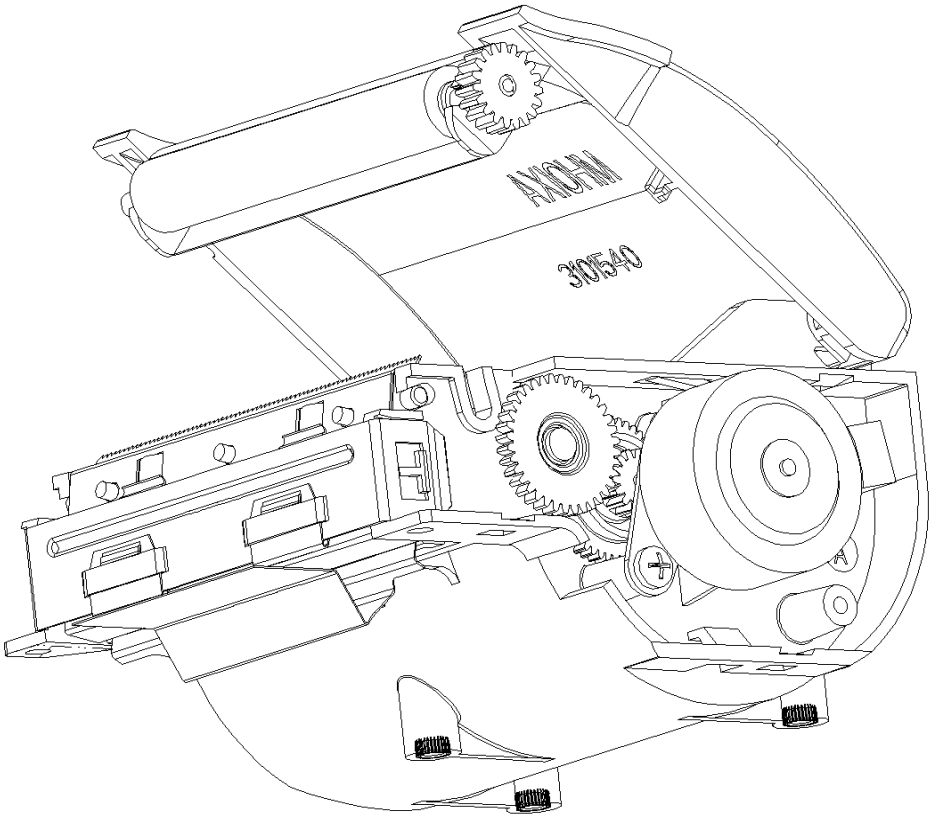
HTPN9050

USER MANUAL

Reference : FDE - 3105721 - A

November 99



AXIOHM, 1-9 Rue d'Arcueil
BP 675, 92542 Montrouge Cedex, France
Tel : (33) (0) 1 47 46 78 00 Fax (33) (0) 1 46 55 13 44

Axiohm™

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WARNING

This manual contains the basic operations to run your printer. Read it carefully before using your printer paying full attention to the chapter recommendations.

Table 1 Summary of printer specifications

ITEM	VALUE	UNIT
Printing method	Static thermal dot line printing	-
Number of resistor dots	384	dots
Resolution	8	Dots/mm
Printing width	48	mm
Paper width	$60^{+0.1}_{-0.1}$	mm
Head T° detection	By Thermistor	-
Paper feed pitch	2	Motor steps
	0.125	mm
Paper empty detection	Opto-sensor	-
Operating voltage range Vcc (logic)	4.75-5.25	V DC
Vch (dot)	4.5-7	V DC
Current Consumption: Vch	42 *1 55	mA per resistor dot "on" at 5V mA per resistor dot "on" at 6.5V
Current Consumption: Stepping motor	250 325	mA per activated phase at 5V mA per activated phase at 6.5V
Current Consumption : Vcc	5	mA per 64 resistor dot ‘on’ at 5V

Storage range	-20 to +60	°C
Relative humidity	no condensing	
Operating range	0 to +50	°C
Electrical lifetime *3	10^8	pulses on OE signal
Mechanical lifetime *3	30	km
Dimensions Width Depth Height	 92.8 76 55	 mm mm mm
Weight	150	g
Recommended paper	2320061 in Axiohm references or other Axiohm approved papers (ex. : Jujo AF KS50 E3 & TF KS 50E3)	

*1 For a printhead with a resistance of 120 Ω

*2 In standard conditions: 5 Volts, 30°C, for a printhead with a resistance of 120 Ω, at 480 PPS

*3 Per AXIOHM conditions (which are mainly : 5 V, room temperature (≈ 25°C), 480 pps, dot printing duty cycle = 30 %)

1. GENERAL

Based on static thermal printing technology, the HTP printers are very easy to use, high reliability devices which are designed to be integrated into a large range of hand-held terminals.
This manual also described the version HTPN9150, HTPN9450 and HTPN9550. Those references are versions with translucent cover, or/and latched cover.

2. SPECIFICATIONS

2.1. Mechanical specifications

Figure 1 General view of printer

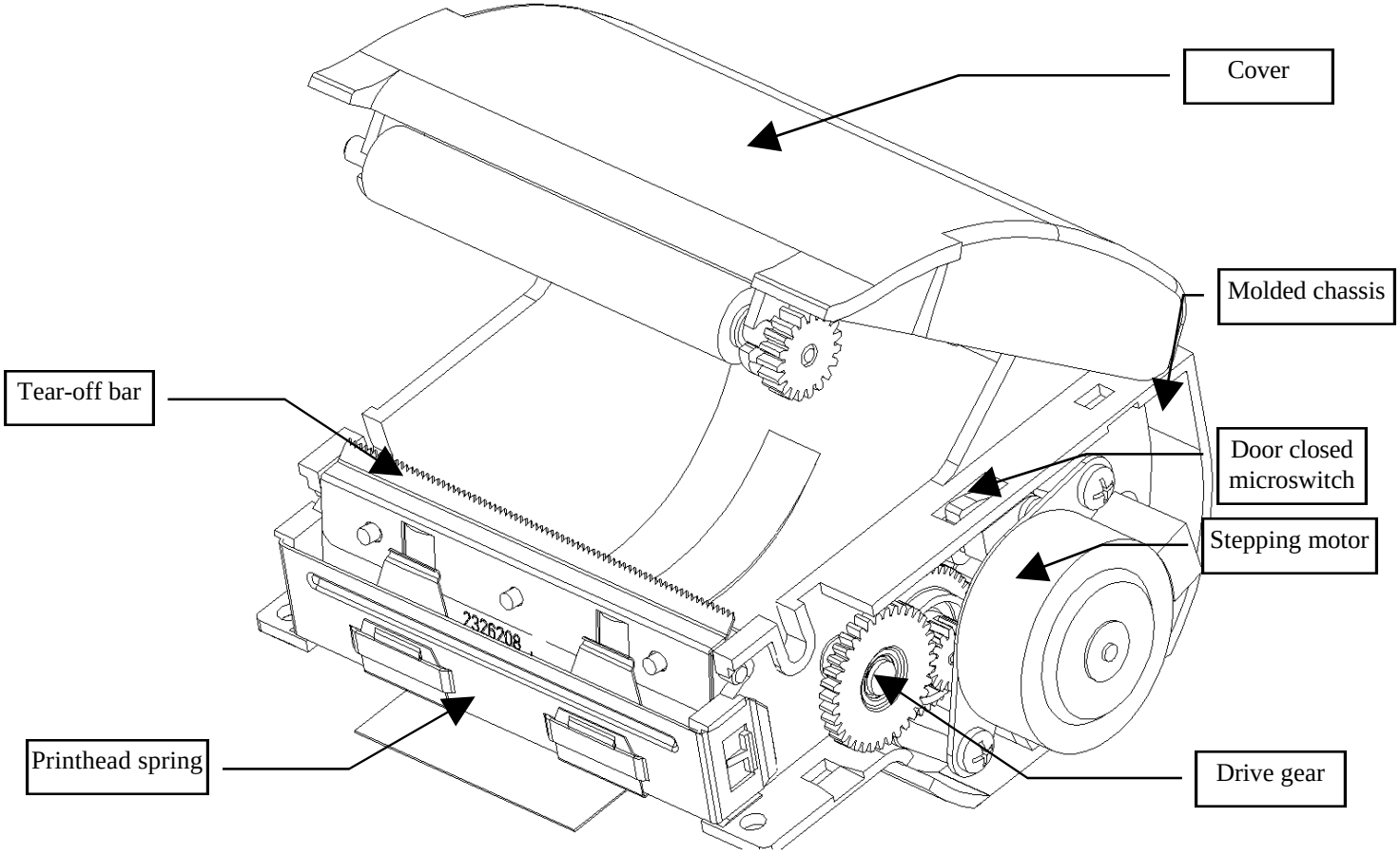
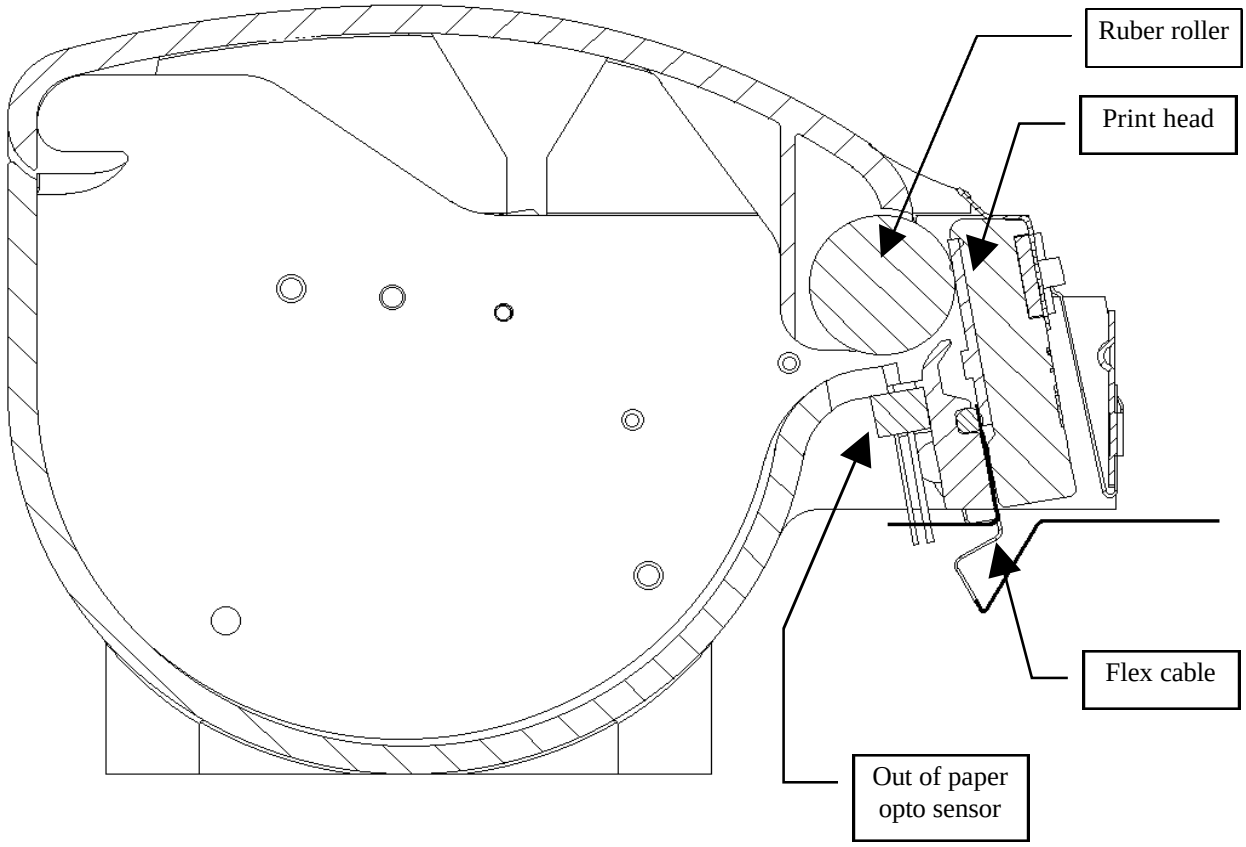


