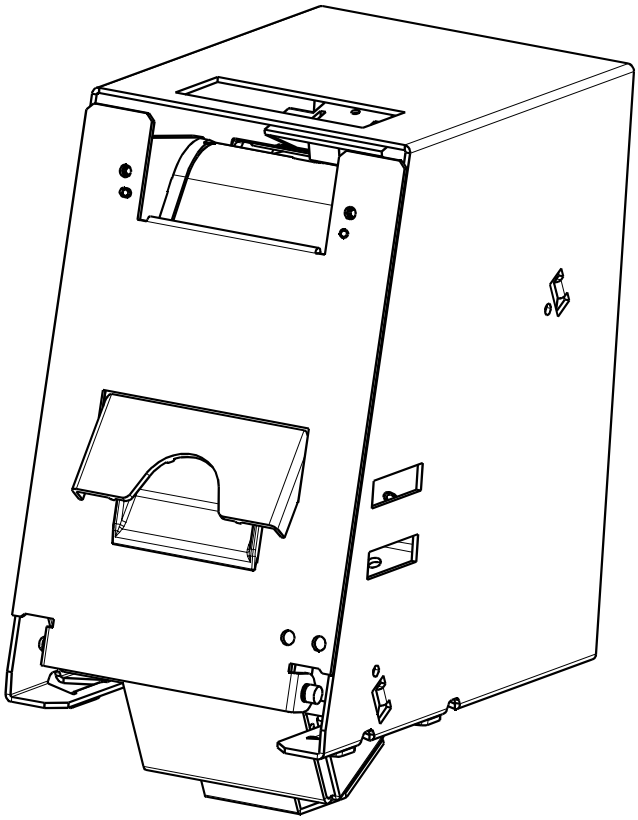
TURNKEY PRINTING SOLUTIONS

TPSK PRINTER SERIES

24 & 12V

USER MANUAL

Reference 3107118 Issue A
November 2004



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EVOLUTIONS

Date	Issue	Modifications
05/02	Preliminary	
10/02	Z	Creation
11/04	A	Addition of TPSK 12V version

INTRODUCTION

The TPSK series is part of the "Compact Kiosk" printer family. The wide range of temperature and humidity operating conditions allows integration to a system used indoors or outdoors.

The TPSK printers are turnkey units that contain the printing head, the interface controller board, the paper roll bucket and a cutter / paper chute assembly to protect and display the printed ticket.

The main characteristics are:
Easy connection (12V or 24V power supply and serial interface)
Easy paper loading with a font printer door, a bucket to set the roll of paper, and a “Clamshell” system to easily set the paper under the print head.
Different ways to install the printer, including a possible sliding system for sealing.
Compact size in which 4 inch paper rolls can be used.
Many information sent back to the host system such as : jam, low paper, out of paper …
A specific cutter patented by Axiohm with which the ticket can be cut when the user pulls it.
This protects the ticket in a chute while it is printed. The chute on the existing units is optimized for a 4 inch ticket length.
Please contact Axiohm for other needs.

Based on the TPSK mechanical & hardware design, the firmware can be customized to fit many applications. If needed, please contact Axiohm Representatives.

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CONTENTS

1 TECHNICAL SPECIFICATIONS

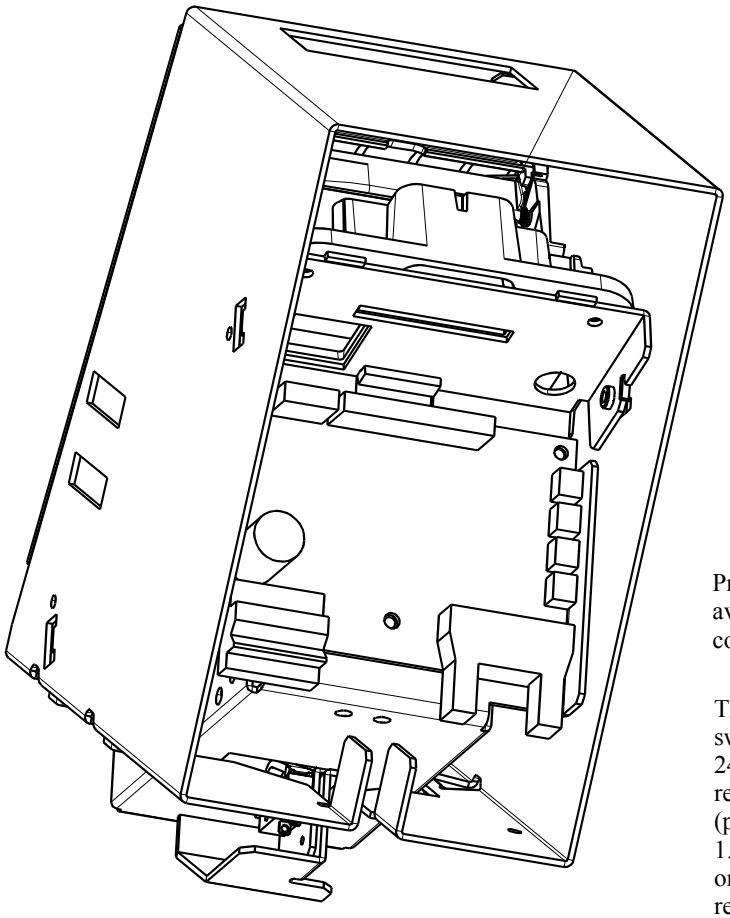
The following table gathers the main characteristics of the printing unit.

