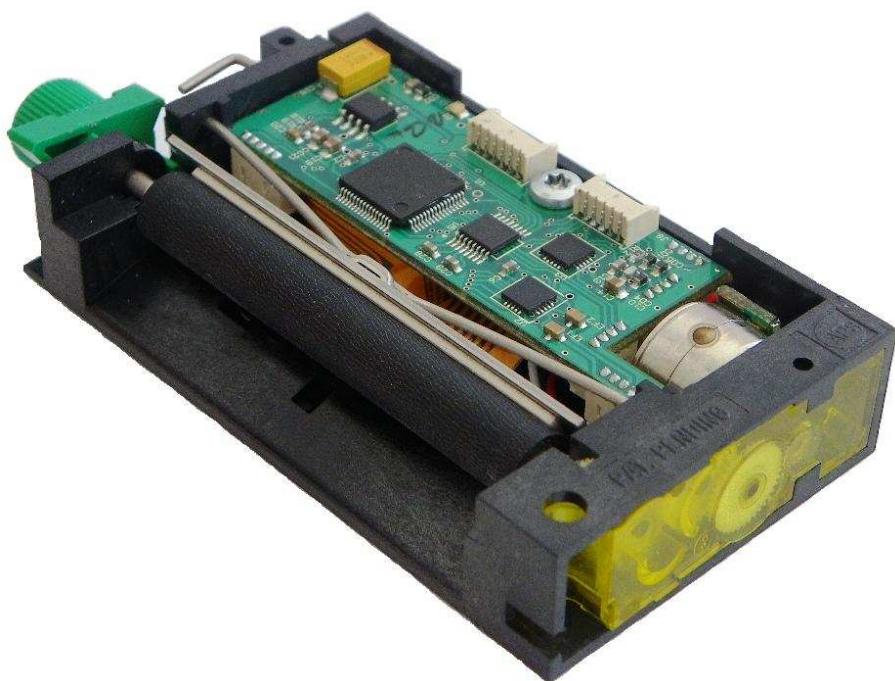


# CP205-HRS

## Technical Manual



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<http://www.aps-printers.com/>

This manual provides complete information about APS CP205-HRS printer.

For customized mechanisms, A.P.S. supplies documentation in addition to the present specification.

The present specification is valid also for customized types, where the different condition has no effect  
on common data (e.g.: different colour of case parts).

A.P.S. reserves the right to make changes without notice to the product to improve reliability, function or design.

A.P.S. does not assume any liability arising out of the application or use of the product or circuit described herein.

The warranty terms of the product are described in a separate document; please contact A.P.S. to obtain this document.

## 2. GENERAL FEATURES

The CP205-HRS printer is the first integrated printer in the size of a mechanism. This printer includes one CP205 print mechanism with an integrated controller board (enhanced version of the previous MRS one) operating from a serial communication. Thanks to its optimization the volume of the complete printer is same as the print mechanism alone.

- **Ultra-compact printers**
- **Fully hot plug printers**
- **Software programmable consumption**
  - Dynamic division and high speed (up to 90mm /s)
- **Full control over printing quality/speed**
  - Speed clamping, acceleration smoothing... via control codes
- **External pluggable switches and LED for easy integration**
- **Single power supply**
  - From 5 Volts to 8.5 Volts
- **RS232 Communication ports**
  - Speed up to 115 200 Bds
- **Three internal fonts**
  - Easy font update
- **Powerful Text Printing Modes**
  - Up to 48 characters per line.
  - Horizontal
  - 180 degree
  - Double and Quadruple width and height printing
  - Inverse video
- **Powerful Graphic Modes**
  - Variable width and offset
  - Double width and height
- **Hole / Mark Detection**
- **Cutter driving**
  - Guillotine cutter type
- **10 Barcodes**
  - Normal and 90 degree
- **Supports reflective and transmissive optocouplers**
- **Printing parameters can be saved in flash**
- **Supports easy single-sheet insertion /ejection**
- **Windows® drivers available**
- **Easy firmware upgrades** (please contact A.P.S)

**3. REVISION HISTORY**

<b>Rev. Index</b>	<b>Date</b>	<b>Page/ Sec.</b>	<b>Description</b>	<b>TDP</b>	<b>Author</b>
Pre	10-Sept-2012	-	Preliminary	-	PS
A	15-Nov-2012		Revision A; Updating ordering codes		PI
B	22-Nov-2012		Added details on the emulation mode supported by the printer		SS

#### 4. GENERAL SPECIFICATIONS

ITEM	SPECIFICATION		
<b>Print method</b>	Thermal dot-line printing		
<b>Dimensions WxDxH (mm)</b>  (See also attached drawings)	88x54x16 (without cutter versions)  93x61x37 (with cutter versions)		
<b>Total dots</b>	384		
<b>Dot density</b>	8 dots/mm		
<b>Paper width</b>	58 mm		
<b>Print width</b> (centred on paper)	48 mm		
<b>Heat element pitch</b>	0.125 mm		
<b>Paper feed pitch</b>	0.125 mm		
<b>Paper feed tension</b>	50g or more		
<b>Paper hold tension</b>	80g or more		
<b>Paper Thickness (<math>\mu</math>) max</b>	80		
<b>Recommended Paper</b>	KF50-HDA or equivalent		
<b>Voltage range</b>	5Volts to 8.5Volts		
<b>Current consumption</b>	From 1.5A to 5Amp ( @5V )		
<b>Operating temperature</b>	From -10°C to +60°C		
<b>Operating humidity ( RH% )</b>	20-85 (no condensation)		
<b>Storage temperature ( °C )</b>	From -40°C to +90°C		
<b>Storage humidity ( RH% )</b>	10-90 (no condensation)		
<b>EMC standard</b>	Designed to comply with Level B – FCC - CE		
Printer life			
	Durability	Basic conditions	Maximum variations
Thermal head pulse resistance	100 million pulses	- Room temp.: 20 ÷ 25 °C - Head temp.: 65 °C max. - Rated energy	Max. 15% in resistance value ( $\Omega$ ) of any dot, from its initial value
Abrasion/wear resistance	100 km of paper (Printing duty 12.5%)		

## 5. PRINTER DEVICE INTERCONNECTION

Please refer to the drawing attached to back of this specification for connector positions. These printers are fully hot plug: any connector hereafter can be connected or disconnected without damaging the printer.

### 5.1. Power supply connector

**Connector J7:** MOLEX, 53048 Series 6 contacts. Female 51021 Series contacts 50079/50058. Power supply (V bat) is from 5v to 8.5v DC. Maximum current is 5A @ 5V(peak for 3ms).

PIN NUMBER	SIGNAL NAME
1	Not Used
2	V bat
3	V bat
4	GND
5	GND
6	GND

#### IMPORTANT NOTE:

Wires AWG28 must be used in order not to increase the current losses

### 5.2. Serial communication connector

**Connector J6:** MOLEX, 53048 Series 5 contacts. Female 51021 Series contacts 50079/50058.

PIN NUMBER	SIGNAL NAME
1	Gnd
2	Transmit data (Txd, printer output)
3	Receive data (Rxd, printer input)
4	CTS/DSR (printer input)
5	RTS/DTR (printer output)

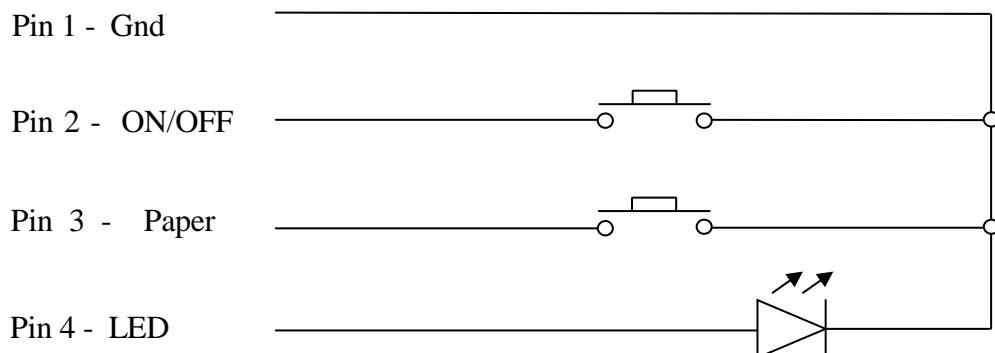
### 5.3. Switch/Led connector

**Connector J1:** MOLEX, 53048 Series 4 contacts. Female 51021 Series contacts 50079/50058.

PIN NUMBER	SIGNAL NAME
1	Gnd
2	ON/OFF line
3	Paper FEED
4	LED (cathode)

This connector allow you to design an external paper feed button, on-line off-line button, and status LED.

External circuitry is as follows:



(\*) A serial resistor (470 Ohms) is on the printer, setting the LED current at about 7 mA.

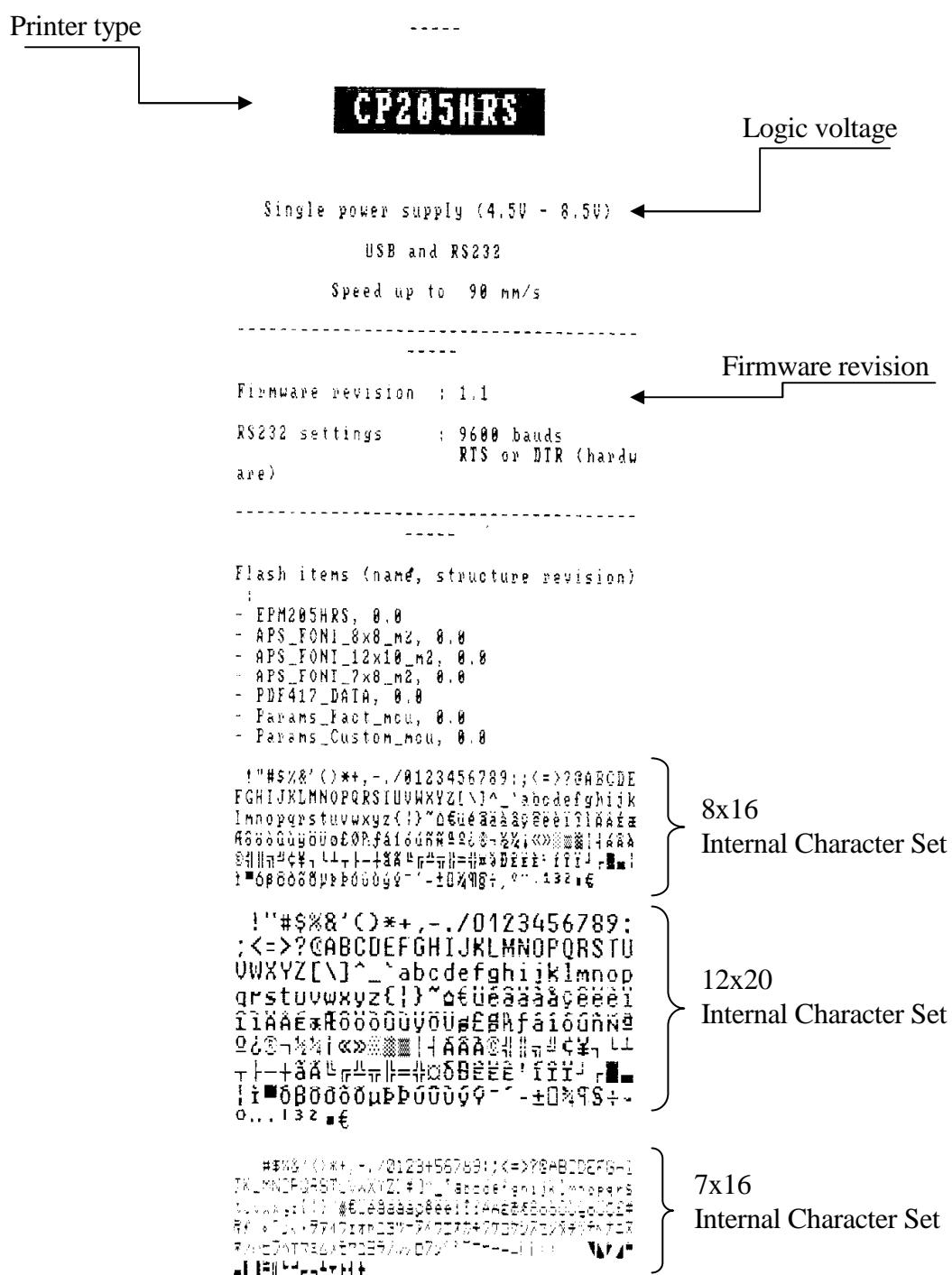
The Switches and LED functions are defined in the following table:

Printer Status	OFF	OFF Line	On Line	Head-up	End of Paper	Over/Under Voltage or Temperature
On/Off Line SW	Execute <b>self-test</b> if pressed during Power-On	On Line	Off Line		N/A	
Paper Feed Switch	N/A	Feeds Paper	Feeds Paper if not already printing		N/A	
LED	OFF	1 Flash "ON"	Always "ON"	2 Flash "ON"	3 Flash "ON"	4 Flash "ON"

## **6. PRINTER DEVICE OPERATIONS**

## **6.1. Self test Mode**

This mode is done by the combination of the 2 external switches (see section 5.3). It prints the printer type, the revision of the printer firmware, the logic voltage, the serial port settings, all internal character sets, and product code.



## 6.2. Paper loading

Paper loading can be achieved by two different methods:

- **Automatic paper loading:** With the green head-up lever in the down position, insert the paper inside the printer, and then the roller will automatically feed the paper for about 40 mm. If the printer has a cutter, the cutter will cut the paper after the loading. The printer is then ready to print. This function can be achieved only if power supply is more than 5 volts. In mark detection mode, the paper is fed forward to the TOF position.
- **Manual paper loading:** Put the green head-up lever in the up position. Manually feed the paper into the printer until it exits between the thermal head and the roller. Turn the green lever to the head-down position. Now the printer is ready to print.

### 6.3. Text Printing format

The controller board has three resident sets of 224 characters: 8x16, 12x20, and 7x16.

However, it is possible to remove them and add your own fonts. An APS tool enables you to perform this customization (please contact APS).

All these residents' fonts include the *Euro currency symbol (Position 128, 80h)*.

12 characters are selectable from the international character set: refer to ESC "R" command for more information.

All character bitmaps are presented below with their hexadecimal code (row being the most significant nibble, and column the least significant nibble). Example: ASCII code for 'A' is 0x41 (or 65 in decimal).

**8x16 characters set:** minimum character area is actually *9 pixels* (8 "active dots" plus 1 character spacing) *x 19 pixels* (16 "active" dots plus 3 lines spacing including underline), or *1.125mm x 2.375mm*. With double and quadruple height and width, maximum character area can go up to *4.5mm width x 9.5mm height*. Horizontal character spacing and vertical line spacing may be adjusted via software.

Therefore, with EPM203HRS (384 pixels width), number of characters per line can be up to 42 in standard text, 21 in double width, and 7 in quadruple width.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	!	"	#	\$	%	&	'	(	)	*	+	,	-	,	/	
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	-
6	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	}	"	^	o
8	€	ü	é	ä	à	á	ç	è	ë	í	î	ñ	ó	ô	à	á
9	ƒ	æ	ß	ö	ò	ú	ÿ	ö	û	ø	ø	ø	ø	ø	ø	f
A	á	í	ó	ú	ñ	ä	ö	í	ö	ó	ñ	ä	ö	í	»	»
B	ß	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ	œ
C	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł
D	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ	đ
E	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö	ö
F	-	±	□	%	§	÷	,	°	„	.	1	3	2	.	€	

**12x20 characters set:** minimum character area is actually *13 pixels* (12 “active dots” plus 1 character spacing) x *23 pixels* (20 “active” dots plus 3 lines spacing including underline), or *1.625mm x 2.875mm*. With double and quadruple height and width, maximum character area can go up to *6.5mm width x 11.5mm height*. Horizontal character spacing and vertical line spacing may be adjusted via software.

