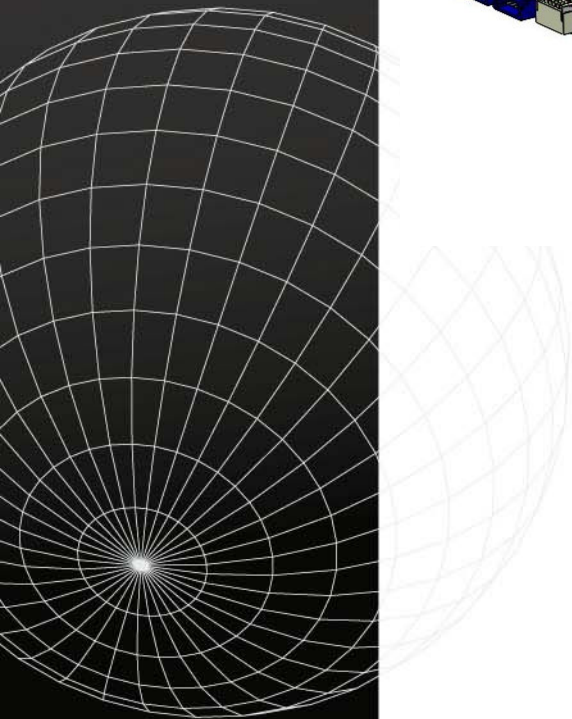
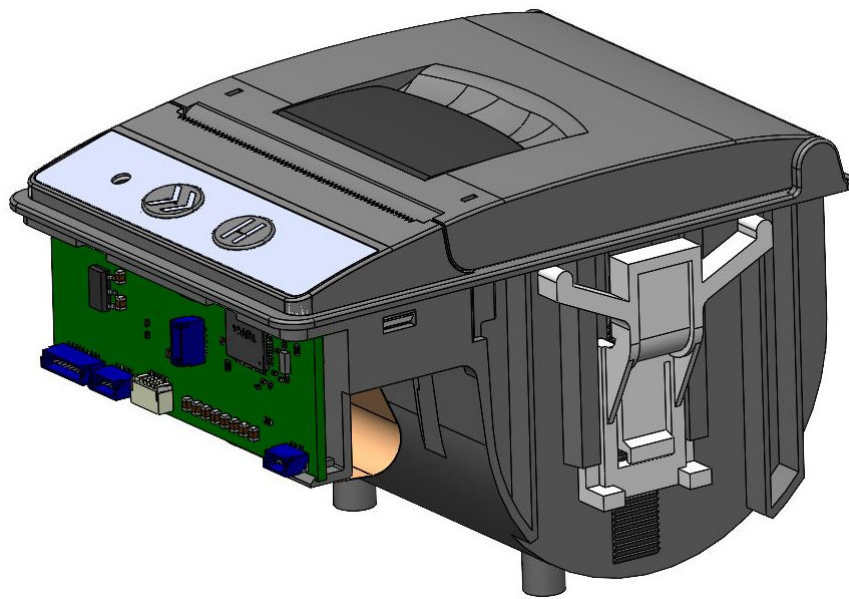
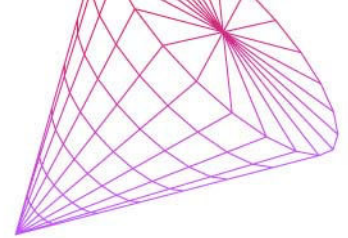




# EPM205-60-M0

## Technical manual



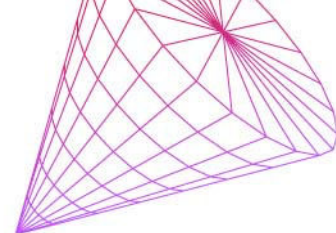


## Preface

- This manual provides complete technical information for the EPM205-60-M0 "Easy Loading Printing Module".
  - 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 rights to make changes to the product, without notice, to improve reliability, function or design.
  - A.P.S. does not assume any liability arising from the application or the use of product or circuits described herein.
  - The warranty terms of the product are described in a separate document; please contact A.P.S. to obtain this document.
- 

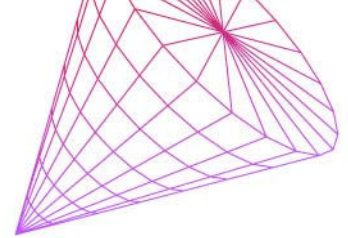
## Revision History

Rev. Index	Date	Page/Sec.	Description	Author
Pre 1	20-Oct-2020	-	Preliminary Revision	PS
Pre 2	20-Dec-2022	-	Preliminary Revision (drawings updated)	PS
A	07-April-2023	-	Official release	PS
B	18-April-2023	22	P/N evolution	PS