ITEM	12 V Version	24 V Version	UNIT
Printing method	Static thermal dot line printing	Static thermal dot line printing	--
Paper loading	Clamshell	Clamshell	--
Number of resistor dots	384	384	dots
Resolution	8 horizontal & vertical	8 horizontal & vertical	Dots/mm
Printing width	48	48	mm
Printing speed	100	100	mm/s
Paper width	+0.1 60 -1	+0.1 60 -1	mm
Head T° detection	By Thermistor	By Thermistor	--
Paper feed pitch	1 0.125	1 0.125	Motor steps mm
Paper empty detection	Opto-sensor	Opto-sensor	--
Operating voltage range Vcc (logic)	4.75-5.25	4.75-5.25	V DC
Vch (dot)	10.8-13.2 (max 16 stand by)	20 - 26.4 (max. 30 stand by)	V DC
Current Consumption : Vch	28	22.6	mA per resistor dot "on" at nominal voltage
Current Consumption: Vcc (all dots "on")	42	42	mA
Nominal dot energy (High sensitivity paper)	0.34*1	0.32*1	mJ
Current Consumption: Stepping motor	300	300	mA per activated phase at nominal voltage
Current Consumption: interface board Stand-by 24V	80	40	mA
Peak print head current (all dots "on " at nominal value)	8.8	8.8	A
Over all dimensions: Width Depth Height	102 160,5 204,37	102 160,5 204,37	mm mm mm
Weight	1700	1700	g
Storage range*2	-20 to +85	-20 to +85	°C
Relative humidity*2	20 to 90 no condensing	20 to 90 no condensing	%
Operating range*2	0 to +60	0 to +60	°C
Electrical lifetime *3	10^8	10^8	pulses on OE signal
Mechanical lifetime *3	50	50	km

*1 In standard conditions: Nominal Volts, 25°C, for a print head with a resistance of 1000 Ω (24V) or 480 Ω (12V), at 800 PPS
*2 Contact Axiohm for recommendations if extended conditions are required
*3 Per AXIOHM conditions

2 INTERFACE BOARD FEATURES

2.1 Overview:



Printer connections are available directly on the board connectors at the printer rear.

The power supply must be a switch power supply AC/DC - 24V 3A mean, with minimum recommended power 75VA (possible peak of 8.8A during 1.5ms).
or 12V 6A mean with minimum recommended power 75VA (possible peak of 8.8A during 1.5ms).

The communication is serial RS232 with possible baud rate setting as described below.

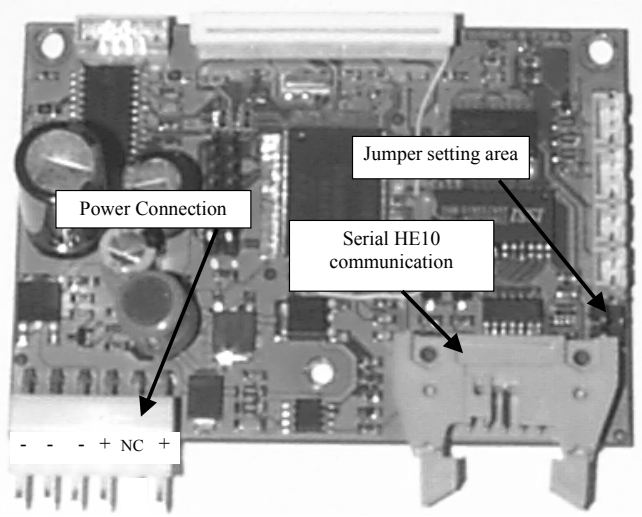
2.2 Baud Rate setting for RS232 communication

If there is no jumper the RS 232 communication baud rate is 230 k Baud.
With one (or two) jumper, the baud rate can be set as described in the following table:

0 0	**0 1**	**1 0**	**1 1**
○–○ ○–○	○–○ ○ ○	○ ○ ○–○	○ ○ ○ ○
38,4 K baud	**115,2 K baud**	**192 K baud**	**230.4 K baud**

The default baud rate setting for TPSK is 115.2 K baud.

***Important Not*e**: in addition to the jumper setting, the printer must be reset to change the baud rate. The baud rate can then be checked on the self-test ticket.



***Note*: All connectors should be SELV types in order to safety standards** (Safety extra low voltage).

Mis en forme : Police :Times New Roman, 11 pt

2.3 Serial HE10 Pinout

Pinout Description

HE10 (board side)	
1 :	GND
2 :	TXD
3 :	GND
4 :	RXD
5 :	NC
6 :	NC
7 :	DSR
8 :	GND
9 :	DTR

Recommended Connector

HE10: 10 points with locating and holding clips
3M ref.: 89110-0103HA or equivalent

2.4 Available Control Codes

2.4.1 Control codes

Control codes are non-printable characters or sequences of characters, which subsequently affect the printer operation.
For your convenience, these are grouped below in logical sets of commands.

2.4.2 Command description format

Throughout the following descriptions of the commands you will note that two special codes are used to cause the printer to interpret the following byte or byte as part of a command and not as printable characters. These codes are:

Code	**Name**	**Dec. Value**	**Hex. value**	
ESC	Escape	27	1B	General “escape sequence” commands
GS	Graphic Sequence	29	1D	Often used for special graphic commands

The general command syntax is as follows:

Command

(Description)	Name and description of the command.
(Format)	The code sequence to be sent to the printer. <nn> is used to represent the decimal value used for the command. <nnH> is used to represent the hexadecimal value used for the command. <ndata> is the raw data used to create graphics and bar codes.
(Comment)	Additional information such as range allowed for the numbers or default values.

