

QTP 22 - QTP 24

Quick Terminal Panel

USER MANUAL



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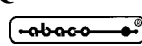
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QTP 22/24

Edition 3.80 Rel. 05 February 1998

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QTP 22 - QTP 24

Quick Terminal Panel

USER MANUAL

QTP 24

Intelligent user panel equipped with Fluorescent 20x2 or 20x4 or LCD display, LEDs backlit, 20x2 or 20x4 characters; RS 232, RS 422-485 or Current Loop serial lines; serial EEPROM for set-up and messages; Possibility of re-naming keys, LEDs and panel name by inserting label with new name into the proper slot; 24 keys and 16 LEDs with blinking attribute and Buzzer manageable by software; built-in power supply; RTC option, reader of magnetic badge and relays.

QTP 22

Intelligent user panel equipped with alphanumeric LCD display, LEDs backlit, 40x1, 40x2 or 40x4 characters or alphanumeric Fluorescent display 40x1, 40x2 or 40x4 characters; RS 232, RS 422-485 or Current Loop serial lines; serial EEPROM for set-up and messages; Possibility of re-naming the 22 keys and name panel by inserting label with new name into the proper slot; 22 LEDs with blinking attribute and Buzzer manageable by software; built-in 24 Vac power supply; RTC option, reader of magnetic badge and relays.

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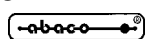
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For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

SYMBOLS DESCRIPTION

In the manual could appear the following symbols:

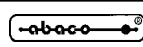


Attention: Generic danger



Attention: High voltage

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INTRODUCTION

The use of these devices has turned - IN EXCLUSIVE WAY - to specialized personnel.

The purpose of this handbook is to give the necessary information to the cognizant and sure use of the products. They are the result of a continual and systematic elaboration of data and technical tests saved and validated from the Builder, related to the inside modes of certainty and quality of the information.

The reported data are destined- IN EXCLUSIVE WAY- to specialized users, that can interact with the devices in safety conditions for the persons, for the machine and for the environment, impersonating an elementary diagnostic of breakdowns and of malfunction conditions by performing simple functional verify operations , in the height respect of the actual safety and health norms.

The informations for the installation, the assemblage, the dismantlement, the handling, the adjustment, the reparation and the contingent accessories, devices etc. installation are destined - and then executable - always and in exclusive way from specialized warned and educated personnel, or directly from the TECHNICAL AUTHORIZED ASSISTANCE, in the height respect of the builder recommendations and the actual safety and health norms.

The devices can't be used outside a box. The User must always insert the cards in a container that respect the actual safety normative. The protection of this container is not threshold to the only atmospheric agents, but specially to mechanic, electric, magnetic, etc. ones.

To be on good terms with the products, is necessary guarantee legibility and conservation of the manual, also for future references. In case of deterioration or more easily for technical updates, consult the AUTHORIZED TECHNICAL ASSISTANCE directly.

To prevent problems during card utilization, it is a good practice to read carefully all the informations of this manual. After this reading, the User can use the general index and the alphabetical index, respectly at the begining and at the end of the manual, to find information in a faster and more easy way.

FIRMWARE RELEASE

This handbook make reference to firmware release **2.0** (standard version with μ P 87c51), **5.8** (extended version with μ P 87c52) and following ones. The validity of the information contained in this manual is subordinated to the firmware release number, so the user must always verify the correct correspondence between the notations. Inside the device, the firmware release number is written on the label stuck on the CPU or it can be obtained by a proper command sent through the serial line.

TERMINALS GENERAL FEATURES

QTP 22 (Quick Terminal Panel-22 Keys) and **QTP 24 (Quick Terminal Panel-24Keys)** are complete operator panels, specifically designed for industrial use and for direct mounting on automatic machinery. They are, in every respect, video terminals suitable to be the direct interface between operator and machinery in any of the control or comand operations which could be necessary during running or diagnostic of the same. **QTP** are available with **Fluorescent** or **LCD** displays, backlite or not, 20x2 or 4 lines (**QTP 24**) or 40 characters for 1, 2 or 4 lines (**QTP 22**). The **QTP** affords 22 or 24 keys, with full user reconfiguration and name personalization slots labels identifying all or some keys. Some keys are provided with indicator LEDs, which can be switched on and off by dedicated commands received through the serial line. A third slot label can be used to carry a name for the **QTP** or the user's own logo. The basic **QTP** can be expanded utilizing the various options available, namely **EEPROM**, up to 4 Kbyte capacity, **Real Time Clock** with 256 bytes user accessible RAM and Lithium backup battery, Actuating **relay** piloted through serial line, Acquisition from magnetic **badge reader**, Sundry communication protocols, **Custom** operating **programs**, etc. The **QTP** is able to execute an entire range of display commands, including Clear Screen, Position cursor, LED blink, etc., with code compatibility similar to that of the **ADDS ViewPoint** video terminal. Maximum specifications for the **QTP** are:

- Surface or flush panel mounting
- Mounting direct to **Phoenix CombiCard®** industrial instrument cases
- Professional keypad: **22 keys** and **22 LEDs (QTP22)**, or **24 keys** and **16 LEDs (QTP24)**
- Complete user reconfiguration of key codes
- Direct control of all indicator **LEDs**; **blinking** command on indicator LEDs
- Name personalization **slots** label for keys; Panel name personalization slot
- Alphanumeric display options afforded by **Fluorescent** or **LCD**
- **Buzzer** programmable as **BELL** or to sound with keystroke
- **EEPROM** for permanent storage of set-up, messages, key codes, etc.
- Maximum possible EEPROM capacity 4 Kbytes
- Option 1 A **relay** with changeover contacts, serially controlled
- Option interface for magnetic strip **badge** reader
- Option **RTC** with 256 bytes user-accessible RAM and **Lithium** backup battery
- **RS 232**, **RS 422-485** or **Current Loop** serial line; Local selection of Baud Rate
- Internal power supply capable of driving external loads
- **DC** or **AC** power supply from **5 Vdc** to **24 Vac**; Customized keyboard and program packages

BUZZER

QTP 22 and **QTP 24** have a circuitry ables to emit a steady sound based on a capacitive buzzer. The said circuitry can be activated via software through a specific comand for generating a sound-beep or it can be linked to a key-pressure just to get the KeyClick function.

EEPROM

QTP 22 and **QTP 24** have the on-board EEPROM (the capacity vary from 256Bytes to 4 KBytes) for memorizing set-up, keys code, communication protocols, name, messages, and so on. It is possible to memorize up to 202 messages of 20 characters to be read in different moments or visualing them on the display just giving the identifying number of the message to the terminal.

KEYBOARD

QTP 22 and **QTP 24** have respectively a keyboard of 22 and 24 keys. These keys are equipped with AutoRepeat and they are totally software re-configurables as the code sent in RS 232 can be changed when a key is pressed. It is also possible to switch on/off the KeyClick function, i.e the Buzzer function each time a chosen key is pressed. Keyboards have user's reconfigurable slots for keys re-name; the **QTP 22** has 22 re-naming keys while **QTP 24** has 16 re-naming keys.

INDICATOR LEDS

QTP 22 and **QTP 24** have indicator LEDs for different visual signals. On **QTP 24** there are 16 LEDs and on **QTP 22** there are 22 LEDs; all of them can also have the Blinking attribute as this function is totally autonomous and it doesn't need any intervention on user part. The **QTP 22** has LEDs linked to all its 22 keys while **QTP 24** has 12 LEDs linked to keys and the remaining 4 keys are for user's personalization.

SERIAL COMMUNICATION

The communication with remote units is by standard RS 232 serial line, but it can be optionally changed in RS 422-485 or Current Loop. 8 Bit protocole communication, NO PARITY, selectionable Baud Rate among 1200, 2400, 4800, 9600, 19200 and 38400 Baud. The local set program makes possible to set a number of 1 or 2 Stop bit. As option is available a communication protocole Master-Slave type with 9th bit technique and settable Baud-Rate at 187,5 Kbaud too.

RELAYS

QTP 22 and **QTP 24** can have as option n.1 Relay equipped with 1 Ampere contact. This latter can be switched on / off via software directly by the user and it makes available, on the appropriate connector, the contact both normally open and normally closed. This option could be necessary when the automatic door opening must be directly controlled by using the terminal placed in the immediate closeness; in this case it will be necessary a power driven by the said relay.

REAL TIME CLOCK

QTP 22 and **QTP 24** as option can have: Real Time Clock 256 Bytes of RAM at user disposal with Lithium battery data back-up. This device is manageable with appropriate software commands by the user and in this way it is possible to set time and date, to read these data or to have them on the display on a given position. There are also available two commands for writing and reading data from the on board RAM of the RTC.

BADGE READER INTERFACE

QTP 22 and **QTP 24** as option can have a circuitery that allows to interface the terminal to a single track magnetic card reader which can be insertion or **sliding types** for reading the track n.1, 2 or 3. **QTP 22** and **QTP 24** automatically acquire the card and its decodification while the string is memorized into the local memory; in this way the user receives the message already decodified without being obliged to make further operations.

ON BOARD POWER SUPPLY

QTP 22 and **QTP 24** have their own switch power supply so they can be powered with a voltage up to **24 Vac**. As option, the **5Vdc** voltage generated by this power supply, can be used to power small external loads directly from the terminal same. Take note that **QTP 22** and **QTP 24** instead of this switch power supply can also be supplied with a circuitery which allows to power the said terminals with a **5Vdc** voltage.

QTP 24 TECHNICAL SPECIFICATIONS

GENERAL FEATURES

- On board resources:**
- **16 LEDs**, 4 of which are for user's personalization and 12 coupled to keys.
 - **24 software reconfigurable keys** 12 of which are for user's personalization.
 - **LCD Display** (20 characters for 2 or 4 lines) backlite or not backlited, trimmer for contrast regulation; or **Fluorescent Display** (20 characters for 2 or 4 lines).
 - **BUZZER** for BELL signaling, or sound feed back when keys are pressed.
 - Full duplex **RS 232** serial line or **RS 422-485** or **Current Loop**.
 - **EEPROM** for set-up, messages, keys codes and so on. 4 KBytes maximum.
 - **Option RTC** with 256 Bytes user-accessible RAM.
 - **Option 1A Relay** with Changeover contacts.
 - Various options among those ones there is also an interface for magnetic **cards reader** for single track.
- On board CPU:**
- INTEL 87C51 with 14.7456 MHz Quartz
INTEL 87C52 with 12MHZ Quartz (**Option**)
- Communicating protocole:**
- Baud Rate: 1200, 2400, 4800, 9600, 19200 or 38400 Bauds.
Option 187.5 Bauds.
1 or 2 Stop Bit.
No Parity.
8 Bit (standard communication), 9 Bit (Master-Slave communication).
Option: settable communication in **Master-Slave** mode.
- Character size:**
- Fluorescent 20x2: 5 x 7 dots, 2,25 x 4,16 mm (Horiz., Vertical)
Fluorescent 20x4: 5 x 7 dots, 2,40 x 4,70 mm (Horiz., Vertical)
LCD 20x2: 5 x 7 dots, 3,20 x 4,85 mm (Horiz., Vertical)
LCD 20x4: 5 x 7 dots, 2,95 x 4,75 mm (Horiz., Vertical)

PHYSICAL FEATURES

- Size:** please refer to figure n. 1
- Weight:** 1000 grammes max.
- Mounting:** On panel as Front-panel and Back-panel or direct mounting on **Phoenix CombiCard** industrial housings.

Connectors:

CN1: 2-4 pins quick screw connector for power.

CN2: 9 pins female D connector for serial connection.

CN3: 3 pins quick screw connector for relays connection
(Option).

CN4: 10 pins connector for different expansions such as Card reader (Option).

