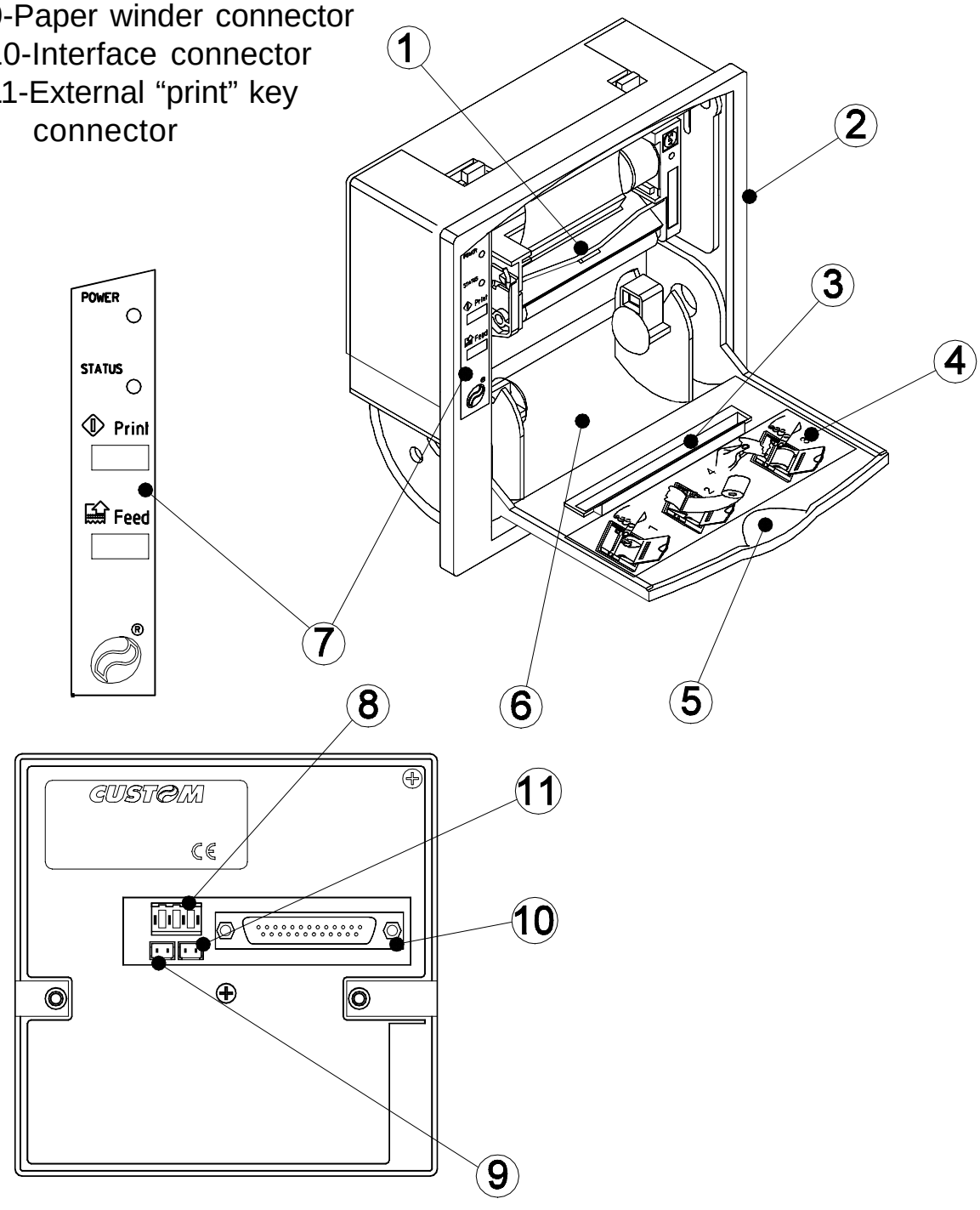
Thermal panel printer
FT190SP
User's manual

Printer components

1-Print mechanism
2-Case
3-Paper outfeed
4-Paper loading label
5-Front panel
6-Paper roll compartment
7-Control panel
8-Feed connector
9-Paper winder connector
10-Interface connector
11-External “print” key connector



COD. DOME - FT190SP REV.1.20

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"CE" Declaration of Conformity

In accordance with standards ISO/IEC Guide 22 and EN 45014

N°: DC0302698

Manufacturer's name: Custom Engineering s.r.l.

Manufacturer's address: Strada Berettine 2
Fontevivo (Parma)
Italy

Declares that the product:

Product name: Panel printer with thermal print mechanism

Type name: FT190SP

Model: FT190SP RS232 / CENTRONICS

is in conformity with the following directives:

Electromagnetic compatibility directives EEC/89/336; EEC/92/31; EEC/93/68

In accordance with the following standards:

EN 55022 Class B	Limits and methods of measurement of radio disturbance characteristics of information technology equipment	1995
EN 50082-1	Electromagnetic compatibility - General immunity standard. Part 2: Industrial environments.	1992
EN 61000-4-2	Electrostatic discharge requirements 4KV contact discharge, 8KV air discharge	1995
EN 61000-4-4	Fast electrical transient/burst requirements. DC mains 0.5KV	1995
ENV 50140	Radiated radio-frequency electromagnetic fields. Immunity tests. 3V/m, 80MHz-1000MHz, 80% 1KHz AM	1993

June 1998

INTRODUCTION

1. INSTALLATION AND USE

2. INTERFACES

3. PRINTER FUNCTIONS

4. TECHNICAL SPECIFICATIONS

5. CHARACTER SETS

APPENDIX A - ACCESSORIES AND SPARE PARTS

CONTENTS OF THE MANUAL

In addition to the introduction which lists: the conventions used in the manual, general information relative to safety, unpacking of the printer and a brief description of the printer itself, highlighting its main features, the manual is split up into the following chapters:

Chapter 1: Containing the information required for installing and using the printer correctly
Chapter 2: Containing the specifications of the interfaces
Chapter 3: Containing the description of the printer command set
Chapter 4: Containing the technical specifications of the printer
Chapter 5: Containing the character sets (fonts) used by the printer

CONVENTIONS USED IN THE MANUAL

N.B.
Gives important information or suggestions relative to the use of the printer

WARNING
The information marked with this symbol must be carefully heeded to safeguard against damaging the printer

DANGER
The information marked with this symbol must be carefully heeded to safeguard against injury to the operator

GENERAL INFORMATION REGARDING SAFETY

- Read and keep the following instructions.
- Observe all warnings and follow all instructions attached to the printer.
- Before cleaning the printer, disconnect the feed cable.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near to water.
- Do not place the printer on unsteady surfaces. It could fall and get seriously damaged.

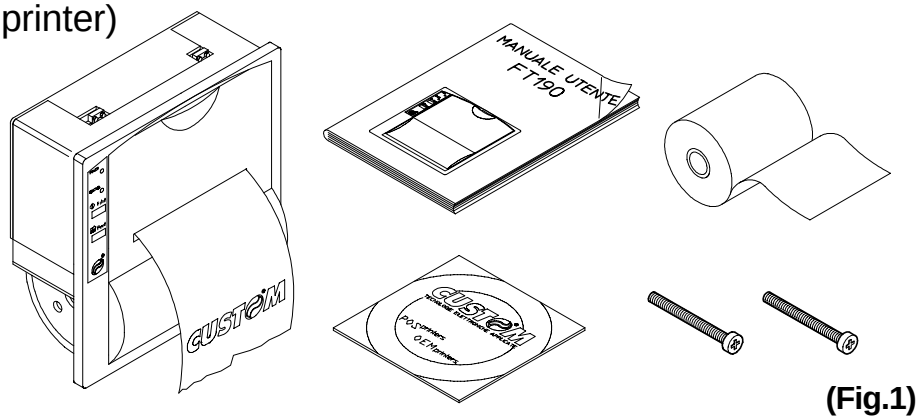
- Use the type of electricity supply marked on the printer label. In the event of uncertainty, contact the seller.
- Position the printer in such a way as to ensure that the cables connected to it will not be damaged.
- Ensure that the maximum absorbed current of the printer does not exceed the maximum acceptable current for the type of feed cable used.
- Do not put objects of any kind inside the printer as they could cause a short circuit or damage parts which could affect its performance.
- Do not spill liquids on the printer.
- Do not carry out technical operations on the printer with the exception of the scheduled maintenance operations specifically indicated in the user's manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician should any of the following conditions occur:
  - A. The feed connector has been damaged.
  - B. Liquid has penetrated to the inside of the printer;
  - C. The printer has been exposed to rain or water;
  - D. The printer is not operating normally despite the instructions in the user's manual having been followed.
  - E. The printer has been dropped and its case damaged.
  - F. The performance of the printer is poor.
  - G. The printer does not work.