2.4.3 Print Features

CODE

<0AH>	<13H> Line Feed
<0BH><nline>	Vertical tabulation: Feeds <nline> lines and goes to the beginning of the line
<0DH>	Carriage return
<0EH>	Double Width: Selects double width character printing
<0FH>	End of double width
<10H>	General Font Reset. ***Note:*** It is recommended not to use 10H to return the Command Codes to the default values, but instead use the corresponding control codes. Example: 0FH to cancel 0EH
<12H>	Double Height : Selects double height character printing
<13H>	End of double height
<15H>	Underlining : Selects underlined character printing
<18H>	End of underlined printing
<1EH>	Inverse Video : Selects white on black printing ***Note:*** *inverse video printing may have an impact on the printing speed due to the high number of dots lighted per printing line.*
<1FH>	End of Inverse Video

2.4.4 Motor Brake Command

ESC'm'	Puts the motor into brake mode, with a 30 seconds time out.

Print Directions

GS'I'<n>	Normal printing if n=0, 180 deg. printing if n=1.

Bar Code

GS'A'<n1><n2>	Selects X position of bar code (X>0): X=n1*256+n2 (Default value = 64)
GS'w' <mag>	Select horizontal size (magnification) of bar code mag = number of dots per thin bar. The ratio between thin and thick bar is 2. If you need a different ratio use GS'W' code
GS'W' <nthin> <nthick>	Select the width of the thin and thick bar in dots. (Default value = 1,3)
GS'h'<nheight>	Selects height of bar code. Height = height in dot lines. 1<N<255. (Default value = 120)
GS't'<under>	Writes text under the bar code if under = 1 (available only with vertical bar code). Do not write if under = 0 (default value). *Note:* Command not available in code 128
GS'O'<or>	Bar code orientation Or = 0 : Vertical bar code (default value). Or = 1 : Side printed bar code (ladder bar code)
GS'k'<type><X><data 1>...<dataN>	Selects a bar code generator and prints the bar code. X = number of characters to be printed.

type	bar code
2	EAN 13
3	EAN 8
4	Code 39
6	Codabar / Monarch
7	Interleaved 2/5
8	Code 128 A
9	Code 128 B
10	Code 128 C

Bar codes can be printed vertically or horizontally, by using the GS'O'<or> command. It is impossible to print any information at the end of the bars when you are in ladder bar code mode.

The printer will therefore only print the character sent when using a barcode with check-sum.

This information is sent by the user and not calculated by the printer.

2.4.5 Graphic Printing

<11H> <data1>,....,<data 24>

Graphic mode. The following 1 to 24 data byte are 8*2 bit bitmap data to be printed on a line.

To be compatible with the last printer, each byte generates 16 dots: every dot will be repeated.