Temperature range:

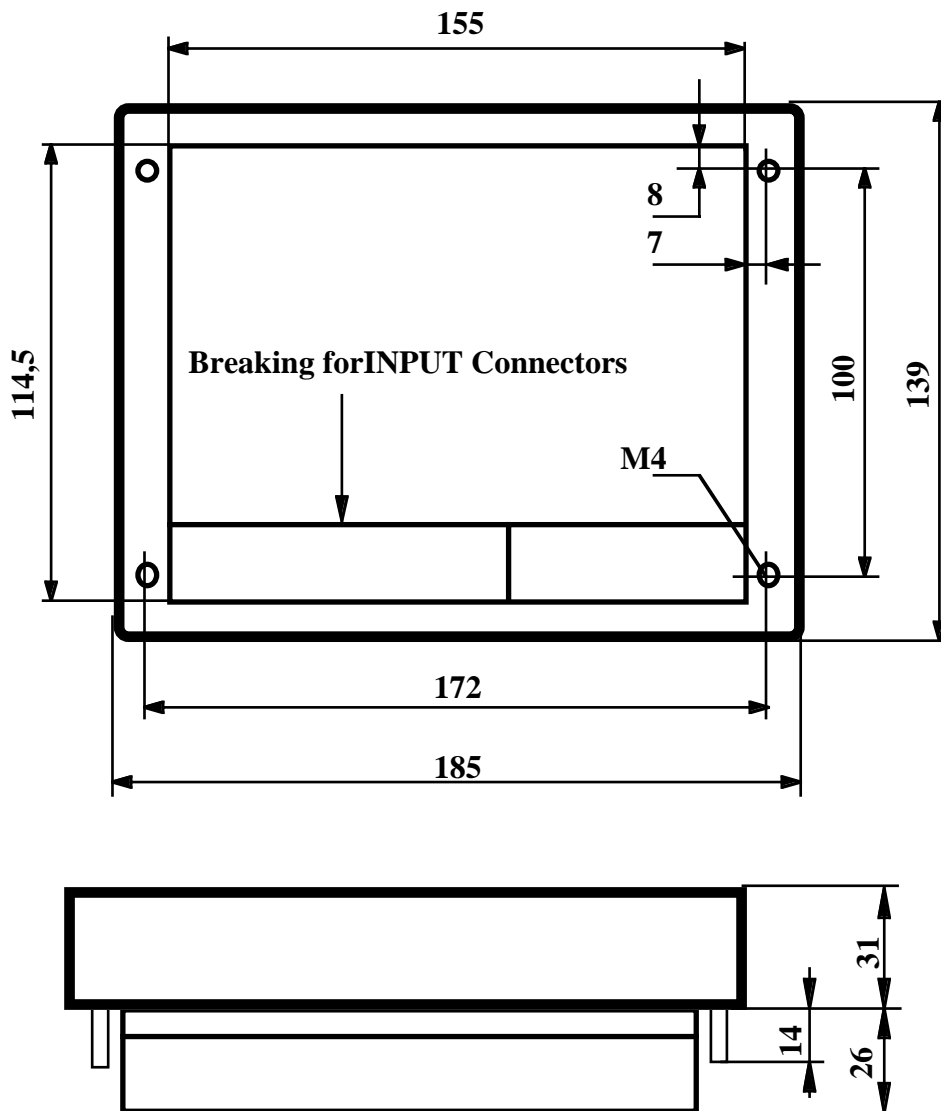
from 0 to 50 °C.

Relative humidity:

20% up to 90% (without condense)

QTP 24 OVERALL SIZE

Here is the QTP 24 size (in mm.) Rear view and lateral sides where connectors are located. This is not a scale drawing.

**FIGURE 1: QTP 24 SIZE**

ELECTRICAL FEATURES

Power voltage :	5Vdc or 8÷24Vac	
External loads power:	5Vdc (option)	
Power supply power:	7,5 W	
RS 422-485 Termination Network:	pull-up resistor:	Absent
	pull-down resistor:	Absent
	line termination resistor:	120 Ω

Hereunder is listed the **QTP 24** consumption referred to the different versions which install different displays version. These consumptions are referred to the **QTP 24** basic version with no options.

DISPLAY Model	Consumption LEDs Switched OFF	Consumption LEDs Switched ON
NOT Backlite LCD	50 mA - 5 Vdc 0.3 W - 8÷24 Vac	300 mA - 5 Vdc 1.9 W - 8÷24 Vac
Backlite 20x2 LCD	200 mA - 5 Vdc 1.3 W - 8÷24 Vac	450 mA - 5 Vdc 2.8 W - 8÷24 Vac
Backlite 20x4 LCD	250 mA - 5 Vdc 1.6 W - 8÷24 Vac	500 mA - 5 Vdc 3.1 W - 8÷24 Vac
20x2 Fluorerscent	295÷395 mA - 5 Vdc 1.8÷2.5 W - 8÷24 Vac	545÷645 mA - 5 Vdc 3.4÷4 W - 8÷24 Vac
20x4 Fluorerscent	380 mA - 5 Vdc 2.4 W - 8÷24 Vac	630 mA - 5 Vdc 4 W - 8÷24 Vac

FIGURE 2: QTP 24 CONSUMPTION TABLE



FIGURE 3: QTP 24 PHOTO

QTP 22 TECHNICAL SPECIFICATIONS

GENERAL FEATURES

- On board resources:**
- **22 LEDs** coupled to keys.
 - **22 software reconfigurable keys** and available for user's personalization.
 - **LCD Display** (40 characters for 1, 2 or 4 lines) backlite or not backlite, trimmer for contrast regulation; or **Fluorescent Display** (40 characters for 1,2 or 4lines).
 - **BUZZER** for BELL signaling, or sound feed back when keys are pressed.
 - Full duplex **RS 232** serial line or **RS 422-485** or **Current Loop**.
 - **EEPROM** for set-up, messages, keys codes and so on.
4 KBytes maximum.
 - **Option RTC** with 256 Bytes user-accessible RAM.
 - **Option 1A Relay** with Changeover contacts.
 - Various options among those ones there is also an interface for magnetic **cards reader** for single track.

On board CPU: INTEL 87C51 with 14.7456 MHz Quartz
INTEL 87C52 with 12MHZ Quartz (**Option**)

Communicating protocole: Baud Rate: 1200, 2400, 4800, 9600, 19200 or 38400 Bauds.
Option 187.5 Bauds.
1 or 2 Stop Bit.
No Parity.
8 Bit (standard communication), 9 Bit (Master-Slave communication).
Option: settable communication in **Master-Slave** mode.

Character size:

Fluorescent 40x1:	5 x 7 dots, 3,5 x 5,0 mm (Horiz., Vertical)
Fluorescent 40x2:	5 x 7 dots, 3,5 x 5,0 mm (Horiz., Vertical)
Fluorescent 40x4:	5 x 7 dots, 3,0 x 5,0 mm (Horiz., Vertical)
LCD 40x1:	5 x 10 dots, 3,15 x 7,90 mm (Horiz., Vertical)
LCD 40x2:	5 x 7 dots, 3,20 x 5,55 mm (Horiz., Vertical)
LCD 40x4:	5 x 7 dots, 2,78 x 4,89 mm (Horiz., Vertical)

PHYSICAL FEATURES

Size: please refer to figure n. 4

Weight: 1800 grammes max.

Mounting: On panels as Front-panel and Back-panel or direct mounting on **Phoenix CombiCard** industrial housings.

Connectors: CN1: 2-4 pins 90° quick screw connector for power.
CN2: 9 pins female D for serial connection.

CN3: 3 pins quick screw connector for relays connection (**Option**)
 CN4: 10 pins connector for different expansions such as Card reader (**Option**).

Temperature range: from 0 to 50 °C.

Relative humidity: 20% up to 90% (without condense)

QTP 22 OVERALL SIZE

Here is the **QTP 22** size (in mm.) Rear view and lateral sides where connectors are located. This is not a scale drawing.

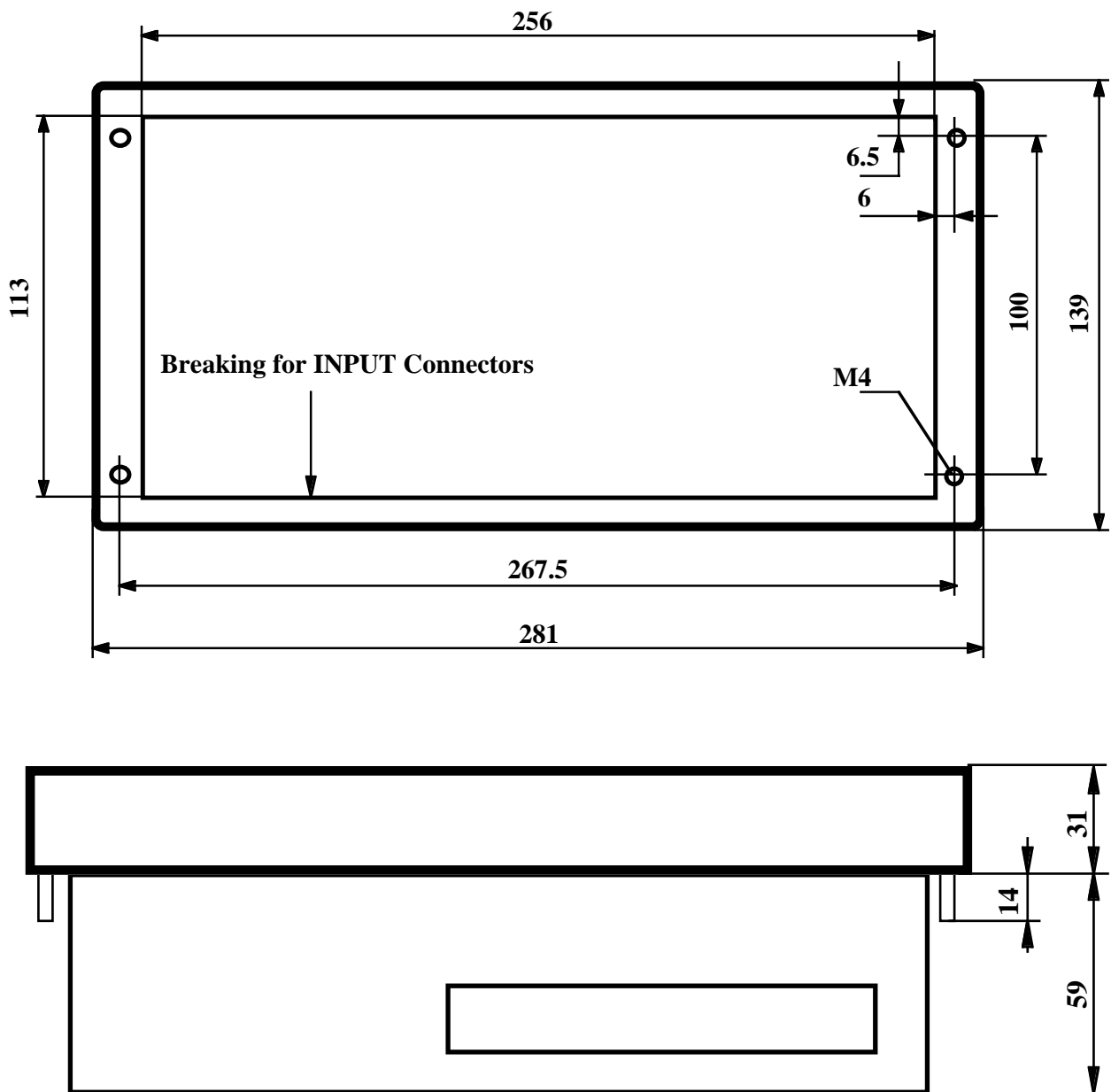


FIGURE 4: QTP 22 SIZE

ELECTRICAL FEATURES

Power voltage: 5Vdc or 8÷24Vac

External loads power: 5Vdc (Option)

Power supply power: 12,5 W

RS 422-485 Termination Network:

pull-up resistor:	Absent
pull-down resistor:	Absent
line termination resistor:	120 Ω

Hereunder is listed the **QTP 22** consumption referred to the different versions which install different displays version. These consumptions are referred to the **QTP 22** basic version with no options.