UNPACKING THE PRINTER

Remove the printer from the box, taking care not to damage the packing material, as it could be needed for future transportation of the machine.

Ensure that all the components illustrated are in fact present and that they are in perfect condition. If this is not the case, contact the after-sales assistance department immediately.

Printer
Manual (or Cdrom)
Paper roll (inside the printer)
Long screws



(Fig.1)

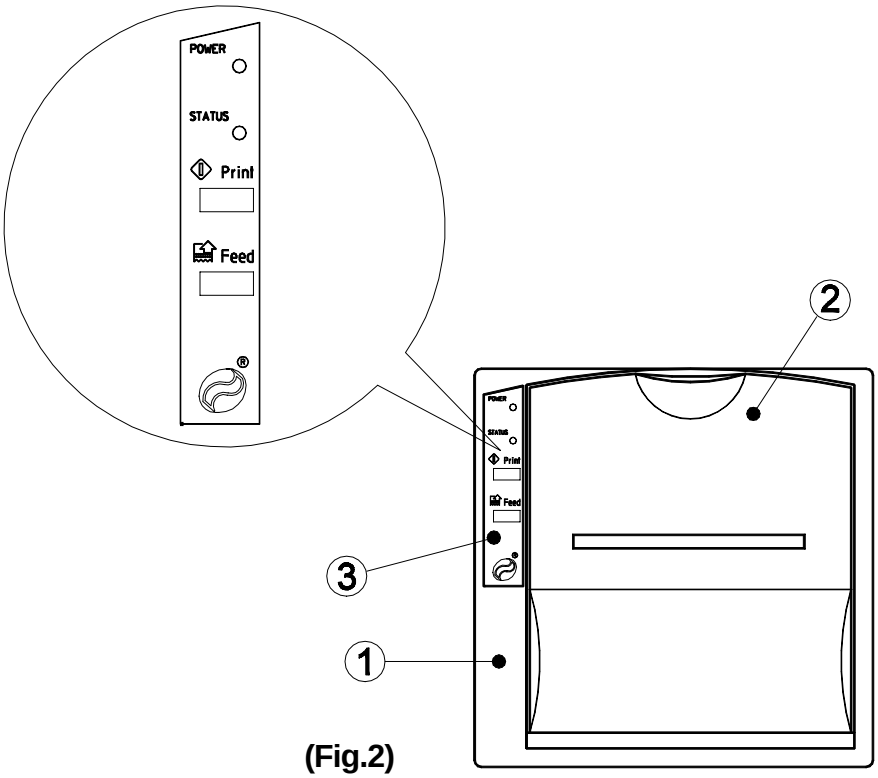
N.B.
Before using the long screws, read the note to paragraph 4.2.

GENERAL FEATURES

The FT190SP is a printer which, in addition to having an innovative design, guarantees high performance and is reliable and user-friendly.
For these reasons, it is the ideal solution for applications which require the immediate printing of data on a ticket, whether they be of an industrial, professional or laboratory nature. Typical fields of application are: weighing systems, receipts (not for tax purposes) as well as for security, controlling and diagnostics purposes.
It has a 200 dpi thermal print mechanism and uses 57.5mm paper rolls. It can print 24 or 40 characters per line according to the selection made at the setup stage or through a software command .
The FT190SP printer is so compact and lightweight that it can be installed extremely easily on any type of equipment. It is supplied with two interfaces: an RS232 serial and Centronics parallel interface. To select one or the other interface, some jumpers must be moved. The reception buffer is 1Kbytes. It can also be equipped with a Real Time Clock.

DESCRIPTION OF THE PRINTER

The FT190SP printer has an ABS casing (1) with a front cover (2) which opens to allow access to the paper roll and print head.
The control panel is located on the front (3) and has a PRINT key, a FEED key and two LEDs: Power and Status.



(Fig.2)

- PRINT key. When pressed, in serial causes the “$0D” control character to be transmitted if enabled during printer setup. In parallel to the PRINT key is the J6 connector which can be used to connect to an external key (fig.1.1).

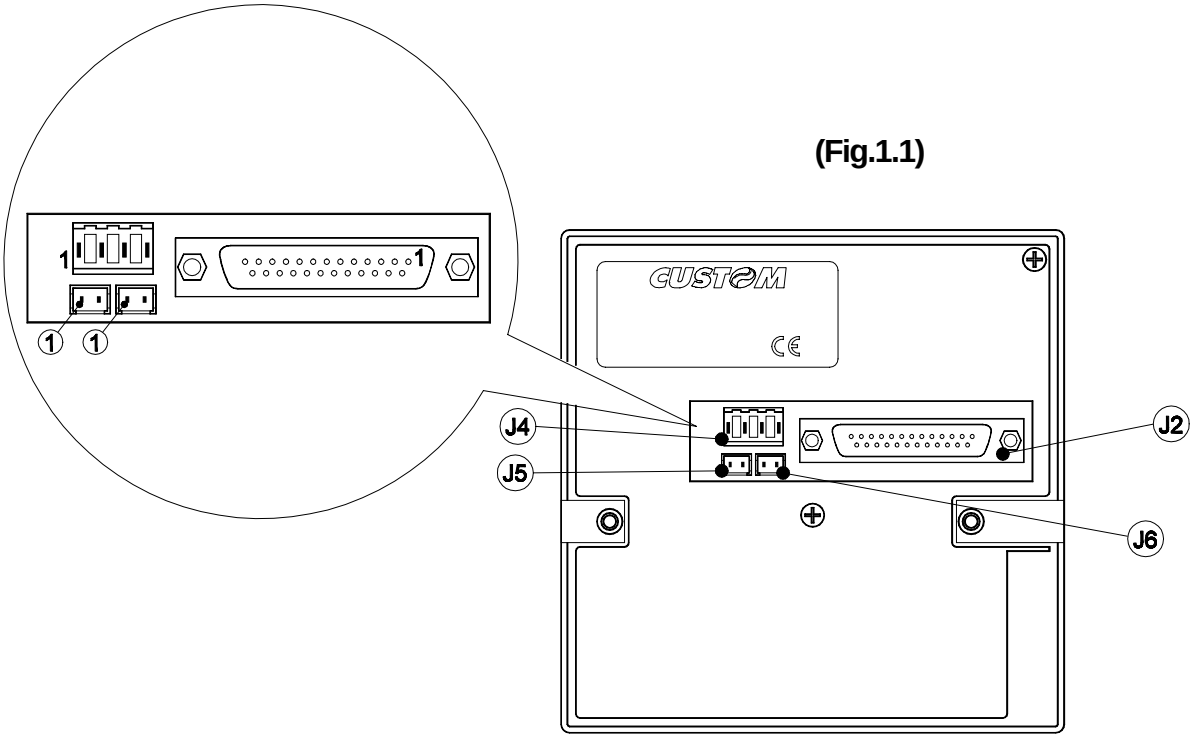
- FEED key. When this is pressed, the paper feeds forward manually. If this key is pressed briefly, when the RTCK option is installed, the date and time of day is printed.

- The POWER LED indicates that the printer is receiving a digital power supply.

- The STATUS LED, when flashing, signals that the paper is finished. When lit steadily, it signals the presence of an error (head power supply too high or too low or head temperature too high).

1.1 CONNECTIONS

(Fig.1.1)



1.1.1 Power supply

The FT190SP printer is equipped with a standard 4-pin male AMPMODU1-type connector (J4). The signals on the connector pins are as follows:

WARNING
Respect the polarity of the power supply.

5V VERSION

PIN	SIGNAL	NOTES
1	GND	
2	GND	
3	+VT: from 4.5 Volt to 7 Volt	(head power supply)
4	+VDC: 5 Vdc ± 7%	(logic card power supply)

(Tab.1.1)

VERSION 9 - 40V

PIN	SIGNAL	NOTES
1	GND	
2	GND	
3	from 9 Vdc to 40 Vdc	
4	N.C.	

(Tab.1.2)

1.1.2 Paper winder

Connector J5 (fig.1.1) is used to feed the external paper winder. The position and function of the signals are given below in Table 1.3.