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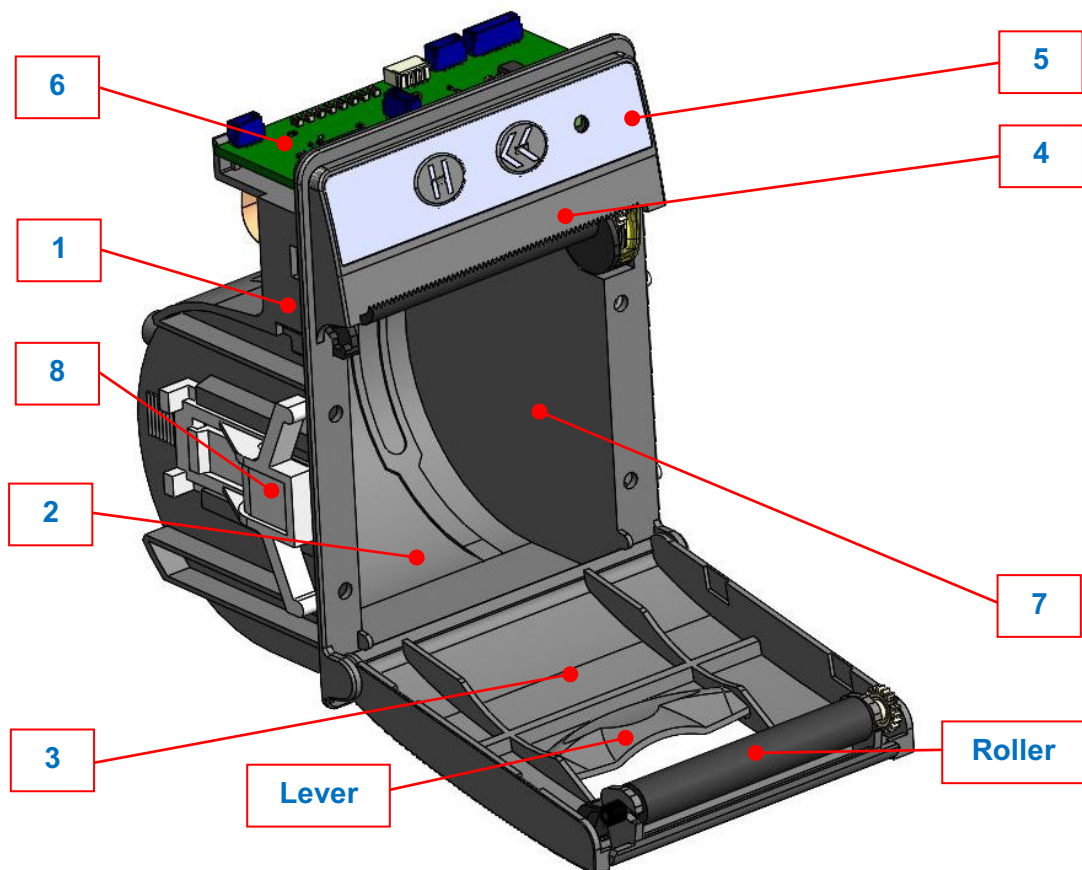
## 1. INTRODUCTION

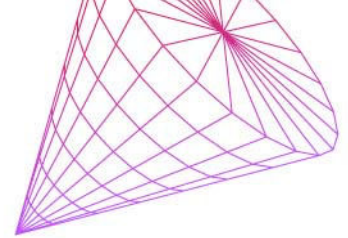
The EPM205-60-M0 is a 2-inch, 5V (from 4V to 9.5V), Easy Loading **Printer Module** with integrated paper roll housing assembled with a standard APS printer mechanism (ELM205-HS) and an integrated control board using RS232C, serial UART and USB communication protocols. The EPM205-60-M0 module consists of a set of mechanical and electronic parts.

These parts have been designed to have a high grade of integration and to perform many different functions.

The sections that form the EPM module are described below:

1. Printer mechanism, easy loading type;
2. Paper roll bucket;
3. Cover group, with lever (for easy opening) and roller;
4. Tear bar, for paper cutting;
5. Control panel with two push buttons and one LED;
6. Electronic control board;
7. Paper roll location, max diam.:60mm; (**EPM205-30-M0 is a smaller version with 32 mm max diameter**)
8. Mount clip;



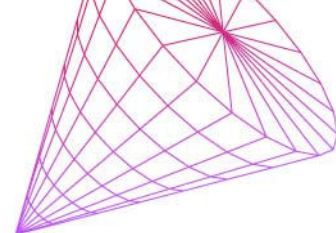


## 1.1 EPM205-M0 MAIN FEATURES

- **Fully hot pluggable printer**
- **Single power supply**  
From 4 Volts to 9.5 Volts
- **2 Communication ports**  
Serial: RS232C and UART (speed up to 115200 Bds)  
& USB 2.0 (full-speed)
- **Software programmable consumption**  
Dynamic division and high speed (up to 100 mm/s)
- **Low stand by consumption**  
< 10 mA
- **Full control over printing quality/speed**  
Speed clamping, acceleration smoothing... via control codes
- **Integrated keyboard with paper feed and ON-OFF line push button and LED**
- **For internal fonts**

16x24 font	(24 characters/line)
12x10 font	(32 characters/line)
12x24 font	(32 characters/line)
8x8 font	(48 characters/line)

Easy font updating  
User fonts may be of any width and height
- **Powerful text printing modes**  
Horizontal  
Double and quadruple width and height printing  
Inverse video
- **Powerful graphic modes**  
Variable width and offset  
Double and quadruple width and height
- **11 barcodes**  
Normal and rotated 90° for 1D bar codes, QR 2D bar code.
- **Printer setup parameters can be saved in flash**
- **Windows®, Linux and Android drivers available**
- **Easy firmware upgrades (Please contact A.P.S.)**

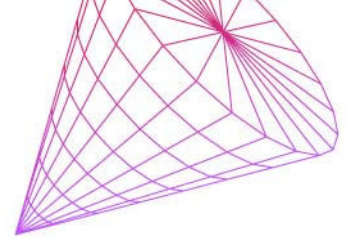


## 2. GENERAL SPECIFICATIONS

NO.	Specifications	
1	Printing method	Thermal
2	Number of dots	384
3	Resolution (dots/mm)	8
4	Printing width (mm)	48 (centered on paper)
5	Paper width (mm)	58 +0/-1
6	Max. paper thickness (u)	80
7	Maximum paper roll diameter (mm)	60
8	Recommended paper	JUJO-AF50KS-E (standard grade) JUJO-AF50KS-E3 (high sensitivity) Equivalent types can be used
9	Paper loading	Easy loading
10	Max Printing speed (mm/s)	100
11	Paper detection	Opto sensor
12	Temperature detection	Thermistor
13	Head-up or cover-open detection	Combined with opto sensor
14	Voltage range	4.0V ~ 9.5V
15	Power consumption (A) -printing ** (average 64 dots on / 7.2 V) -stand by	1.8 A 0.06 A (TBC)
16	Weight (g)	~ 80
17	Life/Reliability	50km/100M pulses Cover Group Opening/closing : 2000 operations or more
18	Operating temperature *(°C)	-5 to 50 non cond.
19	Operating relative humidity (%)	20 to 85 non cond.
20	Storage temperature	-25 to +70 non cond.
21	Storage relative humidity	10 to 90 non cond.
22	Dimensions (W×D×H mm)	81.6 × 106.1 × 69
23	Mount Size (W×D mm)	72.8 × 102.2
24	Interfaces	RS232, TTL, USB
25	Memory buffer size	128 B
26	RAM memory	16 KB
27	FLASH memory	128 KB (+ 8 MB ext)
28	Character fonts	YES
29	Graphics	YES
30	Barcodes	YES
31	Drivers	YES
32	Functional keyboard	YES

