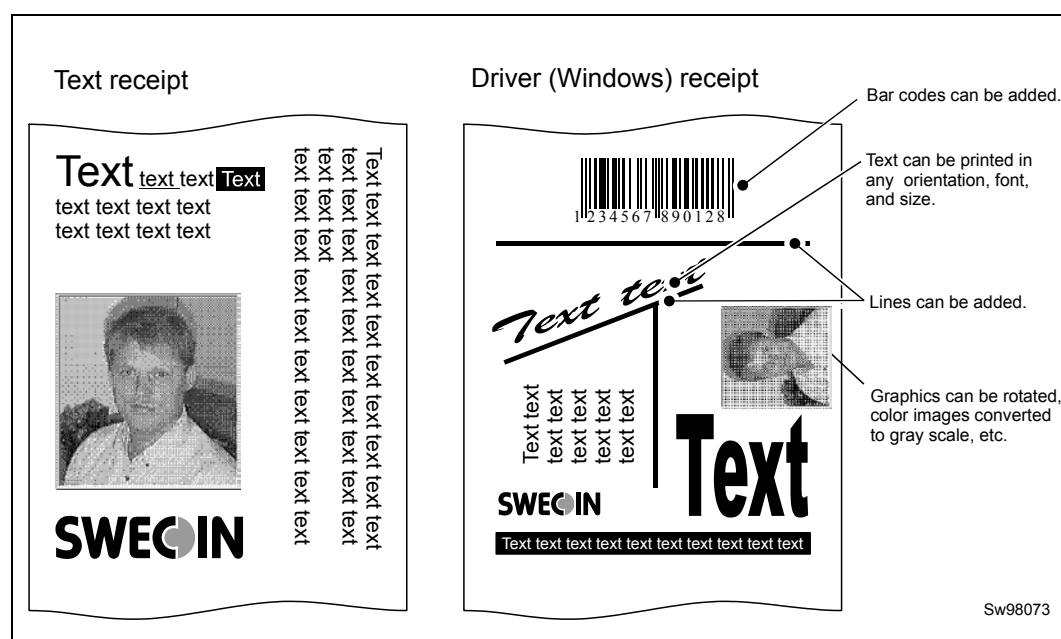


Figure 15. Ticket styles

5.1 Summary of control codes & escape sequences

Command	Hex	Decimal	Function	Page
BS	08	008	Backspace	26
CAN	18	024	Cancel	36
CR	0D	013	Carriage return	27
EM	19	025	Enforced clear presenter	34
ENQ	05	005	Clear presenter	34
ESC ACK n	1B 06 n	027 006	Set acknowledge marker	42
ESC ! n	1B 21 n	027 033	Select font	29
ESC & 1	1B 26 01	027 038 001	Load logotype into flash PROM	36
ESC & 4	1B 26 04	027 038 004	Store current parameter values in flash PROM	36
ESC & C	1B 26 43	027 038 067	Erase all fonts	37
ESC & D	1B 26 44	027 038 068	Erase fonts 4—7	37
ESC & L	1B 26 4C	027 038 076	Erase all logotypes	36
ESC & P n v	1B 26 50 n v	027 038 080 n v	Set parameter values	37
ESC & NUL	1B 26 00	027 038 000	Load font	36
ESC ?	1B 3F	027 063	Reset (full)	36
ESC @	1B 40	027 064	Reset (initialize)	36
ESC 3 n	1B 33 n	027 051	Line spacing	27
ESC b 0 x1 x2 y1 y2	1B 62 n...	027 098 n...	Print bitmap at XY position	31
ESC B n	1B 42 n	027 066 n	Bold ON/OFF	25
ESC c n	1B 63 n	027 099 n	Variable page length ON/OFF	22
ESC C n1 n2	1B 43 n1n2	027 067 n1 n2	Page length	21
ESC d n	1B 64 n	027 100 n	Make n line feeds	27
ESC ENQ 01	1B 05 01	027 005 001	Status enquiry, general	38
ESC ENQ 02	1B 05 02	027 005 002	Paper-near-end enquiry	39
ESC ENQ 04	1B 05 04	027 005 004	Fonts and logotype enquiry	39
ESC ENQ 06	1B 05 06	027 005 006	Status report	40
ESC ENQ 07	1B 05 07	027 005 007	Firmware version enquiry	40
ESC ENQ 09	1B 05 09	027 005 009	Serial number enquiry	41
ESC ENQ 10	1B 05 0A	027 005 010	Control board revision enquiry	41
ESC ENQ 99	1B 05 63	027 005 099	Request device ID	41
ESC ENQ P	1B 05 50	027 005 080	Parameter setting data enquiry	41
ESC f n	1B 66 n	027 102 n	Presenter loop ON/OFF/length	35

Command	Hex	Decimal	Function	Page
ESC F n1...nx NUL	1B 46 n1...nx 00	027 070 n...nx 000	Set horizontal tabs	28
ESC FF n	1B 0C n	027 012 n	Eject (run presenter)	34
ESC g n1 n2 n3 n4 n5	1B 67 n1...n5	027 103 n1...n5	Print logotype at specified X, Y	32
ESC h n	1B 68 n	027 104 n	Set multiple-height print	29
ESC i n	1B 69 n	027 105 n	Italics ON/OFF	25
ESC J n	1B 4A n	027 074 n	Paper advance	32
ESC j n	1B 6A n	027 106 n	Paper reverse	32
ESC L n	1B 4C n	027 76 n	Print logotype at current position	33
ESC M n1 n2	1B 4D n1n2	027 077 n1 n2	Black mark definition	23
ESC N n	1B 4E n	027 078 n	Text alignment	24
ESC NUL	1B 00	027 000	Load firmware	37
ESC o n	1B 6F	027 111	Text and logotype orientation	24
ESC p	1B 70	027 112	Print	32
ESC q n	1B 71 n	027 113 n	Print contrast adjustment	33
ESC RS	1B 1E	027 030	Cut only, no eject	34
ESC s n	1B 73 n	027 115 n	Send dot line	31
ESC S n1 n2	1B 53 n1 n2	027 083 n1 n2	Send graphics data	31
ESC T n	1B 54 n	027 084 n	Reversed text ON/OFF	29
ESC u n	1B 75 n	027 117 n	Underline ON/OFF	29
ESC w n	1B 77 n	027 119 n	Set multiple-width print	29
ESC V n	1B 56 n	027 086 n	Print speed adjustment	32
ESC X n1 n2	1B 58 n1 n2	027 088 n1 n2	Sense black-mark position	23
ESC x n1 n2	1B 78 n1 n2	027 120 n1 n2	Set internal black-mark counter	23
ESC Z	1B 5A	027 090	Go to next top of form	23
FF	0C	012	Form feed	28
HT	09	009	Horizontal tabulation	28
LF	0A	010	Linefeed	27
RS	1E	030	Cut and eject paper	34

Table 3. Control codes & escape sequences in alphabetical order

NOTE! – In all responses from the printer the most significant byte (MSB) is transmitted first.

5.2 Software command syntax

The commands in this section are grouped after what they do, and these groups are sorted in a theoretical usage sequence. It starts with commands for specifying the printed page — through text-and-graphics commands — to cut-and-present commands. System and status commands are presented at the end.

5.2.1 Page setup commands

ESC C n1 n2

1B	43	n1	n2	hex
027	067	n1	n2	decimal

Set fixed page length

NOTE! — Use this command only when you want a fixed page length. Shorter tickets will automatically be extended, while longer tickets will be divided into several tickets of the desired length.

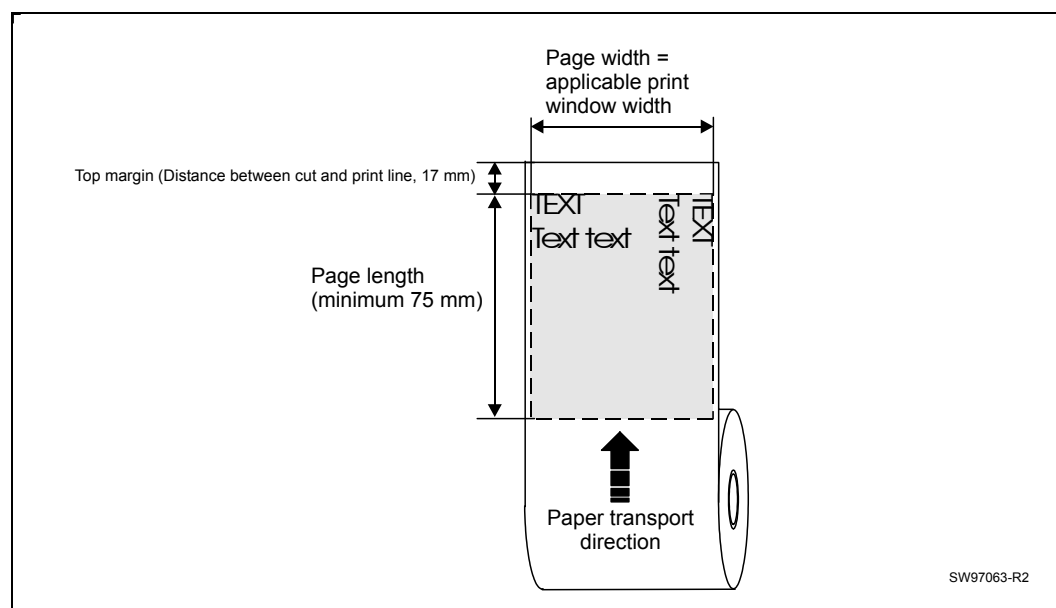


Figure 16. Definition of page size

Sets the fixed page length expressed as a number of 0.125-mm pixel line-feeds. Form feed is effected with the **FF** command.

NOTE! — Do not use fixed page length less than 75 mm ($n1 = 2$, $n2 = 88$)

- The **ESC C n1 n2** setting applies unless superseded by command **ESC c n** that enables the variable page length.
- Fixed page length settings, shorter than the minimum page length as defined by default parameter settings, will automatically be adjusted to the default value.

NOTE! — To enable fixed page length you must also use **ESC c 0**, see next page

Example:

Length	Command	n1	n2	Length	Command	n1	n2
75 mm	ESC C	<002>	<088>	155 mm	ESC C	<004>	<216>
80 mm	ESC C	<002>	<128>	160 mm	ESC C	<005>	<000>
85 mm	ESC C	<002>	<168>	165 mm	ESC C	<005>	<040>
90 mm	ESC C	<002>	<208>	170 mm	ESC C	<005>	<080>
95 mm	ESC C	<002>	<248>	175 mm	ESC C	<005>	<120>
100 mm	ESC C	<003>	<032>	180 mm	ESC C	<005>	<160>
105 mm	ESC C	<003>	<072>	185 mm	ESC C	<005>	<200>
110 mm	ESC C	<003>	<112>	190 mm	ESC C	<005>	<240>
115 mm	ESC C	<003>	<152>	195 mm	ESC C	<006>	<024>
120 mm	ESC C	<003>	<192>	200 mm	ESC C	<006>	<064>
125 mm	ESC C	<003>	<232>	205 mm	ESC C	<006>	<104>
130 mm	ESC C	<004>	<016>	210 mm	ESC C	<006>	<144>
135 mm	ESC C	<004>	<056>	215 mm	ESC C	<006>	<184>
140 mm	ESC C	<004>	<096>	220 mm	ESC C	<006>	<224>
145 mm	ESC C	<004>	<136>	225 mm	ESC C	<007>	<008>
150 mm	ESC C	<004>	<176>	230 mm	ESC C	<007>	<048>

Table 4. Example of page length commands

ESC c	n		Variable page length ON /OFF
1B 63	n	hex	
027 099	n	decimal	
	n = 0		OFF. Automatic form feed if the printed page length exceeds the length set by ESC C n1 n2.
	n = 1		ON. Selects continuous print mode (no auto FF). See also "Default parameter settings".

5.2.2 Black-mark (top-of-form) commands

See also Aligning preprint and thermal print on page 52.

ESC M n1 n2

1B	4D	n1	n2	hex
027	077	n1	n2	decimal

Black mark size

This command specifies maximum (n1) and minimum (n2) length (in transport direction) of the black mark printed on the reverse side of the paper. The black-mark identifies the top of the next form (document). The length of the mark is expressed in pixel lines of 0.125-mm height.

Active transition is from "black" to "white" (trailing edge of black-mark)

n1 Maximum valid value is 160 pixel lines (20.0 mm). Marks longer than this value is interpreted as paper out. Default value = 80 pixel lines (10.0 mm)

n2 Minimum valid value is 15 pixel lines (1.9 mm). Marks shorter than this value is interpreted as dirt. Default value = 24 pixel lines (3.0 mm)

ESC X n1 n2

1B	58	n1	n2	hex
027	088	n1	n2	decimal

Locate black mark

Looks for a black mark within the distance (paper transport) specified by n1n2, starting at the current position.

n1n2 Specifies the distance to be searched for black-mark. n1 is the higher-order and n2 the lower-order byte. The distance is to be expressed as a number of 0.125-mm steps.

The printer adds an error code in the status report (error, top of form, byte 1, bit 3) if no black-mark is found within the specified distance.

ESC x n1 n2

1B	78	n1	n2	hex
027	120	n1	n2	decimal

Delay cut after black mark detection

n1n2 Sets the number of 0.125-mm steps to feed between the black mark detection and the cut. n1 is the higher-order and n2 the lower-order byte.

At completed printout, an `ESC z` command effects paper feed until a black mark is detected, that is, when black-to-white transition is detected at the trailing edge of the black mark. The paper feed then continues the number of steps specified by n1n2, at which point the correct cut-position is assumed.

ESC Z

1B	5A	hex
027	090	decimal

Go to next black mark

Executes the number of pixel line feeds as defined by command `ESC x n1 n2` minus such pixel line feeds that have been effected after detection of black-mark.

NOTE! — *If the black-mark has not passed the paper-out/black-mark sensor when the ESC Z is received, additional paper feed (maximum 128 mm) takes place until a black-mark is detected.*

5.2.3 Text commands

Text received by the printer is printed with the currently selected font and font attributes. Text exceeding the page width is wrapped with the line spacing selected.

ESC o	n		Text and logotype orientation
1B	6F	n	hex
027	111	n	decimal

Changes the orientation of text and logotypes.

n = 0 Gives portrait orientation

n = 1 Gives landscape orientation

Portrait and landscape can be mixes on the same receipt. There are two cursors, one for portrait and one for landscape. The cursor always starts at the top left corner of the document. Looking at the paper when it exits the printer, the portrait cursor is at the top left corner of the receipt, moving to the right as text is typed, while the landscape cursor is at the top right corner, moving downwards.

NOTE! — Landscape only works if fixed page length is used. Start a page by specifying page length for example <ESC>C<003><032>, then turn off auto page length with <ESC>c<000>

NOTE! — ESC o <001> and ESC o <000> must be on separate lines (separated by a linefeed <LF>).

ESC N	n		Text alignment
1B	4E	n	hex
027	078	n	decimal

Changes the alignment of text and logotypes.

ESC N 0= Left

ESC N 1 = Center

ESC N 2 = Right

ESC !	n		Select font
1B	21	n	hex
027	033	n	decimal

This command selects one of eight fonts. The font design depends on which fonts have been loaded¹ into the printer. Make a test printout to see which fonts are available in your printer.

ESC ! 0 selects normal font (font 0) ESC ! 4 selects font 4

ESC ! 1 selects font 1 ESC ! 5 selects font 5

ESC ! 2 selects font 2 ESC ! 6 selects font 6

ESC ! 3 selects font 3 ESC ! 7 selects font 7

Table 5. Font selection commands

- Lines, too long to be printed in the selected font, are automatically wrapped around.
- Different fonts can be used on the same line.

¹ For font loading, see "System related commands" on page 36

- Selection of an erased or for any other reason non-existent font, will set bit 4 of byte 1 in the status enquiry response to "1". See "Parameter setting data enquiry" on page 41.

NOTE! — *If more than 256 characters are sent to the printer before an LF, the first part of the buffer contents is printed-out automatically. The text is formatted according to the already received formatting commands.*

ESC	B	n		Bold	Normal Bold
1B	42	n	hex		
027	66	n	decimal		

n = 0 Turns OFF bold (Normal)

n = 1 Turns ON **bold**

Bold is designed for normal character width and shows less and less as the width increases.

ESC	i	n		Italics	Normal <i>Italics</i>
1B	69	n	Hex		
027	105	n	decimal		

n = 0 Turns OFF Italics (Normal)

n = 1 Turns ON *Italics*

ESC	T	n		Reversed print ON/OFF	Reverse print
1B	54	n	hex		
027	084	n	decimal		

Selects normal or reversed print.

n = 0 Gives normal print, black on white

n = 1 Gives reversed print, white on black

Single words, characters, or complete text lines can be reversed.

ESC	u	n		Underline	<u>Underline</u>
1B	75	n	hex		
027	117	n	decimal		

n = 0 Turns OFF underline

n = 1 Turns ON a 1 pixel wide underline

n = 2 Turns ON a 2 pixel wide underline, etc. up to n=7.