Figure 2 Cut through view of printer



2.1.1. Dimensions of the complete mechanism :

(see appendices for drawings)

Height : 55 mm
Depth : 76 mm
Width : 92.8 mm
Weight : 150 g

2.1.2. Chassis mounting

(see appendices for drawings)

The user should be aware of not stressing the printer mechanism. Otherwise print quality can be degraded producing defects such as light printing or non homogeneity of the print.

The only screws proposed for mounting are M2,5 or M2,6 only. They should not enter the nuts further than 4 mm in which case nuts could be damaged and turn freely inside bucket.

The maximum torque applicable to the screws is 0,2 Nm. Disrespecting this could result in loose inserts inside the bucket (destructive situation).

The printer's mechanism is not designed to hold anything more than itself and the paper within. No extra mass or weight should be attached through the assembly screws.

It is not recommended to have any other part within close proxiity to the gears or print head.

2.2. Electrical Specifications

2.2.1. Power supply

Table 2 Nominal power supply

Printer	**HTPN9050**	
Printhead :		
Logic (Vcc)	5	V DC
Dot line	5	
Stepping Motor	5	

Table 3 Nominal consumption of printer

Printer	**HTPN9050**	**Units**
Printhead : Heating current / dot (Vch)	42*	mA
Logic current/ dot (Vcc)	maxi 0.5	mA
Stepping motor (2 activated phases)	500	mA

* at nominal voltage

2.2.2. Stepping motor

Table 4 Stepping motor specifications

Recommended control voltage	5	VDC
Coil Resistance	20	Ω +/- 7%
Number of phases	2 (bipolar)	
Pitch angle	7.5° +/- 1° (non cumulative error)	
Number of steps per revolution	48	
Paper feed for 2 motor steps	0.125	mm
Recommended control current	250	mA/phase
Maximum starting frequency at 5V	620	step/s
Maximum speed (at 5V *)	680	step/s

* higher voltage (or current) allows to go a bit faster (higher speed indicated in the heating time table).

Note : if higher current is applied, a special care must be taken to avoid overheating of the motor

2.2.2.1. Motor connection

length of the leads : 100 mm
Connector : 6 pins top entry type J.S.T ref. B6B-PH-K-S
Pinout : pin 1,2 : first winding
pin 3,4 : second winding
pin 5: Door switch
pin 6: Ground

2.2.3. Microswitch specifications

Contact resistance : < 1 Ω
Maximum rating : 0.1 A -30 V DC

2.2.3.1. Connection

Leads length : 120 mm
Connector : Together with motor

	Door
Switch	open
Switch	closed

2.2.4. Opto-sensor specifications

Absolute Maximum ratings					
I_F (mA)	**V_R (V)**	**P_D(mW)**	**V_{CEO}(V)**	**I_C(mA)**	**P_C(mW)**
50	5	75	30	20	75
V_F (V) I_F = 4 mA	I_R (µA) V_R = 5 V	I_{CEO} (A) V_{CEO} = 10V	I_O (mA) V_{CE} = 5 V I_F = 4 mA	V_{CE}(sat)(v) -	tr (µs) I_C = 0.1 mA R_L = 1 kΩ
Maxi 1.2	Maxi 10	Maxi 1.10^{-7}	Typical 100	-	Typical 30

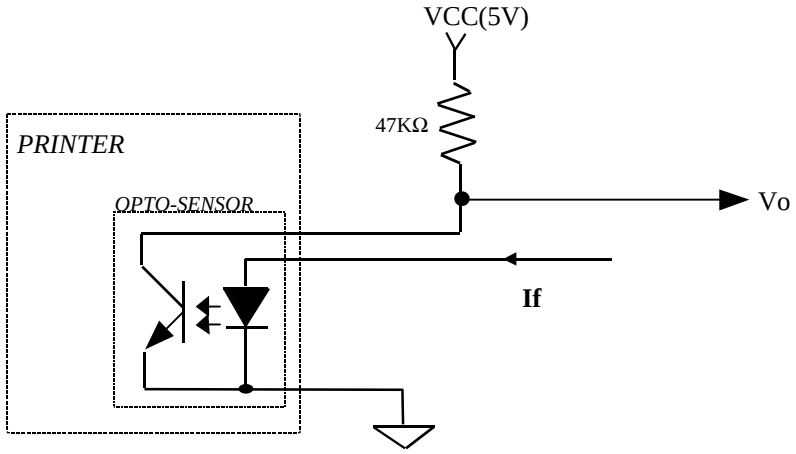
2.2.4.1. Connection

Integrated with the printhead connection (See appendices)

2.2.5. Recommended use Opto-sensor

The user should be aware that opto-sensors characteristics have very wide tolerances. We thus recommend the use of one of the schematics below.

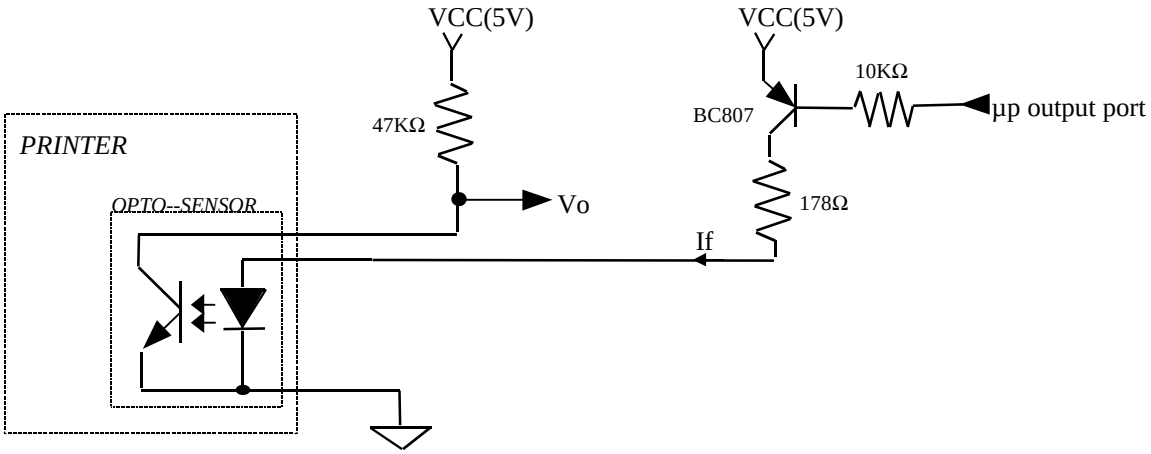
2.2.5.1. Opto Sensor : Sample minimal external circuit



Condition:

For **If** = 20 mA ..... Output signal is LOW when paper is PRESENT Vo<1V,
..... Output signal is HIGH when paper is EXHAUSTED Vo>4V.

2.2.5.2. Sample external circuit with low consumption



Condition:

Pulse wave from output port with low level during 0.6 ms, measuring Vo 0.2 ms after pulse falling edge.

Same conditions for output signal Vo as in 2.2.5.1.

2.2.6. Printhead specifications

Printer	HTPN9050	
Driver chips	6	-
Operating range (Vcc) / LSI supply	4.75-5.25 *	V DC
Mean dot resistance (± 10%)	120	Ω
Nominal dot supply voltage (-10/+40%)	5	V DC
Nominal Heating current per dot	42	mA

* **Filter any transient signal and parasitic on this line.**
Separate Vcc from Vch because Vch can go lower than 4.75 Volts. Vcc must be connected to the same power supply than the other electronic circuits which drive the printer.

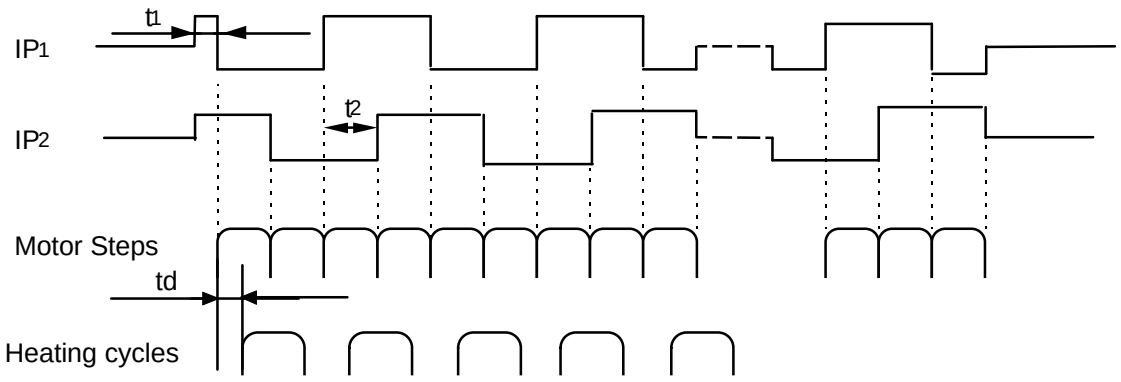
Note that three rank of head resistance are defined depending on the head resistance. This rank is indicated on the head (either on a sticker or directly written on the head). It allows to adjust heating time if very precise driving is required.
Ranks are depicted in the table here after :

Head resistance	Rank
127 to 132 Ω	A
115 to 126 Ω	B
108 to 114 Ω	C

3. OPERATION

3.1. Paper feed

Table 5 Motor feed timing diagram



Note that each time the motor has been stopped for more than 8 ms, the next step should be longer by 1 ms in order to restart the motor in the appropriate position.