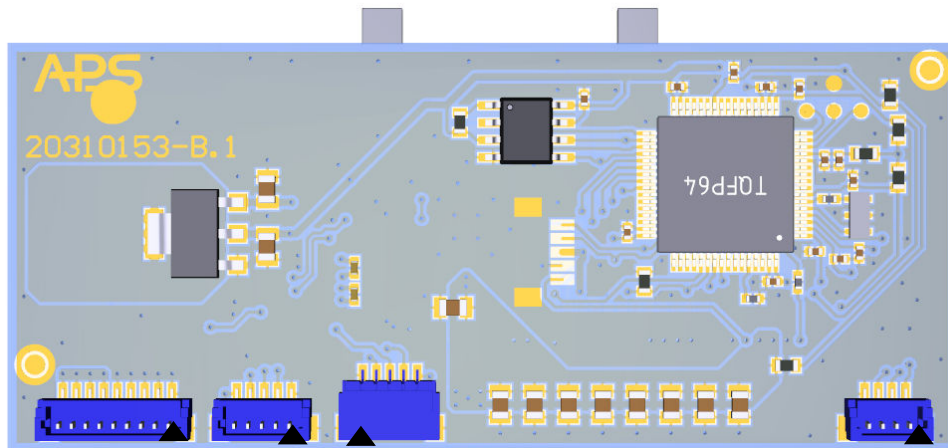
(\*Beyond the range of operating temperature from +5°C to +40°C TPH's printing quality may be affected.). (\*\*power consumption can be adjusted / limited through control sequences)





### 3. PRINTER DEVICE INTERCONNECTION

This device is fully hot-plug: any connector can be connected or disconnected without damaging the printer.

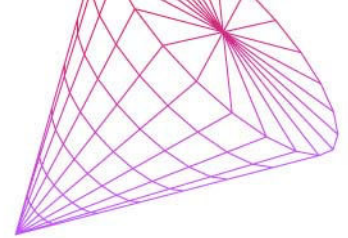


▲ : Position pin number 1

From left to right:

Reference	Description
CN3	Power supply input
CN2	UART serial interface
CN5	RS232C serial interface
CN1	USB interface

Note: APS can provide related cables, see chapter 8 "Accessories"



### 3.1 POWER SUPPLY CONNECTOR

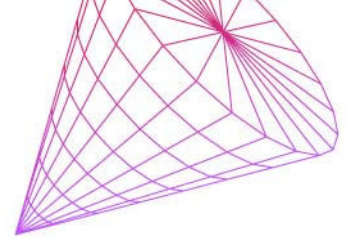
<b>EPM205-30-M0 device connector</b> <b>CN3</b>	<b>User side</b> <b>matching connector</b>
<i>CHYAO SHIUNN JS-1254-09</i> 9 pins pitch 1 mm	<i>CHYAO SHIUNN JS-1253 series</i> Or JST SHR series

<b>Pin number</b>	<b>Signal name</b>
1	GND
2	GND
3	GND
4	GND
5	GND
6	VH
7	VH
8	VH
9	VH

**IMPORTANT NOTE:**

Wires AWG28 must be used in order to avoid current losses.  
Power supply (VH) should range from 4V to 9.5V DC.





### 3.2 UART SERIAL COMMUNICATION INTERFACE

The UART is designed to handle TTL levels (0/3.3V or 5V levels).

Logic Signal	Voltage Level UART mode
0	From 0V to 1.0V
1	From 2.3 to 5V

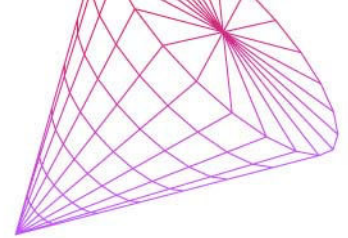
EPM-30-M0 device connector CN2	User side matching connector
CHYAO SHIUNN JS-1254-05 5 pins pitch 1 mm	CHYAO SHIUNN JS-1253 series or JST SHR series

Pin number	Signal name
1	GND
2	Transmit data (TxD, printer output)
3	Receive data (RxD, printer input)
4	CTS/DSR (printer handshaking input, not managed)
5	RTS/DTR (printer handshaking output)

Note: Printer TTL output (pin 2 and 5) are open drain type, so you need to add one pull-up (1K2 ohms recommended) between each output pin and host logic power.

Couple of signals from pins 4 and 5 should be considered as “CTS and RTS” or “DSR and DTR” in function of host handshaking implementation. Anyway, when printer FIFO is full, RTS (or DTR) signal is set to logical level “1” to point out to host that sending should be stopped otherwise data will be lost (handshaking is OFF).

As soon as this signal returns to logical level “0” (free space in printer FIFO), host sending can resume (handshaking is ON).



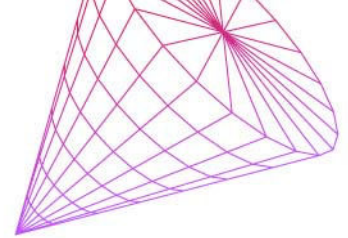
### 3.3 RS232C SERIAL COMMUNICATION INTERFACE

The RS232C connector is especially dedicated to full RS232 protocol (+/-12V levels).