Therefore, with EPM203HRS (384 pixels width), number of characters per line can be up to 29 in standard text, 14 in double width, and 7 in quadruple width.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_	
6	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	}	~	¤	
8	€	Ü	é	ä	à	å	ç	ë	è	í	î	í	ñ	À	Á	
9	É	æ	ß	ö	ö	ö	ö	ü	ü	ü	ü	£	Ø	®	f	
A	á	í	ó	ú	ñ	ñ	ñ	ø	ø	ø	ø	®	¬	¾	í	»
B	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
L	└	└	└	└	└	└	└	└	└	└	└	└	└	└	└	└
D	δ	θ	β	ɛ	ɛ	ɛ	ɛ	í	í	í	í	í	í	í	í	í
E	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø	ø
F	-	±	□	%	¶	§	÷	·	°	..	.	ı	³	²	▪	€

**7x16 characters set:** minimum character area is actually *8 pixels* (7 “active dots” plus 1 character spacing) x *19 pixels* (16 “active” dots plus 3 lines spacing including underline), or *1mm x 2.375mm*. With double and quadruple height and width, maximum character area can go up to *4mm width x 9.5mm height*. Horizontal character spacing and vertical line spacing may be adjusted via software.

Therefore, with EPM203HRS (384 pixels width), number of characters per line can be up to 48 in standard text, 24 in double width, and 12 in quadruple width.

This font includes the Katakana characters set.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_	
6	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	}	~	¤	
8	€	Ü	é	ä	à	å	ç	ë	è	í	î	í	ñ	À	Á	
9	É	æ	ß	ö	ö	ö	ö	ü	ü	ü	ü	£	Ø	®	f	
A	á	í	ó	ú	ñ	ñ	ñ	ø	ø	ø	ø	®	¬	¾	í	»
B	－	フ	イ	ウ	エ	オ	カ	タ	フ	コ	サ	シ	ス	セ	ソ	
C	カ	チ	ツ	テ	ナ	ニ	ス	ネ	ハ	ヒ	フ	ハ	ホ	マ	マ	
L	ミ	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル
D	ミ	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル	ル
E	－	－	－	－	－	－	－	－	－	－	－	－	－	－	－	－
F	ア	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ	リ

## 6.4. Operating Control codes

Control codes are non-printable characters or sequences of characters that control the operation of the printer. Within the following description, a control code causes the printer to interpret the following byte as part of a command and not as a printable character.

### 6.4.1. *Control codes cross reference*

#### *Setup and Hardware control*

COMMAND	DESCRIPTION
<b>GS / n</b>	Set printing speed / maximum peak current
<b>GS s n1 n2</b>	Set maximum print out speed
<b>GS a n</b>	Set acceleration smoothing
<b>GS D n</b>	Set print intensity
<b>ESC @</b>	Reset printer
<b>ESC v</b>	Send printer status
<b>ESC I</b>	Send printer identity
<b>GS B n</b>	Serial communication settings
<b>ESC o n</b>	Set optocoupler type
<b>GS O n1 n2</b>	Start optocoupler calibration
<b>ESC O</b>	Send optocoupler parameters
<b>GS o</b>	Send optocoupler level
<b>ESC f</b>	Disables previous generation emulation
<b>ESC F</b>	Enables previous generation emulation
<b>ESC s</b>	Save in Flash setup parameters
<b>ESC d</b>	Recover factory (default) setup parameters
<b>GS p n</b>	Set paper loading pause
<b>GS P n1 n2</b>	Sets paper loading length
<b>GS e n</b>	Ejects paper
<b>GS d n</b>	Sets eject direction
<b>GS M n1 n2</b>	Sets paper loading speed
<b>GS t n</b>	Sets retight phase of stepper motor
<b>GS c n</b>	Enable / Disable historic heat mode

***Text and General commands***

COMMAND	DESCRIPTION
<b>ESC % n</b>	Select internal font
<b>ESC R n</b>	Select international character set
<b>ESC 2 n</b>	Set line pre-spacing
<b>ESC 3 n</b>	Set line spacing
<b>ESC SP n</b>	Set character spacing
<b>ESC b n</b>	Set normal / inverse video mode printing
<b>ESC c n</b>	Set maximum number of columns
<b>ESC C n</b>	Set text justification
<b>ESC ! n</b>	Set print mode
<b>ESC { n</b>	Set/reset rotated characters
<b>LF</b>	Line feed
<b>CR</b>	Carriage return
<b>ESC J n</b>	Feed paper (n dot lines) forward
<b>ESC j n</b>	Feed paper (n dot lines) backward
<b>CAN</b>	Cancel print data buffer (text mode)
<b>TAB</b>	Make a tabulation

In text mode, all non-printable characters (< 20h) are filtered/ignored except LF, CR, CAN and TAB.

***Graphics commands***

COMMAND	DESCRIPTION
<b>ESC * n1 n2 n3 n4 n5 (n6) data</b>	Print graphics in full mode
<b>ESC \$ n1 n2</b>	Set graphic offset in line mode
<b>ESC V n1 n2 n3 data</b>	Print graphic in line mode

***Cutter commands***

COMMAND	DESCRIPTION
<b>ESC m</b>	Partial cut
<b>ESC i</b>	Full cut

*Bar code commands*

COMMAND	DESCRIPTION
<b>GS k n [Start] &lt;data&gt; NUL</b>	Print bar code
<b>GS h n</b>	Barcode height
<b>GS w n</b>	Barcode magnification
<b>GS H n</b>	Text position in barcode
<b>GS R n</b>	Set/reset rotated barcode

*Hole and black mark detection commands*

COMMAND	DESCRIPTION
<b>GS L n</b>	Set mark length, switch continuous / mark mode
<b>GS T n1 n2</b>	Set “mark” to TOF position length
<b>GS E</b>	Feed paper to “TOF” position
<b>GS Y n1 n2</b>	Set “optosensor” to head dot line length
<b>GS X n1 n2</b>	Set “mark” to “cut” position length
<b>GS x n1 n2</b>	Set “cut” line to “head dot line” position length

#### 6.4.2. Setup and Hardware control

##### GS / n

Description: Set printing speed / Maximum peak current / Dynamic division  
Format: <1Dh> <2Fh> <n>  
Comments: n = 0 : enable maximum peak current on power supply (and so maximum printing speed).  
n = 1 to 32: (Default n = 5) Software programmable consumption (Dynamic division). The maximum number of black dots which are simultaneously heated is (n+1) x 8.  
In default mode, n = 5.  
Example : n = 5 Maximum black dots heated: (5+1)\*8=48.  
Printer Peak consumption @5V: (0.3A (Stepper Motor) + 5\*48/160) = 1.8A  
160 Ohms is the dot resistance.

##### GS s n1 n2

Description: Set maximum print speed  
Format: <1Dh> <73h> <n1> <n2>  
Comments: This control code may be used to reduce the print speed. Maximum print speed may be reduced in case of paper roll diameter above 60mm and/or if rewinding mechanism is connected to the printer. It can also help to reduce noise and improve print quality.  
Bytes n1, n2, set the time T (in  $\mu$ s) between each step:  
 $T = (256*n1) + n2$ .  $1000 < T < 25000$ .  
Default: T = 2000 : n1 = 7, n2 = 208.  
Example: T = 2000  $\mu$ s  
Maximum print out speed:  
 $(1/(8 * 2000e-6)) = 62.5$  mm/s  
8 dots/mm is the dot density.

##### GS a n

Description: Set acceleration smoothing  
Format: <1Dh> <61h> <n>  
Comments: n = 0 to 255: (Default n = 180) Software programmable acceleration smoothing. The print cycle time is limited to the cycle time of the previous cycle multiplied by the acceleration coefficient (coefficient = n/256). This improves print quality and reduces noise.  
Example: n = 180: Cycle time can't be smaller than 70% of previous cycle time.

**GS D n**

Description: Set print Intensity  
 Format: <1Dh> <44h> <n>  
 Comments: n = 80h (128d) : (Default). Nominal print intensity  
              n > 80h (128d) : Printout becomes darker  
              n < 80h (128d) : Printout becomes lighter  
              (n from 0 to 255 (FFh)).

**ESC @**

Description: Resets printer  
 Format: <1Bh> <40h>  
 Comments: Clears data print buffer and initializes the printer with default values. This command is executed immediately after being received (real time request), even in case of buffer full (DTR/RTS or Xoff active).

**ESC v**

Description: Send printer status  
 Format: <1Bh> <76h>  
 Comments: The printer will transmit a single byte which reflects the status of the printer in accordance with the following table:

Bit	Function	Bit = 0	Bit = 1
0	Head temperature	OK	Too high or too low
1	Head-up	No	Yes
2	Paper out	No	Yes
3	Power supply	OK	Too high or too low
4	Printer in use	Ready	Action in progress
5	On/Off line	Off	On
6	Hole/Mark detection Error	No	Too short, too long or not found
7	Cutter failure	Yes	No

This command is executed immediately after being received (real time request), even in case of buffer full (DTR/RTS or Xoff active). Host must disable the handshaking controls to send the ESC v command.

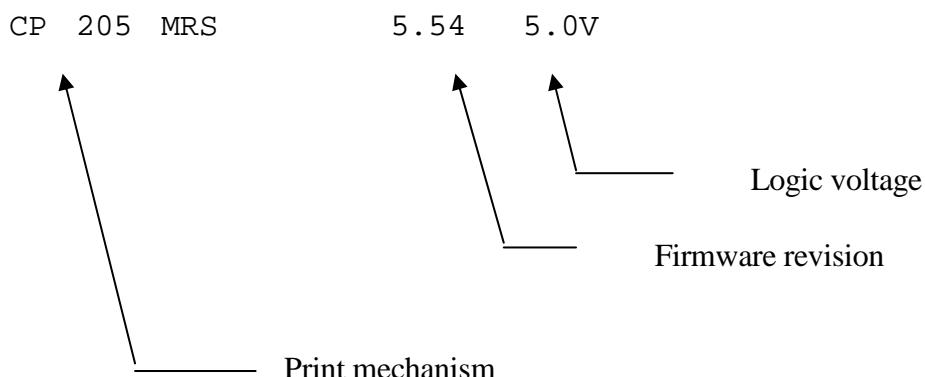
**ESC I**

Description: Send printer identity

Format: <1Bh><49h>

Comments: The printer returns a string ended by zero (00h) that reflects the printer identity.

The string is formed by the concatenation of print mechanism name, firmware revision, and logic voltage, like the following example:



Note: The identity string always has a fixed format, that is: the print mechanism name padded to 16 bytes, a space, then 5 bytes for the firmware revision (the dot being in the middle), a space, then the logic voltage (the string ‘5.0V’) ended with zero.

**GS B n**

Description: Serial communication and mode settings

Format: <1Dh><42h><n>

Comments: Sets serial communication speed, control mode and FIFO margin.

Bit 7: b7 = 0: Xon/Xoff mode (software control)

b7 = 1: RTS/DTR mode (hardware control)

Bit 6: b6 = 0: “low” FIFO margin (3 bytes)

b6 = 1: “high” FIFO margin (17 bytes)

Bit 5: Not used

Bit 4: Not used

Bit 3: Not used

Bits 2, 1, 0: Speed:

<b>n</b>	<b>COMMUNICATION SPEED (BAUDS)</b>
0	1 200
1	2 400
2	4 800
3	9 600
4	19 200
5	38 400
6	57 200
7	115 200

Default : n = 83h: RTS/DTR mode; “low” FIFO margin of 3 bytes, 9600 bauds, 8 bits of data, no parity, 1 stop bit (unused bits should be set to zero).

Notes:

- “high” FIFO margin is required under Linux platform where a transmission buffer of 16 bytes is usually managed. Therefore, with this setting, printer will have enough room to store a full buffer (no loss of data).
- “high” FIFO margin may decrease global printing speed due to more stop&go during transmission especially if communication speed is low.

## GS P n1 n2

---

Description: Sets paper feeding length in automatic paper loading

Format: <1Dh> <50h> <n1> <n2>

Comments: Sets the length of the paper fed during the automatic paper loading.  
Bytes n1, n2, set the length L (in dot lines) of the feeding.

$$L = (256 \cdot n1) + n2.$$

Default : L = 40 mm : n1 = 1, n2 = 64.

## ESC o n

---

Description: Sets the optocoupler type.

Format: <1Bh> <6Fh> <n>

Comments: n = 0: support for reflective optocoupler activated (default).  
n = 1: support for transmissive optocoupler activated.

If the default optocoupler is replaced by the user, the distance between the opto and the printing line can be adjusted by a control code – see “Hole / Black mark detection commands” section.

Note: Transmissive optocouplers are generally used in applications requiring hole or black mark detection.

## GS O n1 n2

---

Description: Starts the optocoupler calibration procedure.

Format: <1Dh> <4Fh> <n1> <n2>

Comments: Due to dispersions in optosensor mounting and sensitivity and due to paper features (reflection efficiency, black mark ...), calibration may be required to update thresholds at which an “End of Paper” will be set or a “Black Mark” will be detected. These updated thresholds are also saved in flash memory and will be recovered at next power-on. In addition, “Black”, “Mark” and “Paper” optosensor levels will be saved in flash too for information.

This control code makes printer to perform a calibration procedure which features depends of bytes n1 and n2 :

- n1 : length in cm of paper loading before starting actually calibration,
- n2 : length in cm of paper required for calibrating the optosensor.

At the end of procedure, printer returns a single byte:

- 0x01 if calibration and saving are successful,

- 0x00 if calibration or saving failure.

**CAUTION :** before sending this control code, paper should absolutely be removed from printer, otherwise, calibration will fail (no robustness) and only a hardware RESET could make printer work again. In addition, 1<sup>st</sup> loaded paper length should not contain any black mark which could cause calibration failure too. For information, when reflective optosensor is used, calibration can be performed even with a paper length without any black mark.

**Notes :-** For the moment, saving of these new thresholds causes saving of all setup parameters too as “ESC s” request (flashing of only few parameters at a time is not available). So it is advised to perform a calibration procedure only in a stable and known context.

- Calibration procedure can take a lot of time in function of paper loading lengths. In addition, during saving, communication is not guaranteed (risk of loss of data in RS232) because flashing operation cannot be performed simultaneously with normal operating function. So it is advised for host to wait for printer return status with a sufficient timeout before resuming communication.
- An “End of Paper” optosensor calibration application note and calibration tools are available. Please contact APS for further details.

## ESC O

Description: Sends optocoupler parameters.

Format: <1Bh> <4Fh>

Comments: The printer responds by sending 6 bytes :

- opto type (0 for reflective, 1 for transmissive)
- black level
- mark/backing level
- paper level
- paper presence threshold
- mark detection threshold

All these parameters are determined automatically by the opto calibration procedure and should provide correct operation for most applications. This command is intended for test purposes.

## GS o

Description: Sends the current level of the opto.

Format: <1Dh> <6Fh>

Comments: The printer responds with a byte representing the opto level.

