

BPM205

Technical reference



Printer overview

The BPM205 is a 2'', 5V, standalone easy loading printer. It includes 2 communication interfaces that are a serial communication port (RS232) and an Infrared communication port (IRDA). This printer is powered by 5 rechargeable batteries (1.2V NiMH 1500mAh) that make it completely standalone combined with IRDA interface. Here are the main features of the BPM205:

- **Fully hot plug printer mechanism.**
- **Software programmable consumption.**
Dynamic division, and high speed (up to 60mm/s).
- **Sleep mode.**
Current consumption <10nA.
Wake-up on serial port or integrated Keyboard.
- **Integrated keyboard with Paper Feed and ON-OFF Line push buttons.**
- **Battery powered.**
5 cells NiMH battery cells.
Built-in battery charger control.
- **2 Communication interfaces.**
RS232 (speed up to 115200 Bds).
IRDA.
- **Programmable default setup parameters.**
The user can modify defaults parameters by using Keyboard buttons.
- **Internal fonts.**
Easy font updating.
- **Built in reception buffer.**
64 Kbytes reception FIFO.
- **Powerful Text Printing Modes.**
Horizontal.
180 degree.
Double and Quadruple width and height printing.
Inverse video.
Underlined.
- **Powerful Graphic Modes.**
- **Hole / Mark Detection.**
- **10 Barcodes.**
- **Printer setup parameters can be saved in flash.**
- **Windows drivers available.**

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1. REVISION HISTORY

Rev. Index	Date	Page/Sec.	Description	Author
A	24 Jan 2003	-	First issue	CF
B	17 Jul 2003	-	Firmware rev 1.2	CF
C	9 Oct 2003	-	Firmware rev 1.3	NT

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

This manual provides complete information about the **BPM205** Box Printer Module “Easy Loading Printer”.
The present specification is valid also for customized types, where the different condition has not effects for common data (e.g.: different color 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 within.
The warranty terms of the product are described in a separate document, ask **A.P.S.** to obtain this document.

2. INSTALLATION AND USE

2.1 Unpacking the printer

Remove the printer from its carton being careful not to damage the packing material so that it may be re-used if the printer is to be transported in the future.

Make sure that all the components illustrated in figure are present and that there are no signs of damage. If there are, please contact Customer Service.



1. **Printer.**
2. **Paper roll.**
3. **Serial Cable.**
4. **Batteries, 5 pcs.**
5. **User manual and software utilities CD-Rom.**
6. **Battery charger (option: to be ordered separately).**
7. **Mains plug for power supply (option: to be ordered separately).**
8. **Wall-mount base (option: to be ordered separately)**

2.2 Handling the printer

2.2.1 *Opening the cover*

Lift the Lever, acting as indicated by the arrow, until the Cover Group is released from its locking position.

To avoid Lever damages do not use excessive force.



2.2.2 *Loading the paper roll*

Position the paper roll so that it unrolls in the direction shown below.



Pull up on the edge of the paper and close the cover.



2.2.3 *Closing the cover*

Press on both sides of the Cover Group (simultaneously).



Alternatively: Press on the middle area of Cover Group (near the paper exit).



Do not close the Cover Group pressing only on one side.



2.2.4 *Cutting the paper*

Pull the paper towards the Tear Bar from one side to the other.

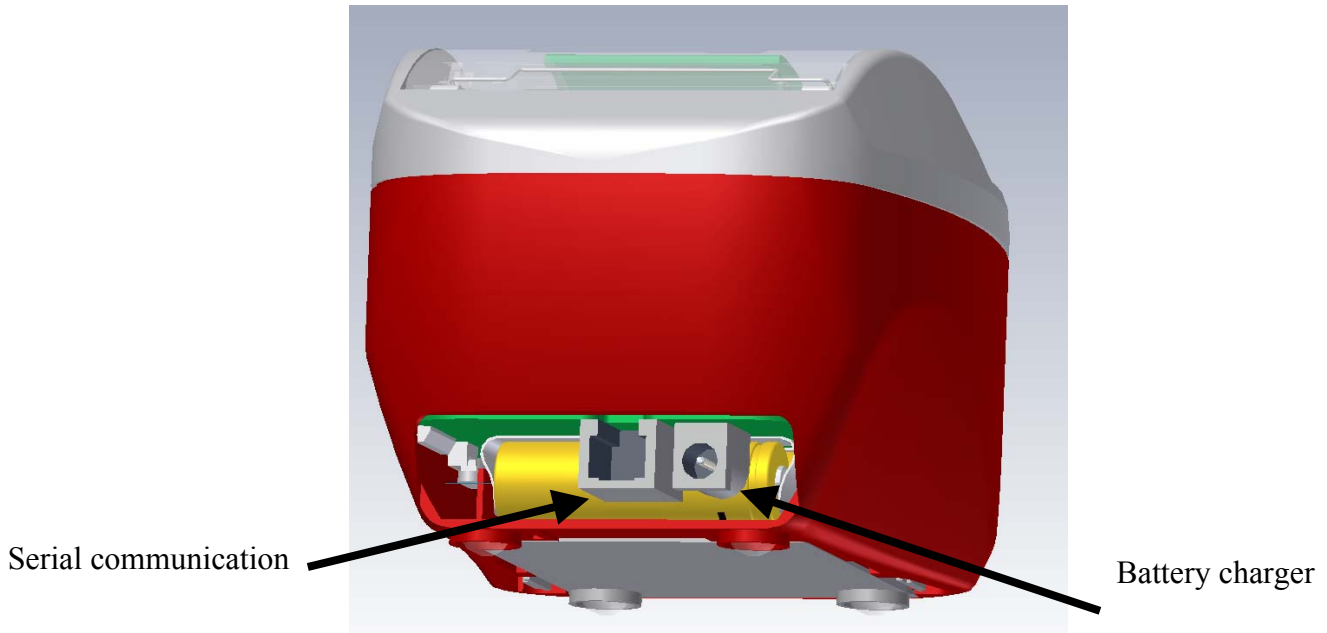


2.3 Maintenance

2.3.1 *Cleaning*

- To clean the printer, use a vacuum cleaner or soft cloth.
- Before cleaning the printer, unplug its electrical cord and make sure that the printer is off.
- Do not use alcohol, solvents or hard-bristled brushes.
- Do not let water or other liquids seep into the printer.