Logic Signal	Voltage Level on RS232 Connector
0	From +3V to +12V
1	From -3V to -12V

EPM-30-M0 device connector <b>CN2</b>	User side matching connector
<i>CHYAO SHIUNN JS-1254R-05</i> 5 pins pitch 1 mm	<i>CHYAO SHIUNN JS-1253 series</i> or <i>JST SHR series</i>

Pin number	Signal name
1	GND
2	Transmit data (TxD, printer output)
3	Receive data (RxD, printer input)
4	CTS/DSR (printer handshaking input, not managed)
5	RTS/DTR (printer handshaking output)



### 3.4 USB COMMUNICATION CONNECTOR

The EPM205-30-M0 printer offers a USB communication interface.

<b>EPM-30-M0 device connector CN1</b>	<b>User side matching connector</b>
<i>CHYAO SHIUNN JS-1254-04 4 pins pitch 1 mm</i>	<i>CHYAO SHIUNN JS-1253 series or JST SHR series</i>

<b>Pin number</b>	<b>Signal name</b>
1	Vbus
2	D-
3	D+
4	GND

## 4. EPM DEVICE OPERATIONS

### 4.1 INTEGRATED KEYBOARD FUNCTIONS

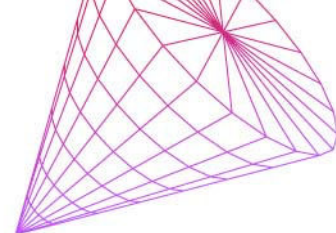
The standard A.P.S keyboard gathers user buttons and status LED. During normal board operation, pressing paper feed switch triggers a paper feed sequence. During normal board operation, pressing ON/OFF line switch continuously during more 3s triggers a hardware reset.

**STATUS Led** indicates the current state of the board:

```
"monitor":          {"pattern":"0xFFFFFFFF"},
"idle":             {"pattern":"0x10000000"},
"busy":            {"pattern":"0xFFFFFFFF"},
"paper loading":   {"pattern":"0xFFFF0000"},
"presentation(ticket at the exit)": {"pattern":"0xFF0F0000"},
```

**Errors:**

```
"temperature": {"pattern":"0xCCCCCCCC"},
"head_up":     {"pattern":"0xF0F0F000"},
"power_supply": {"pattern":"0xCC00CC00"},
"eop":         {"pattern":"0xF0F0F0F0"},
"jam":        {"pattern":"0xFF0F0F00"}
```



Each **Pattern** is corresponding to 32 x 64 ms, bit 1 means led is "on" during 64 ms

For example:

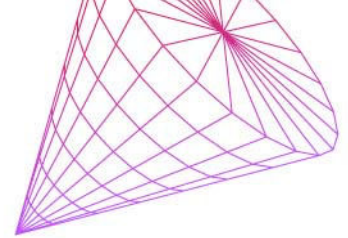
Board state	LED blink pattern
Online ("idle mode")	One short flash "on" (64 ms) every 2 sec
Printing (busy)	Always "on" (except if error occurs)
Paper stop – printer head up (cover is open)	Three flashes "on" 256 ms/ "off" 256 ms every two seconds
Paper stop – end of paper	Flashing "on" 256 ms/ "off" 256 ms...
Jam detection (paper loop detected)	One long flash (512 ms), 2 short flashes (256 ms)...
Monitor mode	"on" during 2sec, "off" during 64 ms...

## 4.2 SELF-TEST MODE

When pressing ON/OFF line button, pressing quickly twice paper feed button triggers a self-test sequence.

This mode is done also by sending the control sequence "ESC GS T 1" to the printer. 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.

- Notes:
- After self-test running, setup parameters return to their latest saving values.
  - During self-test running, communication is disabled. Basically, received data are not buffered (lost if RS232 or in waiting state if USB). Only real time requests are processed (see section 6.5 for further details).



## EPM203-M0-5V

SN:38001B000E51565734333  
 120  
 uC:STM32F070  
 Version :0.0  
 date:Feb 3 2021  
 time:10:17:37  
 time:1612343857  
 git :3f8501706f0bb16bd0f  
 b6b5fca1dfb7ce02677b7

=====  
 Mechanism:  
 Model : ELM205-HS  
 Dots : 384  
 Dots/mm: 8  
 Paper : 58.0 mm  
 Max : 110 (mm/s)  
 USB : yes  
 UART : yes  
 Printed: 299 lines

=====  
 Measure:  
 Voltage: 7.5 V  
 TPH : 22.9 C  
 TPH max: 23.0 C

=====  
 Params:  
 Active font :  
 Font16x24CP437  
 Max dot : 96  
 Baudrate : 115200  
 Parity : NONE  
 Stop bits: 1  
 Flow ctrl: hardware

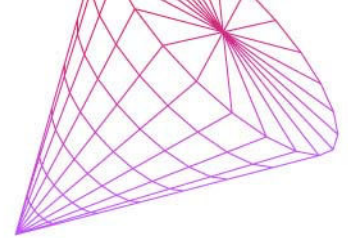
=====  
 Fonts:  
 Font16x24CP437:  
 0123456789ABCDEF  
 2: !"#\$%&'()\*+,-./  
 3: 0123456789:;<=>?  
 4: @ABCDEFGHIJKLMNO  
 5: PQRSTUVWXYZ[\]^\_`  
 6: 'abcdefghijklmnop  
 7: pqrstuvwxyz{|}~  
 8: Çüéàáâäçèéëïíîïï  
 9: éæåöóôûüýðúøëÿ  
 A: áíóúññáâäçèéëïíîïï  
 B: ðíóúññáâäçèéëïíîïï  
 C: ðíóúññáâäçèéëïíîïï  
 D: ðíóúññáâäçèéëïíîïï  
 E: ðíóúññáâäçèéëïíîïï  
 F: ðíóúññáâäçèéëïíîïï