## ESC f

Description: Disables previous controller generation emulation.

Format: <1Bh> <66h>

Comments: The previous generation of the CP205 printer had a different controller and software (4.1). This generation supports a richer set of features and runs with emulation mode ‘disabled’ after reset.

The differences of operation are mainly :

- the number of bytes that define the graphic size in graphics commands.
- the order of the fonts as a function of the control code sent.

In order for older applications written for 4.1 revisions to work as expected, the emulation mode must be enabled with the <ESC ‘F’> command.

Note : The mark detection feature is only supported in the ‘full MRS’ mode. After reset, the printer is running with emulation disabled.

## ESC F

Description: Enables previous controller generation emulation.

Format: <1Bh> <46h>

Comments: The previous generation of the CP205 printer had a different controller and software (4.1). This generation supports a richer set of features and runs with emulation mode ‘disabled’ after reset.

The differences of operation are mainly :

- the number of bytes that define the graphic size in graphics commands.
- the order of the fonts as a function of the control code sent.

In order for older applications written for 4.1 revisions to work as expected, the emulation mode must be enabled with the <ESC ‘F’> (this) command.

Note : The mark detection feature is only supported in the ‘full MRS’ mode. After reset, the printer is running with emulation disabled.

## ESC s

Description: Save the setup parameters. (Applies to version 5.2 and higher)

Format: <1Bh><73h>

Comments: The setup parameters are saved in the internal flash memory of the controller. They are not lost when power is removed or printer reset, and are recalled when power is applied again.

Printer returns 1 byte representing the status of this request :

- 0x01 : saving successful,
- 0x00 : saving failure.

Saving can take more or less time in function of action in progress. During saving, communication is not guaranteed (risk of loss of data in RS232) because flashing operation cannot be performed simultaneously with normal operating function. So it is advised for host to wait for printer return status with a sufficient timeout before resuming communication (100ms minimum, more if printing operation was in progress when request has been sent).

The following parameters are saved by this command. Basically, they represent all setup operations performed with control codes.

### “Custom” parameters

- maximum peak current,
- maximum printing speed,
- intensity,
- RS232 settings,
- historic heat management,
- active font,
- active international character set,
- pre-line spacing,
- line spacing,
- character spacing,
- maximum number of columns,
- text rotation,
- inverse video,
- text justification,
- text mode (simple/double/quadruple width/height and underlining),
- bar code height,

- bar code magnification,
- bar code “human readable interpretation” position,
- bar code rotation.

“Calibration” parameters

- “End of Paper” optosensor type,
- “Black” optosensor level,
- “Mark” optosensor level,
- “Paper” optosensor level,
- “End of Paper” threshold,
- “Mark” threshold,
- “Mark” length,
- “Mark” to “Top Of Form” position length,
- “Optosensor” to “Head dot line” length,

## ESC d

---

Description: Default setup parameters.

Format: <1Bh> <64h>

Comments: Revert all parameters of the ‘Save setup parameters’ command to their factory default values. This action is temporary. If the printer is reset or power is cycled, the parameters will be initialized with the last set saved by the ‘ESC s’ command. If you want to permanently set the parameters to the factory defaults, you must send an ‘ESC d’ ‘ESC s’ sequence. Combining the use of these command and the ‘reset printer’ command enables you to compare the effects of the default and saved values without altering the saved values.

Printer returns 1 byte representing the status of this request :

- 0x01 : saving successful,
- 0x00 : saving failure.

Saving can take more or less time in function of action in progress. During saving, communication is not guarantee (risk of loss of data in RS232) because flashing operation cannot be performed simultaneously with normal operating function. So it is advised for host to wait for printer return status with a sufficient timeout before resuming communication (100ms minimum, more if printing operation was in progress when request has been sent).

The following parameters are saved by this command. Basically, they represent all setup operations performed with control codes.

“Custom” parameters

- maximum peak current,
- maximum printing speed,
- intensity,
- RS232 settings,
- historic heat management,
- active font,
- active international character set,

- pre-line spacing,
- line spacing,
- character spacing,
- maximum number of columns,
- text rotation,
- inverse video,
- text justification,
- text mode (simple/double/quadruple width/height and underlining),
- bar code height,
- bar code magnification,
- bar code “human readable interpretation” position,
- bar code rotation.

**“Calibration” parameters**

- “End of Paper” optosensor type,
- “Black” optosensor level,
- “Mark” optosensor level,
- “Paper” optosensor level,
- “End of Paper” threshold,
- “Mark” threshold,
- “Mark” length,
- “Mark” to “Top Of Form” position length,
- “Optosensor” to “Head dot line” length,

**GS p n**

Description: Sets paper loading pause  
 Format: <1Dh><70h><n>  
 Comments: n = 0 to 255. Software programmable pause between the moment the printer detects the insertion of paper and the moment the roller starts turning. This allows accurate manual positionning of the paper. The value n is in 125 milliseconds units.  
 Default: n = 0.  
 Example: n = 16. The printer waits 2 seconds.

**GS P n1 n2**

Description: Sets paper feeding length in automatic paper loading  
 Format: <1Dh><50h><n1><n2>  
 Comments: Sets the length of the paper fed during the automatic paper loading.  
 Bytes n1, n2, set the length L (in dot lines) of the feeding.  

$$L = (256 * n1) + n2$$
  
 Default : L = 40 mm : n1 = 1, n2 = 64.

**GS e n**

Description: Ejects paper  
 Format: <1Dh><65h><n>  
 Comments: n = 0 to 255. The printer will feed the paper until an end of paper condition is detected. It will then feed extra n millimeters, useful for ejecting sheets totally.  
 Note: Not functional in mark detection mode.

**GS d n**

Description: Sets eject direction  
 Format: <1Dh> <64h> <n>  
 Comments: n = 0 : the eject direction is the forward feed direction (default)  
              n = 1 : the eject direction is the reverse feed direction  
              If n is not either 0 or 1, the command is ignored.

**GS M n1 n2**

Description: Sets paper loading speed  
 Format: <1Dh> <4Dh> <n1> <n2>  
 Comments: This control code may be used to adapt the loading speed to various conditions.  
              Bytes n1, n2, set the time T (in  $\mu$ s) between each step:  
 $T = (256 * n1) + n2. \quad 1500 < T < 32000.$   
              Default: T = 11520: n1 = 45, n2 = 0. Speed:  $(1 / (8 * 11520e-6)) = 10.8 \text{ mm/s.}$

**GS c n**

Description: Enable/disable historic heat.  
 Format: <1Dh> <63h> <n>  
 Comments: When high printing speed is set ( $\geq 60 \text{ mm/s.}$ ), historic heat is required to improve printing quality especially if text is printed. However, this additional heat makes controller to work more and in some case it can cause that maximum speed cannot be reached (too many processing to be done in a few time). So a compromise should be chosen : either speed or quality.

n = 0 :           historic heat is disabled,  
 other values :   historic heat is enabled.

Default : enabled.

Note : When picture graphic is printed, historic should be generally disabled because it makes printout darker. Basically, intensity modification is more suitable to get good printing quality; idem for curve graphic. On the contrary, regarding text graphic, historic is generally required so as to increase edge density. Therefore, user should set suitable historic mode just before transmitting his graphic.

**ESC S**

Description: Puts the printer in sleep mode  
 Format: <1Bh> <53h>  
 Comments: This command puts the printer in sleep mode giving the major benefit of very low power consumption (<300  $\mu$ A).

There are 3 ways of waking the printer up:

- Through the USB port by sending event (data, status etc...)
- Through the serial port by sending the character “00 hex” (wake-up character)
- Press the paper feed button

**Note:**

1. Sleep mode consumption is increased to 700 $\mu$ A if one theses conditions are not true:
  - On RS232C: CTS voltage pin must remaine lower than 0.2V.
  - On RS323TTL: CTS voltage pin must remaine upper or equal than 3V2.
2. Sleep mode consumption is increased to 17mA if host usb is not switched in stanby mode.
3. Wait 500 ms before sending the next character for the printer to execute the power-up sequence.

When waking-up through the serial port, the wake-up character will be ignored

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**GS t n**

Description: Sets retight phase of stepper motor.

Format: <1Dh><74h><n>

Comments: This control code may be used to customize retight phase of stepper motor.

Indeed, after a stepper motor OFF phase, beginning of a new printout may be compressed due to mechanical play inside printer gear box. To avoid that, a retight phase may be required: additional steps are performed just before printing so as to absorb this play. Retight phase is mainly required when feeding changes of sense or following power up/reset. In these cases, 12 extra steps are suitable and performed automatically. But, it may be also required when feeding sense doesn't change depending of application. In this case, a parameter is available to define how many steps to be done before printing.

n = 0 to 255.

n = 0 indicates that no retight phase is required.

Otherwise, n indicates number of extra steps to be done before new printing.

This parameter is not saved in flash memory; so, it has to be set at every power up/reset if default value is not suitable.

Default: n =12 steps.

### 6.4.3. Text and General Commands

#### ESC % n

Description: Switch the set of printable characters

Format: <1Bh> <25h> <n>

Comments: n = 0 : **8x16** Font Bank is selected.

n = 1 : **7x16** Font Bank is selected.

n = 2 : **12x10** Font Bank is selected.

This is the default behaviour. After sending the ESC f command, the order of the fonts will be as follows:

n = 0: **8x16** Font Bank is selected.

n = 1: **12x10** Font Bank is selected.

n = 2: **7x16** Font Bank is selected.

The international character set selection (ESC R) is disabled.

Address from A0h to DFh : Katakana characters.

Note : 24 characters per lines can be performed by printing out in double width (ESC !) with a character spacing set to 1 (ESC SP).

#### ESC R n

Description: Select international character Set

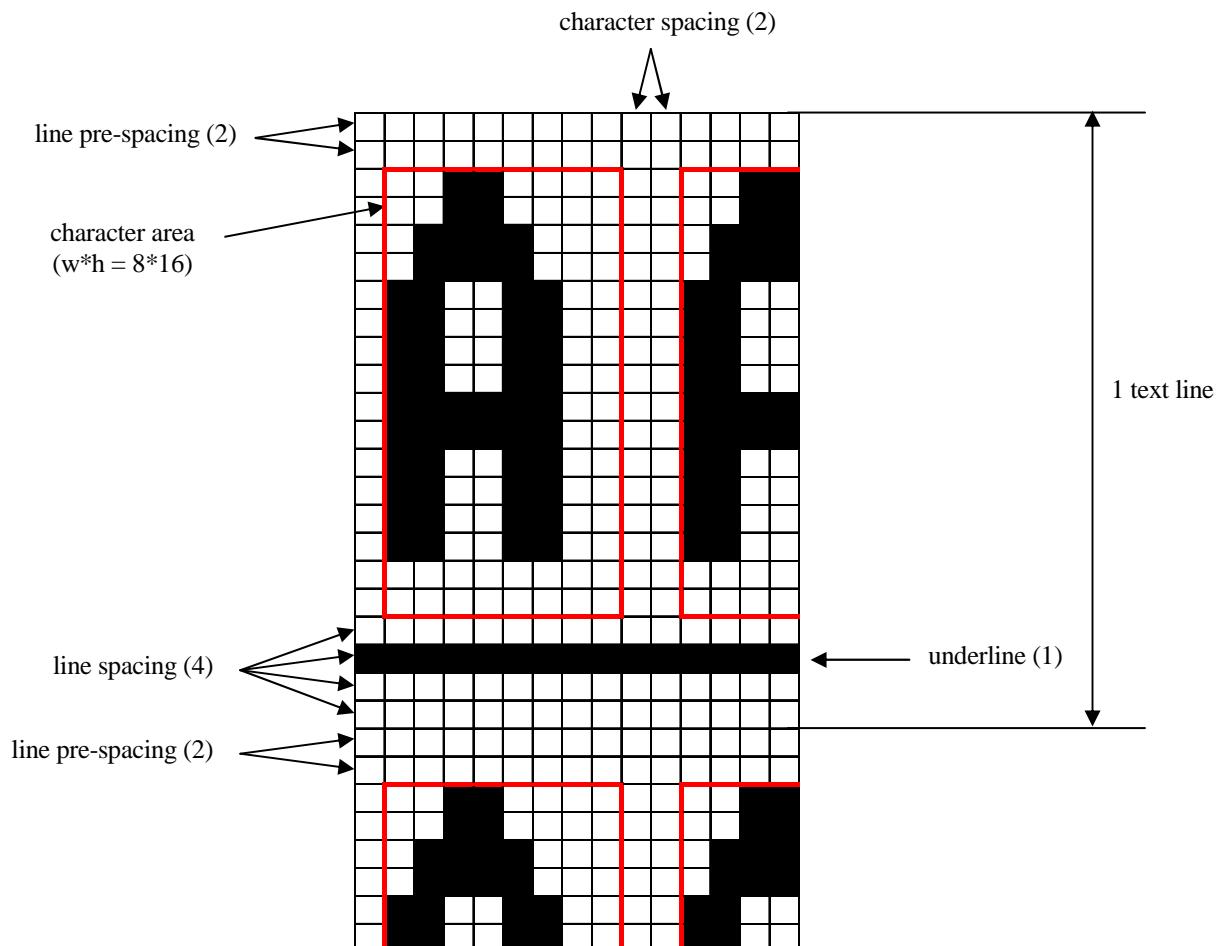
Format: <1Bh> <52h> <n>

Comments: Modify the set of printable characters in accordance with the table below:

n	COUNTRY	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	\$	@	[	\	]	^	'	{		}	~
1	France	#	\$	à	°	ç	§	^	'	é	ù	è	"
2	Germany	#	\$	§	Ä	Ö	Ü	^	'	å	ö	ü	ß
3	UK	£	\$	@	[	\	]	^	'	{		}	~
4	Denmark 1	#	\$	@	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 1	Pt	\$	@	i	Ñ	¿	^	'	"	ñ	}	~
8	Japan	#	\$	@	[	¥	]	^	'	{	í	}	~
9	Norway	#	¤	É	Æ	Í	Å	Ü	é	æ	í	å	ü
10	Denmark 2	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain 2	#	\$	à	i	Ñ	¿	é	'	í	ñ	ó	ú
12	Latin Amer.	#	\$	à	i	Ñ	¿	é	û	í	ñ	ó	ú

Default: USA

Example of text settings:



## ESC 2 n

Description: Set line pre-spacing  
Format: <1Bh><32h><n>  
Comments: Sets the line pre-spacing. (Default n = 0). n may vary from 0 to 15. The line spacing pitch is 1/8mm. Note: This is useful when printing in inverse video if some character pixels are on the first dotline.

## ESC 3 n

Description: Set line spacing  
Format: <1Bh><33h><n>  
Comments: Sets the character line spacing. (Default n=3). n may vary from 3 to 15. The character line spacing pitch is n/16mm.

## ESC SP n

Description: Set character spacing  
Format: <1Bh><20h><n>  
Comments: Sets the character right spacing. (Default n=2). n may vary from 1 to 16. The character right spacing pitch is n/8mm. This spacing is proportional to double width (nx2) and quadruple width (nx4) commands.  
Note: A last character is possible even if next character spacing does not hold in the line.

## ESC b n

Description: Set inverse video printing  
Format: <1Bh><62h><n>  
Comments: The value of n (default 0) can be 1 (inverse video) or 0 (normal video). This setting is valid for the whole printing line. Spaces at the beginning of a line will be printed as a dark rectangle. In order to shift the black printing from the left margin, one can send the TAB (ascii 9) instead. This enables an accurate control of the placement of the edges of the inverted portion.