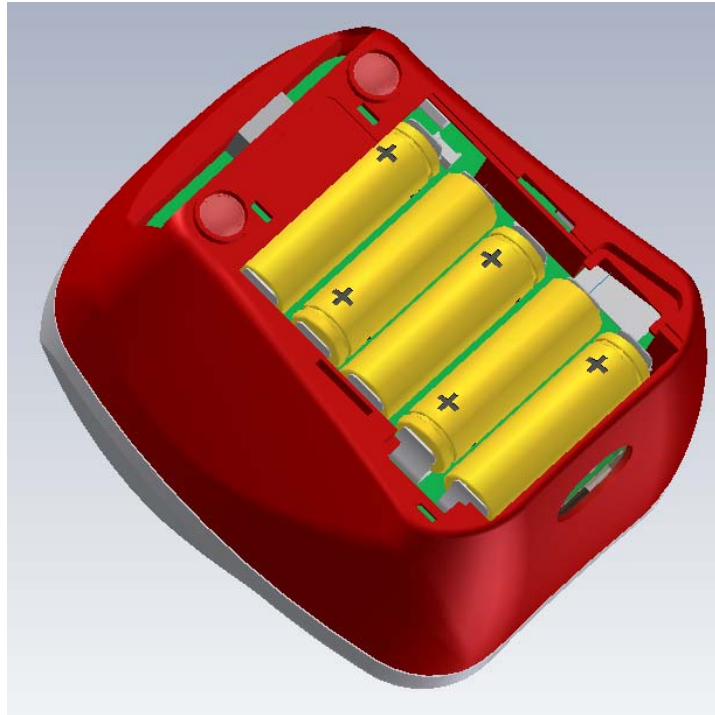
2.4 Serial communication connector and Battery charger connector



The printer is equipped with an RS232 serial interface with RJ11 connector located at the back of the printer. The battery charger connector is located at the back of the printer too.

2.5 Batteries

2.5.1 Charging batteries



The battery charger provided with the printer is suitable to supply the electronics and to recharge the batteries at the same time. It can be connected to the printer only for charging the batteries (cyclic use) or permanently, during normal printing operations, to maintain the batteries always at their maximum level of charge.

IMPORTANT !

Batteries must be fully charged before using the printer for the first time. To reach a complete charge the printer must be connected to its charger for at least 14 hours or more.

Note:

- Please note that the new NiMH battery reaches maximum performance levels only after having been completely discharged and recharged at least two or three times.
- Never use battery rechargers and/or batteries that are damaged or worn.
- Battery life varies greatly depending, for example, on print density and the text to be printed.
- Recharge times vary depending on depletion levels, type of battery and battery recharger used. Batteries may be recharged and discharged hundreds of times, but they do wear out over time. When battery life (both print and stand-by) is noticeably shorter than usual, it is time to buy new batteries.
- Only use batteries that conform to specifications and only recharge them using battery chargers approved by APS ENGINEERING.
- NiMH batteries last longer if you remember to completely discharge them every so often.
- Extreme temperatures can affect battery charge levels—leave them to cool or warm as required.

2.5.2 *Replacing batteries*

Please use only rechargeable batteries. Use of non-rechargeable batteries would void any warranty and can seriously damage the printer.

2.5.3 *Disposing of batteries*

- Batteries must be recycled or disposed of properly.
- Do not throw batteries away as part of normal refuse disposal.
- Do not throw batteries into flames.

2.6 General safety information

- Read and keep the instructions which follow.
- Before cleaning the printer, disconnect the power supply and make sure that the printer is off.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near water.
- Only use approved accessories and batteries. Do not connect to products that are not compatible.
- Use the type of electrical power supply indicated on the printer label. If in doubt, contact your retailer.
- When deciding where to place the printer, make sure it is positioned where its cables will not be damaged.
- Do not introduce foreign objects of any kind into the printer as they could cause a short circuit and could jeopardize printer functioning.
- Do not spill liquids onto the printer.
- Do not carry out technical operations on the printer, with the exception of the scheduled maintenance procedures specifically indicated in the user manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician when:
 - Paper feed or ON/OFF line connectors have been damaged.
 - Liquid has seeped inside of the printer.
 - The printer has been exposed to rain or water.
 - The printer is not functioning normally despite the fact that all instructions in the users manual have been followed.
 - The printer has been dropped and its outer casing damaged.
 - Printer performance is poor.
 - The printer is not functioning.

3. TECHNICAL SPECIFICATIONS

3.1 General specifications

Item	Specification		
Dimension W x D x H (mm)	100 x 120 x 90		
Paper width	58mm +0/-1 mm		
Paper roll size	Max. Ø49.5mm (external diameter)		
Print method	Thermal dot-line printing		
Number of dots	384		
Dot density	8 dots/mm		
Print width	48 mm (centered on paper)		
Heat element pitch	0.125 mm		
Paper feed pitch	0.125 mm		
Paper feed tension	50gf or more		
Paper hold tension	80gf or more		
Recommended Paper	JUJO-AF50KS-E (standard grade) JUJO-AF50KS-E3 (high sensitivity) Equivalent types can be used		
Voltage range	From 5V to 8.5V		
Current consumption	From 1.5A to 5A at 5V (peak for 3ms) ≤10nA (in OFF mode)		
Operating temperature	From 0°C to +50°C		
Operating humidity (RH%)	20-85 (no condensation)		
Storage temperature (°C)	From -40°C to +90°C		
Storage humidity (RH%)	10-90 (no condensation)		
EMC standard	Designed to comply with Level B – FCC - CE		
Mechanism life			
	Durability	Basic conditions	Maximum variations
Thermal head pulse resistance	100 million pulses	- Room temp.: 20/25 °C	Max. 15% in resistance value (Ω) of any dot, from its initial value
Abrasion/wear resistance	50 km of paper		
Cover Group, Opening/closing cycle	2000 operations or more		-

3.2 Interfaces

3.2.1 Battery charger

3.2.1.1 Battery charger characteristics

This printer must be connected to its charger to provide a correct recharge of the internal batteries. Specifications of the charger are listed below.

Input specification

- AC input voltage range: 90Vac to 264Vac
- AC input current: 0.25A at 120Vac with max. Load
0.125A at 240Vac with max. Load
- AC input frequency: 47Hz to 63Hz

Output specification

- Output voltage: +15Vdc
- Output current: 0.33A max.
- Min. load current: 0A
- Output ripple: 150mVp-p
- Output power: 5W max. Continuous

General characteristics

- Operating temperature: 0 to 40 °C
- Operating relative humidity: 10 to 90% non-condensing
- Operating altitude: 3000m (or 10000 feet) max.

Reliability

- MTBF: 150000 hours at full load, 110Vac, 60Hz, 25°C

IMPORTANT !

If the printer is used with a charger different from its original one, output voltage and power must be chosen accordingly.