Single words, characters, or complete text lines can be underlined.

ESC h n				Set multiple-height print	Double height
1B	68	n	hex		
027	104	n	decimal		

Applicable n values are 000 — 015.

n = 1 Increases the character height to 2 times the basic character height.

n = 2 Increases the character height to 3 times the basic character height etc.

n = 0 Resets the character height to the basic character height.

In combination with variable character width (**ESC w n**), give highly legible characters depending on the font to which the command has been applied.

Different fonts and heights can be mixed on the same print line.

ESC w n				Set multiple-width print	Double width
1B	77	n	hex		
027	119	n	decimal		

Applicable n values are 000 — 007.

n = 1 Increases the character width to 2 times the basic character width.

n = 2 Increases the character width to 3 times the basic character width etc.

n = 0 Resets the character width to the basic character width.

In combination with variable character height (**ESC h n**), give highly legible characters depending on the font to which the command has been applied.

Different fonts and widths can be mixed on the same print line.

ESC t n1 n2 n3 n4 n5 data										Print text string
1B	74	n1	n2	n3	n4	n5	data	hex		
027	116	n1	n2	n3	n4	n5	data	decimal		

Prints a text string at the specified X-Y position. The string will use the formatting set by font, reversed, width, height, bold and underline commands.

n1n2 Two byte definition of the X print position (in pixels).

n3n4 Two byte definition of the Y print position (in pixels).

n5 The number of characters in the string.

data The text string. The length must be exactly the number of characters specified by n5, otherwise the printer will stop, waiting for more characters.

After the string has been printed, the cursor will return to the position it had before the string command was issued.

NOTE! — The Y print-position only works if fixed page length is used.
Start a page by specifying page length for example
<ESC>C<003><032>, then turn off auto page length with <ESC>c<000>

BS		Back Space
05	hex	
005	decimal	

Moves the print-position one step to the left. Backspace can be used to combine characters. For instance to print a Ø, send text commands O BS / to the printer, and the slash will overprint the O.

Only one backspace can be used at a time. Excessive backspaces will be ignored.

CAN

18	hex
024	decimal

Cancel

Cancels print data on the same line as the command itself. ESC commands, issued on the same line as the **CAN** command, are not cancelled.

CR

0D	hex
013	decimal

Carriage Return

Carriage return is ignored by default.

By changing the default settings, you can:

- Interpret is as **CR**. This returns print position to beginning of line without line feed.
- Interpret **CR** as **CR/LF**. This inserts line space as specified by the line spacing setting (see command **ESC 3 n** on page 27), and returns the print position to beginning of the line.

See “Carriage return and line feed behavior ” on page 48.

LF

0A	hex
010	decimal

Linefeed

Linefeed is interpreted as **CR/LF** by default. This inserts line spaces as specified by the line spacing setting (see command **ESC 3 n** on page 27), and returns the print position to beginning of the line.

By changing the default settings, you can:

- Interpret **LF** as Linefeed. This inserts line space as specified by the line spacing setting (see command **ESC 3 n** on page 27), without returning the print position to the beginning of the line.
- Ignore **LF**.

See “Carriage return and line feed behavior ” on page 48.

ESC d n

1B	64	n	hex
027	100	n	decimal

Execute n linefeeds

Executes the number of linefeeds as defined by variable n. The length of each line feed is determined by.

- the default value for selected font (see command **ESC 3 n** on page 27) or
- the line setting effected by command **ESC 3 n**, (n = "0" gives no line feed)

The print position is returned to the beginning of the line. Any text on the line is lost. To avoid loosing text, send an LF before sending **ESC d n**.

ESC 3 n

1B	33	n	hex
027	051	n	decimal

Set line spacing

This command is used to increase the line spacing. The entered value n is the absolute line spacing expressed as a number of pixel lines (0.125-mm increment). To increase the line spacing to 5 mm, for example, enter value $n = 40$ ($5 / 0.125 = 40$).

The command is ignored if “n” is less than the default line spacing of the selected font.

The default line spacing is directly related to the size of the selected font.

Examples: 10 cpi 30 pixels = 3.75 mm 15 cpi 20 pixels = 2.5 mm
 12 cpi 24 pixels = 3.0 mm 17 cpi 18 pixels = 2.25 mm

Double-height text on a line will double the line spacing for the entire line.

FF

0C	hex
012	decimal

Form Feed

Prints data from the input buffer and feeds the paper to the top of the next page.

- In fixed document length (FORM-mode) this command prints data in the input buffer and feeds the paper to the top of next page.
- In variable document length mode this command acts as **CR/LF**.
- In black-mark mode, the printer interprets incoming **FF** commands as **ESC x 08 00**

If Autocut at FF is set to 1 (in start-up parameter setting **ESC & P n34**), **FF** effect both form-feed, cut, and eject.

NOTE! — Use **ESC C n1 n2** to define page length.

HT

09	hex
009	decimal

Horizontal Tabulation

Shifts the current print position to the next Tab position.

Set tab positions with the **ESC F n1 . . . nx** command on page 28.

ESC F n1 ... nx NUL

1B	46	n1	...	nx	00	hex
027	70	n1	...	nx	000	decimal

Set horizontal tabs

This command defines the desired horizontal tab positions. Variables n1...nx represent each tab position. Up to 16 tab positions are allowed. Minimum allowed value is "1".

Tab position 255 sets a tab stop on the last position of the line. Use this if you want underline or reversed text to extend across the full paper width.

Note that the tab positions are always expressed in number of 2.5-mm steps.

n = 1 Means 2.5 mm from the left-hand edge of the print window.

EXAMPLE

Send→ **ESC F 005 010 015 020 025 000**

Sets tab stops at 12.5, 25, 37.5, 50, and 62.5 mm.

NOTE! — Do not use value *n = 0*. The values must be sorted from low to high numbers.

5.2.4

Barcode commands¹

ESC	BC	n	
1B	42 43	n	hex
027	067 068	n	decimal

Barcode Clear

Clears the bar code field reserved by command ESC BS.

n Specifies which bar code field to clear. The range is 0 to 15. The fields may be cleared in any order.

ESC	BS	n1	...	nx	NUL	
1B	42 53	n1	...	n11	00	hex
027	66 83	n1	...	n11	000	decimal

Barcode field Specify

Bar codes can only be printed in portrait mode unless fixed page length is selected.

The command reserves an information field as a bar code field. The command also identifies the type, number of digits, and the configuration of bars to be placed in the bar code field.

- n1 Specifies the bar code field No. (0—15). Bar code fields may be specified in any order.
- n2n3 Sets the X coordinate of the bar code field origin (n2 is the higher-order and n3 the lower-order byte).
n2 and n3 must be 1-byte hexadecimal or decimal numbers. The values must not place the bar code outside the total pixel count that can be handled by the printer.
- n4n5 Specifies the Y coordinate of the bar code field position, (n4 is the high, and n5 the lower-order byte).
n4 and n5 must be 1-byte hexadecimal or decimal numbers.
- n6 Specifies the number of bar code digits, but is ignored by the printer.
- n7n8 Specifies the height of the bars.
- n9 Specifies the type of bar code. The following types are supported.
n9 = 0 EAN 8 or 13 (auto detect). The printer calculates the necessary check digit.
n9 = 1 UPC
n9 = 2 2/5 Interleaved (even number of characters must be sent)
n9 = 3 ISBN
n9 = 6 Code39
- n10 Specifies the thickness of the narrow bar 0=1 pixel, 1=2 pixel, and so on.
- n11 Specifies the wide-bar-to-narrow-bar ratio. Only used in Code 39 and 2-of-5 interleaved where different ratios are allowed.

ESC	BW	n1	nx	
1B	42 57	n1	nx	hex
027	066 087	n1	nx	decimal

Barcode Write

Writes data to the bar code field reserved by the ESC BS command.

¹ Introduced in firmware version 2.31

n1 Specifies the field No. Range 0 to 15. Fields can be specified in any order but other values than 0 to 15 are ignored.

n2 . . . nx Specifies bar code data bytes.
 To create a bar code add-on, insert a space character and then the data for the add-on.

NUL must be placed at the end of the bar code data.

Any invalid bar code character terminates the command.

5.2.5 Example:

```
<ESC>BS<h00><h00><h78><h00><h00><h0C><h00><h50><h00><h02><h00><<>>
<ESC>BW<h00>733104000099<h00><<>>
<RS><<>>
```

Will print one barcode with height = 10 mm and moved 15 mm to the right

5.2.6 Graphics commands

ESC S n1 n2 data

1B	53	n1	n2	data	hex
027	083	n1	n2	data	decimal

Send graphics data

Sends bit image graphics data to the printer.

n1 and n2 High and low order byte. Determine the number of dot lines.

<data> If less data than specified is received, the printer may enter a wait state, expecting further data. The printer may handle subsequent character code, or non-bit-image data, as bit-image data. The host computer must therefore supply 72 x (n1n2) data bytes for the 80 mm printer, and 104 x (n1n2) data bytes for the 112 mm printer, that is, 72 alternatively 104 bytes per line times the number of dot lines to be printed.

ESC s n

1B	73	n	hex
027	115	n	decimal

Send dot line

Sends one line of dot data. This command is used to build images, one dot line at a time.

n Determines the number of bytes.

<data> 1–72 bytes of data for 80 mm printer, 1–104 bytes for 112 mm printer

- If less than 72 or 104 bytes are sent, the printer will fill the rest of the dot line with spaces.
- If more than 72 or 104 bytes are received, the rest of the bytes are discarded.

ESC b n1 x1 x2 y1 y2 data

1B	62	n1	x1	x2	y1	y2	data	hex
027	98	n1	x1	x2	y1	y2	data	decimal

Print bitmap image

Prints a black & white Windows bitmap at the specified X-Y position. The bitmap must be a complete Windows bitmap (BMP-file) where the data starts with BM.

n1 Always 0

x1x2 Two byte definition of the X print position (in pixels).

y1y2 Two byte definition of the Y print position (in pixels).

data Bitmap data.

After the bitmap has been printed, the cursor will return to the X-position that it had before the bitmap command was issued.

Selecting horizontal mode (with ESC o 0) prints the image in portrait orientation, while selecting the vertical mode (with ESC o 1) prints the image in landscape orientation.

NOTE! — The Y print-position and horizontal/vertical orientation only works if fixed page length is used.

Start a page by specifying page length for example

<ESC>C<003><032>, then turn off auto page length with <ESC>c<000>

5.2.7 Print commands

ESC p				Print
1B	70	n	hex	
027	112	n	decimal	

This command makes the printer print the contents of the line buffer.

Text is converted from text to pixel lines and stored in the line buffer when an LF is received. If the line buffer is empty when ESC p is received, nothing is printed.

Text to be printed <LF><esc>p prints "Text to be printed" on the paper.

Printout is effected automatically at:

- Cut (RS and ESC RS)
- Clear presenter (ENQ)
- Run presenter (ESC FF n)
- Print buffer full When print data for approximately 0.75 m receipt length has been received (0.5 m for TTP 7000/112)

ESC J n				Paper advance
1B	4A	n	hex	
027	074	n	decimal	

The value n represents the number of dot lines (0.125 mm) the paper is to be transported forwards. Maximum value for n = 255, equal to approximately 32 mm.

ESC j n				Paper reverse
1B	6A	n	hex	
027	106	n	decimal	

The value n represents the number of dot lines (0.125 mm) the paper is to be transported backwards. Maximum value for n = 255, equal to approximately 32 mm.

ESC V n				Print speed adjustment
1B	56	n	hex	
027	086	n	decimal	

n specifies the printing speed. The main reason to decrease the print speed is to enhance print quality, and to reduce the peak current consumption.
n = 17 is default value (maximum speed)

n	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
mm/s	13	21	27	32	37	41	45	48	52	55	57	60	63	66	68	71	73	75

Table 6. Print speed settings

NOTE! — Some settings result in printer chassis resonance causing excessive noise and deteriorated print quality.

ESC q n			
1B	71	n	hex
027	113	n	decimal

Print contrast adjustment

n = 0–15

This command adjusts the burn time to obtain the optimal print contrast with the paper quality in use.

Each step n represents a pulse width adjustment of 5%. The actual burn time depends on ambient temperature and heat built up in the head.

Example:

ESC q 0: 75% pulse width

ESC q 5: 100% pulse width (default)

ESC q 15: 150% pulse width

At power ON, the contrast is set to the value stored as default parameter. See page 47.

ESC L n			
1B	4C	n	Hex
027	076	n	Decimal

Print logotype at current cursor position

Prints a customized logotype¹ stored in the flash PROM at the position of the cursor. The bottom line of the logotype is positioned at the baseline of the text on the line. If the logotype is higher than the text, the line spacing is increased.

See also Logotypes on page 45.

n One-byte logotype identification No. (0—15)

ESC g n1 ... N				
				5
1B	67	n1	...	N5 hex
027	103	n1	...	N5 decimal

Print logotype at specified X–Y

Prints a customized logotype¹ stored in the flash PROM. See also Logotypes on page 45.

n1 One-byte logotype identification No. (0—15)

n2n3 Two-byte definition of desired print position in X-direction (expressed in pixels) measured from left-hand edge of the page (see page 21 regarding definition of "page"). X-direction is perpendicular to the paper transport direction.

n4n5 Two-byte definition of desired print position in Y-direction expressed in pixels from top of the page.

These bytes must always be inserted but they are **ignored in variable-page-length mode** where logotypes are always printed at the current Y-position.

¹ For logotype loading, see "System related commands" on page 36

5.2.8 Cut and present commands

RS

1E	hex
030	decimal

Cut and eject receipt (record separate)

Effects a paper cut-off and a default-length eject through the presenter module.

If the receipt length is too short, paper-feed is added until the 75-mm minimum receipt length is reached, before execution of the Cut command.

ESC RS

1B	1E	hex
027	030	decimal

Cut only, no eject

Effects paper cut-off only.

Eject can be effected with the `ESC FF n` command (see page 34).

If the receipt length is too short, paper-feed is added until the 75-mm minimum receipt length is reached, before execution of the Cut command.

ESC FF n

1B	0C	n	hex
027	012	n	decimal

Eject (run presenter)

`ESC FF` ejects the document through the presenter module. Variable `n` represents the number of eject-steps.

- One step is approximately 2 mm
- The maximum number of steps is 255

Normally, this command is placed after a cut command (`ESC RS`) to partially eject the receipt to the customer. Set the number of eject steps so that a small part of the receipt is retained in the presenter module, avoiding that the receipt drops to the floor.

Another use of the command is to eject a part of a long document without preceding cut. The reason to do this is to limit the size of the loop build-up in the presenter.

NOTE! – The loop is limited to the value set by `ESC £ n` to avoid paper jam. The default setting of `n=18`, gives a loop of just above 0.5 m. When this length has been looped, the printer presents that part of the receipt. Then, without cutting the paper, it continues to print the rest of the receipt.

ENQ

05	hex
005	decimal

Clear presenter

Clears the paper path in the presenter, for example, to eject a document not removed during the previous print/cut/eject operation.

EM

19	Hex
025	Decimal

Enforced Clear Presenter

Same function as ENQ but overrides the Retract and Retain parameter (p45) with another presenter behavior. The function of `n` can be 0 or 100 (see the description of parameter 45). The command will clear the presenter immediately (with printing synchronization).

ESC f n			
1B	66	n	hex
027	102	n	decimal

Presenter loop ON/OFF/max length

- n = 0 Presenter sensor is ignored. The paper is fed straight through the presenter.
- range 0 and 3 to 255. n = the loop length limit in 3.2 cm steps.
If the receipt length exceeds the max loop limit, it is partially ejected before the printer continues.
- n = 18 Default setting which gives a loop of just above 0.5 m.
- Can be turned ON/OFF at any time during an operation.

5.2.9 System related commands

ESC ?

1B	3F	hex
027	063	decimal

Reset (full)

Restarts the printer with a complete reset.

ESC @

1B	40	hex
027	064	decimal

Reset (initialize)

Terminates the processing and initializes the control board. The control board is reset to default-values (same as after power ON). Do not use this command as part of a print data command string.

ESC & 1

1B	26	01	hex
027	038	001	decimal

Load logotype

Stores a logotype bitmap in the flash PROM. The logotype is printed with the `ESC g` command, see page 32. Also see Logotypes on page 45.

ESC & L

1B	26	4C	hex
027	038	076	decimal

Erase all logotypes

Erases all logotypes stored in the flash PROM.

NOTE! — *This command is only executed if all these conditions are met:*

- *At least one logotype has been loaded*
 - *Status inquiry response byte 1, bit 5, "Power has been OFF" is set to "1"¹*
 - *No `ESC ENQ 6` command has been received*
-

ESC & 4

1B	26	04	hex
027	038	004	decimal

Store current parameter values in flash PROM

Stores all parameter values, currently in use in the printer, as permanent default parameter values in the flash PROM. This takes approximately 15 seconds. The printer then resets automatically and activates the presenter motor temporarily.