## ESC c n

Description: Set maximum number of columns  
Format: <1Bh><63h><n>  
Comments: The value of n (default 255) is the maximum number of printable characters the printer accepts before automatically going to the next line.

**ESC C n**

Description: Set text justification  
 Format: <1Bh> <43h> <n>  
 Comments: The value of n specifies how text will be justified.  
     n = 0: text will be centered.  
     n = 1: text will be right justified.  
     n = 2: text will be left justified.  
     Default is left justification.

**ESC! n**

Description: Set print mode  
 Format: <1Bh> <21h> <n>  
 Comments: The value of n (default 0) selects the various modes of printing as described in the table on the next page:

<b>Bit</b>	<b>Function</b>	<b>Bit = 0</b>	<b>Bit = 1</b>
0	Not used	-	-
1	Quadruple Height	Cancelled	Set
2	Quadruple Width	Cancelled	Set
3	Not used	-	-
4	Double Height	Cancelled	Set
5	Double Width	Cancelled	Set
6	Not used	-	-
7	Underlined	Cancelled	Set

Note: Different print widths can be mixed on the same line (8 changes per line maximum). Only one print height is enabled per line. If height change request during a line already started, change will be taken into account only on the next line.

**ESC { n**

Description: Set/Cancel Rotated characters  
 Format: <1Bh> <7Bh> <n>  
 Comments: This command rotates by 180° the text being printed out.  
     n= 0 (default). Printout is normal  
     n=1 : Printout is rotated 180°

**LF**

Description: Line feed  
 Format: <0Ah>  
 Comments: Move the print position to the beginning of the next line

**CR**

Description: Carriage return  
Format: <0Dh>  
Comments: Move the print position to the beginning of the next line. Note : if CR is followed by LF, the printer will ignore the LF after CR. So, CR = LF = CR+LF.

**ESC J n**

Description: Feed paper (n dot lines) forward  
Format: <1Bh> <4Ah> <n>  
Comments: Paper is fed for n (n<256) dot lines (n times 0.125 mm). The print position is at the beginning of the next line

**ESC j n**

Description: Feed paper (n dot lines) backward  
Format: <1Bh> <6Ah> <n>  
Comments: Paper is fed for n (n<256) dot lines (n times 0.125 mm) backward. The print position is at the beginning of the next line

**CAN**

Description: Cancel print data buffer (text mode)  
Format: <18h>  
Comments: The print buffer is cancelled and print position is at the beginning of the next line.

**TAB**

Description: Make a tabulation  
Format: <09h>  
Comments: TAB is converted into SPACE character (20h) but number of tabulations is counted until a printable character is received. Then TAB is always considered as SPACE character and number of tabulations is frozen.  
It is useful in inverse video / underline mode where first SPACE characters must not be affected by these modes.

#### **6.4.4. Graphics commands**

##### **6.4.4.1. Graphics command for emulation mode (also see the <ESC 'F'>/<ESC f> commands):**

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###### **ESC \* n1 n2 n3 n4 n5 <data>**

Description: Print graphics

Format: <1Bh><2Ah><n1><n2><n3><n4><n5><data>

Comments: Bytes n1 and n2 set the number of bytes N to be printed out :  $N = (256*n2) + n1$

Byte n3 sets graphic operators on data byte and has the following meaning :

- n3=0 : print normal size data byte (full printer resolution)
- n3=1 : double width
- n3=2 : double height
- n3=3 : expanded (double width, double height)

Byte n4 sets the number of byte to be skipped before printing out the first graphic bit :

- 00 H : first graphic bit to be printed out is dot one on the head
- 01 to FF H : 1 to 255 bytes skipped (to be less than total number of head's bytes)

Byte n5 sets the width of the graphic to be printed out :

- 01 to FF H : width is 1 to 255 bytes (to be less than total number of head's bytes)

##### **6.4.4.2. Graphics command for full MRS mode :**

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###### **ESC \* n1 n2 n3 n4 n5 n6 <data>**

Description: Print graphics

Format: <1Bh><2Ah><n1><n2><n3><n4><n5><n6><data>

Comments: Bytes n1, n2 and n3 set the number of bytes N to be printed out :  
 $N = (65536*n3) + (256*n2) + n1$ .

Byte n4 sets graphic operators on data byte and has the following meaning:

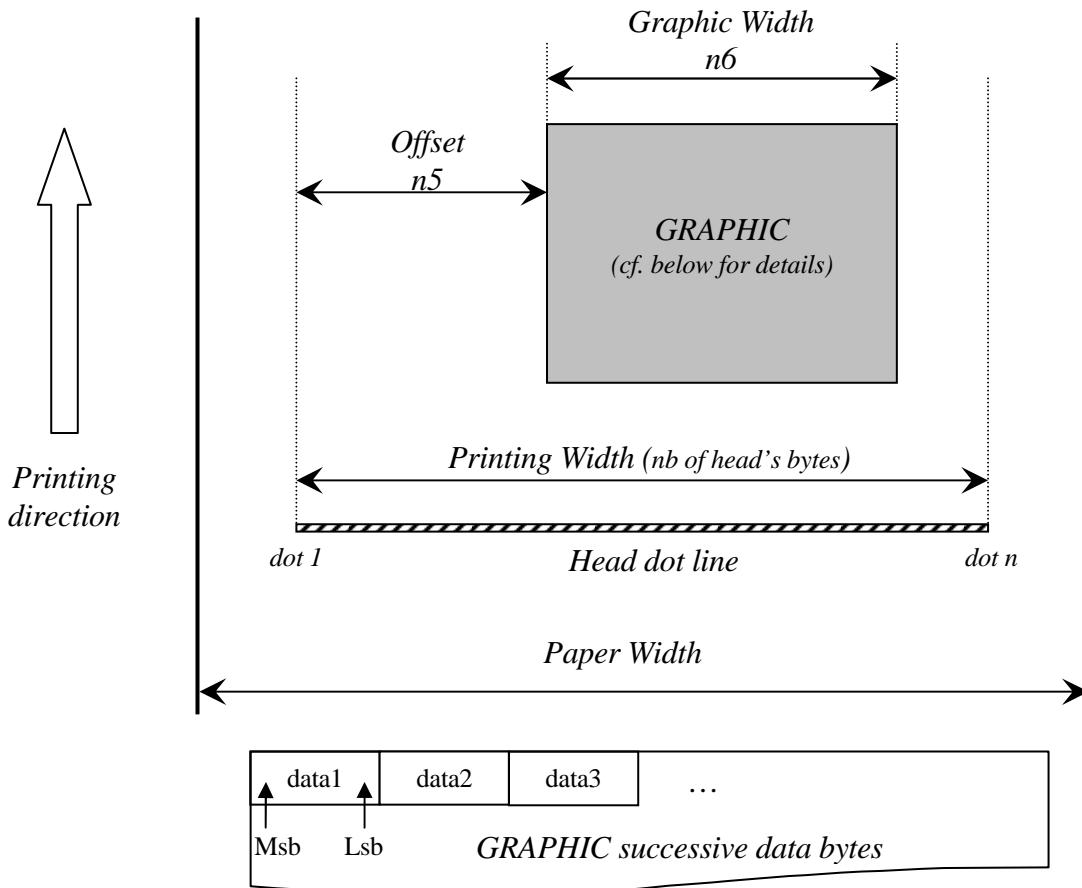
- n4 = 0 : print normal size data byte (full printer resolution).
- n4 = 1 : double width.
- n4 = 2 : double height.
- n4 = 3 : expanded (double width, double height).

Byte n5 sets the number of byte to be skipped before printing out the first graphic bit :

- 00 H : first graphic bit to be printed out is dot one on the head.
- 01 to FF H : 1 to 255 bytes skipped (to be less than total number of head's bytes)

Byte n6 sets the width of the graphic to be printed out :

- 01 to FF H : width is 1 to 255 bytes (to be less than total number of head's bytes).



Total number of head's bytes is given by the total number of dots divided by 8. For instance EPM203HRS is  $384 \text{ dots} / 8 = 48 \text{ bytes}$ .

Example : With the following bitmap :



Black and white, 1 dot per pixel, 368 pixels width and 242 pixels height,  
printed in full resolution, and centered,  
Size =  $368 * 242 / 8 = 11\,132$  bytes :

$n1 = 124d, n2 = 43d, n3 = 0d, n4 = 0d, n5 = 1d, n6 = 46d$   
 $\text{or } n1 = 7Ch, n2 = 2Bh, n3 = 0h, n4 = 0h, n5 = 1h, n6 = 2Eh$

**ESC \$ n1 n2**

Description: Horizontal dot positioning

Format: <1Bh><24h><n1><n2>

Comments: Dot positioning command in bytes (to be used with ESC V). Dot position equals (n1 + 256\*n2). n1 must be less than 48 (384/8), and n2 is always 0.

**ESC V n1 n2 n3 <data>**

Description: Horizontal bit image

Format: <1Bh><56h><n1><n2><n3><datas>

Comments: Byte n1 sets graphic operator on data bytes:

- n1 = 0 : data bytes are directly printed (normal size, full printer resolution),
- n1 = 1 : double width (each pixel is repeated horizontally),
- n1 = 2 : double height (each pixel is repeated vertically),
- n1 = 3 : expanded (double width and height).

Bytes n2 and n3 set the number of data bytes N to be printed out ( $\leq$  total number of head's bytes):

$$N = (256 * n3) + n2. \text{ So } n3 \text{ will be always 0.}$$

Data bytes : successive graphic dot bytes to be printed out. Host should send them with meeting the same order requirement as in full mode (cf. above). "1" bit value means black dots while "0" means white dot.

*Total number of head's bytes is given by the total number of dots divided by 8. For instance EPM203HRS is 384 dots / 8 = 48 bytes.*

**IMPORTANT NOTES FOR GRAPHICS:**

- It is advised when graphic printing is required with **RS232** line to set up communication speed at its maximum value (115200 bauds). Indeed, because there is a lot of data to transmit to printer, communication speed is then the main limitation factor on resulted printing speed. In addition, when user maximum printing speed is too high in comparison with RS232 communication speed and graphic features (width, zoom), it may cause some "stop&go" events which affects printing quality. To avoid this bad behaviour, firmware limits automatically and temporary maximum printing speed in function of all these previous parameters ( $\Rightarrow$  lower but constant printing speed without "stop&go" event, better printing quality). However, this automatically setting is performed only in full mode. In line mode, user should set himself the right setting.
- It is advised when graphic printing is required with **USB** line to limit maximum printing speed. Indeed, because printer has a lot of data to process in a low period, when maximum printing speed is too high, it can cause also some "stop&go" which affects printing quality. Unlike RS232/full mode context, firmware does not limit automatically maximum printing speed. User should set himself the right setting.
- Please check that: "**n5 + n6  $\leq$  total number of head's bytes**" (that is : *offset + width  $\leq$  printing width*). If it is greater, graphic will be truncated, of course. So printer is robust but speed performance may be altered because useless data should be received and processed while it is not necessary. So it takes useless processing time which makes user to set a lower maximum printing speed to get best printing quality.

For the moment, these previous advices are required to get the best performance as possible. Some enhancements are forecasted to make required settings automatically without user operation.

#### 6.4.5. *Cutter commands*

##### **ESC i**

Description: Full cut  
Format: <1Bh> <69h>  
Comments: In continuous paper feed mode, this command performs a full cut (if cutter is present) at the current paper position.  
In hole/mark detection mode, the paper is fed forward to the next Cut position (GS X) and then cut.

##### **ESC m**

Description: Partial cut  
Format: <1Bh> <6Dh>  
Comments: In continuous paper feed mode, this command performs a partial cut (if cutter is present) at the current paper position.  
In hole/mark detection mode, the paper is fed forward to the next Cut position (GS X) and then cut.

#### 6.4.6. *Bar code commands*

##### **GS k n [Start] <data> NUL**

Description: Print bar code  
Format: <1Dh> <6Bh> <n> [Start] <data> <00h>  
Comments: n is barcode standard selection, as described in the following table.  
[Start] is an optional byte used only by Code 128.  
[Stop] is an optional byte always used except with PDF417.

n	START BYTE	BAR CODE TYPE	STOP BYTE
0	No	UPC-A	00h
1	No	UPC-E	00h
2	No	EAN13	00h
3	No	EAN8	00h
4	No	Code 39	00h
5	No	Interleaved 2/5 (ITF)	00h
6	No	Codabar	00h
7	135d	Code 128 (start with subset A)	00h
	136d	Code 128 (start with subset B)	00h
	137d	Code 128 (start with subset C)	00h
	138d	Code 128 (A,B,C: automatic subset selection)	8Bh
8	No	PDF417	No

*MRS compatibility**not yet**implemented**MRS compatibility**not yet**implemented**MRS compatibility**not yet**implemented*

Notes (intended for 1D bar codes):

- some checking are performed on <data> in function of bar code type : minimum number of data bytes, correct checksum byte, correct character type (only numerical characters for example), possible UPC-A compression. If data are wrong, bar code will not be printed out.
- when number of data bytes is higher than required number (required ‘Stop’ is not detected), even so bar code data are processed (checking step, ...).
- when checksum byte misses, printer will calculate it and add to <data> (except with Code 39).
- when UPC-E is selected, data to be transmitted can be either initial UPC-A data or directly corresponding compressed UPC-E data (checksum byte is then compulsory) (*not yet implemented*).
- when Codabar is selected, “Start” and “Stop” bytes are compulsory to get a valid encoding (but their presence is not tested).
- when ITF is selected, last byte will be ignored if total number of bytes is odd. Furthermore, if total is null (or = 1), no bar code will be printed out.
- when Code 39 is selected, “Start” and “Stop” bytes are automatically added and so they should not be sent.