DISPLAY Model	Consumption LEDs Switched OFF	Consumption LEDs Switched ON
Not Backlite LCD	60 mA - 5 Vdc 0.4 W - 8÷24 Vac	400 mA - 5 Vdc 2.5 W - 8÷24 Vac
Backlite 40x1 LCD	410 mA - 5 Vdc 2.6 W - 8÷24 Vac	750 mA - 5 Vdc 4.7 W - 8÷24 Vac
Backlite 40x2 LCD	410 mA - 5 Vdc 2.6 W - 8÷24 Vac	750 mA - 5 Vdc 4.7 W - 8÷24 Vac
Backlite 40x4 LCD	810 mA - 5 Vdc 5.1 W - 8÷24 Vac	1150 mA - 5 Vdc 7.2 W - 8÷24 Vac
40x1 Fluorescent	345÷495 mA - 5 Vdc 2.2÷3.1 W - 8÷24 Vac	585÷735 mA - 5 Vdc 3.7÷4.6 W - 8÷24 Vac
40x2 Fluorescent	795÷1045 mA - 5 Vdc 5÷6.5 W - 8÷24 Vac	1135÷1385 mA - 5 Vdc 7.1÷8.7 W - 8÷24 Vac
40x4 Fluorescent	1445÷2045 mA - 5 Vdc 9÷12 W - 8÷24 Vac	1785÷2385 mA - 5 Vdc 11÷14.9 W - 8÷24 Vac

FIGURE 5: QTP 22 CONSUMPTION TABLE

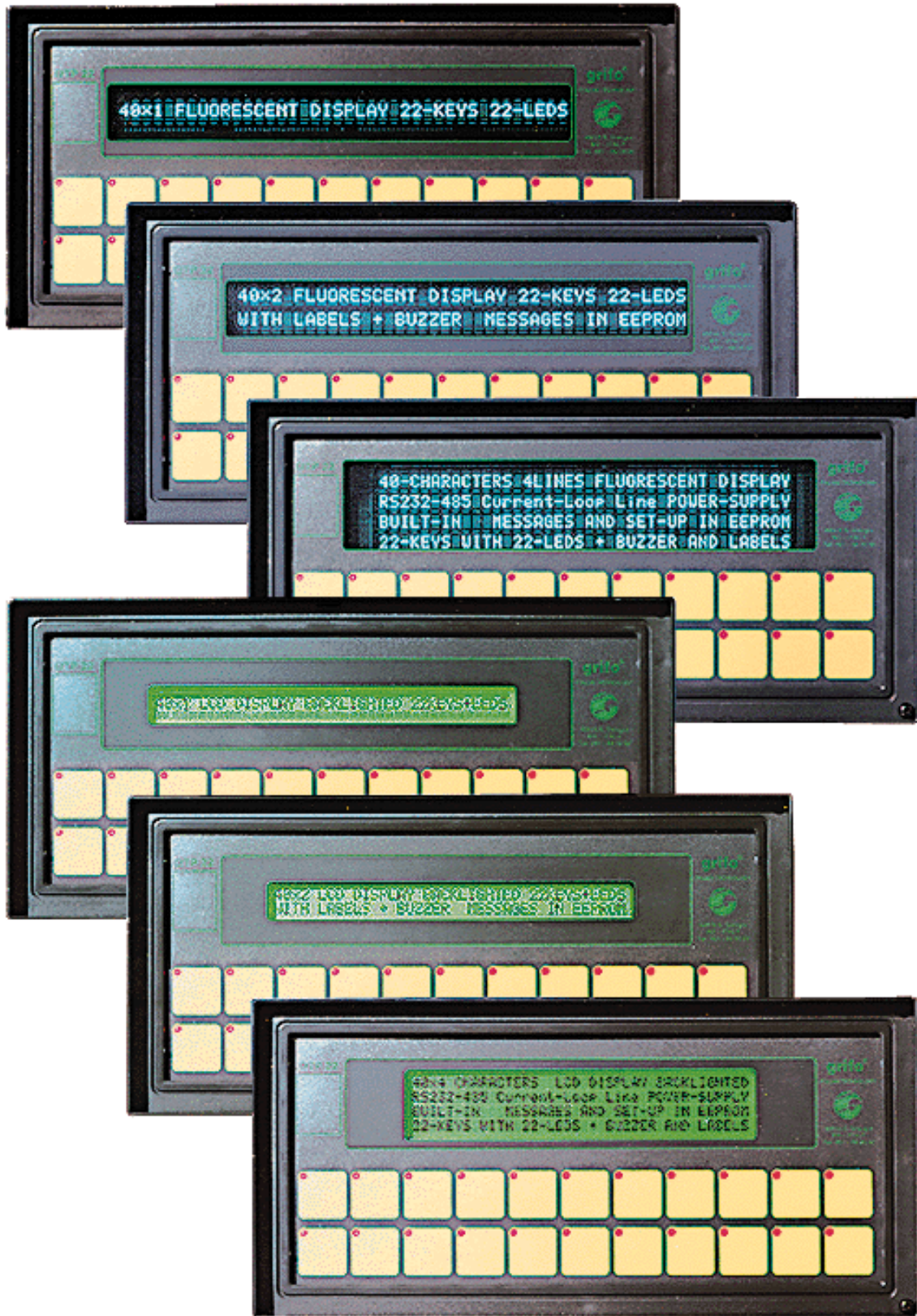


FIGURE 6: QTP 22 PHOTO

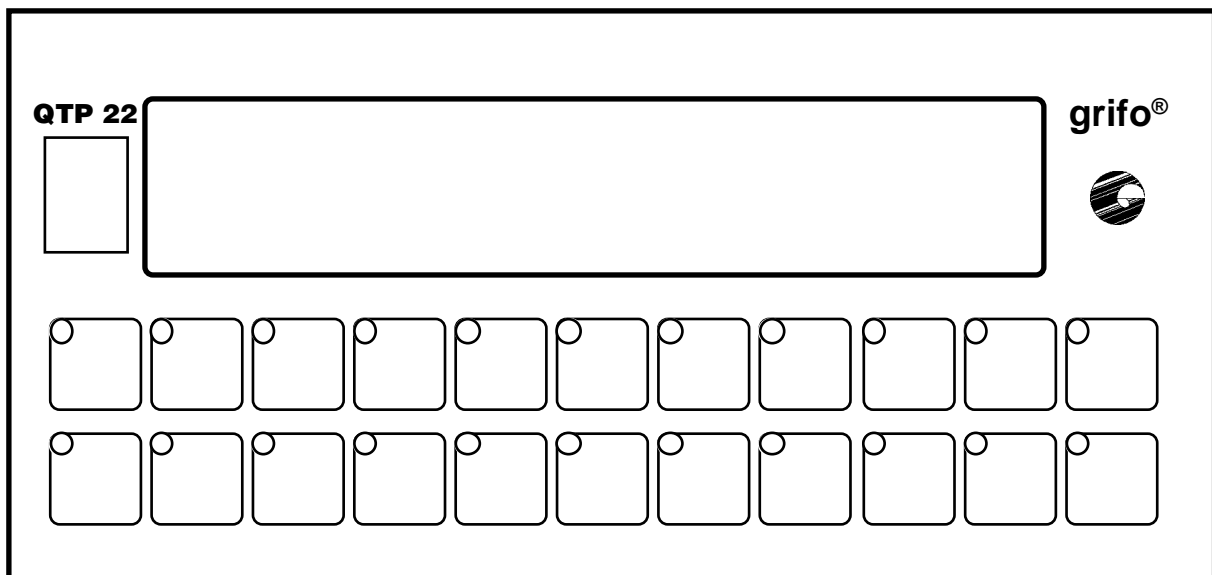
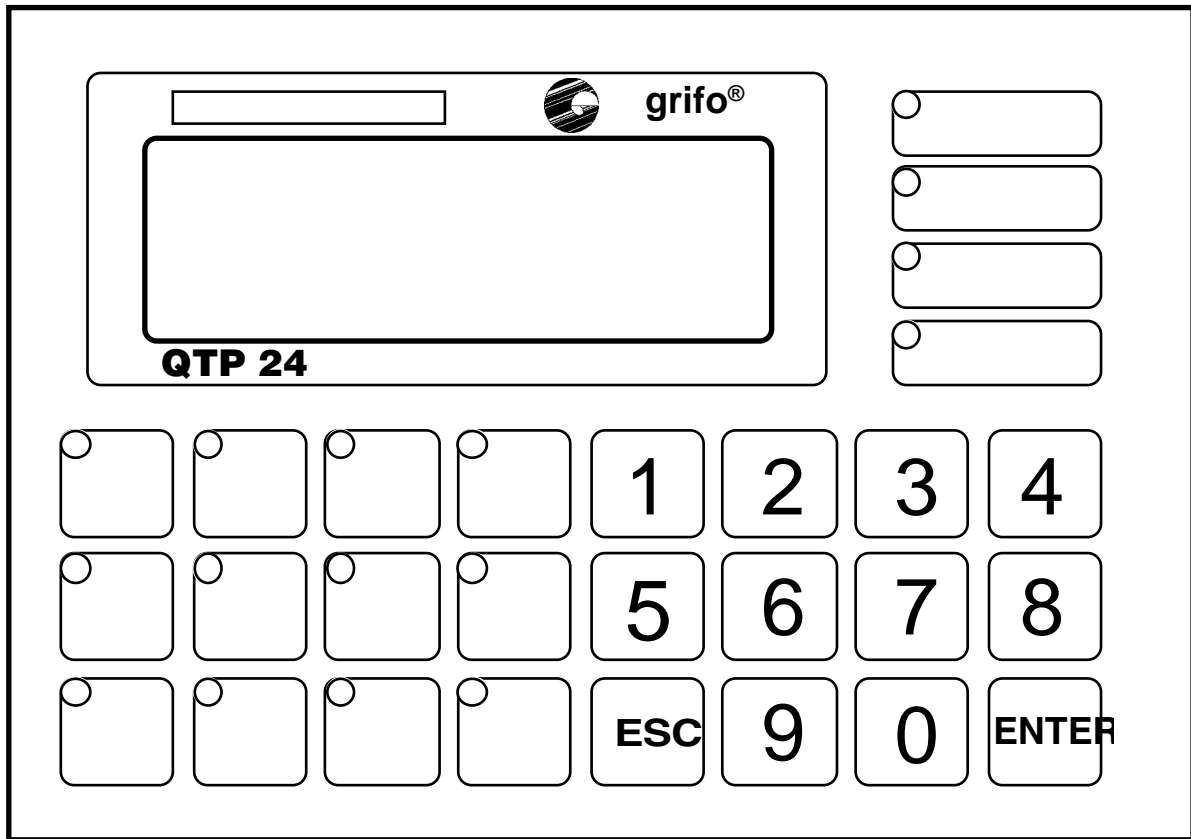


FIGURE 7: QTP 24 AND QTP 22 PANELS

TERMINALS INSTALLATION

This chapter illustrates all the operations which have to be done for the proper use of **QTP 22** and **QTP 24** terminals. These latter are provided with 4 connectors (2 of which are optional) for getting all the connections to the system. Here under please find the list of their Pin-Out and the meaning of the connected signals.

QTP 24 POWER SUPPLY CONNECTOR.

CN1 is a quick screw terminal connector having 2 or 4 pins as it is possible to get the 5Vdc generated by the on board switch power supply.

The standard **QTP 24** version is supplied with a 2 pins connector which is connected for giving a voltage of **8÷24Vac** or **+5Vdc** to the card.

Here is the rear view of the terminal where are shown the possible connector configurations.

4 PINS CONNECTOR FOR QTP24 SUPPLY

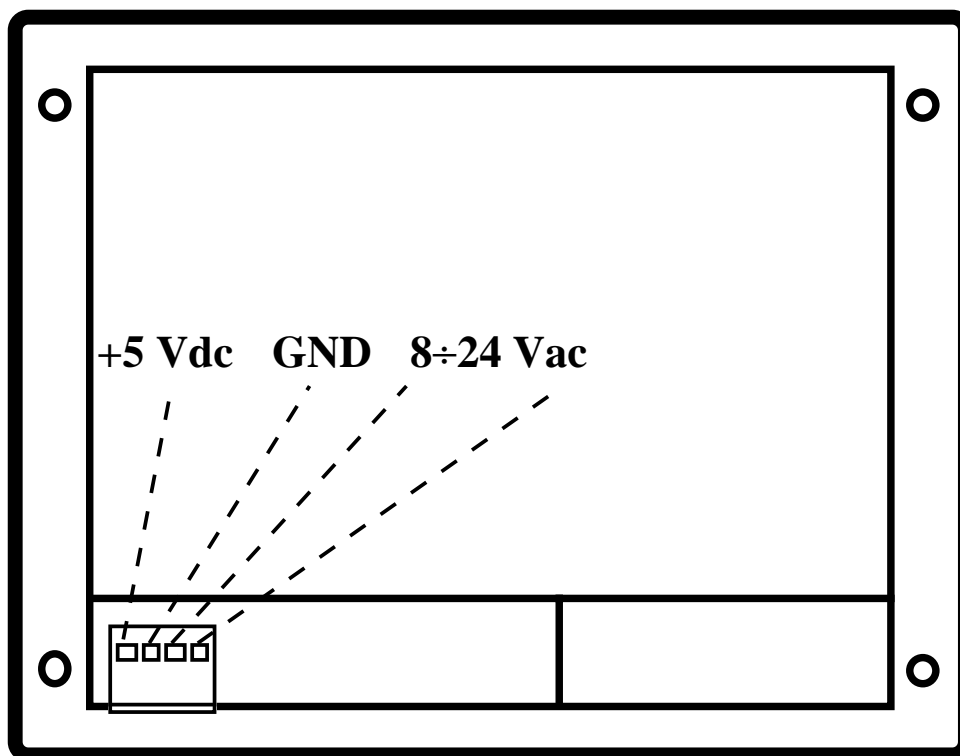


FIGURE 8: 4 PINS CONNECTOR FOR QTP 24 SUPPLY

Signals description:

8÷24 Vac	=	I	-	Lines for QTP 24 powering through AC voltage connected to the on-board switch section.
+5Vdc	=	O	-	Output line for powering an external load through the on-board switch power supply.
GND	=			Ground line for external load supply.