Pin	Signal
1	MOTOR +
2	MOTOR -

(Tab.1.3)

1.1.3 External print key

An external print key may be connected to connector J6 (fig. 1.1). The polarity and function of the signals are given in Table 1.4.

Pin	Signal
1	PRINT
2	GND

(Tab.1.4)

1.2 CONFIGURATION

The FT190SP enables the configuration of the printer default parameters.This procedure is enabled by holding down the PRINT and FEED keys while switching on, with the jumper JP2 (Fig. 2.1) present on the printer card open.

After this, each time the PRINT key is pressed, the parameter is modified and its current value is printed. Once the required value has been obtained, press the FEED key to proceed to the next parameter, and so on. Once all the parameters have been run through, the printing of a message signals the end of the setting procedure.

The parameters affected during configuration are:

- Selection of the number of columns (24 or 40)
- Print direction (normal or reverse)
- Selection of the character dimensions (normal, double width, double height, expanded)
- Selection of the font (font 1 or font 2)
- Enabling or disabling of the CR command
- AUTOFEED enabling or disabling : if the function is enabled when the printer receives a characters number equal to the line buffer the next character will place on the left margin in a new line
- Selection of the print speed in function of the absorption
- Selection of the red intensity : using two-colour thermal paper is possible to set different red tonality
- Selection of the parameters for serial or parallel communication
- Enabling or disabling of the 1Kbyte buffer
- Enabling setting of the real time clock
- Enabling of seconds printing in the real time clock function

The settings made are saved on the EEPROM (non volatile memory).

1.3 AUTOTEST

To run the autotest, hold down the FEED key, while switching on the printer. The autotest causes the printing of the printer's current setting data and the printing of the complete ASCII character set.

1.4 HEXADECIMAL DUMP

If the PRINT key is held down during switching on, the printer enters Hexadecimal Dump mode. This function is used for the diagnostics of characters received in serial or parallel. In fact, these are printed in hexademical code together with the corresponding ASCII code.

1.5 MAINTENANCE

1.5.1 Changing the paper roll

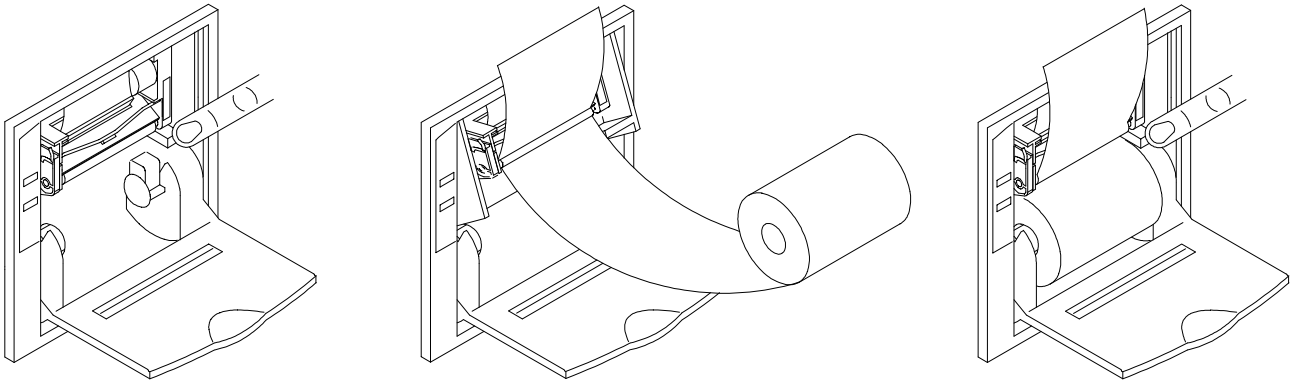
To change the paper roll, proceed as follows:

1) Open the printer cover and press down the swinging support of the print mechanism at the point marked PUSH;

2) Insert the end of the paper roll in the slit of the print mechanism and position the paper roll so that it rotates in the right direction, as shown in the figure;

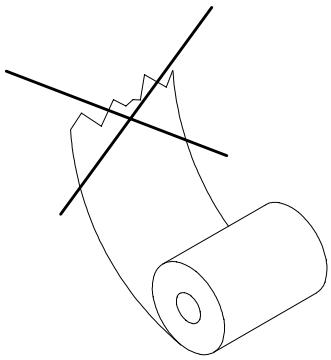
3) The paper is automatically pulled by the roller for 3 or 4 centimetres;

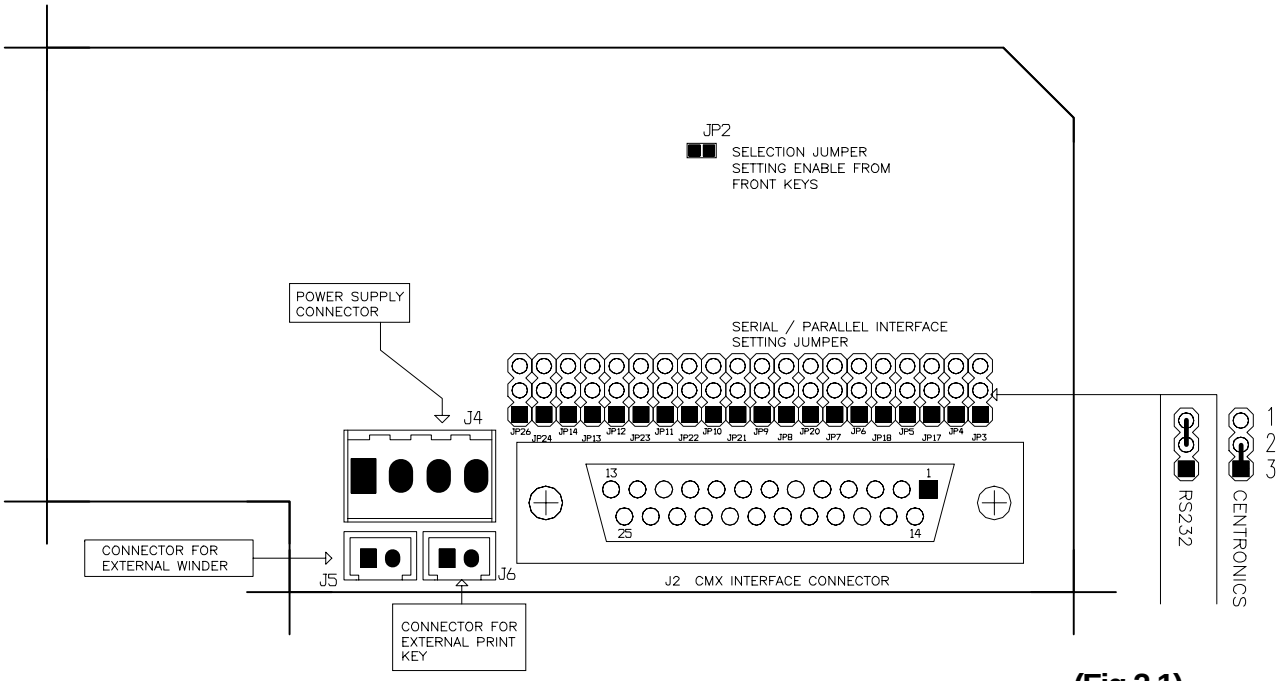
4) Tear off the paper and re-close the cover.



(Fig.1.2)

WARNING
Make sure the paper edge is straight before inserting it in the machine.





(Fig.2.1)

The selection of the RS232 or CENTRONICS interface is made through the 20-contact strip:
When the strip is placed in position 1-2 (fig.2.1) the standard CENTRONICS interface is selected; when placed in position 2-3 the RS232 interface is selected.