Heating of subline should be started after a time td>0.5ms in order to reduce risks of unevenly spaced sublines when overheating the paper. Td can be reduced to 0 if the heating time is well adapted to the paper used.

3.1.1. Motor initialisation :

This operation is necessary to place the motor in a good position when the printer electronic is powered on or reseted. Both phases must be powered with the same current during t1=1 ms. It must be followed by 16 motor steps in order to compensate the play in the gears.

3.1.2. Printing mode :

There are 4 different positions for the motor phases.

If $P_1 = A$; $P_2 = B$

The circulation is :

$AB \Rightarrow \overline{A}B \Rightarrow \overline{AB} \Rightarrow A\overline{B} \Rightarrow AB$

The position of the phases must be kept in memory while the phase currents are switched to zero in order to restart the motor in a good position.

$I_P = \pm 250$ mA

$t_2 > 2.2$ ms

After the motor has been switch off, before feeding the paper for further printing, the phases must be repowered at their position before switch off during 5 ms. Otherwise unevenly spaced lines may be printed.

During printing, the motor phases should be maintained otherwise a paper motion can occur and induce unevenly spaced sublines.

3.1.3. Closing door and motor feed :

When the door is closed, you should feed 1 to 2 cm of paper at high speed in order to reposition the platen roller and cover in good mechanical conditions.

4. RECOMMENDATIONS

4.1. - Mechanical stress

Never apply mechanical stress to the printer because this could cause misalignment and degrade print quality.

4.2. - Energising and de energising printer

Warning ! : When energising the thermal printhead (Vcc, 5 V) it is important to apply all the logic signals within 4 ms (particularly to de-energise all the OEs).

If the line of dots (Vch, 5 V) is supplied before the control logic, resistor dots may be destroyed. Because the control logic has a random state, resistors might be heated for a longer period than the specified maximum, burning out the heated resistor.

To avoid this, we recommend applying the heating voltage (Vch,) after the logic supply voltage (Vcc).

The same precaution should be taken at shut down. The heating supply Vch must be switched off before the logic supply Vcc. **Care should be taken** to allow enough time for residual capacitive charge to dissipate.

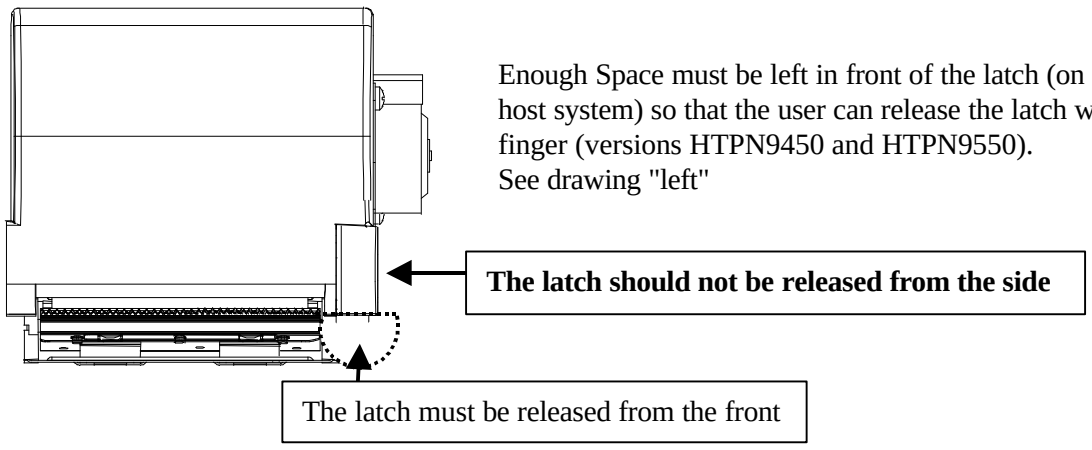
4.3. - Paper drive recommendations:

- Use a paper reference 2320061 in AXIOHM classification (or references specified in this manual). Any other paper can induce problems such as : poor print quality, unevenly spaced sublines, reduced head life expectancy, chemical incompatibilities with bucket, roller or head.
- Use a paper roll of a maximum diameter of 50 mm. A paper jam could occur otherwise.
- Do not run the printer without paper: this would damage the printer.
- Ensure that adequate air circulation around the printhead support/heatsink is provided. Poor ventilation of the printhead support/heatsink can degrade the print quality.
- There is a possibility (when there is no latch) after loading paper (or after puling the paper in a wrong direction to cut it) that **the cover switch stays open because the cover is not well closed**. In this case the end of paper optical sensor will detect paper, try once to achieve 16 motor steps and check again the cover switch, if it stays open then stop printing.

4.4. - Constraints to consider for maintaining printhead life expectancy :

- **Do not print if thermistor is over 60°C. If this happens, head may be destroyed.**
- Respect other voltages and timings limits specified in this document.
- **Logic voltage on chip** : care should be taken to filter any transient signal or parasitic in order to keep the driver in a known state: failure to observe this may result in head destruction. Separate the Vch and Vcc signals in order to stay in the defined limits of voltage on Vcc. Vcc must be connected to the same power supply than the other electronic circuits which drive the printer.

4.5. - Specific Recommendation for Version with Latch



Enough Space must be left in front of the latch (on the host system) so that the user can release the latch with his finger (versions HTPN9450 and HTPN9550).
See drawing "left"

5. APPENDICES

5.1. APPENDIX 1 : Drawings of Printer

Figure 3 Right view

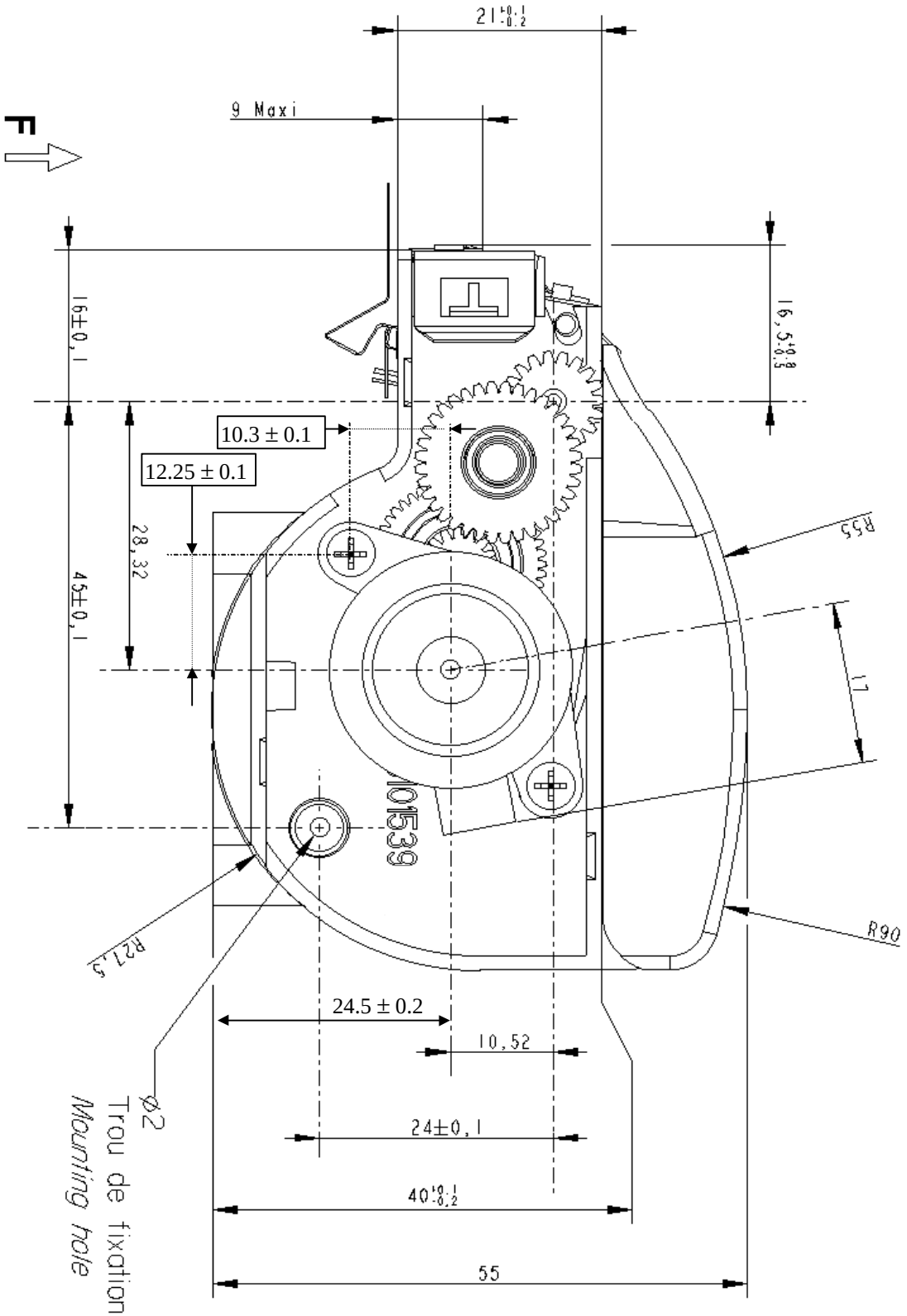
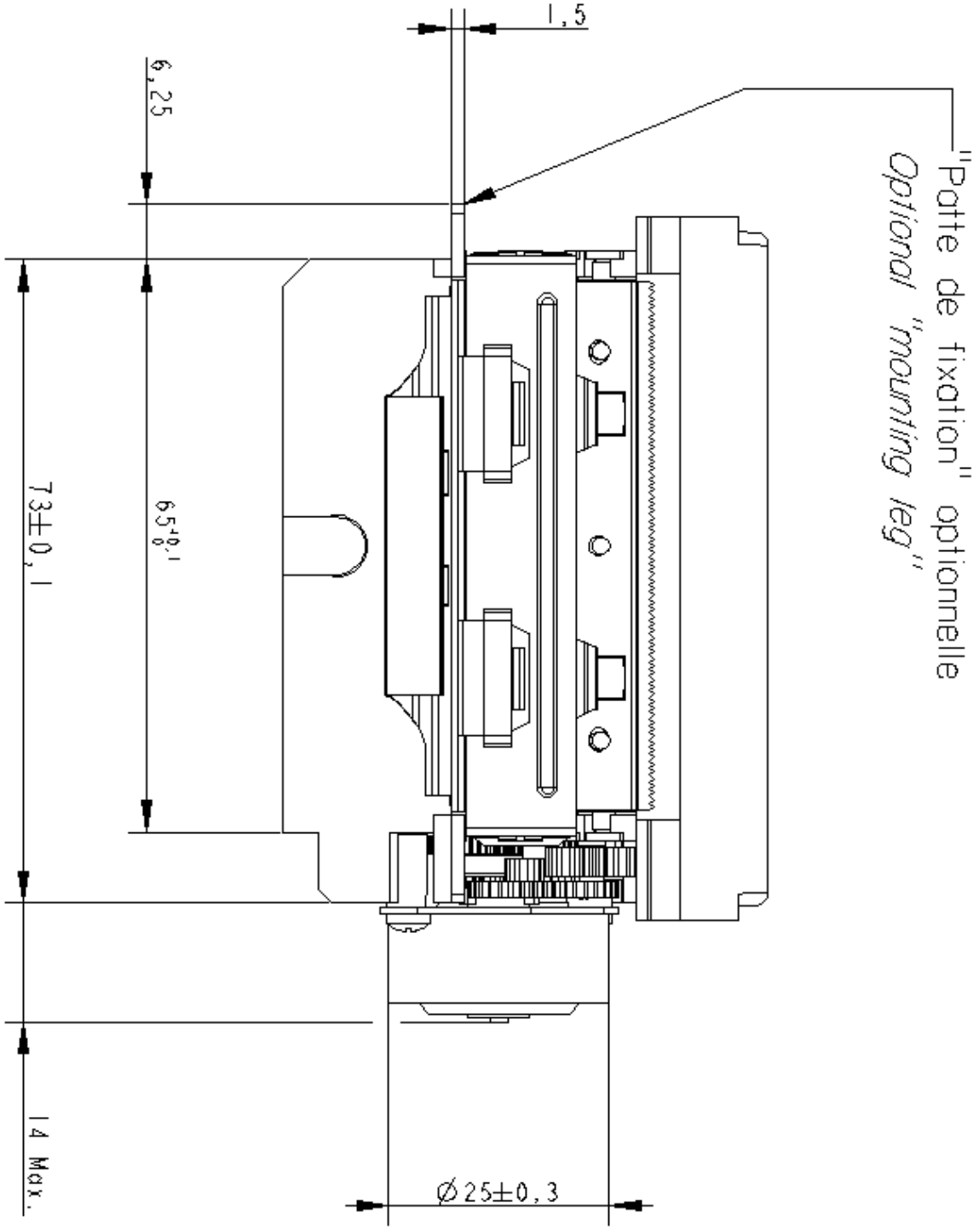