2 PINS CONNECTOR FOR QTP 24 A.C. SUPPLY

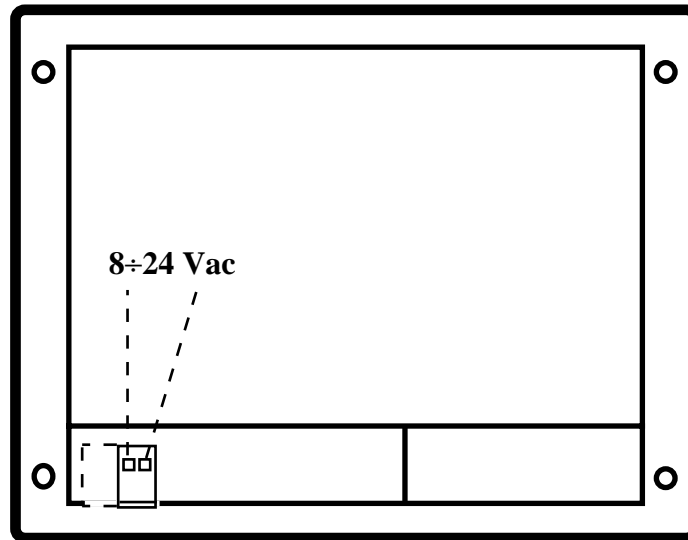


FIGURE 9: 2 PINS CONNECTOR FOR QTP 24 A.C. SUPPLY

Signals description:

8-24 Vac = I - Lines for **QTP 24** supply through Ac voltage connected to on-board switch

2 PINS CONNECTOR FOR QTP 24 D.C. SUPPLY

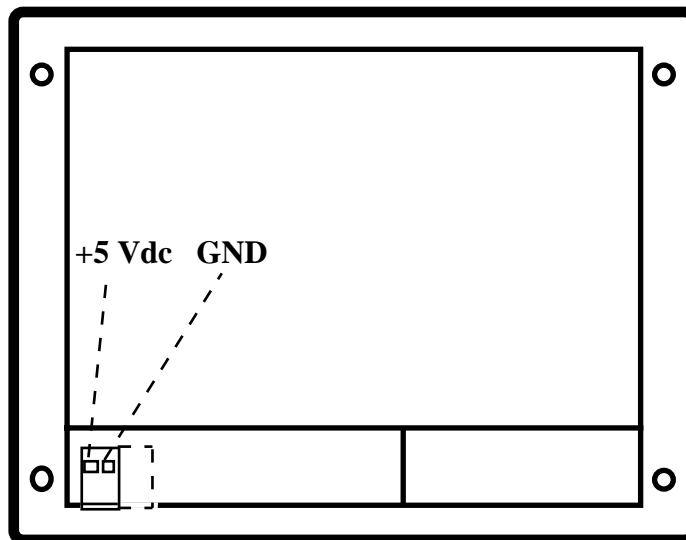


FIGURE 10: 2 PINS CONNECTOR FOR QTP 24 D.C. SUPPLY

Signals description:

+5Vdc = I - Line for **QTP 24** supply through a +5Dc voltage.
GND = Ground line for **QTP 24** supply.

QTP 22 POWER SUPPLY CONNECTOR

CN2 is a quick screw terminal connector having 2 or 4 pins as it is possible to get the 5Vdc generated by the on board switch power supply.

The standard **QTP 22** version is supplied with a 2 pins connector which is connected for giving a voltage of **8÷24Vac** or **+5Vdc** to the card.

Here are the possible configuration of the said connector .

4 PINS CONNECTOR FOR QTP22 SUPPLY

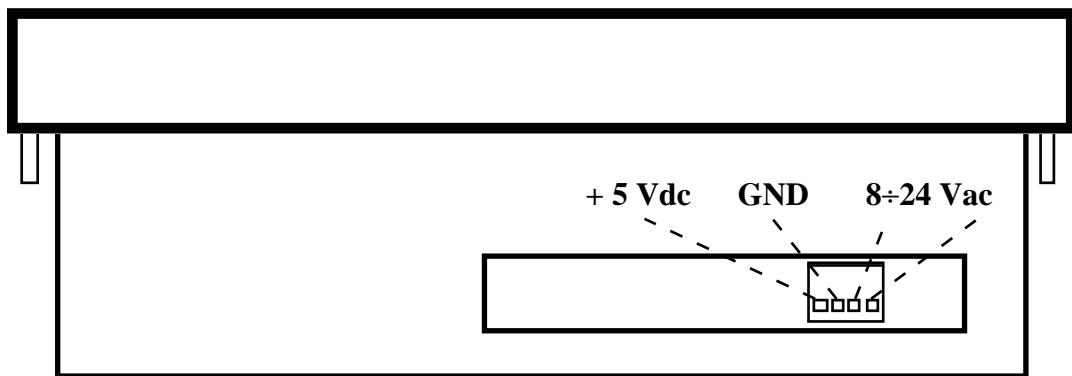
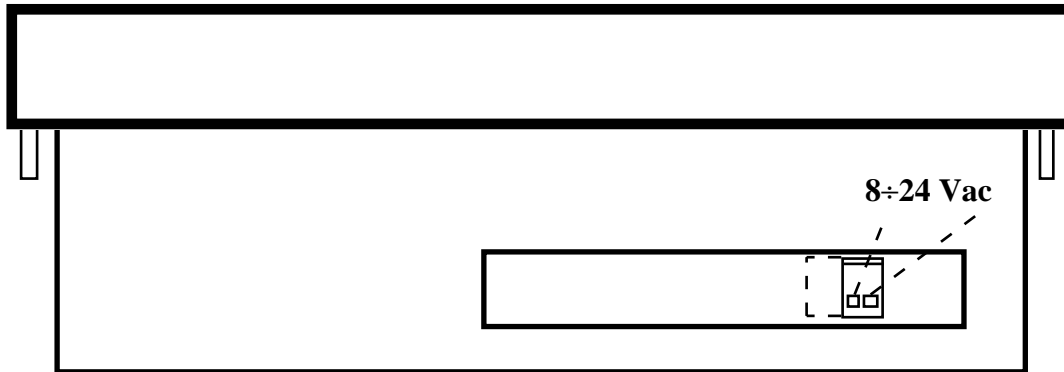


FIGURE 11: 4 PINS CONNECTOR FOR QTP 22 SUPPLY

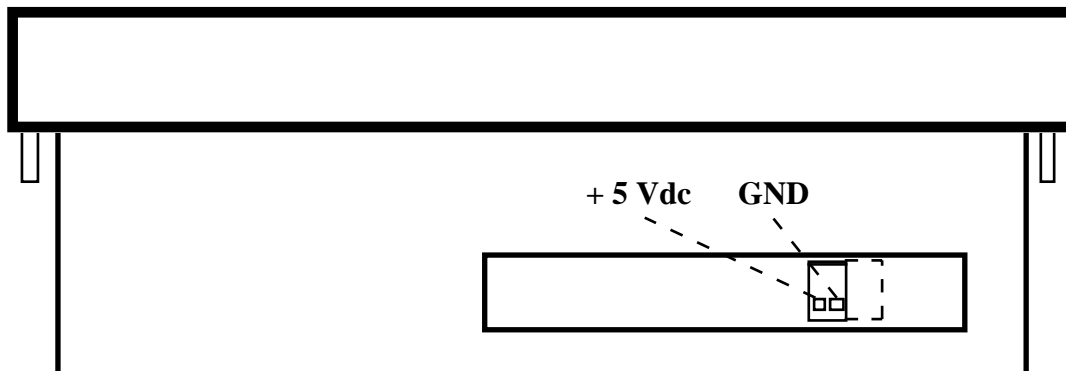
Signals description:

8÷24 Vac	=	I	-	Lines for QTP 22 supply through AC voltage connected to the on-board switch section.
+5Vdc	=	O	-	Output line for powering an external load through the on-board switch power supply.
GND	=			Ground line for external load supply.

2 PINS CONNECTOR FOR QTP 22 A.C. SUPPLY

FIGURE 12: 2 PINS CONNECTOR FOR QTP 22 A.C. SUPPLY

Signals description:

8÷24 Vac = **I** - Lines for **QTP 22** supply through AC voltage connected to the on-board switch.

2 PINS CONNECTOR FOR QTP 22 D.C. SUPPLY

FIGURE 13: 2 PINS CONNECTOR FOR QTP 22 D.C. SUPPLY

Signals description:

+5Vdc = **I** - Line for **QTP 22** supply through a +5Dc voltage.
GND = Ground line for **QTP 22** supply.

CONNECTOR FOR SERIAL COMMUNICATION

The connector for **RS 232**, **RS 422-485** or **Current Loop** communication is **CN2** on **QTP 24** and **CN3** on **QTP 22**; it is question of a 9 pins D female connector.

Signals location has been carefully studied in order to reduce to the minimum level the interferences and making easier the connection to the field.

RS232 CONNECTION

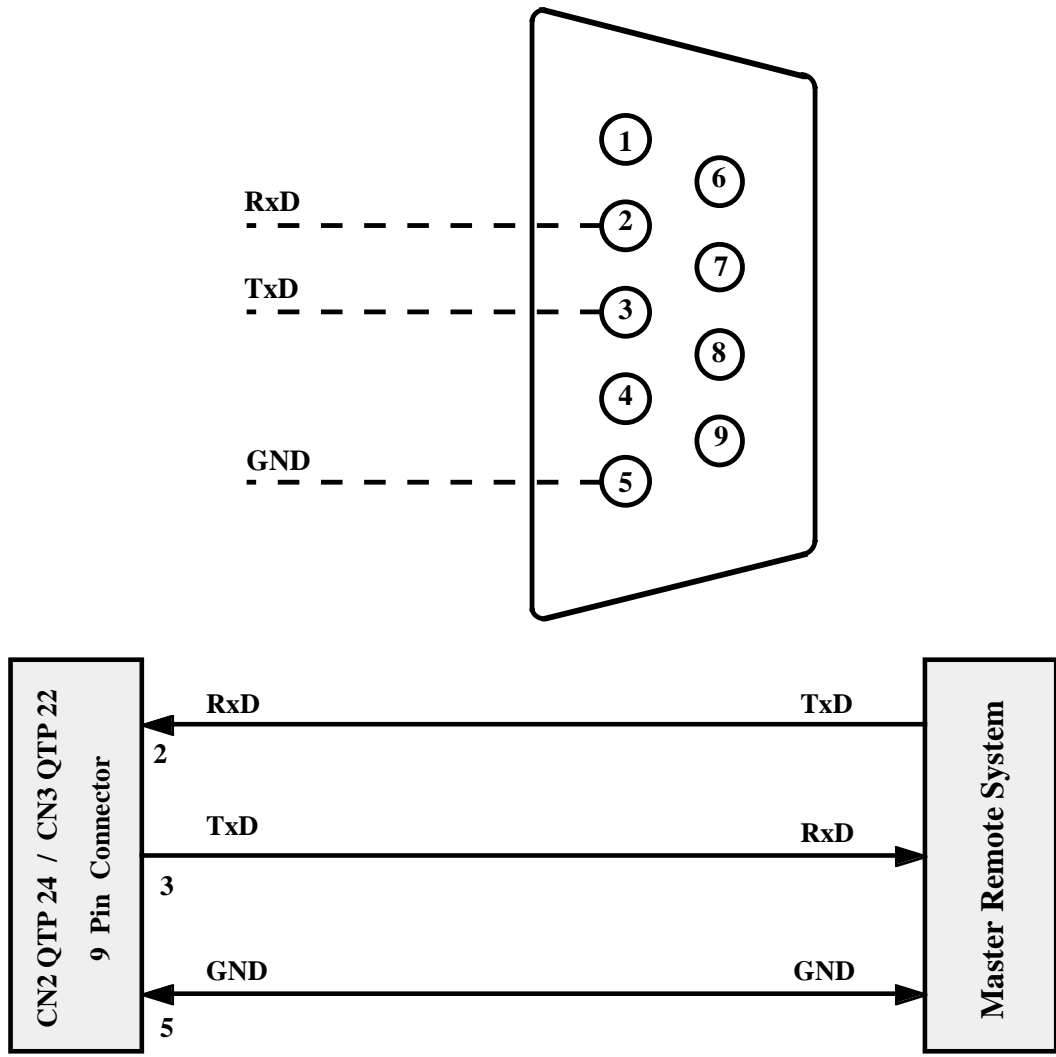


FIGURE 14: RS 232 PIN-OUT AND POINT TO POINT CONNECTION EXAMPLE

Signals description:

- RxD** = **I** - Receive Data.
- TxD** = **O** - Transmit Data.
- GND** = Ground line.