Font12x10m2:  
 0123456789ABCDEF  
 2: !"#\$%&'()\*+,-./  
 3: 0123456789:;<=>?  
 4: @ABCDEFGHIJKLMNO  
 5: PQRSTUVWXYZ[\]^\_`  
 6: 'abcdefghijklmnop  
 7: pqrstuvwxyz{|}~  
 8: Çüéàáâäçèéëïíîïï  
 9: éæåöóôûüýðúøëÿ  
 A: áíóúññáâäçèéëïíîïï  
 B: ðíóúññáâäçèéëïíîïï  
 C: ðíóúññáâäçèéëïíîïï  
 D: ðíóúññáâäçèéëïíîïï  
 E: ðíóúññáâäçèéëïíîïï  
 F: ðíóúññáâäçèéëïíîïï

font8x8:  
 0123456789ABCDEF  
 2: !"#\$%&'()\*+,-./  
 3: 0123456789:;<=>?  
 4: @ABCDEFGHIJKLMNO  
 5: PQRSTUVWXYZ[\]^\_`  
 6: 'abcdefghijklmnop  
 7: pqrstuvwxyz{|}~  
 8: Çüéàáâäçèéëïíîïï  
 9: éæåöóôûüýðúøëÿ  
 A: áíóúññáâäçèéëïíîïï  
 B: ðíóúññáâäçèéëïíîïï  
 C: ðíóúññáâäçèéëïíîïï  
 D: ðíóúññáâäçèéëïíîïï  
 E: ðíóúññáâäçèéëïíîïï  
 F: ðíóúññáâäçèéëïíîïï

font12x24CP437:  
 0123456789ABCDEF  
 2: !"#\$%&'()\*+,-./  
 3: 0123456789:;<=>?  
 4: @ABCDEFGHIJKLMNO  
 5: PQRSTUVWXYZ[\]^\_`  
 6: 'abcdefghijklmnop  
 7: pqrstuvwxyz{|}~  
 8: Çüéàáâäçèéëïíîïï  
 9: éæåöóôûüýðúøëÿ  
 A: áíóúññáâäçèéëïíîïï  
 B: ðíóúññáâäçèéëïíîïï  
 C: ðíóúññáâäçèéëïíîïï  
 D: ðíóúññáâäçèéëïíîïï  
 E: ðíóúññáâäçèéëïíîïï  
 F: ðíóúññáâäçèéëïíîïï





### 4.3 TEXT PRINTING FORMAT

The controller board is provided with **4 resident set of 224 characters:**

16x24 font	(24 characters/line)
12x10 font	(32 characters/line)
12x24 font	(32 characters/line)
8x8 font	(48 characters/line)

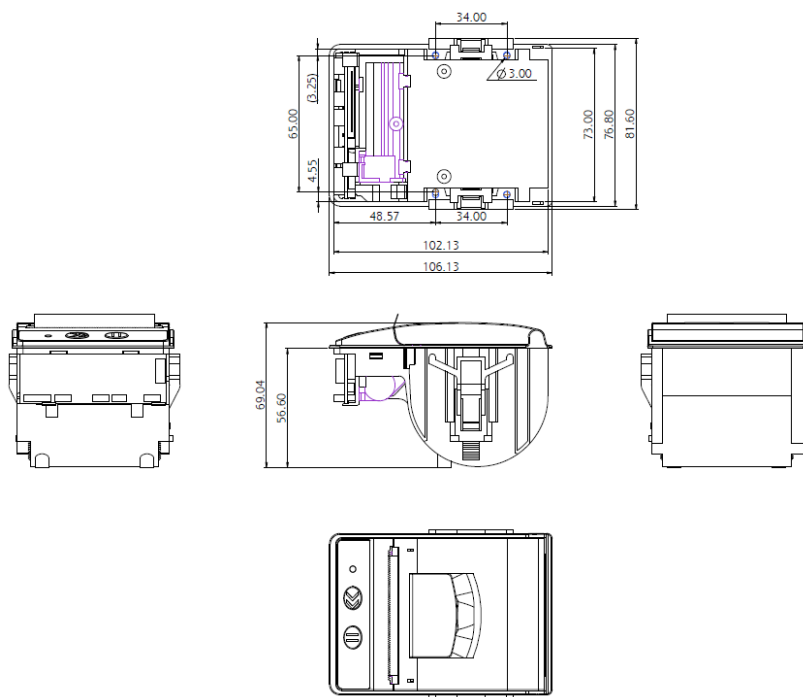
## 5. OPERATING CONTROL CODES

Please refer to the programming manual of the **M0 driver board architecture** for the detail of the corresponding CTRL sequences.

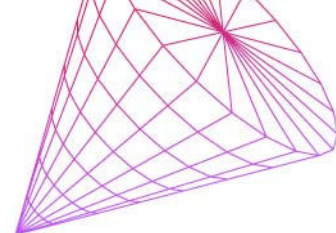
## 6. MECHANICAL AND HOUSING

### 6.1 OVERALL DIMENSIONS AND FIXING POINTS

See attached drawings at the end of this technical reference for overall dimensions. 3D-IGES files, for mechanical details, are available upon request, ask A.P.S for more information.

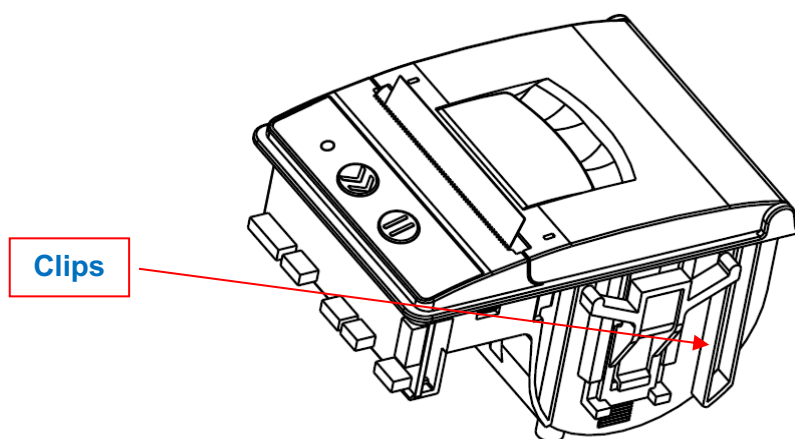


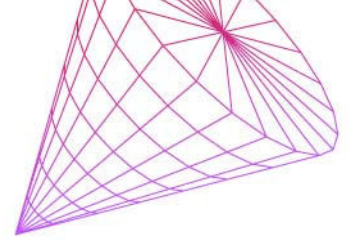




The mechanism has to be fixed using the clips provided for this purpose or through the fixation holes.