Figure 4 Front view



The optional leg is designed to assemble the printer to a PCB. It should not incur stress and is not sufficient to support the printer mechanism. Use the lower inserts for assembling the mechanism to the full product set.

Figure 5 Top view

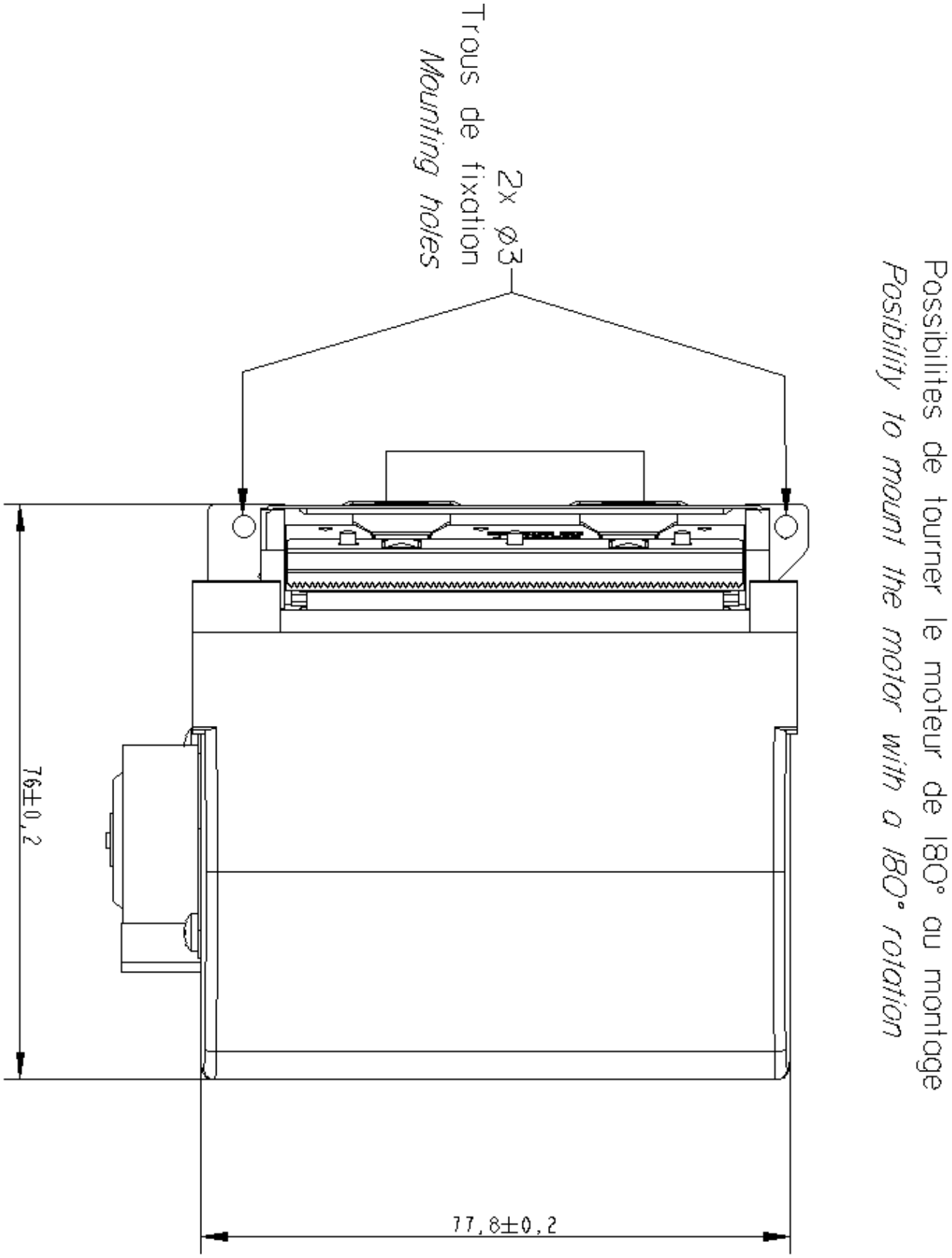
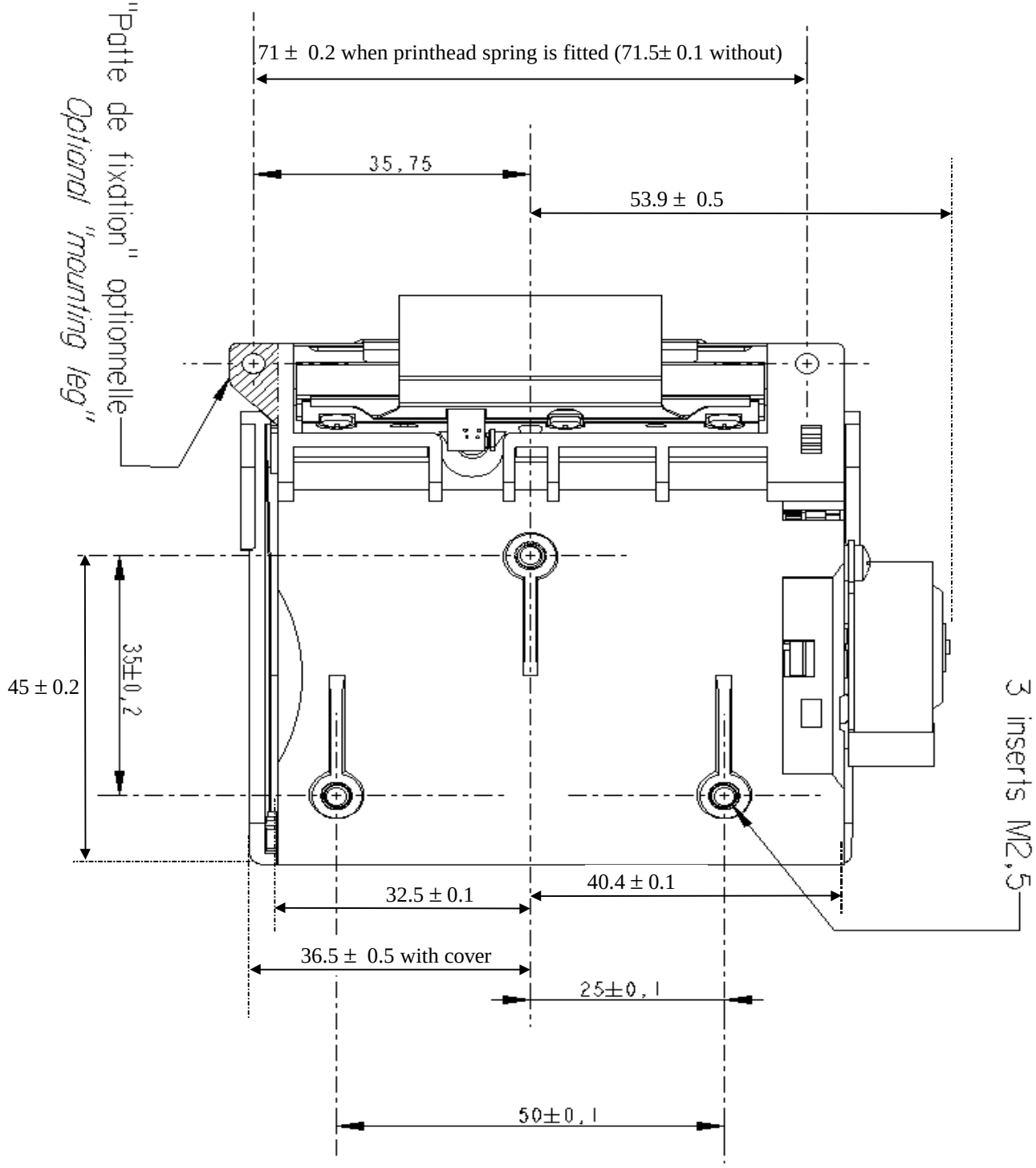


Figure 6 Bottom view



The 3 inserts are designed to assemble the printer to the user set. They can accept M2.5 and M2.6 screws. The screws should not be screwed longer than 4 mm inside bucket. The maximum acceptable torque is 0.2 Nm. The maximum pulling effort is 50 N by insert. **Screwing outside of these maximum values may destroy the bucket.**

5.2. APPENDIX 2 : 64-BIT LSI DRIVERS CHART AND OPERATION

The LSI power and multiplexing circuit drivers located on the thermal printhead provide power control from logic signals and the DC power supply voltage.