2.1 RS232 SERIAL

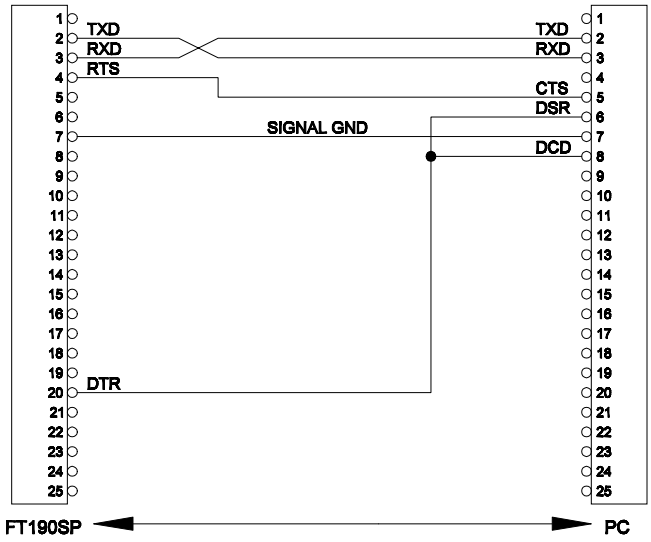
The printer has an RS232 serial interface and is connected using a 25-pin female connector. The communication signals used for serial protocol are TXD, RXD and RTS (if the RTS/CTS protocol was selected) or TXD and RXD if the XON/XOF protocol was selected.
Given below are the signals present on the connector:

PIN	SIGNAL	DIRECTION	DESCRIPTION
1	NC	-	
2	TXD	Output	Data transmission
3	RXD	Input	Data reception
4	RTS	Output	Same as DTR signal
7	SG	-	Ground signal

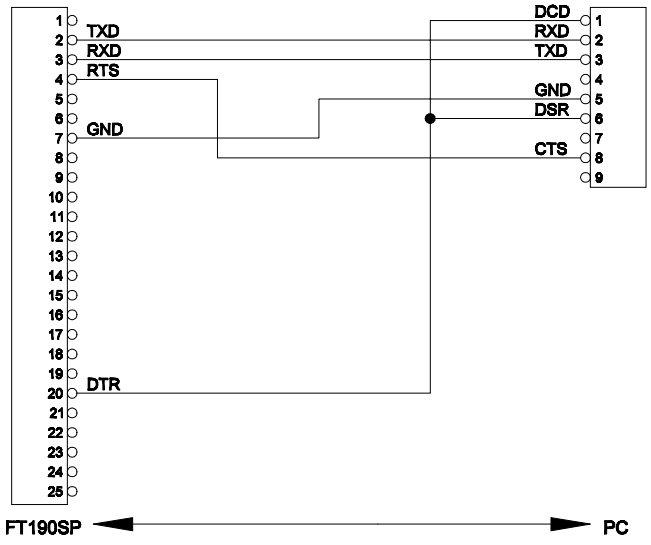
PIN	SIGNAL	DIRECTION	DESCRIPTION
20	DTR	Output	When the DTR/DSR command is selected, this signal indicates when the printer is busy. SPACE indicates that the printer is ready to receive data and MARK that the printer is busy.
23	GND	-	Ground
24	GND	-	Ground
25	GND	-	Ground

(Tab.2.1)

The diagrams below give sample connections between the printer and Personal Computer using a 25- and 9-pin female connector.



(Fig.2.2)



(Fig.2.3)

2.2 CENTRONICS PARALLEL

The printer has a Centronics parallel interface and is connected using a 25-pin female connector. The following signals can be used for parallel communication:

1) 7 or 8 bit data bus;
2) STROBE signal that indicates data validity;
3) BUSY signal that indicates if printer is available to receive data;
4) ACK signal for data read confirmation.

Given below are the signals present on the connector:

PIN	SIGNAL	DIRECTION
1	Strobe	Input
2	Data bit 0	Input
3	Data bit 1	Input
4	Data bit 2	Input
5	Data bit 3	Input
6	Data bit 4	Input
7	Data bit 5	Input
8	Data bit 6	Input
9	Data bit 7	Input
10	ACK	Output
11	BUSY	Output
12	PAPER END	Output
13	HIGHT	Output
14	NC	-
15	FALT	Output
16	RESET	Input
17-25	GND	-

(Tab.2.2)

2.3 CALENDAR CLOCK (optional)

The Real Time Clock is available as an option.
Printing and adjustment of the clock are managed by a series of control characters, described as follows.

N.B.
For the real time clock control characters, please refer to the description of the printer command sets in chapter 3

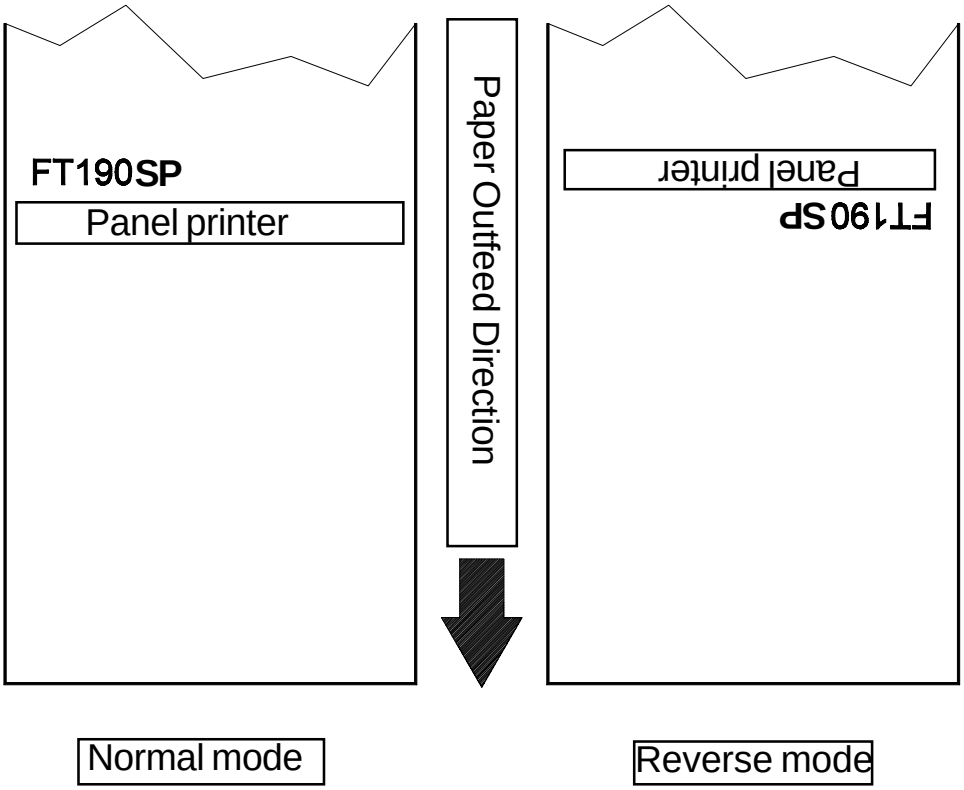
2.3.1 Adjusting the clock through the keypad

The time and date can be adjusted using the PRINT and FEED keys on the printer's front panel. To set, proceed as follows:

- While holding down the FEED key, press the PRINT key. The printer will print the time and date with an arrow indicating the digit to be modified;
- Each time the PRINT key is pressed, the digit marked by the arrow will increase and an updated version will be printed;
- To proceed to modify another digit, press the FEED key again. Each time the printer will print the updated time and date, highlighting with an arrow the currently selected digit;
- To terminate the setting procedure, press PRINT and FEED at the same time.

3.1 PRINT DIRECTION

The FT190SP printer has two printing directions which can be selected by means of the control characters:
normal and reverse.



(Fig.3.1)

3.2 CONTROL CHARACTERS

The command table lists all the commands for the management of the FT190SP printer functions. These commands can be transmitted to the printer with both the serial and parallel interfaces; if, however, the parallel interface is being used, the user will not be able to receive any kind of response, as this interface is mono-directional.
The commands can be transmitted to the printer at any moment, but they will only be carried out when the characters previously transmitted have been printed or the commands previously transmitted have been carried out. There are no commands with priority status; all the commands are carried out when the circular buffer is free to do so.

