

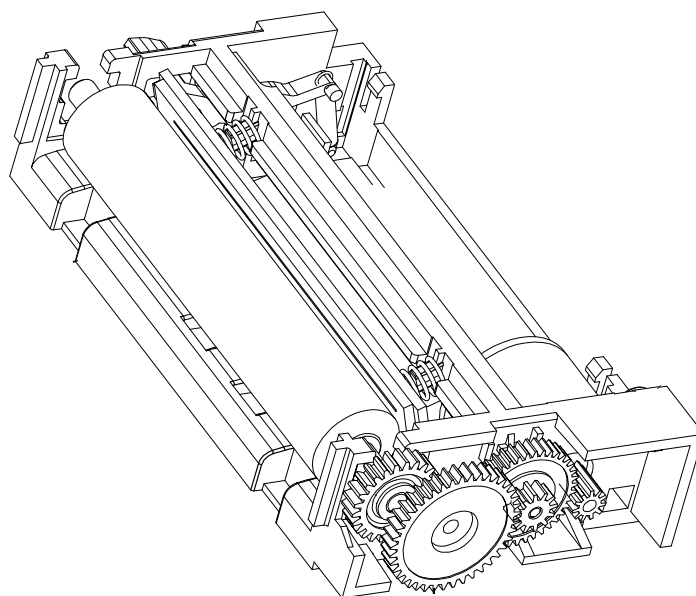


THERMAL PRINTER COMPONENTS

THTE PRINTER MECHANISM SERIES

USER MANUAL

Reference 3107383 Issue Z
May 2004



AXIOHM

1, rue d'Arcueil, BP 820
92542 MONTROUGE CEDEX, FRANCE
Tel : (33) 1 58 07 17 17, Fax : (33) 1 58 07 17 18
www.axiohm.biz



EVOLUTIONS

Date	Issue	Modifications
05/04	Z	Creation



IMPORTANT

**This manual contains the basic instructions to run your printer.
Read it carefully before using your printer, paying full attention
to the section "Recommendations".**

CONTENTS

1	UNPACKING	5
2	OVERVIEW	5
3	MECHANICAL SPECIFICATIONS	7
3.1	<i>General description</i>	7
3.2	<i>Dimensions of the complete mechanism.....</i>	7
3.3	<i>External Dimensions</i>	7
3.4	<i>Fixing Elements</i>	8
3.5	<i>Flex cable position.....</i>	8
3.6	<i>Chassis mounting.....</i>	9
3.7	<i>Cover axis position.....</i>	9
3.8	<i>Useful distances.....</i>	10
4	ELECTRICAL SPECIFICATIONS	11
4.1	<i>Nominal Power supply.....</i>	11
4.2	<i>Nominal Consumption of printer.....</i>	11
4.3	<i>Description of print head.....</i>	11
4.3.1	Function of 64 bit LSI drivers chart and operation	12
4.3.2	Electrical specifications of 64-BIT LSI driver	14
4.3.2.1	<i>General electrical description of drivers</i>	14
4.3.2.2	<i>Other</i>	14
4.3.2.3	<i>Timing</i>	15
4.3.3	Print head connection	17
4.4	<i>Bipolar stepping motor.....</i>	18
4.4.1	Characteristics	18
4.4.2	Motor connection	18
4.4.3	Induction sequence and timing (paper feed)	19
4.4.4	Printing mode	19
4.5	<i>Sensors specifications</i>	20
4.5.1	End of paper opto-sensor	20
4.5.1.1	<i>Electrical characteristics</i>	20
4.5.1.2	<i>Connection</i>	20
4.5.2	Recommended use for Opto-sensor.....	21
4.5.2.1	<i>Opto Sensor : Sample minimal external circuit</i>	21
4.5.2.2	<i>Sample external circuit with low consumption</i>	21

5	PRINTER CONTROL TECHNIQUES	22
5.1	<i>Mode 1.....</i>	22
5.2	<i>Mode 2.....</i>	24
5.3	<i>Mode 3.....</i>	25
6	RECOMMENDATIONS	26
6.1	<i>Mechanical recommendations.....</i>	26
6.2	<i>Electrical Recommendations</i>	26
6.3	<i>Motor Driving Recommendations.....</i>	26
7	HEATING TIME	27
7.1	<i>Using formulas.....</i>	27
7.2	<i>Historical Control</i>	28
7.3	<i>Heating Table.....</i>	30
7.4	<i>Thermistor Specifications.....</i>	31
8	PAPER SUPPLIERS	32
9	SPARES	32
9.1	<i>kits.....</i>	32
10	INDEX	33



1 UNPACKING

Each printer mechanism is packaged in an antistatic bag.
Observe precautions while handling in electrostatic protected areas.

2 OVERVIEW

Based on static thermal printing technology, the THTE series is a family of user-friendly, highly reliable devices which have been specially designed with 5Vdots line and very small size, to suit independent terminal applications.

THTE have got the UL, CSA, IES 60950 certification.

UL/CSA: Project n°03CA36108

IEC: Report n°E199398-A2-UL-1

The printer is designed to be used with a clamshell cover, an optional tear bar is available, and the mechanism can tolerate a latch if required.

SUMMARY OF PRINTER SPECIFICATIONS

ITEM	VALUE	UNITS
Printing method	Static thermal dot line printing	-
Printing width	48	mm
Maximum printing speed	see "heating time": depends on voltage, temperature and control way	mm/sec
Paper loading	Clamshell with front paper path or underneath paper path	-
Paper width	58 or 60	mm
Maximum paper thickness	- 80 with front paper path - 130 with underneath paper path For underneath paper path this value can be overshoot with restrictions: if needed, contact AXIOHM Technical support.	g/m ²
Recommended paper	/ JUJO TF50KSE3	-
Number of resistor dots	384	-
Maximum number of dots energized simultaneously	128*	-
Resolution	8	dots/mm
Paper feed pitch	2	motor steps
	0.125	mm
Head temperature detection	By thermistor	-
Out of paper detection	By opto-sensor	-
Maximum size for the roll paper	50	mm

SUMMARY OF PRINTER SPECIFICATIONS (continued)

ITEM	VALUE	UNITS
Maximum duty cycle (1 sec "on" max)	15	%
Storage temperature range	- 25 to + 70	°C
Operating temperature range	0 to +50	°C
Relative humidity (<i>operating</i>)	10 to 90	%
Operating voltage range Vcc (<i>logic</i>)	3.3 to 7	V DC
Operating voltage range Vch (<i>dot</i>)	4 to 8.5	V DC
Energy Supply	0.20	MJ/dot
Current consumption: Vch (at nominal value: 5V)	28	mA per resistor dot «on»
Current consumption: Icc max (at value : 5.25V)	54	mA
Current consumption: Stepping motor (at nominal value)	277	mA per activated phase
Electrical life time**	1. 10 ⁸	pulses
Mechanical life time**	50	km
Over all dimensions:	Height	16 mm
	Width	72 mm
	Depth	39 mm
Weight	40	g
Specified standards	IEC 68-2-6, IEC 68-2-29, IEC 68-2-36	

* The printing density variation may become significant when the number of dots energized simultaneously becomes greater than 64 . Print head is allowed to have 4.0 A maximum.