4 WIRES RS 422 CONNECTION

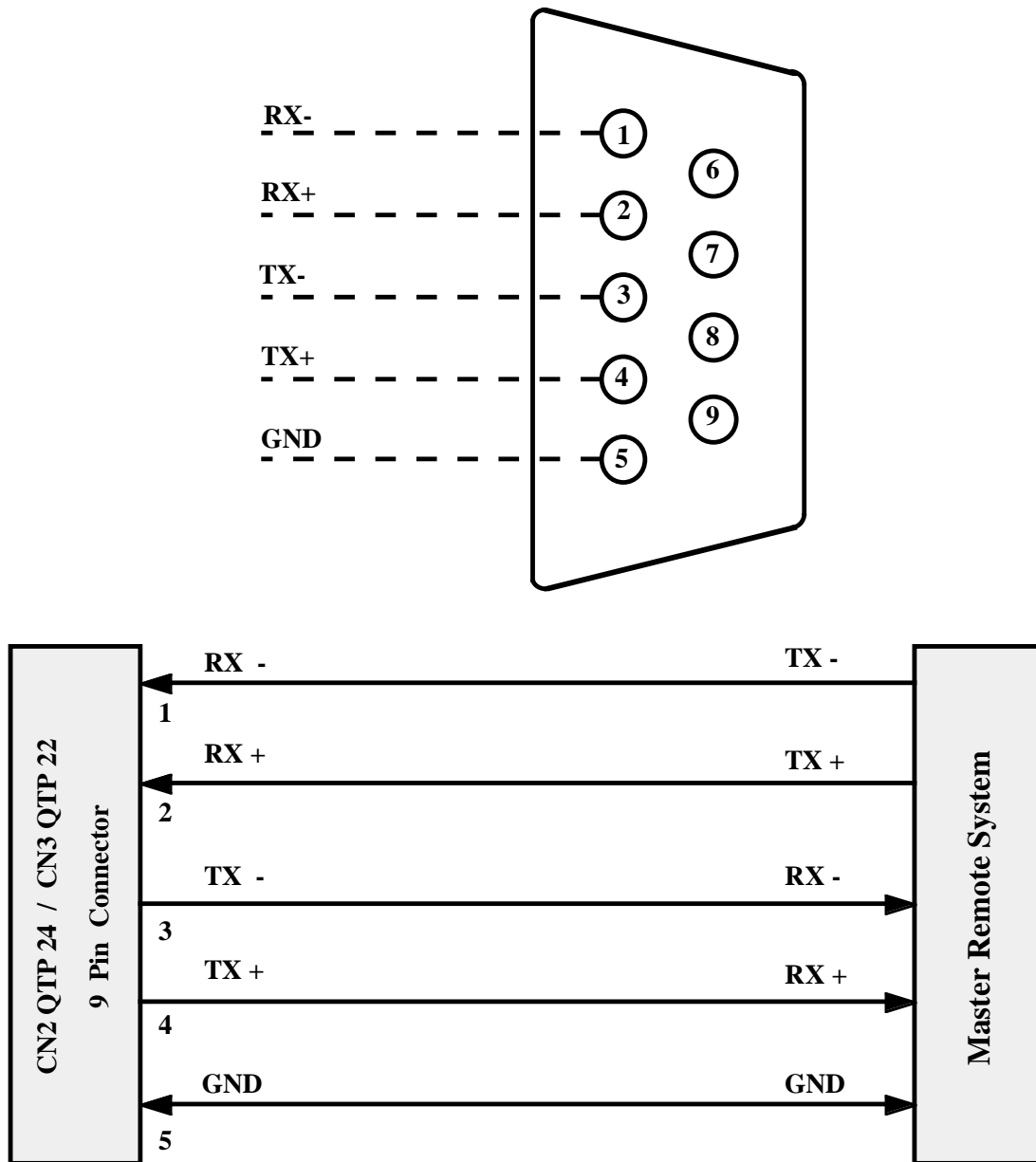


FIGURE 15: RS 422 PIN-OUT AND 4 WIRES CONNECTION EXAMPLE

Signals description:

- RX-** = **I** - Receive Data Negative: negative bipolar line for 4 wires RS 422-485 diversity serial reception.
- RX+** = **I** - Receive Data Positive: positive bipolar line for 4 wires RS 422-485 diversity serial reception.
- TX-** = **O** - Transmit Data Negative: negative bipolar line for 4 wires RS 422-485 diversity serial reception.
- TX+** = **O** - Transmit Data Positive: positive bipolar line for 4 wires RS 422-485 diversity serial reception.
- GND** = Ground line.

2 WIRES RS 485 CONNECTION

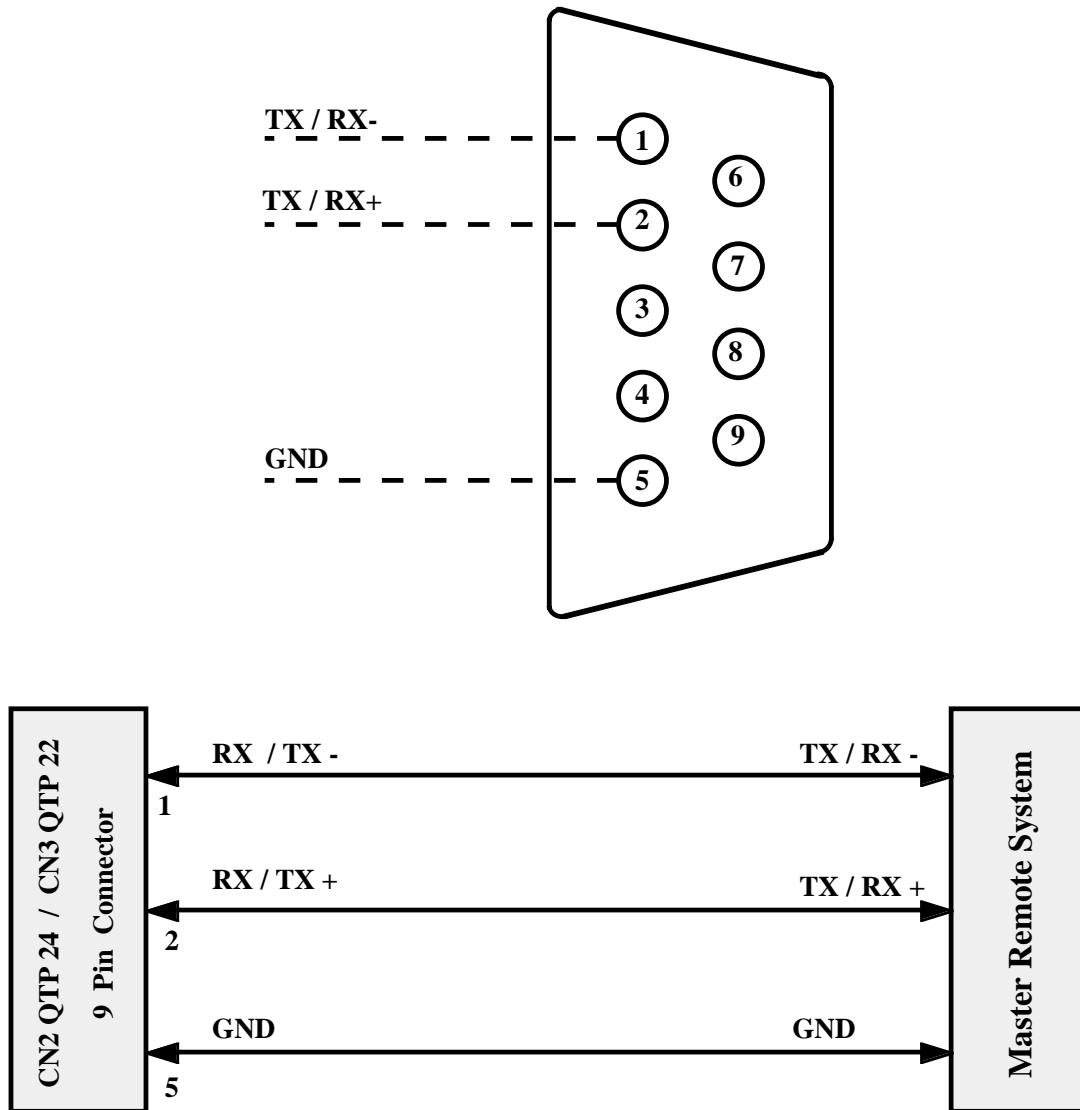


FIGURE 16: RS 485 PIN-OUT AND 2 WIRES CONNECTION EXAMPLE

Signals description:

- RX/TX -** = **I/O -** Receive/Transmit Data Negative: negative bipolar line for diversity serial transmitting or receiving 2 wires RS 422-485.
- RX/TX +** = **I/O +** Receive/Transmit Data Positive: positive bipolar line for diversity serial transmitting or receiving 2 wires RS 422-485.
- GND** = Ground line.

Note:

Using this serial connection it is possible to get the 9 Bit Master-Slave communication mode only.