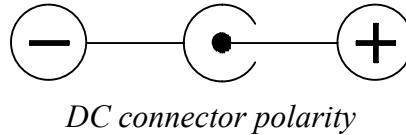
Moreover, to avoid risk of fire, care must be taken to provide a power source fully protected from overloads and short-circuit.

CAUTION !

Never use the printer without internal batteries or with damaged batteries because the charger can't source the needed power.

3.2.1.2 Battery charger connector

The DC input connector is a coaxial jack with +15V on internal contact and GND (0V) on the external one, as shown in the figure below. It matches with DC plugs with inner contact diameter of 2.5mm and outer diameter of 5.5mm.



3.2.2 Communication interfaces

3.2.2.1 Serial cable layout

For serial connection a serial cable is packed with the printer this cable has: on one side a 9 pins female connector and on the other side of the cable is a RJ11 connector.

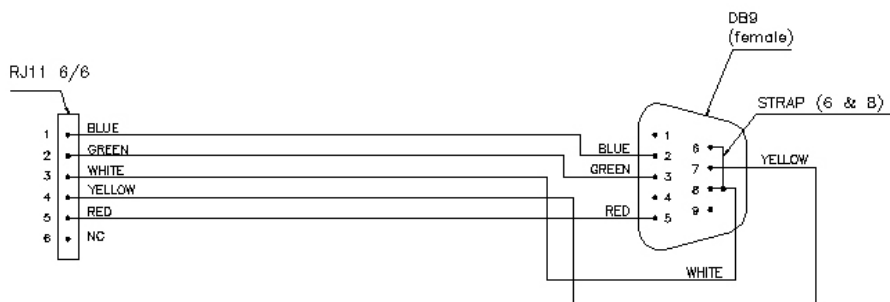
Layout of signals on RJ 11 connector (Printer side)

Pins	Signal	In/Out	Description
1	TX	OUT	Transmit data
2	RX	IN	Receive data
3	RTS	OUT	Request to Send
4	CTS	IN	Clear to Send
5	GND	-	Ground Signal
6	NC	-	-

DB9 connector (Computer side)

Pins	Signal	In/Out	Description
1	NC	-	-
2	RXD	IN	Receive data
3	TXD	OUT	Transmit data
4	NC	-	-
5	GND	-	Ground signal
6	DSR	IN	Data set ready
7	RTS	OUT	Request to send
8	CTS	IN	Clear to send
9	NC	-	-

Cable interconnections:



3.2.2.2 IRDA communication

The printer has an IRDA (Infrared) interface for bi-directional, half-duplex, wireless data exchange. The infrared port is centered on the lower part of the front side of the printer.

The infrared communication port acts as a RS232 interface half-duplex without handshaking, so when printing with the IRDA interface the control codes used are the same than the RS232 interface. These control codes are described in the “*Operating Control Codes*” section.

Note:

**When IRDA is activated, if characters are received on RS232, characters echoed back will be done on IRDA interface.
But when RS232 is activated IRDA interface is completely deactivated.**

3.2.2.3 Serial/IRDA mode selection

Serial or IRDA mode can be selected by activating or deactivating IRDA communication bit (GS B control code):

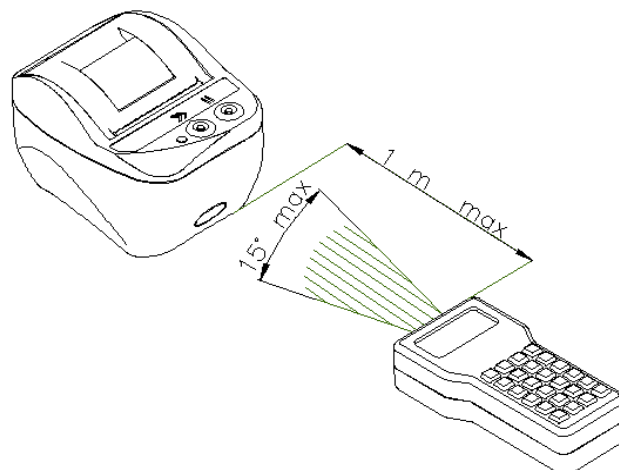
- Serial is enabled when IRDA is disabled.
- Serial is disabled when IRDA is enabled.

Note:

The BPM printer has a built in memory module composed of a 512Kbits (64 Kbytes) SRAM memory reception buffer. This module is used in RS232 and IRDA communication interfaces to allow big tickets reception (up to 64Kbytes per ticket) without any software handshake (IRDA).

3.2.3 Positioning the printer with IRDA interface

Place a computer, conforming to the printing instructions, not more than 1 meter away from the printer’s infrared port. Make sure the two modules are placed in front of each other with an angle not more than 15°.