** Per AXIOHM standard test conditions (which are mainly: 5V, ≈ 25 °C, dot printing duty cycle = 30%)

3 MECHANICAL SPECIFICATIONS

3.1 General description

The mechanism consists in:

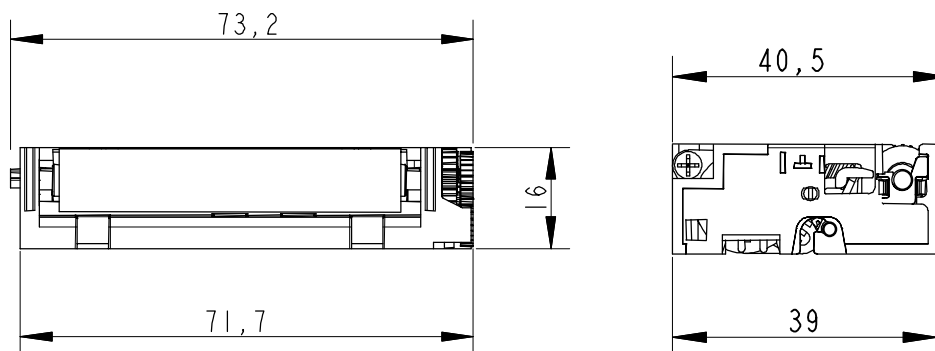
- Plastic chassis with two platen bearings
- Stepper motor
- Gears train
- Printhead module with flex cable and opto sensor
- Platen roller

3.2 Dimensions of the complete mechanism

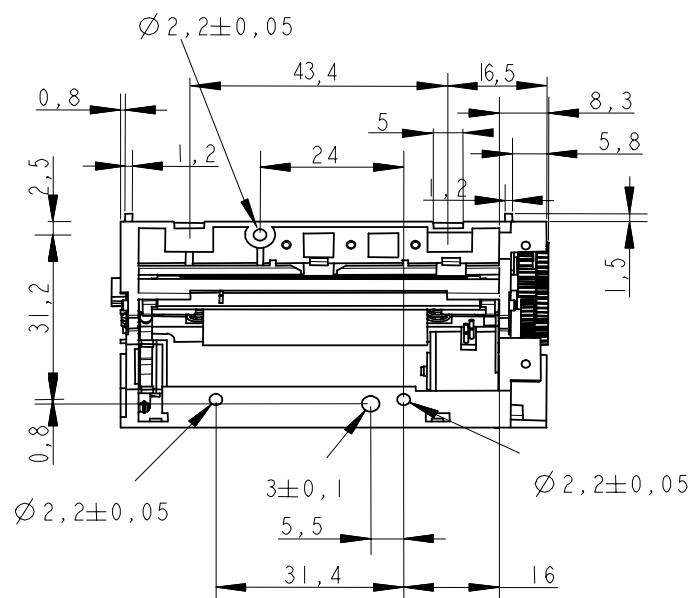
Height:	16 mm
Width:	72 mm
Depth:	39 mm
Height:	16 g

Note : general tolerances ± 0.2 (when no other is specified)

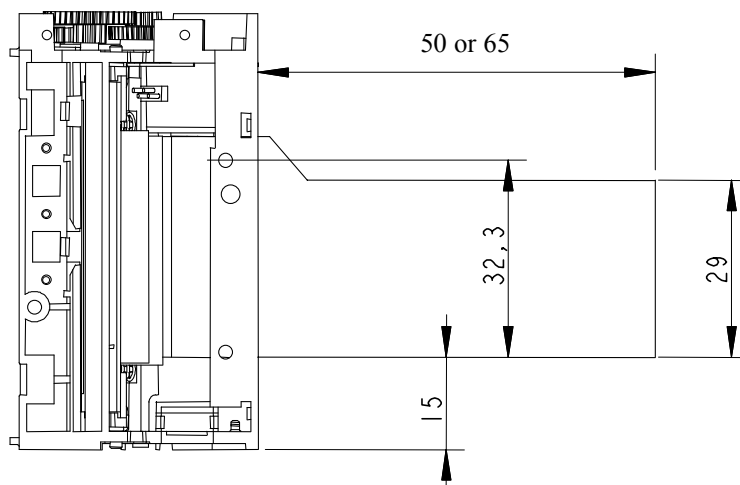
3.3 External Dimensions



3.4 Fixing Elements



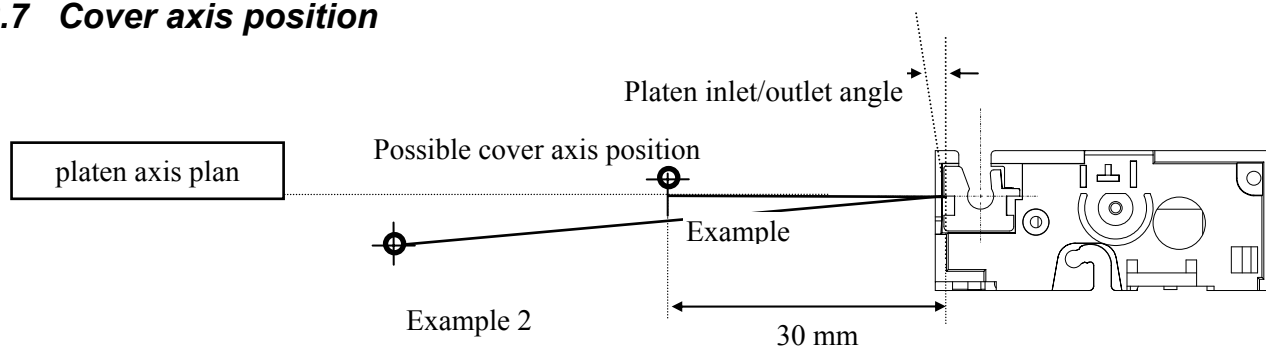
3.5 Flex cable position



3.6 Chassis mounting

Fixing holes position is shown on figure 3.2, use 3 x M2.5 self threading screws pan head eco-syn length 6 mm (for example from our supplier BOSSARD) for the 3 diameters $\varnothing 2,2 \pm 0.05$.

3.7 Cover axis position



- The inlet angle for the platen axis is from 3.5° to 11°
- The optimum position for setting cover axis close to the mechanism is on the platen axis plan (up to 30mm).
- The cover axis should not be fitted above the platen axis plan

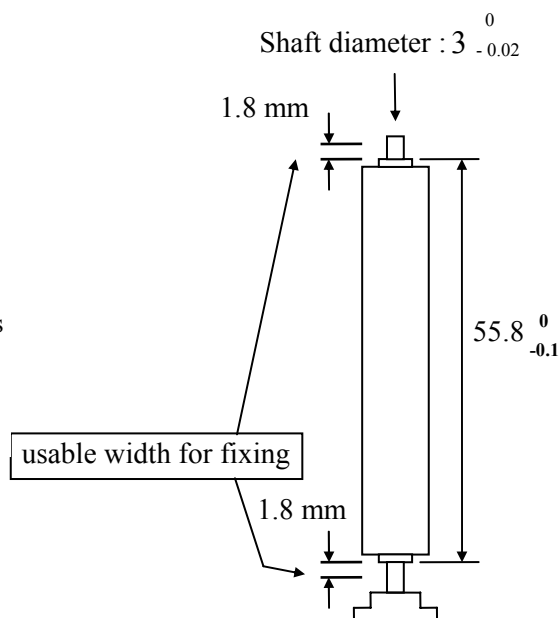
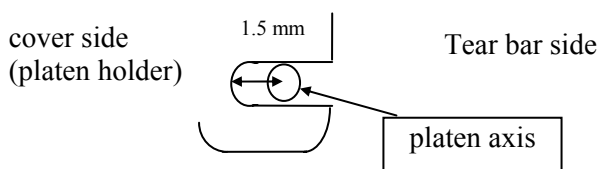
Those possible positions depend on the play of platen axis in its fixations to the cover

Example 1: the cover axis is on the same plan than the platen axis at 30 mm.

Example 2: the cover axis is 65 mm from the platen axis and 8.5 mm below the platen axis plan.

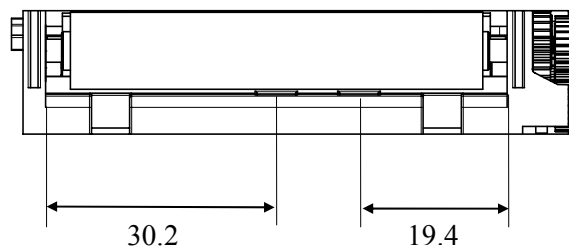
The cover can be set between 56 and 60 mm (2mm on each side) it is recommended to use a maximum of 1.8 mm only on each side

Important note : when the mechanism is used with both Clamshell and tear bar option, the platen axis must be free to move 1.5 mm in its holders as shown on the drawing below . This allows the platen path without pushing against the tear bar.