See also `ESC & P` (Set temporary default parameters) on page 37.

ESC & NUL

1B	26	00	hex
027	038	000	decimal

Load font

This command is used to load a font to the printer flash PROM. The font is placed in the first free address position in the order of load sequence.

A Swecoin font-file consists of a header containing data describing the font as well as data for each individual character in the font.

¹ When parallel cable is connected, both printer and host computer must have been off to set this bit. This is because the interface powers the RAM in the printer.

Fonts can be designed with the font editor and loaded or deleted with the software available for free on the Swecoin web site. The font loading and deleting commands described here should only be used if you do not work in the Windows environment.

For complete specification of the font format, see Font loading on page 43.

NOTE! 256 Kbytes are available for font storage. A maximum of 8 fonts can be addressed. Exceeding any of these limits will cause this command to fail.

ESC & C

1B	26	43	hex
027	038	067	decimal

Erase all fonts

Erases all fonts stored in the flash PROM.

NOTE! — This command is only executed if all these conditions are met:

- At least one font has been loaded
 - Status inquiry response byte 1, bit 5, "Power has been OFF" is set to "1"
 - No ESC ENQ 6 command has been received
-

ESC & D

1B	26	44	hex
027	038	068	decimal

Erase fonts 4–7

Erases fonts number 4–7. Fonts 0–3 are not affected by this command.

The operation is complete when the printer resets automatically and activates the presenter motor temporarily. Takes approximately 15 seconds.

ESC & P n v

1B	26	50	n	v	hex
027	038	080	n	v	decimal

Set temporary default parameters

A number of bytes in the flash PROM hold various parameter values called *default parameters*. One or several of them can be overridden temporarily with this command.

n Parameter number

v Parameter value.

See Default parameter setting on page 47.

The permanently stored parameters will be used again after a printer-reset command or at power ON.

The temporary values can, however, be stored in the flash PROM as permanent values with command ESC & 4.

ESC NUL

1B	00	hex
027	000	decimal

Load firmware

This command should only be used when loading new firmware into the printer. See also Firmware on page 67.

5.2.10 Status reporting commands

See also Status reporting on page 41.

NOTE! – The status commands are immediate, that is they are executed exactly when they are received. This means they pass the print queue in the printer and may be executed before other commands.

ESC ENQ 1

1B	05	01	hex
027	005	001	decimal

Status enquiry

A status enquiry results in response **ACK** (06 decimal) if all sensors are clear, but **NAK** (15 decimal) + code if one or more sensors report fault condition.

Error code	Meaning
ACK	OK (printer is operable)
NAK 01	Paper left in presenter module. Attempt to clear the paper path failed. ¹
NAK 02	Cutter not in home position
NAK 03	Out of paper
NAK 04	Printhead lifted
NAK 05	Paper-feed error. No paper detected in presenter although 10 cm has been printed. Paper might be wound around the platen or, in some way, has been forced above the presenter module.
NAK 06	Temperature error. The printhead temperature has exceeded the 80 °C maximum limit.

Table 7. Error codes

NOTE! — Errors 2, 5, and 6 are terminal faults that require you to reset the printer before it will be operable again. The printer automatically recovers from the other error conditions as soon as the error is corrected.

A status enquiry command can only return one status code at a time. If there are two or more simultaneous errors, each error condition should be cleared and the status enquiry repeated in order to get a complete report of all status codes.

The host computer cannot be certain that all error conditions have been cleared until an **ACK** is received.

The possible error conditions are reported in the above order.

¹ The printer will answer ACK even if paper is present in the presenter unless you send a clear presenter command first, and that command fails. To get an immediate sensor status reply, use ESC ENQ 6 instead and look at bit 3 in the second byte.

ESC ENQ 2

1B	05	02	hex
027	005	002	decimal

Paper-near-end enquiry

This command requests a paper-near-end sensor (paper low) status from the printer in a 1-byte format.

Value = (01H) indicates "No paper"

Value = (00H) indicates "Paper present" at the sensor position

NOTE! – The status of the sensor is sampled every time the receipt is cut. If three succeeding samples show "no paper", the status reply changes to 00. This is to prevent false alarm if the side of the paper roll is not clean. If you want the momentary status of the sensor, use **ESC ENQ 6** and extract the paper-near-end bit.

ESC ENQ 4

1B	05	04	hex
027	005	004	decimal

Font and logotype enquiry

Requests multiple bytes of information regarding loaded fonts and logotypes.

EXAMPLE (↵ = CR LF)

Send→ **ESC ENQ 004**

Read← **0:9632 Courier 13↵**

1:12612 Ariel 12↵

2: ↵

3: ↵

4: ↵

5: ↵

6: ↵

7: ↵

Free font memory:246122↵

00: ↵

01: ↵

02: ↵

03:14 110 Recycle↵

04: ↵

05:103 65 Warning↵

06: ↵

07: ↵

08: ↵

09: ↵

10: ↵

11: ↵

12: ↵

13: ↵

14: ↵

15: ↵

16: ↵

Free logotype memory:189512↵

The response begins with 8 lines of font data containing font numbers, font sizes in bytes, font names, and font height in pixels.

Remaining font memory in bytes.

16 lines of logotype data containing logotype number, with and height of the logotype in pixels, and logotype name.

Remaining logotype memory in bytes

ESC ENQ 6

1B	05	06	hex
027	005	006	decimal

Status report

Results in a 2-byte response, reflecting the status of each sensor. This command is intended as a go/no go indication. When everything is OK, this status report returns 0.

NOTE! – If no weekend sensor is installed, 64 is returned when everything is OK. If no weekend or paper-near-end sensors are installed, 64+2=66 is returned when OK.

First byte, bit No.:								Second byte, bit No.:							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Pending error code*	Print data exists**	Power has been OFF***	Software error****	Error Black Mark	.	.	.	Retract unit fitted	Weekend sensor	Head lifted	Cutter not home	Paper at presenter	FF button pressed	Paper-near-end*****	Out of paper

Table 8. Sensor status

* This bit indicates that an error code is available. Use ESC ENQ 1 to fetch it.

** This bit tells you that there are data in the printer that have not yet been printed. There are two possible reasons for that:

1. The last command received by the printer was not a command that triggers a printout.
2. The printer is printing

*** When parallel cable is connected, both printer and host computer must have been off to set this bit. This is because the interface powers the RAM in the printer.

**** Trying to select non existing font or other error

***** This paper-near-end bit differs from the ESC ENQ 2 response, see page 39.

Bits 3 to 5 in the first byte are reset when they are read.

ESC ENQ 7

1B	05	07	hex
027	005	007	decimal

Firmware version enquiry

Results in a 2-byte response representing the version of the installed firmware.

The first byte represents major versions, and the second byte minor versions.

EXAMPLE

Send→ ESC ENQ 007

Read← <001><020>

That is, a response with the value <001><020> indicates version 1.20.

ESC ENQ 9

1B	05	09	hex
027	005	009	decimal

Serial number enquiry

Results in a 6-byte response representing the serial number.

EXAMPLE

Send→ **ESC ENQ 009**

Read← 00h 00h 02h 2Bh C6h 28h (hex), or 000 000 002 043 198 040 (dec)

ESC ENQ 10

1B	05	10	hex
027	005	010	decimal

Control board revision enquiry

Results in a 1-byte response representing the control board revision. A minus sign indicates that no revision has been made, while A indicates the first revision, and so on.

EXAMPLE

Send→ **ESC ENQ 010**

Read← **n** Where **n** can be 'A' (ASCII) or 41h (hex) or 065 (dec)

ESC ENQ c

1B	05	63	hex
027	005	099	decimal

Request device ID

Results in a string containing the device ID in the Windows Plug and Play string format. The two first bytes represent the string length.

EXAMPLE

Send→ **ESC ENQ 099**

Read← 000 106 This indicates that the string is 104 characters (plus two characters indicating the string length)

Read← "MANUFACTURER:Swecoin AB;COMMAND SET:None;MODEL:TTP7000;CLASS:PRINTER;
DESCRIPTION:Ticket Printer TTP7000;"

NOTE! – The read string above is just an example.
Read out the actual string from your printer.

ESC ENQ P n

1B	05	50	n hex
027	005	080	n decimal

Parameter setting data enquiry

This command requests information about the setting of parameter **n**, that is, the parameter value stored in flash PROM or any parameter value temporarily set by other ESC commands. Parameter names (**n**) are listed on page 48.

ESC ACK n

1B	06	n	hex
027	006	n	decimal

Set acknowledge marker¹

n = One-byte marker. Range 0 to 255

The "acknowledge marker" n is placed in the command queue and when the execution of commands reaches the marker it is sent back to the host computer. This is an addition to the status commands that pass the queue and are answered immediately when received.

EXAMPLE:

"Print data" <ESC><ACK><001>"Cut & Eject" <ESC><ACK><002>

The printer will send <001> when <print data> has executed and <002> when the ejecting has been performed.

NOTE! — Acknowledge marker cannot be used for events that write to the flash PROM, for instance font loading. This is because the writing procedure erases the buffer, including the markers, and uses all RAM in the printer.

¹ Added in firmware version 2.29b

5.3 Font loading

The printer can store 8 fonts in its flash PROM. 256 kB are available for font storage. The font size is fixed¹, so you must load one font file for each character size you require. The fonts are given font numbers when they are loaded into the printer. The first font is assigned number 0 and the next font 1 etc. up to font 7. The font number parameter number14 of the default parameter setting will be used when no font selection command has been received (see page 47).

You cannot erase a single font, but must erase font 4-7 with command `ESC & D`, or all eight fonts with `ESC & C`, then reload the fonts you wanted to keep.

Windows software for font generation and management is available on the Swecoin web site. If you need to load fonts in a non-Windows environment, use the `ESC & NUL` command.

The time required for processing the font data that is loaded is typically 15–20 seconds per font, excluding transfer time. During this time, any data sent to the printer will be lost.

NOTE! — *The font processing is ends with a reset. The presenter motor runs momentarily to indicate that the printer is ready to be used.*

CAUTION! — *Loading to the flash PROM will erase the RAM completely since the RAM is used during the loading process. Any print data residing in RAM will thus be lost.*

5.3.1 File format

A font consists of a header describing the font, then data for every character in the font. The header has to be downloaded even if the font consists of a single character only. Below is a description of the font header.

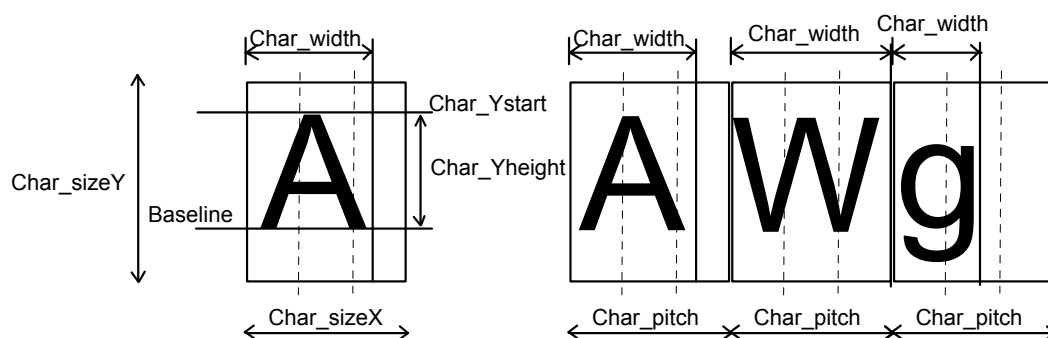
1 byte	Reserved	Should always be 0 (zero)
1 byte	Reserved	Should always be 0 (zero)
1 byte	Char. width (X)	The number of bytes required for the width of one character, usually 2 or 3. Range 1 to 8.
1 byte	Character pitch	The maximum width of one character in the set. This value is used for tab position calculation. Range 1 to 255.
1 byte	Char. height (Y)	The maximum height of one character matrix measured in pixels. This is also the minimum line spacing for this character set.
27 byte	Font name	String of characters used to identify the character set. This will be printed on status receipts. (E.g. Swiss 10 cpi.)

Char_matrix table: 256 records, each containing 3 bytes.

3 byte Char_width (pixels) + Char_Ystart(pixels) + Char_Yheight(pixels)

Char_bitmap data: Bitmap data for all characters that are to be defined.

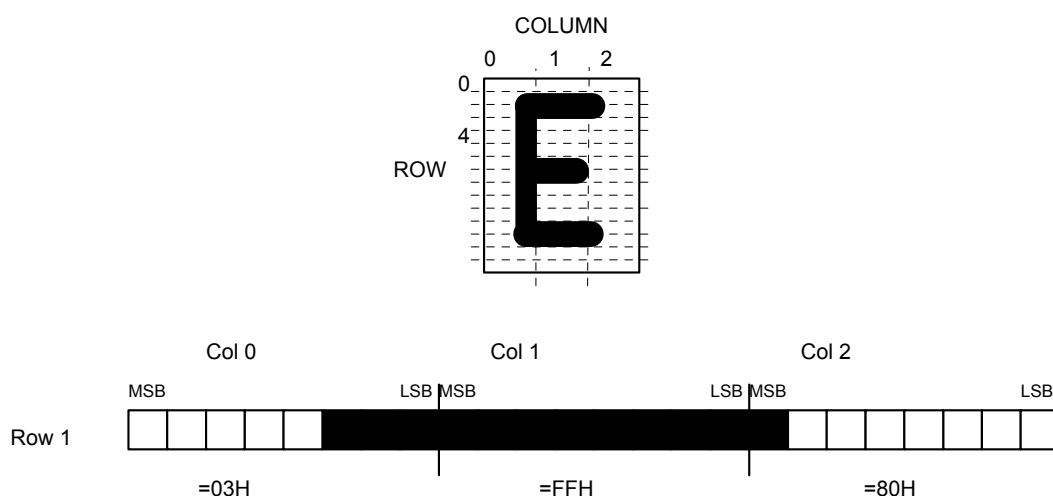
¹ Multiple height, and width commands can be used on all fonts.



Character bitmap data:

A character is made up of a bitmap the size of which is:

Char. width (X) * Char. Height (Y) bytes.



The bitmap data consists of bitmap patterns for each character in a character set for which the parameter Char_width in the Char_matrix table is set to a value between 1 and 24. A character that has its Char_width set to zero, is not included in the bitmap data.

The bitmap for one character is then defined according to the following table:

(COL 0, ROW Ystart) , (COL 1, ROW Ystart) , (COL 2, ROW Ystart)

(COL 0, ROW Ystart+1) , (COL 1, ROW Ystart+1) , (COL 2, Ystart+1)

.

(COL 0, ROW Ystart+Yheight), (COL 1, ROW Ystart+Yheight) , (COL 2, ROW Ystart+Yheight)

In this example, each row consists of 3 columns equal to 3 bytes.

In order to minimize the required storage space, only rows between Ystart and Ystart+Yheight are included in the character bitmap.

5.4 Logotypes

Up to 16 logotypes can be stored in the flash PROM of the printer. The logotypes can be positioned and printed out with commands `ESC g` or `ESC L`.

The exact number of logotypes and their sizes is determined by the total amount of memory used for fonts, logotypes and loaded firmware. Make a test printout to see how much memory is available.

5.4.1 Loading

Windows software that convert black and white BMP bitmap files to logotypes and load them into the printer is available on the Swecoin web site. If you need to load logotypes in a non-Windows environment, use the `ESC & 1` command.

The time required by the printer to process logotype data, excluding transfer time from the PC, is typically 15 to 20 seconds, per logotype. During this time, any data sent to the printer will be lost.

5.4.2 File format

A header containing information about the logotype number, size and logotype name shall define each loaded logotype. Immediately after the header follows the actual bitmap of the logotype.

`ESC & 01H <Header><Bitmap>`

Header:

Byte 0 Logotype number used to identify the logotype when printing.

Byte 1 X size measured in bytes.

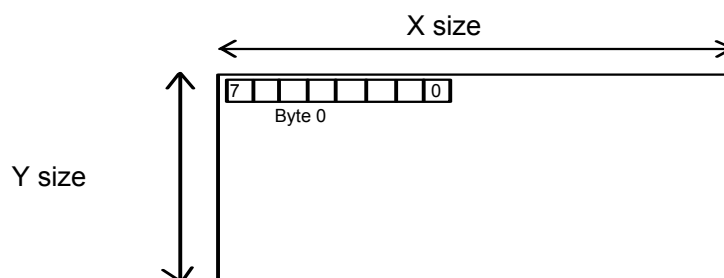
Byte 2 Y size measured in pixels.

Byte 3—15 A logotype name that will be printed on test printouts.

Bitmap:

The bitmap **must** have exactly (X size * Y size) number of bytes. 1=black, 0=white dot.

Bit No. 7 in byte 0 represents the top left corner of the logotype.