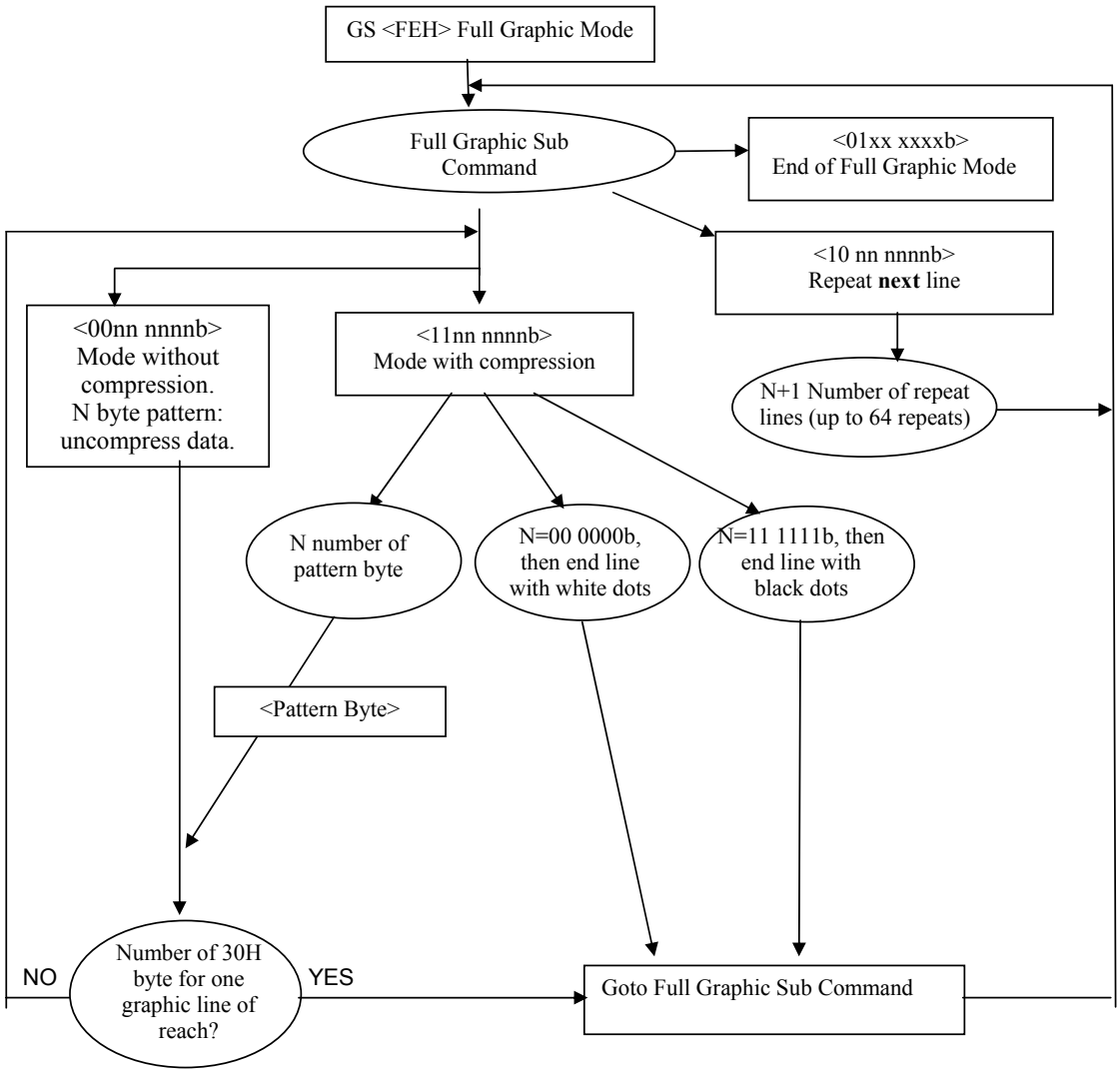
GS <FEH> <XXH…XXH>

Enters in Full Graphic Mode

2.4.6 Full Graphic Printing Commands

GS <FEH>	Enters in full graphic mode
<00nn nnnnb><List of graphic byte>	Mode without compression (bit 6=0 and bit7=0), and number of uncompress byte (bit 0 to 5: N). Follow the list of uncompress byte.
<11nn nnnnb><Pattern Byte>	Mode with compression (bit 6=1 and bit 7=1), and number (bit 0 to 5: N) of <Pattern Byte>. If N equals 00 0000b then end the line with white dots. If N equals 11 1111b, then end the line with black dots.
<10nn nnnnb>	Repeat Mode: This mode gives how many times (bit 0 to 5: N times) the next line will be repeated. 63 repeat can be managed. After this command a line has to be described.
<01xx xxxxb>	End of Full Graphic Mode (bit 0 to bit 5 not used).

(See diagram on next page)



Algorithm for the GS FE control code

EXAMPLES

1) To print a 5 Grey Line:
GS <FEH><84H><1111 0000b><AAH><40H>

2) To print a half black line:
GS<FEH><1101 1000><00H><1111 1111><40H>

3) To Print 100 white lines:
GS<FEH><1011 1111b><C0H><10100101b><C0H><40H>

3) To print a line without compression, and the same line with compression:

Aim: print 3* **<16H>, 2*<18H>**, 2* **<10H>** and end line with white dots.

We have twelve byte, if uncompress method:
GS<FEH><0000 0111b><16H><16H><16H><18H><18H><10H><10H><1100 0000b><40H>

We have 10 sequences of <pattern byte>
GS<FEH><1100 0011b><16H><1100 0010b><18H><1100 0011b><10H><1100 0000b><40H>

Notes:

1) If you have less than 2 similar byte for a graphic line, prefer the non-compression subcommand.

2) You can mix compression and non-compression command for the same line.

Ex: To print 3 similar byte and black remaining line
GS<FEH><0000 0011b><16H><16H><16H><<1100 0000b><40H>

3) During all compression mode, you must not send ESC'v' OR ESC'P' OR ESC'W' sequence. These control codes are real time interpreted, consequently these codes will be manage during a graphic compression data flow.

2.4.7 Paper Management

ESC'J' <n ¼mm>	Forward feeds n ¼mm (0<n<255) and goes to the beginning of the line.
ESC'I'	Resets buffer, executed in real time.

2.4.8 Additional and Optional Features

ESC'R'<nset> Selects the character set of the country. (default value: 0)

nset	Country
0	USA
1	France
2	Germany
3	UK
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

		Ascii Character Code										
		23h	24h	40h	5Bh	5Ch	5Dh	5Eh	60h	7Bh	7Ch	7Dh	7Eh
n	Country	35	36	64	91	92	93	94	96	123	124	125	126
0	U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
1	France	#	$	à	•	ç	§	^	`	é	ù	è	¨
2	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	UK.	£	$	@	[	\	]	^	`	{	|	}	~
4	Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	•	\	é	^	ù	à	ò	è	ì
7	Spain	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	`	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

2.4.9 Character sets

00 0	10 16	20 SP 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 176	C0 192	D0 208	E0 224	F0 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 i 161	B1 177	C1 193	D1 209	E1 225	F1 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 178	C2 194	D2 210	E2 226	F2 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 179	C3 195	D3 211	E3 227	F3 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 180	C4 196	D4 212	E4 228	F4 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 181	C5 197	D5 213	E5 229	F5 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 102	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 182	C6 198	D6 214	E6 230	F6 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 183	C7 199	D7 215	E7 231	F7 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 184	C8 200	D8 216	E8 232	F8 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ⌐ 169	B9 185	C9 201	D9 217	E9 233	F9 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA 186	CA 202	DA 218	EA 234	FA 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ¢ 155	AB ½ 171	BB 187	CB 203	DB 219	EB 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC 188	CC 204	DC 220	EC 236	FC ν 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D ¥ 157	AD ¡ 173	BD 189	CD 205	DD 221	ED 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E Pt 158	AE « 174	BE 190	CE 206	DE 222	EE 238	FE ϖ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F ≅ 127	8F Å 143	9F *f* 159	AF » 175	BF 191	CF 207	DF 223	EF 239	FF BLANK 255

Note : From E0 to FA, the characters are issued from the font ISO 8859-8 (*Hebrew Font*)

2.4.10 Status

The printer status is returned after the reception of the ESC sequence.

