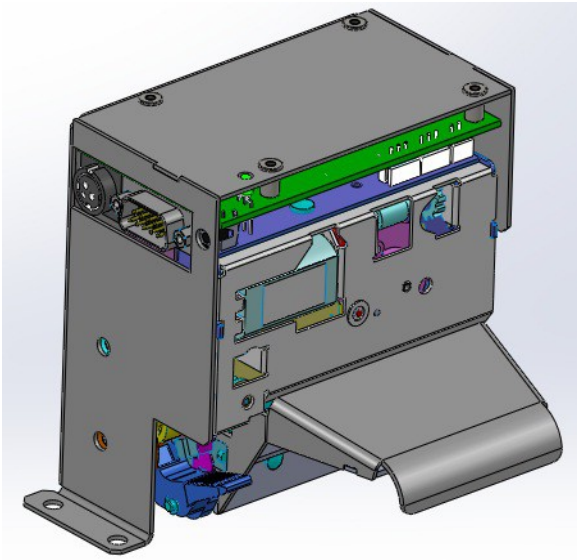
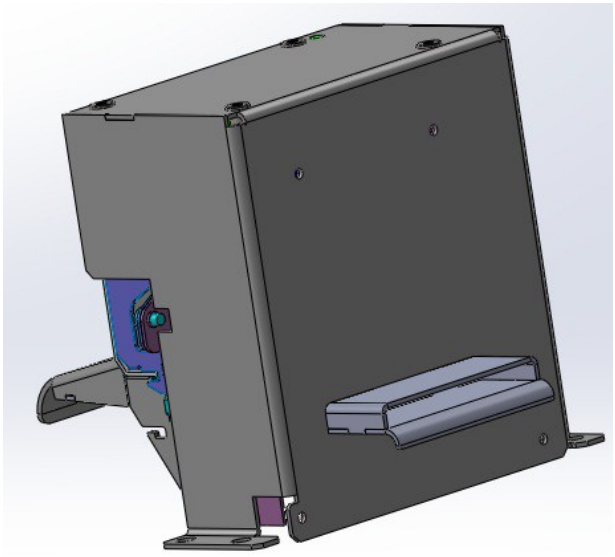
PTD55 THERMAL PRINTER SERIES

Operation manual

Rev 1.0





FENIX

IMVICO, S.A.

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1 - INTRODUCTION

The PTD55 is a very high-performance thermal printer, **specially designed as Parking Ticket Dispenser, for standard parking tickets 54mm wide.**
The PTD55 mounts the EPSON M-T522II printer mechanism. Its compact and functional design covers many industrial uses. It is capable of printing text, graphics, logo and bar codes.

PTD55 is intended to be integrated into the user's final system. Its structure allows an easy connection both with the mechanism connectors and with the communications and power supply connectors.

Main features of the PTD55 thermal printer are:

- Simple installation and easy maintenance.
- 54mm Paper width.
- High speed printing: up to 250mm/s (NOTE 1).
- Single 24V DC power supply.
- Available sensors: No-paper, paper-near-end, optical mark, ticket pick-up and paper jam.
- Programmable optional output for user control (buzzer, LEDs, relay..)
- Printing resolution: 8 dots/mm (203 dpi).
- Port interface: - Serial RS232C data input interface on-board (up to 115200bps).
  - Universal Serial Bus (USB2.0).
- Scalable font (independent scale in X / Y axis), up to 64 times.
- Programmable character and line space.
- Bold, underline, reverse and rotate character capabilities
- Graphic bitmap printing capabilities.
- Several format bar code (EAN13, Code39, Code128 and ITF).
- Several 2D format Bar Code (QR and AZTEC).
- Two internal character fonts (A font = 12x24 dots. B font = 8x16 dots).
- Control code based on ESC / POS commands (NOTE 2).
- Automatic paper load.
- Four maintenance counters (On/Off times, hours, meters and cuts)
- Hexadecimal mode for easy software debugging.
- Self test mode feature
- Input buffer of 32KBytes.
- Multiple logo load capability through Windows driver or command.
- Upgrading of firmware version through communication port (NOTE 3).
- TrueType font loading capability (NOTE 3).
- Extended operating temperature range (-20ºC to +70ºC).
- Storage temperature range (-35ºC to +75ºC).
- Automatic cut with partial or full cut capability.
- Windows XP and Windows 7 drivers and demo/configuration program.
- Linux Driver.

(1) Print speed changes according to the baud rate in RS232 connection and temperature. Higher printer speed rates are achieved at higher baud rates and USB connection.
(2) ESC/POS are registered trademarks of Seiko Epson Corporation.
(3) In order to upload new firmware or new TrueType font, FWLoader and FontLoader application programs are available on our website.

This manual is the printer operations' guide and is intended for the designer's application. The following sections contain a detailed description of both hardware and configuration software that allow obtaining the maximum benefit of the printer capabilities.

2 - IMPORTANT NOTES ON THERMAL PRINTER HANDLING

In order to preserve the life of the printer, it is necessary to keep in mind some precautions on the handling of the PTD55 printer. Please read carefully the following points in order to make a good use of the printer.

2.1 - SAFETY PRECAUTIONS

- Before using the printer, read carefully section - *INSTALLATION.*
- **NEVER** connect the external power supply with the wrong polarity. This could permanently damage the printer.
- Turn off the printer immediately if it produces smoke, a strange smell or an unusual noise. Keeping on using the printer could cause fire. Unplug the equipment immediately and contact your official distributor.
- **NEVER** connect cables with different connectors from the ones mentioned in this manual. Failing on doing so could permanently damage the printer.
- Use a power supply whose output voltage is within the specification range stated in this manual. Over voltage can permanently damage the printer. Under voltage can cause malfunctions.
- **NEVER** wet PTD55 thermal printer with water or any other liquid. If any liquid is spilled inside the equipment, unplug the power cable immediately and contact the technical service.
- Make sure the printer is on a steady, securely fixed surface. If the printer falls down, it could break or damage.
- **NEVER** use the printer in high humidity or in locations with high risk of fire.
- **NEVER** place heavy objects on top of the printer and never lean on it.
- **NEVER** put any object inside of the printer, as it could cause hardware damage on it, such as short-circuit, print head breaking or general failure of the printer.
- **NEVER** shake the printer.
- **NEVER** disassemble or modify the hardware of the printer.
- **NEVER** try to repair the printer. Please contact your official distributor in case of failure.
- As the printer contains electromagnets (inside of the motor), it should not be used in excessively dirty environments or places with dust or metal particles.
- **NEVER** print without paper loaded or without the cover closed, as the thermal print head life can be highly shortened.
- **NEVER** pull the paper out when the cover is closed. Use the paper advance button instead.
- Avoid touching accessible parts with metallic objects, such as screwdrivers or tweezers, the print head thermal elements as well as the electronic printed circuit. They are delicate parts.
- **NEVER** touch with bare hands the areas around the print head and the motor surface as they become very hot during and just after printing; wait 15 seconds after printing to let them cool down.
- **NEVER** touch the surfaces of the print head thermal elements or the electronic printed circuit, as dust and dirt can stick to their surface and cause damage by electrostatic discharge. Moreover, some electronic components can get very hot during operation.
- The thermal paper contains Na+, K+ and Cl- ions that can cause harm to the print head elements. Therefore, use only the specified paper.
- If the printer has not been used for long period of time and the paper was loaded, the paper could become deformed by the drive roller pressure. It is recommended to make it advance at least 30 mm before printing again.
- For safety reasons, unplug the printer if it is not going to be used over a long period of time.
- **Do not print continuously (without stopping) for more than 6 minutes.**

2.2 - ABSOLUTE MAXIMUM RATINGS

Supply voltage . . . . . +30VDC
Operating temperature range . . . . . −20°C to 70°C
Storage temperature range . . . . . −35°C to 75°C

2.3 - CLEANING PROCEDURE AND PRECAUTIONS

Paper dust, paper chips, and thermal chemicals attached to the heat elements of the print head and the platen may reduce print quality. In order to clean the thermal print head, proceed as indicated by the following steps:

1- Unplug the power supply cable and open the cutter unit.
2- Pull the paper lever in order to release the platen.
3- Soak a cotton sponge in alcohol (ethanol, methanol or IPA), and rub it gently along the thermal head in order to remove the possible accumulation of paper particles.
4- Wait for alcohol to evaporate before inserting the paper roll and closing the cover.

FENIX recommends cleaning the thermal print head periodically (every 2 or 3 months) in order to keep an optimal print quality.

NOTES:

- ✓ The print head may be hot after printing. Make sure it has thoroughly cooled down before proceeding to clean it.
- ✓ Never touch the thermal elements of the print head with your hands.
- ✓ Never use metallic or piercing elements to clean the print head, as they could scratch it.

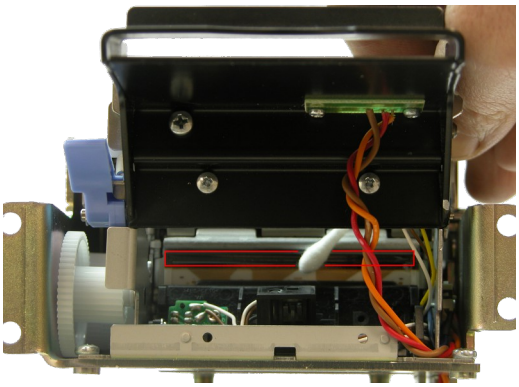


Fig.2.1. Thermal print head cleaning.

2.4 - RECOMMENDATIONS

- The plug has to be located near the printer and has to be easily obtainable.
- Before connecting any communication data cable, check the printer is working properly by executing the self-test.
- Set the PTD55 in a place where the connection cables do not suffer stretching or cross with each other.
- **IMPORTANT!!!** Since the printer demands high current peaks during operation it is advisable to make the power supply cables the shortest possible.

3 - GENERAL SPECIFICATIONS

3.1 - PRINTING SPECIFICATIONS

Printing method	Thermal line printing
Dot density	203 x 203 dpi (1)
Printing direction	Unidirectional with friction feed
Printing width	M-T522II 60mm (448 dots)
Printing width available	54 mm (432 dots)
Printing speed	High speed mode: up to 250mm/s (2)
Paper feed speed	250mm/s (continuous paper feed)

(1) 'dpi': dots per inch. 1 inch = 25.4mm; 203 dpi = 8 dots per mm

(2) Printing speed could vary depending on the print head temperature as well as the command processing and the data transmission speed. Low transmission speed could cause intermittent printing. It is recommended to transmit data to the printer as quickly as possible.

3.2 - CHARACTER SPECIFICATIONS

Character per line (default)	Font A: 24		Font B: 32
Character spacing (default)	0.5 mm (4 dots)		
Character structure	Font A: 12 x 24 dots (1.5 x 3 mm). (default) Font B: 8 x 16 dots (1 x 2 mm).		
Character size (mm) (1)		**Font A** WxH(mm) – cpl(2)	**Font B** WxH(mm) – cpl
	Standard Double-width Double-height Double width/height:	1.5 x 3 – 24 3 x 3 – 12 1.5 x 6 – 24 3 x 6 – 12	1 x 2 – 32 2 x 2 – 16 1 x 4 – 32 2 x 4 – 16
Number of characters	Alphanumeric characters: 95 Extended Graphics: 128 per page		
Line spacing (default)	1,875mm (15 dots)		

(1) Characters can be scaled up to 64 times bigger than their normal size. (2) 'cpl': characters per line.

3.3 - PAPER SPECIFICATIONS

Paper type	Thermal
Paper specifications	T2CH826 T28I381 T21I06S (all from Ifb Ticket Systems) T28H960 T29J10S
Paper loading	Automatic.
Width	54mm

NOTES:
→ Print quality varies depending on paper types.
→ Use the specified thermal paper, or proper print quality may not be obtained, the life of the print head and autocutter unit may be shortened, or printer troubles may be caused.

3.4 - COMMUNICATIONS INTERFACE

Serial	Serial interface RS232 (baud options: 115200, 38400, 19200, 9600)
USB	USB 2.0 480Mbit/s

3.5 - DIGITAL OUTPUT

Max Drive current	100mA continuous, 200mA peak.
Max supported voltage	45VDC open-drain

3.6 - INTERNAL BUFFER

The standard PTD55 printer has a 32 Kbytes internal memory buffer, whose functionality is dynamically shared by the receiving buffer.

The buffer is being filled at the same time that buffered data is being printed, for that reason high transmission speed is required in order to ensure that data is available for printing at any time. Data transfer of at least 115200 bauds or USB connection increase the printing performance substantially.

3.7 - ELECTRICAL SPECIFICATIONS

Power supply: +24VDC ± 10%
Consumption:

		80mm paper-width model	60mm paper-width model
High speed mode	Mean current	Approx. 9A	Approx. 6.5A
	Peak current	Approx. 14A	Approx. 10A
Standby mode	Mean current	Approx. 0.1A	Approx. 0.1A

3.8 - BARCODE SPECIFICATIONS

Standard barcodes	EAN-13, CODE39, ITF, CODE128
2D barcodes	AZTEC, QR

3.9 - MECHANICAL SPECIFICATIONS

Overall dimensions (W x D x H)	See *APPENDIX – MECHANICAL DIMENSIONS*
Weight	900g approx.

3.10 - RELIABILITY AND ENVIROMENTAL CONDITIONS

Printer service life	15 millions lines
MCBF	37 millions lines
Print head service life (1)	100 Km, one hundred million pulses
Autocutter service life (1)	1 million cuts
Operating temperature	-20 to 70ºC Reliable printing: 5 to 50°C Note that there are some restrictions, depending on the temperature range
Operating humidity	10 to 80% (non-condensing) (Humidity at 34°C or higher is equivalent to the absolute humidity at 34°C, 80%.)
Storage temperature	-35 to 75ºC (without paper, in a dry place)

(1) The service life of the print head and autocutter may become shorter if paper other than specified is used.

NOTES:

1. Reliability statistics assume that the printer repeats printing in which one dot line consists of an average of 112 dots or less, and the average number of printing dots per dot line per element is 30.
2. Life end is defined as the point at which two or more adjacent heat elements are damaged (when two or more adjacent dots are omitted), except when damaged by foreign objects or external causes.
3. The print head life is measured using the specified paper.
4. Using the printer with the density correction factor of the print head energization width set to a value larger than 1 may shorten the life of the print head
5. The ambient temperature should be kept close to room temperature.
   Stop printing when the print head temperature detected by the head thermistor reaches 75°C.
   Resume printing when the temperature drops down to 70°C for lower.

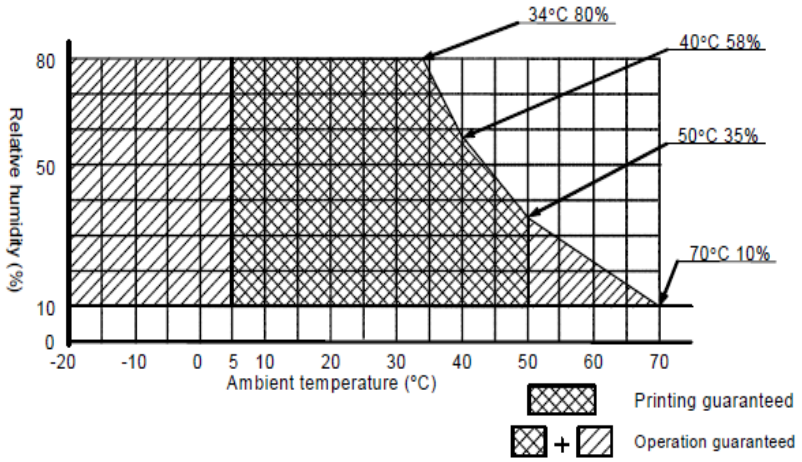


Fig.3.1. Operating temperature and humidity range.

4 - INSTALLATION

4.1 - INSTALLATION CONSIDERATIONS

The PTD55 is designed to be fixed in a bigger case or structure or another kind of appropriate chassis. A wrong installation may cause many issues like paper jam, difficult maintenance of the printer, difficulty in changing the paper, etc. Moreover, a correct installation can prevent the printer from being damaged by external agents, such as weather or vandalism.