5.4.3 Printing

To print a logotype you can use two commands, `ESC L n1`, prints the logotype at the current cursor position, just like any character. `ESC g n1 n2n3 n4n5` prints the logotype at a specified X-Y position.

n1	One byte logotype number, (0—15)
n2n3	Two byte X position measured in pixels from the left hand edge of the print window.
n4n5	Two byte Y position in pixels from top of the page. These bytes must always be inserted but they are ignored in variable-page-length mode where logotypes are always printed at the current Y-position.

5.4.4 Erasing

All logotypes are erased with the `ESC & L` command.

CAUTION! — Loading to the flash PROM will erase the RAM completely since the RAM is used during the loading process. Any print data residing in RAM will thus be lost.

5.5 Status reporting

The printer is equipped with a number of sensors that report the printer status and various error conditions such as out-of-paper, previous printout not removed, etc.

A good practice in unattended printer applications is to check for errors and paper availability before printing.

1. Send a Status Report Query (`ESC ENQ 6`, page 40) and check that the answer is "No errors"
2. If an error is indicated, read out the error message with Status Request (`ESC ENQ 1`, page 38), and take appropriate actions. Repeat this step until no more error code is available. If weekend sensor signals "level passed" check again after next document is printed. If the sensor still signals "level passed" after three successive print/check cycles, report the condition to the systems supervisor so that he can schedule a service visit to the printer. This three cycle check is to ensure that dirt on the side of the roll does not cause the alarm.
3. Send a paper-near-end query (`ESC ENQ 2`, page 39) to see if the sensor reports low paper level.
4. If paper-near-end is indicated, report the condition to the systems supervisor so that he can schedule a service visit to the printer.
5. Print the receipt.

5.6 Default parameter setting

Some of the printer settings can be stored in the flash PROM so that they will be used also after power OFF. When the printer is set up the way you like it to be, you send <ESC>&<004>, and the following settings will be stored.

- 1 Baud
- 2 Data bits
- 3 Parity
- 4 Flow control
- 5 Disable parallel port signaling
- 7 Burn time
- 8 Max print speed
- 9 Loop ON/OFF
- 10 Printhead pulse control
- 13 Line spacing
- 14 Font
- 15-30 Tab positions
- 33 CR/LF
- 34 Autocut at FF
- 35 Black-mark synchronization
- 36 Variable document length
- 39 Max. black-mark length
- 40 Min. black-mark length
- 41 Byte 1, feed between the black mark detection and cut (see ESC x)
- 42 Byte 2, feed between the black mark detection and cut
- 43 Byte 1, black-mark to first text line (see ESC Y)
- 44 Byte 2, black-mark to first text line
- 45 Wastebasket mode (Retract and retain mode)
- 47 Eject calibration constant

The number in front of the stored function is the parameter number (n) used when setting the parameter with the command ESC & P n v.

Parameters and values for ESC & P n v

Baud ¹ (n1)							
	24	48	96	19	38	57	11
v	2 400	4 800	9 600	19 200	38 400	57 600	115 200

Data bits ¹ (n2)			Parity ¹ (n3)			Flow control ¹ (n4)		
v	7	8	0	1	2	0	1	2
	7-bits	8-bits	None	Odd	Even	None	Xon/Xoff	Hardware

¹ New setting is not activated until stored in flash PROM.

Disable parallel port signaling (n5)	
0	1
No (paper out is indicated on pin 12 of the parallel port)	Yes

Burn time (n7)																
v	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
%	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150

Max speed (n8)																		
v	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
mm/s	13	21	27	32	37	41	45	48	52	55	57	60	63	66	68	71	73	75

Presenter Loop length (n9)			Printhead pulse control ¹ (n10)			
v	0	3-255(18)	0	1	2	3
	ON	Max loop length in 3.2cm steps	1 burn + history	1 burn	2 burn + history	2 burn

Line spacing (n13)		Font (n14)	Tab positions (n15-n30)
v	030	See page 29.	See page 28.
	Font height30 pixels or font height, whichever is the largest		

Carriage return and line feed behavior ² (n33)					
v	0	1	2	3	4
LF	CR/LF	CR/LF	LF	LF	Ignored
CR	Ignored	CR	CR	CR/LF	CR/LF

Autocut at FF (n34)		Black-mark sync. (n35)		Variable page length (n36)		Max. black-mark size ³ (n39)	Min. black-mark size ⁴ (n40)
v	0 1	0 1		0 1		016-160(80)	015-159(24)
	OFF ON	Normal Black-mark		OFF ON		80=10 mm	24=3 mm

¹ One burn pulse means that all dots of the printhead are burned (heated up) at once.

Two burn pulses mean that 50% of the dots are burned at a time, decreasing the top current and print speed.

History pulses enhance print quality, settings without history pulses can be considered as draft-mode settings.

² v=1 is suitable for UNIX, v=2 for DOS, and v=4 for Macintosh

³ Must be larger than n39.

⁴ Must be smaller than n40.

Feed between the black mark detection and cut			Black-mark to first text line	
n	n41	n42	n43	n44
v	000-255	000-255	000-255	000-255
	High byte	Low byte	High byte	Low byte
Wastebasket mode¹ (n45) (option)				
v	0	1-30	100	101-130
	Disabled (Eject when new receipt is printed)	Eject when new receipt is printed, but receipt not collected after 1–30 x 10s will be retracted.	Retracts when new receipt is printed	As 100, but receipt not collected after 1–30 x 10s will be retracted.
Eject length calibration² (n47)				
v	22-39	40	41-255	
	Shorter eject	Default value	Longer eject	
Sets the eject length of the receipt, that is the length of paper that protrudes outside the printer after a cut-and-eject command. Normal eject length is in the range 40-63 mm.				

Table 9. Default parameter settings. Bold = factory setting.

¹ Added to firmware version 2.01

² Added to firmware version 2.24

5.7 Windows WIN32 API calls

When using Microsoft Windows™, you use API-calls to communicate with the printer. These API-calls separate the hardware from your application program. This way you don't have to bother with handshaking, reverse channel modes, or other things that depend on what kind of hardware are used in a specific PC. There are two ways to communicate with the printer; directly to the port, or through the Windows printer driver.

The API-calls used to communicate *directly with the parallel port* from Windows 9x¹ are:

<code>CreateFile("LPT1",...)</code>	Open the port for communication
<code>SetCommTimeouts(...)</code>	Set the timeout (in milliseconds) used to close the communication link if the communication session is not terminated correctly
<code>WriteFile(...)</code>	Send command to printer
<code>ReadFile(...)</code>	Read information from printer
<code>CloseHandle(...)</code>	End the communication session

NOTE! – These API-calls communicate directly with the parallel port, meaning that you do not have to have a printer driver installed to use the API-calls.

However, if a printer driver is used, the parallel port will be busy when printing, and free to use through the API-calls when the printer is idling. The `CreateFile` locks the port so that other devices cannot use it, while `CloseHandle` releases it again.

Example:

This example reads the program (firmware) version from the printer.

- If the function is successful it returns a ONE and the VersionBuffer will contain two bytes representing the firmware version number.
- Should a communication error occur, the function fails and returns a zero.

```
int GetProgramVersion(BYTE VersionBuffer[])
{
    DWORD NumberOfBytes;
    BYTE TraBuffer[3];
    COMMTIMEOUTS CommTimeouts;

    TraBuffer[0]= 0x1B; //ESC
    TraBuffer[1]= 0x05; //ENQ
    TraBuffer[2]= 7;

    // Open Parallelport

    HANDLE hPort= CreateFile("LPT1", // pointer to name of the file
    GENERIC_READ | GENERIC_WRITE, // access (read-write) mode
    0, // share mode
    NULL, // pointer to security attributes
    OPEN_EXISTING, // how to create
```

¹ These API calls are only valid in Windows 9x. To accomplish the same result in any NT OS (NT4 and Windows 2000) you need to communicate with a Language Monitor, which is an additional driver layer in the NT driver system.

```

FILE_ATTRIBUTE_NORMAL,          // file attributes
NULL                            // handle to file with attributes to copy
);

// check if success

if(hPort == INVALID_HANDLE_VALUE)
{
    ShowSystemError("Error open Port");
    return 0;
}

// set communication timeouts

CommTimeouts.WriteTotalTimeoutMultiplier= 1000;
CommTimeouts.WriteTotalTimeoutConstant= 5000;
CommTimeouts.ReadIntervalTimeout= 250;
CommTimeouts.ReadTotalTimeoutMultiplier= 5;
CommTimeouts.ReadTotalTimeoutConstant= 3000;
if(SetCommTimeouts(hPort,&CommTimeouts)==0)
{
    ShowSystemError(" Error SetCommTimeouts");
    CloseHandle(hPort);
    return 0;
}

// send request for program version

if(WriteFile(hPort,TraBuffer,3,&NumberOfBytes,NULL)==0)
{
    ShowSystemError("Error writing to port");
    CloseHandle(hPort);
    return 0;
}

if(3 != NumberOfBytes)
{
    ShowApplError("Didn't write all 3 bytes");
    CloseHandle(hPort);
    return 0;
}

// Read response

if(ReadFile(hPort,VersionBuffer,2,&NumberOfBytes,NULL)==0)
{
    ShowSystemError("Error reading from Port");
    CloseHandle(hPort);
    return 0;
}

if(2 != NumberOfBytes)
{
    ShowApplError("Didn't read 2 bytes");
    CloseHandle(hPort);
    return 0;
}
CloseHandle(hPort);
return 1;
}

```

API-calls used to communicate with the printer through the *Windows printer driver* are available from Microsoft.

6 ALIGNING PREPRINT AND THERMAL PRINT

The printer can synchronize the cutting of the receipt with black-marks printed on the back of the paper. You use this function when you have preprint on the receipt and you don't want a cut in the middle of that preprint, or text printed on top of the preprint.

The sensor used to detect the black-marks is the same sensor as used for paper end detection. It is positioned 9 mm from the edge of the paper entry on the side of the **blue** release arm, and 25 mm behind the cutter (as seen from the presenter [output] side of the printer). The sensor accuracy is about ± 0.5 mm so avoid designing receipts with too high demands for synchronization.

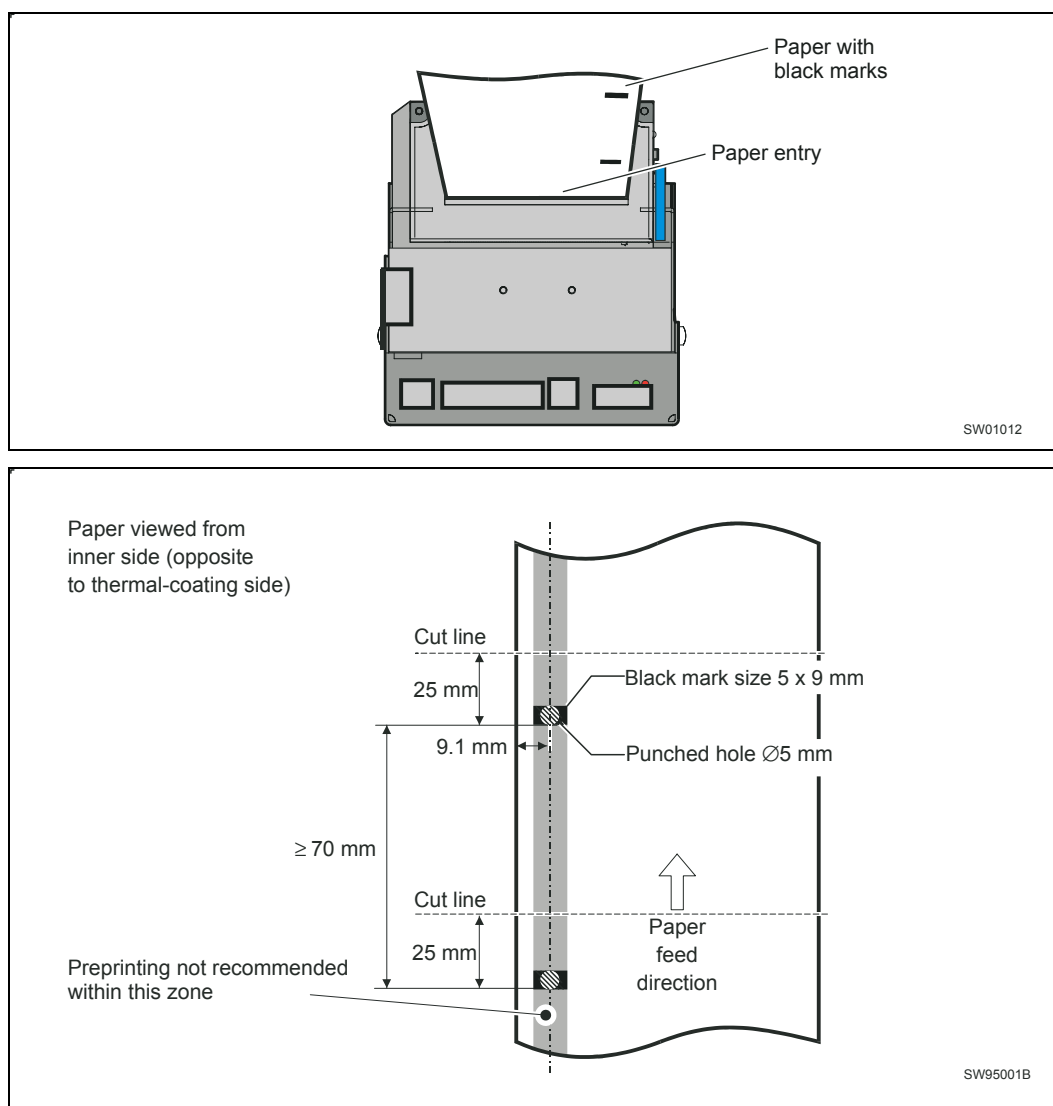


Figure 17. Recommended black mark size and position

The sensor triggers on the black-to-white transition of the black-mark, which is when the black print ends (trailing edge).

Since the same sensor is used for both paper end and black-mark detection, the printer must know the length of the black-mark to avoid signaling end-of-paper when it detects a black-mark. The default setting accepts black-marks in the range 3 –16 mm, and works

perfect with the recommended black-mark length of 5 mm. Marks shorter than 3 mm are interpreted as dirt, and marks longer than 16 mm as out-of-paper. You can change both these values with a printer command, or by changing the printer default settings in the flash PROM.

6.1 Commands used with the black-mark

ESC M sets the black-mark size acceptable to the printer

ESC x triggers the printer to start looking for a black-mark

ESC z feeds the receipt to the next black-mark + the additional feed specified by the **ESC x** command

ESC x sets the length of paper to feed between the black-mark detection, and the cut

Parameter setting No. 35

With this parameter set to 1 (in the startup parameter settings) the printer automatically synchronizes the cut with the black-mark when you install a new paper roll, press the paper feed button etc.

6.1.1 Example

The commands are used together in the following way:

The following examples are not made for a specific programming language or editor, but can be implemented with the tools of your choice. The data sent **to the printer** are marked with "Send→".

When setting up the printer:

Set parameter No. 35 in the startup parameter settings to "1" to synchronize the cut with the black mark at power on.

Send→	ESC M <max><min>	Where max is the max black-mark length in dots (1/8 mm). Omit this command if you use 5-mm black-mark size.
Send→	ESC x <n1><n2>	Where n1 and n2 is MSB and LSB of to feed between the black mark detection and the cut (in 1/8 mm steps).
Send→	ESC & 4	Stores the above parameters as default parameters.

Document:

Send→ the text and graphics

At the end of the document:

Send→	ESC z	Feeds the receipt to the next black-mark + the additional feed specified by the ESC x command.
Send→	RS	Cuts and ejects the receipt.

or

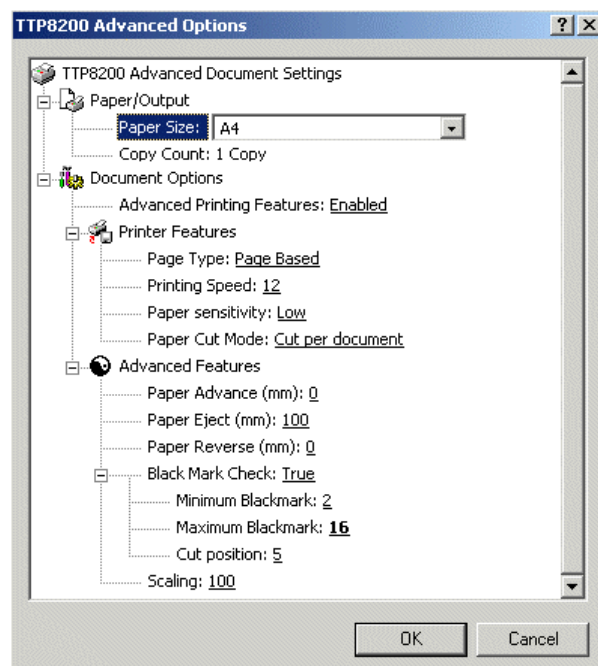
Send→ **ESC X <n1><n2>** Where n1 and n2 is MSB and LSB of the search length in dots (in 1/8 mm steps). This search length should be at least twice the distance from the end of one black-mark to the end of the next.