3.8 Useful distances

- Distance between opto-sensor and line of dots : 11 ± 1.5 mm
- Distance between opto-sensor and cut line (with tear bar) : 14 ± 1.5 mm
- Tow positions for opto sensor : Middle lateral position 30.15 mm from paper path guide
Set on right side at 19.5 mm from the paper path guide



4 ELECTRICAL SPECIFICATIONS

4.1 Nominal Power supply

		Value	Units
Print head:	Logic (Vcc)	3.3 / 5	V DC
	Dot line	5	-
Stepping motor		5	-

4.2 Nominal Consumption of printer

		Value	Units
Print head:	Heating current / dot (Vch)	28	mA
	Logic current (Vcc) All high	54	mA
	Stepping motor current (2 activated phases)	554	mA

4.3 Description of print head

	Value	UNIT
Driver chips	6	-
Operating range (Vcc)	3.1 to 7 * ¹	V DC
Mean dot resistance ($\pm 4\%$)	176	Ω
Nominal dot supply voltage	5 (min = 4, max = 8.5)	V DC
Nominal Heating current per dot	28	mA
Max. number of dots to heat at once	128 * ²	-

*¹ 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.

*² The printing density variation may become significant when the number of dots energized simultaneously becomes greater than 64

4.3.1 Function of 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 **3.3 or 5 V** 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.

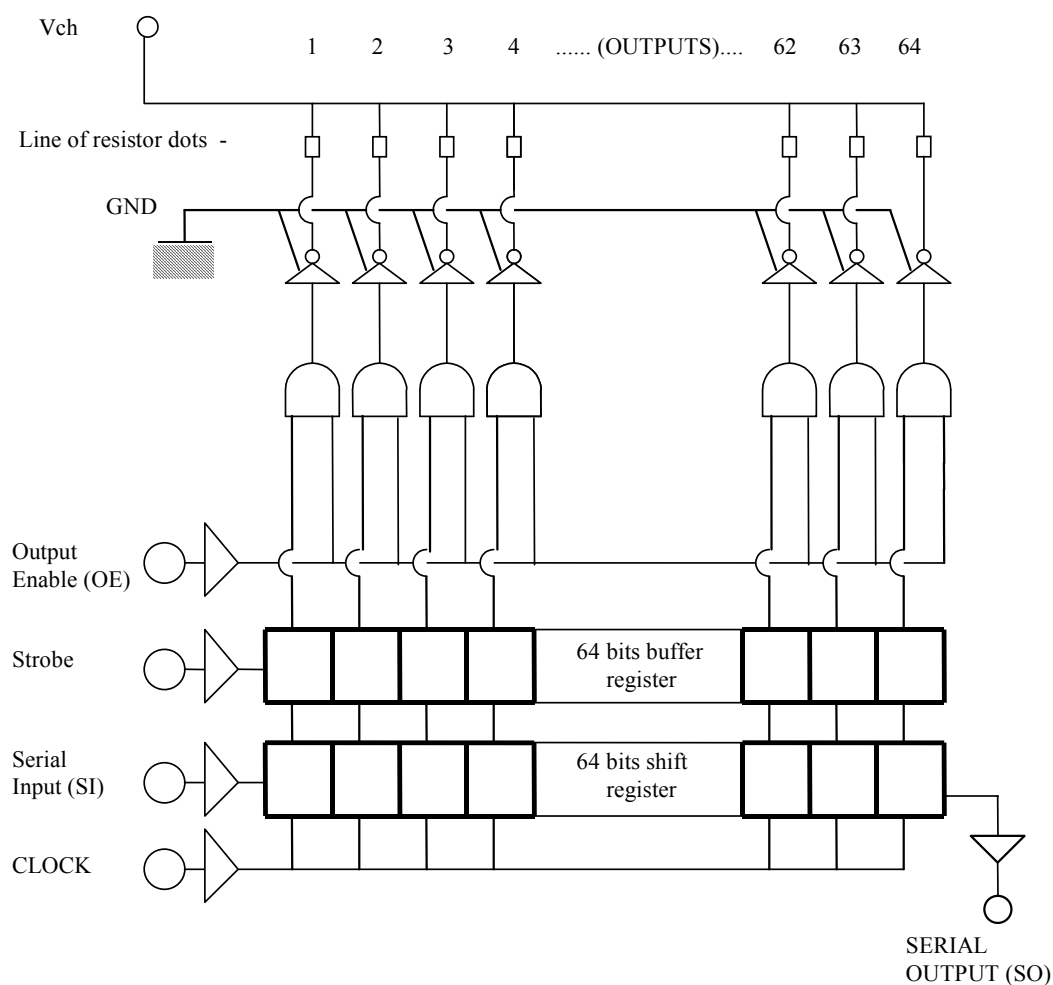


Figure 1 driver chart

Note: see page 11 and 12 for the available signals on the printer connection.

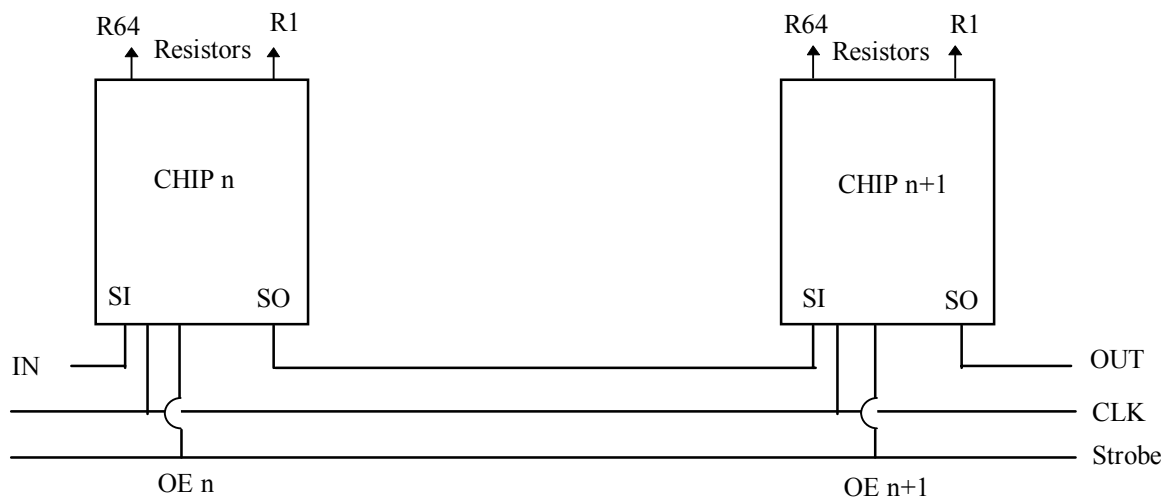


Figure 2 Routing of data to the thermistor dots

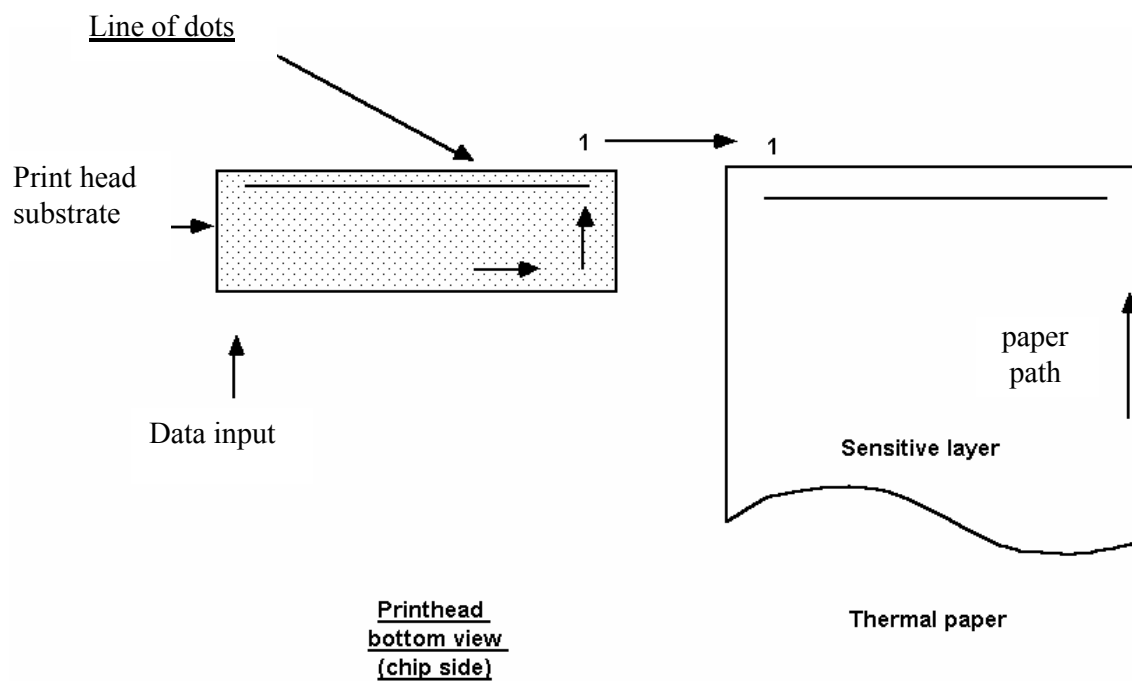


Fig.3 Dots print order

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

4.3.2 Electrical specifications of 64-BIT LSI driver

4.3.2.1 General electrical description of drivers

Description of drivers	MIN	MAX	UNIT
Max voltage at outputs 1 to 64		8.5	Volt
Max voltage any other pin		Vcc	Volt
Max output current		40	mA
Total max output current (64 dots "On")		2.6	A
Max leakage current/driver when stand-by mode		10	μA