To avoid any kind of deformation or distortion, a **flat surface for contact areas is required**, otherwise, the print quality and printer's life will be drastically reduced.





## 6.2 MOUNTING PRECAUTIONS

Orientation according to figure A is to be preferred; reliability and life tests have been based only according to this orientation.

Alternatively, it is possible to choose different orientation angles as shown in figures B-C-D.

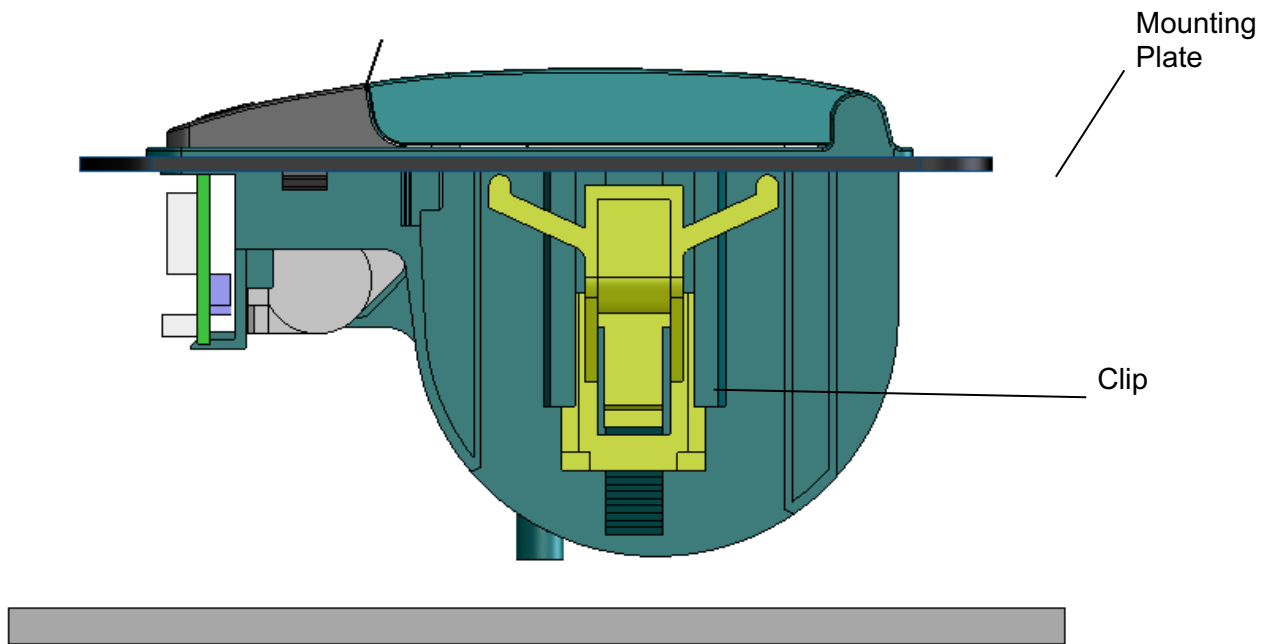


Figure A

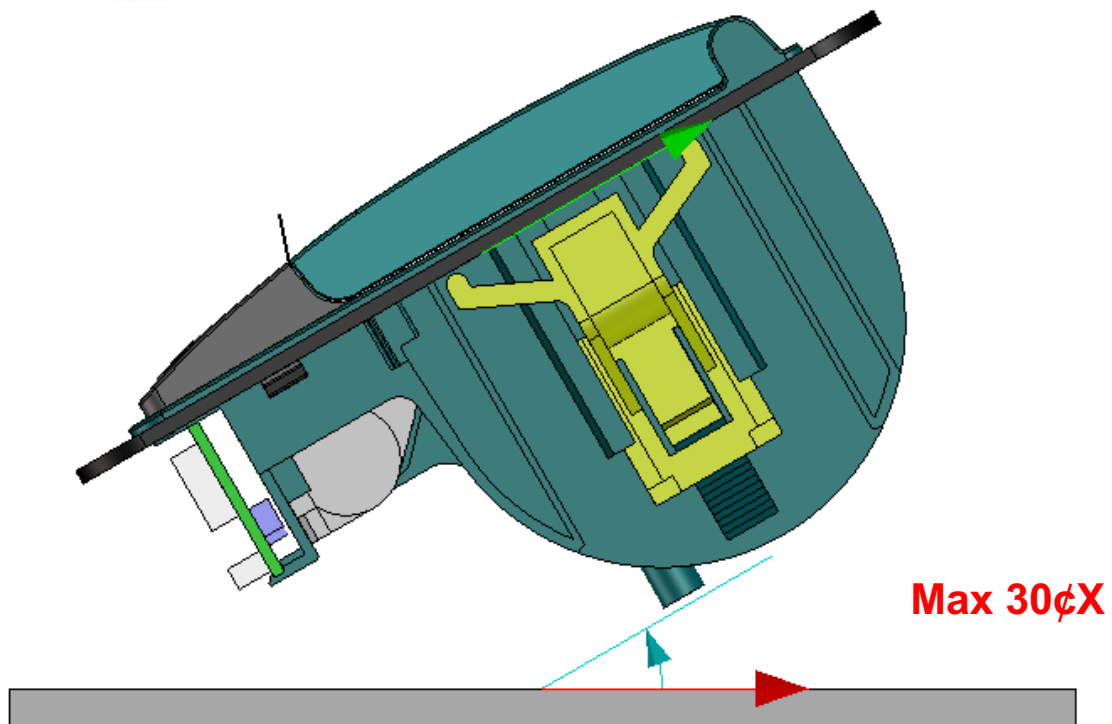
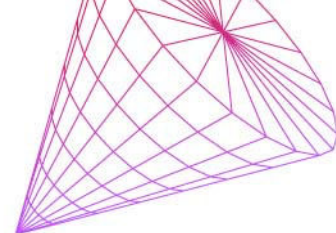