Two different types of status are available:

- **With Esc'v', the printer returns the status of each sensor.**
- **With Esc'P' it returns the interpretation of this status (for instance if the cutter sensor is positioned low at the end of the cut it will respond "jam").**

ESC'P' Ask for printer status (MSB bit 7, LSB bit 0)

Bit Number	Description	HIGH = 1	LOW = 0
0	Fatal Jam	jam or flap open: printing disabled	OK
1	Print head Resolution	always high	
2	End of Paper	no paper, printing disabled	OK
3	Low Paper	switch lever open low paper	switch lever closed paper OK
4	Test Button		always low
5	Power Failure	power failure / reset	OK
6	Buffer	empty	contains data
7	**Printer Clamshell door**	**Door open**	**Door closed**

ESC'v' Ask for sensors and buttons status (MSB bit 7, LSB bit 0)

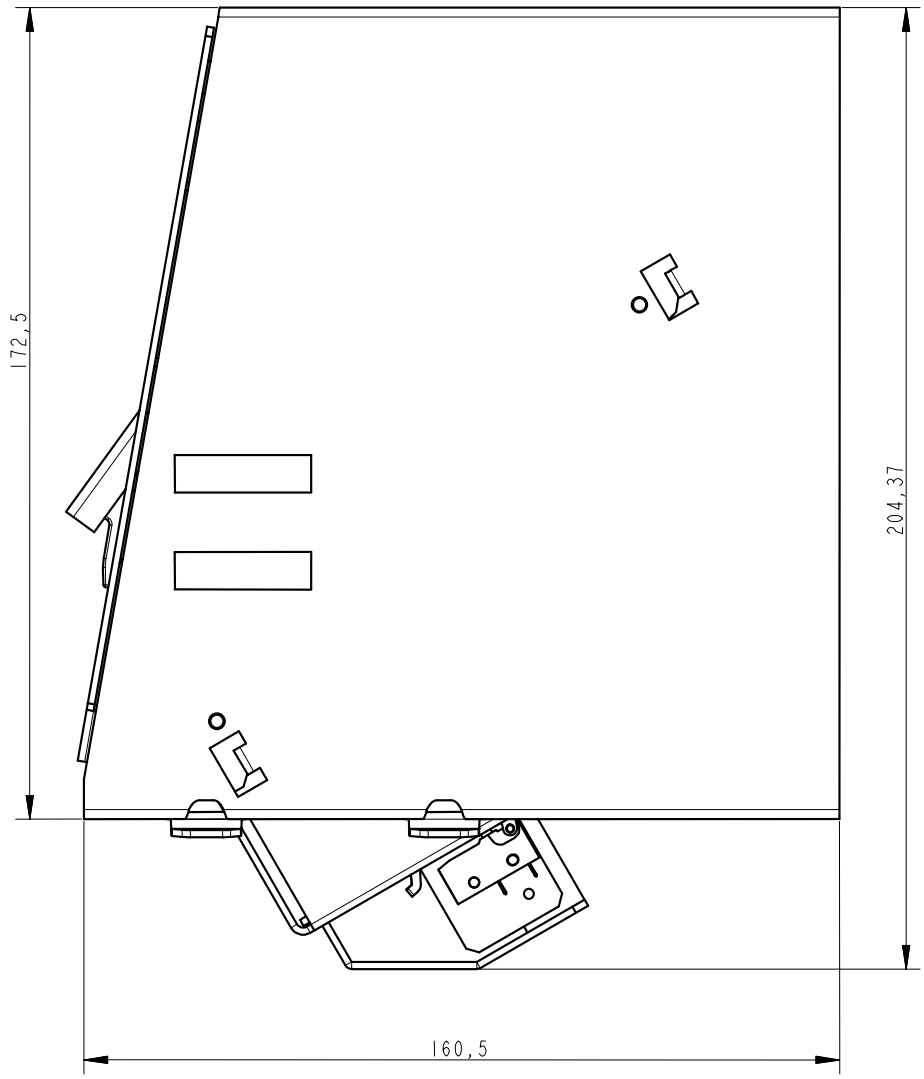
Bit Number	Description	HIGH = 1	LOW = 0
0	End of Paper (optical sensor)	paper present	no paper
1	**Flap position (optical sensor)**	**flap present (high position)**	**flap open (paper pulled out from chute end)**
2	Low paper (switch)	switch lever closed paper OK	switch lever open low paper
3	Jam (opto)	paper present	no paper
4	Test Button		always low
5	Forward Button		always low
6	Pre-Heating	enabled	disabled
7	Power Failure	power failure	OK