These circuits are supplied by **5 V ± 5%** logic voltage. Take care to filter transient and parasitic on all logic lines. Undetermined states can happen and destroy the head. The power source should be disconnected from the logic source. The logic source must be connected to the same source as the electronic circuits in charge of controlling the printer.

Each circuit features 64 open collector transistors, a 64-bit shift register and a 64-bit memory register.
Each circuit controls 64 resistor dots on the printhead.

Figure 7 Driver chart

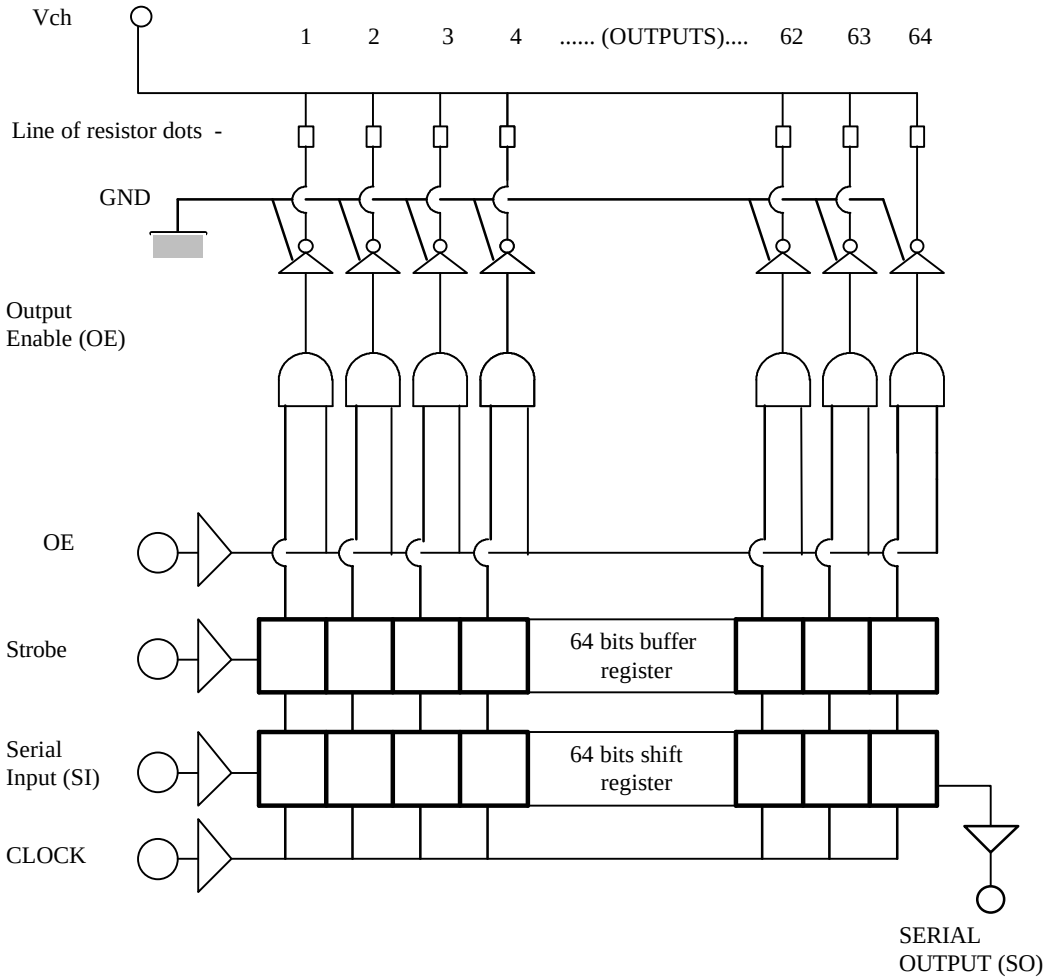


Figure 8 Routing data to the resistor dots

Note : See Appendix "Connection" for the available signals on the printer connection.

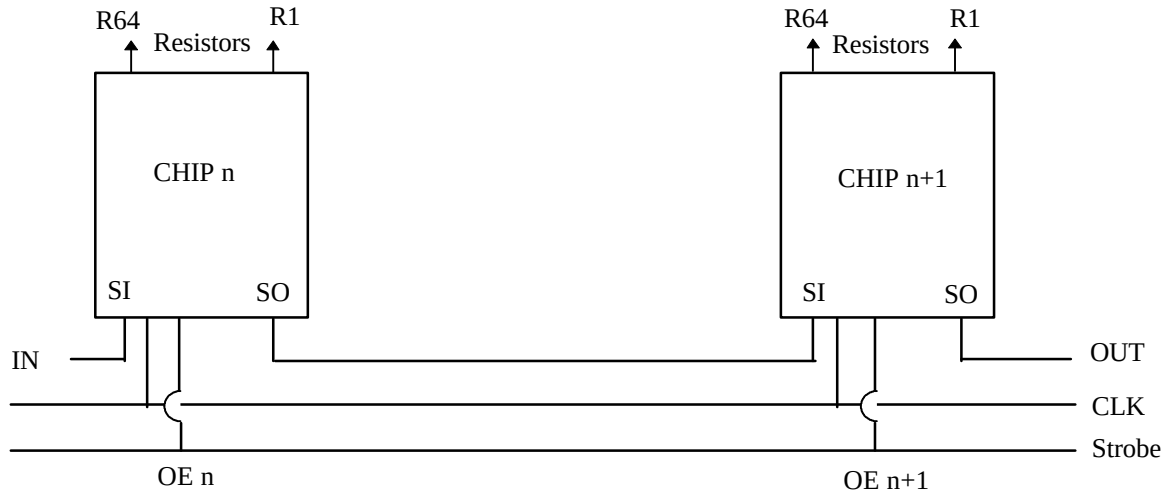
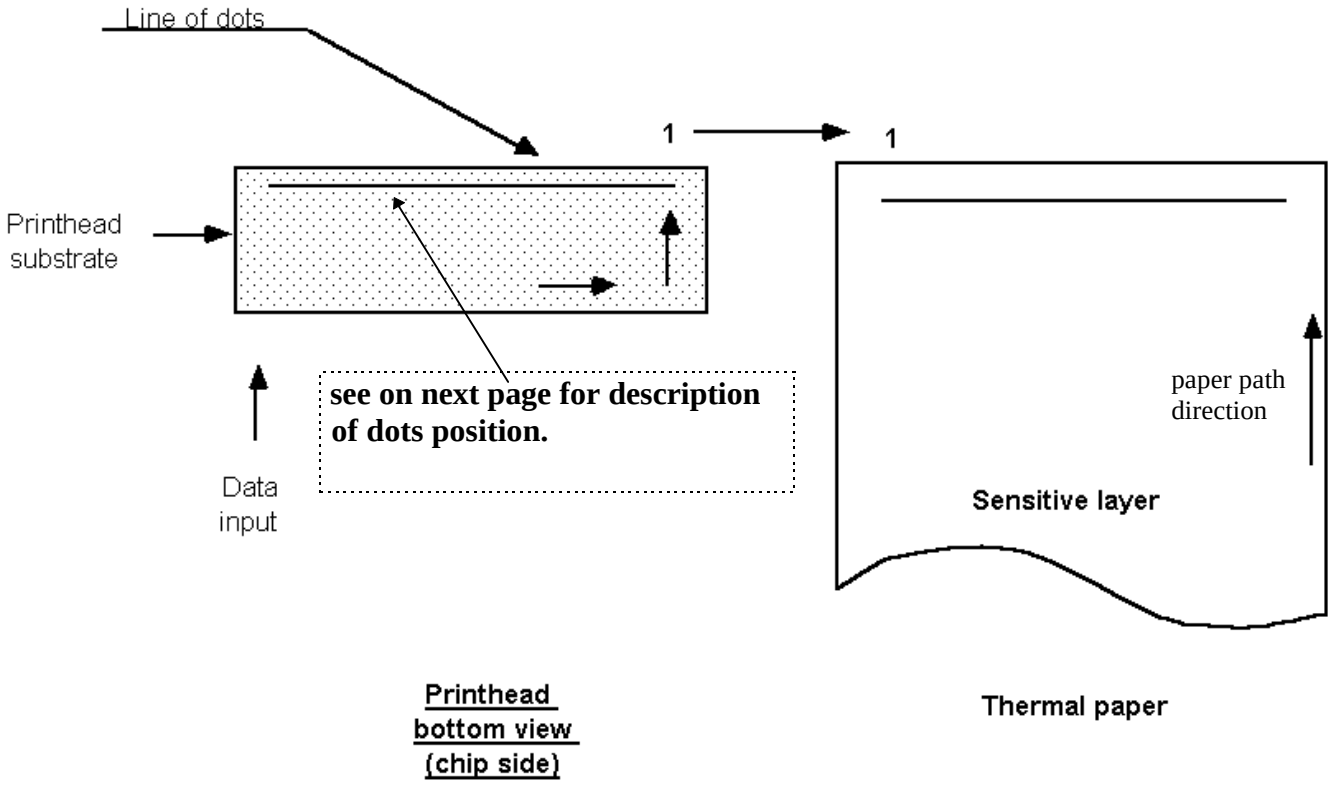


Figure 9 Dots print order



The first bit of data entered will be the first bit of data printed (FIFO).