(Tab.3.1) **COMMAND TABLE**

ASCII Com.	HEX Com.	Description
	$00	Prints in small characters
	$01	Prints in double width
	$02	Prints in double height
	$03	Expanded printing
	$04	Restores small character printing
	$0A	Forward feeds one line
	(n) $0B	Forward feeds (n) line
	$0D	Prints line buffer
	$0F	Sets CRLF mode
	$11	Graphic mode
	$12	Prints time and date
	$13	Sets time and date
	$14	Transmits time and date in serial
	$17	Prints 1st programmable character
	$18	Prints 2nd programmable character
	$19	Prints 3rd programmable character
	$1A	Prints 4th programmable character
	$1C	Prints 5th programmable character
	$1D	Prints 6th programmable character

ASCII Com.	HEX Com.	Description
	$1E	Prints 7th programmable character
	$1F	Prints 8th programmable character
ESC A	$1B $41	Executes [n] dots line feed
ESC R	$1B $52	Sets reverse mode printing
ESC N	$1B $4E	Sets normal mode printing
ESC @	$1B $40	Resets the printer
ESC D	$1B $44	Enters date in print buffer
ESC T	$1B $54	Enters time in print buffer
ESC U	$1B $55	Enters date (mm:dd:yy) in print buffer
ESC S	$1B $53	Enables printing of seconds
ESC X	$1B $58	Prints in red
ESC x	$1B $78	Prints in black
ESC B	$1B $42	Sets character font 1
ESC b	$1B $62	Sets character font 2
ESC I	$1B $49	Selects 24 columns
ESC i	$1B $69	Selects 40 columns
(aa) ESC r	(aa) $1B $72	Reads data at an address (aa)
(aadd) ESC w	(aadd) $1B $77	Writes data (dd) in an address (aa)
(dd) ESC G	(dd) $1B $47	Writes value (dd) in option register
(dd) ESC K	(dd) $1B $4B	Writes value (dd) in option register 1
(dd) ESC M	(dd) $1B $4D	Writes value (dd) in print mode
ESC p	$1B $70	Transmits option register in serial
ESC k	$1B $6B	Transmits option register 1 in serial
ESC m	$1B $6D	Transmits print mode in serial
ESC s	$1B $73	Transmits next character in serial
(dd) ESC a	$1B $61	Selects number of dot spaces
ESC J (n)	$1B $4A	Loads programmable character
ESC W	$1B $57	Prints graphic line of 200 dpi
ESC c	$1B $63	Management of bar code printing
ESC Q	$1B $51	Enables underlining
ESC q	$1B $71	Disables underlining

A more detailed description of the single commands can be found below.

00H

[Name]	**Small character printing**	
[Format]	ASCII	-
	Hex	00
	Decimal	0
[Description]	The printer prints in small characters (normal)	
[Notes]	• The commands 00H - 09H do not cancel the print buffer • The commands which modify the direction of the characters are only active at the beginning of the line	
[Default]	Setting in option register by means of front keys	
[Reference]	**01H, 02H, 03H, 04H**	
[Example]		

01H

[Name]	**Double width printing**	
[Format]	ASCII	-
	Hex	01
	Decimal	1
[Description]	The printer prints in double width format	
[Notes]	• The commands 00H - 09H do not cancel the print buffer • The commands which modify the direction of the characters are only active at the beginning of the line	
[Default]	Setting in option register by means of front keys	
[Reference]	**00H, 02H, 03H, 04H**	
[Example]		

02H

[Name]	**Double height printing**	
[Format]	ASCII	-
	Hex	02
	Decimal	2
[Description]	The printer prints in double height format	
[Notes]	• The commands 00H - 09H do not cancel the print buffer • The commands which modify the direction of the characters are only active at the beginning of the line	

[Default] Setting in option register by means of front keys
[Reference] **00H, 01H, 03H, 04H**
[Example]

03H

[Name] **Expanded printing**
[Format] ASCII -
Hex 03
Decimal 3
[Description] The printer prints in expanded character mode
[Notes] • commands 00H-09H do not cancel the print buffer
• the commands which modify the dimensions of the characters are only active at the beginning of the line
[Default] Setting in the option register by means of the front keys
[Reference] **00H, 01H, 02H, 04H**
[Example]

04H

[Name] **Restore small character printing**
[Format] ASCII -
Hex 04
Decimal 4
[Description] The printer resumes printing with small characters
[Notes] • commands 00H-09H do not cancel the print buffer
• the commands which modify the dimensions of the characters are only active at the beginning of the line
[Default] Setting in the option register by means of the front keys
[Reference] **00H, 01H, 02H, 03H**
[Example]

0AH

[Name] **Forward feeds one line**
[Format] ASCII -
Hex 0A
Decimal 10
[Description] Forward feeds one line equivalent to a line of print
[Notes] • This command brings about the printing of the contents of the line buffer

[Default]
[Reference] **0BH**
[Example]

(n) 0BH

[Name] **Forward feeds (n) lines**
[Format] ASCII -
Hex 0B
Decimal 11
[Description] Carries out the number of line feeds specified in (n)
[Notes] •The number must be ASCII and between 0 and 9 (when n=0 the command is ignored)
• This command clears the line buffer
[Default]
[Reference] **0AH**
[Example] To forward feed fast, 5 lines at a time:
$35 $0B (or 5 and the command $0B)

0DH

[Name] **Print the line buffer**
[Format] ASCII -
Hex 0D
Decimal 13
[Description] This command prints the line buffer
[Notes] • If the line buffer is empty, the command is ignored
• If the CRLF option is set, this command is ignored and printing can only be ordered through the command $0A
[Default]
[Reference] **0FH**
[Example]

0FH

[Name] **Set CRLF mode**
[Format] ASCII -
Hex 0F
Decimal 15
[Description] Inhibits the command $0D maintaining enabled only the command $0A for printing

[Notes]
- To disable this option, reset the printer
- This command clears the line buffer
- On switching on the default value is in the Option Register

[Default] Setting in the option register by means of the front keys

[Reference] **0DH**

[Example]

11H

[Name] **Graphic mode**

[Format]

ASCII	-
Hex	11
Decimal	17

[Description] Enables graphic mode:
a line in 24 column mode corresponds to 144 horizontal dots divided into 24 blocks of 6 dots each; a line in 40 column mode corresponds to 240 horizontal dots divided into 40 blocks of 6 dots each.

[Notes] To obtain graphic printing, enter the command $11 at the beginning of each line. The format of the byte in graphic configuration is:

X	**R**	**P6**	**P5**	**P4**	**P3**	**P2**	**P1**
D7	D6	D5	D4	D3	D2	D1	D0

where:
X is not used (0 is recommended);
R must be fixed at level 1;
P1,.P6 are the graphic dot data (1 prints, 0 does not print).
The P6 bit of the string of dots transmitted is printed on the left and the others follow from left to right (P5, P4, P3, P2, P1) as shown:

1st byte è	**2nd byte è**	**3rd byte è**
P6 P5 P4 P3 P2 P1	P6 P5 P4 P3 P2 P1	P6 P5 P4 P3 P2 P1

[Default]

[Reference]

[Example] To print a line of dots, transmit:
$11, n x $7F (where n is the number of characters per line), $0D.
To print an empty line, transmit:
$11, $40, $0D.

12H

[Name] **Print time and date**

[Format] ASCII -
Hex 12
Decimal 18

[Description] Prints the time and date in the following format:
hh : mm dd - mm -yy
If seconds printing is enabled, the format will be:
hh : mm : ss dd - mm -yy

[Notes] • The command resets the line

[Default]

[Reference] **13H, 14H**

[Example]

13H

[Name] **Set time and date**

[Format] ASCII -
Hex 13
Decimal 19

[Description] This command sets the time and date in two possible ways: the first uses the 24-hour clock and the second the 12-hour am/pm clock. In the first case, transmit the 10 ASCII characters representing the time and the date followed by $13 and in the second case transmit the 10 ASCII characters representing the time and the date preceded by "A" or "P" and followed by $13.