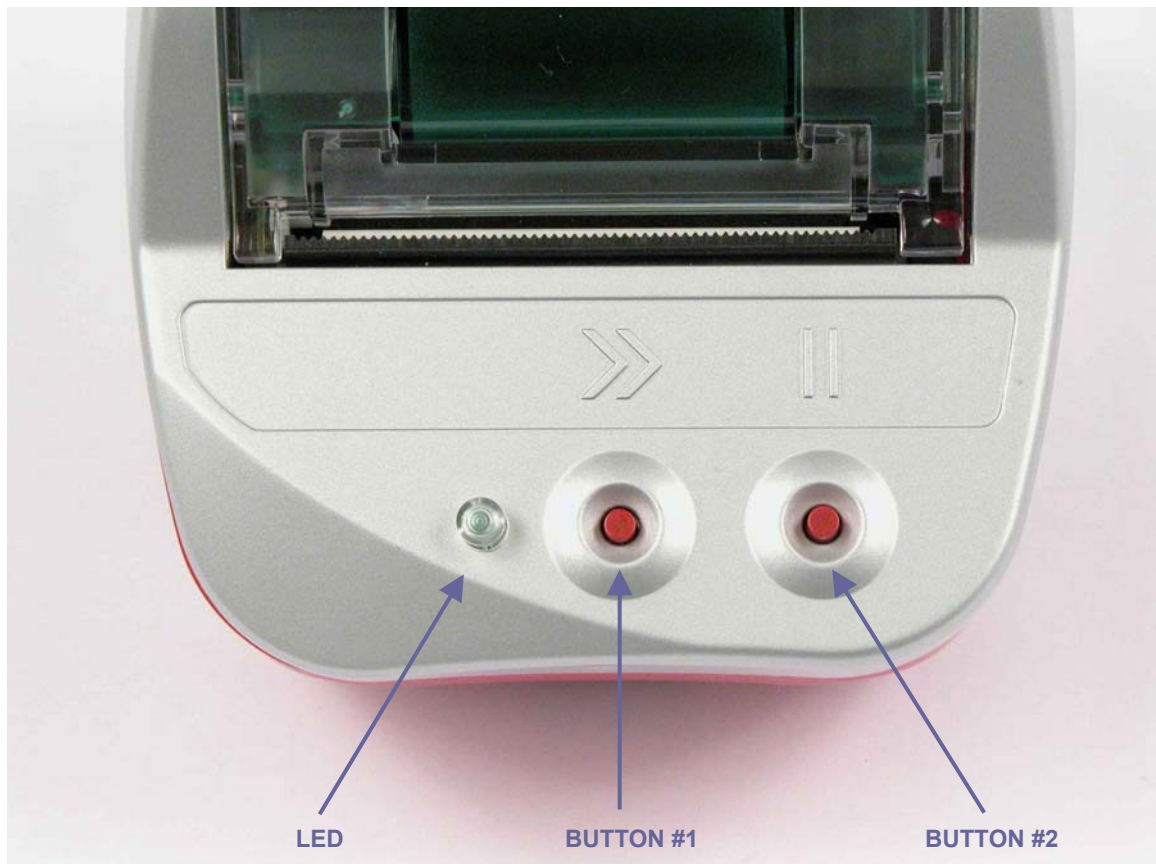
3.3 Printer Operations

3.3.1 Keyboard functions

The two push buttons and LED functions are described in the following table:

Printer Status →	OFF	OFF Line	On Line	End Paper	of	Over/Under Voltage or Temperature
Push Button #1	Execute self-test if pressed during Power-On	On Line	Off Line	N/A		
Push Button #2	Switch On the Printer	Feeds Paper	Feeds Paper if not already printing	N/A		
LED	OFF	1 Flash "ON"	Always "ON"	3 Flashes "ON"	4	Flashes "ON"

The following photo shows the exact position of led and push buttons.



3.3.2 Turning the printer ON/OFF

3.3.2.1 Turning the printer On

- By briefly pressing the Paper-feed key.
- By sending one character (Recommended 00h) over the serial line. It is better to send characters that are not read as printer controls.

3.3.2.2 Turning the printer Off

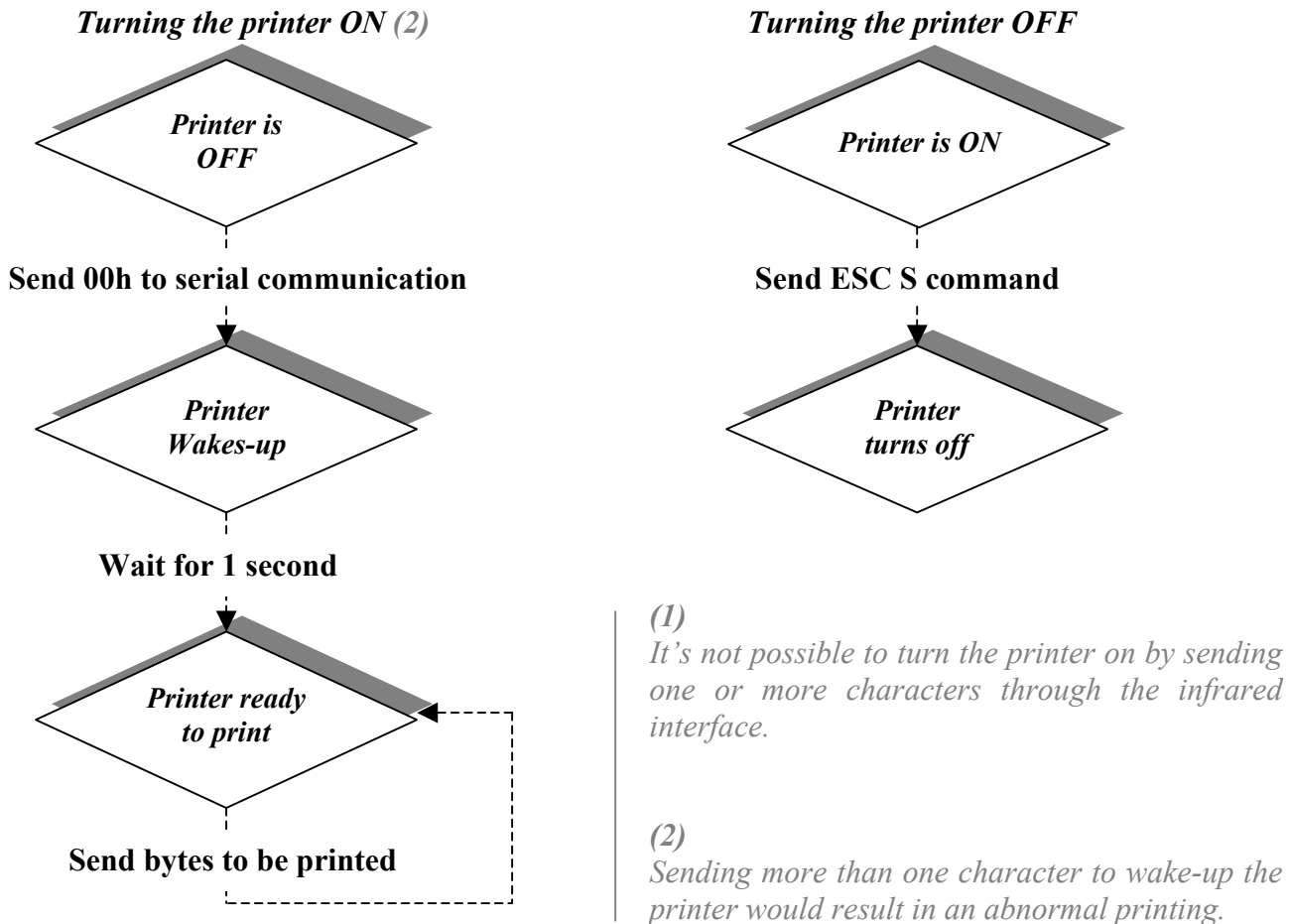
The printer can be turned Off:

- By pressing the ON/OFF line key for more than 2 seconds.
- By sending the character ESC S (sleep command) over the serial line.
- Following a given period of inactivity as specified in setup (Auto-sleep time parameter).

3.3.2.3 Example: Turning the printer On and Off using software commands

If the printer is Off, sending a character over the serial line will turn it on (1).