The basic points that a correct installation must follow are:

- Smooth exit of the ticket. Prevent problems with static electricity due to the nature of the used materials. Be sure to make a good earth connection.
- Prevent final user's from accessing the printer outlet.
- Allow enough room and accessibility to reach the maintenance procedure points in case it is needed. Take notice all user accessible parts in the printer:
  - Printing Head
  - Paper box location.
  - Connectors.
  - Led and push-button.
- Fix the PTD55 printer to the chassis by using four screws (Ø5mm maximum) as shown on the pictures below. It is recommended to implement some system to allow the printer to be moved backwards when accessing the printing head. Below it is shown how to fix the printer onto a detachable or sliding tray or practice fixing slots on the supporting base, so that the PTD55 can be moved backwards and forwards for easy maintenance.

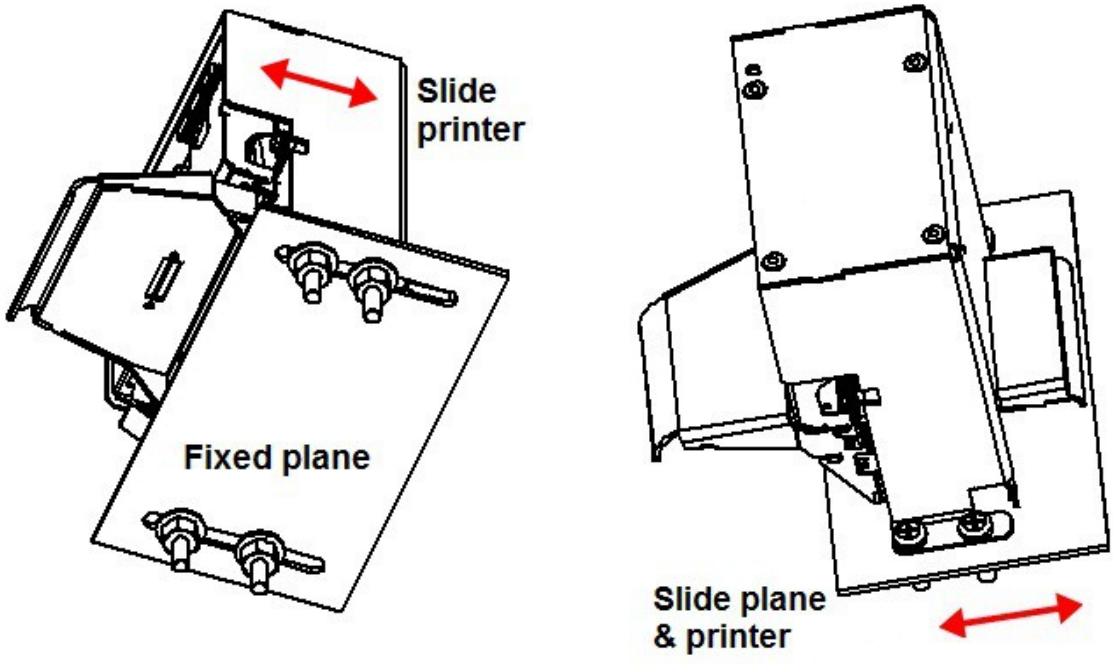


Fig.4.1. Fixing the PTD55 onto a sliding tray or through fixing slots.

- Below it is shown a slot example to be performed on the front side of the kiosk to put the paper nozzle across.

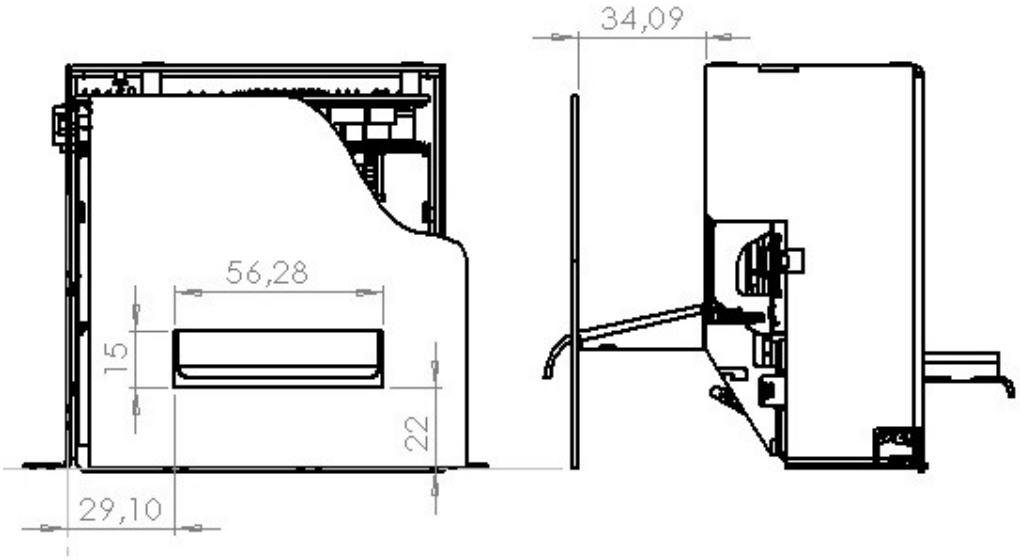


Fig.4.2. Slot example for paper nozzle (in mm).

4.2 - PTD55 CONNECTORS

On the PTD55 could be found the following connectors (see APPENDIX ***HOW TO ORDER***):

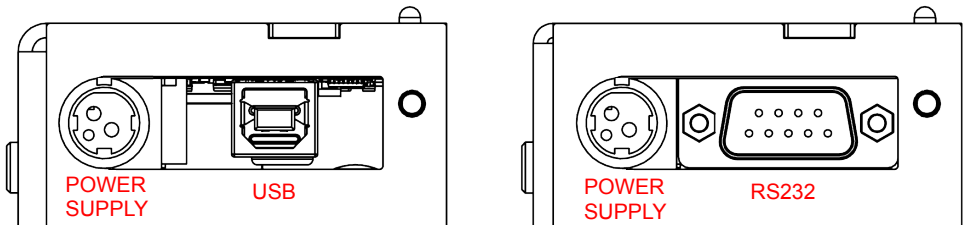


Fig.4.3. USB or SERIAL RS232 interface connectors.

4.2.1 - Power supply connector

The PTD55 is powered by an external power supply by means of 3-pins connector shown below. Verify power supply voltage before connecting the printer.

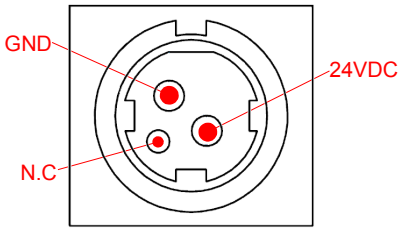


Fig.4.4. Power supply connector J1.

Use a **3-pin DC jack TCS-7960-43-2010 (HOSIDEN)** or equivalent. (See *APPENDIX – HOW TO ORDER-ACCESSORIES*).

NOTES:

(1) The PTD55 requires one power source: VCC (24VDC) for driving the thermal head and motor.
(2) If the number of dots that are energized at the same time is increased, a higher current will flow; therefore, a power supply with an adequate current capability must be used.
(3) When designing printing lines and bit images, take the printing ratio and print duty into consideration. Print quality may be poor if the printing ratio (energizing pulses/dot line) or print duty is high.
(4) Average energizing pulse width is defined as 64 of 192 dots/dot line that are energized.

WARNING: Beware not to invert the polarity of power supply. This may irremediably damage the printer. Ensure that the voltage is the correct one.

IMPORTANT NOTE ABOUT POWER SUPPLY:

The required power supply depends on the content printed on the ticket. A 150W power supply covers all adverse possibilities (printing ratio of 100% black at any temperature). However, if the print ratio is not over 60%, a 60W power supply can be used. In any case, power supply must satisfy the peaks current that mechanism requires, which are determined by the following formula:

Ipeak = [24/657] x number of printing dots

FENIX offers different power supplies as an accessory option (See *APPENDIX – HOW TO ORDER*). These power supplies which have been exhaustively tested are available in open frame or enclosed version.

4.3 - RS-232 SERIAL INTERFACE

4.3.1 - RS-232 Serial interface specifications

- Data transmission type: Serial
- Synchronization: Asynchronous
- Flow control: None, Hardware and Xon/Xoff
- Signal levels (RS232): MARK = -3 to -15 V Logic '1'/OFF
  SPACE = +3 to +15 V Logic '0'/ON
- Speed: 9600, 19200, 38400 and 115200 bauds.
- Data length: 8 bits
- Parity: none, even and odd
- Stop bits: Fixed to 1
- Connector (user side): Male D-SUB9 pin connector

4.3.2 - Change between online and offline mode

The printer is in offline mode:

1) When powering up or resetting the printer, until the printer is ready to receive data.
2) When the door is opened.
3) After pressing the button while the paper advances.
4) When 'out of paper' causes the printer to stop printing.
5) When the power supply has a temporal abnormal voltage change.
6) When an error has occurred.

4.3.3 - Serial RS-232 interface pins assignment

The assignments of the terminals of the RS-232 connector and the functions of its signals are described in the following figure and table:

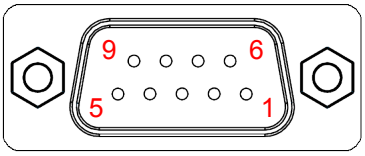


Fig.4.5. Serial RS-232 interface pins.

Pin number	Signal name	Function
5	SGND	Signal ground
2	RXD	Data reception line
3	TXD	Data transmission line
7	RTS	Indicates whether the printer is busy
other	-	Not connected

4.4 - USB INTERFACE

The PTD55 USB interface has the following general features:

- USB specification — USB 2.0 (480Mbits/s full speed)
- Transfer type — Bulk
- Maximum receive/transmit endpoint size — 64 bytes
- Current consumption from USB bus — 2mA max.

User has to use a standard “B” series USB connector.

4.5 - PAPER NEAR-END INPUT CONNECTION

The PTD55 has an optional input which can be used to warn the maintenance operator that the printer is running out of paper although there is still paper to print few tickets. When the remaining paper in the box reaches a level that can be considered "near-end", the system can alert the operator to replace by another box of paper. This can be done by querying the status of the printer (***DLE EOT n*** =4 command).

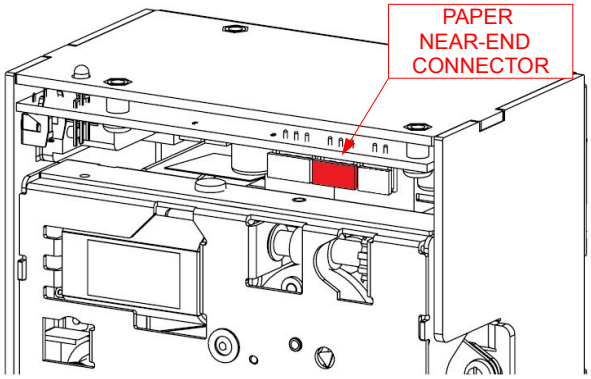


Fig.4.6. Paper near-end input connector.

The developer can connect both sensor type photo-reflective or simple contact.
See available accesories in APPENDIX ***HOW TO ORDER***.

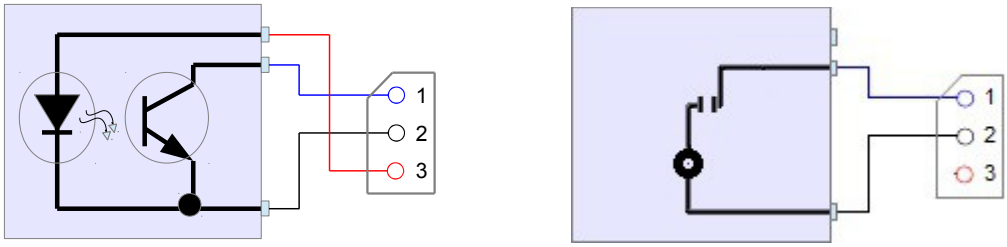


Fig.4.7. Connection of both sensor types: photo-sensor or simple contact.

User side connector type
Housing: QH250-03H (Plastron)
Contact: QH250T-010 (Plastron)

4.6 - DIGITAL OUTPUT CONNECTION

The PTD55 has an optional output which can be used for different purposes such a blink and external warning light when a ticket has not been picked up or the printer is running out of paper, activate a beeper when previous or other events are triggered, etc.

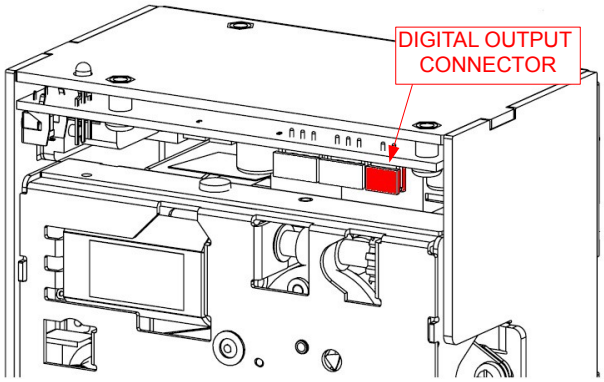
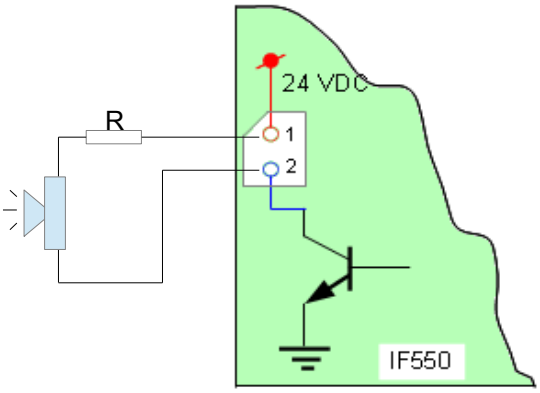


Fig.4.8. Digital output connector.

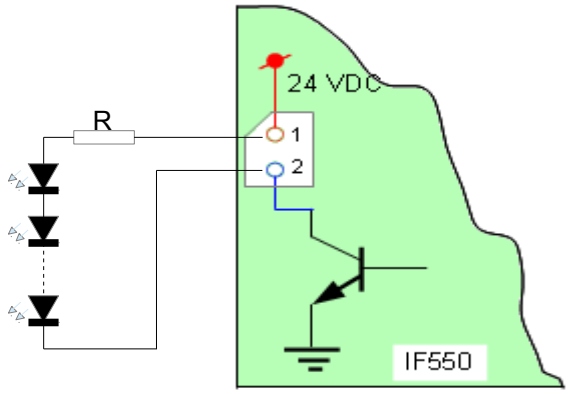
Housing: QH250-02H (Plastron)
Contact: QH250T-010 (Plastron)

The open collector transistor output can be triggered either by any of the error events or can be activated instantaneously using the same command: ***DC3 p m ton toff*** .

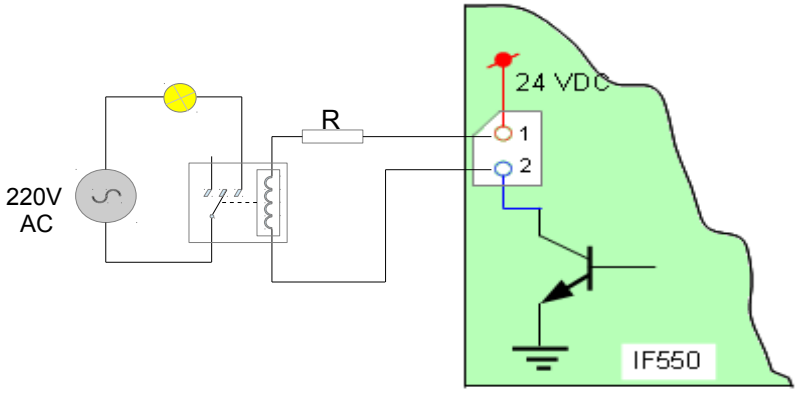
The digital output provides a signal that can blink or stay stable for up to 16 cycles. In case that a blinking output is preferred, the time the output stays on and off are also programmable.



Driving a buzzer.



Driving a led array.



Driving a relay.

Fig.4.9. Digital output examples.