Figure B

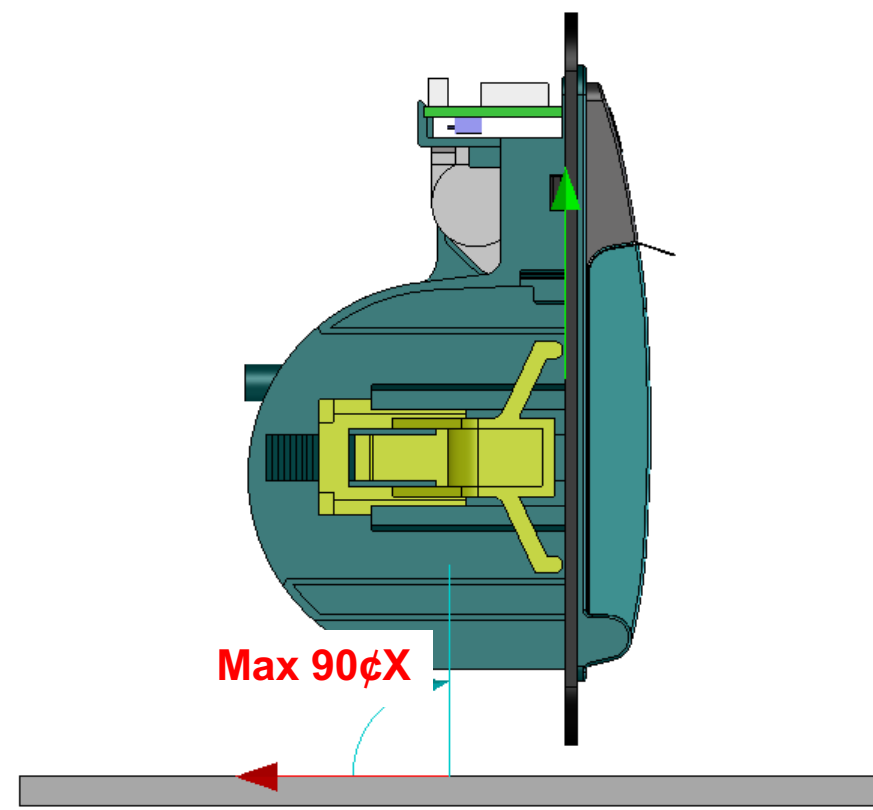


Figure C

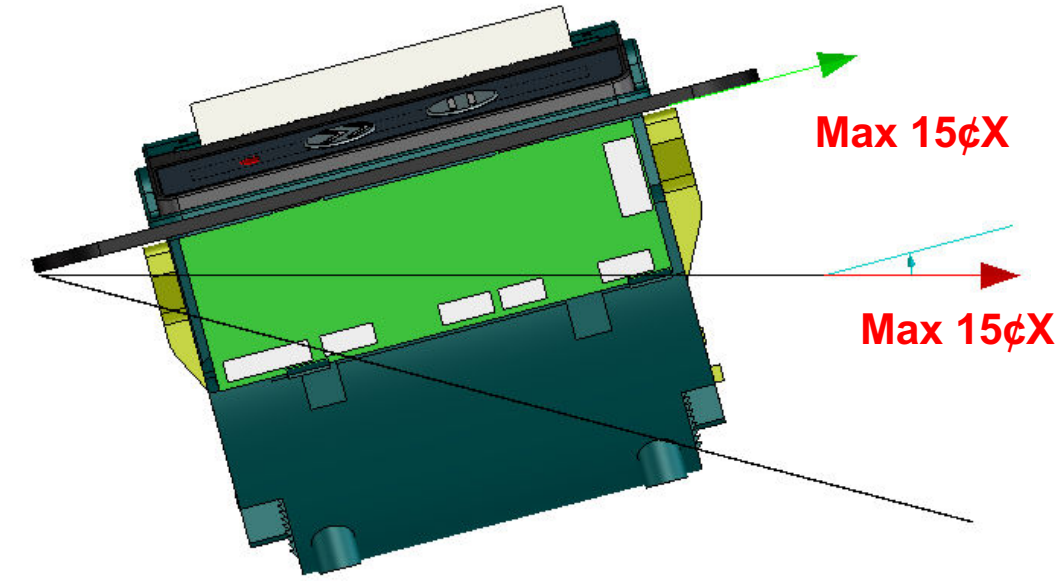
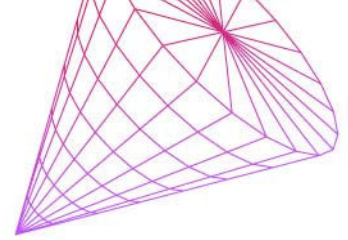
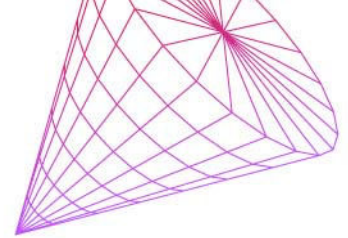


Figure D

## 7. HANDLING THE EPM205-M0



## 7.1 HOW TO OPEN THE COVER GROUP

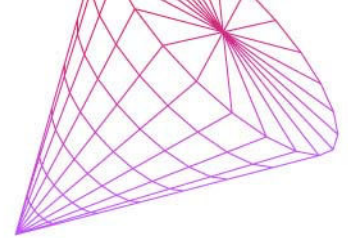
Pull the lever until the Cover Group is released from its locking position.  
To avoid damages to the lever do not use excessive force.