RS 485 MASTER-SLAVE COMMUNICATION NETWORK

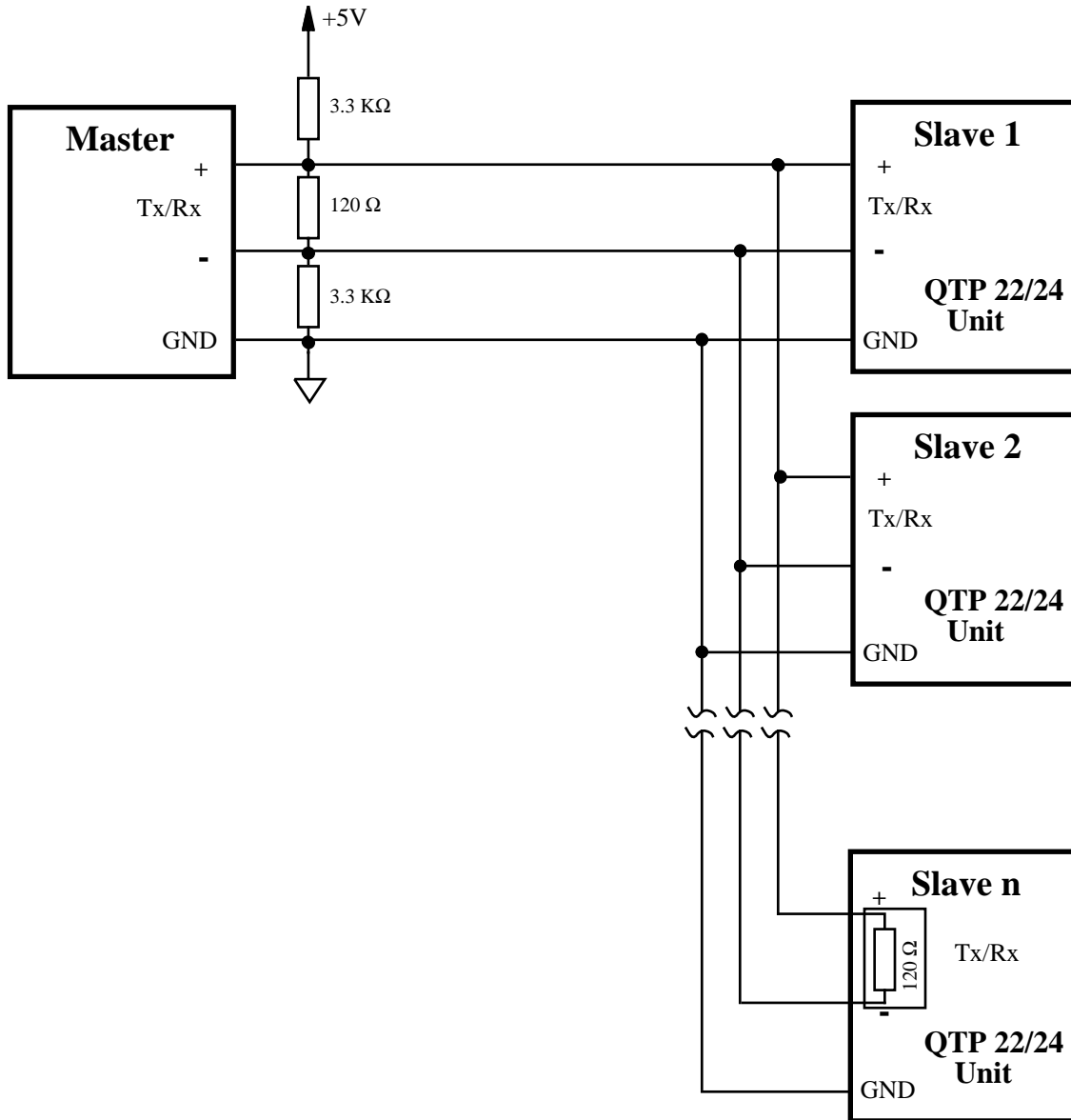


FIGURE 17: RS 485 NETWORK CONNECTION EXAMPLE

On the network line the user must connect a pull up and a pull down resistor (3,3 KΩ) because they are not present on QTP 22 and QTP 24 terminals. The user must also remember to connect at the communication line extremes, 2 line termination resistors (120 Ω) installed respectively near the Master unit and near the farthest Slave unit. The 120 Ω line termination resistor is already available on QTP 22 and QTP 24 and can be connected or not to the network with a dedicated jumper:

- | | | | | |
|---------------|-----------|----|-----------------------------|--|
| QTP 22 | J5 | -> | <i>Connected (DEFAULT):</i> | The 120 Ω line termination resistor is connected to the RS 485 line. |
| | | | <i>Not connected:</i> | The 120 Ω line termination resistor is not connected to the RS 485 line. |
| QTP 24 | J3 | -> | <i>Connected (DEFAULT):</i> | The 120 Ω line termination resistor is connected to the RS 485 line. |
| | | | <i>Not connected:</i> | The 120 Ω line termination resistor is not connected to the RS 485 line. |

For further info please refer to "RS 422 and RS 485 Interface Circuits" TEXAS INSTRUMENTS Data Book, pages for RS 422 and RS 485 NETWORK.



CURRENT LOOP CONNECTION

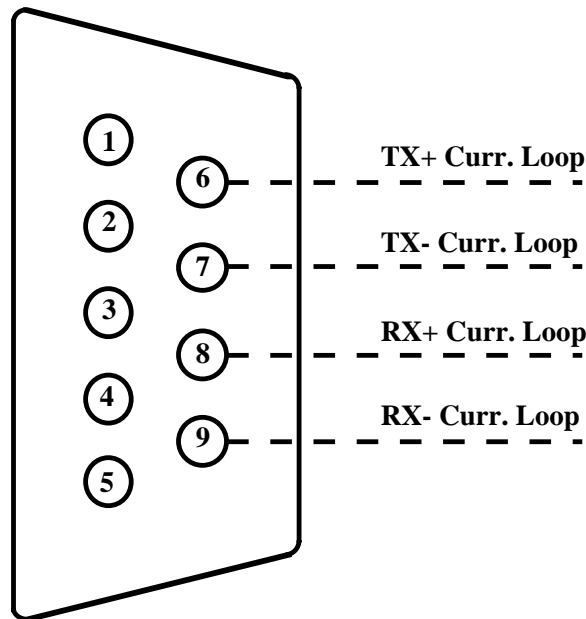


FIGURE 18: CURRENT LOOP PIN-OUT

Signals description:

RX- Curr. Loop	=	I	-	Receive Data Negative: negative bipolar line for Current Loop serial reception.
RX+ Curr. Loop	=	I	-	Receive Data Positive: positive bipolar line for Current Loop serial reception.
TX- Curr. Loop	=	O	-	Transmit Data Negative: negative bipolar line for Current Loop serial transmission.
TX+ Curr. Loop	=	O	-	Transmit Data Positive: positive bipolar line for Current Loop serial transmission.

For Current Loop connection it is possible to get 2 different type of connection: 2 and 4 wires. These kind of connections have been shown in the next two drawings where it is possible to see the voltage for **VCL** and the resistances for current limitation (**R**).

The supply voltage vary in compliance with the number of the devices connected. When the maximum of current (**20mA**) runs it must be guaranteed that each device dissipates at maximum **125mW** for transmitter and **90mW** for receiver.

The **R** resistance is needed for limiting the maximum of current in case short circuit of the line.

This is a **220 Ω** resistance for a voltage of **VCL=5Vdc**.

For further info please refer to HEWLETT-PACKARD Data Book, page for **HCPL 4100** and **4200** devices.

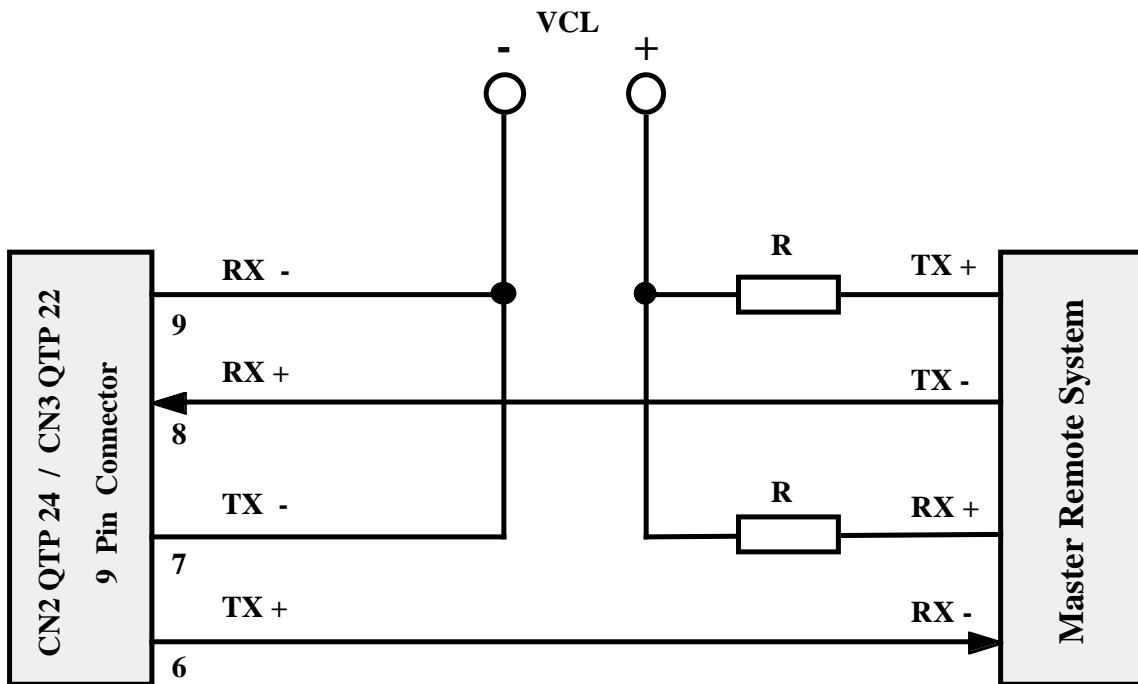


FIGURE 19: 4 WIRES CURRENT LOOP POINT TO POINT CONNECTION EXAMPLE

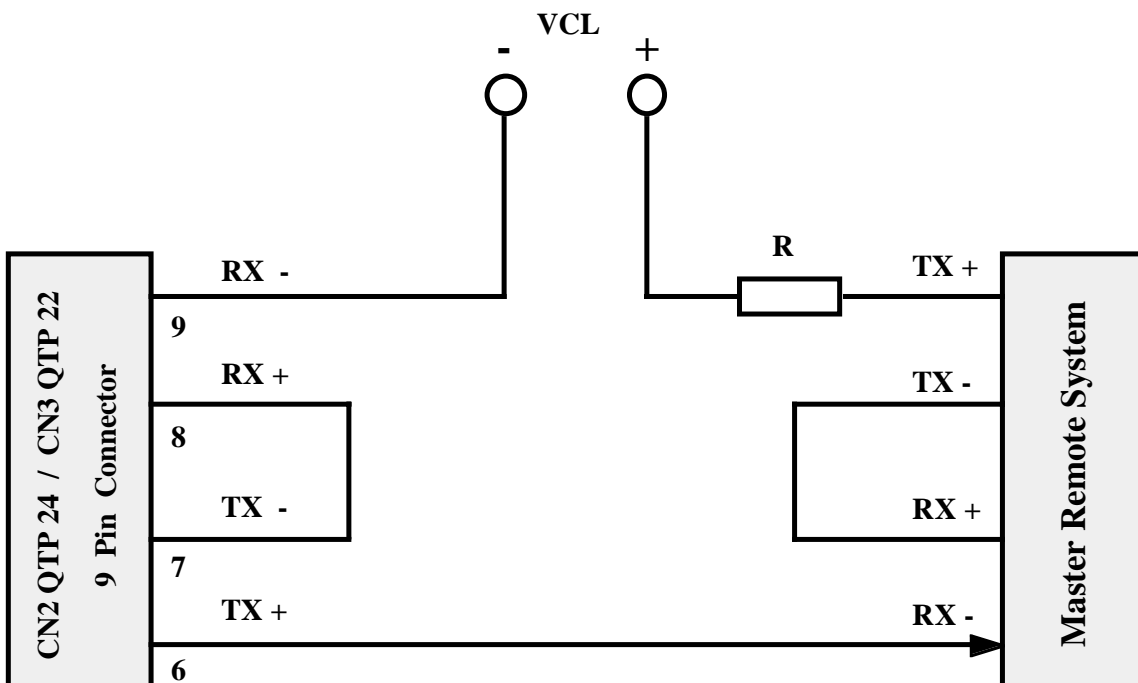


FIGURE 20: 2 WIRES CURRENT LOOP POINT TO POINT CONNECTION EXAMPLE

CONNECTOR FOR RELAY CONNECTION

The connector for the on-board relay connection (**option**) is named **CN3** on **QTP 24** and **CN4** on **QTP 22**. It is a 3 pins quick terminal connection; on it there are the following contacts : normal open, normal close and comun of the Relay as shown in the drawings here under. **QTP 24**: rear side and **QTP 22** profile view