5.3. APPENDIX 3 : Electrical specifications of 64-bits LSI driver

Table 6 General electrical description of drivers

Description	Min	Maxi	Unit
Max. voltage at outputs 1 to 64		7	Volt
Max. voltage any other pin		5.25	Volt
Max. output current	- 45		mA
Total max. output current	-2.88 =(64×(- 45.10^{-3}))		A

The specifications given below are given for the following conditions :

Logic voltage on chip : 4.75V < Vdd < 5.25V (care should be taken to filter any transient signal or parasitic in order to keep the driver in a known state: failure to observe this may result in head destruction)

Clock frequency : 5 MHz

Table 7 Logic current (5 V)

	CONDITIONS	VALUES	SYMBOL
Vdd supply current	64 drivers on +	30 mA	Idd
Min. high-level input voltage	Vcc = 5 Volts	3.5 V (0.7×Vdd)	Vih
Max. low-level input voltage	Vcc = 5 Volts	1.5 V (0.3×Vdd)	Vil
Max. high-level input current		0.5 µA	Iih
Max. low-level input current		- 0.5 µA	Iil
Min. high-level output voltage	Io = Iohmax	4.45 V	Voh
Max. low-level output voltage	Io = Iolmax	0.05 V	Vol

Table 8 Heating Current

	CONDITIONS	VALUES	SYMBOL
Max. power output current	Vdon = Vdonmax	-45 mA	Idomax
Max. output leakage current	Vdon = 5V	1 µA	Idoleak
Max. output voltage	Idout = Idomax	1.1 V	Vdonmax

5.4. APPENDIX 4 : 64 Bits LSI driver timing chart

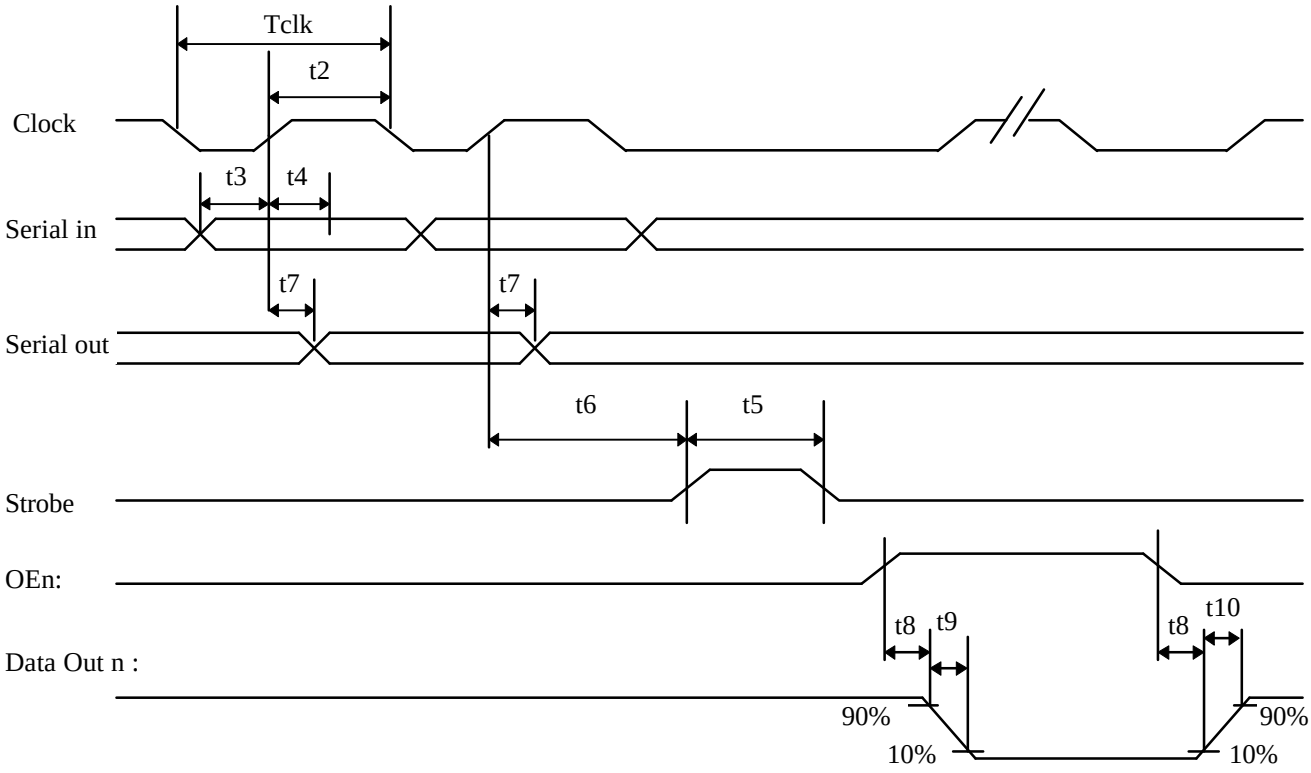
5.4.1. TYPICAL LOADING SEQUENCE

Table 9 LSI driver symbols

Symbol	Description	Min	Typ	Maxi	Unit
Tclk	serial clock period			5	Mhz
t2	clock pulse width	70			ns
t3	data in to clock set-up time	40			ns
t4	data in from clock hold time	40			ns
t5	strobe high time	100			ns
t6	clock to strobe delay time	100			ns
t7	serial data out from clock delay			120	ns
t8	OE to data out delay time			4.5	µs
t9	data out fall time 10% --> 90%		1.5	4.5	µs
t10	data out rise time 10% --> 90%		1.5	4.5	µs

Vdd = 5V, Temp = 25 °C with resistive load, R1=120Ω connected to 5V

Figure 10 LSI driver timing chart



Serial in	:	Serial input for data to be printed
Clock	:	Serial/parallel shift register clock, activated on leading edge of pulse (rest level = logic 0) Clock frequency is 5 MHz. **The rising time of clock must be < 50 ns**
Serial out	:	Serial data out sent back to the connector of the thermal head
STROBE	:	Signal for putting data into memory, active on logic level 1 (rest level = logic 0)
OE	:	Output Enable (OE1 to OE3): power activation signals active at logic level 1.
Data Out n	:	Internal data out to heating points (not available on connector)
Note	**:**	**All these inputs are CMOS compatible.**

5.5. APPENDIX 5 : Thermistor specifications

This thermistor has a resistance variation can be expressed as follows :

Equation 1 Resistance value of thermistor

$$R = Rn \times e^{\left(B \times \left[\frac{1}{T} - \frac{1}{Tn} \right] \right)}$$

where T is in Kelvin degrees (°K)

B = 4066 °K

Rn = 100 KΩ : reference value at temperature Tn (298°K)

The main specifications of the thermistor are listed in the following pages.

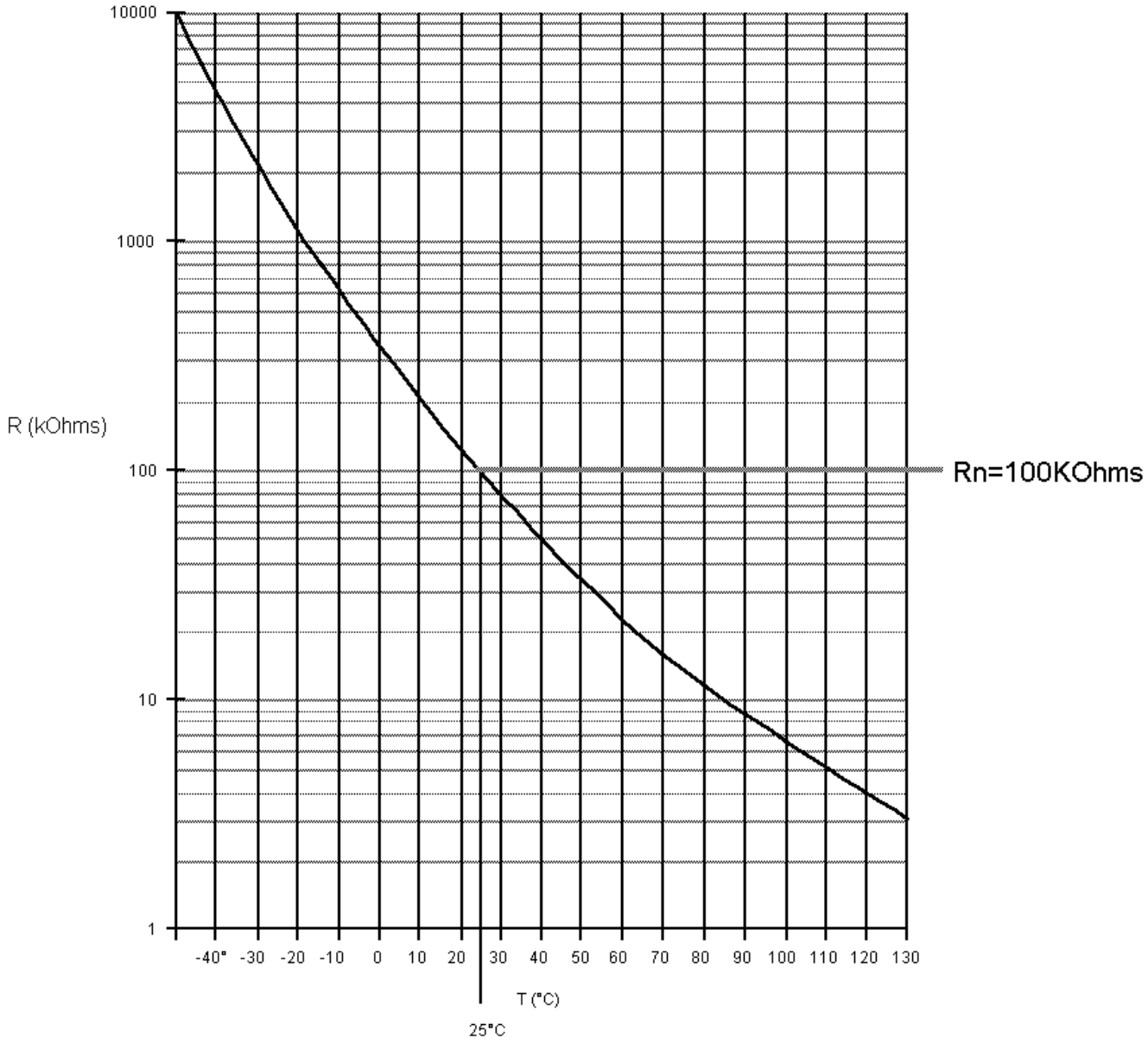
NTC thermistor, rectangular size (IEC 12.05), silver palladium metallic coating.

5.6. GENERAL CHARACTERISTICS

* Climatic category (IEC) 40/85/56
* Maximum operating temperatures : -20°C to +80°C
* Rated resistance at 25° C : Rn = 100 KΩ (see table of values)
* Tolerance for Rn : 5%
* Maximum dissipation at 25° C : Pmax = 0.24 mW
* Thermal dissipation factor : 5 mW/°C
* Thermistor time constant / dot line : t = 30 sec
* Resistance value as a function of temperature (see curves)

Note that printing should be stopped if the thermistor value goes over 60°C.

Figure 11 Thermistor's resistance (R) / Temperature variations



5.7. APPENDIX 6 : Heating time for HTPN9050

The heating time table is presented on next pages, it was achieved with the JUJO TF50KS E3 paper

The motor cycle time for one dot line is given in the second top line of the table, it is the time for two motor steps.