The transistor's output capability is: Vco = 45V , I_C = 100mA. Values beyond this absolute maximum ratings could result in a permanent damage of the device.

5 - BASIC OPERATIONS

The PTD55 contains an internal photo-sensor that acts as optical mark detector. In most cases, the optical mark is a hole (corner cut), whereby the sensor is mechanically located at one end side of the ticket 54mm. The PTD55 uses the space between two consecutive corners (“black mark”) to identify the cut positioning.

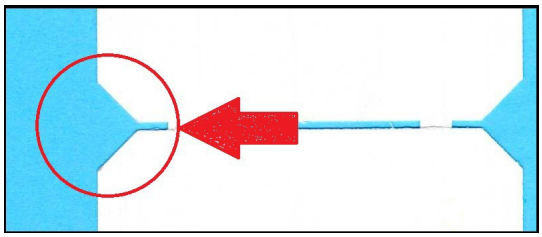


Fig.5.1. Corner to positioning the cutting.

Because there really is not a standard set (only the width and length: 54x85mm), there may be numerous types of corners and joints between tickets:

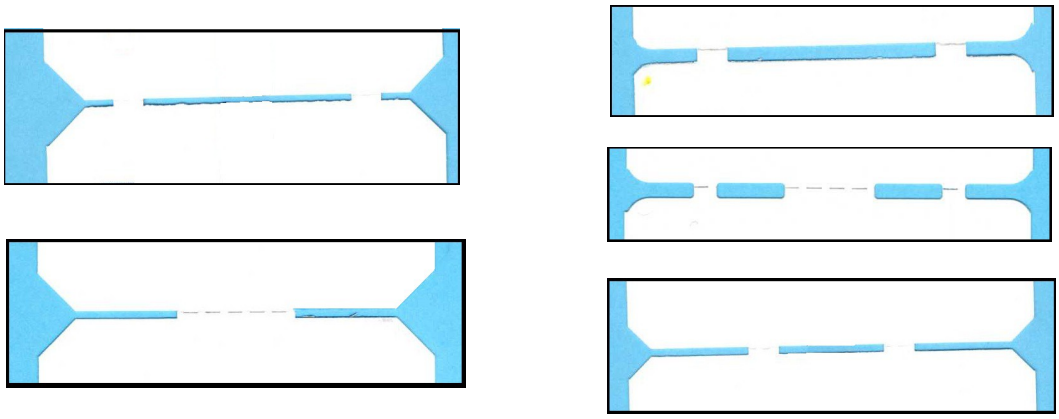


Fig.5.2. Real examples of preformed tickets.

NOTE: FENIX recommended to use tickets with straight cut corners (45º), as large as possible, as in Figure 5.1.

Some types of preformed tickets, like the following image, may not function properly.

Fig.5.3. Preformed ticket **NOT** recommended.

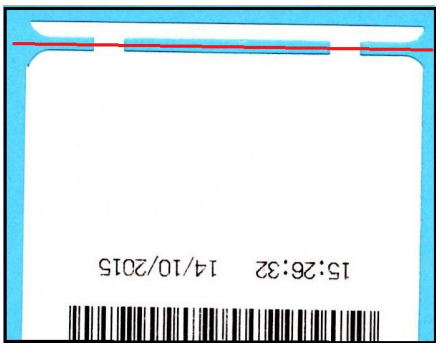
5.1 - ADJUSTING THE CUTTING POSITION BY COMMAND

3.1- To adjust the distance between the black mark and cutting line, the PTD55 provides the standard command ***GS (G nL nH mL mH***, where:

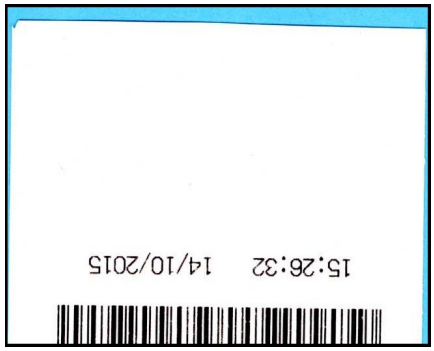
	hexadecimal	
GS (G :	1D 28 47	→ Command head (Always fixed).
nL nH :	**A8 02**	→ Total length of the ticket in dots (**Always fixed**). 85 mm = (85 x 8) dots = 680 dots 680 decimal = 02A8 hexadecimal
mL mH :	1C 00	→ Offset distance in dots between the top of the black mark and the next cutting line of the ticket in the feed direction (**Variable depending on the preformed**).

As it indicated above, the fact that there are different preformed, as well as mechanical tolerances and mounting, causes the ***mLmH*** distance is variable.

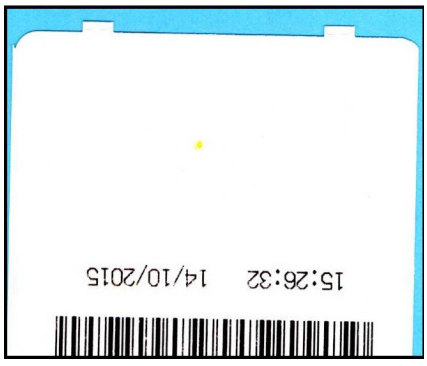
An example of trial-error adjustment is shown:



1.- For the preformed shown in the image, suppose that you start by ***mLmH* = 1C00** value and the cut has exceeded the desired line (in red).



2.- In a second attempt, decreasing the value of ***mLmH* = 0200**, pruduce the opposite result. The cut occurs before the desired line.



3.- Therefore, by selecting an intermediate value ***mLmH* = 0800**, the cut is achieved in the right place.

5.2 - CUTTING POSITION SELF-ADJUSTING

The PTD55 has a self-adjusting, whereby the parameter ***mLmH*** is estimated practically.
To perform the self-adjusting follow these steps:

1º) Turn the printer off and the head lever down.
2º) Keeping the PFEED button pressed, turn the printer on and lift the head lever.

Immediately the PTD55 will issue 4 tickets and will make a cut. From here, each time the PFEED button is pressed a ticket is issued and cut with the parameters calculated.
If the final result of self-adjusting is not satisfactory, the developer must fit the parameter ***mLmH*** by sending the command ***GS (G nL nH mL mH*** *(see above)*.

NOTES:

- After sending the ***GS (G*** command (or by self-adjusting), the parameters are stored in non-volatile memory.
- When pressing the paper feed button the printer will feed paper to the next cutting line according to the parameters set with the ***GS (G*** command.
- When sending any cut command to the printer will do the same as above.
- When sending a ***GS FF*** command to the printer it will feed paper to the next cutting line.
- If the printer detects that paper has been fed for a distance larger that the ticket length without having cut the paper, it will pop a black mark error.
- The first ticket should be discarded since the printer cannot estimate the distance to the next cutting line until it has detect at least one black mark.

5.3 - LOADING PAPER

5.3.1 - Automatic paper loading

1. Make sure the PTD55 is power supplied.
2. Remove any rest of paper if there is any.
3. Make sure that the platen is closed.
4. Make sure the paper end is cut in a straight way.
5. Thread the paper roll with the right orientation as shown in the next figure. The thermal paper has only one printing side (thermal side). If there are doubt about which one is the printing side, just scratch the paper and the thermal side will show up the track on.
6. Once the printer has detected the paper, it will automatically start the paper load sequence which consist of feeding few millimeters of paper at a very low speed.
   Note: running at low speed, the motor will be noisier.

5.3.2 - Manual paper loading

1. Open the printing head by pulling the lever and remove the paper (if there is any). Keep the printing head open.
2. Place the paper roll in the right direction.
3. Put the paper end in the mechanism inlet. Push the paper in until it reaches the mechanism outlet.
4. Close the printer head.

5.4 - OPEN CUTTER UNIT

Sometimes the cutter could get jammed if thicker paper is used, the printer mechanism is not properly closed or other reason. In that case the printer will report a cutter error and may not be possible to open the printer mechanism to fix it. **In order to, manually release the cutter blade the cutter unit has a wheel that, when turned, will move the cutter blade up or downwards depending.**

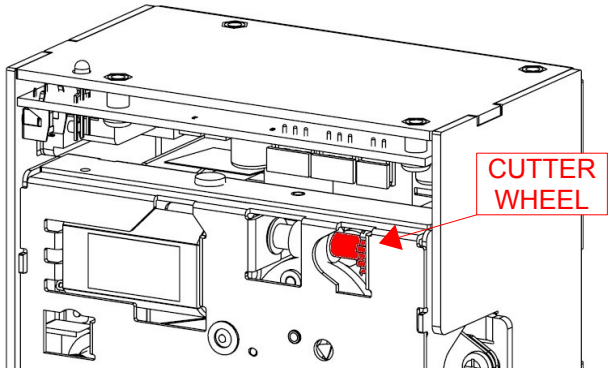


Fig.5.4. Unlocking the cutter blade.

5.5 - BUTTON FUNCTIONS

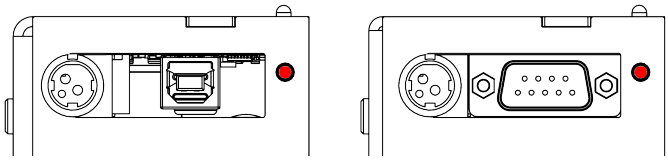


Fig.5.5. Button location in USB and SERIAL interfaces.

The on-board button has the following functions:

- PAPER FEEDING: when the printer is powered on pressing the button will feed the paper. The paper roller will not move under the following conditions:
  - The paper roll end sensor detects a paper end.
  - When the door is open.
  - When another non-recoverable error is present.
- *SELF-TEST MODE*: If pressed on start-up with the door closed, it activates this mode.
- *HEXADECIMAL MODE:* In order to activate it, if the button is still pressed when the full Self-test has been printed, the printer will prompt the user to hold the button to enter this mode. If we do not hold the button in the next 3 seconds (meaning NO), the printer will exit to normal operation.

5.6 - SPECIAL PRINTING MODES

Besides the normal printing mode in which all the received data are printed according to the settings or conditions fixed by the commands, the PTD55 printer allows two special working modes: self-test mode and the hexadecimal mode.

5.6.1 - Self-test mode

The printer provides the self-test mode with two different functionality: showing information of the settings of that particular printer model and verifying the printing.

To enter the self-test mode, the printer must be powered on while keeping pressing the button.

The PTD55 will start printing a report, which allows checking the features of this particular model, like the firmware current version, control functions of the communications protocol, and so on.

Once this printing has been finished, if the button is kept pressed; the printer will start printing continuously and repetitively a character pattern until it finally concludes the self-test by printing '* * completed * *'. This second option of the self-test mode has the goal of validating the printing speed and quality.

At the end of the self-test page there are few lines showing the four different maintenance counts:

1- Times that the printer has been switched on.
2- Time (in half hours) that the printer has been powered on.
3- Meters of paper printed.

FENIX IMVICO

IF550 V1.7.1

MECHANISM: M-T52XII-60mm

SERIAL PORT SETTINGS

Data bits:	8 (fixed)
Stop bits:	1 (fixed)
Baud rate:	115200 bauds
Parity bit:	No parity
Protocol:	Hard.RTS/CTS

USB PORT SETTINGS

USB V2.0	480Mbits/s

DEFAULT TEXT SETTINGS

Set character Table A (12x24 dots)	EUROPE 437
Character Height:	1
Character Width:	1
Character space:	4
Line space:	15
Print density:	Standard
Black mark:	Disabled
Near-end-paper	Disabled
Carry Return:	Disabled

CUTTER SETTINGS

Automatic full & partial

EXTERNAL TABLES:

(No table loaded)

LOGOS LOADED:

(No logo loaded)

* RECORDS *

Serial num.	0FE057057142
On/Off times:	100
Meters:	100
Cuts:	100
Time ON(H:M):	0:10

```
  !"#$%&'()*+,-./01234567
 !"#$%&'()*+,-./012345678
"#$%&'()*+,-./0123456789
#$%&'()*+,-./012345679 :
$%&'()*+,- ./012345679 : ;
%&'()*+,-./0123456779 : ; <
&'()*+,-./0123456779 : ; < -
'()*+,-./0123456779 : ; < - >
()*+,-./0123456779 : ; < - >?
)*+,-./0123456779 :;< - >?@
*+,-./0123456779 :;< - >?@A
+,-./0123456779 :;< - >?@AB
,-./0123456779 :;< - >?@ABC
                .
                .
                .
                .
                .


vwxyz{ | }~   !"#$%&'()*+,
wxyz{ | }~   !"#$%&'()*+,-
xyz{ | }~   !"#$%&'()*+,-.
yz{ | }~   !"#$%&'()*+,-./
z{ | }~   !"#$%&'()*+,-./0
{ | }~   !"#$&'()*+ , - . /01
| }~   !"#$&'()*+ , - . /012
      * * completed * *
```

Fig.5.6. SELF-TEST mode example.

- **FACTORY CONFIGURATION**

Some parameters are preset at the factory. However, the developer can change these settings by FenixDemo program (www.feniximvico.com) or by commands.

Black Mark: Enable → It is essential to enable the black mark sensor and allow proper operation of the PTD55.

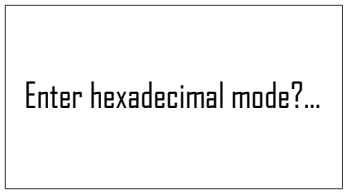
Printing speed : 100 mm/s
Print density: DARK } → It allows a sharper impression, especially in the barcodes and protected thermal paper.

Baud rate: 9600 bauds

5.6.2 - Hexadecimal dump mode

To enter the hexadecimal mode, proceed in the same way as in the continuous self-test, but keeping pressing the button until printing "*Enter in hexadecimal mode?...*".

Then continue with the button pressing for four seconds until the text "*~~~ HEXADECIMA MODE ~~~*" has been printed.



This mode can be very helpful for the application developer during the setup test time, as it allows detecting possible errors (like out of range parameters, non valid command sequences, errors in the communication channel, etc.), comparing what it has theoretically been sent to the printer to what it is really being received.

Turn off the printer to quit the hexadecimal mode.

NOTES:

(1) For any received characters under 20h, the ASCII '.' will not be printed.
(2) During the hexadecimal dump mode, the **DEL EOT** command does not work.
(3) It must be taken into account that if the number of bytes is less than the minimum amount required to print one line (9 bytes), the printer will not print. It is recommended to complete the hexadecimal dump by sending at least 9 bytes (for example 00h).
(4) It is also possible to enter the hexadecimal mode through the **GS (A** command.

```
1B 21 00 1B 33 0A 1B 20 04    .! . .3. . . .
1B 61 01 1B 45 00 1D 42 00    a. . E. .B. .
1B 20 00 1B 56 30 0A 1D 21    -. .V0. . !U
55 54 45 53 54 0A 1D 21 00    UTEST. . !.
1B 61 30 1B 33 01 1B 20 01    . a0.3. . . .
1B 40 00 1B 74 00 1D 4C 00    M. .t. . L. .
00 1B 45 00 1D 42 00 1B 2D    . E. .B . .-.
00 1B 56 30 0A 54 65 78 74    .V0 .Text .
0A 2D 2D 2D 2D 0A 46 45 4E    - - - - . FE
49 58 20 70 72 69 6E 74 65    NIX print
72 20 73 61 6D 70 6C 65 20    er sample
74 69 63 6B 65 74 0A 0A 0A    ticket . . .
0A 0A 0A 1B 6D                . . . . m
```

Fig.5.7. HEXADECIMAL DUMP mode example.

5.7 - ERROR PROCESSING

When an error occurs, the printer visually notifies its type through the LED. This fact allows the final user to have a direct and visual reference of the current printer status.

On the other hand, the printer status and all its possible errors can also be monitored via software through the "***DEL EOT n***" command or activating the automatic status reporting "***GS a n***" command. In this way, the application developer can have more complete information on the printer status, therefore being able to act accordingly.

FENIX recommends that developers include in their applications a flow chart like the one shown below, to have monitored the printer.