PDF417 : this 2D bar code is more complex and requires further details. <data> field is made up of several sub-fields :

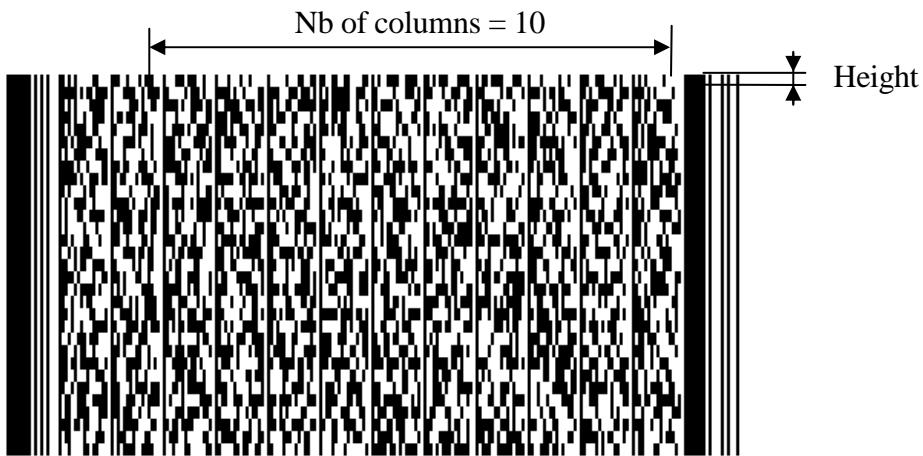
<n1> <n2> <n3> <n4> <n5> <data1> <data2>

- n1 : compression mode (**for the moment, “Automatic” is set automatically**)
  - o 0 : Text,
  - o 1 : Numeric,
  - o 2 : Byte,
  - o 3 : Automatic.
- n2 : error level (0 to 8) (**maximum of 5 for the moment**),
- n3 : number of columns (1 to 30),
- n4, n5 : number of bytes transmitted in the next data blocks (n4 is MSB, n5 is LSB; 1 to 2862 bytes),
- <data1> : as many bytes of data as indicated by (n4, n5),
- <data2> : repetition of <data1>

Notes :

- <datax> contains the bytes to be encoded. The whole extended ASCII table is allowed. The maximum number of bytes depends basically of their type (“text”, “numeric” or “byte” => compression efficiency) and chain of these types (insertion of specific “switches”). For information, it is possible to encode up to 1850 “text” bytes (TAB, LF, CR and from ASCII code 32d to 126d) or up to 462 “bytes” (others bytes values).
- regarding error level, printer can automatically lower it so as to make printout possible when too much bytes should be encoded. For information, printing execution time is proportional to error level. It should be low when few bytes are encoded and high when a lot of bytes. Generally, it is recommended to set level 5 only from 321 data “CodeWords”.
- regarding number of columns, printer can automatically adjust it so as to meet number of lines requirements (3 to 90).
- in any case, when a feature is not valid and cannot be adjusted automatically, printing is then not performed and data are dumped.
- “Macro PDF417” is not managed.
- PDF417 bar code encoding requires big tables of data and so big space in printer flash. Basically, these tables are not part of main firmware which enables to remove them without updating firmware. Therefore, this feature enables to free flash space for customer who does not use PDF417 and who needs more flash space for bigger customized fonts. By default, these tables are provided with main firmware; please contact APS for removing/downloading operations (APS tool). Please note that if tables have not been loaded while a PDF417 bar code is requested, printing will then not be performed and data will be dumped.

Example :



### GS h n

---

Description: Set bar code height.

Format: <1Dh> <68h> <n>

Comments: Set bar code height as multiple of 1/8 mm. n should range from 1 to 255. When rotated bar code, printed height will be rounded up to mm. When PDF417, it sets basically the height of each line (cf. example above; n=8 (i.e. 1mm) is advised).

Default: 128 (16mm).

### GS w n

---

Description: Set bar code magnification.

Format: <1Dh> <77h> <n>

Comments: Set bar code module width as multiple of 1/8mm. Module is the elementary bar/space on which bar code symbol is based. n should range from 2 to 6.

Default: 3.

Notes: - **bar code ratio** between thick and thin line is **2:1**.

- bar code printing is always **centred**.

- when magnification is too important, bar code width may exceed printing width. Therefore, bar code will be printed out from left paper side and truncated.

### GS H n

---

Description: Set bar code text position.  
 Format: <1Dh> <48h> <n>  
 Comments: Set position where HRI text (Human Readable Interpretation) of next barcodes will be printed out.

<b>n</b>	<b>TEXT POSITION</b>
0	Not printed
1	Above bar code
2	Under bar code
3	Above and under bar code

Default: HRI is not printed.

Notes: - HRI is printed out with the latest text features (font, width, height ...) and always centred.  
 - when PDF417, HRI text is never printed out. Before PDF417 printing, this feature is set automatically to “Not printed” and it is not restored after printing !

## GS R n

---

Description: Set normal/rotated bar code.  
 Format: <1Dh> <52h> <n>  
 Comments: n = 0: bar code printing is normal (horizontally),  
 n = 1: bar code printing is rotated of 90° (vertically).

Default: normal.

Note: when PDF417, printing is always horizontal. Before PDF417 printing, this feature is set automatically to “Normal” and it is not restored after printing !

#### 6.4.7. Real time control codes

2 requests are processed in real time: “**Send printer status**” and “**Reset printer**”. However, the suitable way to send these requests depends of communication line and context.

Bytes are received one after one directly by UART of microcontroller. So they can be processed whatever printer state (printer error or full buffer). In the case of full buffer (handshaking was set OFF by printer with “RTS or DTR” or Xoff), host should disable its own handshaking control before sending its real time request. Otherwise this control will prevent request to be sent.

- “**ESC v**” will be used to send a “Send printer status” request. Note that during graphic printing, it is possible that printer interprets graphic data as a “Send printer status” request (edge effect of real time processing implementation). Then printer will return its status. So when host needs to get some data from printer, it is advised to reset its receiving buffer before sending its request (in the case when this noisy answer has been received previously).
- “**ESC @**” will be used to send a “Reset printer” request. Note that this one will be processed in real time only if printer is in error so as to prevent the same edge effect explained above (fatal consequence this time !).

#### 6.4.8. *Hole / Black mark detection commands*

##### GS L n

Description: Set Mark length  
Format: <1Dh> <4Ch> <n>  
Comments: Set Mark length and switch from continuous paper feed to mark detection.  
n specifies the length of the mark in dot lines at 0.125mm. If n = 0 (Default) then the printer switches into continuous paper feed mode.  
Example: If n = 24 the length of the mark is equal to 3mm, and the printer enters the mark detection mode.  
The minimum mark length is 2mm and the maximum is 7 mm.

Note: this command is ignored if the printer is running in emulation mode. Also see the <ESC ‘F’>/<ESC ‘f’> commands.

Note: Sending this command clears the hole/mark detection error bit in the printer status.

##### GS T n1 n2

Description: Sets top of form (TOF) position  
Format: <1Dh> <54h> <n1> <n2>  
Comments: Defines the number of dot lines N between the end of the mark and the first printable line (TOF).  
 $N = (256 * n1) + n2$ . By default, N = 0 dot lines.

Note: It is possible to define a negative top of form distance. The value is represented with the two’s complement of the absolute value of the distance.  
For example, to specify a - 5 mm distance, N = - 40 = 65536 - 40 = 65496. n1 = 255, n2 = 216.

##### GS E

Description: TOF feed paper  
Format: <1Dh> <45h>  
Comments: Makes paper feed to the next TOF position.

##### GS Y n1 n2

Description: Set opto to head dot line length  
This code is to be used only if the opto position is different from that set on the printer by default.

Format: <1Dh> <59h> <n1> <n2>  
Comments: Defines the number of dot lines N between the opto position and the head dot line.  
 $N = (256 * n1) + n2$ .  
Values are a function of printer mechanism.

#### 6.4.9. Cutter settings Commands

When executing partial or full cut, the ticket is fed to the next cut position and then cut.

To avoid advancing and losing one ticket during power Off/On sequence, please do the following:

- Turn the printer off in top of form position.
- Turn the printer on and reconfigure the Hole / Mark detection by sending detection by sending all parameters (GS L, GS T, GS X and if necessary GS x).

#### GS X n1 n2

Description: Set mark to cut position length

Format: <1Dh><58h><n1><n2>

Comments: Defines the number of dot lines N between the end of the mark and the Cut position.  
 $Y = (n1 * 256) + n2$  (Default: N = 0).

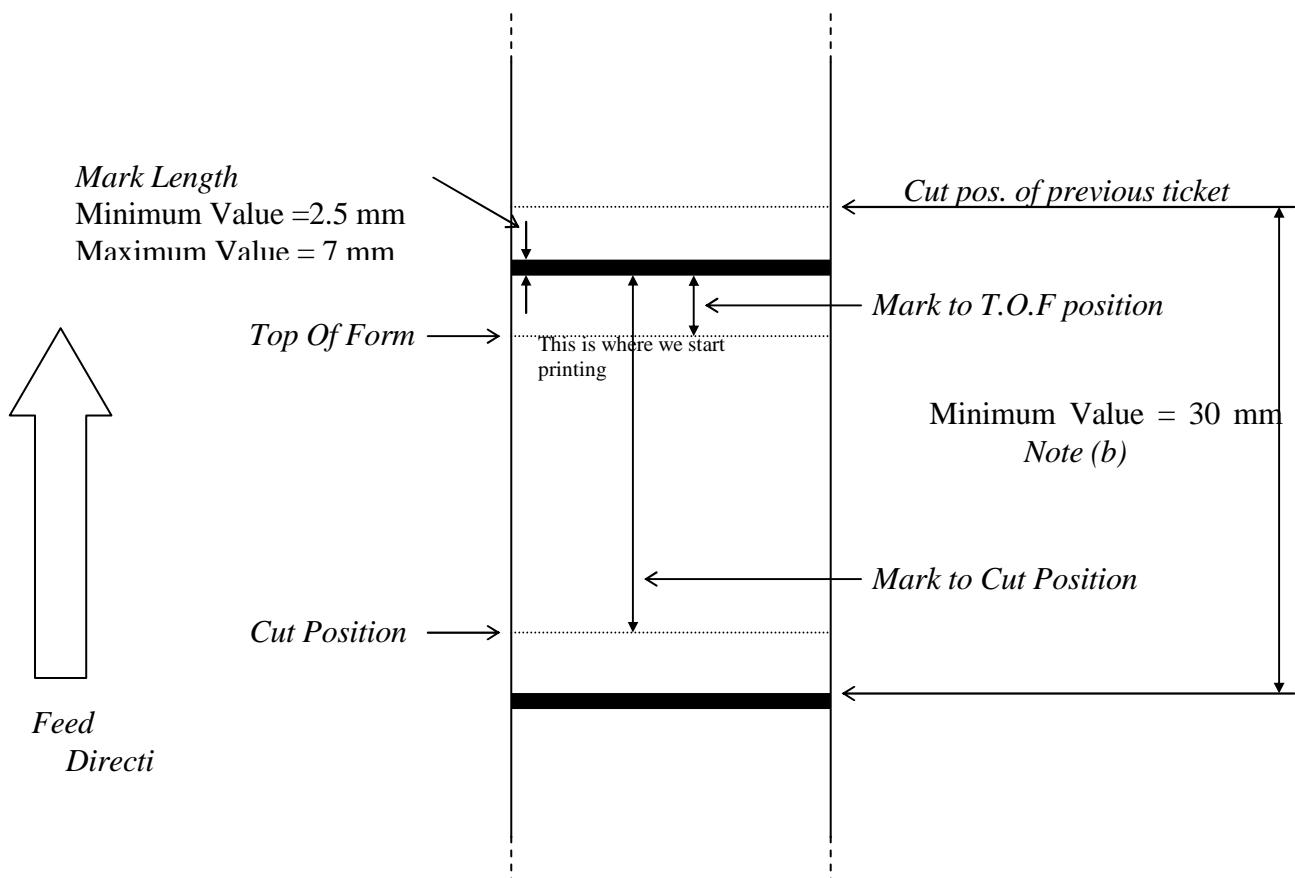
#### GS x n1 n2

Description: Set cut line to head dot line length

This code is to be used only if the cutter's blade position is different from that set on the printer by default.

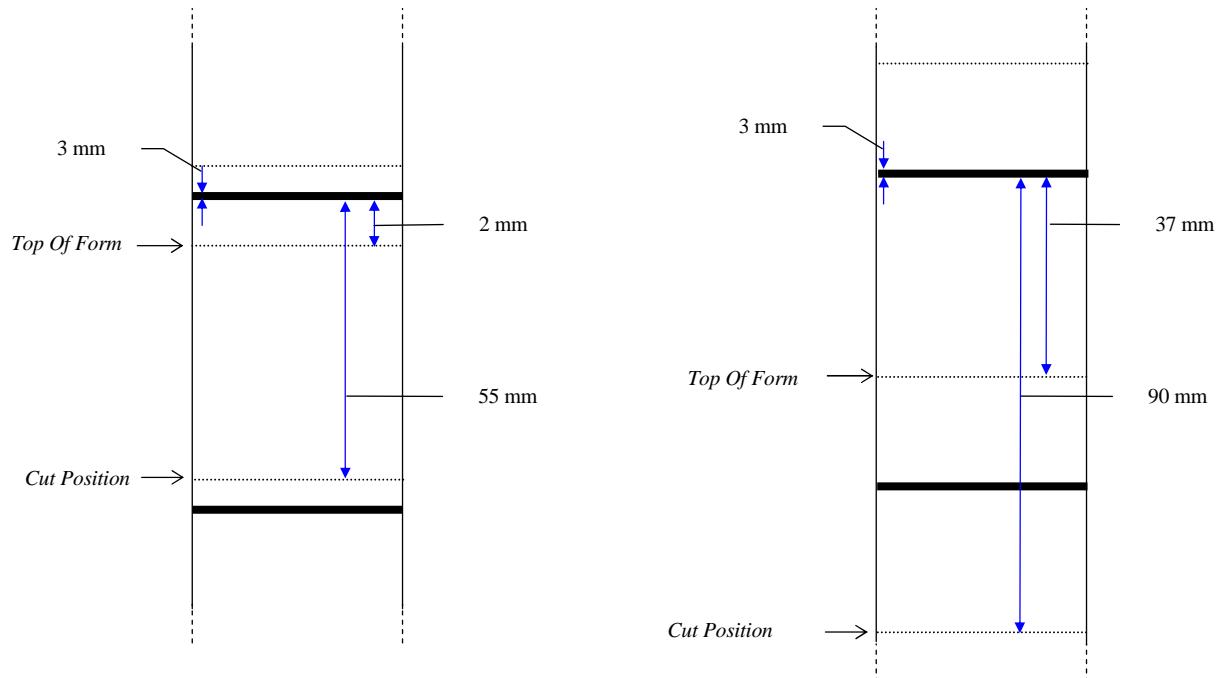
Format: <1Dh><78h><n1><n2>

Comments: Defines the number of dot lines N between the cut position and the head dot line.  
 $N = (256 * n1) + n2$ . By default, N = 88 dot lines.