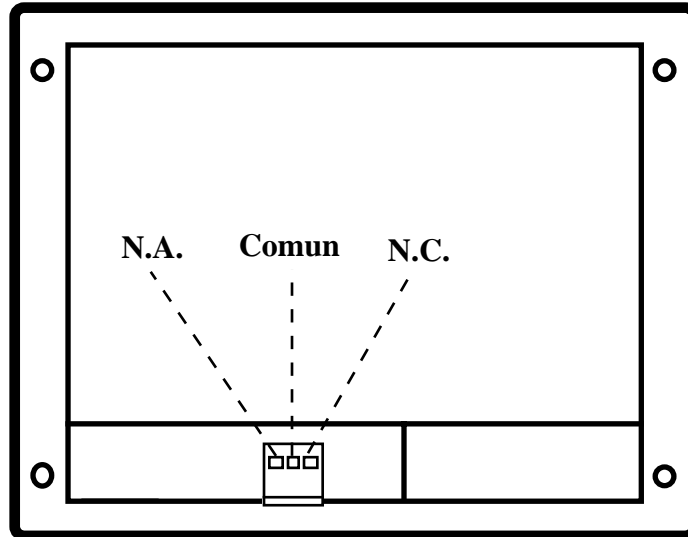


FIGURE 21: QTP 24 RELAY CONNECTOR

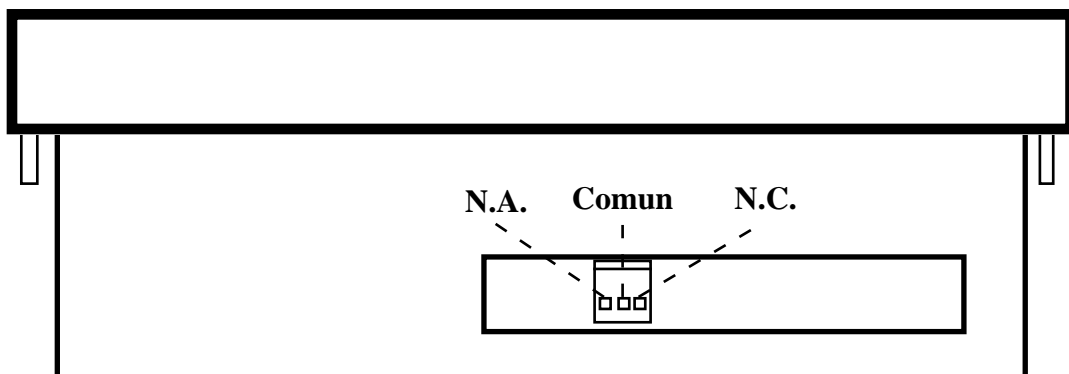


FIGURE 22: QTP 22 RELAY CONNECTOR

Signals description:

Comun = Relay comun contact
N.C. = Relay contact normal closed
N.O. = Relay contact normal open

CONNECTOR FOR CARD READER CONNECTION

This **optional connector** is a 10 pins 2.54 mm. type. It is named **CN9** on **QTP 22** and **CN4** on **QTP 24**. Its pin-out depends from the card reader type (manual or motor driven) and below there is a description of the 2 different pin-outs:

MANUAL BADGE READER CONNECTION

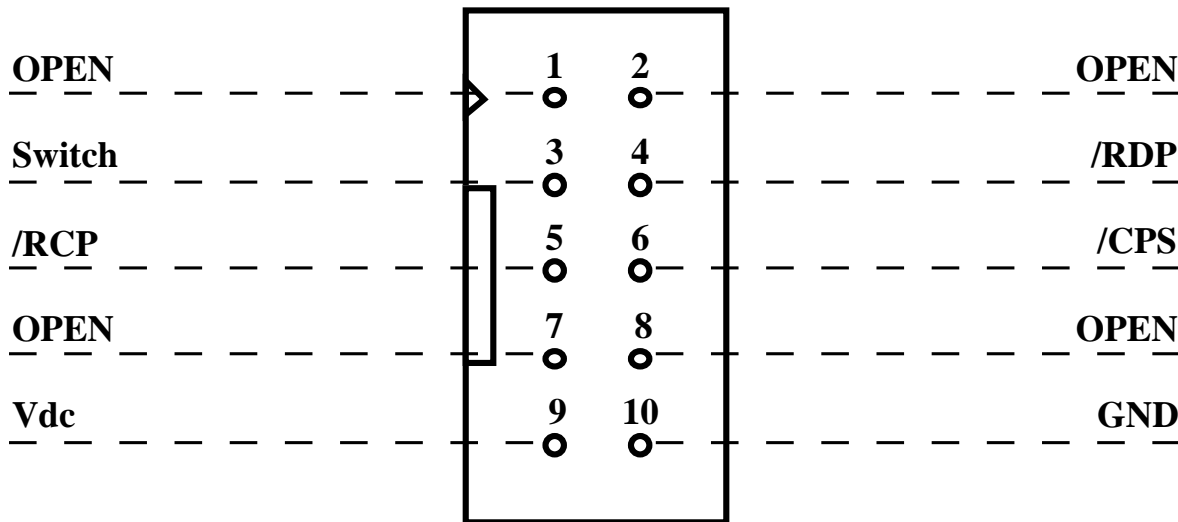


FIGURE 23: QTP CONNECTOR FOR MANUAL CARD READER

Signals description:

- OPEN** = This pin must be necessary **NOT CONNECTED**.
- /RDP** = Pin to be connected to **Read Data Pulse signal** (data line), coming from the reader.
- /RCP** = Pin to be connected to the **Read Clock Pulse signal** (clock line), coming from the badge reader.
- /CPS** = Pin to be connected to the **Card Presence signal**, coming from the badge reader.
- SWITCH** = This pin must be connected only if a **manual insertion reader** is used and in particular way this pin must be connected to **N.O.** contact of the switch (for this reader type only) as it indicates that the card is inserted even if partially. The COM contact of the said switch must be **necessarily** connect to the CND.
- Vdc** = +5Vdc voltage for badge reader supply.
- GND** = Ground line to be connected to the badge reader GND.

MOTOR DRIVEN BADGE READER CONNECTION

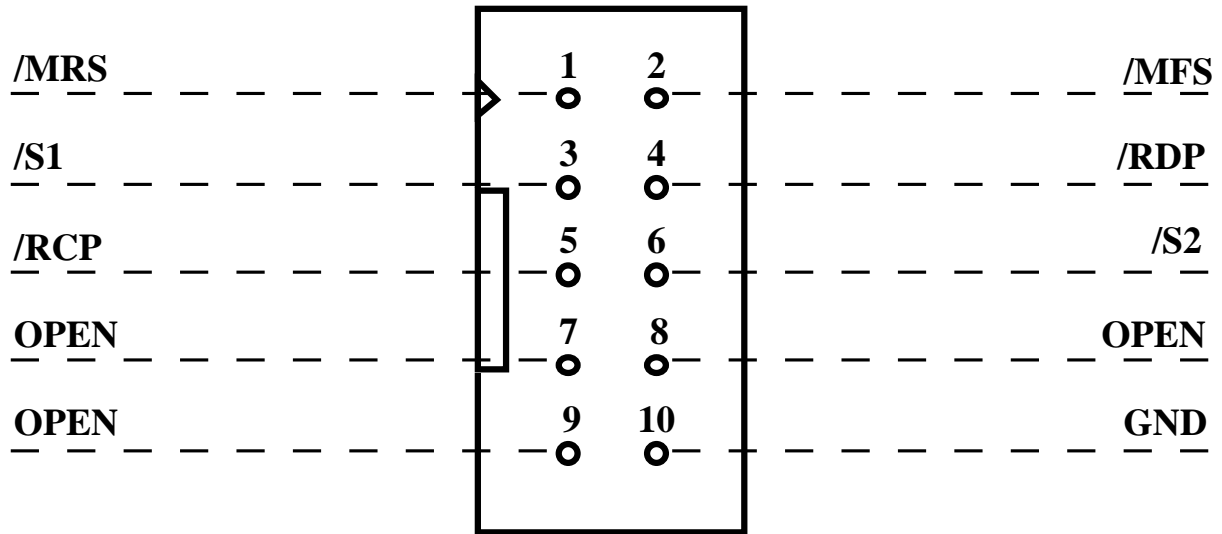


FIGURE 24: QTP CONNECTOR FOR MOTOR DRIVEN CARD READER

Signals description:

- OPEN** = This pin must be necessary **NOT CONNECTED**.
- /MRS** = Pin to be connected to the **Motor Reverse signal**, coming from badge reader.
- /MFS** = Pin to be connected to the **Motor Forward signal**, coming from badge reader.
- /RDP** = Pin to be connected to **Read Data Pulse signal** (data line), coming from the badge reader and relative to the used track.
- /RCP** = Pin to be connected to the **Read Clock Pulse signal** (clock line), coming from the badge reader and relative to the used track.
- /S1** = Pin to be connected to the Badge reader signal which is driven by the switch indicating that the **card is inserted into its slot**.
- /S2** = Pin to be connected to the Badge reader signal which is driven by the switch **indicating that the beginning edge of the card is lined up to the reading head**
- GND** = Ground line to be connected to the badge reader GND.

NOTE

If the **QTP** is configured for the motor driven badge reader connection, the maximum EEPROM size is **2 Kbytes** and the **Real Time Clock** can't be managed.

SOFTWARE DESCRIPTION

As already said **QTP 22** and **QTP 24** terminals are complete video terminals and for this reason any thing received through serial line, if it is not question of a command, is shown on the display and codes of any pressed keys of the on-board keyboard, are transmitted to the control master unit. On board of these terminal panels is also implemented a local set-up program which allows to set the communication protocols by using the **QTP**'s keyboard and display. This manual contains, in addition to the description of the different functions, a complete list of the command sequences and the recognized combination to be used to benefit of the main features of **QTP 22** and **QTP 24**. For each code or codes sequence, there is a double description i.e: the mnemonic one through the ASCII characters and the numerical one under decimal and hexadecimal form. The said commands respect the **ADDS View Point** standard so all the sequences begin with **ESC** character corresponding to the **27** decimal code (**1B Hex**).

LOCAL SETUP

At this point the display shows the parameter set-up menu and LEDs referred to the keys used for modifying the parameters become active, more exactly it is necessary to act on keys n. **5** and n. **6** as it will be lately illustrated. Take note that if **QTP** is equipped with the managing program for Master-Slave communication (**Option**) there will be a bigger number of option at your disposal and for this reason please refer to the paragraph which refer to the managing program installed on the terminal same.

MANAGING PROGRAM WITHOUT MASTER-SLAVE COMMUNICATION

KEY n.5 : It allows to select the parameter to be modified displaying the following menu: "**BAUD**" (communication Baud Rate), "**STOP**" (Stop bits number) and "**BEEP**" (Keyclick function).

KEY n.6: It allows to vary the value of the parameter previously selected with key n.5 and the following selections can be made:

BAUD: 38400, 19200, 9600, 4800, 2400 or 1200 Baud

STOP: 1 (1 Stop bit) or 2 (2 Stop bits)

BEEP: ON (Keyclick On) or OFF (Keyclick Off)

Once the set-up ends, pressing keys n. **0** and n. **11** together, the parameters are memorized and it goes back to the standard function.

MANAGING PROGRAM WITH MASTER-SLAVE COMMUNICATION

KEY n.5: It allows the selection of the parameter to be modified displaying the following menu:

"**COMMUNICATION**" (communication type), "**BAUDRATE**" (communication baud rate), "**STOPBIT**" (Stop bits number), "**KEYCLICK**" (Keyclick function), "**NAME**" (first digit) and "**NAME**" (second digit).

KEY n.6: It allows to vary the value of the parameter previously selected with key n.5 and the following selections can be made:

COMMUNICATION: *Standard or Master-Slave*

BAUD RATE: *187500, 38400, 19200, 9600, 4800, 2400 or 1200 Baud.*

STOP BIT: *1 or 2 with standard communication*

1 with Masetr-Slave communication

KEYCLICK: *ON or OFF*

NAME: *it modifies the figure from ">" and "<" in the field 0÷F Hex*

Please note that the code that will be put in "**NAME**", it will be the same to be used for identifying the **QTP 22** or **QTP 24** in Master-Slave communication.

Once the set-up ends, if key n. **0** and n. **11** are pressed at the same moment, the parameters are memorized and it returns to the standard function.

P.S.

To this set-up program it is possible to enter only at the moment of the switch-on as, if keys n. **0** and n. **11** are pressed during standard **QTP 22** and **QTP 24** running no results will be achieved.

KEYBOARD ACQUISITION

When **QTP 22** or **QTP 24** recognizes the key pressure, it transmits the pertinent code in serial mode and this is immediate if standard communication is used. When Master-Slave communication is used, the said code is re-sent only upon specific request of the Master unit with the format illustrated in the specific paragraph.

The **AutoRepeat** function of the pressed key is also implemented so when **QTP** recognizes the pressure on a specific key for a period of time over **0.5 sec.** it will start the serial transmission of its code for about **0.2 sec.** and it lasts until that specific key is left again.