Follow the instructions shown in the diagram below:



3.3.3 *Configurable parameters*

The BPM205 includes a large range of parameters that can be modified. The user can also save those parameters to specific values when the printer boots.

This is achieved by sending ESC s control code with all parameters defined.

The printer's configurable parameters are:

- Communicating Interface.
- Baud rate .
- Handshaking.
- Sleep time latency.
- Intensity.
- Internal font selected.
- Pre-line spacing.
- Line spacing.
- Character spacing.
- Print mode (Height, Width, Underlined).
- International character set
- Rotated mode.
- Maximum number of columns.
- Text justification.
- Maximum peak current.
- Barcode height.
- Barcode magnification.
- Barcode text position.
- Barcode orientation.
- Paper loading length.
- Paper loading speed.
- Paper loading pause.
- Speed limitation.
- Acceleration smoothing.
- Opto to head length.
- Top of form position.

All those parameters are described in the “*operating control codes*” section.

3.3.4 Text Printing Format

The controller board has two resident font sets of 224 characters: 8x16 and 12x20.

The 8x16 and 12x10 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 will be shown with their hexadecimal code (row being the most significant nibble, and column the least significant nibble). Example: ASCII code for ‘A’ is 41 hex (or 65 decimal).

- 8x16 Character set:** Character size is 9 pixels (8 “active dots” plus one inter-character) x 20 pixels (16 “active” dots plus 4 interlines including underline), or 1.125mm x 2.5mm.

With double and quadruple height and width, maximum character size can go up to 4.5mm width x 10mm height. Horizontal character spacing and line spacing may be adjusted via the software.

Character per line is up to 64 in standard text, 32 in double width, and 16 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																
9	¡	¢	£	¤	¥	¦	§	¨	©							
A											¡	¢	£	¤	¥	¦
B	§	¨	©													
C					¡	¢	£	¤	¥	¦	§	¨	©			
D															¡	¢
E	£	¤	¥	¦	§	¨	©									
F									¡	¢	£	¤	¥	¦	§	¨

- 12x20 Character set:** Character size is 13 pixels (12 “active dots” plus one inter-character) x 24 pixels (20 “active” dots plus 4 interlines including underline), or 1.625 mm x 3 mm.

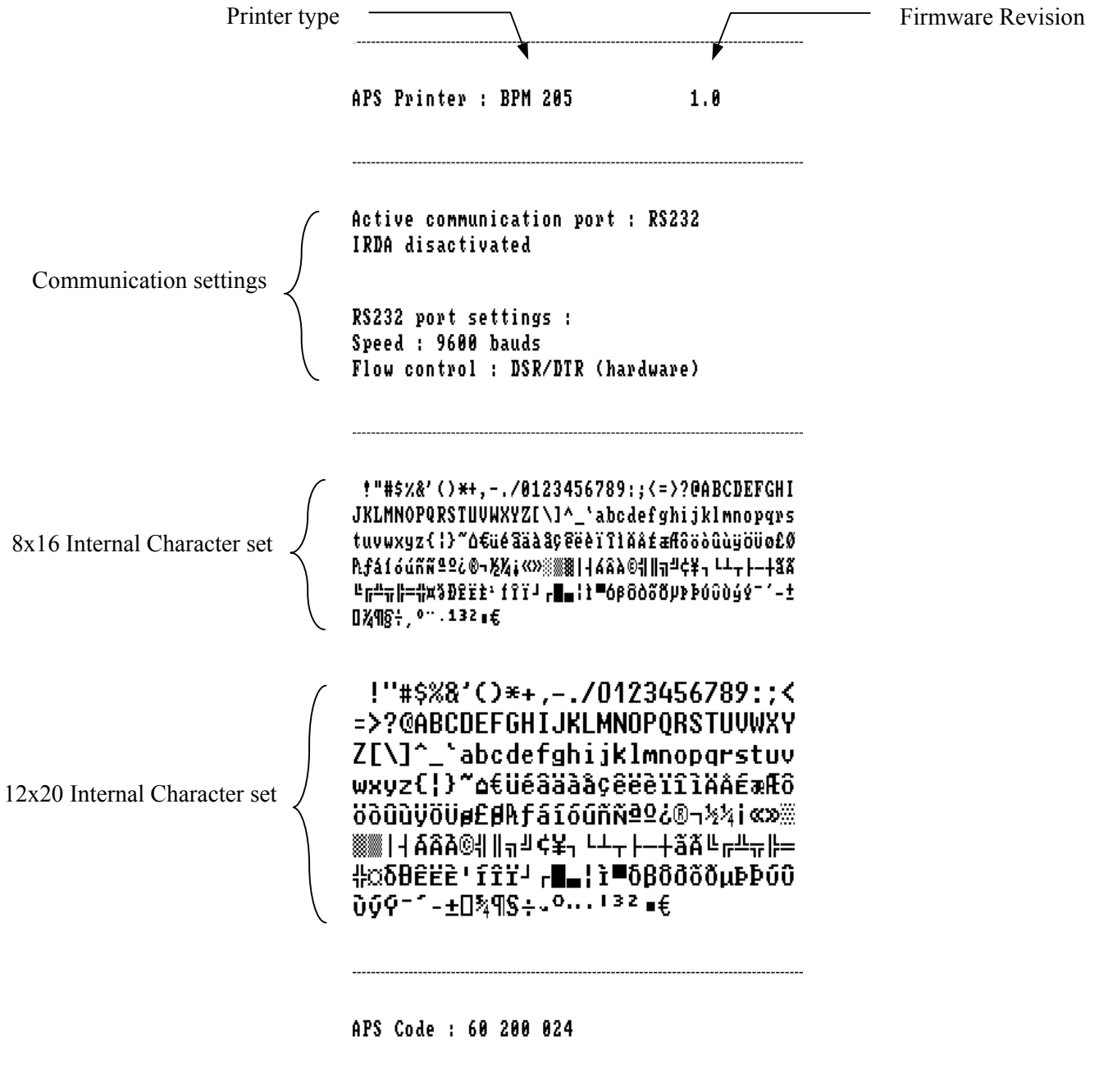
With double and quadruple height and width, maximum character size can go up to 6.5mm width x 12mm height.

Horizontal character spacing and line spacing may be adjusted via the software. Character per line is up to 44 in standard text, 22 in double width, and 11 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																
9	¡	¢	£	¤	¥	¦	§	¨	©							
A											¡	¢	£	¤	¥	¦
B	§	¨	©													
C					¡	¢	£	¤	¥	¦	§	¨	©			
D															¡	¢
E	£	¤	¥	¦	§	¨	©									
F									¡	¢	£	¤	¥	¦	§	¨

3.3.5 Self test Mode

This mode is done by the combination of the 2 external switches (see section 3.3). It prints the printer type, the revision of the printer firmware, all internal character sets, and product code.