Send→ **RS** Cuts and ejects the receipt.

6.2 Black-mark sensing from within "Windows"

In Windows, the printer driver controls when the paper is cut and ejected. Settings in the driver take over from the default parameter settings in the printer.

The settings are available in the Windows *Printing Preferences Menu*, in the Advanced Options window. The names of the options box differ between Windows versions, but the same settings are available:



You set n35 to 1 by setting
Black Mark Check: True

You set n37, n38 by setting
Paper Size. If no standard paper size corresponds to the page length you have, create a new form with that length in the Windows "Printer Server Properties".

You set n39 by setting
Maximum Blackmark: to the length of the blackmark on your paper

You set n40 by setting
Minimum Blackmark: to the value you want for scrap filter

You set n41, n42 by setting
Cut Position: to the length of transport that you want between blackmark and cut.

7 INTERFACE

The printer has two standard interfaces, the parallel, and the USB interface and an optional serial interface. There are no selections to be made, but only one interface can be used at a time. The printer will not function properly if data is received on more than one interface at a time.

CAUTION! – *If you connect both parallel and USB cables, the voltage that the host computer outputs on the parallel port may be enough to give signals out on the USB-interface even if the power of the printer is turned OFF!*

These signals can result in the operating system of the host computer detecting the printer as on and available when it's not.

Another effect of these false signals is that after turning the printer on and off to clear an error condition, the printer is dead to Windows.

Always disconnect the parallel interface cable when using USB!

NOTE! — *If you use the printer through a Windows driver, you need not read the rest of this chapter.*

7.1 Parallel

The IEEE-1284 standards define 5 modes of operation:

1. Compatibility Mode.
2. Nibble Mode.
3. Byte Mode (protocol not implemented in TTP 7000).
4. EPP Mode, Enhanced Parallel Port.
5. ECP Mode, Extended Capabilities Port.

NOTE! – *If you intend to use any other mode than Compatibility Mode, we recommend you to get the documents for the IEEE-1284 standards, and study them thoroughly.*

7.1.1 Differences between the modes

The Compatibility, Nibble and Byte modes use the standard hardware available in the original Centronics parallel port, while EPP and ECP modes require additional hardware; hardware that can run at higher speeds while still being downward compatible with the standard parallel port.

Compatibility Mode, or "Centronics Mode" as it is commonly known, can only send data in the forward direction.

Pin (Host)	Direction	Pin (printer)	SPP Signal
1	⇒	1	_Strobe
2–9	⇒	2–9	Data 0-7
10	⇐	10	_Ack
11	⇐	11	Busy
12	⇐	12	Paper Out/ End
13	⇐	13	Select
14	⇒	14	_Auto Linefeed
15	⇐	32	_Error/ _Fault
16	⇒	31	_Initialize
17	⇒	36	_Select Printer
18–25	GND	19–30	Ground

*Table 10. Signal names for Centronics parallel port.
Signal names starting with a "_" are active LOW signals*

To output a byte to a printer using Compatibility Mode, the software must:

1. Write the byte to the Data Port.
2. Check to see if the printer is busy. If the printer is busy, it will not accept any data. Thus any written data will be lost.
3. Take the Strobe (Pin 1) low. This tells the printer that the correct data is present on the data lines (pins 2–9).
4. Put the strobe high again after waiting approximately 5 microseconds after putting the strobe low (step 3).

This limits the speed at which the port can run to about 50 Kbytes per second.

In order to receive data, you must change the mode to either Nibble or Byte Mode.

NIBBLE MODE

Nibble Mode can input a nibble (4 bits) in the reverse direction (from the printer to the computer).

BYTE MODE

Byte Mode uses the bi-directional feature of the parallel port (found on some ports only) to input a byte (8 bits) of data in the reverse direction.

EPP MODE

EPP and *ECP* use additional hardware to generate and manage handshaking. The hardware checks to see if the printer is busy, and generate a strobe signal and appropriate handshaking. This means that only one I/O instruction needs to be performed, thus increasing the speed to 1–2 megabytes per second.

When using EPP-mode, a different set of tasks and labels are assigned to each line as listed in the following table.

Pin (Host)	Direction	Pin (printer)	EPP Signal	Function
1	⇒	1	_Write	LOW indicates a write. HIGH indicates a read.
2–9	⇔	2–9	Data 0-7	Data bus, bi-directional
10	⇐	10	Interrupt ¹	Interrupt line. Interrupt occurs on positive edge.
11	⇐	11	Wait	Used for handshaking. An EPP cycle can be started when LOW, and finished when HIGH.
12	⇐	12	Spare	User defined 1 - Paper in presenter
13	⇐	13	Spare	User defined 3 - Not used by Swecoin
14	⇒	14	_Data Strobe	When LOW, indicates data transfer
15	⇐	32	Spare	User defined 2 - Not used by Swecoin
16	⇒	31	_Reset	Reset – Active LOW
17	⇒	36	_Address Strobe	When low, indicates address transfer
18–25	GND	19–30	Ground	Signal ground

Table 11. Signal names for EPP parallel port. Signal names starting with a "_" are active LOW signals.

The signal timing follows the IEEE-1284 parallel printer interface specification.

ECP MODE

The ECP port has the advantage of using DMA channels and FIFO buffers in the computer so that data can be shifted around without using I/O instructions. The ECP port also supports run-length data compression, minimizing the No. of bytes that has to be transferred to the printer.

The ECP-mode tasks and labels assigned to the interface lines are listed in the following table.

¹ Interrupt is generated for paper out, cutter-not-home, printhead lifted, presenter jam, temperature too high.

Pin (Host)	Direction	Pin (printer)	ECP Signal	Function
1	⇒	1	HostCLK	A LOW on this line indicates that there is valid data at the host. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the device.
2–9	⇔	2–9	Data 0-7	Data bus, bi-directional
10	⇐	10	PeriphCLK	A LOW on this line indicates that there is valid data at the Device. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the Host.
11	⇐	11	PeriphAck	When in reverse direction a HIGH indicates Data, while a LOW indicates a Command Cycle. In forward direction, functions as PeriphAck.
12	⇐	12	_AckReverse	When Low, Device acknowledges Reverse Request.
13	⇐	13	X-Flag	Extensibility Flag
14	⇒	14	Host Ack	When in forward direction a HIGH indicates Data, while a LOW indicates a Command Cycle. In reverse direction, functions as HostAck.
15	⇐	32	PeriphRequest	A LOW set by the device indicates reverse data is available
16	⇒	31	_ReverseRequest	A LOW indicates data is in reverse direction
17	⇒	36	1284 Active	A HIGH indicates Host is in 1284 Transfer Mode. Taken LOW to terminate.
18–25	GND	19–30	Ground	Signal ground

Table 12. Signal names for ECP parallel port. Signal names starting with a "_" are active LOW signals.

The HostAck and PeriphAck lines indicate whether the signals on the data line are data or a command. If these lines are HIGH then data is placed on the data lines (Pins 2-7). If a command cycle is taking place then the appropriate line will be LOW, i.e. if the host is sending a command, then HostAck will be LOW or if the device/peripheral is sending a command the PeriphAck line will be LOW.

A command cycle can be one of two things, either a RLE count or an address. This is determined by the bit 7 (MSB) of the data lines, i.e. Pin 9. If bit 7 is a 0, then the rest of the data (bits 0-6) is a run length count, which is used with the data compression scheme. However if bit 7 is a 1, then the data present on bits 0 to 6 is a channel address. With one bit missing this can only be a value from 0 to 127(DEC).

7.1.2 Negotiation

Peripherals are not required to implement all of the modes (Nibble Mode, EPP, and ECP Modes are implemented in TTP 7000). Because of this, the host platform needs a method to determine what mode the attached peripheral supports, and to have a controlled method to set the interface to one of the supported modes.

The concept of negotiation was developed to fill this need. Negotiation is a sequence of events on the parallel port interface that would not effect an older device but would provide identification of a 1284 peripheral. An older device will not respond to the negotiation sequence. Therefore the host would remain in Compatibility Mode. An IEEE-1284 peripheral responds to the sequence, and could then be set to any of the modes supported by both peripheral and host.

During the negotiation phase, the host places a request on the data lines and then initiates the negotiation sequence. The request can be to put the interface into a particular mode, or request a device ID from the peripheral. Figure 18 shows the basic negotiation sequence.

A byte called the *extensibility byte* is used during negotiation to request that. The peripheral enters a specific transfer mode, or to request that the peripheral sends a device ID. This ID will allow the host to identify the type of attached peripheral. The device ID can be returned in any reverse channel mode other than EPP. Table 13 describes the extensibility byte and allowed values.

Bit	Description	Valid bit values: 8765 4321
8	Request Extensibility Link	1000 0000
7	Request EPP Mode	0100 0000
6	Request ECP Mode with RLE	0011 0000
5	Request ECP Mode without RLE	0001 0000
4	Reserved	0000 1000
3	Request device ID	Return data using Nibble Mode: 0000 0100 Return data using Byte Mode: 0000 0101 Return data using ECP Mode without RLE: 0001 0100 Return data using ECP Mode with RLE: 0011 0100
2	Reserved	0000 0010
1	Byte Mode	0000 0001
none	Nibble Mode	0000 0000

Table 13. The extensibility byte and allowed values

The peripheral uses the XFlag to acknowledge that the requested mode is available. The XFlag will always be set to one as a positive acknowledgment for all requests except for Nibble Mode reverse channel. All 1284-compliant devices are required to support Nibble Mode for reverse channel operation. The Extensibility Link request bit is used to provide a mechanism for future expansion and addition of new operational modes and features.

Negotiation and device ID are key features for the future ability of host platforms to determine system configuration and to include parallel port attached peripherals in this determination.

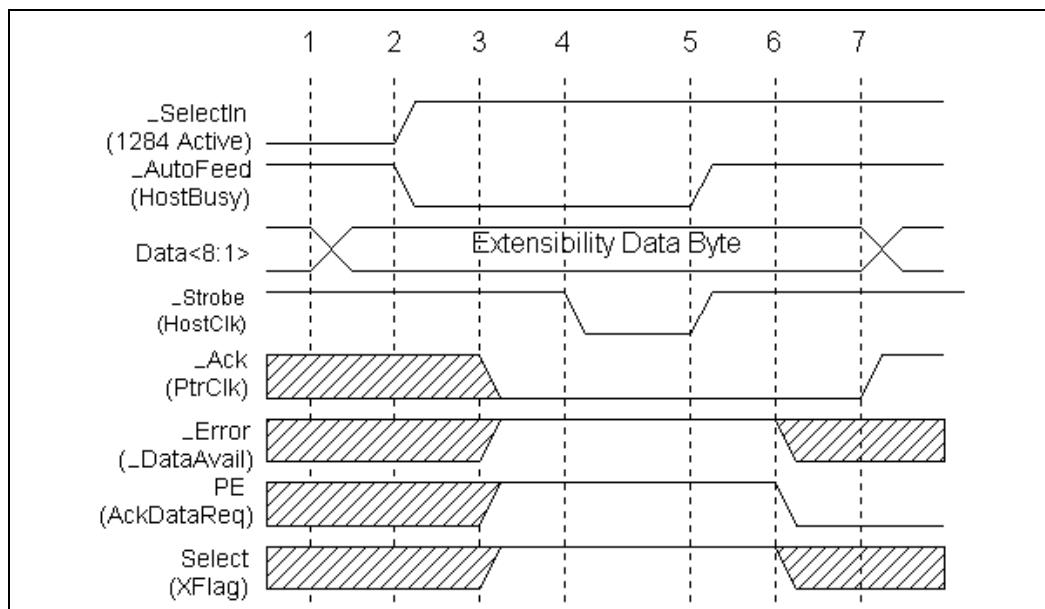


Figure 18. Basic Negotiation sequence

1. The host places the requested extensibility byte on the data lines
2. The host then sets `_SelectIn` high and `_AutoFeed` low to indicate a negotiation sequence.
3. A 1284 peripheral will respond by setting `_Ack` low, and `_Error`, `PE`, and `Select` high. A non-1284 peripheral will not respond.
4. The host sets `_Strobe` low. This is used to strobe the Extensibility byte in to the peripheral.
5. The host then sets `_Strobe` and `_AutoFeed` high to signal to the peripheral that it recognizes it as a 1284 device.
6. The peripheral responds by setting `PE` low, `_Error` low if the peripheral has reverse channel data available, and `Select` high if the requested mode is available, or `Select` low if the requested mode is not available.
7. The peripheral now sets `_Ack` high to signal that the negotiation sequence is over and the signal lines are in a state compatible with the request mode.

This was just an introduction to the use of IEEE-1284 parallel ports. How to select and use the different modes is explained further in the IEEE-1284 standards.

7.2 USB

The USB (Universal Serial Bus) is an interface designed to handle peripherals daisy chained to a single connector. The transfer speed is up to 12 Mbits/s, which is quite adequate for the printer. Use this interface in operating systems with USB support, for instance Windows 2000. USB devices are Plug and Play compatible and hot swappable, which means that they can be connected and disconnected without turning off the power, or rebooting the computer.

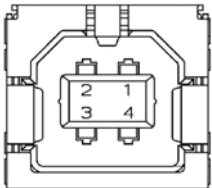
	Contact Number	Signal Name	Comment
	1	VCC	Cable power
	2	– Data	
	3	+ Data	
	4	Ground	Cable ground

Table 14. USB connector (J13) pin assignment

7.3 Serial (option)

The printer has a 10-pin connector on the control board. This connector can be used to connect to an external RS-232 adapter. See page 10 for installation instructions.

The transfer speed of the serial interface can be set to between 2 400 and 115 200 bits/s.

This low transfer speed limits the printing speed. Printing full-width graphics with 115 200 bits/s result in printing speeds of about 24 mm/s for the 80-mm version of the printer, and 16 mm/s for the 112-mm version.

Applications where text-only receipts are to be printed are suitable for serial interface because of its easy to use bidirectional capability.

Printer (9 pole D-sub)	2 (RXD)	3 (TXD)	4 (DTR)	5 (GND)	6 (DSR)	7 (RTS)	8 (CTS)
PC (9 pole D-sub)	3 (TXD)	2 (RXD)	6 (DSR)	5 (GND)	4 (DTR)	8 (CTS)	7 (RTS)
PC (25 pole D-sub)	2 (TXD)	3 (RXD)	6 (DSR)	7 (GND)	20 (DTR)	5 (CTS)	4 (RTS)

Table 15. Serial connector pin assignment

Setup options

Baud: 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, 115 200 bits/s

Flow control: None, Xon / Xoff, or Hardware

Data bits: 7/8

Stop bits: 1 (fixed)

Parity: None, Odd, or Even

Default settings: 9600 bits/s, 8-bits, No parity, 1 stop bit, and hardware flow control.

See also: Default parameter setting on page 47

8 MAINTENANCE

8.1 Fault finding

In connection with service of the printer it is good practice to remove paper dust and lint from the paper path, cutter and sensor areas. Paper dust, when accumulated, may interfere with printer functions such as optical sensors.

To avoid smudging the paper, do not apply oil on the cutting knife.

Symptom	Suggested actions
Nothing is printed when you press the feed-forward button in self-test mode, but the document is transported, cut and ejected.	<ul style="list-style-type: none">• Check that the paper roll is turned the correct way with thermal sensitive layer facing up.• Check that the paper used meets the paper specification. See "Paper specification" on page 75.• Check that the printhead ribbon cable is fully inserted into the connectors at each end.
Paper jam	<ul style="list-style-type: none">• Check cutter-home switch.
Printer does not work at all	<ul style="list-style-type: none">• Check that the paper release lever is lowered (printhead presses against the paper).• Check that power is supplied to the printer.• Check the function of the paper-out sensor.
Self-test prints OK, but the printer works strangely in normal operation.	<ul style="list-style-type: none">• Check that both ends of the interface cable are properly connected.• Application program might be incorrect. Contact system manager.
No cutting	<ul style="list-style-type: none">• Check that the connectors for the cutting motor/home-position switch are fully seated on the control board.
Bad cutting (uneven top and bottom document edges).	<ul style="list-style-type: none">• Switch OFF printer and remove any obstructing paper particles in cutter and presenter modules.
Inconsistent cutter operation	<ul style="list-style-type: none">• Check cutter-home switch.
Paper is fed straight through the printer. Paper does not loop.	<ul style="list-style-type: none">• Check presenter sensor.
Missing print or irregular spots.	<ul style="list-style-type: none">• Paper may be too humid. Let it adapt to ambient temperature and humidity for approximately 24 hours before use.• The paper used might not meet the paper specification. See "Paper specification" on page 75.
White longitudinal lines in the printout.	<ul style="list-style-type: none">• Faulty printhead, replace print module.
Faint print.	<ul style="list-style-type: none">• The paper used might not meet the paper specification. See "Paper specification" on page 75.• Clean printhead with ethyl or isopropyl alcohol.• Adjust print contrast, see page 33.
Strange characters or graphics printed, or any kind of strange printer behavior.	<ul style="list-style-type: none">• Might be caused by erroneous data sent from the host. Check validity of transferred data.