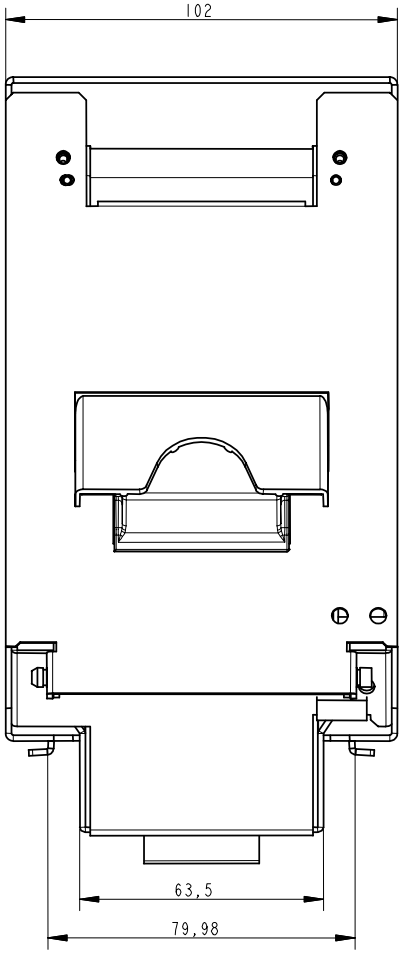
Note: To avoid information fluctuation
- "Paper low" is reported with a 50 seconds delay
- "Jam" is reported with a 6 seconds delay (paper feeding is stopped in real line).

ESC'W' Firmware version. The printer responds with 4 byte (Ex: 0111).
The two first digits (byte 1 & 2) are for Major Revision (MR, ex: 0x00 & 0x01 for 01); the two last (byte 3 & 4), for minor Revision (mR, ex: 0x00 and 0x0B for 11).
Bits 0 to 3 of byte 1 code for MR/16 (int. div.), ex: 0x00.
Bits 0 to 3 of byte 2 code for MR%16 (modulo, reminder of integer division), ex: 0x01.
Bits 0 to 3 of byte 3 code for mR/16 (int. div.), ex: 0x00.
Bits 0 to 3 of byte 4 code for mR%16 (modulo, reminder of integer division), ex: 0x0B.

3 MECHANICAL FEATURES

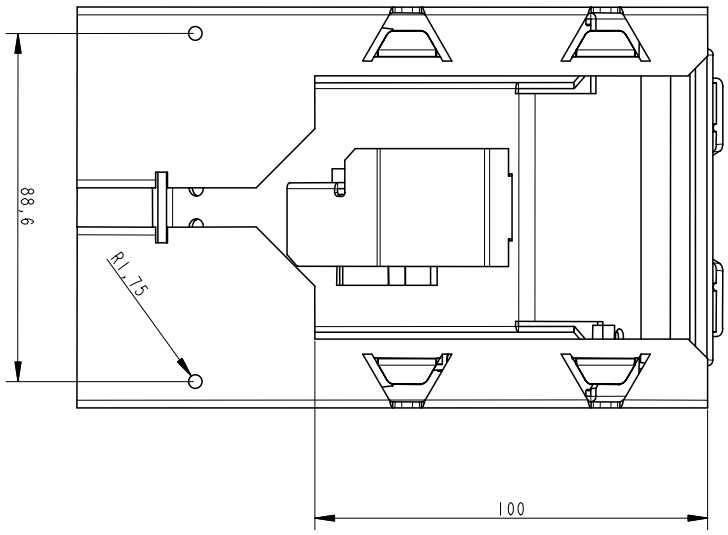
3.1 External Dimensions





The support for this printer needs to be "U shaped" to allow the paper roll bucket to protrude through.

The printer can be either fixed (using a "U shaped" support and the two holes underneath the unit), or free to slide with its guiding tabs (for sealing issue if needed).