4.3.2.2 Other

The specifications given below are given for the following conditions:

Logic voltage on chip: 3.3 V < Vcc < 7V (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 (max.): 8 MHz (Vcc=5V)
5 MHz (Vcc=3.3V)

Logic Current (5 V)	Conditions	Values	Symbol
Min high-level input voltage	Vcc = 5 V	0.8 x Vcc	Vih
Max high-level input voltage	Vcc = 5 V	Vcc	Vih
Min low-level input voltage		0	Vil
Max low-level input voltage		0.2 x Vcc	Vil
Max high-level input current	Vih = Vcc	0.5μA	Iih
Max. low-level input current	Vil = 0	0.5μA	Iil
Min. high-level output voltage		4.45 V	Voh
Max. low-level output voltage		0.05 V	Vol

4.3.2.3 Timing

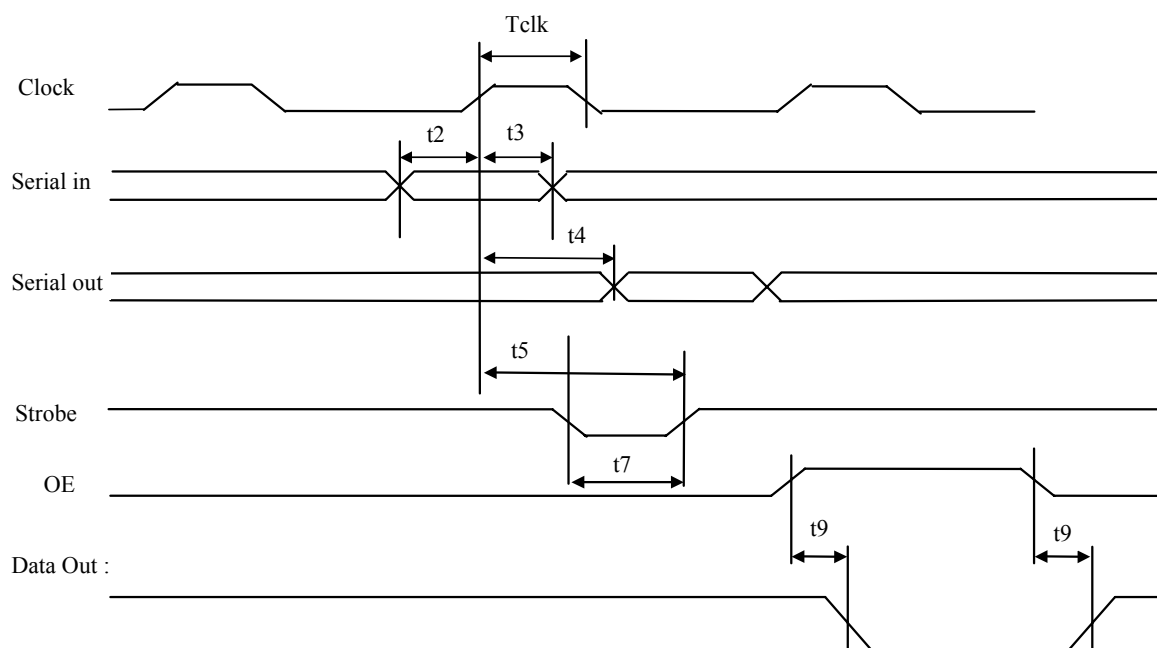


Fig.4 LSI driver timing chart

- 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) Maximum clock frequency is 8 MHz.
- 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 0 (rest level = logic 1).
- OE : Output Enable (OE1 to OE6) 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.

Fig. 5 LSI driver symbols

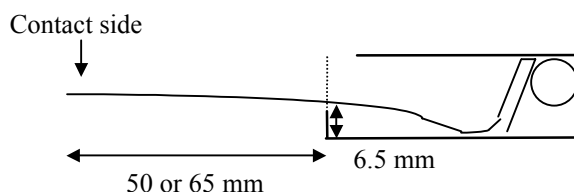
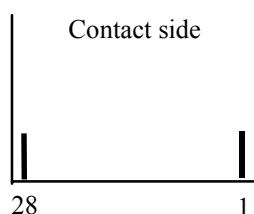
Symbol	Description	5V / 5 MHz		3.3V / 3MHz		Unit
		Min	Maxi	Min	Maxi	
Tclk	Clock pulse width	95		155		ns
t2	Clock - SI set-up time	100		140		ns
t3	Clock – SI hold time	85		85		ns
t4	Serial out delay time		50		90	ns
t5	Clock – strobe set up time	200		200		ns
t7	Strobe pulse width	150		150		ns
t9	OE data out delay time		10		30	µs

Vcc = 5V or 3.3V, Temp = 25 °C with resistive load.

4.3.3 Print head connection

Pinout of the print head flex cable

Pin Number	Signal	Comment
1	Vch	
2	Vch	
3	Data-in	Data input
4	OE6	OE for driver 6
5	OE5	OE for driver 5
6	OE4	OE for driver 4
7	GND	Logic GND
8	GND	GND
9	GND	GND
10	GND	GND
11	Thermistor2	Thermistor2
12	Thermistor1	Thermistor1
13	OE3	OE for driver 3
14	OE2	OE for driver 2
15	OE1	OE for driver 1
16	Vcc	
17	CLOCK	Clock signal for serialising data to line
18	STROBE	Strobe signal for line print
19	Data-out	Data out
20	Vch	
21	Vch	
22	B0	Paper feed motor B0
23	A0	Paper feed motor A0
24	A1	Paper feed motor A1
25	B1	Paper feed motor B1
26	Anode opto	Anode of end of paper opto-sensor
27	Opto ground	
28	Collector opto	Collector of end of paper opto-sensor



Pitch between contact : 1 mm

For the connection of the mechanism Axiohm recommend the following 28 pins connectors (from printhead flex to board):

- JST series FMN-BMT or FMN-SMT 5597



4.4 *Bipolar stepping motor*

This motor is used to drive the platen for paper feed, it is a bipolar stepping motor, its characteristics are described below.

4.4.1 Characteristics

Recommended control voltage	5	VDC
Coil Resistance	18	Ω
Number of phases	2 (bipolar)	
Pitch angle	18°	
Number of steps per revolution	20	
Paper feed for 2 motor steps	0.112	mm
Recommended control current	277 (=5V/18 Ω)	mA/phase
Maximum starting speed *	720 (=45mm/s)	step/s

* to go faster : an acceleration ramp up must be achieved.

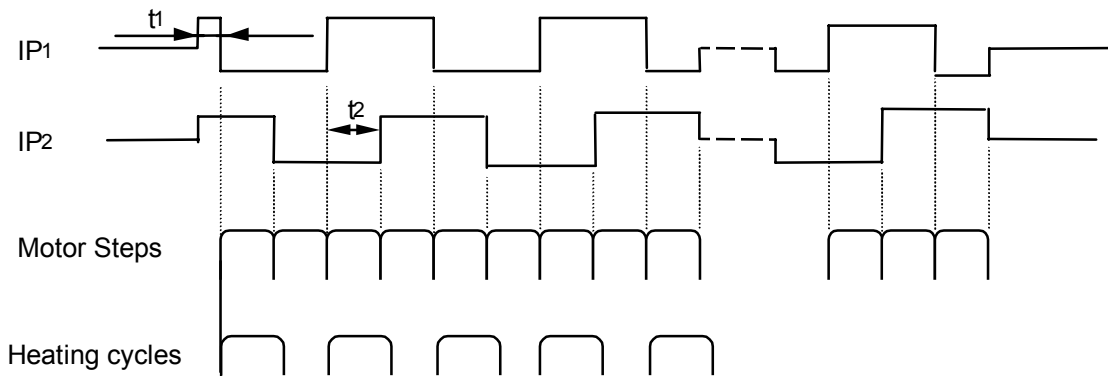
For the motor driving, see the following page and the chapter "Recommendations"

4.4.2 Motor connection

The motor is connected to the main flex cable (in addition to the End of paper opto sensor).
See 4.3.3 Print head connection

4.4.3 Induction sequence and timing (paper feed)

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.