[Notes] • It is advisable to transmit the command $0D first, in order to empty the print buffer

[Default]

[Reference] **12H, 14H**

[Example] To set the time 12:45 on 19-01-93, transmit:

1	2	4	5	1	9	0	1	9	3	$13
$31	$32	$34	$35	$31	$39	$30	$31	$39	$33	$13

To set the time A12:45 on 19-01-93, transmit:

A	1	2	4	5	1	9	0	1	9	3	$13
$41	$31	$32	$34	$35	$31	$39	$30	$31	$39	$33	$13

14H

[Name]	**Transmit the time and date in serial**				
[Format]	ASCII	-			
	Hex	14			
	Decimal	20			
[Description]	Transmit the time and date on the serial port in 11 ASCII: character format: hours/minutes/day/month/year + (CR) $0D				
[Notes]					
[Default]					
[Reference]	**12H, 13H**				
[Example]					

17H,...1FH

[Name]	**Print 1st (...8th) programmable character**				
[Format]	ASCII	-			
	Hex	17, ...1F			
	Decimal	23, ...31			
[Description]	This command prints the corresponding programmable character.				
[Note]					
[Default]	BIT MAP contained in flash				
[Reference]	**17H, 18H, 19H, 1AH, 1CH, 1DH, 1EH, 1FH**				
[Example]					

ESC A [nH] [nL]

[Name]	**Executes [n] dots line feed**				
[Format]	ASCII	ESC	A	nH	nL
	Hex	1B	41	nH	nL
	Decimal	27	65	nH	nL
[Description]	Executes [n] dots line feed				

ESC R

[Name]	**Set reverse mode printing**		
[Format]	ASCII	ESC	R
	Hex	1B	52
	Decimal	27	82
[Description]	Selects printing in reverse mode: the receipt feeds out of hte printer with the printing in normal mode running from left to right		

[Notes]

[Default] Setting in option register by means of front keys

[Reference] **ESC N**

[Example]

ESC N

[Name] **Set normal mode printing**

[Format]

ASCII	ESC	N
Hex	1B	4E
Decimal	27	78

[Description] Select normal mode printing:the receipt feeds out of the printer with the printing upside down running from right to left

[Notes]

[Default] Setting in option register by means of front keys

[Reference] **ESC R**

[Example]

ESC @

[Name] **Resets the printer**

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Cancels all the data in the print buffer and resets the printer mode, restoring the mode which was enabled at the moment of switching on

[Notes]
- Same as hardware reset
- After the command has been transmitted, 1.5 seconds elapse before the printer is enabled

[Default]

[Reference]

[Example] This can be useful during switching on in order to avoid the sending of false characters during initialization by the master device

ESC D

[Name] **Enters the date in the print buffer**

[Format]

ASCII	ESC	D
Hex	1B	44
Decimal	27	68

[Description] Enters in the buffer the date of the calender clock installed inside the printer, in the following format: dd - mm -yy.

[Notes] • The date is printed in 8 characters: if there is not enough space in the buffer, it will not be printed
• It does not zero-set the line buffer

[Default]

[Reference] **ESC T, ESC U**

[Example] If you wish to write:

DATE: 11-09-93 TEST OK

transmit DATE: $1b $44 TEST OK $0D
to print just the date $1B $44 $0D

ESC T

[Name] **Enters the time in the print buffer**

[Format]

ASCII	ESC	T
Hex	1B	54
Decimal	27	84

[Description] Enters in the buffer the time on the calendar clock installed inside the printer, in the following format: hh:mm

[Notes] • The time is printed in 5 characters and, if the seconds option is enabled, in 8 characters: if there is not enough space in the buffer, it will not be printed.
• It does not zero-set the line buffer

[Default]

[Reference] **ESC D, ESC U, ESC S**

[Example] If you wish to write:

HOUR: 16:45 TEST OK

transmit HOUR $1b $54 TEST OK $0D
to print just the date $1B $54 $0D

ESC U

[Name] **Enter the date (mm - dd - yy) in the print buffer**

[Format]

ASCII	ESC	U
Hex	1B	55
Decimal	27	85

[Description] Enter in the buffer the date on the calendar clock installed inside the printer, American style: mm-dd-yy

[Notes] • The date is printed in 8 characters: if there is not enough space in the buffer, it will not be printed
• It does not zero-set the line buffer

[Default]

[Reference] **ESC D, ESC T**

[Example] If you wish to write:

DATE: 09-11-93 TEST OK

transmit DATE: $1b $55 TEST OK $0D
to print just the date $1B $55 $0D

ESC S

[Name]	**Enables printing of seconds**		
[Format]	ASCII	ESC	S
	Hex	1B	53
	Decimal	27	83
[Description	Enables the printing of the seconds when the time of day is requested through command ESC T		
[Notes]			
[Default]	Setting in option register by means of front keys		
[Reference]	**ESC T**		
[Example			

ESC X

[Name]	**Prints in red**		
[Format]	ASCII	ESC	X
	Hex	1B	58
	Decimal	27	78
[Description]	After receiving this command the printer prepares itself to print in red		
[Notes]			

ESC x

[Name]	**Prints in black**		
[Format]	ASCII	ESC	x
	Hex	1B	78
	Decimal	27	120
[Description]	After receiving this command the printer prepares itself to print in black		
[Note]			

ESC B

[Name]	**Sets font 1**		
[Format]	ASCII	ESC	B
	Hex	1B	42
	Decimal	27	66
[Description]	Selects the first character font		
[Notes]	• The complete font is printed during the autotest. Some codes are not standard: $60, $7B, $7C, $7D, $7E, $7F, $8D, $ED, $FA, $FF		
[Default]	Setting in the option register by means of the front keys		
[Reference]	**ESC b**		
[Example]			

ESC b

[Name]	**Sets font 2**		
[Format]	ASCII	ESC	b
	Hex	1B	62
	Decimal	27	98
[Description]	Selects the second character font		
[Note]	•The complete font is printed during the autotest. The font contains cyrillic characters		
[Default]	Setting in the option register by means of the front keys		
[Reference]	**ESC B**		
[Example]			

ESC I

[Name]	**Select 24 columns**		
[Format]	ASCII	ESC	I
	Hex	1B	49
	Decimal	27	73
[Description]	On receiving this command, the printer enters 24-column per line printing mode		
[Notes]			
[Default]			
[Reference]	**ESC i**		
[Example]			

ESC i

[Name]	**Select 40 columns**		
[Format]	ASCII	ESC	i
	Hex	1B	69
	Decimal	27	105
[Description]	On receiving this command, the printer enters 40-column per line printing mode		
[Notes]			
[Default]			
[Reference]	**ESC l**		
[Example]			

(aa) ESC r

[Name]	**Read data at an address (aa)**				
[Format]	ASCII	aH	aL	ESC	r
	Hex	aH	aL	1B	72
	Decimal	aH	aL	27	114
[Description]	Read a memory location (EEPROM) at address *aa*. aH is the most significant nibble of *aa* expressed in ASCII aL is the least significant nibble of *aa* expressed in ASCII				
[Notes]	• There are 256 legible locations (from $00 to $FF)				
[Default]	The whole memory bank contains the value $20 by default				
[Reference]	**ESC w**				
[Example]	To read address $01, transmit in ASCII: $30 $31 $1B $72 If address $01 contains $A5, we will receive: $41 $35				

(aadd) ESC w

[Name] **Write data (dd) in address (aa)**

[Format]

ASCII	aH	aL	dH	dL		ESC	w
Hex	aH	aL	dH	dL		1B	77
Decimal	aH	aL	dH	dL		27	119

[Description] Save data *d* in address *a* in the memory (EEPROM):
aH is the most significant nibble of *a* expressed in ASCII
aL is the least significant nibble of *a* expressed in ASCII
dH is the most significant nibble of *d* expressed in ASCII
dL is the least significant nibble of *d* expressed in ASCII

[Notes] • There are 256 writable locations (from $00 to $FF). The data maximum is $FF (255) and both the addresses and the data must be expressed in ASCII on two bytes

[Default] The whole memory bank contains the value $20 by default

[Reference] **ESC r**

[Example] To save the data $A5 in the address $01, transmit:
$30 $31 $41 $35 $1B $77

(dd) ESC G

[Name] **Write the value (dd) in the option register**

[Format]

ASCII	dH	dL	ESC	G
Hex	dH	dL	1B	47
Decimal	dH	dL	27	71

[Description] Modify the configuration register. (dd) are two ascii characters which represent the hexadecimal code for the programming of the register.

(dd)	**bit=0**	**bit=1**
bit0: setting of real time clock	disabled	enabled
bit1: print direction	normal	reverse
bit2: number bits in parallel reception	8	7
bit3: printing of seconds	disabled	enabled
bit4: CR ($0D)	enabled	disabled
bit5: reception parameter selection	hardware (dipswitch)	software
bit6: font selection	font 1	font 2
bit7: reception buffer	1Kbyte	N° columns

[Notes] • The setting is memorized in the EEPROM and assumed as the default value the next time the printer is switched on

[Default]

[Reference] **ESC K**

[Example] To send setting byte 00001001 ($09):
$30 $39 $1B $47

(dd) ESC K

[Name] **Write the value (dd) in the option register 1**

[Format]

ASCII	dH	dL	ESC	K
Hex	dH	dL	1B	4B
Decimal	dH	dL	27	75

[Description] Modifies the configuration register. (dd) are two ASCII characters representing the hexadecimal code for the programming of the register.