Table 16. Fault finding

8.2 Cleaning the printhead

The printhead can be cleaned without removal.

1. Tilt the print module backwards.
2. Lift the printhead with the printhead release lever.
3. Clean the heat elements with a cotton swab immersed in ethyl or isopropyl alcohol.

8.3 Removing the printhead

1. Tilt the print module backwards.
2. Remove the plastic lock from the printhead pressure shaft.
3. Pull the printhead shaft out so that it disengages from the inner bushing. Then turn it so that you can lift the lever end of the shaft up, and remove the shaft.

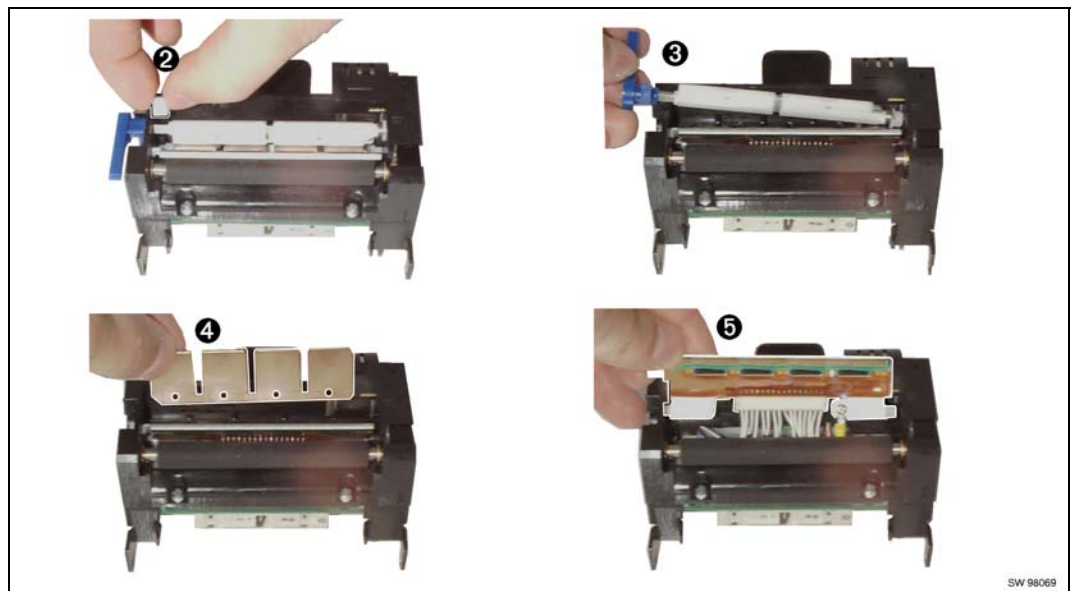


Figure 19. Loosening the printhead

4. Remove the leaf spring pressurizing the printhead.
5. Lift the printhead.
6. Gently loosen the printhead cable from the printhead, making sure not to damage the flexible board of the printhead.
7. Remove the printhead.

8.4 Installing the printhead

Install the printhead in the reverse order.

NOTE! Make sure the spring on the printhead pressure shaft is seated correctly.

8.5 Printer disassembly

⚠ CAUTION! Use standard procedures for handling of ESD sensitive components. Dismantling the printer will expose the control board with its sensitive electronics.

⚠ WARNING! The print module tilt mechanism can close like a mousetrap over your fingers. Make it a rule to always unhook the two springs from the print module when disassembling the printer.

8.5.1 Tools required

- Phillips screwdrivers No. 1
- Hexagonal (Allen) key, 2 mm
- Nutdriver 5.5 mm
- Spring hook

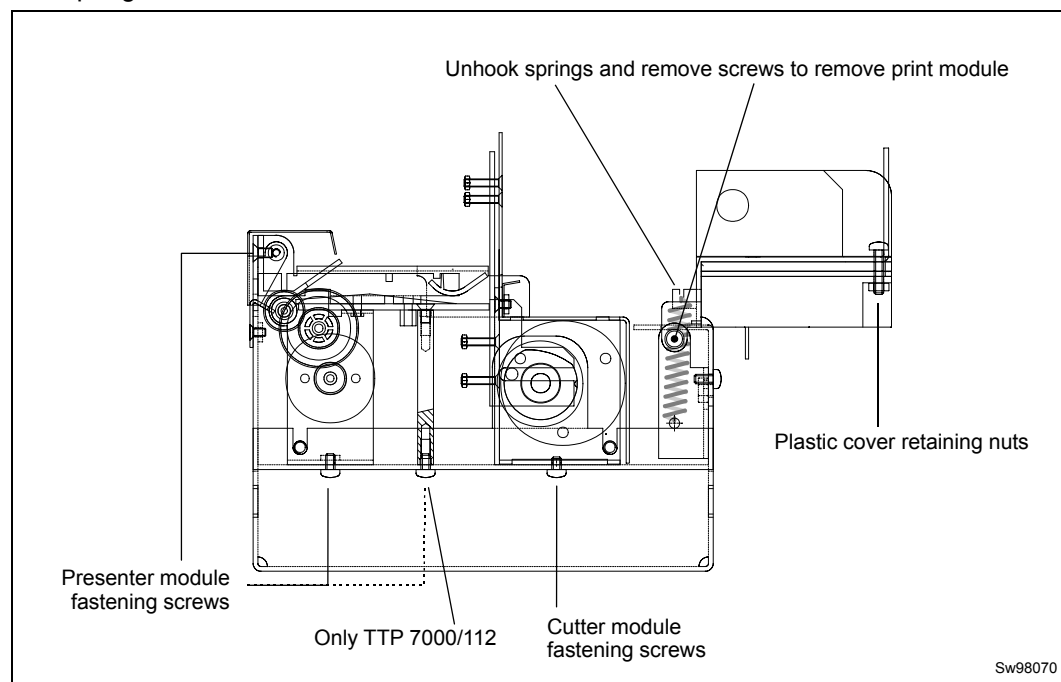


Figure 20. Screws for removing the different modules of the printer

8.5.2 Print module

REMOVAL

1. Remove the plastic cover by removing the two nuts holding it.
2. Disconnect the flat cable that interconnects the control board and the print module.
3. Flip the print module fully backward.
4. Unhook the two springs from the print module using a spring hook or a pair of pliers.
5. Remove the two Allen screws from the hinges of the print-module tilt-mechanism and remove the print module.

REPLACEMENT

Install the print module in the reverse order.

8.5.3 Control board

REMOVAL

1. Loosen the four screws holding the control board module to the printer.
2. Remove the module and disconnect all cables from the control board.
3. Remove the four screws holding the board, and remove it.

REPLACEMENT

Install the control board in the reverse order.

NOTE! – When the printer is assembled, load new firmware to the printer. See page 67.

8.5.4 Cutter module

1. Loosen the four screws holding the control board module to the printer.
2. Remove the module and disconnect the cutter cable from J2 on the control board.
3. Remove the two screws holding the cutter module to the chassis.
4. Flip the print module back and lift the cutter module out of the printer chassis.

REPLACEMENT

Install the cutter module in the reverse order.

8.5.5 Presenter module

REMOVAL

1. Loosen the four screws holding the control board module to the printer.
2. Remove the module and disconnect the presenter module cable from J3 on the control board.
3. Remove the cutter module.
4. Remove the two screws and the plate holding the presenter module to the front of the printer chassis.
5. Remove the two screws (three screws for TTP 7000/112) holding the presenter module to the bottom of the printer chassis.
6. Slide the presenter backwards and lift it out of the printer chassis.

REPLACEMENT

Install the presenter module in the reverse order.

8.6 Replacement parts

Not all parts are replacement parts:

1. Screws, washers, nuts etc. are available in a common hardware store, and are thus not replacement parts.
2. Parts that are considered as *not* being worn by normal printer use are not replacement parts, for example the printer chassis.

Should you require any of these non-replacement parts, contact Swecoin for advice.

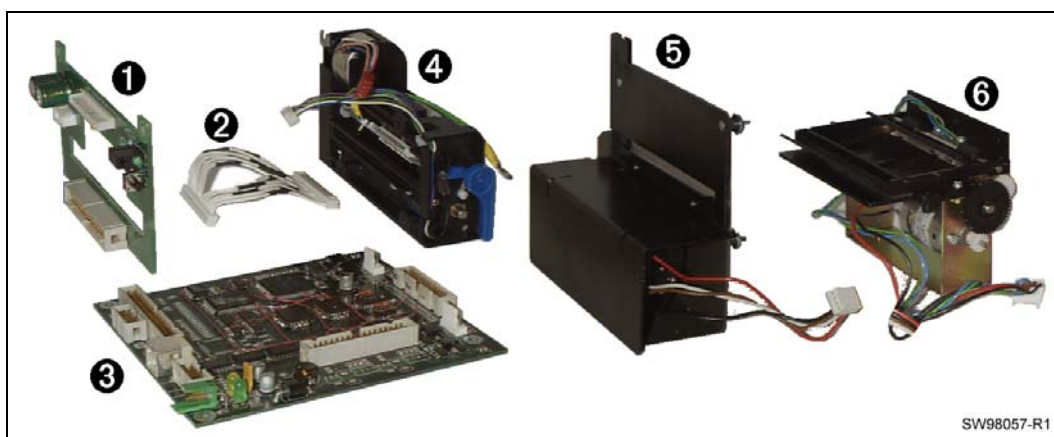


Figure 21. Replacement part modules

Item	Ordering No.		Designation	Quantity		Note
	80 mm	112 mm		80 mm	112 mm	
1	01122-080	01122-112	Print module	1	1	Complete with printhead, connection board, and printhead cable
2	01125-000	01125-000	Printhead cable	1	1	Included in print module
3	01119-901	01119-901	Control board	1	1	
4	01121-080	01121-112	Cutter module	1	1	With motor, sensor, cable, and connector
5	01120-080	01120-112	Presenter module	1	1	With motor, sensor, cable, and connector

Table 17. Replacement parts, 80 mm printer

NOTE! See also Ordering numbers on page 77.

8.7 Firmware

The firmware is stored in flash-PROM on the control board. A replacement control board just contains a bootstrap program that is used to communicate through the parallel interface to make it possible to load the firmware.

8.7.1 Loading

Fetch the firmware from the Swecoin web site <http://www.swecoin.se>. There you will also find a loader program (Windows™ software) facilitating the loading of the firmware into the printer.

The loader program contains a help file with detailed instructions on how to load the firmware into the printer.

In non-Windows environments, use the following procedure to load the firmware:

1. Send ESC NUL (1BH 00H) to the printer.
2. Wait 0.5 seconds.
3. Send the firmware file to the printer.
4. Wait until the printer buzzes to confirm that the loading is complete (the presenter motor runs for a second).

CAUTION! *The loading and burning can take up to one minute. Do not abort before one minute by turning OFF the power to the printer. Doing so may leave the printer in a state where new firmware cannot be loaded.*

8.7.2 Firmware history

Functions and features are being added from time to time affecting the firmware in the printer. The following table lists the changes of general interest.

Notice that the list may not contain the latest firmware versions. Please visit our web site <http://www.swecoin.se> for current information.

FW version	Change
1.00	First version released to customer, primary as Windows printer.
2.00	Added text mode support
2.10	Support for 112 mm paper width (Auto detect of width)
2.20	Support for retract and retain unit, and for new USB circuit on the PCB
2.30	<i>New features</i> New command for printing logotypes added. Added eject length calibration, parameter 47 Hex mode added. Activate by lifting head, paper at head and switch pressed at power on. Added Load Factory Defaults command (ESC & F) Max Font height increased from 128 to 255 pixels. <i>Bug</i> Bugs removed from landscape mode printing on 112-mm printers. Removed Serial number in the USB Descriptor. This is to avoid that each TTP7000 unit connected to the USB get their own port and driver instead of sharing the same driver with USB enumeration. A bug that randomly caused the printer to freeze when erasing all fonts has been removed. (Even loading new firmware did not help remove this state).

2.35	<i>New Features</i>
	Barcode commands added (EAN, UPC, I25, ISBN, Code39).
	<i>Bugs</i>
	Redesigned USB handling
	Cutter, better sensing of cutter home sensor.
	Fixed parameter handling.
	Printer will now start in normal text mode (was bold).
	Fixed so that paper reverse command (ESC 'j' n) no longer causes USB chip to reset.
2.37	Changed default value for N10 (pulse control), from 0 to 1.
	Auto-load timeout longer. Auto-load errors will now be reset at head lift.

Table 18. Firmware history

9 SPECIFICATIONS

Specification subject to changes without notice.
--

9.1 Print data

Printer control	Windows 95/98/ME and NT 4/2000/XP drivers. Direct addressing through ESC sequences
Plug and Play	Yes
Print method	Direct thermal line printing
Resolution	8 dots/mm (203 dpi)
Feed pitch	1/8 mm (203 lpi)
Print speed	Up to 75 mm/s
Print width	
80-mm version	72 mm, 576 dots
112-mm version	104 mm, 832 dots
Interfaces	Parallel IEEE-1284 and USB. Optional external RS-232 serial interface adapter.
Serial interface settings	<i>Baud:</i> 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, 115 200 bits/s <i>Data bits:</i> 7 or 8 <i>Parity:</i> None, Odd or Even <i>Stop bits:</i> 1 (fixed) <i>Flow control:</i> None, Xon / Xoff, or Hardware <i>Default settings:</i> 9600 bits/s, 8 data bits ,no parity, 1 stop bit, no flow control.

9.2 Text modes (non-Windows applications)

Orientation	Horizontal (portrait mode) only
Number of possible fonts:	8
Font memory	256 kB
Font technology	Bitmap fonts, non scaleable
Font format	Swecoin proprietary
Standard fonts	TTP Mono 9, Ariel 6p, 10p and 16p, Wingdings, Code 39
Text attributes	Bold, underline, reverse print, multiple-width, multiple height. Attributes can be combined on the same text line.

9.3 Basic character set

The printer uses the ISO 8859-1 (ANSI) character set used in Windows. Other character sets can be used, by creating and loading appropriate font files.

Characters 0 to 31 are control codes that cannot be changed, but 32 to 255 can be custom designed.

The table below shows the characters stored in flash PROM on the printer control board.

Dec Hex Key	32 20	33 21 !	34 22 "	35 23 #	36 24 \$	37 25 %	38 26 &	39 27 '	40 28 (	41 29)	42 2a *	43 2b +	44 2c ,	45 2d -	46 2e .	47 2f /
Dec Hex Key	48 30 0	49 31 1	50 32 2	51 33 3	52 34 4	53 35 5	54 36 6	55 37 7	56 38 8	57 39 9	58 3a :	59 3b ;	60 3c <	61 3d =	62 3e >	63 3f ?
Dec Hex Key	64 40 @	65 41 A	66 42 B	67 43 C	68 44 D	69 45 E	70 46 F	71 47 G	72 48 H	73 49 I	74 4a J	75 4b K	76 4c L	77 4d M	78 4e N	79 4f O
Dec Hex Key	80 50 P	81 51 Q	82 52 R	83 53 S	84 54 T	85 55 U	86 56 V	87 57 W	88 58 X	89 59 Y	90 5a Z	91 5b [	92 5c \	93 5d]	94 5e ^	95 5f _
Dec Hex Key	96 60 ,	97 61 a	98 62 b	99 63 c	100 64 d	101 65 e	102 66 f	103 67 g	104 68 h	105 69 i	106 6a j	107 6b k	108 6c l	109 6d m	110 6e n	111 6f o
Dec Hex Key	112 70 p	113 71 q	114 72 r	115 73 s	116 74 t	117 75 u	118 76 v	119 77 w	120 78 x	121 79 y	122 7a z	123 7b {	124 7c |	125 7d }	126 7e ~	127 7f A0127
Dec Hex Key	128 80 A0128	129 81 A0129	130 82 A0130	131 83 A0131	132 84 A0132	133 85 A0133	134 86 A0134	135 87 A0135	136 88 A0136	137 89 A0137	138 8a A0138	139 8b A0139	140 8c A0140	141 8d A0141	142 8e A0142	143 8f A0143
Dec Hex Key	144 90 A0144	145 91 A0145	146 92 A0146	147 93 A0147	148 94 A0148	149 95 A0149	150 96 A0150	151 97 A0151	152 98 A0152	153 99 A0153	154 9a A0154	155 9b A0155	156 9c A0156	157 9d A0157	158 9e A0158	159 9f A0159
Dec Hex Key	160 a0 A0160	161 a1 A0161	162 a2 A0162	163 a3 A0163	164 a4 A0164	165 a5 A0165	166 a6 A0166	167 a7 A0167	168 a8 A0168	169 a9 A0169	170 aa A0170	171 ab A0171	172 ac A0172	173 ad A0173	174 ae A0174	175 af A0175
Dec Hex Key	176 b0 A0176	177 b1 A0177	178 b2 A0178	179 b3 A0179	180 b4 A0180	181 b5 A0181	182 b6 A0182	183 b7 A0183	184 b8 A0184	185 b9 A0185	186 ba A0186	187 bb A0187	188 bc A0188	189 bd A0189	190 be A0190	191 bf A0191
Dec Hex Key	192 c0 A0192	193 c1 A0193	194 c2 A0194	195 c3 A0195	196 c4 A0196	197 c5 A0197	198 c6 A0198	199 c7 A0199	200 c8 A0200	201 c9 A0201	202 ca A0202	203 cb A0203	204 cc A0204	205 cd A0205	206 ce A0206	207 cf A0207
Dec Hex Key	208 d0 A0208	209 d1 A0209	210 d2 A0210	211 d3 A0211	212 d4 A0212	213 d5 A0213	214 d6 A0214	215 d7 A0215	216 d8 A0216	217 d9 A0217	218 da A0218	219 db A0219	220 dc A0220	221 dd A0221	222 de A0222	223 df A0223
Dec Hex Key	224 e0 A0224	225 e1 A0225	226 e2 A0226	227 e3 A0227	228 e4 A0228	229 e5 A0229	230 e6 A0230	231 e7 A0231	232 e8 A0232	233 e9 A0233	234 ea A0234	235 eb A0235	236 ec A0236	237 ed A0237	238 ee A0238	239 ef A0239
Dec Hex Key	240 f0 A0240	241 f1 A0241	242 f2 A0242	243 f3 A0243	244 f4 A0244	245 f5 A0245	246 f6 A0246	247 f7 A0247	248 f8 A0248	249 f9 A0249	250 fa A0250	251 fb A0251	252 fc A0252	253 fd A0253	254 fe A0254	255 ff A0255