The column 3 (indicated with : speed <2 mm/s and motor cycle time > 62.5 ms) gives the required heating time, giving the necessary energy to obtain an optical density of 1.2.

Three areas are then defined in the table :

Area 1 : "white" : the motor cycle time for one dot line is greater than the heating time indicated in column 3

Area 2 : high lighted : the maximum heating time is greater than the motor cycle time

Area 3 : indicated by " * " : the required heating time (function of speed, voltage and temperature) becomes greater than the motor cycle time, printer cannot be operated.

How to use tables ?

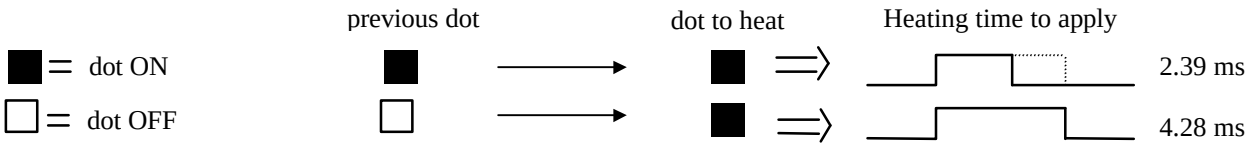
heating time can be controlled either with or without historical control.

- **Without historical control :** apply the indicated heating time given as a function of speed, voltage and temperature. At high speed, printing quality for isolated dots might be affected with this method.

  Example : at 25 mm/s, 25°C and 5 volts : 3.85 ms

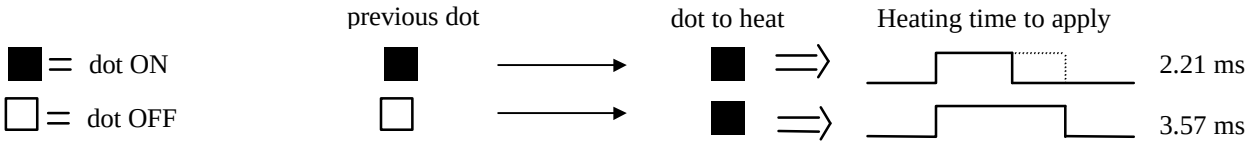
- **With historical control in area 1 :** apply the indicated heating time (function of speed, voltage and temperature) when the dot has been heated on the previous subline, and the time from column 3 when it has not. This method gives the best printing quality.

  Example : at 25 mm/s, 30°C and 6 volts :



- **With historical control in area 2 :** apply the indicated heating time (function of speed, voltage and temperature) when the dot has been heated on the previous subline, and the motor cycle time when it has not. At high speed, printing quality for isolated dots might be slightly affected with this method.

  Example: at 35 mm/s, 10°C and 6.5 volts :

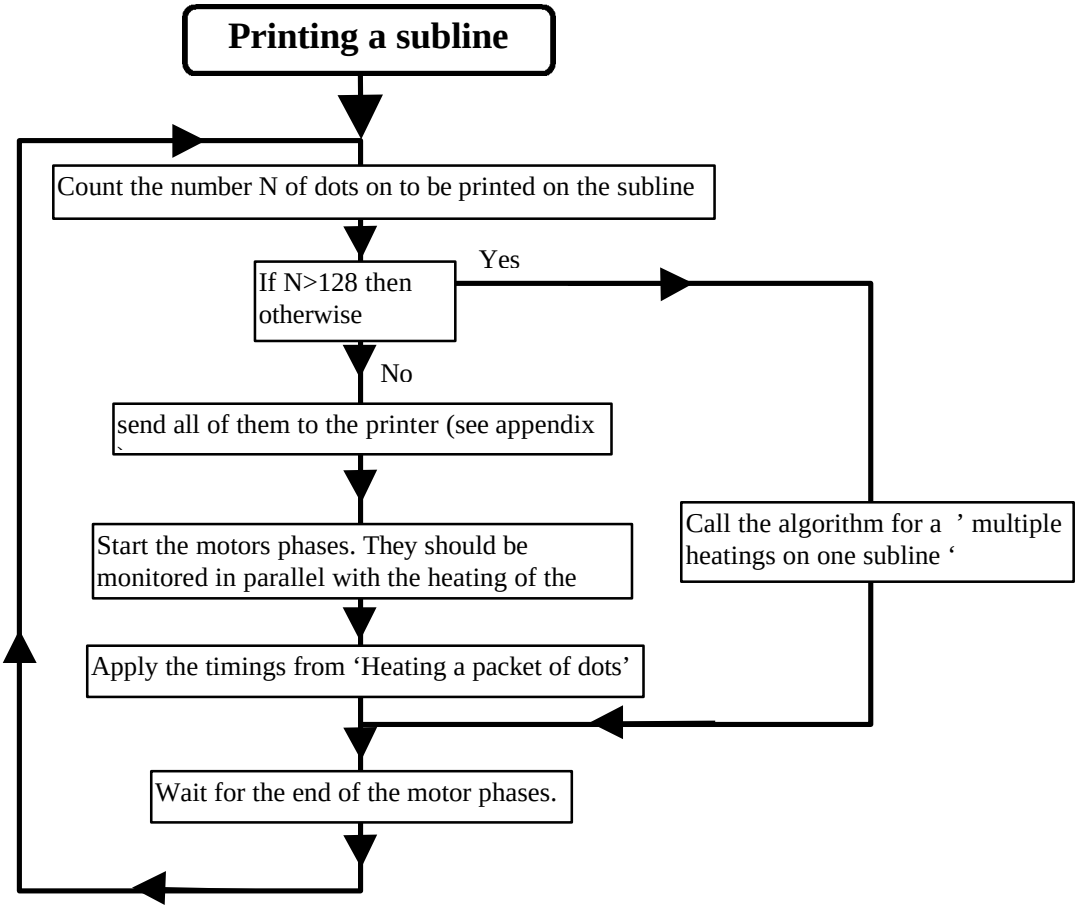


Voltage	Temp °C	Speed (mm/s)						R=120 Ohm		
		< 2 mm/s	10 mm/s	20 mm/s	25 mm/s	30 mm/s	35 mm/s	40 mm/s	50 mm/s	60 mm/s
		>62,5 ms	12,5 ms	6,25 ms	5 ms	4,17 ms	3,57 ms	3,13 ms	2,5 ms	2,08 ms
4 Volts	0 °C	15,06	10,82	*	*	*	*	*	*	*
4 Volts	10 °C	13,73	9,87	*	*	*	*	*	*	*
4 Volts	20 °C	12,41	8,92	*	*	*	*	*	*	*
4 Volts	30 °C	11,08	7,96	*	*	*	*	*	*	*
4 Volts	40 °C	9,76	7,01	5,83	*	*	*	*	*	*
4 Volts	50 °C	8,43	6,06	5,04	**4,71**	*	*	*	*	*
4,5 Volts	0 °C	11,34	8,15	*	*	*	*	*	*	*
4,5 Volts	10 °C	10,34	7,43	6,18	*	*	*	*	*	*
4,5 Volts	20 °C	9,35	6,71	5,58	*	*	*	*	*	*
4,5 Volts	30 °C	8,35	6	4,99	**4,66**	*	*	*	*	*
4,5 Volts	40 °C	7,35	5,28	4,39	**4,1**	3,87	*	*	*	*
4,5 Volts	50 °C	6,35	4,56	3,79	**3,54**	3,34	**3,17**	3,02	*	*
5 Volts	0 °C	8,85	6,36	5,28	**4,94**	*	*	*	*	*
5 Volts	10 °C	8,07	5,8	4,82	**4,5**	*	*	*	*	*
5 Volts	20 °C	7,29	5,24	4,35	**4,07**	3,84	*	*	*	*
5 Volts	25 °C	**6,9**	**4,96**	**4,12**	**3,85**	3,63	**3,45**	*	*	*
5 Volts	30 °C	6,51	4,68	3,89	**3,63**	3,43	**3,25**	3,1	*	*
5 Volts	40 °C	5,73	4,12	3,42	**3,2**	3,02	**2,86**	2,73	2,5	*
5 Volts	50 °C	4,96	3,56	2,96	**2,77**	2,61	**2,47**	2,36	2,16	*
5,5 Volts	0 °C	7,1	5,1	4,24	**3,96**	3,74	**3,54**	*	*	*
5,5 Volts	10 °C	6,47	4,65	3,86	**3,61**	3,41	**3,23**	3,08	*	*
5,5 Volts	20 °C	5,85	4,2	3,49	**3,26**	3,08	**2,92**	2,78	*	*
5,5 Volts	25 °C	5,54	3,98	3,31	**3,09**	2,91	**2,76**	2,64	2,42	*
5,5 Volts	30 °C	5,22	3,75	3,12	**2,91**	2,75	**2,61**	2,49	2,28	*
5,5 Volts	40 °C	4,6	3,3	2,75	**2,57**	2,42	**2,3**	2,19	2,01	1,86
5,5 Volts	50 °C	3,97	2,85	2,37	**2,22**	2,09	**1,98**	1,89	1,74	1,61
6 Volts	0 °C	5,82	4,18	3,47	**3,25**	3,06	**2,9**	2,77	*	*
6 Volts	10 °C	5,3	3,81	3,17	**2,96**	2,79	**2,64**	2,53	2,32	*
6 Volts	20 °C	4,79	3,44	2,86	**2,67**	2,52	**2,39**	2,28	2,09	1,94
6 Volts	30 °C	**4,28**	**3,08**	**2,56**	**2,39**	2,25	**2,14**	2,04	1,87	1,73
6 Volts	40 °C	3,77	2,71	2,25	2,1	1,98	**1,88**	1,79	1,65	1,53
6 Volts	50 °C	3,26	2,34	1,95	1,82	1,71	**1,63**	1,55	1,42	1,32
6,5 Volts	0 °C	4,85	3,49	2,9	2,71	2,56	**2,42**	2,31	2,12	1,96
6,5 Volts	10 °C	**4,43**	**3,18**	**2,64**	**2,47**	**2,33**	**2,21**	2,11	1,93	1,79
6,5 Volts	20 °C	4	2,87	2,39	2,23	2,11	2	1,9	1,75	1,62
6,5 Volts	25 °C	3,79	2,72	2,26	2,11	1,99	1,89	1,8	1,65	1,53
6,5 Volts	30 °C	3,57	2,57	2,13	1,99	1,88	1,78	1,7	1,56	1,45
6,5 Volts	40 °C	3,15	2,26	1,88	1,76	1,66	1,57	1,5	1,37	1,27
6,5 Volts	50 °C	2,72	1,95	1,62	1,52	1,43	1,36	1,29	1,19	1,1
7 Volts	0 °C	4,11	2,95	2,46	2,3	2,16	2,05	1,96	1,8	1,66
7 Volts	10 °C	3,75	2,69	2,24	2,09	1,97	1,87	1,79	1,64	1,52
7 Volts	20 °C	3,39	2,43	2,02	1,89	1,78	1,69	1,61	1,48	1,37
7 Volts	30 °C	3,03	2,17	1,81	1,69	1,59	1,51	1,44	1,32	1,22
7 Volts	40 °C	2,67	1,91	1,59	1,49	1,4	1,33	1,27	1,16	1,08
7 Volts	50 °C	2,3	1,65	1,38	1,29	1,21	1,15	1,1	1,01	0,93