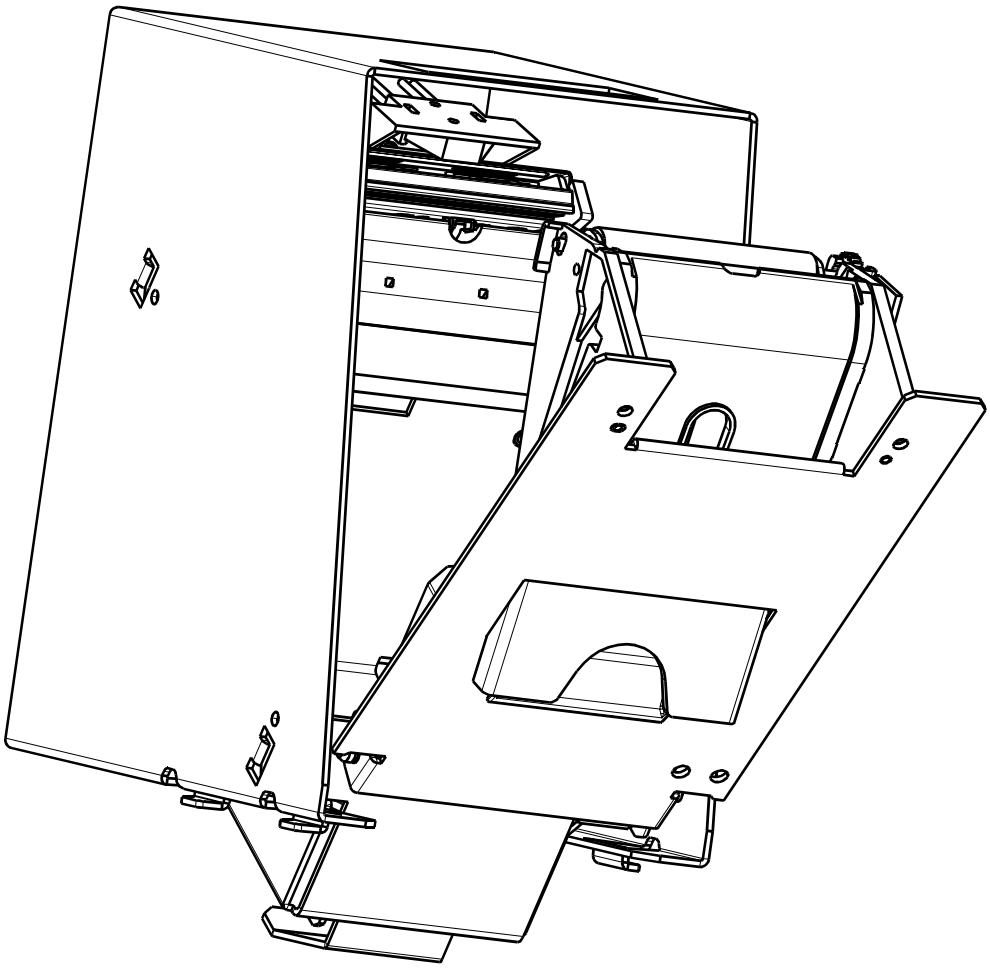


3.2 Housing features for ticket access

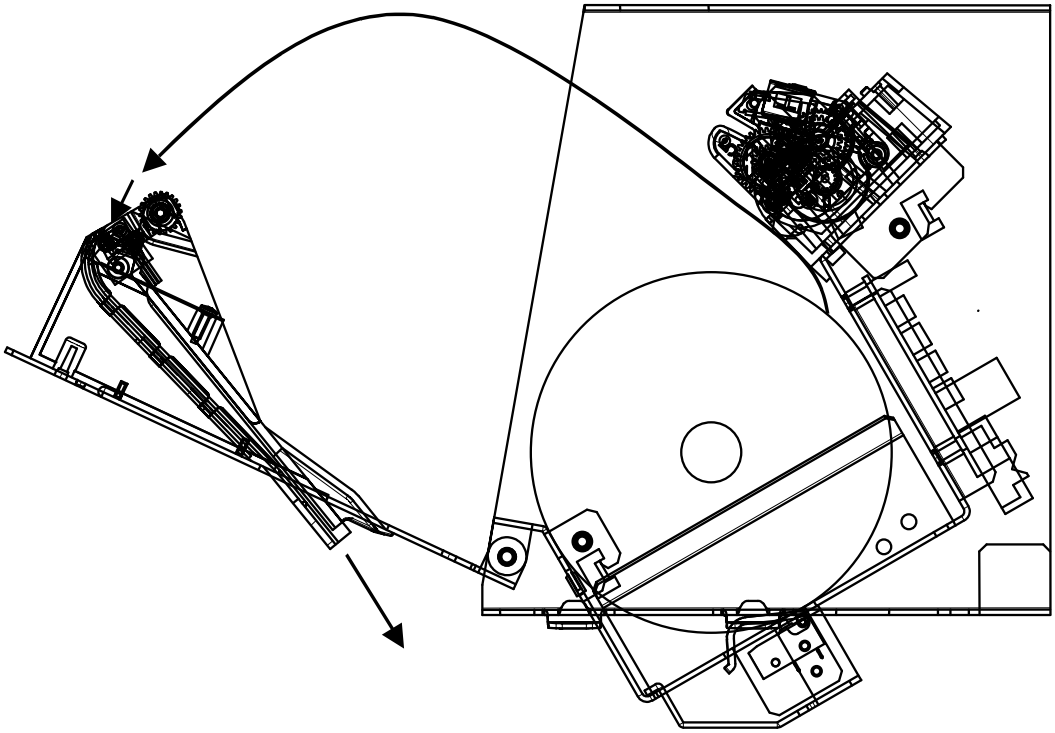
See section «Recommendations».

3.3 Paper Loading

The following steps are needed to load the paper:
Open the door by pulling it
Remove the core of the preceding roll if necessary
Place the new roll
Set the paper end through the door chute over the platen
Close the door, keeping the paper end tight to avoid a possible paper loop.
Pull the paper end to cut; it the paper is loaded.



Maximum paper roll diameter is102 mm; "low paper" information will be sent with diameter lower than 40 mm.
Paper / roll width must be 59 to 60 mm.