**NOTES :**

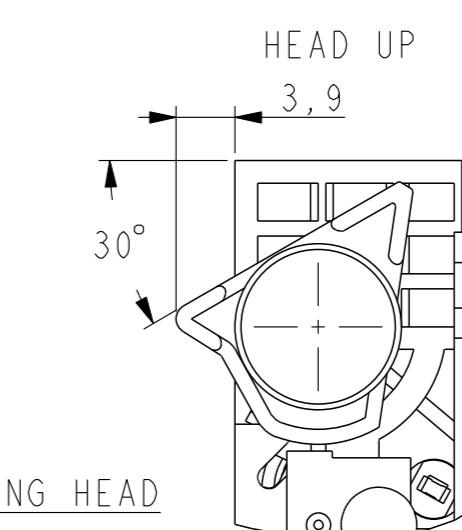
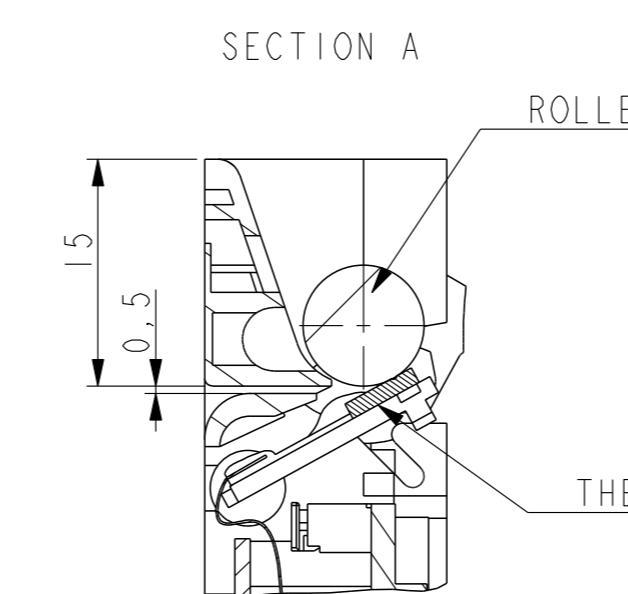
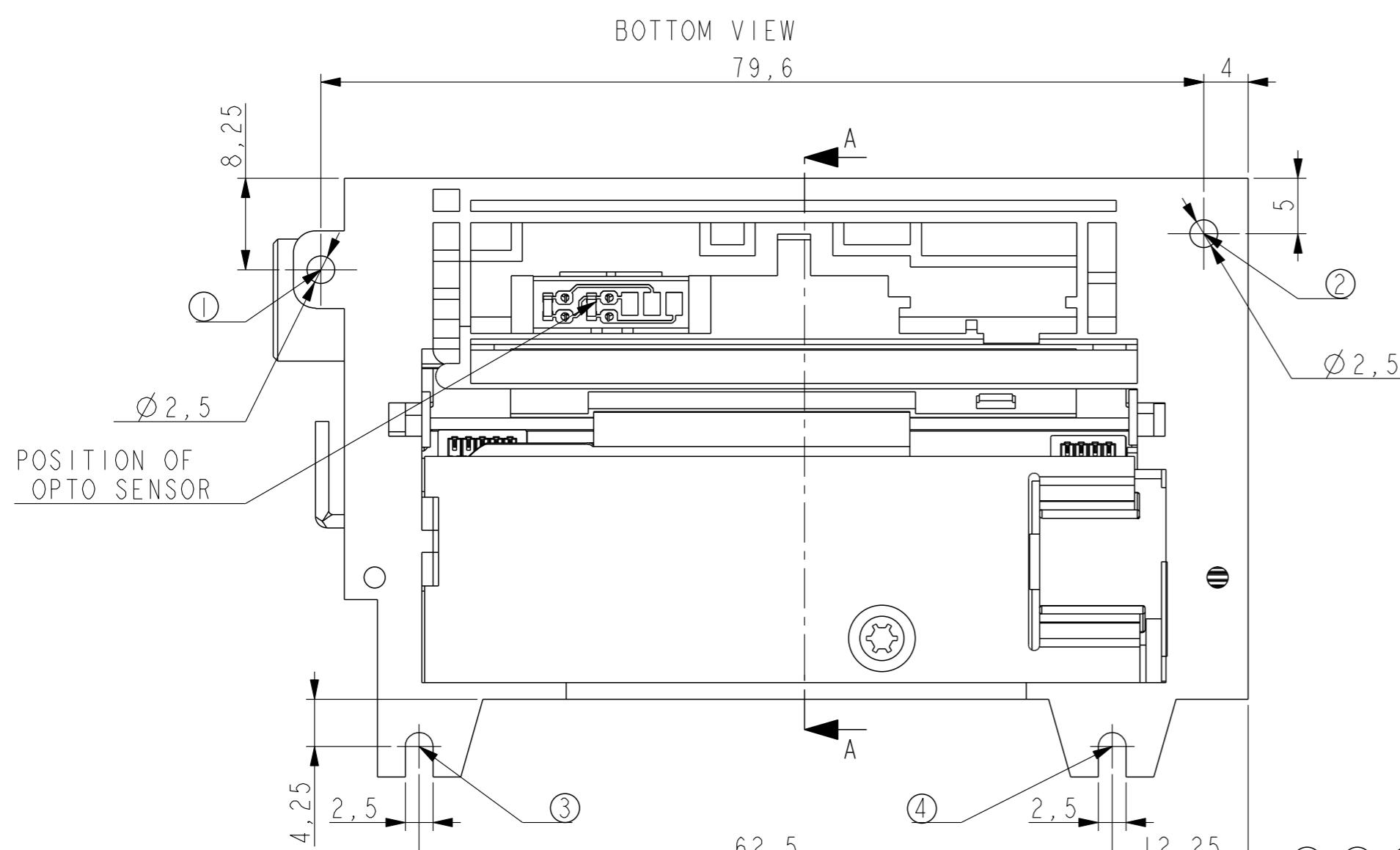
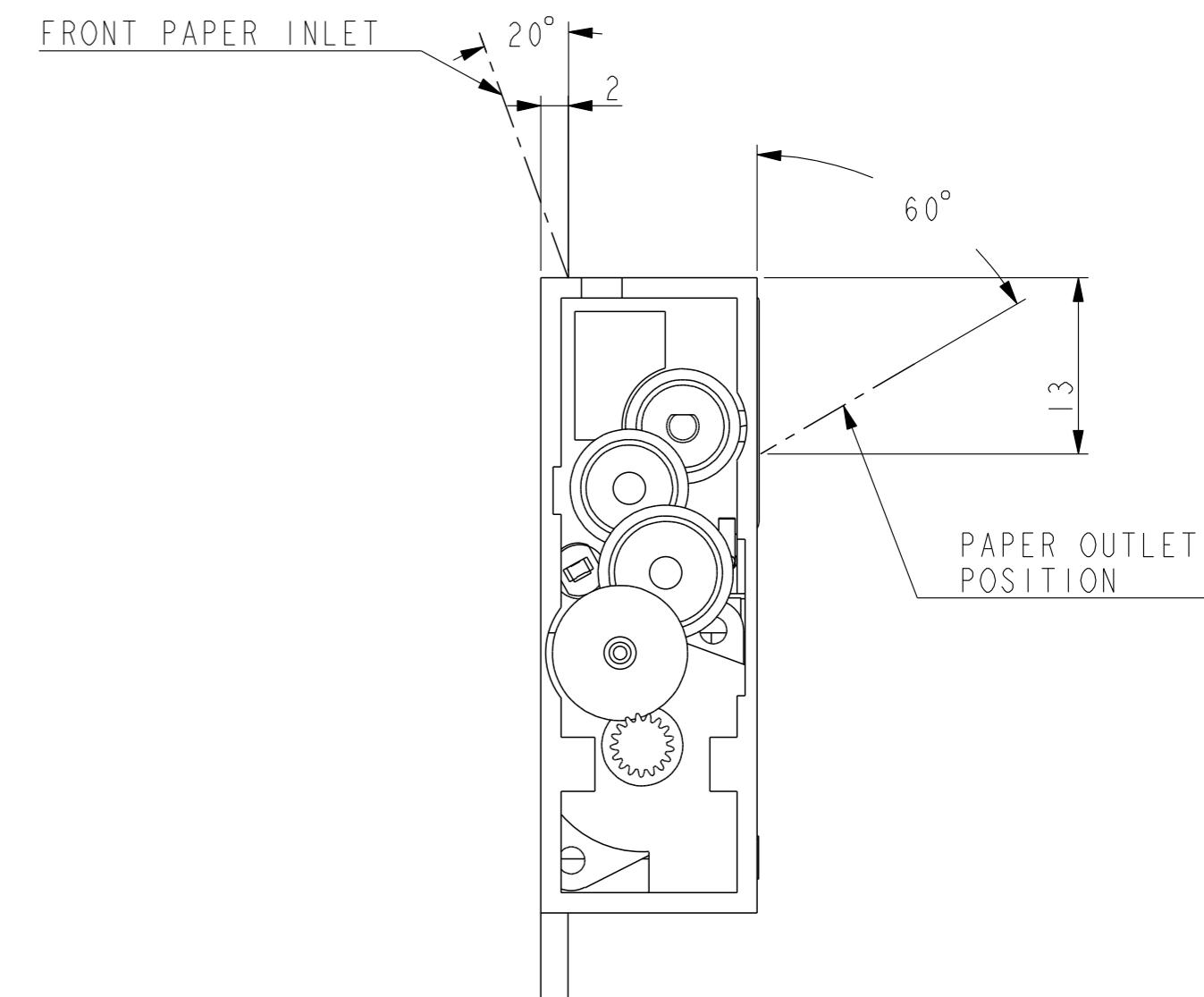
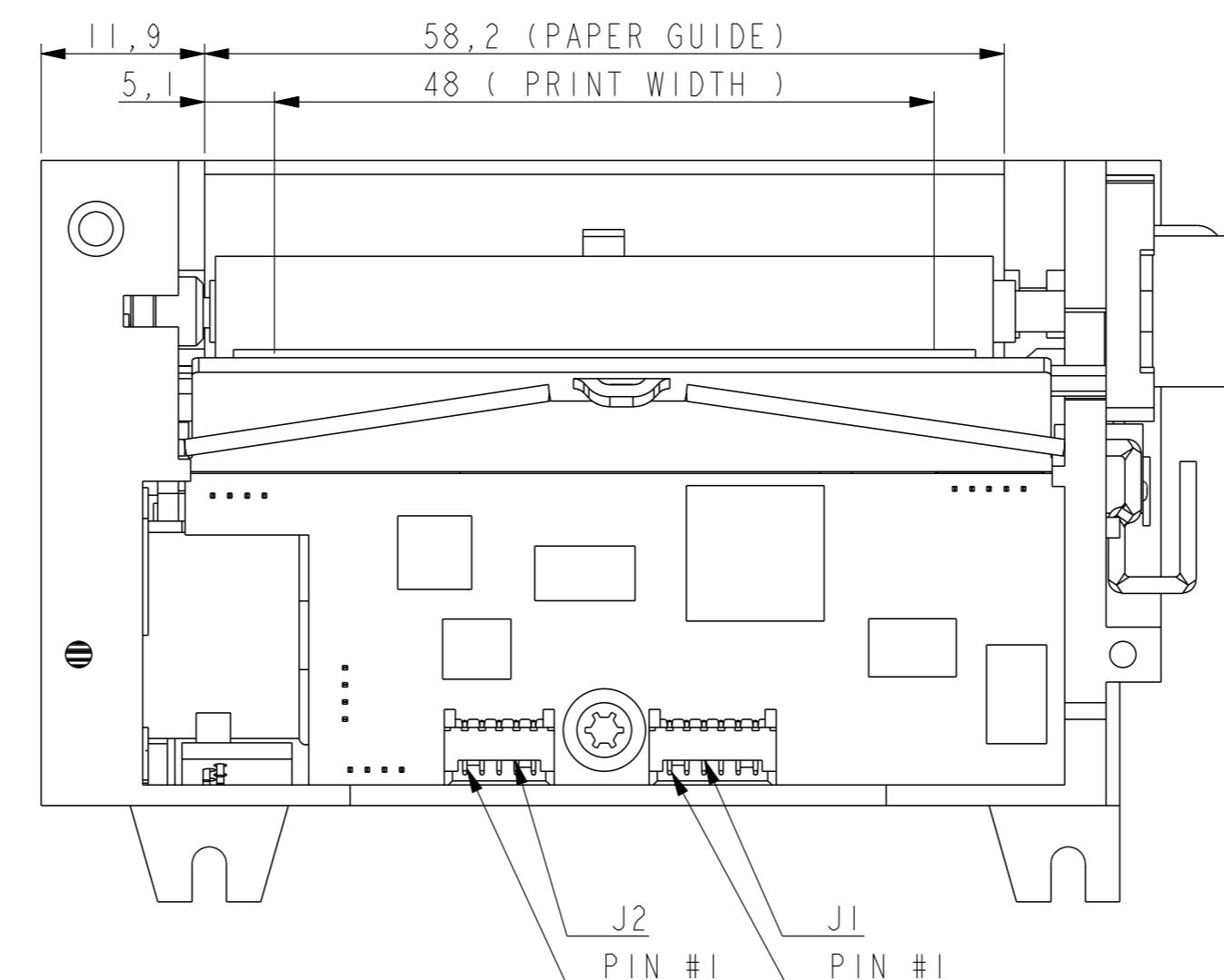
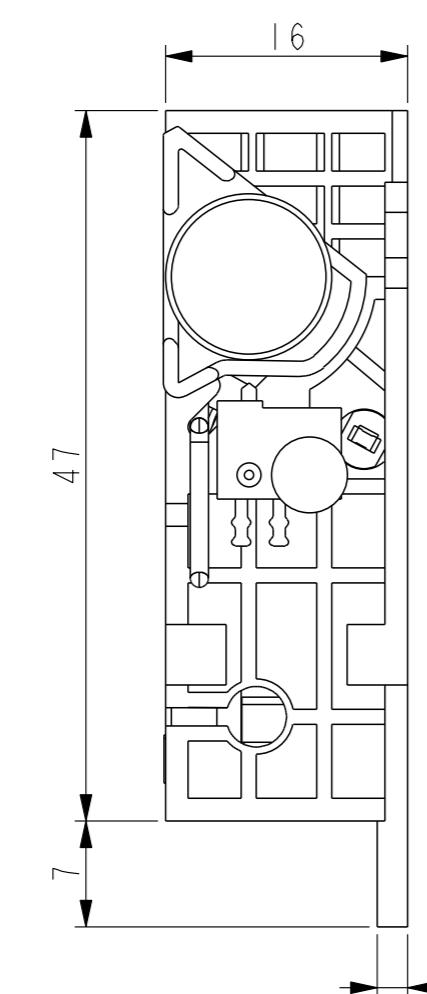
- (a) Make sure that Hole/Black mark fully covers the opto sensor window, according to the paper path chosen (front or bottom).
- (b) The distance between the cut position of the previous ticket and the mark of the next ticket should be superior to the distance (in terms of paper path) between the cutter and the opto (default: 24.5mm). A minimum distance of 30mm should provide reasonable margin.
- (c) For optimum performance, the paper should be guided, and in particular, the distance between the paper and the opto should be kept as constant as possible.