(dd)	bit=0	bit=1
bit0: number of columns	24 columns	40 columns

[Notes] • The setting is memorized in the EEPROM and assumed as default value the next time the printer is switched on

[Default]

[Reference] **ESC G**

[Example] To send setting byte 00001001 ($09):
$30 $39 $1B $47

(dd) ESC M

[Name] **Writes the value (dd) in the print mode**

[Format]

ASCII	dH	dL	ESC	M
Hex	dH	dL	1B	4D
Decimal	dH	dL	27	77

[Description] Sets the print mode default parameters:
$00 small character printing
$01 double width printing
$02 double height printing
$03 expanded printing

[Notes] • The setting is stored in the EEPROM

[Default] Setting by means of the front keys

[Reference] ESC m

[Example] For double height printing, transmit:
$30 $32 $1B $4D

ESC p

[Name] **Transmit the configuration register in serial**

[Format]

ASCII	ESC	p
Hex	1B	70
Decimal	27	112

[Description] Transmit the option register byte on the serial port

[Notes] • If the printer is using the parallel protocol, nothing with be transmitted

[Default]

[Reference] **ESC G, ESC K, ESC k**

[Example] The response is on two bytes. E.g., if you receive:
$30 $39
it means that the default configuration is 00001001

ESC k

[Name] **Transmits the second configuration register in serial**

[Format]

ASCII	ESC	k
Hex	1B	6B
Decimal	27	107

[Description] Transmits in serial the value of the second configuration register in ASCII format on two characters which represent the hexadecimal value

[Notes] • If the printer is using the parallel protocol, nothing with be transmitted

[Default]

[Reference] **ESC K**

[Example] The response is on two bytes. E.g. if you receive:
$30 $39
it means that the default register is 00001001

ESC m

[Name] **Transmits the print mode in serial**

[Format]

ASCII	ESC	m
Hex	1B	6D
Decimal	27	109

[Description] Transmits the print mode configuration on the serial port

[Notes] • If the printer is using the parallel protocol, nothing with be transmitted

[Default] Setting in the option register by means of the front keys

[Reference] **ESC B**

[Example] The response is on two bytes. E.g. if you receive:
$30, $32
it means that printing is in double height mode

ESC s

[Name] **Transmits the next character in serial**

[Format]

ASCII	ESC	s
Hex	1B	73
Decimal	27	115

[Description] Transmits the next character it receives on the serial port

[Notes]

[Default]

[Reference]

[Example] If you transmit: ESC s A
the last character, A, will not be printed but immediately transmitted on the serial line

(dd) ESC a

[Name] **Selects the number of dot spaces**

[Format]

ASCII	(dd)	ESC	a
Hex	(dd)	1B	61
Decimal	(dd)	27	97

[Description] (dd) are two ASCII characters which identify a hexadecimal byte and correspond to the number of dot lines between one print line and another

[Notes]

[Default] = 0

[Reference]

[Example]

ESC J (n) 10*(d)

[Name] **Load the programmable character**

[Format]

ASCII	ESC	J	(n)
Hex	1B	4A	(n)
Decimal	27	74	(n)

[Description] (n) corresponds to the character number,i.e. between 1and 8. The bit map that represents the character is contained in the next 10 bytes expressed in binary code. The formatting of these bytes is as follows:

bit	7	6	5	4	3	2	1	0
	0	1	d	d	d	d	d	d

[Notes]

[Default] The 8 characters available on switching on are loaded with a bit map contained in the printer's flash. To modify these bit maps, a firmware upgrade is required.

[Reference]

[Example] If you wish the symbol of the code $1F to be #, transmit ESC J 2 followed by the 10 bytes making up the character:
$1B $4A $32 $52 $52 $52 $7F $52 $52 $7F $52 $52 $52

ESC W

[Name] **Print a graphic line at 200 dpi**

[Format]

ASCII	ESC	W
HEX	1B	57
Decimal	27	87

[Description] After receiving this command, the printer waits for 48 bytes which correspond to an entire graphic line. In fact, 48 bytes of 8 bits each correspond to 384 dots per line.

[Notes]

[Default]

[Reference]

[Example]

ESC c

[Name] **Management of bar code printing**

[Format]

ASCII	ESC	c	[code] [height] [position] [options] [length] [data]
Hex	1B	63	
Decimal	27	99	

[Description]

[ASCII code] Type of bar code

I	Interleved 2/5
C	Code 39
B	CodaBar
e	EAN8
E	EAN13

[height]
Number of dot lines in 1/8 mm. units.

[position]
Left hand margin, expressed in 1/8 mm. units

[options]

bit	bit 0	bit 1
bit0: check digit	is not printed	is printed

bit3,2: HRI 0=no 1=above 2=below 3=above & below
bit5,4: size 0=normal 1=double 2=triple 3=quadruple

[maximum length]

Interleaved 2/5	= 12 characters
Code 39	= 10 characters
CodaBar	= 10 characters
EAN8	= 8 characters
EAN13	= 13 characters

[data]
Expressed in ASCII

[Notes]

[Default]

[Reference]

[Example]

ESC Q

[Name]	**Enable underlined printing**		
[Format]	ASCII	ESC	Q
	Hex	1B	51
	Decimal	27	81
[Description]	After this command has been received, the characters are printed underlined		
[Note]			
[Default]			
[Reference]	**ESC q**		
[Example]			

ESC q

[Name]	**Disables underlined printing**		
[Format]	ASCII	ESC	q
	Hex	1B	71
	Decimal	27	113
[Description]	Annuls underlined printing		
[Notes]			
[Default]			
[Reference]	**ESC Q**		
[Example]			

4.1 TECHNICAL SPECIFICATIONS

The main technical features of the printer are listed in Table 4.1.

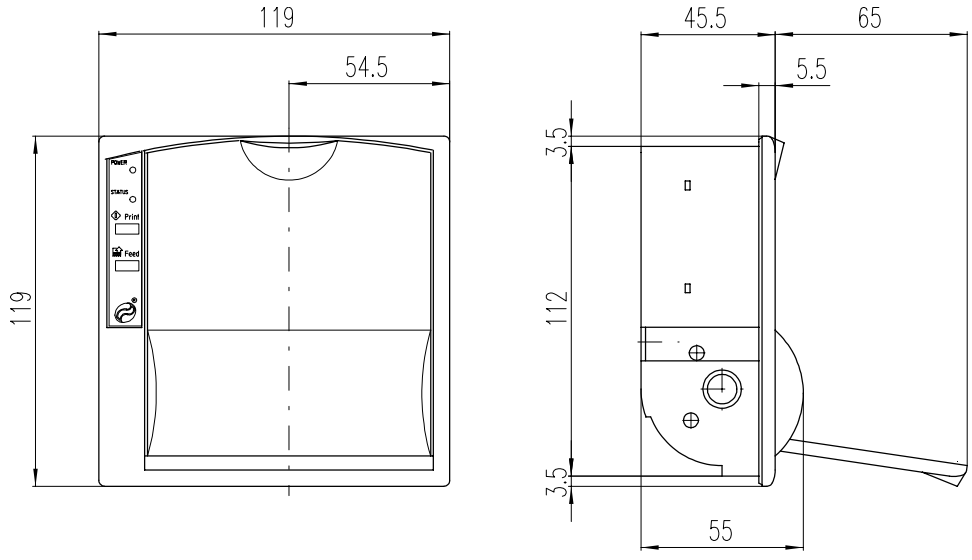
Table 4.1

Columns	**24**	**40**
Character (L x H mm)		
Normal	2x3	1x3
Double height	2x6	1x6
Double width	4x3	2x3
Expanded	4x6	2x6
Graphic dot	0,125 x 0,125	0,125 x 0,125
Custom emulation dots per line	144	240
Print speed (speed/current = normal)		
Lines/sec	30	30
Characters/sec	220	320
Feed (lines/sec)	53	53
Line buffer	24 byte	40 byte
Print buffer	1Kbyte	
Print method	Thermal dot matrix	
Character matrix	16 x 24	8x24
Print direction	Normal or reverse	
Character set	Normal and extended	
Paper roll dimensions	58 +/- 1mm x Ø50 mm max	
Standard interfaces	RS232 or Centronics	
Power supply	Double or single 5 Vdc. ± 10%	
Absorption (with 5 Volt power supply)		
Selection “Speed/current = LOW”		
Printing	3 A	
Stand by	100 mA	
In feed	750 mA	

Selection “Speed/current = NORMAL”	
Printing	4,5 A
Stand by	100 mA
In feed	750 mA
Selection “Speed/current = HIGH”	
Printing	6 A
Stand by	100 mA
In feed	750 mA
Environmentals conditions	
Operating temperature	0°C - 50°C
Operating humidity	20% - 85% (no condensing)
Storage temperature / humidity	-25°C - +70°C / 10% - 90%
Options	Real time clock 9 - 40 Vcc Power supply

4.2 DIMENSIONS

The dimensions of the FT190SP panel printer are shown in the figure below. With the screws fitted in the printer, the maximum thickness of the panel is 5 mm; using the two additional screws provided, the printer can be mounted on panels with a maximum thickness of 15 mm. For even thicker panels, use longer M3 screws.