Table 19. ISO 8859-1 (ANSI) character table

Dec Hex Key	32 20	33 21 !	34 22 "	35 23 #	36 24 \$	37 25 %	38 26 &	39 27 '	40 28 (	41 29)	42 2a *	43 2b +	44 2c ,	45 2d -	46 2e .	47 2f /
Dec Hex Key	48 30 0	49 31 1	50 32 2	51 33 3	52 34 4	53 35 5	54 36 6	55 37 7	56 38 8	57 39 9	58 3a :	59 3b ;	60 3c <	61 3d =	62 3e >	63 3f ?
Dec Hex Key	64 40 @	65 41 A	66 42 B	67 43 C	68 44 D	69 45 E	70 46 F	71 47 G	72 48 H	73 49 I	74 4a J	75 4b K	76 4c L	77 4d M	78 4e N	79 4f O
Dec Hex Key	80 50 P	81 51 Q	82 52 R	83 53 S	84 54 T	85 55 U	86 56 V	87 57 W	88 58 X	89 59 Y	90 5a Z	91 5b [	92 5c \	93 5d]	94 5e ^	95 5f _
Dec Hex Key	96 60 '	97 61 a	98 62 b	99 63 c	100 64 d	101 65 e	102 66 f	103 67 g	104 68 h	105 69 i	106 6a j	107 6b k	108 6c l	109 6d m	110 6e n	111 6f o
Dec Hex Key	112 70 p	113 71 q	114 72 r	115 73 s	116 74 t	117 75 u	118 76 v	119 77 w	120 78 x	121 79 y	122 7a z	123 7b {	124 7c |	125 7d }	126 7e ~	127 7f A0127
Dec Hex Key	128 80 A0128	129 81 A0129	130 82 A0130	131 83 A0131	132 84 A0132	133 85 A0133	134 86 A0134	135 87 A0135	136 88 A0136	137 89 A0137	138 8a A0138	139 8b A0139	140 8c A0140	141 8d A0141	142 8e A0142	143 8f A0143
Dec Hex Key	144 90 A0144	145 91 A0145	146 92 A0146	147 93 A0147	148 94 A0148	149 95 A0149	150 96 A0150	151 97 A0151	152 98 A0152	153 99 A0153	154 9a A0154	155 9b A0155	156 9c A0156	157 9d A0157	158 9e A0158	159 9f A0159
Dec Hex Key	160 a0 A0160	161 a1 A0161	162 a2 A0162	163 a3 A0163	164 a4 A0164	165 a5 A0165	166 a6 A0166	167 a7 A0167	168 a8 A0168	169 a9 A0169	170 aa A0170	171 ab A0171	172 ac A0172	173 ad A0173	174 ae A0174	175 af A0175
Dec Hex Key	176 b0 A0176	177 b1 A0177	178 b2 A0178	179 b3 A0179	180 b4 A0180	181 b5 A0181	182 b6 A0182	183 b7 A0183	184 b8 A0184	185 b9 A0185	186 ba A0186	187 bb A0187	188 bc A0188	189 bd A0189	190 be A0190	191 bf A0191
Dec Hex Key	192 c0 A0192	193 c1 A0193	194 c2 A0194	195 c3 A0195	196 c4 A0196	197 c5 A0197	198 c6 A0198	199 c7 A0199	200 c8 A0200	201 c9 A0201	202 ca A0202	203 cb A0203	204 cc A0204	205 cd A0205	206 ce A0206	207 cf A0207
Dec Hex Key	208 d0 A0208	209 d1 A0209	210 d2 A0210	211 d3 A0211	212 d4 A0212	213 d5 A0213	214 d6 A0214	215 d7 A0215	216 d8 A0216	217 d9 A0217	218 da A0218	219 db A0219	220 dc A0220	221 dd A0221	222 de A0222	223 df A0223
Dec Hex Key	224 e0 A0224	225 e1 A0225	226 e2 A0226	227 e3 A0227	228 e4 A0228	229 e5 A0229	230 e6 A0230	231 e7 A0231	232 e8 A0232	233 e9 A0233	234 ea A0234	235 eb A0235	236 ec A0236	237 ed A0237	238 ee A0238	239 ef A0239
Dec Hex Key	240 f0 A0240	241 f1 A0241	242 f2 A0242	243 f3 A0243	244 f4 A0244	245 f5 A0245	246 f6 A0246	247 f7 A0247	248 f8 A0248	249 f9 A0249	250 fa A0250	251 fb A0251	252 fc A0252	253 fd A0253	254 fe A0254	255 ff A0255

Table 20. Symbol character table

9.4 Paper handling

Paper width	80 mm or 112 mm depending on model
Receipt length	75–500 mm before partially ejecting receipt, no upper limit for receipt length.
Cutting	Guillotine cutter
Presenter operation	Holds receipt until printed then cuts and presents the complete receipt. Extremely long receipts can be partially ejected to limit loop buildup.
Eject length after cut	Programmable, full eject, or receipt held until the customer removes it. Eject of uncollected receipts.
Receipt retraction	Optional retract and retain function pulls back uncollected receipts and throws them in a wastebasket inside the kiosk.
Paper loading	Automatic feed, cut, and eject when paper is detected. Automatic "on-line" after successful paper load.
Sensors	Optical sensors: Out of paper, paper left in presenter, paper near end (optional) and weekend level sensor (optional). Switch sensors: Cutter not in home position and printhead lifted.

9.5 Printer dimensions

NOTE! – Additional space is required for paper roll and handling.

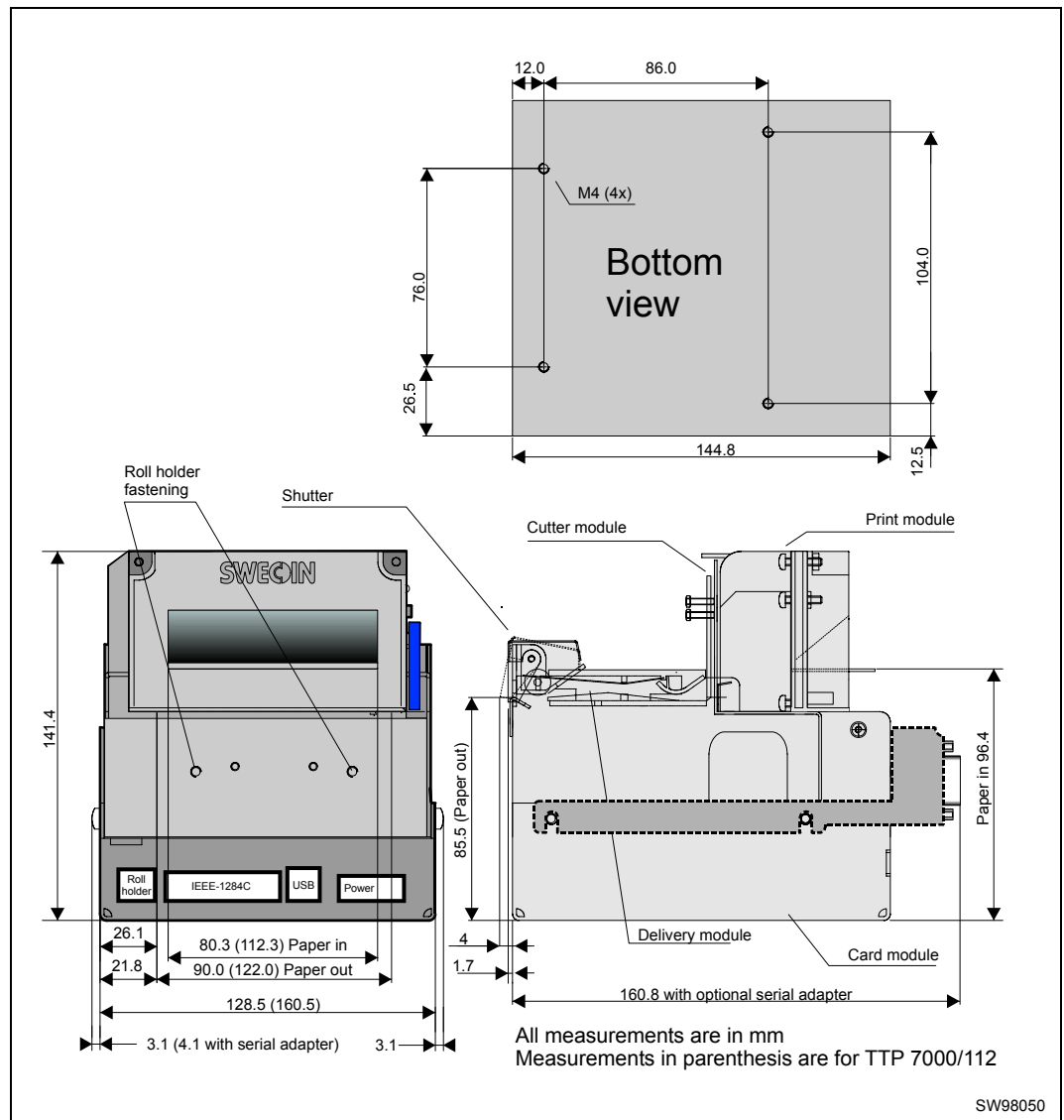


Figure 22. Measurements drawing

9.6 Environmental conditions

Temperature	Operating:	0 to +50 °C
	Storage and transportation:	–20 to +60 °C
Relative humidity	Operating:	35 to 75%, non-condensing
	Storage and transportation:	10 to 90%, non-condensing

9.7 Miscellaneous

Weight	2.4 kg (80 mm), 2.85 kg (112 mm)
Typical throughput	1.5 s/receipt (length 75 mm, print, cut, and present)
Power requirements	
80 mm version	24Vdc \pm 10%, idle 150 mA, average 2.5A, peak 8.5A
112 mm version	24Vdc \pm 10%, idle 150 mA, average 3.5A, peak 11A
Life expectancy	Printhead: more than 50 km paper, more than 100 million pulse lines (typically) Cutter: 500 000 cuts (typically) Control board: 40 000 hours (typically)
MTBF ¹	250 000 receipts (typically)

9.8 Paper specification

9.8.1 General

Paper supply	Roll paper with heat sensitive coating (thermal paper)
Type of paper	TF50KS-E2C, AF50KS-E, Mitsubishi TG7065, or equivalent is recommended
Number of layers	One
Paper weight	55—110 g/m ²
Paper thickness	0.054—0.10 mm
Surface smoothness	450-s minimum according to Bekk TAPPI T 479
Reflection	80% minimum according to SCAN P3
Core	Paper or plastic
Core inner diameter	Minimum 25 mm
Paper end	Must not be glued to the core
Paper width	80 +0/–0.3 mm, or 112 +0/–0.3 mm depending on model
Paper length	Approx. 150 m (with 110-mm roll diameter and 65 g/m ²) Approx. 250 m (with 150-mm roll diameter and 65 g/m ²) Approx. 450 m (with 200-mm roll diameter and 65 g/m ²)

9.8.2 Thermal coating

Thermal coating	Outer side
Sensitivity	Activated at approx. 68 °C saturated at approx. 75 °C.
Dynamic sensitivity	1.14 \pm 0.04 OD

¹ MTBF figures does not include paper jam

Top coating	Standard, semi or UV (if applicable)
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9.8.3 Perforation

Tear-off perforation	Punching must be done from outer side (thermal coating side) with a sharp perforation tool.
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9.8.4 Preprinting

General	<p>To endure the heat developed during printing, the preprint must meet the requirements applicable for preprinting on paper intended for laser printing. OCR-blind ink must be used for preprint on the inner side of the roll.</p> <p>Ink used for preprinting on the thermal side must be non-abrasive.</p> <p>The ink must not smear while wound up on the supply roll or during the printing process.</p>
Print side	One side or both sides.

9.8.5 Black mark size and position

See also Aligning preprint and thermal print on page 52.

Print side	Inner side (opposite to thermal coating side)
Sensor position	25 mm before cutter, and 9.1 mm from left edge of ticket entry when seen from the front of the printer (on the side of the blue release arm).
Mark length range	3 to 18 mm, default 5 mm
Mark width	Minimum 5 mm centered on the sensor position, recommended width is 9 mm
Print density	<p>Standard wet offset mode is recommended for printing of the black-marks. The full mark area must be printed. Screen-printing is not allowed. Measurement of print density must be performed relative to the white paper background.</p> <p>Using a MacBeth densitometer, the print density must be greater than 1.3. Anti-gloss filter is not allowed. Using a Gretag densitometer, the print density must be greater than 1.5. The reflection from the black-mark must be less than 10%. The reflection from the paper must exceed 80%.</p>
Preprinting	Preprinting in the zone passing over the black-mark sensor is not recommended. If required, OCR blind type of ink must be used, (outside the 700-1100 nm range).
Punched holes	Punching must be done from the thermally coated side. Distorted print can be expected within a zone of approximately 2-mm around the edges of the hole. The function must be tested.

9.9 Ordering numbers

9.9.1 Printer assembly

	Print Width:	80 mm	112 mm
Basic printer (no roll holder)		01100-080	01100-112
Evaluation kit containing one basic printer with 150 mm roll holder and one each of the options marked with * in the options list. (Only one evaluation kit/customer.)		01578-080	01578-112

9.9.2 Options

	Print Width:	80 mm	112 mm
75 W Power supply unit (see figure 23) with 0.5 m PSU-to-printer cable		01776-000	
150 W Power supply unit (see figure 24) with 0.5 m PSU-to-printer cable, on/off switch, and fuse*		01035-014	
One sensor (paper-near-end) with 150 mm cable		01483-000	
Two sensors (paper-near-end + weekend) with 200 mm cable		01579-000	
IEEE-1284 cable, straight 1.8 m*		01366-000	
IEEE-1284 cable, 90° angled 1.8 m		01366-090	
USB cable, 1.8 m		01542-000	
Serial adapter		01437-000	
Serial cable, 1.8 m		01659-000	
Paper roll, no preprint, for Ø110 mm roll holders, 65g/m ² *	04767-000		04768-000
Paper roll, no preprint, for Ø150 mm roll holders, 65g/m ²	01139-080		01139-112
Paper roll, no preprint, for Ø200 mm roll holders, 65g/m ²	01543-080		01543-112
Technical manual*		01536-000	
Printer driver package, Windows 9x and NT4/2000/XP*		01628-xxx	
Retract and retain (Wastebasket) accessory ¹ (see figure 25)	01439-080*		01439-112

¹ The retract and retain option must be ordered together with the printer and they are assembled together at delivery.

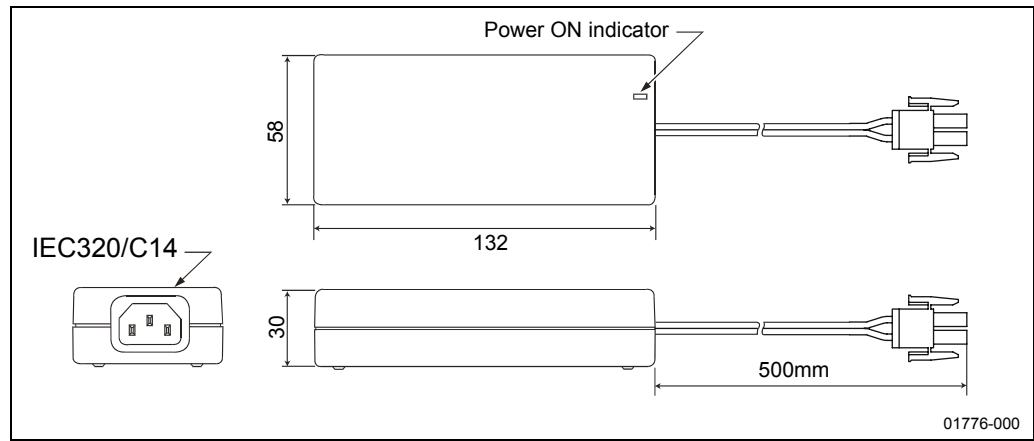


Figure 23. 75W Power supply unit.