## 7.2 HOW TO LOAD PAPER ROLLS

### STEP 1



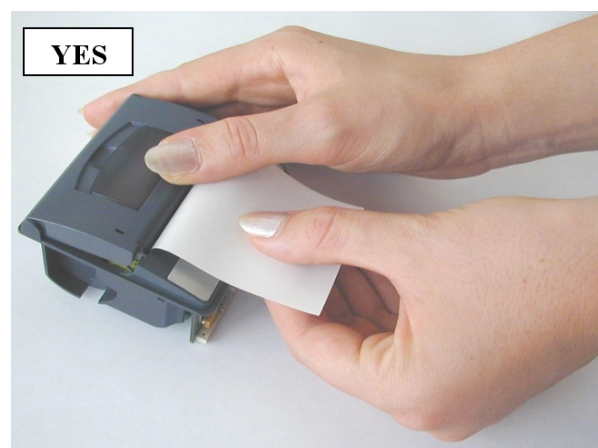


### 7.3 HOW TO CLOSE THE COVER GROUP CORRECTLY

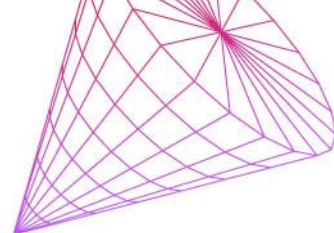
Press on both sides of the Cover Group simultaneously.



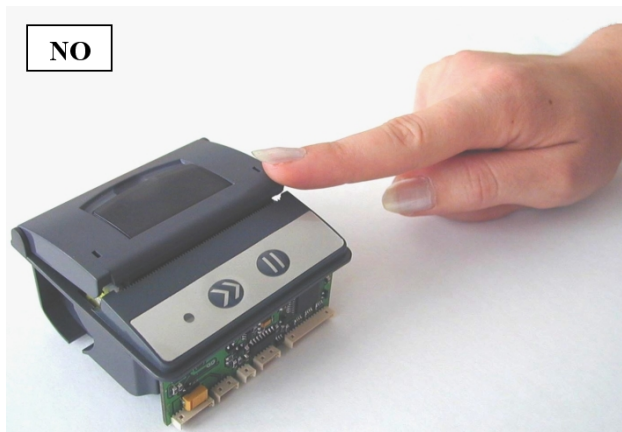
Alternatively:  
Press on the middle area of Cover Group, near the paper exit.







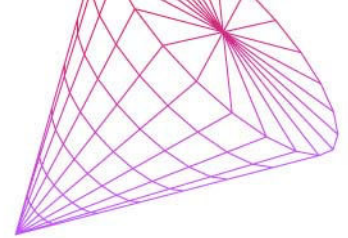
**Do not close the Cover Group pressing only on one side.**



## 7.4 HOW TO CUT THE PAPER CORRECTLY

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





## 8. ENVIRONMENTAL PROTECTION

The Product described in the present specification is conform to directive 2002/95-EC (RoHS) and following amendments issued by the European Council, the product doesn't contain the hazardous substances prohibited by the directive.

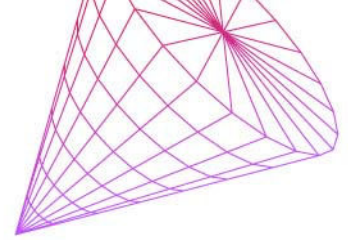
Declaration of RoHS compliance is available upon request.

## 9. ORDERING CODE

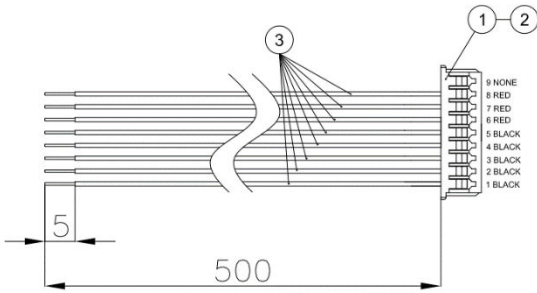
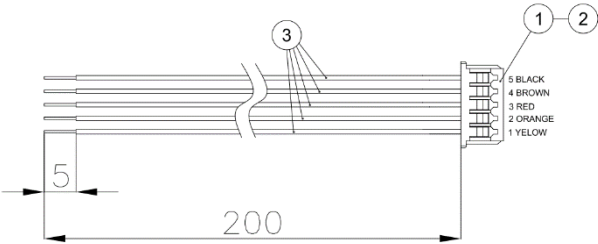
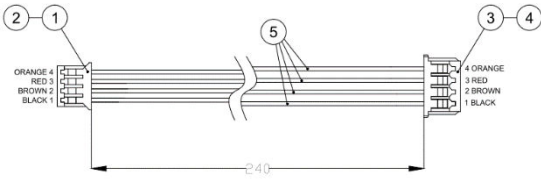
Product Name	Ordering Code
EPM205-60-M0 BUCKET PRT 2" 5V (Grey)*	90EPM254Bxxxx
EPM205-60-M0 BUCKET PRT2"5V(G*)NO CLIPS	90EPM255Bxxxx

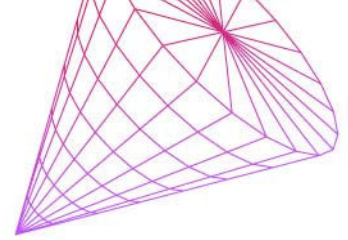
xxxx : the for last digits are used to specify the firmware revision

\*Grey color is standard, for other colors please contact APS.



10. ACCESSORIES

Description	Ordering Code
<p>Cable power supply L=500 mm ECP JST 9 pins pitch 1 mm</p> 	<p>91301337</p>
<p>Cable RS232 (L=200 mm, JST 5 pins 1 mm pitch only on one side)</p> 	<p>91301334</p>
<p>Cable USB</p> 	<p>91301329</p>



11. MECHANICAL DRAWING  
(pages below)