***6.4.10. Hole / Black mark detection examples***

**7. ORDERING CODE**

Description	Product Name	RoHS Compliant	Ordering Code
CP205-HRS, Front and Bottom Loading available	CP205-HRS Compact Printer 2" 5V w/build in driver board	YES	90CP2200
CP205-HRS, Front and Bottom Loading available	CP205-HRS-GCA Compact Printer 2" 5V w/build in driver board and cutter	YES	90CP2201

REVISIONI / (Revisions) : A: [TDP-2012-075] CREATION ( 25-SEP-2012 ) ;

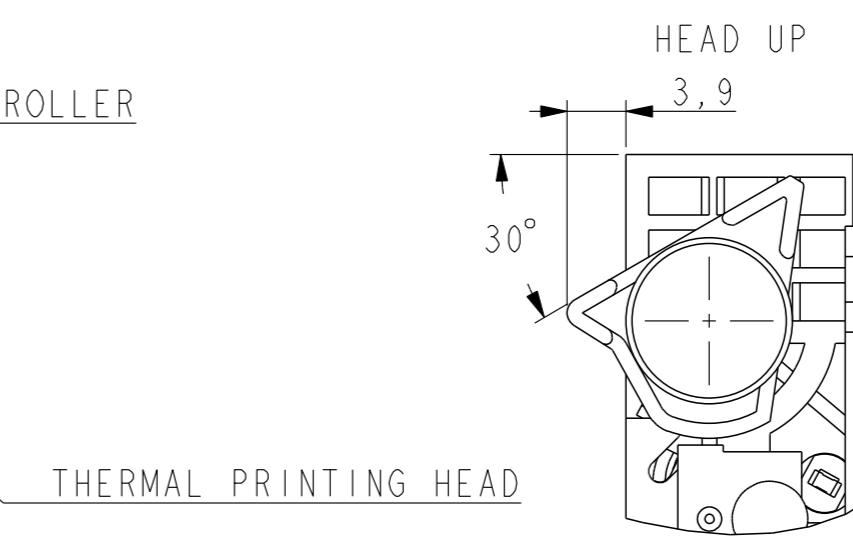
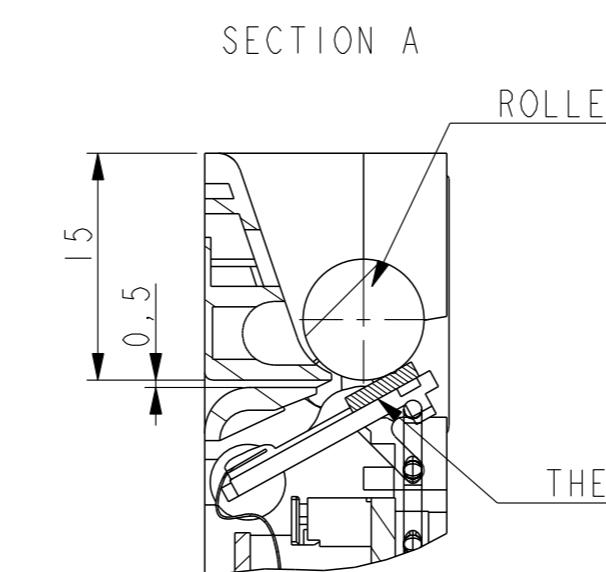
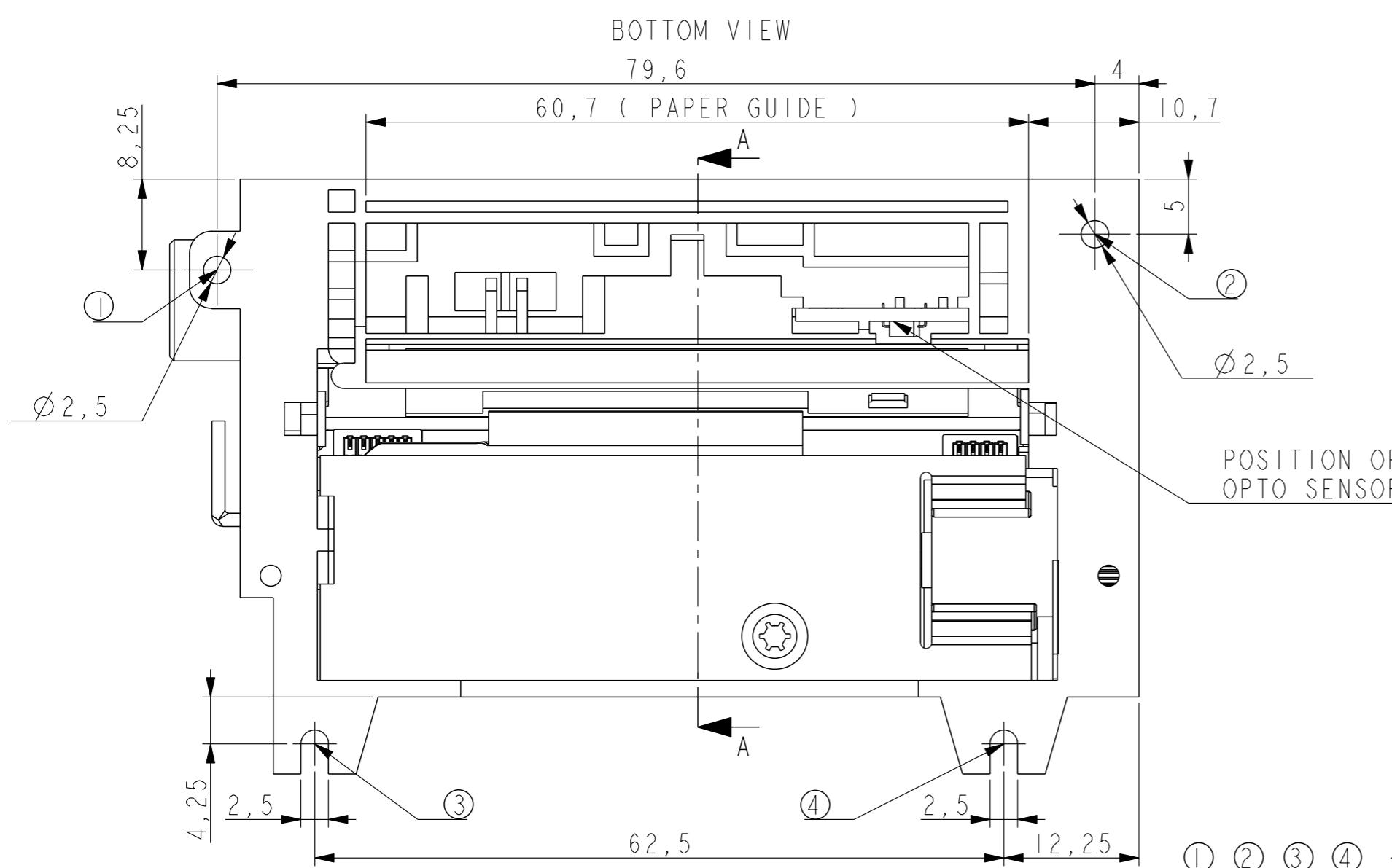
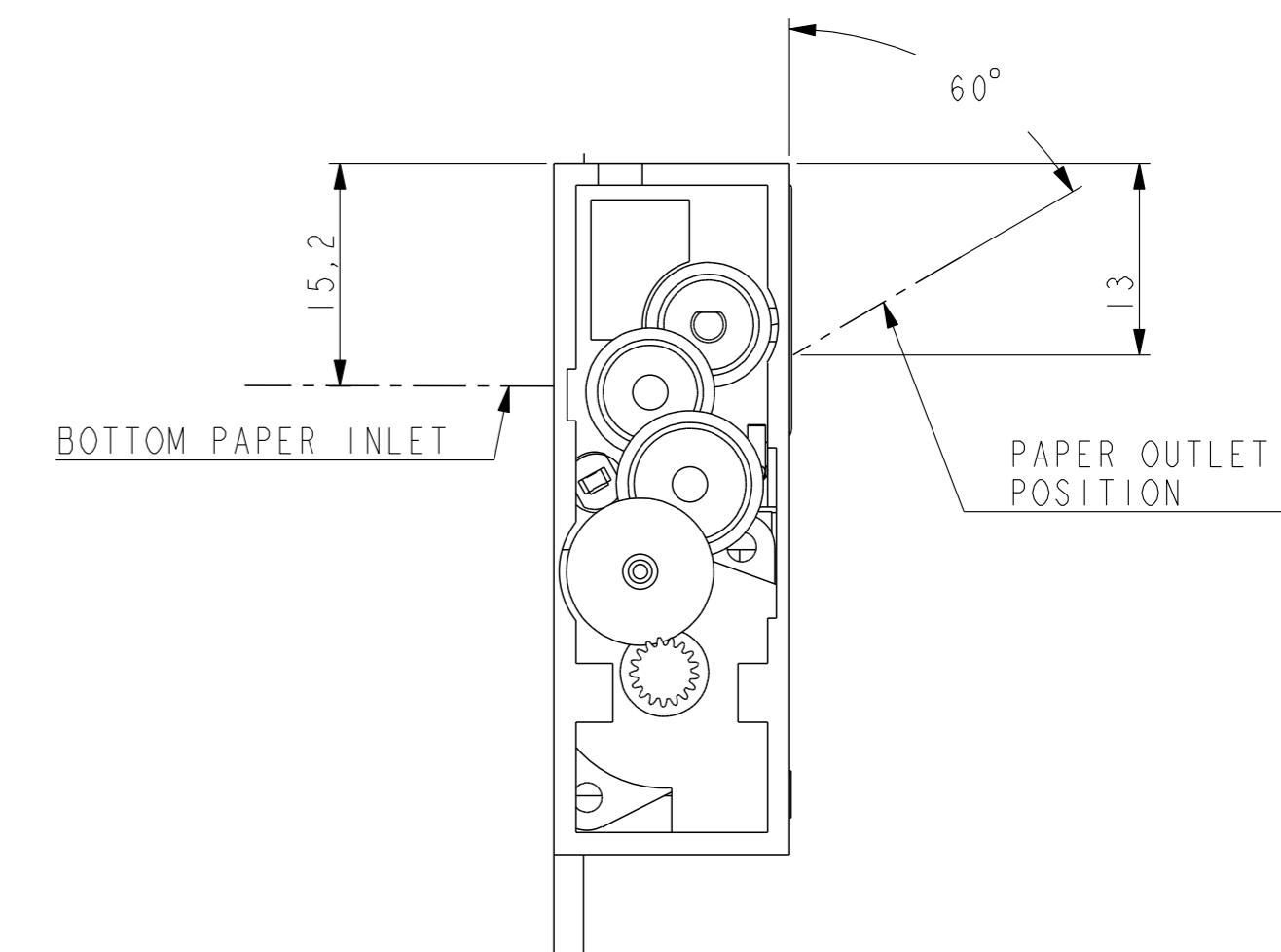
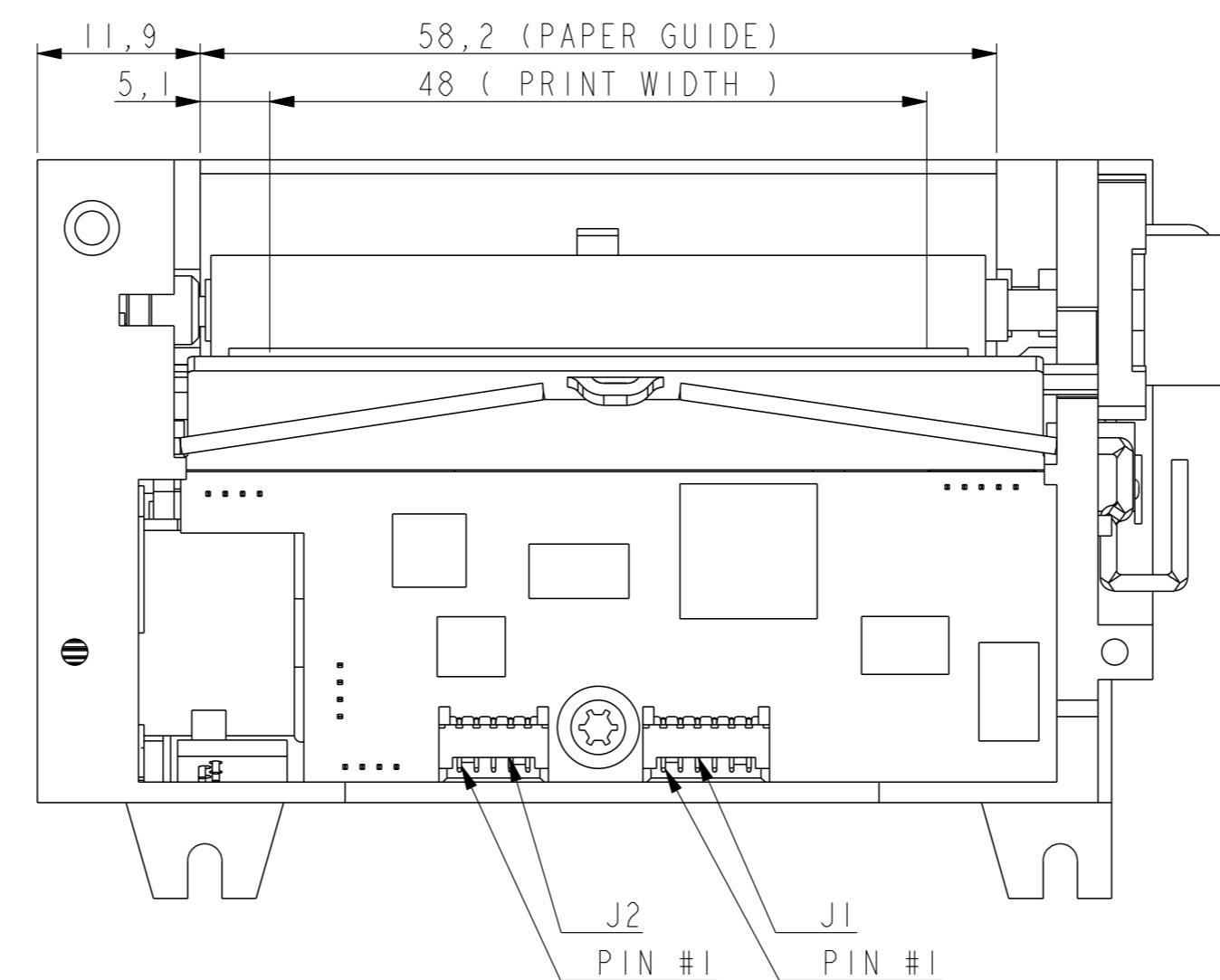
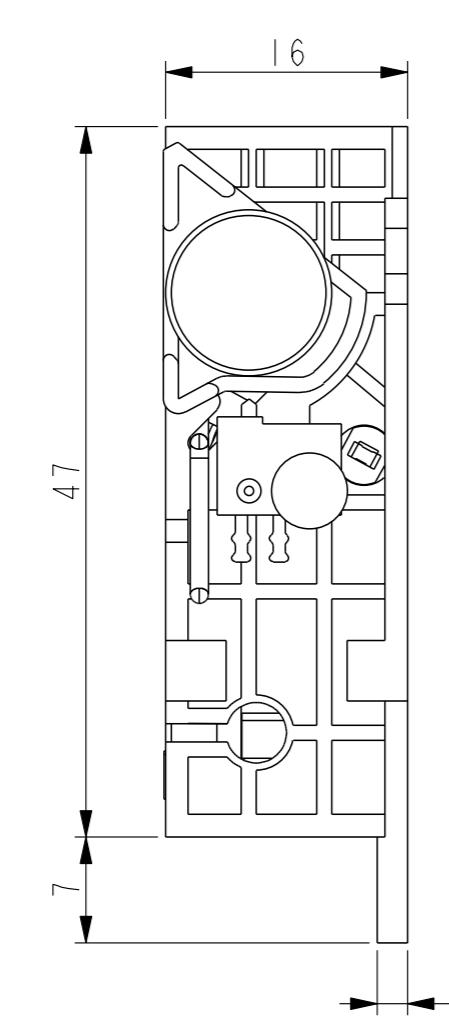


CONNECTOR	FUNCTION
J1	POWER SUPPLY
J2	SERIAL COMMUNICATION (RS 232)