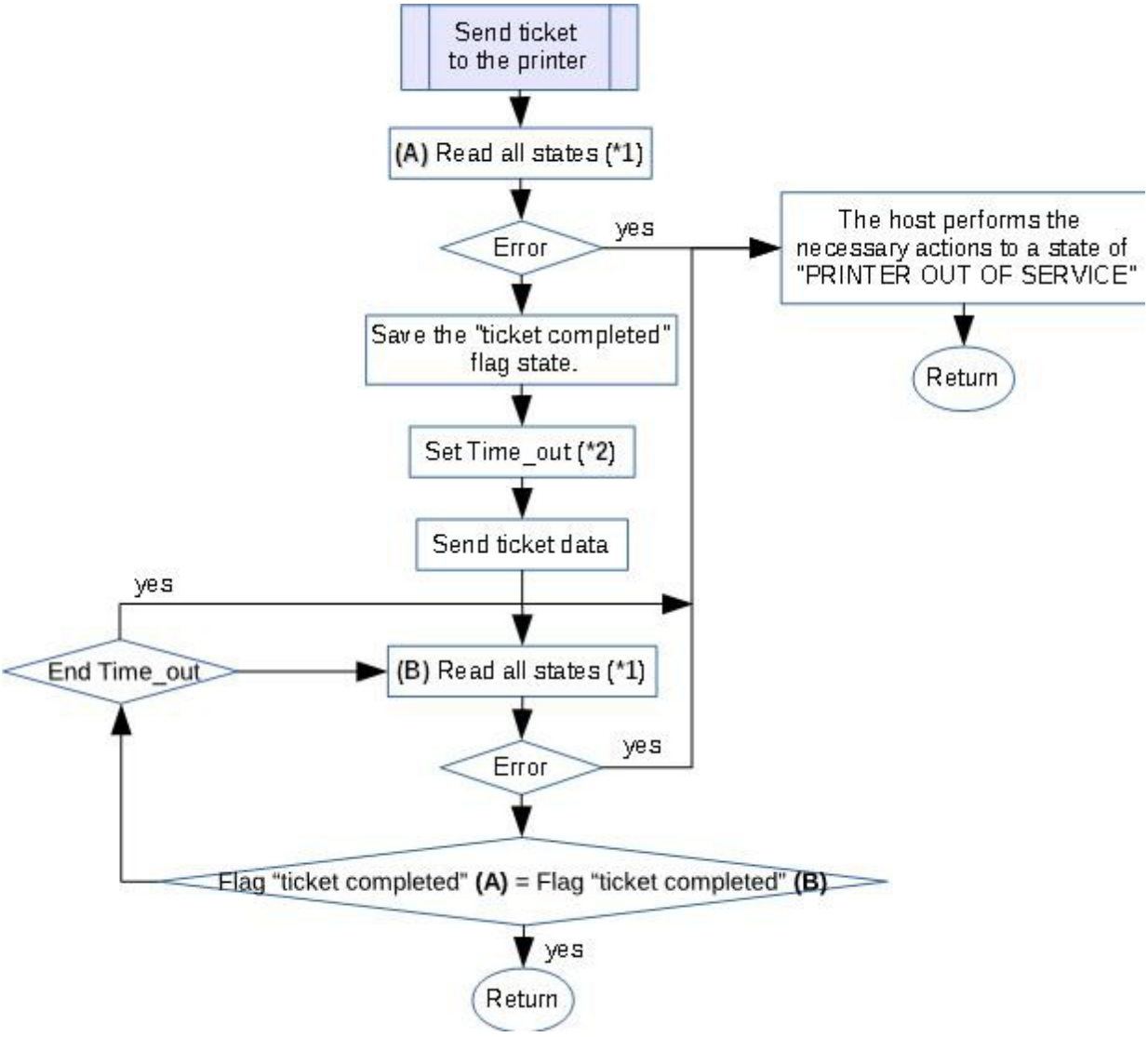


Fig.5.8. Flowchart for error detection.

NOTES

(*1) All DLE EOT n commands sent should have associated a time_out to detect a communication failure or malfunction in the printer. This time_out can be 1s <= T10> = 0.5s.

(*2) The goal of this second time_out is to control that ticket has been printed: transmission, processing, printing and cutting have been implemented and process to that ticket is completed. The value of this time_out depends on the ticket.

5.6.1- Error types

When any of these errors happen, the led blinks with a different blinking timing sequence and color for each of them according to the figure below. If no error happens the led will light **permanently green.**

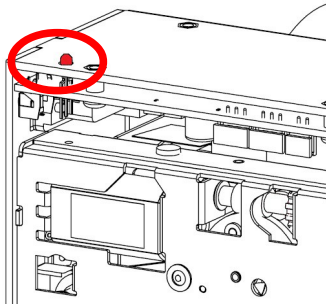


Fig.5.9. Error status indicator LED.

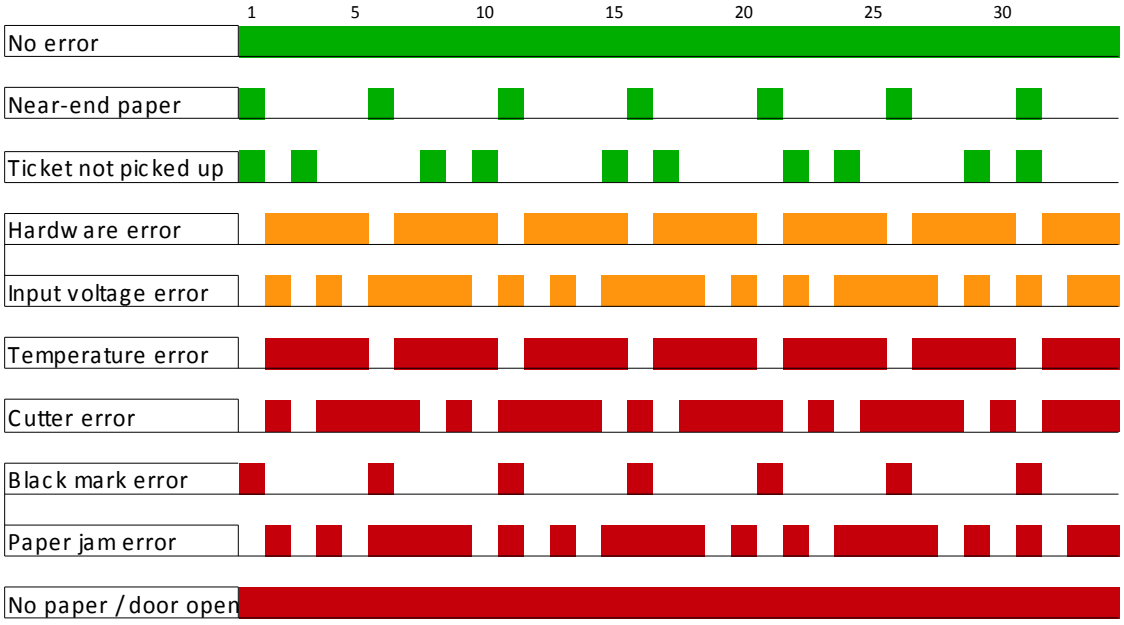


Fig.5.10. LED Blinking sequence. Each time unit corresponds to 0.5 seconds.

More information on these errors can be found below:

NEAR END PAPER WARNING

[Description] At run time, the printer checks periodically, through the near-end paper sensor, if there is enough remaining paper in the paper roll. If the printer in running out of paper the printer will warn visually the user. The print will not stop working. This error is informational only (warning).

[Status flags] This error involves the following flags activation:
***n*=<04>**H Continuous paper sensor status → Paper not present **bit 3**=”1”.

[Recover action] Change the paper roll by a new one.

TICKET NOT PICKED UP WARNING

[Description] Every time a ticket is printed if the correspondent sensor is properly installed in the output paper nozzle, the printer will warn that the ticket has not been picked up. The print will not stop working. This error is informational only (warning).

[Status flags] This error involves the following flags activation:
***n*=<05>**H Paper sensor status → Ticket not pick-up **bit 3**=”0”.

[Recover action] Remove the printed ticket from the output paper nozzle.

HARDWARE ERROR

[Description] At initialization, the printer internally checks its hardware devices (i.e. flash memory). If they do not function properly, an error occurs.

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**=”1”.
***n*=<02>**H Offline status → Error occurred **bit 6**=”1”.

[Recover action] This error cannot be recovered. One of the control board components might be damaged and should be replaced or repaired.

VP VOLTAGE ERROR

[Description] The voltage of the VP voltage converter is out of range.

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**=”1”.
***n*=<02>**H Offline status → Error occurred **bit 6**=”1”.
***n*=<03>**H Error status → Unrecoverable error occurred **bit 5**=”1”.

[Recover action] This is an unrecoverable error. Unplug the power supply from the printer and check if the output voltage of the power supply is within the specified range. Replace it in case it is not working properly.

[Note] When this error occurs, some parts of the printer may be damaged. If this happens, the printer will be unable to recover itself and some of its components are likely to be replaced.

THERMAL HEAD TEMPERATURE ERROR

[Description] Due to very continuous use of the printer or due to environmental conditions, the temperature in the thermal head may reach levels (above 80ºC), which can damage the printer itself. When this situation occurs, an error must be indicated in order to protect the printer from abrasion.

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**=”1”.
***n*=<02>**H Offline status → Error occurred **bit 6**=”1”.
***n*=<03>**H Error status → Auto-recoverable error occurred **bit 6**=”1”.

[Recover action] The printing recovers automatically from this error when the thermal print head temperature drops below 60ºC again.

[Note] This error can happen if the ambient temperature is very high and the printer is working continuously with high-density printing.

CUTTER ERROR

[Description] If the cutter is not working correctly either due to an internal malfunction or a paper jam, this error pattern will be triggered.

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**="1".
***n*=<02>**H Offline status → Error occurred **bit 6**="1".
***n*=<03>**H Error status → Unrecoverable error occurred **bit 5**="1".
→ Cutter error occurred **bit3**="1".

[Recover action] The printer tries to automatically recover from this error at printer initialization (turning the printer on). Remove paper jam and try recovering the cutter blade turning the printer on some times. If the autocutter does not return to its normal position by itself, manually rotate the cutter motor gear to return the cutter to its original position. (See Section - *OPEN CUTTER UNIT.)*

BLACK MARK ERROR

[Description] It will be triggered when, being the black mark option set, the printer has cut a ticket but has not found the next black mark. The possible reasons may be:
a) The paper does not have black mark.
b) The black mark is not in the right position.
c) The black mark does not have the right size or intensity

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**="1".
***n*=<02>**H Offline status → Error occurred **bit 6**="1".
***n*=<03>**H Error status → Unrecoverable error occurred **bit 5**="1".

[Recover action] If paper with no black marks is used replace it by the correct one.
[Note] Two consecutive black marks cannot be separated more than 50cm.

PAPER JAM ERROR

[Description] If an object obstructs the output, the paper may jam in the platen roller.

[Status flags] This error involves the following flags activation:
***n*=<01>**H Printer status → Offline **bit 3**="1".
***n*=<02>**H Offline status → Error occurred **bit 6**="1".
***n*=<03>**H Error status → Unrecoverable error occurred **bit 5**="1".
***n*=<04>**H Continuous paper status → Paper present **bit 2**="1".

[Recover action] Open the platen unit and remove the jammed paper.
Also, depending on the paper type, paper dust may stick to the platen and may cause malfunction of the paper jam detector. In this case, clean the platen roller.

NO PAPER ERROR / PLATEN OPEN

[Description] The out-of-paper sensor detects there is not paper on the printing line. When the door is open the printer will also detect it the same way.

[Status flags] This error involves the following flags activation:
***n*=<*01*>**H Printer status → Offline **bit 3**=”1”.
***n*=<*02*>**H Offline status → Error occurred **bit 6**=”1”.
→ Printing is being stopped **bit5**=”1”.
→ Platen is open **bit2**=”1”.
***n*=<*04*>**H Continuous paper status → Paper not present **bit 6**=”1”.

[Recover action] This error disappears loading a new paper roll in the printer and closing the paper door (see section - *PAPER LOADING).*

[Note] This error stops the printing and it cannot be restarted until it is not recovered. This error is indicated in the parallel port depending on the conditions set by the *ESC c 3* command (see section - *CONTROL COMMANDS*).

6 - CONTROL COMMANDS

Command	Name	Command	Name
LF	Print and line feed	**FS p**	Print NV bit image
CR	Print and carriage return	**FS q**	Define NV bit image
DC3 p	Enable digital output	**FS DC2 ESC**	Serial number query
DLE EOT	Real-time status transmission	**FS GS ESC**	Historic counters transmission
DC3 ESC FS GS	Program printer settings		
ESC SP	Set right-side character spacing		
ESC DC2 GS BEL	Save current settings		
ESC DC3 GS BS	Save default settings		
ESC !	Select print mode(s)		
ESC –	Turn underline mode on/off		
ESC 2	Select default line spacing		
ESC 3	Set line spacing		
ESC @	Initialize printer		
ESC E	Turn emphasized mode on/off		
ESC G	Turn double-strike mode on/off		
ESC I	Turn reverse mode on/off		
ESC J	Print and feed paper		
ESC M	Select character font		
ESC V	Character rotation		
ESC a	Select justification		
ESC c 4	Select paper-near-end sensor to stop printing		
ESC d	Print and feed n lines		
ESC i	Full cut		
ESC j	Back feed paper		
ESC m	Partial cut		
ESC t	Select character code table		
ESC&yc1 c2	Load an external character table		
ESC {	Inverse print mode on/off		
GS FF	Feed marked paper to print starting position		
GS !	Select character size		
GS (A	Execute test print		
GS (C	Erase all logos		
GS (G	Set ticket length & cut offset related to black mark		
GS B	Turn white/black reverse printing mode on/off		
GS E	Set printing speed		
GS H	Select printing position of HRI characters		
GS I n	Firmware version query		
GS L	Set left margin		
GS P	Print a 2D AZTEC format barcode		
GS Q	Print a 2D QR format barcode		
GS q n	Set 2D barcode size		
GS T	Set print position to the beginning of print line		
GS V	Select cut distance and cut paper		
GS a n	Automatic status report		
GS f	Select font for HRI characters		
GS h	Set bar code height		
GS k	Print bar code		
GS v 0	Print raster bit image		
GS w	Set bar code width		

LF

[Name] Print and line feed
[Format] ASCII LF
Hex 0A
Decimal 10
[Description] Prints the data in the print buffer and feeds one line, based on the current line spacing.
[Note] This command sets the print position to the beginning of the line.
[Reference] *ESC 2, ESC 3*.

CR

[Name] Print and carriage return
[Format] ASCII CR
Hex 0D
Decimal 13
[Description] When automatic line feed is enabled, this command operates the same as **LF**; when automatic line feed is disabled, this command is ignored.
[Notes]
- This command is effective only it is programmed with such functionality (see command *DC3 ESC FS GS*)
- Sets the print starting position to the beginning of the line.

[Reference] *LF*

DC3 p *m ton toff*

[Name] Enable digital output

[Format]						
	ASCII	DC3	p	*m*	*ton*	*toff*
	Hex	13	70	*m*	*ton*	*toff*
	Decimal	19	112	*m*	*ton*	*toff*

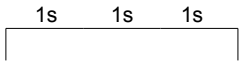
[Range] <00>H ≤ ***m, ton, toff*** ≤ <FF>H
[Description] Enables the digital output which can be triggered either by an error event or intentionally The parameter ***m*** is composed by to nibbles. The high nibble sets the triggering event while the lower one set the number of complete cycles to be output.

m (hex) high nibble	*m (hex) low nibble*	Function
0	0 to F	No event. Output directly by command
1	0 to F	Output triggered by hardware error
2	0 to F	Output triggered by Vp voltage error
3	0 to F	Output triggered by temperature error
4	0 to F	Output triggered by cutter error
5	0 to F	Output triggered by no-paper error
6	0 to F	Output triggered by platen-opened error
7	0 to F	Output triggered by black mark error
8	0 to F	Output triggered by ticket not picked up error
9	0 to F	Output triggered by paper-near-end error
A	0 to F	Output triggered by paper jam error

Setting No-event associated to the digital output causes that the output will be enabled immediately by the command while associating it to an event, such as near-end-paper error, for instance, will cause that each time near-end-paper is detected, the digital output will be enabled. ***ton*** and ***toff*** are the time the digital output is in on or off estate respectively.