3.4 Operating Control codes

Control codes are non-printable characters or sequences of characters that control the operations 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.

3.4.1 Control codes cross reference

Setup and Hardware control

COMMAND	DESCRIPTION
GS / n	Set printing speed / maximum peak current
GS s n1 n2	Set maximum print out speed
GS a n	Set acceleration smoothing
GS D n	Set print intensity
ESC @	Reset printer
ESC v	Send printer status
ESC I	Send printer identity
ESC S	Put the printer in sleep mode
ESC A n	Set autosleep time
GS B n	Communication settings
GS P n1 n2	Set paper loading length
GS O n1 n2	Start optocoupler calibration
ESC O	Send optocoupler parameters
GS o	Send optocoupler level
ESC s	Save setup parameters
ESC d	Default setup parameters
GS p n	Set paper loading pause
GS e n	Ejects paper
GS M n1 n2	Sets paper loading speed

Graphics commands

COMMAND	DESCRIPTION
ESC * n1 n2 n3 n4 n5 n6 data	Print graphics
ESC \$ n1 n2	Horizontal dot positioning
ESC V n1 n2 n3 data	Horizontal bit image

Text and General commands

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

Barcode commands

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

Hole and black mark detection commands

COMMAND	DESCRIPTION
GS L n	Set mark length
GS T n	Set TOF position
GS E	TOF feed paper
GS Y n1 n2	Set opto to head dot line length

3.4.2 Setup and Hardware control

GS / n

Description: Set printing speed / Maximum peak current / Dynamic division

Format: <1Dh> <2Fh> <n>

Comments: 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.

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.

Bytes n1, n2, set the time T (in μ s) between each step:

$$T = (256 * n1) + n2. \quad 1000 < T < 25000.$$

Default: T = 2000 : n1 = 7, n2 = 208.

Example: T = 2000 μ s.

Maximum print out speed:

$$(1 / (8 * 2000e-6)) = 62.5 \text{ mm/s.}$$

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 = 205) 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 = 205: Cycle time can't be smaller than 80% 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 S

Description: Put the printer in sleep mode

Format: <1Bh> <53h>

Comments: This command returns ESC S to the host and then puts the printer in sleep mode by driving the wakeup signal high. For more information, please contact A.P.S.

ESC A n

Description: Set the autosleep time

Format: <1Bh> <41h> <n>

Comments: n = 0 to 255: (Default n = 0: feature disabled). This command puts the printer in sleep mode after a certain time when no print activity has occurred by driving the wakeup signal high. Timeout is n * 5 seconds. For more information, please contact A.P.S.

GS B n

Description: Communication settings

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

Comments: Sets serial communication speed and mode.

Bit 7: B7 = 0: Xon-Xoff mode (software control), B7 = 1: DSR/DTR mode (hardware control)

Bit 6: Not used.

Bit 5: Stopbit; B5 = 0: 1 Stopbit; B5 = 1: 2 Stopbits.

Bit 4: Not used.

Bit 3: Communication interface : RS232 = 0 ; IRDA = 1.

Bit 2, 1, 0: Speed: (note: the speeds are not totally identical due to hardware limitations).

n	SPEED FOR RS232	SPEED FOR IRDA
0	1200	9600
1	2400	9600
2	4800	9600
3	9600	9600
4	19200	19200
5	38400	38400
6	57600	57600
7	115200	115200

(Default n = 83h: DSR/DTR; Normal mode, 1 Stopbit, 9600 Bds, No Parity, RS232 activated).

IMPORTANT !

If IRDA interface is selected the bit 7 must be 1 but no handshake is available. The 64Kbytes reception buffer must be considered.

When changing communication to IRDA a 50ms time-out must be added between the communication settings control code (GS B) and any following byte.

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 O n1 n2

Description: Starts the optocoupler calibration procedure.
Format: <1Dh> <4Fh> <n1> <n2>
Comments: n1 specifies the length of paper loading before the actual calibration is done.
n2 specifies the length of paper used to calibrate the opto.
Length is in centimeters.
For details, please contact A.P.S for opto calibration application note.

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 s

Description: Saves setup parameters

Format: <1Bh> <73h>

Comments: The printer saves the setup parameters in the internal flash so they won't be lost when power supply is removed.

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.

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 positioning of the paper. The value n is in 125 milliseconds units.

Default: n = 0.

Example: n = 16. The printer waits 2 seconds.

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 an extra n millimeters, useful for ejecting sheets totally.

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 μ s) between each step:

$T = (256 * n1) + n2. \quad 1000 < T < 25000.$

Default: T = 11520: n1 = 45, n2 = 0. Speed: $(1 / (8 * 11520e-6)) = 10.8$ mm/s.

3.4.3 Graphics commands

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 sets the number of byte N to be printed out:

$$N = (65536 * n3) + (256 * n2) + n1.$$

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

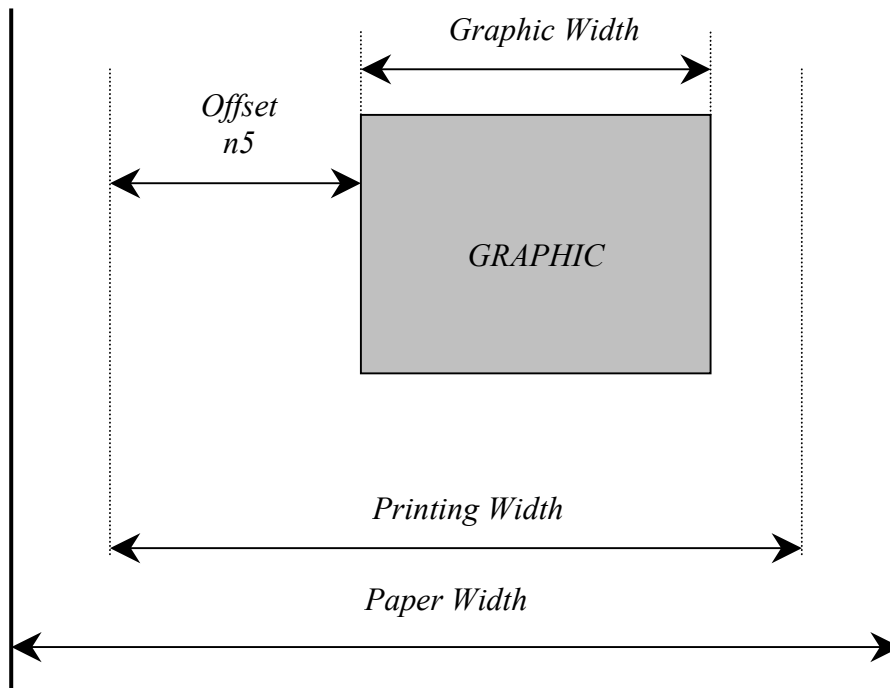
- n4 = 0: print normal size data byte (full printer resolution).
- n4 = 1: double width .
- n4 = 2: double height.
- n4 = 3: expanded (double width, double height).