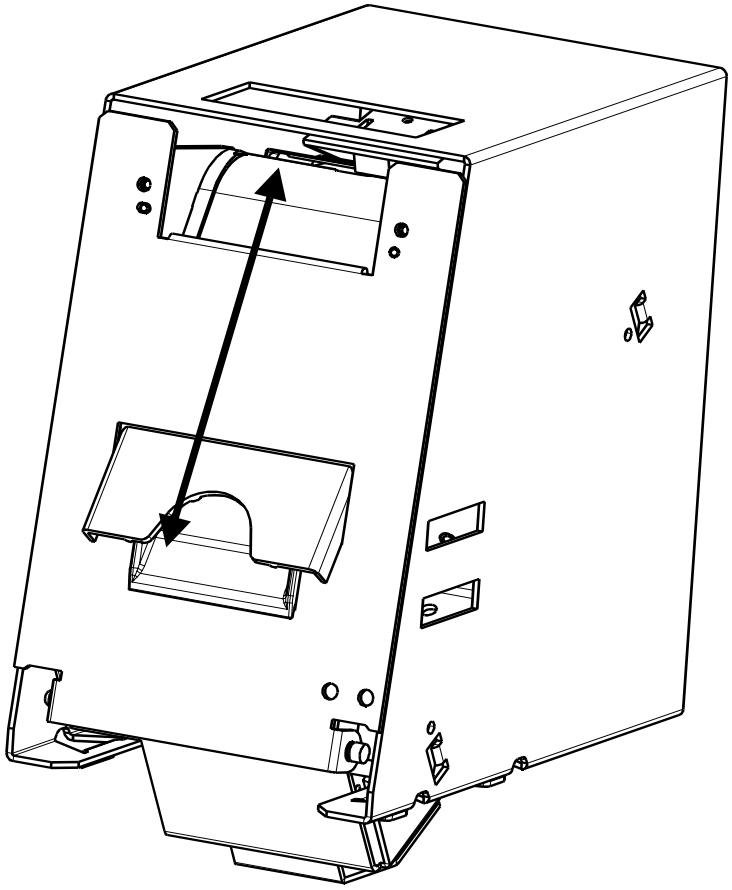
3.4 CUTTER SYSTEM / PAPER CHUTE

The paper is fed into a chute. The user can get the ticket end at the chute exit. The user then cuts the receipt when he pulls on the ticket.

With this system (on existing units), the distance between the printing line and the cutting line is between 20 and 21 mm. It is possible to print a header (or footer) of the next ticket in this area.

The chute hides the ticket from the user until it is fully printed; the length of ticket with the existing TPSK is 4 inches. With tickets shorter than 3.75 inches, the user would not access the ticket end. It is possible to print a ticket longer than 4 inches; sensors and software provide security to avoid jam when the ticket is pulled during printing.

Chute length optimised for 4 inch tickets:
- for ticket protection
- for ticket end access



4 RECOMMENDATIONS

4.1 Storage :

If the printer has been stored for a long time with paper set below the print head, it may be necessary to re-load the paper before operating.

4.2 Duty cycle :

If the temperature is between 50°C and 60°C: the duty cycle is 10% (10% ON, 90% Off), with a maximum printing time of 10 seconds.
If the temperature is lower than 50°C: the duty cycle is 20%, with maximum printing time 10 seconds.

Higher duty cycle may destroy the paper feed motor.
Printing is stopped by of a software security feature, if the temperature of the print head becomes too high. Printing will re-start after cooling.

4.3 Grounding :

The printer must be grounded. This can be done either by setting it on a grounded metal support or by connecting its external chassis.

4.4 Print head Cleaning :

This printer is designed with the print head facing down, this avoid dust accumulation. However, in heavy duty condition or if the paper used has a poor quality, it is recommended to clean the print head. The print head is visible and accessible when the door is opened.

To clean the heating dots of the head, use a cotton stick containing a solvent alcohol (ethanol, methanol, or IPA), but do not touch the print head with your fingers!

AXIOHM can provide cleaning kits, ref.: CK60000A

4.5 Ticket access / Housing features

To maintain printer reliability, the pressure on the Clamshell door must be limited. In case of sealing needs, make sure the pressure applied to the door is lower than 6 lbs.

This pressure must be applied around the ticket exit chute.
Please contact Axiohm Technical Support for specific integration.

4.6 Power supply

The power supply should be 75 Watts or more, particularly if a heavy duty is requested by the head (reverse video, wide black marks).

5 TROUBLESHOOTING

Situation	Problem	Solution
Paper loading: When the paper is correctly loaded and the printer is powered, closing the door will generate a self-test ticket with the message "PAPER SUCCESSFULLY LOADED".	The self-test ticket is not printed.	Check if the printer is powered. Check if the paper end is tight enough: - Open the door. - Keep the paper end tight from the chute outlet. - Close the door; printing of the self-test should begin.
Printing tickets:	Printer prints blank tickets.	Make sure the paper roll is not set upside down; see the instruction label inside the printer.
	Tickets do not come out: Even though no error message is sent. Even though tickets are required, and the printer makes noise as if it was printing.	Open the printer door. Check if there is a small black plastic part (paper guide) between the roller and the white plastic flap. This guide is clipped to the roller axle and attached to the white flap; if it is missing, there is a gap between the roller and the flap in which the paper can be fed.*
	Printer prints erratic characters.	A wrong baud rate could be the cause: Check if the jumper is in place (bottom right of the PCB); refer to the chapter "Baud rate setting" for the proper position in which to set the jumper, to obtain the required baud rate. The baud rate is indicated on the self-test ticket, which can be printed by closing the door.
	Printer does not start printing, even though paper path is clear and there is no visible jam.	If your application can detect status return, check the sensor status. If your application does not detect the status return, or you cannot easily check them: Make sure that all sensors are plugged in correctly - Four connectors on the right side of the PCB, from top to bottom: 4 contacts, 3 contacts, 2 contacts with red wires, 2 contacts with black wires. Check the door switch for contact (small mushroom switch on the left of the printer mechanism). When applying pressure to the switch, it should make a noise; if it does not, there is no contact and the switch may need to be replaced.

** For replacement of this part, call maintenance.*