Motor initialisation :

This operation is necessary to place the motor in a good position when the printer electronic is powered on or reset. Both phases must be powered with the same current during $t_1=1$ ms. It must be followed by 16 motor steps in order to compensate the play in the gears.

4.4.4 Printing mode

There are 4 different positions for the motor phases.

The circulation is :

$$P1 = A0B0 ; P2 = A1B1$$

$$P1P2 \Rightarrow \overline{P1P2} \Rightarrow \overline{P1P2} \Rightarrow \overline{P1P2} \Rightarrow P1P2$$

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.

$$IP = \pm 277 \text{ mA}$$

$$t_2 > 1.3 \text{ ms}$$

During printing, the motor phases should be maintained otherwise a paper motion can occur and induce unevenly spaced sub lines. A good way to achieve this without over heating the motor is to keep the motor phases "on" when the buffer contains data, and to release them when the buffer is empty.

4.5 Sensors specifications

4.5.1 End of paper opto-sensor

This opto-sensor detects the end of paper

4.5.1.1 Electrical characteristics

Absolute maximum ratings					
IF (mA)	VR (V)	PD(mW)	VCEO(V)	IC(mA)	PC(mW)
50	5	75	30	20	50

Operating characteristics						
	VF (V)	IR (μA)	ICEO (A)	IO (mA)	VCE(sat)(v)	tr (μs)
Value	Maxi 1.3	Maxi 10	Maxi 2.10 ⁻⁷	mini 90 μA	-	Typical 30
Conditions	IF = 10 mA	VR = 5 V	VCEO = 10V	IF = 10 mA	-	IC = 0.1 mA
				VCE = 5 V		RL = 1 kΩ

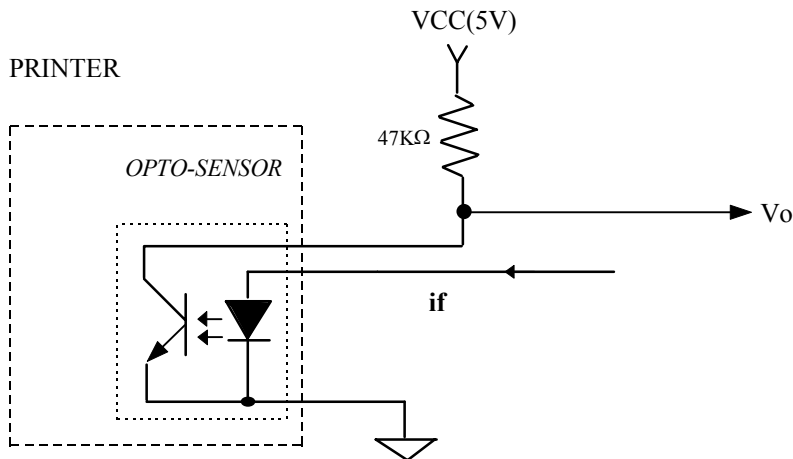
4.5.1.2 Connection

Integrated with the main flex cable , see 4.3.3

4.5.2 Recommended use for Opto-sensor

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

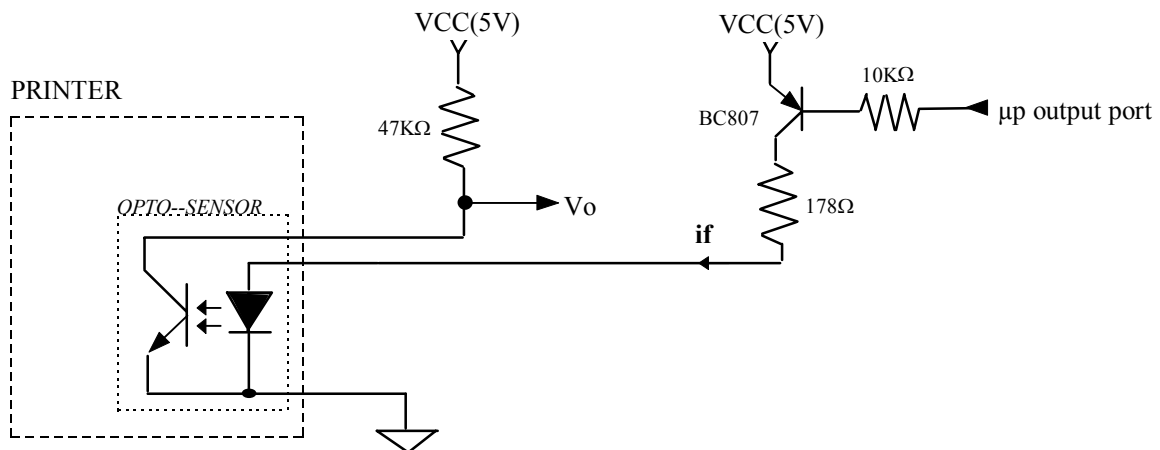
4.5.2.1 Opto Sensor : Sample minimal external circuit



Condition:

- ✓ For $I_f = 20 \text{ mA}$ Output signal is LOW when paper is PRESENT $V_o < 0.7 \text{ V}$.
-Output signal is HIGH when paper is EXHAUSTED $V_o > 3.4 \text{ V}$.

4.5.2.2 Sample external circuit with low consumption



Condition:

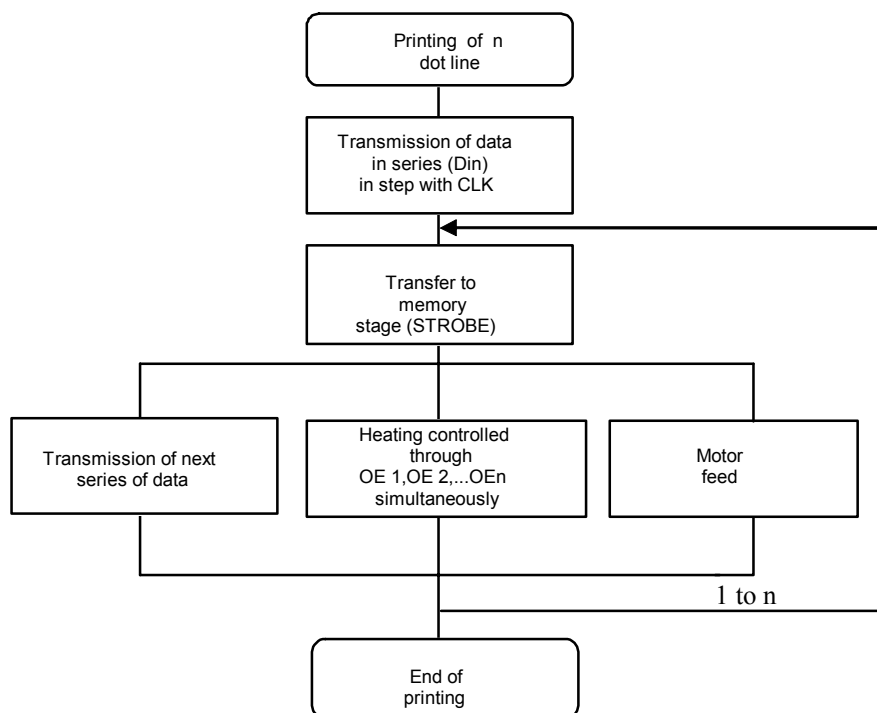
- ✓ Pulse wave from output port with low level during 0.6 ms, measuring V_o 0.2 ms after pulse falling edge.
- ✓ Same conditions for output signal V_o , as chapter above.