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 of the head.
- 01 to FF H: 1 to 255 bytes skipped (to be less than total number of head 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 bytes).



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 the total number of the head bytes, given by the total number of dots divided by 8 (for instance CP305 is $576/8 = 72$), and n2 is always 0.

ESC V n1 n2 n3 <data>

Description: Horizontal bit image

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

Comments: The number of bytes to be printed is equal to $(n2+256*n3)$. n2 must be less than the total number of the head bytes, given by the total number of dots divided by 8 (for instance CP305 is $576/8 = 72$), and n3 is always 0. n1 is the resolution: 0 is standard size, 1 is double width, 2 double height, 3 is expanded.

IMPORTANT NOTES FOR GRAPHICS !

- Please note that n4 (offset) + n5 (graphic width) needs to be less than the number of head's bytes (printing width).
- One dot line must be performed in less than 2s. If not, the current into stepper will be removed resulting in poor print quality.
- It is recommended for all graphics sequences to set up the communication speed at the maximum value.

3.4.4 Text and General commands

ESC % n

Description: Select internal font
 Format: <1Bh> <25h> <n>
 Comments: n = 0: **8x16** Font is selected. (default)
 n = 1: **12x20** Font is selected.
 For custom fonts support, please contact A.P.S.

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:
 Default n = 0.

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	ı	Å	^	'	æ	ı	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	\$	@	ı	Ñ	¿	^	'	"	ñ	}	~
8	Japan	#	\$	@	[¥]	^	'	{	ı	}	~
9	Norway	#	□	É	Æ	ı	Å	Ü	é	æ	ı	å	ü
10	Denmark 2	#	\$	É	Æ	ı	Å	Ü	é	æ	ı	å	ü
11	Spain 2	#	\$	à	ı	Ñ	¿	é	'	ı	ñ	ó	ú
12	Latin Amer.	#	\$	à	ı	Ñ	¿	é	û	ı	ñ	ó	ú

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 line spacing. (Default n = 3). n may vary from 3 to 15. The line spacing pitch is 1/8mm.

ESC SP n

Description: Set character spacing

Format: <1Bh> <20h> <n>

Comments: Sets the character spacing. (Default n = 1). n may vary from 1 to 16. The character spacing pitch is 1/8mm. This spacing is proportional to double width (nx2) and quadruple width (nx4) commands.

ESC b n

Description: Set inverse video printing

Format: <1Bh> <64h> <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 one 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).

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:

Bit	Function	Bit = 0	Bit = 1
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).

ESC { n

Description: Set/Cancel Rotated characters
Format: <1Bh> <7Bh> <n>
Comments: This command rotates text by 180°.
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 LF follows CR, 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 the print position is set to the beginning of the next line.

3.4.5 Barcode 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.

n	START BYTE	BARCODE TYPE
0	No Start	UPC-A
1	No Start	UPC-E
2	No Start	EAN 13
3	No Start	EAN 8
4	No Start	Code 39
5	No Start	Interleaved 2/5 (ITF)
6	No Start	Codabar
7	135	Code 128A
	136	Code 128B
	137	Code 128C

GS h n

Description: Select vertical height of bar code

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

Comments: n, from 1 to 255 in multiple of 1/8 mm (default is 128).

GS w n

Description: Select horizontal magnification of bar code

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

Comments: n, defines the number of 0.125mm units are used to define the module of each barcode symbol. The thick lines are set to twice n value. (n from 2 to 6, default is 3).

GS H n

Description: Select printing position of bar code text

Format: <1Dh> <48h> <n>

Comments: n is used to define the position of the characters which are printed with the bar code:
Default n = 2.

n	PRINTING POSITION
0	Not printed
1	Above bar code
2	Under bar code
3	Above and under bar code

Note:

If the barcode width exceeds the printing width, it will be ignored.
The barcode text is printed out with the latest selected font (ESC %).

GS R n

Description: Set/reset rotated barcode

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

n = 0: barcode is printed horizontally. (default)

n = 1: barcode is printed vertically.

3.4.6 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 2.5 mm and the maximum is 7 mm.

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> <n>
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.

GS E

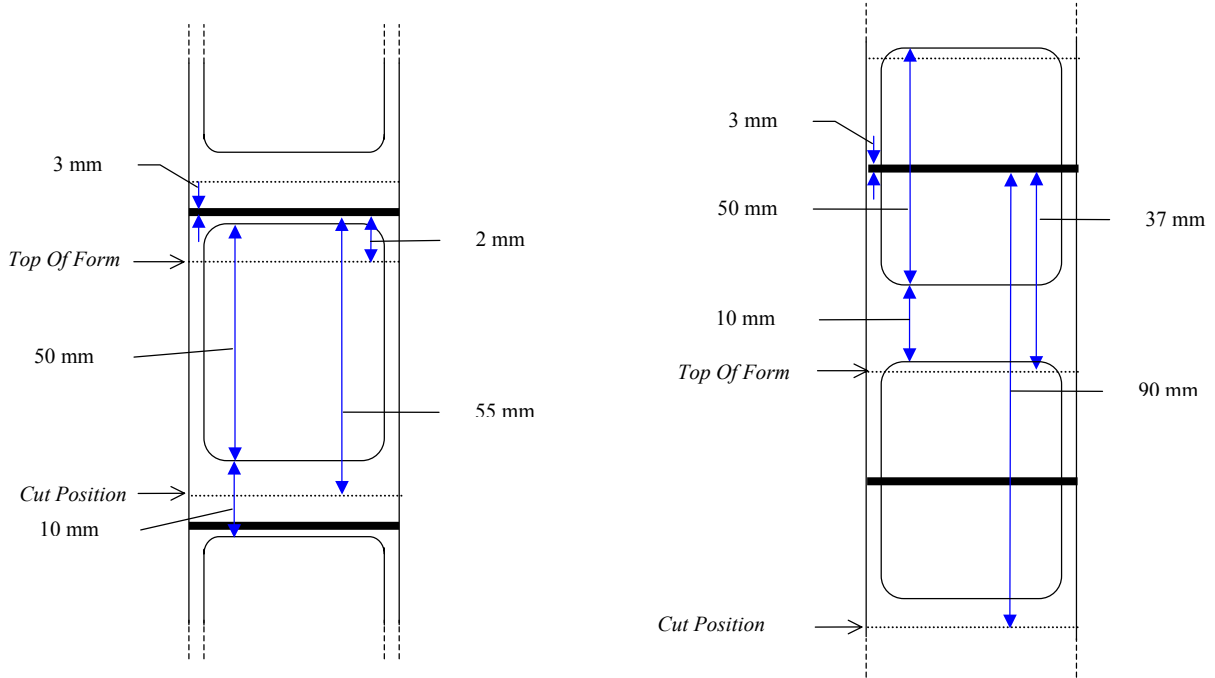
Description: TOF feed paper
Format: <1Dh> <45h>
Comments: Makes paper feed to the next TOF position. The hole/mark detection error bit in the printer status is automatically cleared when the black mark is found.