The time unit is 0.01seg. The examples below shows how it look like different output signals with the parameters on the right-side.

m = 0x03
ton = 100
toff = 200



m = 0x03
ton = 100
toff = 0

m = 0x07
ton = 50
toff = 50

[Notes] In order to disable an output associated to an event, the same command must be sent specifying the event in the ***m*** parameter but setting ***ton*** and ***toff*** to 0.

DLE EOT *n*

[Name] Real-time status transmission

[Format]

ASCII	DLE	EOT	*n*
Hex	10	04	*n*
Decimal	16	4	*n*

[Range] <01>H ≤ ***n*** ≤ <04>H

[Description] Transmits the selected printer status specified by ***n*** in real-time, according to the following parameters:

n = <01>H: Transmit printer status
n = <02>H: Transmit offline status
n = <03>H: Transmit error status
n = <04>H: Continuous paper sensor status
n = <05>H: Paper sensor status

[Notes]

- The status is transmitted whenever the data sequence <10>H<04>H<***n***> (<01>H ≤ ***n*** ≤ <05>H) is received.
- The printer transmits the current status. Each status item is represented by one byte.
- The printer transmits the status without confirming whether the host computer can receive data (in serial interface).
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receiver buffer is full, or there is an error status with a serial interface model.

n = <01>H: Printer status

Bit	OFF/ON	Function
0	OFF	Not used. Fixed to OFF
1	ON	Not used. Fixed to ON
2	OFF	Not used. Fixed to OFF
3	OFF	**Online**
	ON	**Offline**
4	ON	Not used. Fixed to ON
5	OFF	Does not wait for online error recovery
	ON	Waits for online error recovery
6*	ON/OFF	Ticket completed
7	OFF	Not used. Fixed to OFF

(*) Bit 6 is toggled every time a cut command is executed

n = <02>H: Offline status

Bit	OFF/ON	Function
0	OFF	Not used. Fixed to OFF
1	ON	Not used. Fixed to ON
2	OFF	**Platen is closed (Thermal head is closed)**
	ON	**Platen is open (Thermal head is open)**
3	-	Undefined
4	ON	Not used. Fixed to ON
5	OFF	**No paper-end stop**
	ON	**Printing is being stopped**
6	OFF	**No error**
	ON	**Error occurred**
7	OFF	Not used. Fixed to OFF

n = <03>H: Error status

Bit	OFF/ON	Function
0	OFF	Not used. Fixed to OFF
1	ON	Not used. Fixed to ON
2	OFF	Not used. Fixed to OFF
3	OFF	**No cutter error**
	ON	**Cutter error occurred**
4	ON	Not used. Fixed to ON
5	OFF	**No unrecoverable error**
	ON	**Unrecoverable error occurred**
6*	OFF	**No auto-recoverable error**
	ON	**Auto-recoverable error occurred**
7	OFF	Not used. Fixed to OFF

(*) Bit 6 is ON when printing is stopped due to high print head temperature until the print head temperature drops sufficiently.

n = <04>H: Continuous paper sensor status

Bit	OFF/ON	Function
0	OFF	Not used. Fixed to OFF
1	ON	Not used. Fixed to ON
2	OFF	**Paper jam sensor: Paper not present**
	ON	**Paper jam sensor: Paper present**
3	OFF	**Paper near-end sensor: Paper present**

	ON	**Paper near-end sensor: Paper not present**
4	ON	Not used. Fixed to ON
5	-	Undefined
6	OFF	**Paper real-end sensor: Paper present**
	ON	**Paper real-end sensor: Paper not present**
7	OFF	Not used. Fixed to OFF

n = <05>H: Paper sensor status

Bit	OFF/ON	Function
0	OFF	Not used. Fixed to OFF
1	ON	Not used. Fixed to ON
2	-	Undefined
3	OFF	**Ticket not pick up**
	ON	**Ticket pick up**
4	ON	Not used. Fixed to ON
5	-	Undefined
6	-	Undefined
7	OFF	Not used. Fixed to OFF

DC3 ESC FS GS

[Name] Program printer settings

[Format]

ASCII	DC3	ESC	FS	GS	*n*	*s1...sn*
Hex	13	1B	1C	1D	*n*	*s1...sn*
Decimal 19	*27*	*28*	*29*	*n*	*s1...sn*	

[Range] <00>H ≤ ***n*** ≤ <07>H

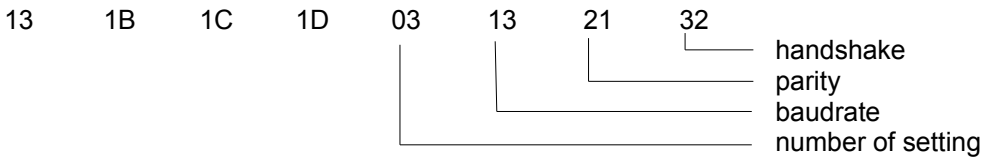
[Description] Changes any of the programmable settings and saves them into non-volatile memory. Any of the settings can be programmed simultaneously with any other settings.
n is the number of printer settings to be changed, and ***s1...sn*** indicates the type and new value of the setting as follows:

[Notes]
- Once the command has been sent the printer will save the new setting into non-volatile memory and print a message indicating if the feature has been saved successfully, or on the contrary if the feature is not supported. It is required, therefore, to have the paper roll installed.
- After this command has been executed, the printer will reset itself automatically in order to activate new settings.
- If communications setting are changed it will be required to change them also in the host controller in order to reestablish communications.
- The number and order of setting changed it is not important.

Feature	s (high nibble)	s (low nibble)	value
1- Paper width	0	1	60mm
		2	80mm
		3	82.5mm

2- Baudrate	1	0	9600 bauds
		1	19200 bauds
		2	38400 bauds
		3	115200 bauds
		4	230400 bauds
3- Parity	2	0	Odd parity
		1	Even parity
		2	No parity
4- Handshaking	3	0	Hardware
		1	Xon/Xoff
		2	No handshake
5- Cutter	4	0	No cutter
		1	Total cut
		2	Partial cut
		3	Total/partial cut
6- Printing density	5	0	Normal
		1	Light
		2	Dark
7- Black Mark	6	0	Enable
		1	Disable
8- Carriage return	7	0	Enable
		1	Disable
9- Near-end paper sensor	8	0	Enable
		1	Disable

[Example] The following command will change baudrate to “115200 bauds”, parity to “Even” and handshake to “No handshake”.



If all the features are supported by the printer, it will print the following message on paper:

Feature saved successfully-> 2
Feature saved successfully-> 3
Feature saved successfully-> 4

The settings can also be changed through our DEMO Fenix application that can be downloaded from our website feniximvico.com.

ESC SP *n*

[Name] Set right-side character spacing

[Format]

ASCII	ESC	SP	*n*
Hex	1B	20	*n*
Decimal	27	32	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H

[Description] Sets the character spacing for the right side of the character to [***n*** *x* 0.125 mm (***n*** *x* 0.0049")].

[Notes]
- The right side character spacing for double-width mode is twice the normal value.
- This command is effective only when sent at the beginning of a line.

[Default] ***n*** = *<04>H*

ESC DC2 GS BEL

[Name] Save current settings into non-volatile memory

[Format]

ASCII	ESC	DC2	GS	BEL
Hex	1B	12	1D	07
Decimal	27	18	29	07

[Description] Saves current configuration into flash memory so when the printer is restarted, current configuration will be loaded.

[Notes] The parameters that will be saved are line spacing, character spacing, character table, character width and height.

ESC DC3 GS BS

[Name] Save default settings into non-volatile memory

[Format]

ASCII	ESC	DC3	GS	BS
Hex	1B	13	1D	08
Decimal	27	19	29	08

[Description] Saves default configuration (factory settings) into flash memory so when the printer is restarted, default configuration will be loaded.

[Notes] The parameters that will be saved are line spacing, character spacing, character table, character width and height.

ESC ! *n*

[Name] Select print mode(s)

[Format]

ASCII	ESC	!	*n*
Hex	1B	21	*n*
Decimal	27	33	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H

[Description] Selects print mode(s) using ***n*** as follows:

Bit	OFF/ON	Hex	Function
0	OFF	00	Character **font A** (12 x 24).
	ON	01	Character **font B** (8 x 16).
1	--	--	Undefined.
2	--	--	Undefined.
3	OFF	00	Emphasized mode not selected.
	ON	08	**Emphasized** mode selected.
4	OFF	00	Double-height mode not selected.
	ON	10	**Double-height** mode selected.
5	OFF	00	Double-width mode not selected.
	ON	20	**Double-width** mode selected.
6	--	--	Undefined.
7	OFF	00	Underline mode not selected.
	ON	80	**Underline** mode selected.

[Notes]
- When both double-height and double-width modes are selected, quadruple-size characters are printed.
- When some characters in a line are double or more height, all the characters in the line are aligned at the baseline.
- *ESC E* can also select the emphasized mode. Be careful when uses both command.
- *ESC M* can also select character font type. However, the setting of the last received command is effective.
- *GS !* can also select character size. However, the setting of the last received command is effective.
- If this command is not received at the beginning of a line, and the character font is to be changed, all previous data in the print buffer is printed and the ticket is placed at the beginning of the next line.

[Default] ***n*** = <00>H
[Reference] *ESC M, ESC E, ESC G, GS !*

ESC - *n*

[Name] Turns on/off underline mode
[Format]

ASCII	ESC	-	*n*
Hex	1B	2D	*n*
Decimal	27	45	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H
[Description] Sets the underline mode. Only the least significant two bits are valid for ***n***:
n = <00>H / <30>H : Underline mode is turned off.
n = <01>H / <31>H: Set the underline thickness to 1-dot.
n = <02>H / <32>H: Set the underline thickness to 2-dots.
[Notes] ESC ! command can turns off the underline mode.
[Default] ***n*** = <00>H
[Reference] *ESC !*

ESC 2

[Name] Select default line spacing
[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Selects 3.75 mm (30 x 0.125 mm) line spacing.
[Reference] *ESC 3*

ESC 3 *n*

[Name] Set line spacing
[Format]

ASCII	ESC	3	*n*
Hex	1B	33	*n*
Decimal	27	51	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H
[Description] Sets the line spacing to [*n* x 0.125 mm].
[Default] ***n*** = <1E>H
[Reference] *ESC 2*

ESC @

[Name] Initialize printer
[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer settings to the settings that were in effect when the power was turned on.
[Notes]
- The data in the receiver buffer is not cleared.
- This command does not involve a hardware reset.

ESC E *n*

[Name]	Turn emphasized mode on/off			
[Format]	ASCII	ESC	E	*n*
	Hex	1B	45	*n*
	Decimal	27	69	*n*
[Range]	<00>H ≤ ***n*** ≤ <FF>H			
[Description]	Turns emphasized mode on or off When the LSB of ***n*** is 0, emphasized mode is turned off. When the LSB of ***n*** is 1, emphasized mode is turned on.			
[Notes]	• Only the least significant bit of ***n*** is enabled. • This command and *ESC !* turns on and off emphasized mode in the same way. Be careful when this command is used with *ESC !*.			
[Default]	***n*** = <00>H			
[Reference]	*ESC !, ESC G*			

ESC G *n*

[Name]	Turn on/off double-strike mode			
[Format]	ASCII	ESC	G	*n*
	Hex	1B	47	*n*
	Decimal	27	71	*n*
[Range]	<00>H ≤ ***n*** ≤ <FF>H			
[Description]	Turns double-strike mode on or off. When the LSB of ***n*** is 0, double-strike (emphasized) mode is turned off. When the LSB of ***n*** is 1, double-strike (emphasized) mode is turned on.			
[Notes]	Printer output is the same in double-strike mode and in emphasized mode.			
[Default]	***n*** = <00>H			
[Reference]	*ESC E*			

ESC I *n*

[Name]	Turn reversed mode on/off			
[Format]	ASCII	ESC	I	*n*
	Hex	1B	49	*n*
	Decimal	27	73	*n*
[Range]	<00>H ≤ ***n*** ≤ <FF>H			
[Description]	Turns reversed mode on or off When the LSB of ***n*** is 0, reversed mode is turned off. When the LSB of ***n*** is 1, reversed mode is turned on.			
[Default]	***n*** = <00>H			
[Notes]	Only the least significant bit of ***n*** is enabled.			

ESC J *n*

[Name]	Print and feed paper			
[Format]	ASCII	ESC	J	*n*
	Hex	1B	4A	*n*
	Decimal	27	74	*n*
[Range]	<00>H ≤ ***n*** ≤ <FF>H			
[Description]	Prints the data in the print buffer and feeds the paper *[**n** x 0.0625 mm (0.0024")]*.			
[Notes]	• After printing is completed, this command sets the print starting position to the beginning of the line. • The paper feed amount set by this command does not affect the values set by *ESC 2* or *ESC 3*.			

ESC M *n*

[Name] Select character font

[Format]

ASCII	ESC	M	*n*
Hex	1B	4D	*n*
Decimal	27	77	*n*

[Range] ***n*** = <00>H, <01>H, <30>H, <31>H

[Description] Selects the character font.

n	Function
<00>H <30>H	Character Font A (12 x 24) selected
<01>H <31>H	Character Font B (8 x 16) selected

[Notes]
- ESC ! can also select character font types. However the setting of the last received command is effective.
- This command must be sent at the beginning of a line. If it is sent in the middle of a line, all previous data in the print buffer is printed and the ticket is placed at the beginning of the next line.

[Reference] *ESC !*

ESC V n

[Name] Character rotation

[Format]

ASCII	ESC	V	*n*
Hex	1B	56	*n*
Decimal	27	86	*n*

[Range] <00>H ≤ ***n*** ≤ <02>H, <30>H ≤ ***n*** ≤ <32>H

[Description] Rotates the characters using the mode specified by ***n***.

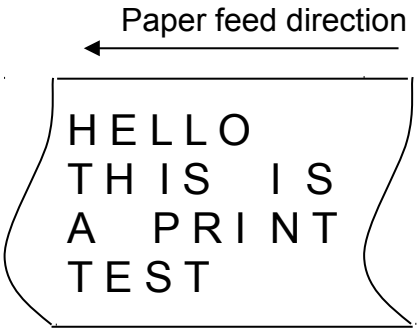
n	Function
<00>H / <30>H	Normal
<01>H / <31>H	Right 90º rotated
<02>H / <32>H	Left 90º rotated

In both left and right 90º rotated modes, the characters lines transmission order changes from the normal mode, because can be printing several lines at once.

Example for right 90º rotation mode:

Characters lines transmission order

1st line: **T A T H** <CR>
2nd line: **E** <SP> **H E** <CR>
. . . . . .
. . . . . .
Last line: <SP> **T S** <SP> <CR>



[Notes]
- The vertical and horizontal character scaling effect to paper feed direction regardless of the character rotation setting.
- It is not allowed both normal and rotated mode in the same character line.
- When any rotated mode is setting, the inverse mode is disabled.
- This command is enabled only when processed at the beginning of a line.

[Default] ***n*** = <30>H

[Reference] *GS !*

ESC a *n*

[Name] Select justification

[Format]

ASCII	ESC	a	*n*
Hex	1B	61	*n*
Decimal	27	97	*n*

[Range] <00>H ≤ ***n*** ≤ <02>H, <30>H ≤ ***n*** ≤ <32>H

[Description] Aligns all the data in one line to the specified position.
n selects the justification as follows:

n	Justification
<00>H / <30>H	Left justification
<01>H / <31>H	Centering
<02>H / <32>H	Right justification

[Notes]
- The command is enabled only when processed at the beginning of the line.
- This command executes justification in the printing area.

[Reference] *ESC !*

[Example]

Left justification

ABC
ABCD
ABCDE

Centering

ABC
ABCD
ABCDE

Right justification

ABC
ABCD
ABCDE

ESC c 4 *n*

[Name] Select paper-near-end sensor to stop printing

[Format]

ASCII	ESC	c	4	*n*
Hex	1B	63	34	*n*
Decimal	27	99	52	*n*

[Range] <00>H ≤ **n** ≤ <FF>H

[Description] Selects whether the paper-near-end sensor stops printing.
When the bit 1 of ***n*** is 0, paper near-end sensor does not stop printing.
When the bit 1 of ***n*** is 1, paper near-end sensor will stop printing.