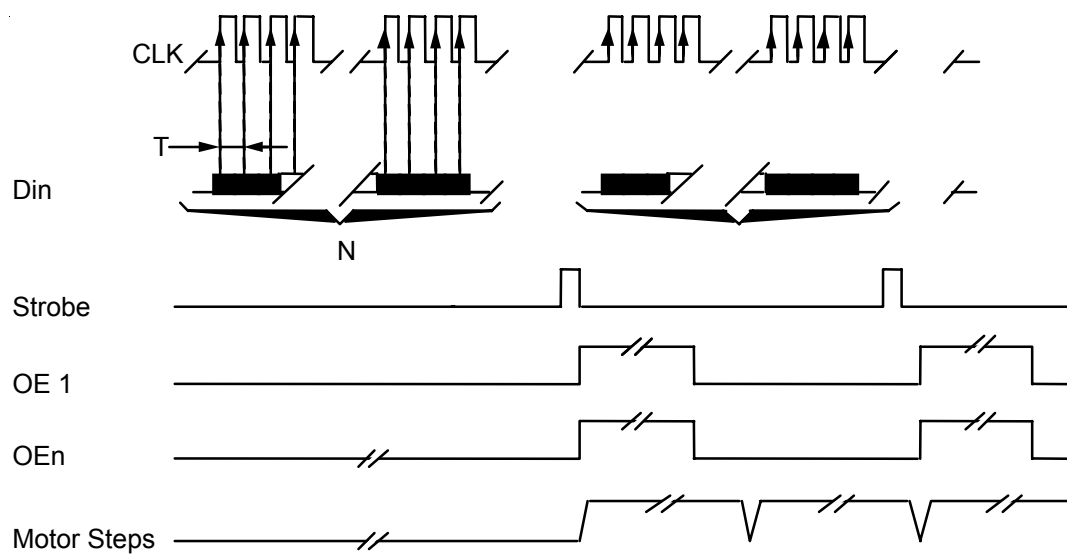
5 PRINTER CONTROL TECHNIQUES

For printer control techniques, in order to operate the printer, we depict hereafter three possible modes.

5.1 Mode 1

The paper feeds itself automatically during the heating cycle, thereby permitting high speed to be achieved (in this mode, it is recommended to use historical control, see chapter: "Heating Time").



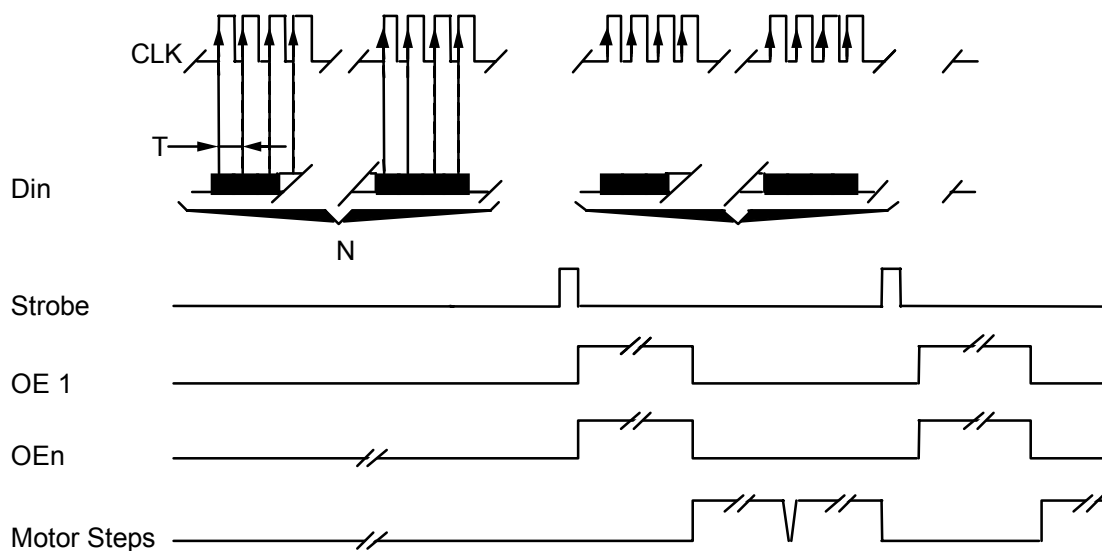
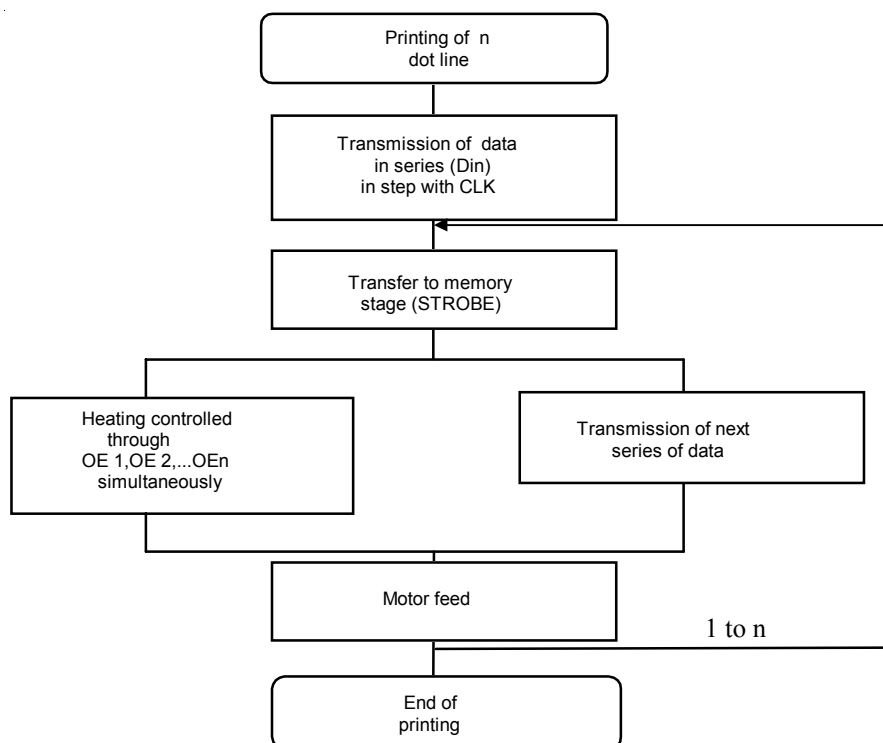


T : Clock frequency 8 MHz maximum (or 5 MHz if VCC < 5V)

Timing diagram for mode 1

5.2 Mode 2

The paper feed occurs after the heating cycle giving high quality printing.