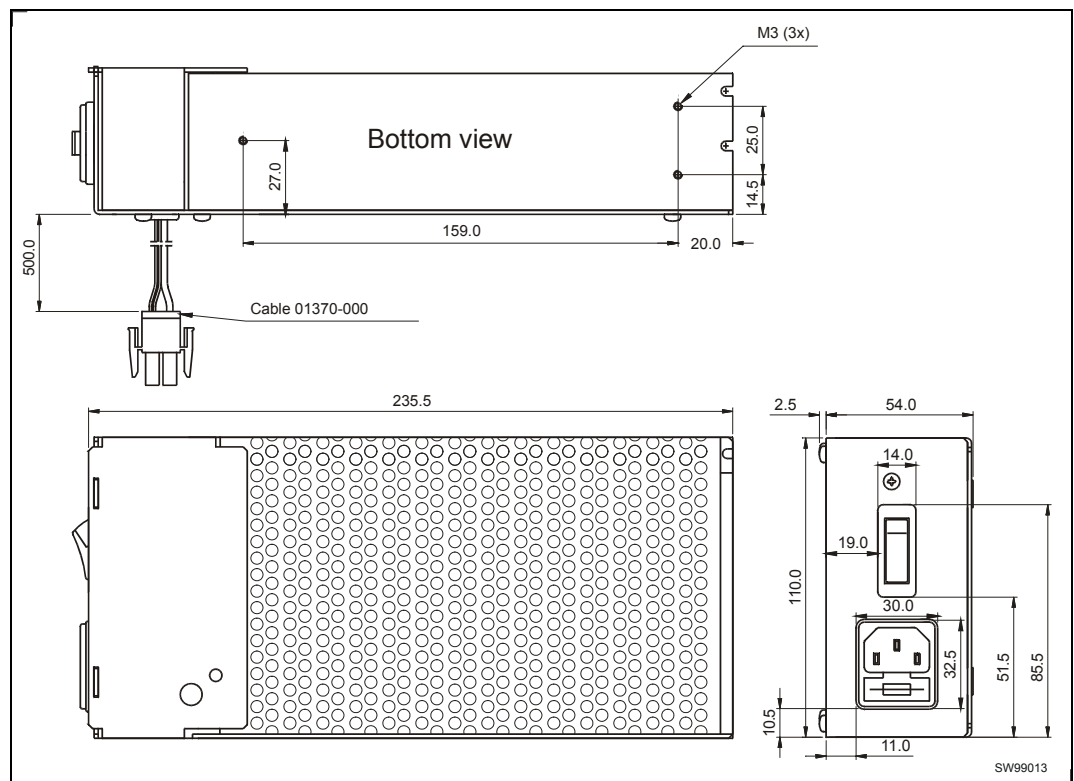


Figure 24. 150W Power supply unit.

NOTE! – Mains cord is not included in the PSU's.

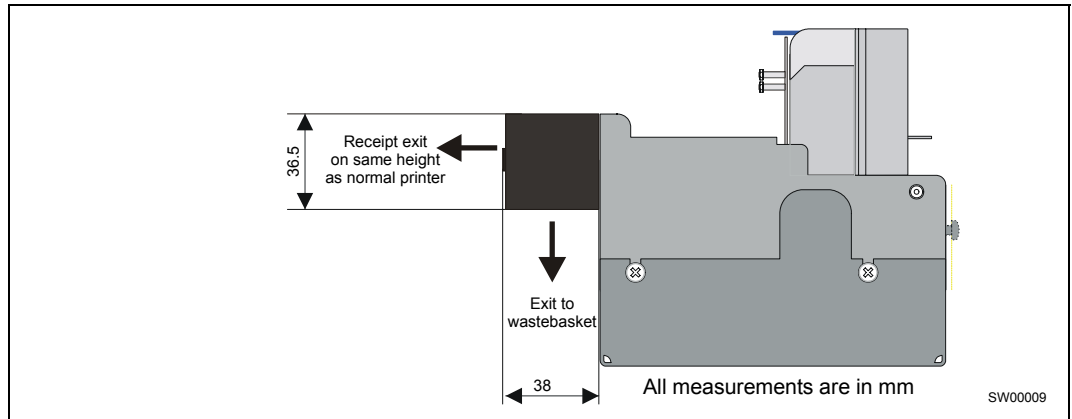


Figure 25. Retract and retain option.

Choose between four modes in the default parameter setup:

1. Retract when new receipt is printed
2. Retract after a preset time
3. Eject to customer when new receipt is printed (wastebasket off)
4. Eject to customer when new receipt is printed, but retract if not collected within a preset time

No additional commands are required

NOTE! – Use paper rolls with an inner diameter of 40 mm or more when using the "retract and retain" option.

9.9.3 Roll holders

	Print Width: 80 mm	112 mm
Paper roll holder for up to 110 mm roll diameter. With paper-near-end sensor.	01148-080	01148-112

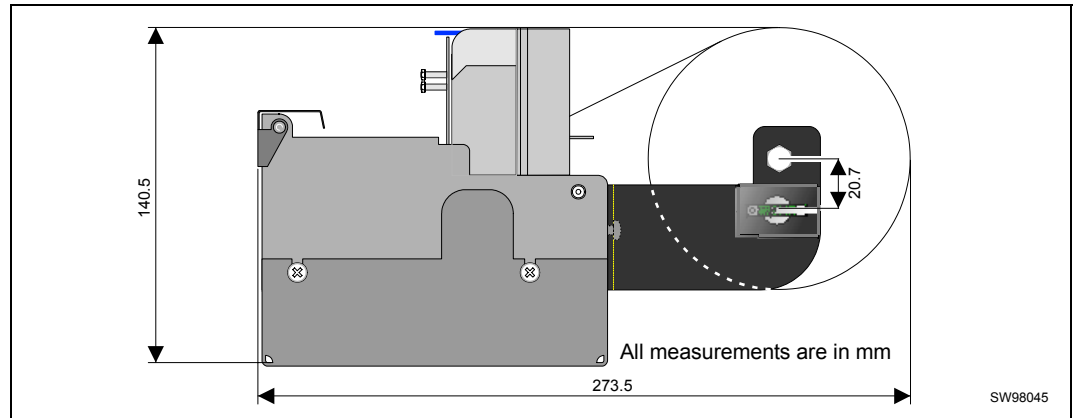


Figure 26. Roll holder for paper rolls up to 110-mm

	Print Width: 80 mm	112 mm
Paper roll holder for up to 150 mm roll diameter. With paper-near-end sensor.	01123-080	01123-112

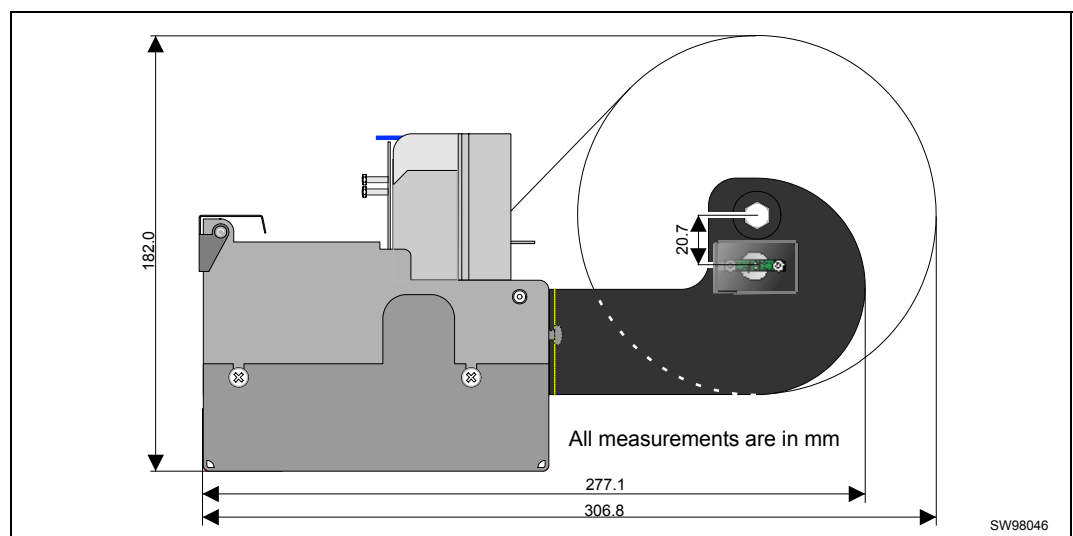


Figure 27. Roll holder for paper rolls up to 150-mm

	Print Width: 80 mm	112 mm
Paper roll holder for up to 200 mm roll diameter. With paper-near-end and weekend sensors.	01149-080	01149-112

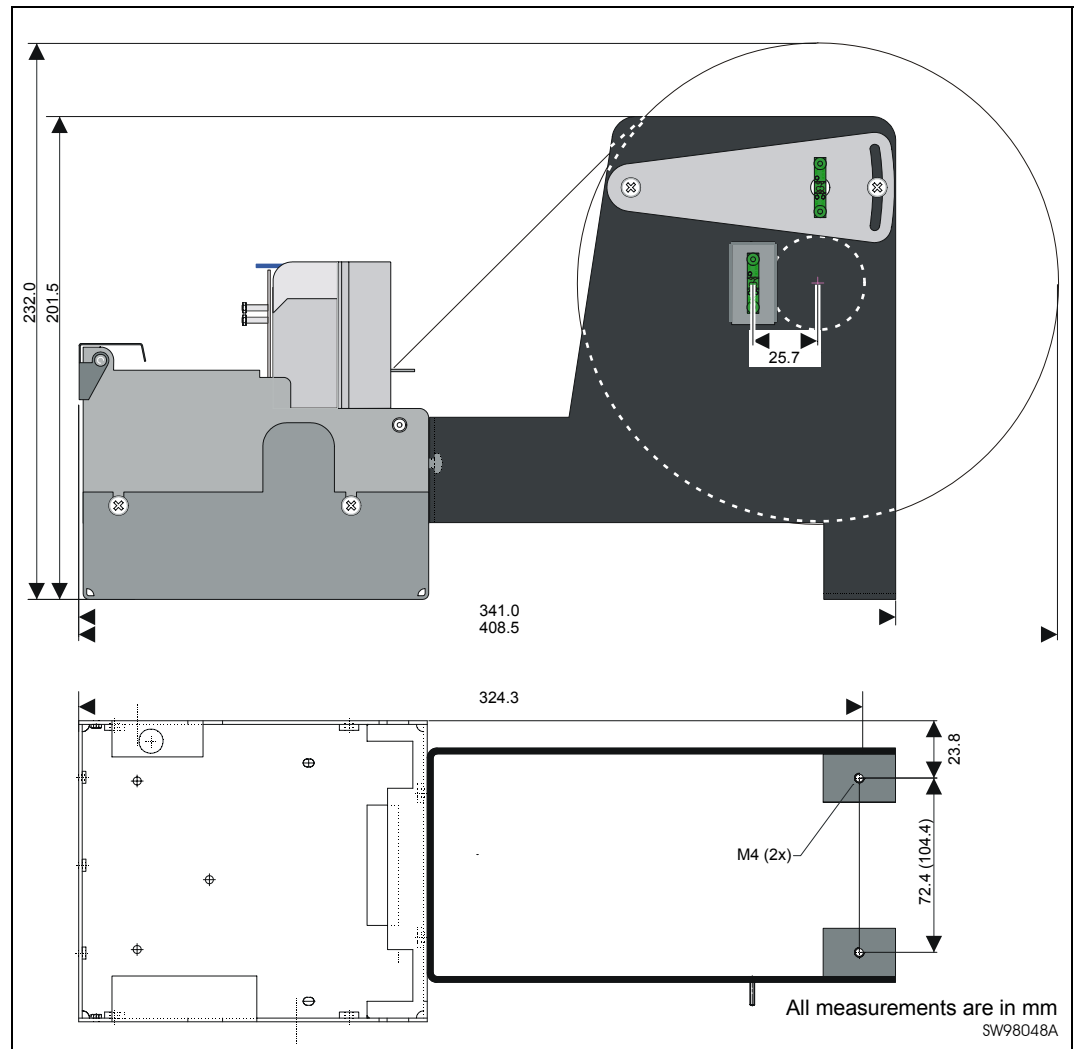


Figure 28. Roll holder for paper rolls up to 200-mm

	Print Width: 80 mm	112 mm
Paper roll holder for up to 250-mm roll mm roll placed below printer. With paper-near-end and weekend sensors.	01754-080	01754-112

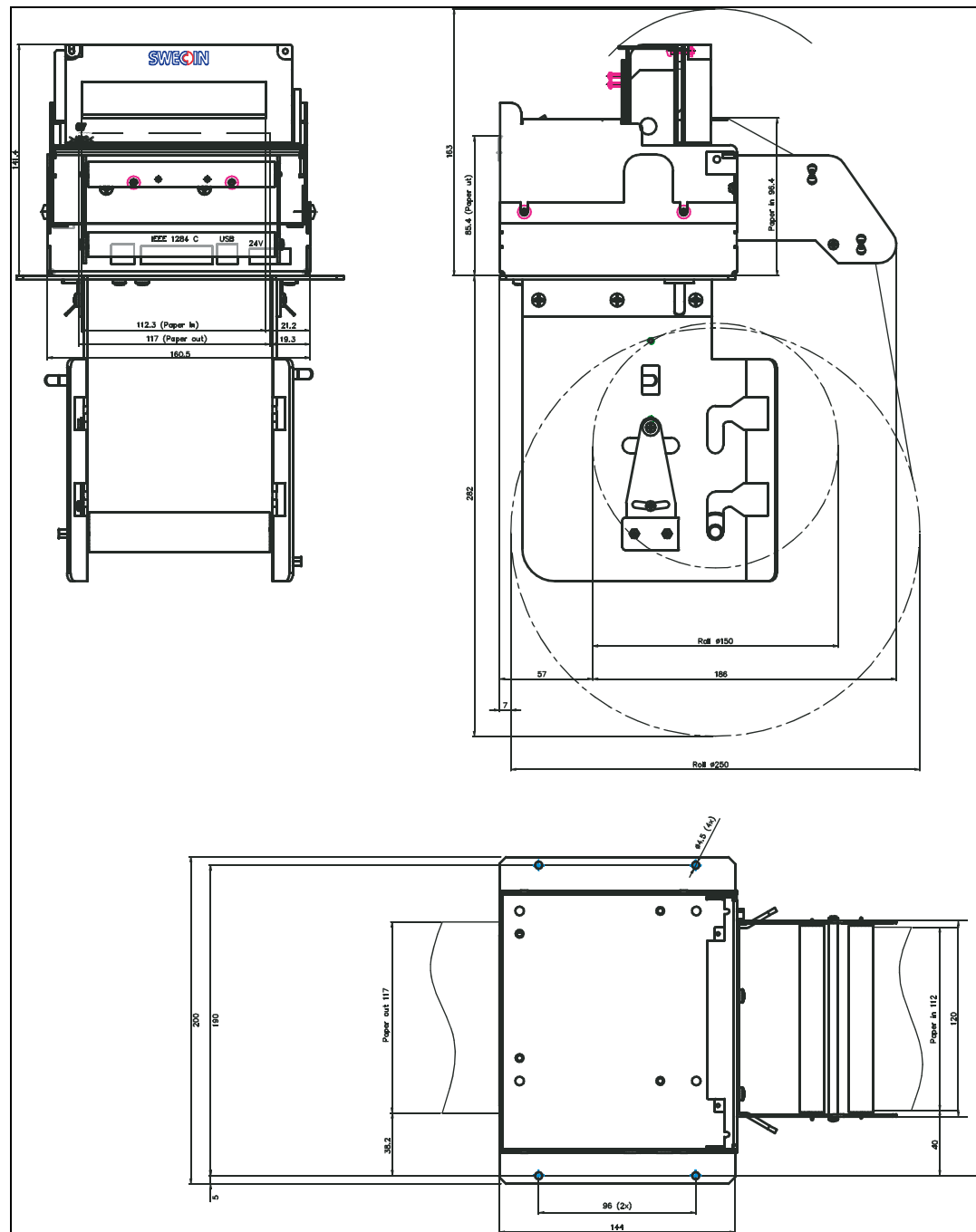


Figure 29. Roll holder for paper placed under printer. The roll can be fitted on two different levels, one for 150-mm roll, and one for 250-mm roll. This way, minimal space is required under the printer.

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