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> <78h> <n1> <n2>
Comments: Defines the number of dot lines N between the opto position and the head dot line.

$$N = (256 * n1) + n2.$$
 Default value is 104
 Value is 56 for BPM205.

3.4.7 *Hole / Black mark detection examples*



4. DIMENSIONS

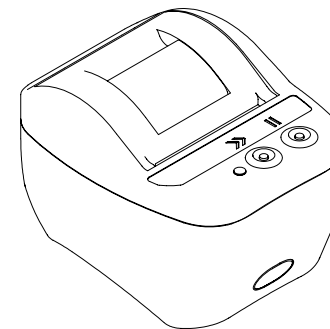
Please refer to the attached mechanical drawings for overall dimensions and other particulars on components location.

Fixing points for Wall Mount option are shown on mechanical drawings.

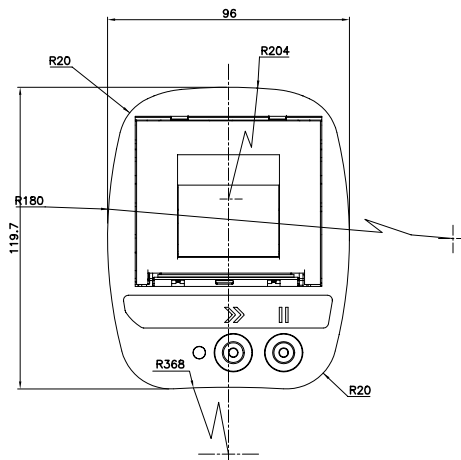
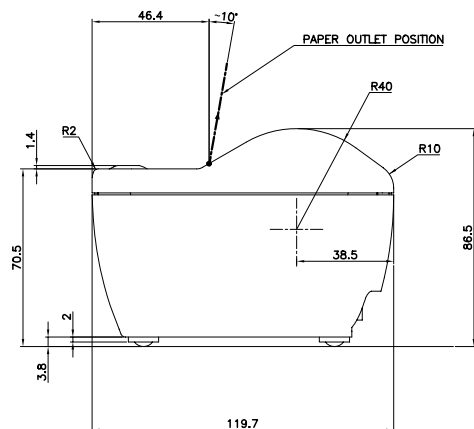
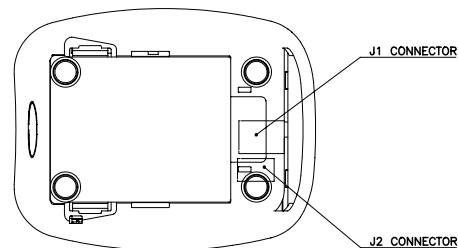
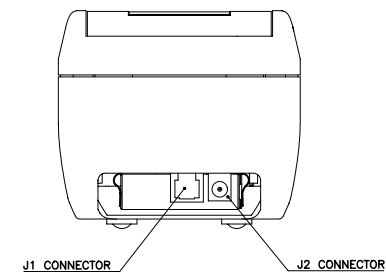
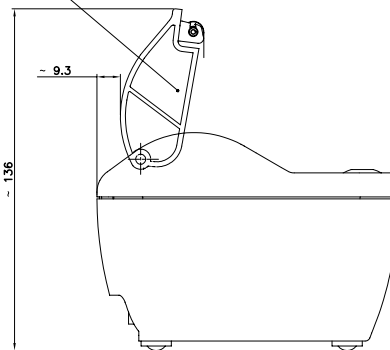
5. ORDERING CODE

Item	Ordering code
BPM205-MRS Printer	90 200 708
BPM205 Power Supply	40 200 001
Mains plug for power supply – Europe type	20 700 003
Mains plug for power supply – US type	20 700 001
Mains plug for power supply – UK type	20 700 002
Mains plug for power supply – Australia type	20 700 004
Wall-mounting base	10 206 009

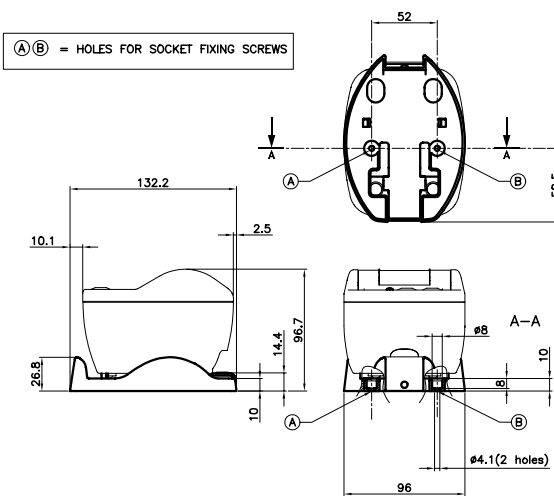
3D VIEW



COVER GROUP IN MAX. OPEN POSITION.



WALL MOUNTING OPTION - Scale 1:2



(A) (B) = HOLES FOR SOCKET FIXING SCREWS

CONNECTOR	FUNCTION
J1	SERIAL COMMUNICATION
J2	BATTERY CHARGER

DENOMINAZIONE Description I CB F D DRUCKER	I	STAMPANTE	MASSA-Massa	UNITA'-Unit	mm		
	DESIGNATO DA drawn by	FC	CONTROLLATO DA Checked by	AF			
	DATA-Date	06-NOV-02	SCALE-Scale	1:1	FORMATO-Size		A1
	FOGLIO-Sheet	1/1	N° DIS.-Draw.No		REV.		A
DISEGNO D'INGOMBRO OVERALL DIMENSIONS DRAWING		BPM-205		90 200 708			

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