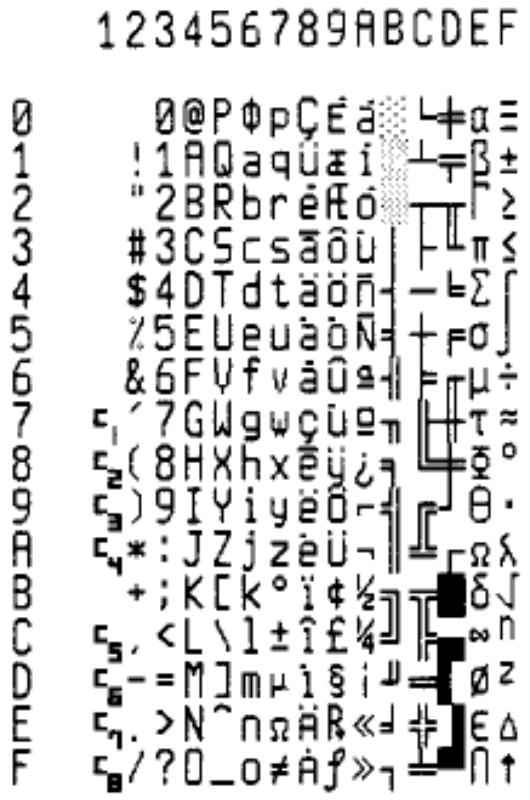


(Fig.4.1)

5.1 CHARACTER SETS

The FT190SP printer has two characters sets, each containing 224 characters (font 1 and font 2), which can be called up through the programming (paragraph 1.2) or through the control characters (paragraph 3.2).

FONT 1



(Fig.5.1)

FONT 2

(Fig.5.2)

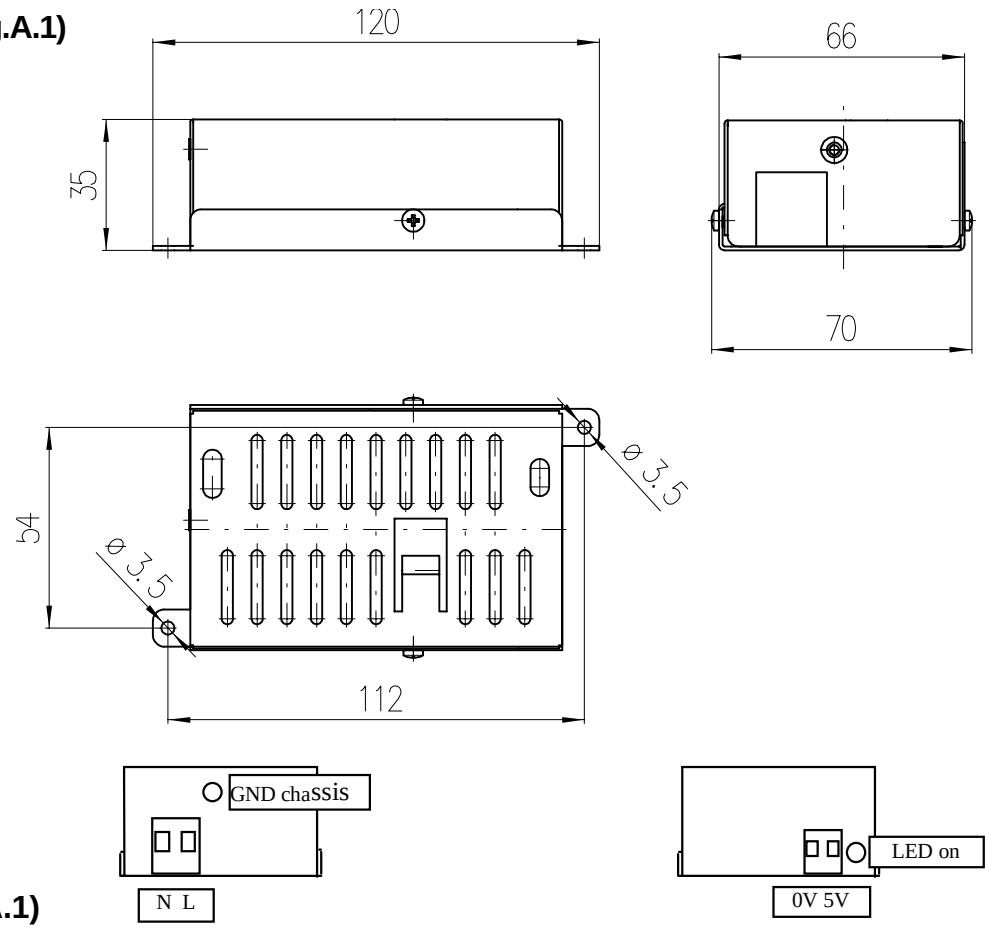
A.1 ACCESSORIES

A.1.1 Power supply

The drawing below shows the power supply manufactured by Custom Engineering to be used with the FT190SP printer.
The power supply is available in 3 models:

- PSM05 for the 5V version
- PSM12 and PSM24 for the 9-40V version

(Fig.A.1)



(Tab.A.1)

Input specifications		
Input voltage		100 Vac to 240 Vac
Input frequency		50 Hz to 60 Hz
PSM05 Output specifications		
Output voltage		5 V
Output current	Minimum	0 A
	Maximum	3,6 A
	Peak	5 A(1)
	Short Circuit	6 A(2)

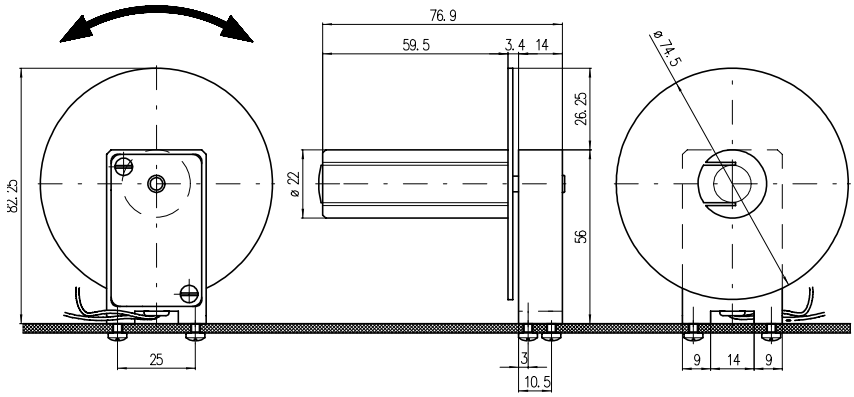
PSM12 Output specifications (for 9-40VDC version)		
Output voltage		12 V
Output current	Minimum	0 A
	Maximum	4 A
	Peak	6 A
	Short Circuit	6 A

PSM24 Output specifications (for 9-40VDC version)		
Output voltage		24 V
Output current	Minimum	0 A
	Maximum	2 A
	Peak	3,5 A
	Short Circuit	6 A

(Fig.A.2)

A.1.2 Paper winder

The AV03 model paper winder can be connected to the FT190SP at the J5 connector.



Technical specifications:

Tecnical specifications:

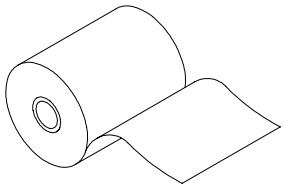
Range of application	Universal
Paper width (max)	60 mm
Roll diameter (max)	70 mm
Power supply	5 - 12Vdc ± 10%
Electrical input (max)	450 mA

(Tab.A.2)

A.2 SPARE PARTS

(Tab.A.3)

RCT57X50	Thermal paper roll			
	Quantity recommended per n° machines purchased			
N° machines	<10	<50	<100	>100
Quantities recommended	5	30	60	90



(Fig.A.3)