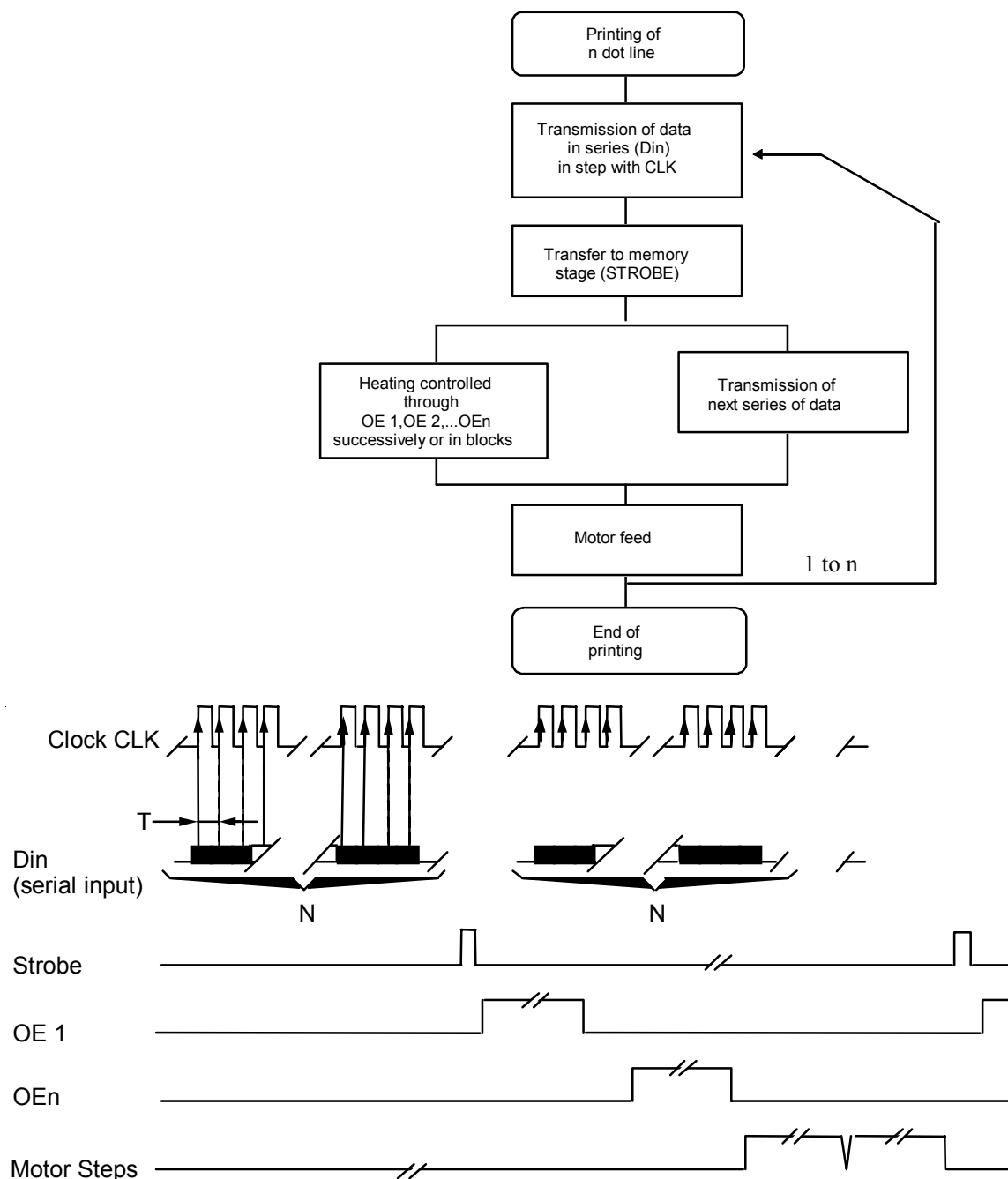


T : Clock frequency 8 MHz maximum

Timing diagram for mode 2

5.3 Mode 3

This mode is used in conditions where there is a limit of electrical current. The dot line is printed in stages heating only a portion of the line at a time, effectively giving reduced consumption.



T : Clock frequency 8 MHz maximum

Timing diagram for mode 3



6 RECOMMENDATIONS

6.1 Mechanical recommendations

Never apply mechanical stress to the printer; this could result in misalignment and thus degradation of the print quality.

The thermal print head must have 1 degree of freedom. Never prevent the print head from pivoting on its axis.

Refer to the drawings in chapters "Cover axis position" to design an easy loading Clamshell cover.

The paper should be guided to the mechanism to make sure it is centred in the mechanism paper path (particularly when the paper width is less than 60mm).

6.2 Electrical Recommendations

The following recommendation must be followed when the heating voltage (Vch) is greater than 5.25 V.

When energising the thermal print head (Vcc, 5 V), it is important to apply all the logic signals within 10 ms (particularly to de-energise all the OEs).

If the line of dots (when Vch, $\geq 5.25V$) 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, 5V).

The same precaution should be taken when shutting down. The supply voltage Vch must be switched off before the logic supply voltage Vcc.

Care should be taken to allow enough time for residual capacitive charge to dissipate.

6.3 Motor Driving Recommendations

* Motor driving can be achieved with voltage control or regulated current control.

When the motor is under voltage control, it is recommended to connect it to the same supply as logic current (from 4.5V to 5.5V).

If the motor is connected to the heating source power, it is recommended to control it under regulated current.

When the control voltage is greater than 5.25 V, or the current is greater than 280 mA per phase, it is necessary to determine a duty cycle time (max recommended: 15% ton/toff, with a sec "on" max) to avoid the motor temperature rising.

This has to be achieved with the customer host chassis, as the cooling depends on air volume and circulation around the motor.

This motor can be controlled either under voltage or current.

The maximum voltage is 8.5 V, the maximum current is 470 mA per phase.

The maximum temperature on external motor frame is 80°C.

7 HEATING TIME

7.1 Using formulas

Basic Heating Time		At Nominal Speed & Nominal Temperature
		$t_1 = \frac{R_{mean}}{V^2} \times E_0$
Voltage	5 Volts	(cf Density Sheet)
Temperature	25 °C	
Speed	75 mm/s	
Paper	AF50KSE3	
Eo saturation	0,412 mJ	
Tch (saturation heating time)	2,700 ms	
Température statique	80 °C	
Heating Time vs Speed		At Nominal Voltage & Nominal Temperature
		$t_2 = t_1 \times (a \times \text{Log}(tm) + b)$
Voltage	5 Volts	$t_m =$ Time for motor step (ms)
Temperature	25 °C	
Paper	AF50KSE3	
Coeff "a"	0,5602	
Coeff "b"	0,0984	

Heating Time vs Temperature		At Nominal Speed & Nominal Voltage
		For linear modelisation
Voltage	5 Volts	$t_3 = t_2 \times (cT + d)$
Speed	75mm/s	
Paper	AF50KSE3	
Coeff « c »	-0,0092	
Coeff « d »	1,2300	
Coeff « g »	-0.000005	
Coeff "h"	0,000372	$t_3 = t_2 \times (g \times T^3 + hT^2 \times iT + J)$
Coeff "i"	-0,016484	
Coeff "j"	1,250000	

7.2 Historical Control

The Heating time table is given on next page.

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.

Column 3 (indicated with: speed <16 mm/s, and motor cycle time > 7.81 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 heating time 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 heating time in column 3 is greater than the motor cycle time.

Area 3: (indicated by <None>)

The indicated heating time (depending on speed, voltage and temperature) would be greater than the motor cycle time.

In areas 1 and 2, the heating time can be controlled either with or without historical control.

In areas 3, the printer cannot be operated.

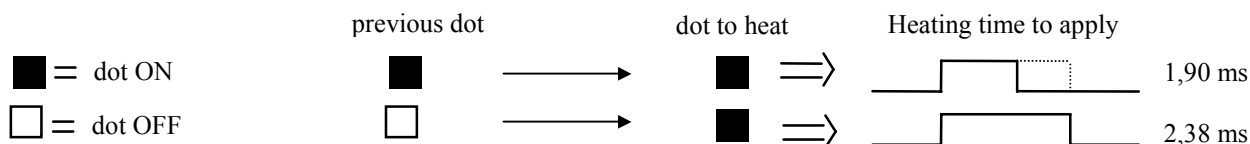
How to use tables ?

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 20 mm/s, 30°C and 6 volts, heating time = 2.233 ms (time from column 3).

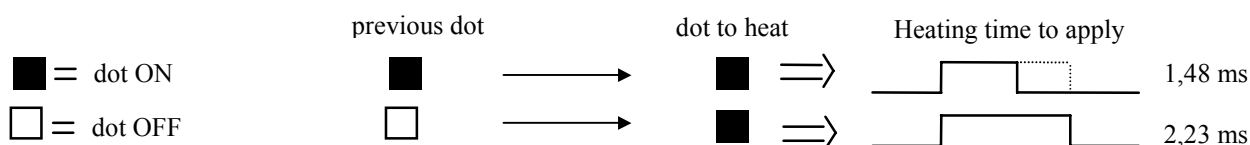
With historical control in area 1: apply the indicated heating time (function of speed, voltage and temperature) when the dot has been heated on the previous dot line, and the time from column 3 when it has not. This method gives the best printing quality.