① ② ③ ④ - POSSIBLE FIXING POINTS

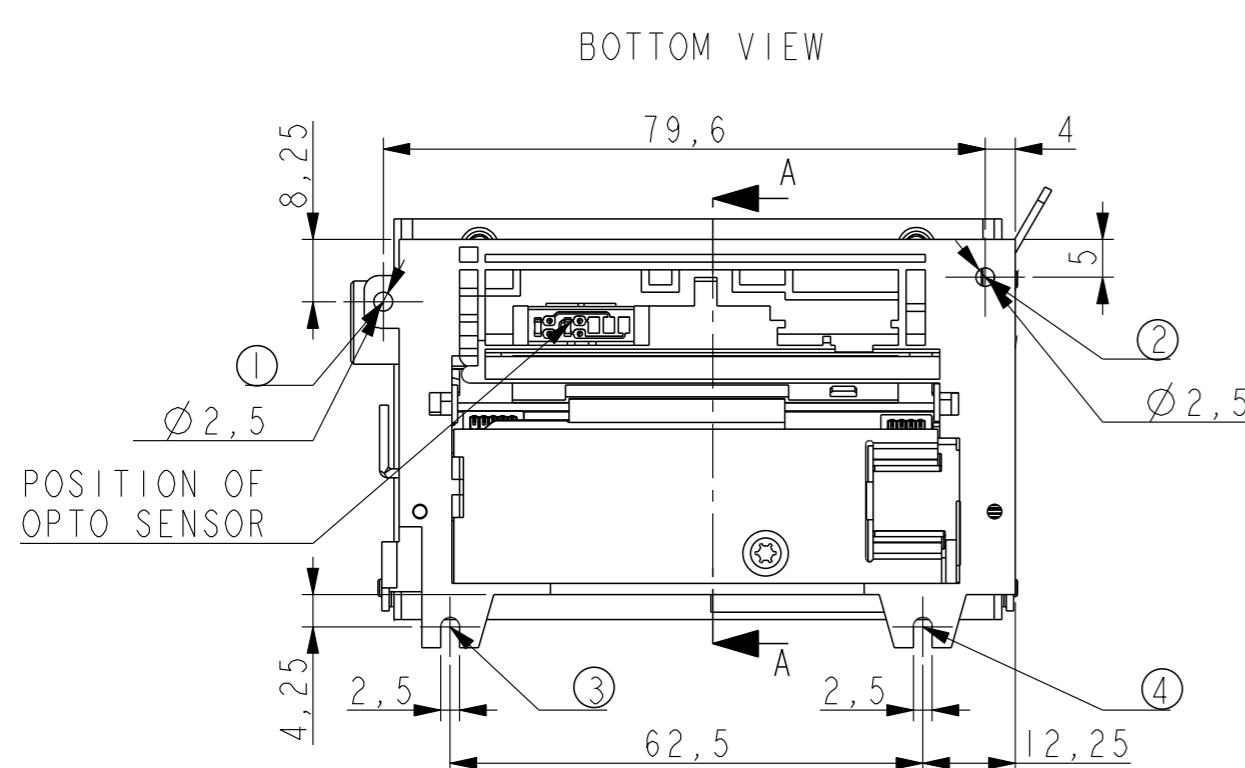
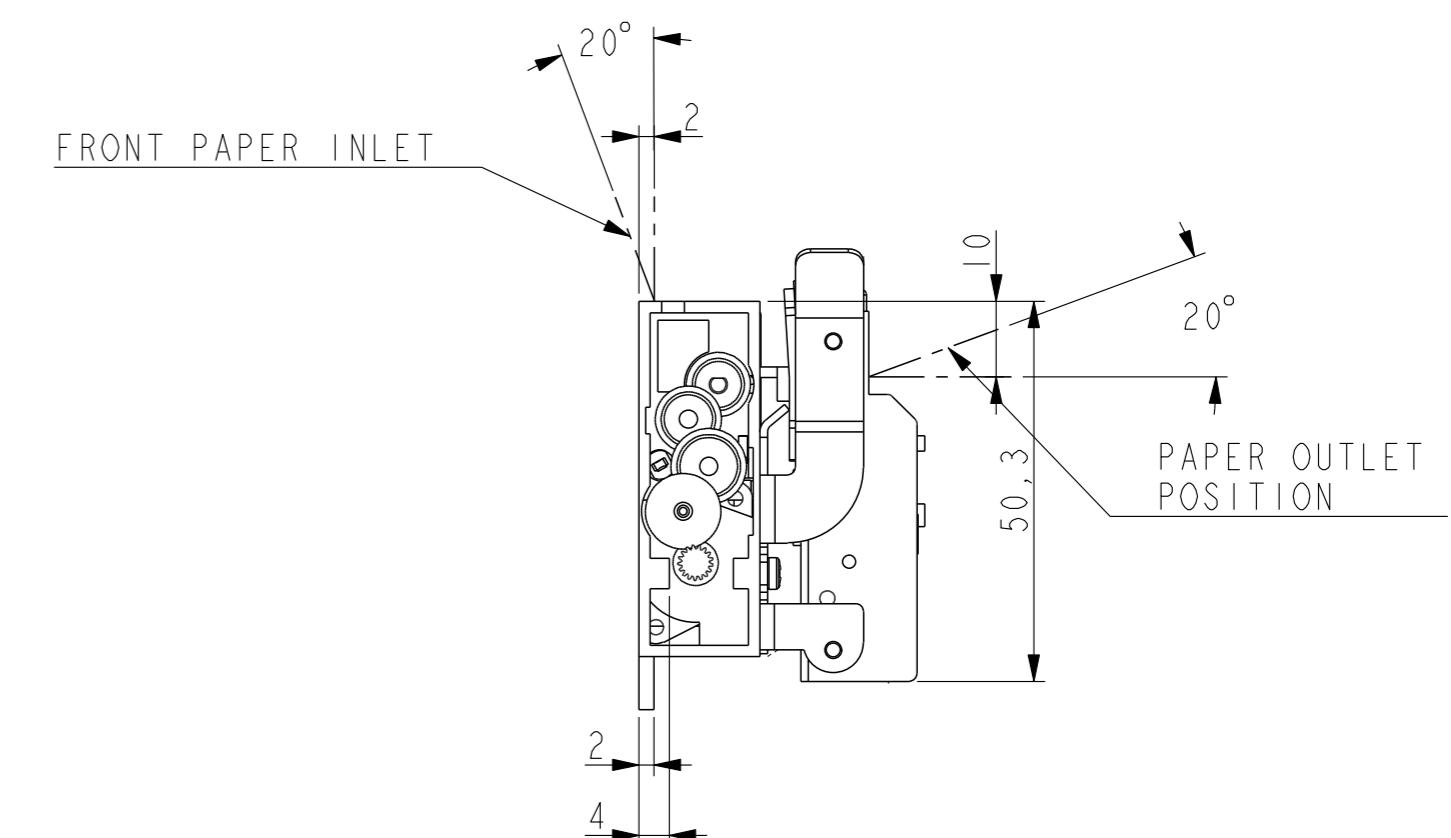
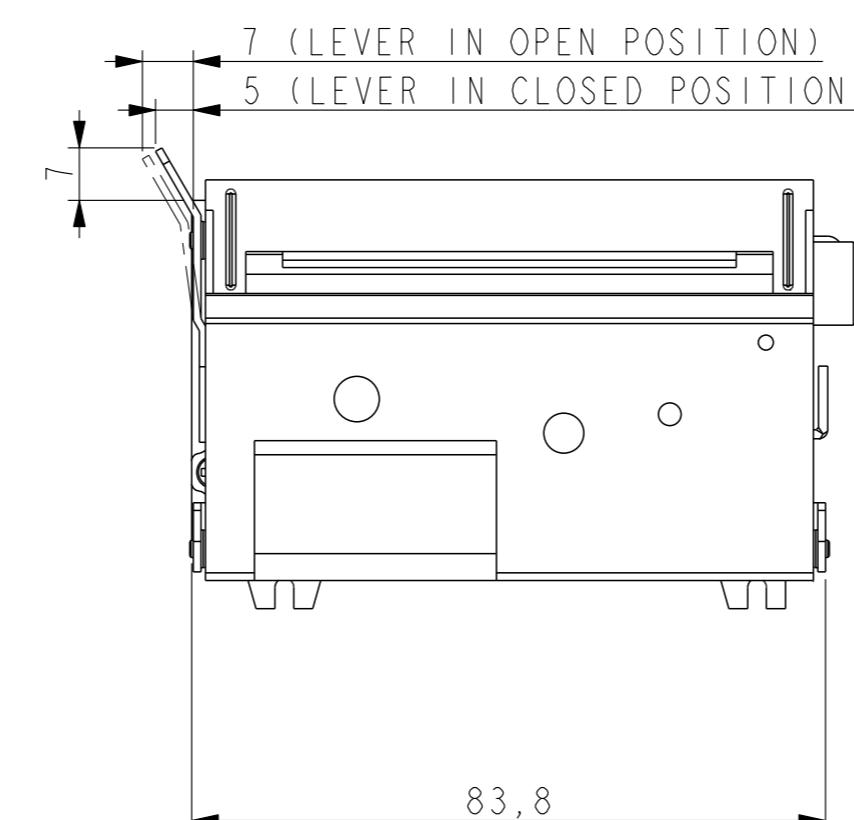
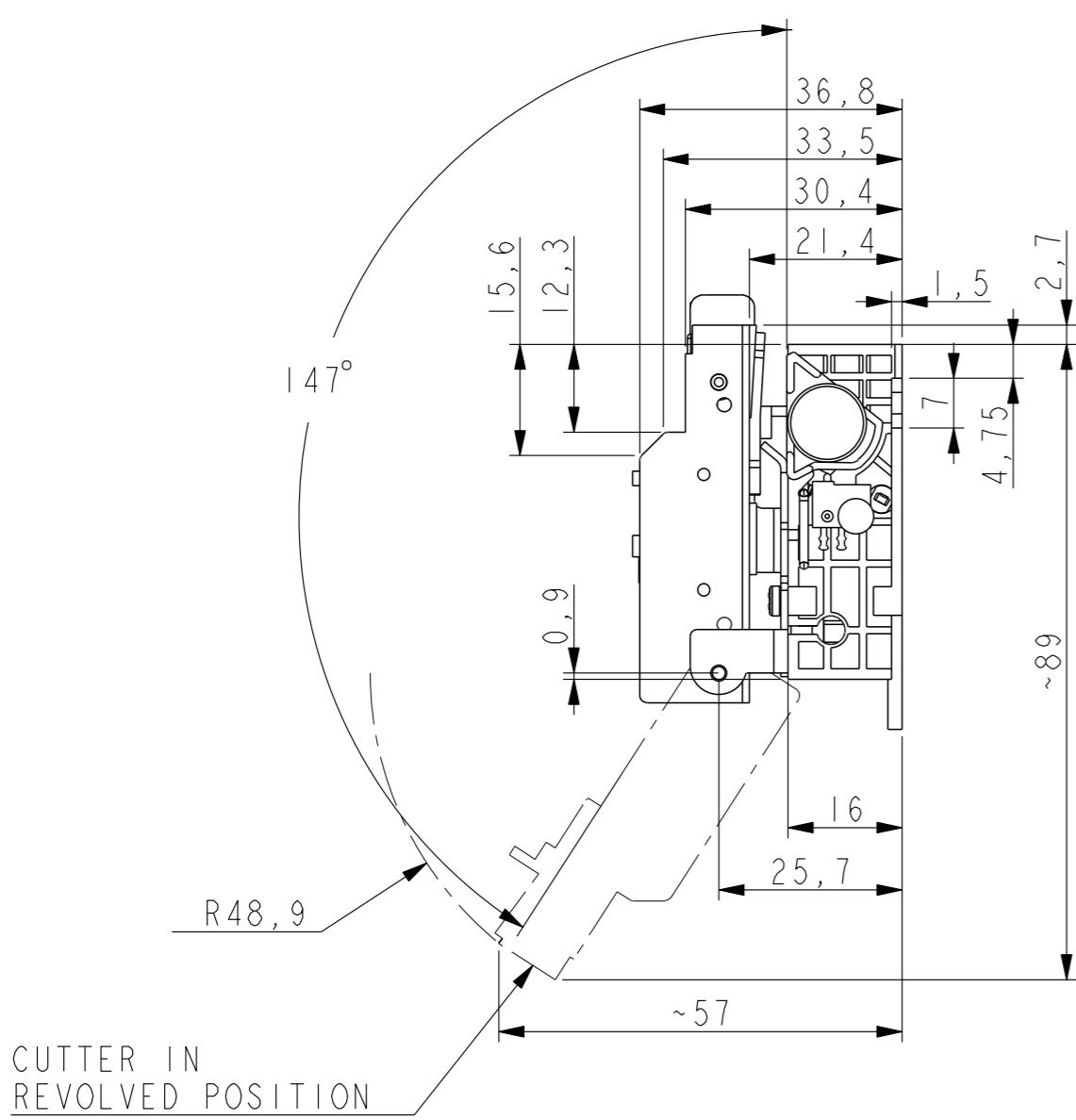
FORMATO-Size	REV.
A2	A
1	
90 CP2 200	

REVISIONI (Revisions) : A: [TDP-2012-075] CREATION ( 25-SEP-2012 ) ;

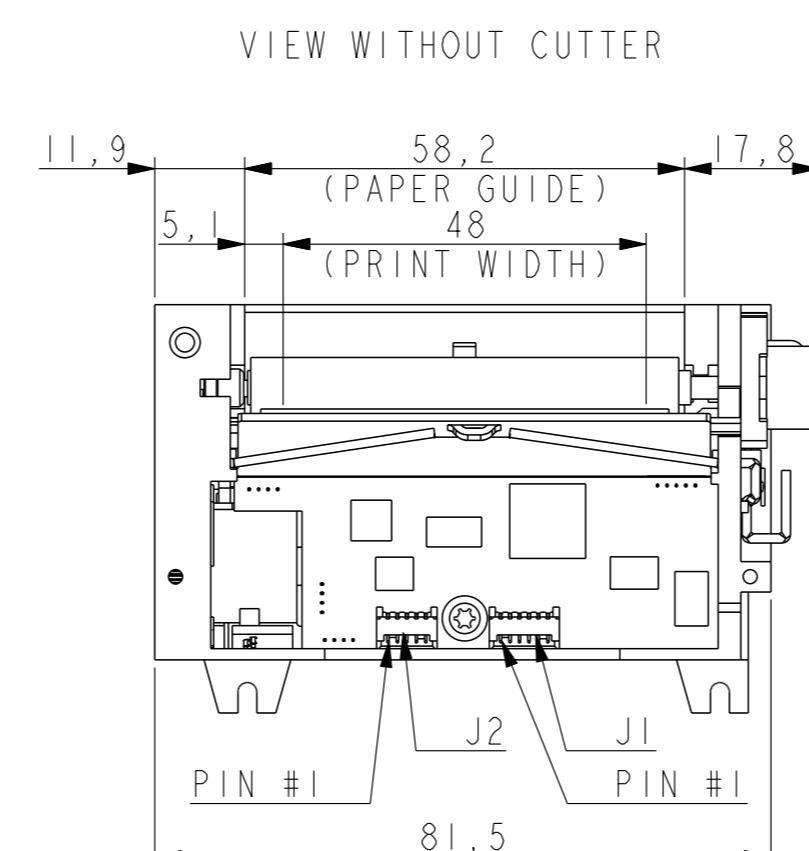


CONNECTOR	FUNCTION
J1	POWER SUPPLY
J2	SERIAL COMMUNICATION (RS 232)

CARTELLA/Folder	DESCRIZIONE / Description	FOGLIO/Sheet	FORMATO-Size
CP205		1	A2
DENOMINAZIONE/Denomination	N° DIS./Draw. No	REV.	
CP205-HRS (Bottom Loading)	90 CP2 200	A	



① ② ③ ④ - POSSIBLE FIXING POINTS



CONNECTOR	FUNCTION
J1	POWER SUPPLY
J2	SERIAL COMMUNICATION (RS 232)

MASSA Mass	UNITA' unit	DISEGNATO DA Drawn by	VISTO DA Checked by	DATA Date	SCALA Scale	ADS
	mm	SS	LY	25-SEP-2012	1:1	
CARTELLA/Folder CP205	DESCRIZIONE / Description				FOGLIO/Sheet	1
DENOMINAZIONE/Denomination <b>CP205-HRS-GCA</b>	N° DIS./Draw. No <b>90 CP2 201</b>				REV. <b>A</b>	