[Notes] When bit 1 is on, in paper-near-end is detected, the printer goes offline and stop printing.

ESC d *n*

[Name] Print and feed *n* lines

[Format]

ASCII	ESC	d	*n*
Hex	1B	64	*n*
Decimal	27	100	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H

[Description] Prints the data in the print buffer and feeds ***n*** character lines.

[Notes]
- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by *ESC 2* or *ESC 3*.
- The maximum paper feed amount is 1016 mm {40”}. If the paper feed amount (***n*** *x* line spacing) of more than 1016 mm {40”} is specified, the printer feeds the paper only 1016 mm {40”}.
- Every line feed corresponds to the current selected font height (24 dots for Font A and 16 dots for Font B).

[Reference] *ESC 2, ESC 3*.

ESC i

[Name] Full Cut
[Format] ASCII ESC i
Hex 1B 69
Decimal 27 105
[Description] Cuts the paper completely in the current position.
[Notes]
- If this command is sent without cutter connection the printer enters cutter error status.
- The interval between each cutting operation must be two seconds or more.
- When the black mark sensor is set to be effective, the printer feeds paper to (black mark ± [(value which is set by *GS (F*) x 0.125mm]) and cuts it. After cutting, it feeds paper to the position specified by the command *GS (F*. (See section – *BLACK MARK SENSOR*)

[Reference] *GS (F, ESC m, GS V*

ESC j *n*

[Name] Back feed paper
[Format] ASCII ESC j *n*
Hex 1B 6A *n*
Decimal 27 106 *n*
[Range] <00>H ≤ ***n*** ≤ <FF>H
[Description] Back feeds the paper [***n*** x 0.0625 mm (0.0024")].
[Notes]
- This command is only effective when the optical mark sensor is enabled.
- Allows readjust the paper position when the black mark has surpassed the black mark sensor, and it is needed back feed paper to prepare the cutting.

ESC m

[Name] Partial Cut
[Format] ASCII ESC m
Hex 1B 6d
Decimal 27 109
[Description] Cuts the paper partially in the current position.
[Notes]
- If this command is sent without cutter connection, the printer enters cutter error status.
- The interval between each cutting operation must be two seconds or more.
- This command performs the partial cut even when the black mark is enabled, but no action relative to black mark is performed.

[Reference] *ESC i, GS V.*

ESC t *n*

[Name] Selects the character tables
[Format] ASCII ESC t *n*
Hex 1B 74 *n*
Decimal 27 116 *n*
[Range] <00>H ≤ ***n*** ≤ <03>H, <30>H ≤ ***n*** ≤ <33>H
[Description] Selects the character tables between the internal ones or the external ones loaded.

n	**Character table selected**
<00>H / <30>H	**Both internal** tables A and B are selected.
<01>H / <31>H	**External** loaded table A is selected. **Internal** table B is selected.
<02>H / <32>H	**External** loaded table B is selected. **Internal** table A is selected.
<03>H / <33>H	**Both external** loaded tables A and B are selected.

[Default] ***n*** = <30>H
[Reference] *APPENDIX – INTERNAL CHARACTER TABLES*.

ESC & y c1 c2 [table name] [table data]

[Name] Load an external character table

[Format]

ASCII	ESC	&	*y*	c1	c2	[table name]	[table data]
Hex	1B	26	79	c1	c2	[table name]	[table data]
Decimal	27	38	12	c1	c2	[table name]	[table data]

[Range] ***y*** = <00>H to table A (12x24 format); ***y*** = <01>H to table B (8x16 format).
c1= <20>H; ***c2*** = <FF>H
[table name] : 24 Byes (ASCII characters).
Padded with <20>H ("SPACE" character) to get the 24 bytes, if needed.
[table data] : 10752 bytes to table A or 3584 bytes to table B.
20H to FFH → 224 characters
12 bits → 2 bytes; 224 x (2x24) = 10752 bytes.
8 bits → 1 byte ; 224 x (1x16) = 3584 bytes.

[Description] Load an external character table in non-volatile memory.

[Notes]
- The memory space available for external tables only allows to load one table A plus one B.
- Loading a new table (A or B) means losing the previous loaded.
- Through the self-test it can check the tables currently loaded in the printer.

[Reference] *APPENDIX – INTERNAL CHARACTER TABLES*.

ESC { n

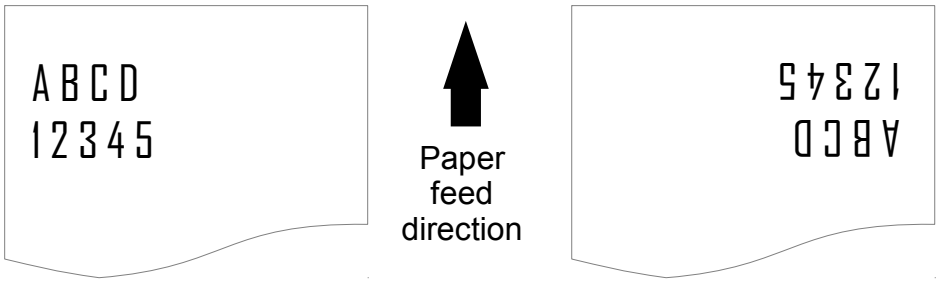
[Name] Inverse printing mode

[Format]

ASCII	ESC	{	*n*
Hex	1B	7B	*n*
Decimal	27	123	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H

[Description] Turns inverse printing mode on/off.
When the LSB of ***n*** is 0, Inverse printing mode off.



Inverse printing mode **OFF** — Inverse printing mode **ON**

When the LSB of ***n*** is 1, Inverse printing mode on.

[Notes]
- Each character is printed upside down (180º rotating) and the sequence of characters is printed backwards as well. The character sent fist is printed al the right margin and subsequent characters are printed from right to left. The characters lines transmission order changes from the normal mode, because the first line is sent to the printer must be the last to appear on the ticket, and the last line is sent must be the first to appear on the ticket.
- When inverse mode is setting, the rotated mode (90º) is disabled.
- This command is enabled only when processed at the beginning of a line.

[Default] ***n*** = <00>H

GS FF

[Name] Feed marked paper to print starting position

[Format]

ASCII	GS	FF	
Hex	1D	0C	
Decimal	29	12	

[Description] Feeds paper until finding the black mark. Then moves the ticket, forward or backward, placing it at the printing position.

[Notes]
- This command is only effective when the optical mark sensor is enabled.
- This command sets the next print position to the beginning of the line.
- The maximum amount of paper feed until find the black mark is 0,5m.

[Reference] *GS (G*

GS ! *n*

[Name] Select character size

[Format]

ASCII	GS	!	*n*
Hex	1D	21	*n*
Decimal	29	33	*n*

[Range] <00>H ≤ ***n*** ≤ <77>H. While ***n*** ≤ <7X>H and ***n*** ≤ <X7>H

[Description] Selects the character height using bits 0 to 3 and selects the character width using bits 4 to 7, as follows:

n (in hex)		Horizontal size (**WIDTH**)							
		x **1**	x **2**	x **3**	x **4**	x **5**	x **6**	x **7**	x **8**
Vertical size (**HEIGHT**)	x **1**	00	10	20	30	40	50	60	70
	x **2**	01	11	21	31	41	51	61	71
	x **3**	02	12	22	32	42	52	62	72
	x **4**	03	13	23	33	43	53	63	73
	x **5**	04	14	24	34	44	54	64	74
	x **6**	05	15	25	35	45	55	65	75
	x **7**	06	16	26	36	46	56	66	76
	x **8**	07	17	27	37	47	57	67	77

[Notes]
- This command is effective for all characters, except for HRI characters.
- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The *ESC !* command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] ***n*** = <00>H

[Reference] *ESC !*

GS (A pL pH n m

[Name] Execute test print

[Format]

ASCII	GS	(	A	*pL*	*pH*	*n*	*m*
Hex	1D	28	41	*pL*	*pH*	*n*	*m*
Decimal	29	40	65	*pL*	*pH*	*n*	*m*

[Range] (***pL*** + (***pH*** x 256)) = 2 (where ***pL*** = <02>H, ***pH*** = <00>H)
<00>H ≤ ***n*** ≤ <02>H, <30>H ≤ ***n*** ≤ <32>H
<01>H ≤ ***n*** ≤ <03>H, <31>H ≤ ***m*** ≤ <33>H

[Description]
- Executes a test print with a specified test pattern on a specified paper.
- ***pL***, ***ph*** specifies (***pL***+(***ph***x256)) for the number of the bytes after ***ph*** (***n*** and ***m***).
- ***n*** *specifies the paper to be tested.*

n	**Paper**
<00> / <30>H <01> / <31>H <02> / <32>H	Paper roll

- **m** specifies a test pattern.

m	**Test pattern**
<01> / <31>H	Hexadecimal dump
<02> / <32>H	Printer status print
<03> / <33>H	Rolling pattern print

[Notes]
- This command has enabled only when processed at the beginning of a line.
- After the test print is finished, the printer resets itself automatically. Therefore, data already defined before this command is executed, such as user-defined buffer and print buffer are cleared; and each setting returns to the default value.
- The printer cuts the paper at the end of the test print.

GS (C pL pH NULL 6 NULL C L R

[Name] Erase all logos

[Format]

ASCII	GS	(	C	*pL*	*pH*	*NULL*	*6*	*NULL*	*C*	*L*	*R*
Hex	1D	28	43	*pL*	*pH*	*00*	*36*	*00*	*43*	*4C*	*52*
Decimal	29	40	67	*pL*	*pH*	*00*	*54*	*00*	*67*	*76*	*82*

[Range] ***pL*** = *<06>H (fixed),* ***pH*** = *<00>H (fixed)*

[Description] Erases all logos stored in non-volatile memory.

[Reference] *FS p, FS q commands.*

GS (G nL nH mL mH

[Name] Set ticket length and cut offset related to black mark

[Format]

ASCII	GS	(	G	*nL*	*nH*	*mL*	*mH*
Hex	1D	28	47	*nL*	*nH*	*mL*	*mH*

[Range] 0 ≤ (***nL*** + ***nH*** x 256) ≤ 65535
0 ≤ (***mL*** + ***mH*** x 256) ≤ 65535
(where <00>H ≤ ***nL***, ***nH***, ***mL*** *and* ***mH*** ≤ <FF>H)

[Description] (***nL*** + ***nH*** x 256) specifies the total ticket length in dots (0.125 mm) and (***mL*** + ***mH*** x 256) sets the offset distance, also in dots, between the top of the black mark and the next cutting line of the ticket in the paper feed direction (see section *BLACK MARK SENSOR*).

[Notes]
- Normally, the first ticket printed after powering up the printer must be discarded as it will have different length that the following ones.
- This command takes into account the distance from the black mark sensor and the cutter blade which is fixed in a particular assembly. For this reason, this distance must be kept if a different implementation is taken.
- This parameters are saved in non-volatile memory.

[Default] (***nL*** + ***nH*** x 256) = 800 (100mm) ; (***mL*** + ***mH*** x 256) = 400 (50mm)

[Reference] *GS FF, GS V, ESC i, ESC m*

GS B *n*

[Name] Turn white/black reverse printing mode

[Format]

ASCII	GS	B	*n*
Hex	1D	42	*n*
Decimal	29	66	*n*

[Range] <00>H ≤ ***n*** ≤ <FF>H

[Description] Turns on or off white/black reverse printing mode.
When the LSB of ***n*** is 0, white/black reverse mode is turned off.
When the LSB of ***n*** is 1, white/black reverse mode is turned on.

[Notes]
- Only the lowest bit of ***n*** is valid.
- When white/black reverse printing mode is on, it also applied to character spacing set by *ESC SP*.
- This command does not affect bit image, user-defined bit image, bar code and HRI characters.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not cancelled) when white/black reverse mode is selected.

[Default] ***n*** = 0

GS E *n*

[Name] Set printing speed.

[Format]

ASCII	GS	E	*n*
Hex	1D	45	*n*

[Range] ***n*** = <00>H, <10>H, <20>H, <30>H

[Description] Selects the printing speed.

n	**Printing speed**
<00>H	Maximum speed
<10>H	Fast Speed
<20>H	Slow Speed
<30>H	Minimum Speed

[Notes] This command can be used when the power supply does not give the current request (less speed→ less average current), or when an accurate outline quality is desirable (less speed → best outline quality).

[Default] ***n*** = <00>H

GS H *n*

[Name] Select print position for HRI characters.

[Format]

ASCII	GS	H	*n*
Hex	1D	48	*n*
Decimal	29	72	*n*

[Range] <00>H ≤ ***n*** ≤ <03>H , <30>H ≤ ***n*** ≤ <33>H

[Description] Selects the print position of HRI characters when printing a bar code.
n selects the print position as follows:

n	**Printing position**
<00>H / <30>H	Not printed
<01>H / <31>H	Above the bar code
<02>H / <32>H	Below the bar code
<03>H / <33>H	Both above and below the code bar

[Notes]
- HRI indicates Human Readable Interpretation
- HRI characters are printed using X-scale = 1, Y-scale = 1 and the font specified by *GS f*.

[Default] ***n*** = <02>H

[Reference] *GS f*, *GS k*

GS I n

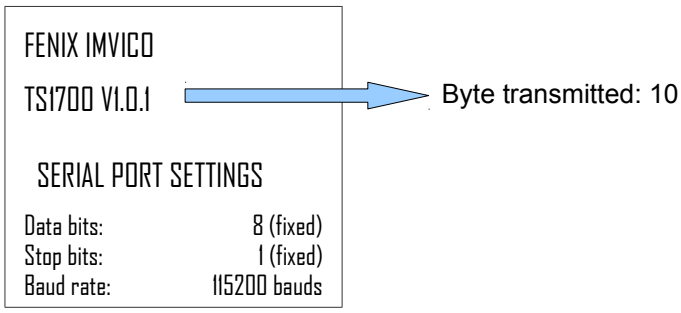
[Name] Firmware version transmission

[Format]

ASCII	GS	I	*n*
Hex	1D	49	*n*
Decimal	29	73	*n*

[Range] ***n*** = <33>H

[Description]
- Transmits the firmware version number.
- Besides of checking the firmware version by printing the self-test page, this command can be used as support for possible automatic firmware upgrade through the host application. Thus, the system could check whether the current version is less than the new provided (contact with FENIX IMVICO or distributor if necessary).
- Returns one byte indicating numerically the current firmware version and revision (1st and 2nd index. 3Rd index indicates the boot firmware version and it is not transmitted by this command
  Example:



GS L *nL nH*

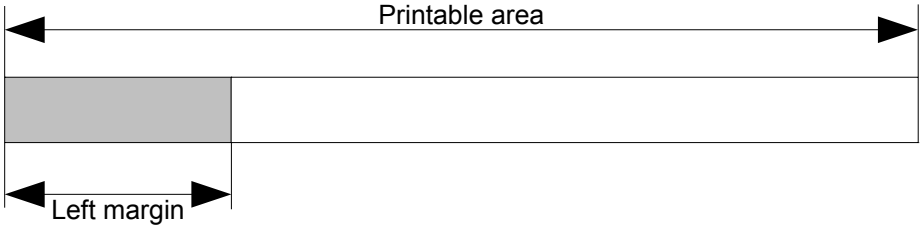
[Name] Set left margin

[Format]

ASCII	GS	L	*nL*	*nH*
Hex	1D	4C	*nL*	*nH*
Decimal	29	76	*nL*	*nH*

[Range] <00>H ≤ ***nL*** ≤ <FF>H, <00>H ≤ ***nH*** ≤ <FF>H

[Description]
- Sets the left margin using nL and nH.
- The left margin is set to [(***nL*** + ***nH*** x 256) x 0.125 mm].



[Notes]
- This command is effective only when processed at the beginning of the line.
- This commands affects text, graphic and bar code printing.

[Default] ***nL*** = ***nH*** = <00>H

GS P *nL nH d1...dn*

[Name] Print a 2D AZTEC format barcode

[Format]

ASCII	GS	P	*nL*	*nH*	*d1..dn*
Hex	1D	50	*nL*	*nH*	*d1..dn*
Decimal	29	80	*nL*	*nH*	*d1..dn*

[Description] Prints a 2D Aztec barcode with n characters where n = ***nL*** + ***nH*** x 256.