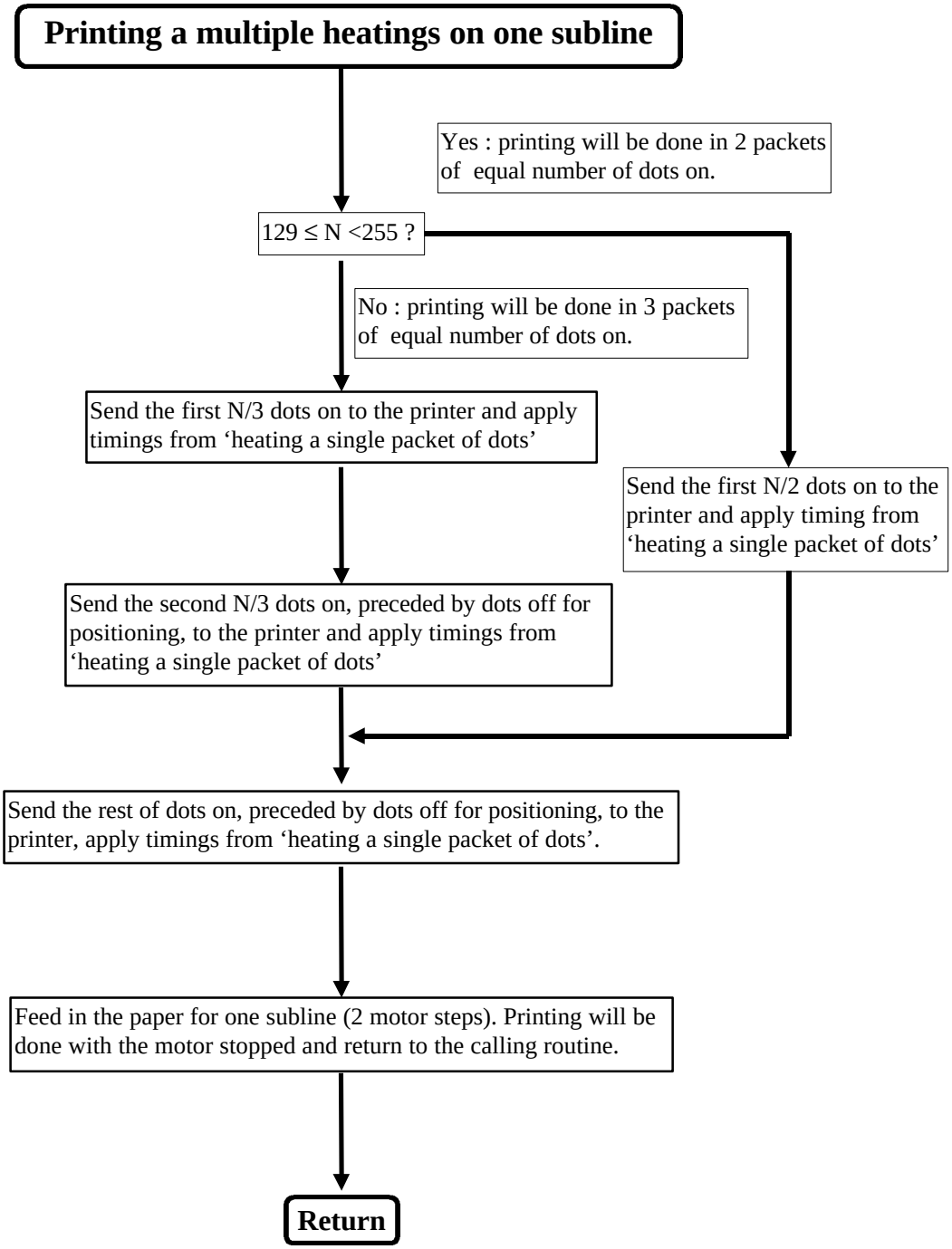
5.8. Printing algorithm giving a reasonably fast result

Some simple rules should be applied:

+ always print less than 128 dots at once
+ on a given subline, print only packets of the same number of dots on
+ if more than 128 dots are on on a given subline print it with the motor stopped
+ use precomputed heating time tables with the Vch measures and Thermistor measure as index to heating time value.
+ Drive the motor phases through a specific interruption and timer in order to warrant independence with all other tasks.



This algorithm is to be used if more than 128 dots are on for a subline.
This limitation is induced by high currents values required to print more than 128 dots.
The approach is to split the subline into packets of dots that will be printed successively.



5.9. APPENDIX 7 : PAPER SPECIFICATIONS

The two recommended and tested references for paper are :

- **JUJO : AF KS50E3 & TF 50KS E3 (used to generate the heating time table shown in this manual)**

Property	Method	Unit	Value
Grammage	SCAN P6	g/m2	58.5 ± 2
Thickness	SCAN P7	µm	62 ± 2
Surface smoothness		sec	500 ± 50
Brightness	SCAN P3 (ISO 2470)	%	85 min
Static initial activation temperature	OD = 0.2	°C	70
Static activation temperature	OD = 1	°C	78
Tensile strength	SCAN P16	KN/m	3.2 min
Tear Strength	SCAN P11	mN	260 min
Image Colour	-	-	Black
Moisture stability	SCAN P4	%	6 ± 0.5

Property	Conditions	Unit	Value
Heat resistance	60°C, 24 hrs	OD	0.25 max 1.25 min
Humidity resistance	40°C 90%RH 24 hrs	OD	0.15 max 1.25 min
Dynamic Sensitivity	(0.49 mj-dot)	OD	0.95 ± 0.05
Maximum Density	SCAN P11	OD	1.35 ± 0.05
Warranty (Image & Printability)	25°C, 65%RH, dark place.	-	3 years

- **Kanzaki : KP440**

Property	Method	Unit	Value
Grammage	ISO 536	g/m2	58 ± 5
Thickness	ISO 534	µm	60 ± 5
Surface smoothness	ISO 5627	sec	250 min.
Brightness	ISO 2470	%	75 min
Tensile strength	ISO 1924	KN/m	3.3 min
Static initial activation temperature	OD = 0.2	°C	50
Static activation temperature	OD = 1	°C	98
Tear Strength	ISO 1974	mN	250 min
Image Colour	-	-	Black
Moisture stability	ISO 287	%	6.5 ± 1

5.10. APPENDIX 8 : Printer connections

Table 10 Pinout of the printer flex cable

Pin Number	Signal	Comment
1	Vch	
2	Vch	
3	CLOCK	Clock signal for serialising data to line
4	STROBE	Strobe signal for line print
5	D-in	Data input
6	GND	GND
7	OE1	OE for driver 1
8	OE2	OE for driver 2
9	GND	GND
10	GND	GND
11	OE3	OE for driver 3
12	GND	GND connected to radiator (heatsink)
13	TH1	Thermistor
14	TH2	Thermistor
15	OE4	OE for driver 4
16	GND	GND
17	OE5	OE for driver 5
18	Collector opto	Collector of end of paper opto sensor
19	Opto GND	GND for Opto-sensor
20	Anode opto	Anode of end of paper opto sensor
21	GND	GND
22	OE6	OE for driver 6
23	D-out	Data out
24	Vcc	Logic power supply +5V
25	Vch	
26	Vch	

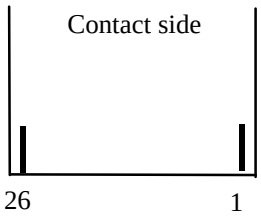


Figure 12 Pin numbers of flex cable

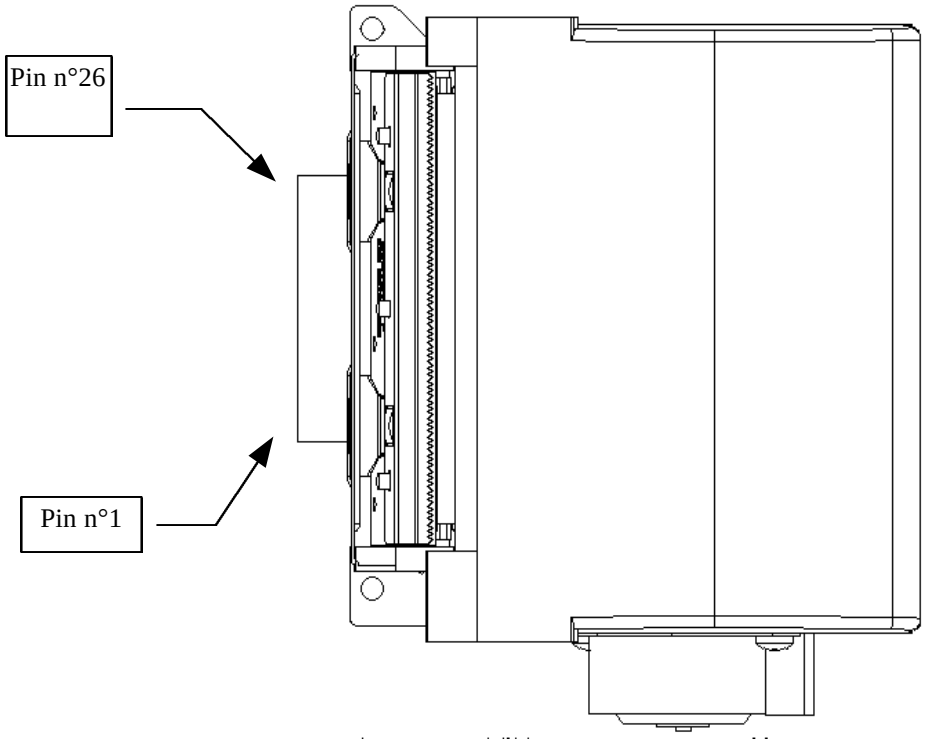


Table 11 Recommended connectors for the flex cable

N°	Supplier	Reference
1	Molex	5597 39-51-3264 5597 30-51-7263
2	Stocko	MZF 9386-6-0-2626 MZF 8896-6-0-2626

The Connector requested : 26 pins, step of 1,25 mm, Zero insertion force. Note that using any other connector can destroy the flex cable.