Example: at table at 25 mm/s, 20°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 dot line, 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 56 mm/s, 25 °C and 5 volts:





7.3 Heating Table

With Paper AF50KSE3

Voltage (V) Real	Temperature (°C)	Speed (mm/s)				R= 163,8 Ohms			
		< 16 mm/s	18 mm/s	20 mm/s	25 mm/s	40 mm/s	56 mm/s	60 mm/s	75 mm/s
Temps moteur pour un pas		7,810 ms	6,940 ms	6,250 ms	5,000 ms	3,130 ms	2,230 ms	2,080 ms	1,670 ms
Temps moteur pour une sous ligne		7,810 ms	6,940 ms	6,250 ms	5,000 ms	3,130 ms	2,230 ms	2,080 ms	1,670 ms
3,30 Volts	0 °C	<None>	<None>	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	10 °C	<None>	<None>	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	20 °C	<None>	<None>	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	25 °C	<None>	<None>	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	30 °C	<None>	<None>	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	40 °C	7,334 ms	6,946 ms	<None>	<None>	<None>	<None>	<None>	<None>
3,30 Volts	50 °C	6,472 ms	6,129 ms	5,825 ms	<None>	<None>	<None>	<None>	<None>
4,00 Volts	0 °C	6,766 ms	6,408 ms	6,091 ms	<None>	<None>	<None>	<None>	<None>
4,00 Volts	10 °C	6,051 ms	5,731 ms	5,447 ms	4,842 ms	<None>	<None>	<None>	<None>
4,00 Volts	20 °C	5,592 ms	5,296 ms	5,034 ms	4,474 ms	<None>	<None>	<None>	<None>
4,00 Volts	25 °C	5,413 ms	5,126 ms	4,872 ms	4,331 ms	<None>	<None>	<None>	1,670 ms
4,00 Volts	30 °C	5,243 ms	4,965 ms	4,719 ms	4,195 ms	3,094 ms	<None>	<None>	1,618 ms
4,00 Volts	40 °C	4,856 ms	4,599 ms	4,371 ms	3,885 ms	2,866 ms	2,128 ms	1,976 ms	1,499 ms
4,00 Volts	50 °C	4,285 ms	4,058 ms	3,857 ms	3,428 ms	2,529 ms	1,878 ms	1,744 ms	1,322 ms
5,00 Volts	0 °C	4,221 ms	3,997 ms	3,799 ms	3,377 ms	2,491 ms	1,850 ms	1,718 ms	1,303 ms
5,00 Volts	10 °C	3,775 ms	3,575 ms	3,398 ms	3,020 ms	2,228 ms	1,654 ms	1,536 ms	1,165 ms
5,00 Volts	20 °C	3,488 ms	3,304 ms	3,140 ms	2,791 ms	2,059 ms	1,529 ms	1,420 ms	1,076 ms
5,00 Volts	25 °C	3,376 ms	3,198 ms	3,039 ms	2,702 ms	1,993 ms	1,480 ms	1,374 ms	1,042 ms
5,00 Volts	30 °C	3,270 ms	3,097 ms	2,944 ms	2,617 ms	1,930 ms	1,433 ms	1,331 ms	1,009 ms
5,00 Volts	40 °C	3,029 ms	2,869 ms	2,726 ms	2,424 ms	1,788 ms	1,327 ms	1,233 ms	0,935 ms
5,00 Volts	50 °C	2,673 ms	2,531 ms	2,406 ms	2,139 ms	1,577 ms	1,171 ms	1,088 ms	0,825 ms
6,00 Volts	0 °C	2,882 ms	2,729 ms	2,594 ms	2,306 ms	1,701 ms	1,263 ms	1,173 ms	0,889 ms
6,00 Volts	10 °C	2,577 ms	2,441 ms	2,320 ms	2,062 ms	1,521 ms	1,129 ms	1,049 ms	0,795 ms
6,00 Volts	20 °C	2,382 ms	2,256 ms	2,144 ms	1,906 ms	1,406 ms	1,044 ms	0,969 ms	0,735 ms
6,00 Volts	25 °C	2,305 ms	2,183 ms	2,075 ms	1,845 ms	1,361 ms	1,010 ms	0,938 ms	0,711 ms
6,00 Volts	30 °C	2,233 ms	2,115 ms	2,010 ms	1,787 ms	1,318 ms	0,978 ms	0,909 ms	0,689 ms
6,00 Volts	40 °C	2,068 ms	1,959 ms	1,862 ms	1,655 ms	1,221 ms	0,906 ms	0,842 ms	0,638 ms
6,00 Volts	50 °C	1,825 ms	1,728 ms	1,643 ms	1,460 ms	1,077 ms	0,800 ms	0,743 ms	0,563 ms
8,50 Volts	0 °C	1,401 ms	1,327 ms	1,261 ms	1,121 ms	0,827 ms	0,614 ms	0,570 ms	0,432 ms
8,50 Volts	10 °C	1,253 ms	1,187 ms	1,128 ms	1,002 ms	0,739 ms	0,549 ms	0,510 ms	0,387 ms
8,50 Volts	20 °C	1,158 ms	1,097 ms	1,042 ms	0,926 ms	0,683 ms	0,507 ms	0,471 ms	0,357 ms
8,50 Volts	25 °C	1,121 ms	1,061 ms	1,009 ms	0,897 ms	0,661 ms	0,491 ms	0,456 ms	0,346 ms
8,50 Volts	30 °C	1,085 ms	1,028 ms	0,977 ms	0,869 ms	0,641 ms	0,476 ms	0,442 ms	0,335 ms
8,50 Volts	40 °C	1,005 ms	0,952 ms	0,905 ms	0,804 ms	0,593 ms	0,441 ms	0,409 ms	0,310 ms
8,50 Volts	50 °C	0,887 ms	0,840 ms	0,799 ms	0,710 ms	0,524 ms	0,389 ms	0,361 ms	0,274 ms

7.4 Thermistor Specifications

Operating Temperature: - 20 to + 80 °C

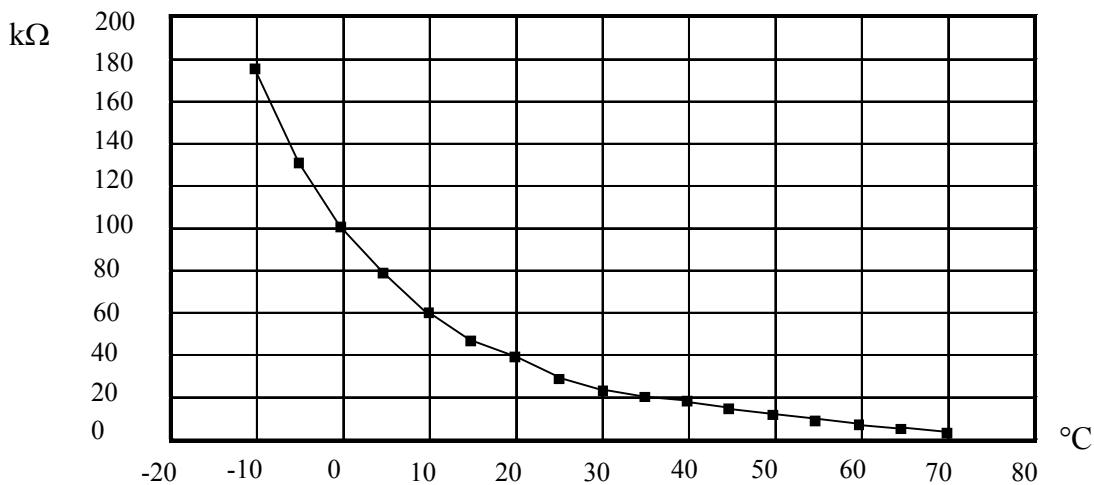
Thermistor time constant: Max. 30 sec (in air)

This thermistor has a rated value of 30 kΩ ± 5 %. Its resistance variation can be expressed as follows:

$R = R_n \exp B \left(\frac{1}{T} - \frac{1}{T_n} \right)$ where T is in Kelvin degrees (K). This gives the following curve (for T in °C)

B = 3950 K

R_n = reference value at temperature T_n (298° K)





8 PAPER SUPPLIERS

JUJO TF50KSE3

Ref: 3104208

9 SPARES

All spare parts kits are supplied as individually packaged loose parts. It is possible to obtain different groups of spare parts kits. AXIHOM customer service will provide the list later.

Reference	Designation	Contents
9.1 kits		
K3105401	Platen Roller	<i>Lot of:</i>
<i>For Products:</i>	All THTExxxx	(x1)

10 INDEX

C

connection	17
Current consumption	7

D

dot resistance	12
dots energized simultaneously.....	6
driver	13
driver timing chart	16
drivers.....	15
duty cycle	7

H

Heating time	27
historical control.....	27

M

memory register.....	13
motor	18, 26
motor driving.....	26

O

opto-sensor	20, 21
-------------------	--------

P

platen axis	10
-------------------	----

R

recommendation.....	26
Relative humidity	See <i>SPECIFICATIONS</i>

S

shift register	13
<i>SPECIFICATIONS</i>	6
stepping motor.....	18

T

tear bar	6
thermistor	29