[Range] ***nH*** = <00>H, <00>H ≤ ***nL*** ≤ <FF>H.

The maximum number of characters is undetermined as it depends on the available paper size and the type of characters to be printed (numbers, uppercase / lowercase characters, etc.)

[Example] Sending the following command to the printer will result in a 2Daztec barcode as shown below.
<1D 50 2D 00> H <ABC 123456789. This is an AZTEC bar code test>ASCII

GS Q *nL nH d1...dn*

[Name] Print a 2D QR format barcode

[Format]						
	ASCII	GS	Q	*nL*	*nH*	*d1..dn*
	Hex	1D	51	*nL*	*nH*	*d1..dn*
	Decimal	29	81	*nL*	*nH*	*d1..dn*

[Description] Prints a 2D QR barcode with n characters where n = ***nL*** + ***nH*** x 256.**Regardless of the amount of data to encode, always the QR code is printed on 7M format (45x45).**

[Range] ***nH*** = <00>H, <00>H ≤ ***nL*** ≤ <FF>H.
The maximum number of characters is undetermined as it depends on the available paper size and the type of characters to be printed (numbers, uppercase / lowercase characters, etc.)

[Example] Sending the following command to the printer will result in a 2D QR barcode as shown below.
<1D 51 2D 00> H <ABC 123456789. This is an QR bar code test>ASCII

GS q *n*

[Name] Set 2D barcode size

[Format]				
	ASCII	GS	q	*n*
	Hex	1D	71	n
	Decimal	29	113	n

[Range] <04>H ≤ ***n*** ≤ <08>H

[Description]
- Selects the 2D barcode square size.

n	**Printing size (mm)**
<04>H	22,5 x 22,5
<05>H	28,1 x 28,1
<06>H	33,7 x 33,7
<07>H	39,3 x 39,3
<08>H	45 x 45

[Default] ***n*** = <08>H

GS T *n*

[Name] Set print position to the beginning of print line

[Format]

ASCII	GS	T	*n*
Hex	1D	54	n
Decimal	29	84	n

[Range] <00>H ≤ ***nL*** ≤ <01>H

[Description]
- Sets the print position to the beginning of print line.
- ***n*** specifies the data processing in the print buffer.

n	**Printing position**
<00>H	Sets the print position to the beginning of print line after deleting all data in the print buffer.
<01>H	Sets the print position to the beginning of print line after printing all data in the print buffer.

GS V m (1) **GS V m n (2)**

[Name] Select cut distance and cut paper

[Format]

1)	ASCII	GS	V	*m*		
	Hex	1D	56	*m*		
	Decimal	29	86	*m*		
2)	ASCII	GS	V	*m*	*n*	
	Hex	1D	56	*m*	*n*	
	Decimal	29	86	*m*	*n*	

[Range]
1) ***m*** = <01>H
2) ***m*** = <42>H; <00>H ≤ ***n*** ≤ <FF>H

[Description] Selects a distance for cutting paper and executes a full cut. The value of ***m*** sets the distance as follows:

m	**Cutting distance**
<01>H	Cuts the paper in the current position.
<42>H	Feeds paper ("*cutting-D*" + [***n*** x 0,0625mm]), and cuts the paper.

[Notes for **1)** and **2)**]
- This command is effective only when processed at the beginning of a line
- "*Cutting-D*" is the distance between the thermal head (printing position) and the cutter (8.4mm).
- After cutting the ticket, the printer always feeds the paper back to the printing position.
- If this command is sent without cutter connection, the printer enter cutter error status.

[Notes for **1)**]
- The printer cuts paper at the current position, even when the black mark is enabled.

[Notes for **2)**]
- Black mark disabled:
  - When ***n*** = <00>H, the printer feeds paper "*Cutting-D*" and cut it.
  - When ***n*** ≠ <00>H, the printer feeds paper ("*Cutting-D*" + [***n*** x 0.0625 mm]) and cuts it.
- Black mark enabled:
  - When the black mark sensor is set to be effective, the printer feeds paper to (black mark ± [(value which is set by *GS (F*) x 0.0625mm]) and cuts it. After cutting, it feeds paper to the position specified by the command *GS (F*. See point *– Black mark sensor*.

[Default] ***n*** = <00>H

[Reference] GS (F, ESC i, ESC m

GS a n

[Name] Automatic status report

[Format]

ASCII	GS	a	*n*
Hex	1D	61	*n*
Decimal	29	97	*n*

[Range] <00>H ≤ ***n*** ≤ <01>H, <30>H ≤ ***n*** ≤ <31>H

[Description]

- Enable/disable automatic status report.

n	Function
<00>H / <30>H	Disable automatic status report
<01>H / <31>H	Enable automatic status report

- When enabling the automatic status report, the printer remains in this state indefinitely, until it becomes disabling, or until switch the power off.
- After enabling the automatic status report, the printer returns the 5 states mentioned in the command *DLE EOT n*, every 0.5 seconds in the following order:

First status sent..... Last status sent
(*status1*) ..... (*status5*)
status1 = Transmit printer status
status2 = Transmit offline status
status3 = Transmit error status
status4 = Continuous paper sensor status
status5 = Paper sensor status

[Default] ***n*** = <30>H

[Reference] *DEL EOT*

GS f *n*

[Name] Select font for Human Readable Interpretation (HRI) characters

[Format]

ASCII	GS	f	*n*
Hex	1D	66	*n*
Decimal	29	102	*n*

[Range] <00>H ≤ ***n*** ≤ <01>H, <30>H ≤ ***n*** ≤ <31>H

[Description] Selects a font for the HRI characters used when printing a bar code.
n selects a font from the following table:

n	Font
<00>H / <30>H	Font A (12x24)
<01>H / <31>H	Font B (8x16)

[Notes]

- HRI indicates Human Readable Interpretation.
- HRI characters are printed at the position specified by *GS H.*
- HRI characters are always printed at X-Scale = 1 and Y-Scale = 1

[Default] ***n*** = <01>H

[Reference] *GS H, GS k*

GS h *n*

[Name] Select bar code height

[Format]

ASCII	GS	h	*n*
Hex	1D	68	*n*
Decimal	29	104	*n*

[Range] <01>H ≤ ***n*** ≤ <FF>H

[Description] Selects the height of the bar code.
n specifies the number of dots in the vertical direction (***n*** x 0.125mm).

[Default] ***n*** = <A2>H (162 dots←→20,25mm)

[Reference] *GS k*

GS k *m n d1...dn*

[Name] Print bar code

[Format]

ASCII	GS	k	*m*	*n*	*d*1...*dn*	
Hex	1D	6B	*m*	*n*	*d*1...*dn*	
Decimal		29	107	m	*n*	*d1...dn*

[Range] ***m*** = <43>H, ***m*** = <45>H, ***m*** = <46>H or ***m*** = <49>H
(***n*** and ***d*** depend on the bar code system used).

[Description] Selects a bar code system and prints the bar code.
m selects a bar code system as follows:

m	Bar Code System	Num. of characters	Remarks
<43>H	EAN13	***n*** = 12	48 ≤ ***d*** ≤ 57
<45>H	CODE39	1 ≤ ***n*** ≤ 255	48 ≤ ***d*** ≤ 57, 65 ≤ ***d*** ≤ 90, 32, 36, 37, 43, 45, 46, 47
<46>H	ITF	1 ≤ ***n*** ≤ 255 (even)	48 ≤ ***d*** ≤ 57
<49>H	CODE128	2 ≤ ***n*** ≤ 255	0 ≤ ***d*** ≤ 127

[Notes]

- ***n*** indicates the number of bar code data bytes, and the printer processes ***n*** bytes from the next character data as bar code data.
- If ***n*** is outside the specified range, the printer stops command processing and processes the following data as normal data.
- If ***d*** is outside the specified range, the printer only feeds paper and processes the following data as normal data.
- If the horizontal size exceeds printing area, the printer only feeds the paper.
- This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by *ESC 2* or *ESC 3*.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following ***m*** as normal data.
- After printing the bar code, this command sets the print position to the beginning of the line.
- This command is not affected by print modes.
- The number of data for the ITF bar code must be even numbers. When an odd number of bytes of data is input, the printer ignores the last received data.
- When Code128 (***m***=49h) is used:
    1. When using Code128 in this printer, take the following points into account for data transmission:
        → The top of the bar code data string must be the code set selection character (CODE A, CODE B or CODE C), which selects the first code set.
        → Special characters are defined by combining two characters "**{**" and one character. The ASCII character "**{**" is defined by transmitting "**{**" twice consecutively.

Specific character	Transmit data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123,67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B,32	123, 50
FNC3	{3	7B, 33	123,51
FNC4	{4	7B,34	123, 52
"{"	{{	7B, 7B	123, 123

[Example] Example data for printing “Ref. 258710”

In this example, the printer first prints “No.” Using CODE B, then prints the following numbers using CODE C.

GS k 73 11 123 66 82 101 102 46 123 67 25 87 10

3. If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.
4. If the combination of “{“ and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.
5. If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.
6. The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
7. HRI character for the function character is space.
8. HRI characters for the control character (<00>H to <1F>H and <7F>H) are space.

<Others> Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

[Reference] *GS h, GS w*

GS v 0 m *xL xH yL yH d1 ... dk*

[Name] Print raster bit image

[Format]

ASCII	GS	v	0	*m*	*xL xH*	*yL yH*	*d1...dk*
Hex	1D	76	30	*m*	*xL xH*	*yL yH*	*d1...dk*
Decimal	29	118	48	*m*	*xL xH*	*yL yH*	*d1...dk*

[Range]
<00>H ≤ ***m*** ≤ <03>H
<00>H ≤ ***xL*** ≤ <FF>H
<00>H ≤ ***xH*** ≤ <FF>H where 1 ≤ (***xL*** + ***xH*** x 256) ≤ 128
<00>H ≤ ***yL*** ≤ <FF>H
<00>H ≤ ***yH*** ≤ <08>H where 1 ≤ (***yL*** + ***yH*** x 256) ≤ 4095
<00>H ≤ ***d*** ≤ <FF>H
k = (***xL*** + ***xH*** x 256) x (***yL*** + ***yH*** x 256) (***k*** ≠ 0)

[Description]
- Selects raster bit-image mode. The value of ***m*** selects the mode, as follows:

m	Mode	Vertical Dot Density	Vertical Dot Density
<00>H	Normal	203.2 dpi	203.2 dpi
<01>H	Double-width	203.2 dpi	101.6 dpi
<02>H	Double-height	101.6 dpi	203.2 dpi
<03>H	Quadruple	101.6 dpi	101.6 dpi

(dpi: dots per 25.4 mm {1"})

- ***xL***, ***xH***, select the number of data bytes *(**xL**+**xH** x* 256) in the horizontal direction for the bit image.
- ***yL***, ***yH***, select the number of data bits *(**yL**+**yH** x* 256) in the vertical direction for the bit image.

[Notes]
- This command is effective only when there is no data in the print buffer.
- Data outside the printing area is read in and discarded on a byte-by-byte basis.
- The position at which subsequent characters are to be printed for raster bit image is specified by *GS L* (Set left margin).
- ***d*** indicates the bit-image data. Setting a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Example] When ***xL*** + ***xH*** x 256 = 64

GS w *n*

[Name] Set bar code width

[Format]

ASCII	GS	w	*n*	
Hex	1D	77	*n*	
Decimal	29	119	*n*	

[Range] <02>H ≤ ***n*** ≤ <06>H

[Description] Sets the horizontal size of the bar code.
n specifies the bar code width as follows:

n	**Module Width (mm) for Multi-level Bar Code**	**Binary-level Bar Code**	
		Thin element width (mm)	**Thick element width (mm)**
<02>H	0.282	0.282	0.706
<03>H	0.423	0.426	1.129
<04>H	0.564	0.564	1.411
<05>H	0.706	0.706	1.834
<06>H	0.847	0.847	2.258

Multi-level bar codes are JAN 13(EAN13), CODE 128.
Binary-level bar codes are ITF, CODE39.

[Default] ***n*** = <03>H

[Reference] *GS k*

FS p *n m*

[Name] Print NV bit image

[Format]

ASCII	FS	p	*n*	*m*
Hex	1C	70	*n*	*m*
Decimal	28	112	*n*	*m*

[Range] <01>H ≤ ***n*** ≤ number of saved logo
<30>H ≤ ***m*** ≤ <33>H

[Description] Prints a NV bit image ***n*** using the mode specified by ***m***.

m	**Mode**	**Vertical Dot Density**	**Horizontal Dot Density**
<30>H	Normal	203.2 dpi	203.2 dpi
<31>H	Double-width	203.2 dpi	101.6 dpi
<32>H	Double-height	101.6 dpi	203.2 dpi
<33>H	Quadruple	101.6 dpi	101.6 dpi

[dpi: dots per 25.4 mm]

n is the number of the NV bit image (always 1).
m specifies the bit image mode.

[Notes]
- NV bit image means a bit image which is defined in a non-volatile memory by *FS q* and printed by *FS p*.
- This command is not effective when the specified NV bit image has not been defined.
- This command is effective only when there is no data in the print buffer.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, etc.).
- If the printing area width set by *GS L* for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode (***m***=30H) and in double-height mode (***m***=31H), and it means 2 dots in double-width mode (***m***=32H) and in quadruple mode (***m***=33H).
- If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

[Reference] *FS q, GS v 0*

FS q *n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]*

[Name] Define NV bit image

[Format]

ASCII	FS	q	*n*	*[xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]*
Hex	1C	71	*n*	*[xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]*
Decimal	28	113	*n*	*[xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]*

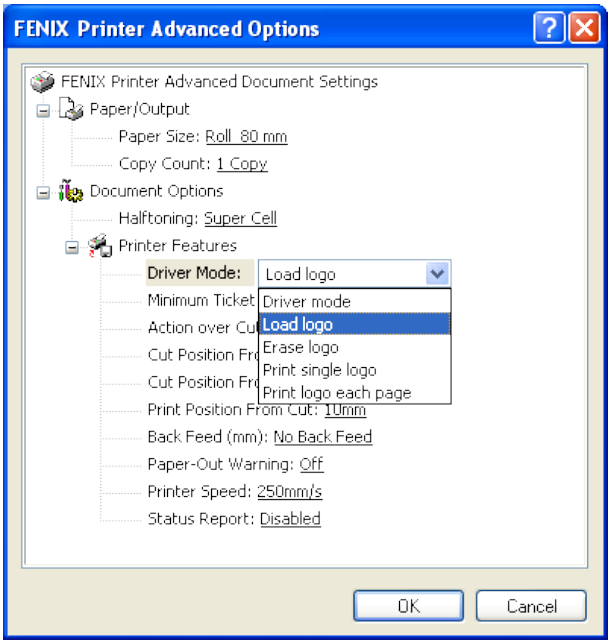
[Range]
n = <01>H
xL ≤ <30>H, ***xH*** = <00>H (when 1≤ (***xL***+ ***xH*** × <FF>H) ≤ <30>H)
<00>H ≤ ***yL*** ≤ <FF>H, <00>H ≤ ***yH*** ≤ <01>H (when 1≤ (***yL***+ ***yH*** × <FF>H) ≤ 288)
<00>H ≤ ***d*** ≤ <FF>H, ***k*** = (***xL***+ ***xH*** × 256) × (***yL***+ ***yH*** × 256) × 8
Total available data area = 16380 bytes (16KB-4Bytes)

[Description]
Define the NV bit image specified by ***n*** .
n specifies the NV bit image number (always 1).
xL, ***xH*** specifies (***xL***+ ***xH*** × 256) × 8 dots in the horizontal direction for the NV bits image you are defining.
yL, ***yH*** specifies (***yL***+ ***yH*** × 256) × 8 dots dots in the vertical direction for the NV bit image you are defining.

[Notes]
- From the beginning of the processing of this command till the finish, mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the button, etc.) cannot be performed.
- NV bit image means a bit image which is defined in a non-volatile memory by *FS q* and printed by *FS p*.
- This command is effective only when processed at the beginning of the line.
- This command is effective when 7 bytes <FS~*yH*> is processed as a normal value.
- When the amount of data exceeds the capacity left in the range defined by ***xL***, ***xH***, ***yL***, ***yH***, the printer processes ***xL***, ***xH***, ***yL***, ***yH*** out of the defined range.
- The ***d*** indicates the definition data. In data (*d*) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
- The definition area in this printer is a maximum of 16KBytes-4Bytes.
- Once a NV bit image is defined, it is not erased by performing *ESC* @, reset or power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the *FS p* command.
- **Once the logo has been loaded, it is printed; then, a number is assigned to it. This number is used for printing as a parameter *n* in the command *FS P n m*.**

[Reference] *FS p*

IMPORTANT NOTE: FENIX provides a powerful utility to the Windows driver, that makes logo load extremely easy and useful. Taking advantage of high features in drawing and image handle software like Word, Paint, Photoshop, etc. the user can load a logo, selecting in “Device operation” (PTD55 Windows driver) the correct option.



We suggest adjusting the logo selecting “Driver mode” option until get the size, the layout and the arrangement desired. Afterwards, the user just have to reprint with the option “Load Logo” selected, and the logo will be stored same way that last printing.

FS DC2 ESC

[Name] Serial number transmission

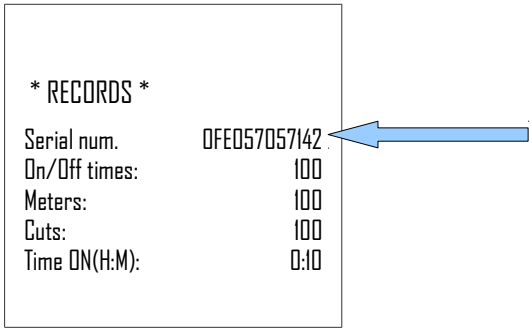
[Format]

ASCII	FS	DC2	ESC
Hex	1C	12	1B
Decimal	28	18	27

[Description] Transmits the interface exclusive serial number. This number consists of 12 hexadecimal digits (6 bytes). Transmission order is from least to most significant byte. Example: Serial number = 12D4AC78F38E

First byte sent.....Last byte sent
8E ..... F3 78 AC D4 .....12 (Hex)

[Notes]
- The interface exclusive serial number can be used to assure absolute traceability because no two parts are alike.
- The serial number can also be verified by printing the self-test:



FS GS ESC *n*

[Name] Historic counters transmission

[Format]

ASCII	FS	GS	ESC	*n*
Hex	1C	1D	1B	*n*
Decimal	28	29	27	*n*

n	**Type of counter**	**Description**	**Bytes returned**
<31>H	On/off times	Number of times the printer has been turned on	2
<32>H	Time On	Number of seconds the printer has been working	4
<33>H	Meters	Number of meters the printer has printed	2
<34>H	Cuts	Number of cuts performed	2

[Range] <31>H ≤ ***n*** ≤ <34>H

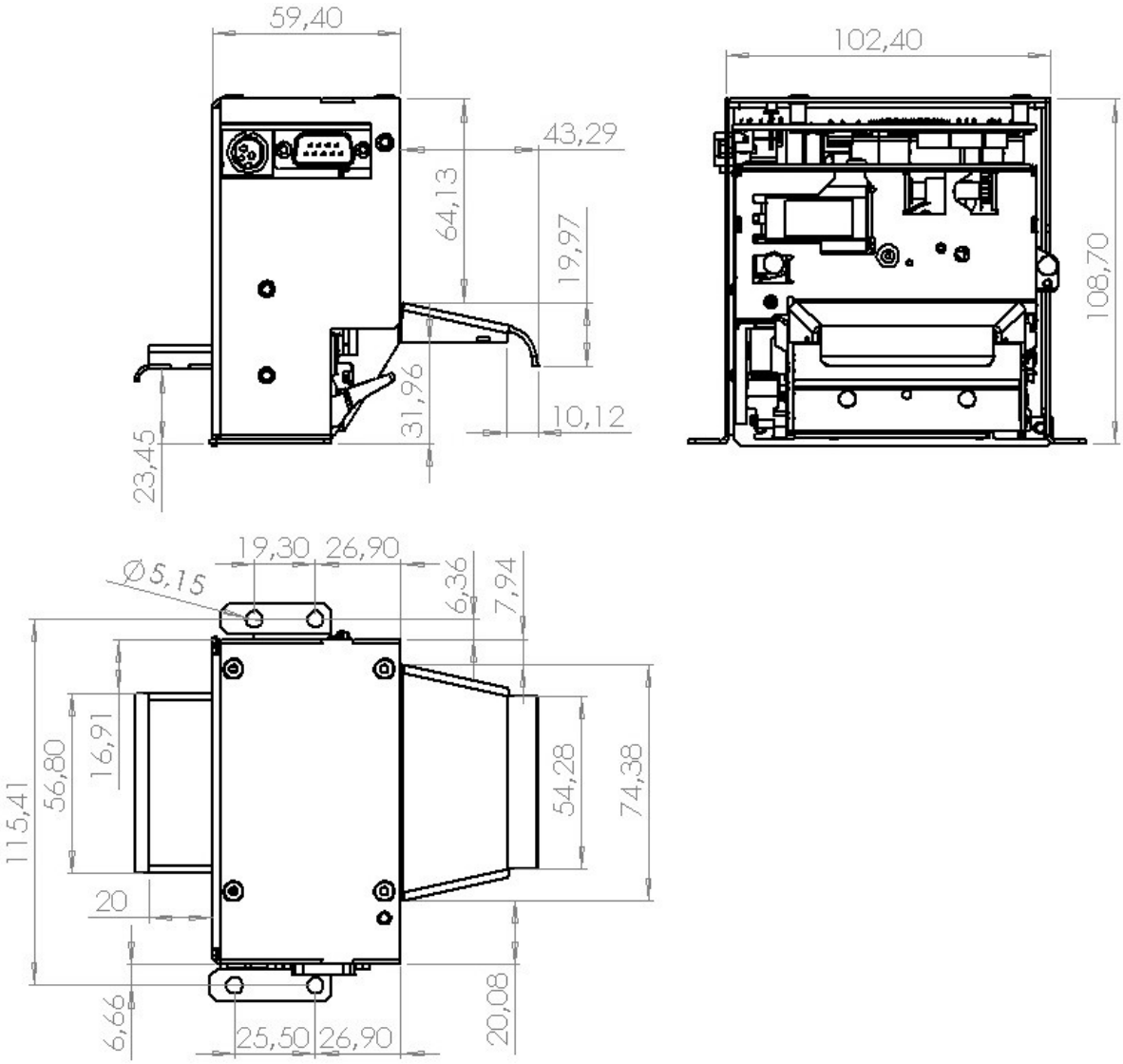
[Description] Each of the counters consist of a 16 bits register except the “Time On” counter that has 32 bits. The transmission of each counter starts by the LSB and ends at MSB. In order to obtain any counter it is required to send the correspondent command and immediately read 2 or 4 bytes *(b0, b1, b2, b3)* depending on the counter required. Finally in order to obtain the absolute value of the counter proceed as follow:

$$\text{counter value} = 16777216 \times \boldsymbol{b3} + 65536 \times \boldsymbol{b2} + 256 \times \boldsymbol{b1} + \boldsymbol{b0}$$

[Notes]
- The “Meters” counter only registers complete meters, any portion of a meter that has been printed before turning the printer off will be discard.
- For the “Cuts” counter to increment the full cut or partial cut command has to be sent to the printer.
- The maximum number of each counter is 65536 counts except “Time On” counter that records up to 2^{32} seconds → 1193046 hours → 49710 days uninterruptedly.

APPENDIX A – MECHANICAL DIMENSIONS

NOTE: All dimensions in millimeters



APPENDIX B – HOW TO ORDER

PTD55- X - XX

Communication thermal printer
S: serial RS232 thermal printer.
U: USB 2.0 thermal printer.

Others
nil : (Standard type).
XX : custom-made type (under agreement only).

AVAILABLE ACCESORIES (optional)

Part Number	Description
FAPOS-1	Power supply close frame (jack-2 Terminals)
FA-40TK	Power supply open frame
Cable PS2	Power supply cable 2m with jack TCS-7960-43-2010 assembled
RS232-5	Serial cable 1,5m
Fotocélula	Paper near-end and Ticket picked-up photo-sensors

APPENDIX C – INTERNAL CHARACTER TABLES. LOADING EXTERNAL CHARACTER TABLES.

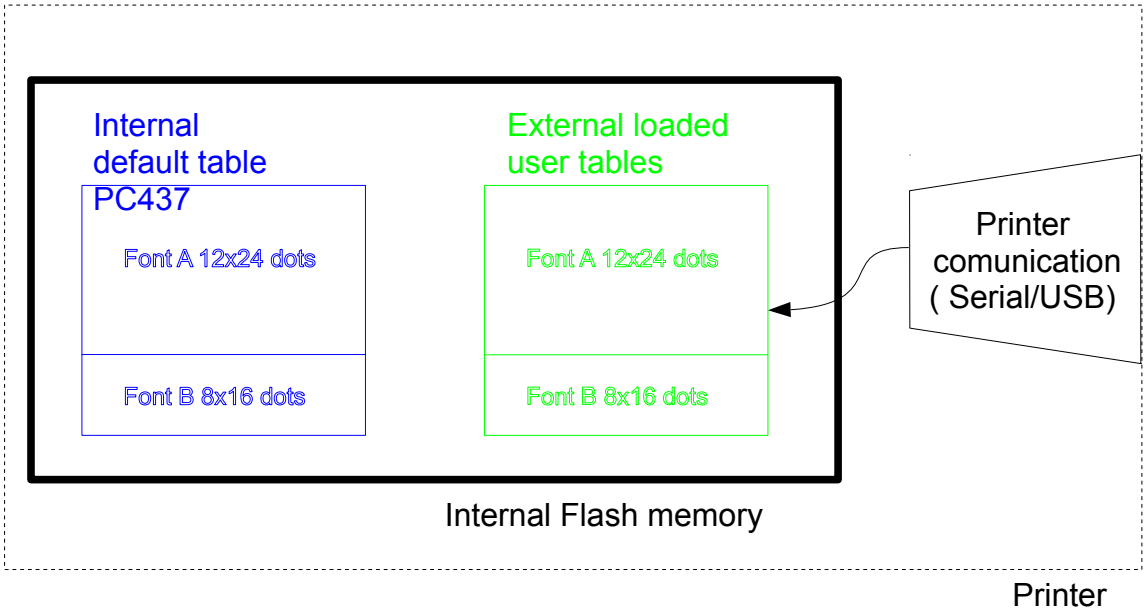
FENIX printers have by default the **PC437** table in 2 different formats:

Table A : format 12 x 24 dots
Table B : format 8 x 16 dots

PC437: USA, Standard Europe (International Character Set: USA).

HEX	BIN	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX	BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 00	DLE 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	XON 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▒ 177	┴ 193	┬ 209	ß 225	± 241
2	0010	02	18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▒ 178	├ 194	╥ 210	Γ 226	≥ 242
3	0011	XOFF 03	19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	┤ 195	└ 211	π 227	≤ 243
4	0100	EOT 04	20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	ENQ 05	21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	€ 213	σ 229	⌡ 245
6	0110	06	22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	├ 198	╒ 214	µ 230	÷ 246
7	0111	07	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	┼ 215	τ 231	≈ 247
8	1000	CAN 08	24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╕ 184	└ 200	╪ 216	Φ 232	° 248
9	1001	HT 09	25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╣ 185	┌ 201	┘ 217	θ 233	• 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	┴ 202	┌ 218	Ω 234	· 250
B	1011	11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╗ 187	┬ 203	▐ 219	δ 235	√ 251
C	1100	FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	¦ 124	î 140	£ 156	¼ 172	╝ 188	├ 204	▄ 220	∞ 236	n 252
D	1101	CR 13	GS 29	— 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	╜ 189	─ 205	▌ 221	ø 237	² 253
E	1110	14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	╛ 190	┼ 206	▐ 222	∈ 238	■ 254
F	1111	15	31	/ 47	? 63	O 79	_ 95	o 111	SP 127	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

In addition, they have provided an internal flash memory area to load 2 other external user tables (one per format), through the communication interface of the printer (serial / USB). The internal memory structure is:



FEATURES AND PERFORMANCES

→ The active current format (font A / B) is set by "***ESC M n***" command, where

n	Function
<00>H <30>H	Character Font A (12 x 24) selected
<01>H <31>H	Character Font B (8 x 16) selected

→ The active current table is set by the "***ESC t n***" command, where

n	Character table selected
<00>H /<30>H	Both internal table A and table B are selected.
<01>H /<31>H	External loaded table A is selected. Internal table B is selected.
<02>H /<32>H	External loaded table B is selected. Internal table A is selected.
<03>H /<33>H	Both external loaded table A and table B are selected.

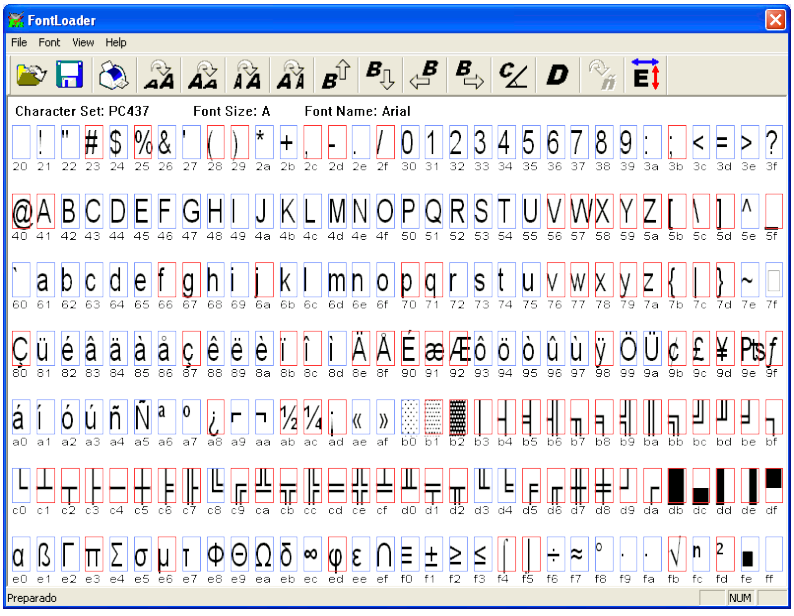
→ Loading any external user table does not involve replacing the corresponding internal PC437.
→ Loading a new external character table involves replacing the previous one.
→ It is not allowed to change the character table or the format on the same character line.
→ All optional standard attributes are also applicable to external user tables: scaling, rotation, underline, reverse...

LOADING EXTERNAL TABLES

→ In order to load an external table of characters the user has 3 options:

1) Through the external table load command "***ESC & c1 c2 [name] [date]***", the user can load their own character table.

2) Use our ***FontLoader*** application through which you can load Windows TrueType fonts. TrueType format conversion to internal 12x24 or 8x16 printer format may require adaptation of some characters with the options available within the application.

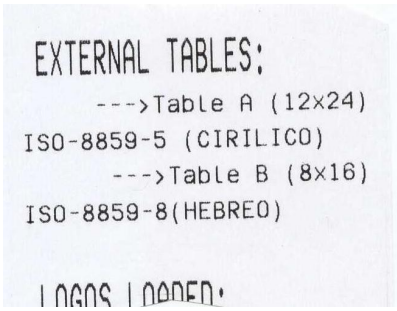


3) Using our ***DemoFenix*** application, whereby **ISO-8859** sources can be loaded directly in format 12x24 or 8x16 dots (under agreement only: consult sales department).

NOTE: ***DemoFenix*** and ***FontLoader*** applications, as well as the user manual of the respective printer, can be downloaded from our website www.feniximvico.com.

EXAMPLE:

Using the option **3)**, the character tables **ISO-8859-5 (Cyrillic) in 12x24** format and **ISO-8859-8 (Hebrew) in 8x16** format have been loaded, which can be verified by the self-test.



Sending the following file, creates the ticket shown.

Change to internal table A

Change to external table A

Change to external table A

Text in **internal table A** → PC437 standar Europe

This is a test in English

Text in **external table A** → ISO-8859-5 CYRILLIC

Это тест для печати на русском языке

Text in **external table B** → ISO-8859-8 HEBREW

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