These two pictures show the keys numbering of **QTP 22** and **QTP 24**, then the two tables show the codes the terminal leaves again in serial mode after having pressed a key. As per the command sequences these ones are expressed under decimal form, hex-decimal and mnemonic formats by means of the specific characters of the ASCII table.

QTP 24 TERMINAL KEYS MAP

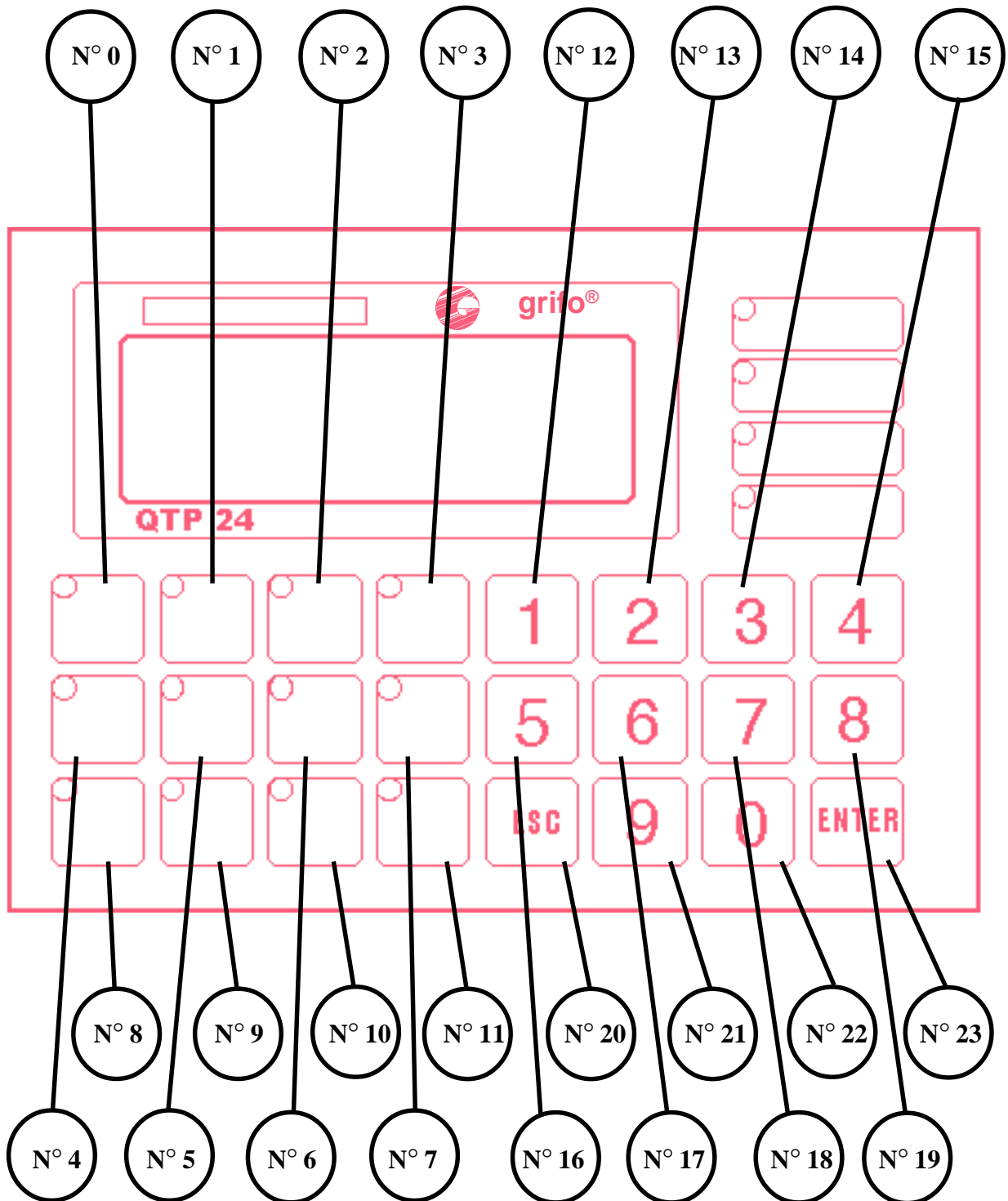


FIGURE 25: QTP 24 TERMINAL KEYS MAP

KEYS DEFAULT CODES ON QTP 24

Here are the tables which show the codes that **QTP 24** send in serial mode when a key is pressed; said codes are those ones listed under default condition i.e when no keys have been yet re-named.

KEY N°	CODE	HEX CODE	MNEMONIC
0	65	41	A
1	66	42	B
2	67	43	C
3	68	44	D
4	69	45	E
5	70	46	F
6	71	47	G
7	72	48	H
8	73	49	I
9	74	4A	J
10	75	4B	K
11	76	4C	L
12	49	31	1
13	50	32	2
14	51	33	3
15	52	34	4
16	53	35	5
17	54	36	6
18	55	37	7
19	56	38	8
20	27	1B	ESC
21	57	39	9
22	48	30	0
23	13	0D	CR

FIGURE 26: KEY DEFAULT CODES ON QTP 24

QTP 22 TERMINAL KEYS MAP

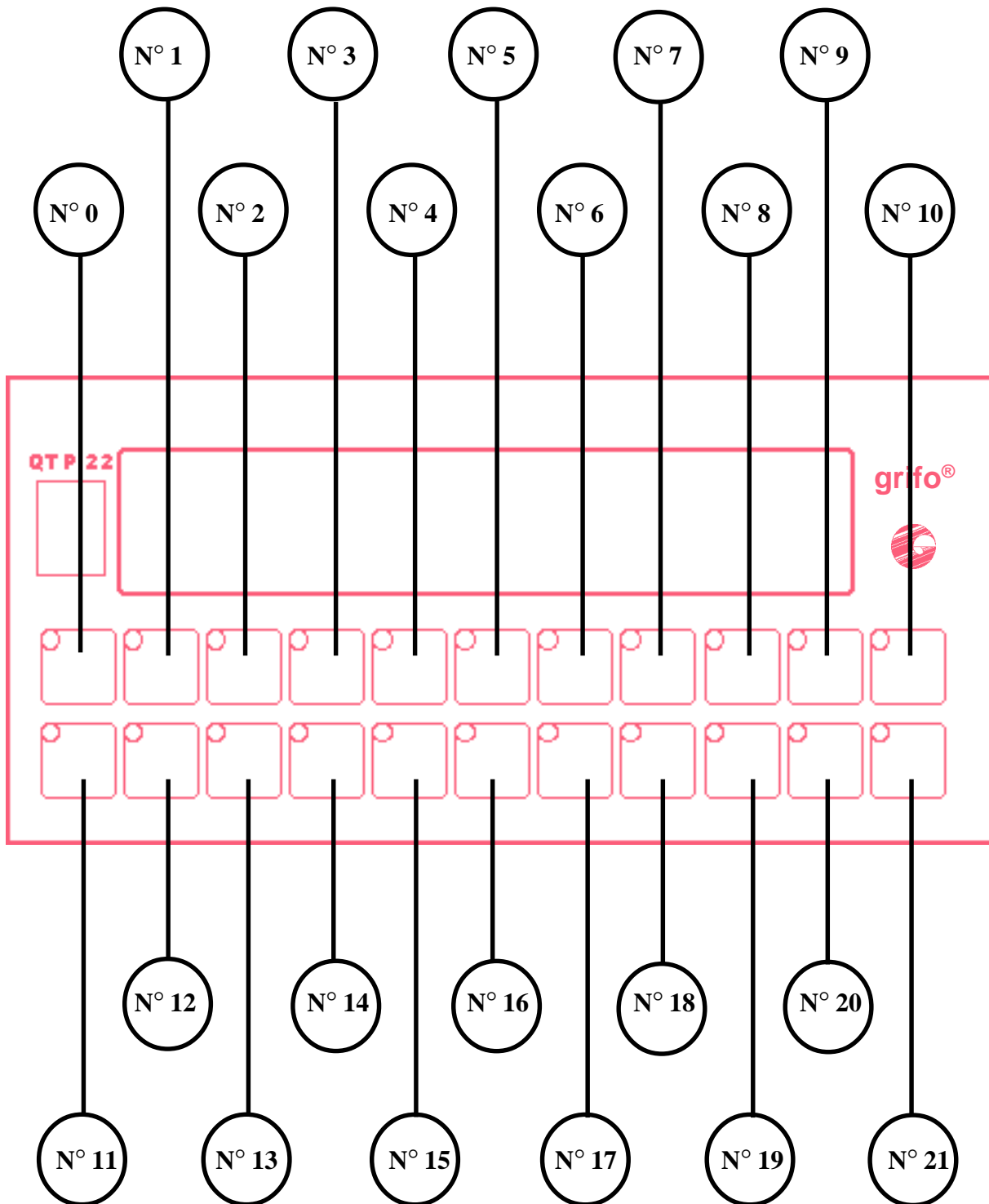


FIGURE 27: QTP 22 TERMINAL KEYS MAP

KEYS DEFAULT CODES ON QTP22

Here are the tables which show the codes that **QTP 22** send in serial mode when a key is pressed; said codes are those ones listed under default condition i.e when no keys have been yet re-named.

KEY N°	CODE	HEX CODE	MNEMONIC
0	65	41	A
1	66	42	B
2	67	43	C
3	68	44	D
4	69	45	E
5	70	46	F
6	71	47	G
7	72	48	H
8	73	49	I
9	74	4A	J
10	75	4B	K
11	76	4C	L
12	77	4D	M
13	78	4E	N
14	79	4F	O
15	80	50	P
16	81	51	Q
17	82	52	R
18	83	53	S
19	84	54	T
20	85	55	U
21	86	56	V

FIGURE 28: KEY DEFAULT CODES ON QTP 22

CHARACTER VISUALIZATION ON THE DISPLAY

QTP 22 and **QTP 24** show on-board display all the characters having a code included in the range **32÷255 (20÷FF Hex)**; if it is sent a code not included in this range and this latter is not a command, this latter is ignored.

The characters of the codes in the range **32÷127 (20÷7F Hex)** correspond to those ones of the standard ASCII table, while characters associated to **128÷255 (80÷FF Hex)** codes, vary depending on the type of the display installed. This is the reason why is better to refer to A Table.

The character is visualized in the at-the moment cursor position and this latter will go the the next position; if it is placed in the last character down on the right of the display, it will be placed on Home position.

COMANDS FOR CURSOR POSITIONING

CURSOR LEFT

Code: 21 (15Hex)
Mnemonic: NACK

The cursor is shifted of one position on the left without modifying the display contents. If the cursor is in Home position, it will be placed in the last character at the down-right position of the display.

CURSOR RIGHT

Code: 06
Mnemonic: ACK

The cursor is shifted of one position on the right.
If the cursor is placed on the last display character, down-right, il will be place on the Home position.

CURSOR DOWN

Code: 10 (0A Hex)
Mnemonic: LF

The cursor will be placed on the next line of that one it is now but it will remain in the same column.
If the cursor is in the last display line, it will be placed at the first display line.

CURSOR UP

Code: 26 (1A Hex)
Mnemonic: SUB

The cursor will be placed in the previous line of that one it is now, but it will remain in the same column. If the cursor is on the first display line, it will be placed on the last display line.

HOME

Code: 01
Mnemonic: SOH

The cursor is on Home position i.e. first line, first column of the display.

CARRIAGE RETURN

Code: 13 (0D Hex)
Mnemonic: CR

The cursor is placed at the beginning of the line where it is.

CARRIAGE RETURN+LINE FEED

Code: 29 (1D Hex)
Mnemonic: GS

The cursor is placed at the beginning of the next line at which it was placed. If the cursor is at the last display line, it will be placed at the beginning of the first line i.e. Home position.

CURSOR ABSOLUTE POSITIONING WITH 20H OFFSET

Code: 27 89 r c (1B 59 r c Hex)
Mnemonic: ESC Y ASCII(r) ASCII(c)

The cursor is placed at the absolute point indicated through "r" and "c". These codes are referred to line and column values of the display at which the 32 (20 Hex) offset must be added. If, for example, you wish to place the cursor at Home position (0 line, 0 column) the next sequence is necessary 27 89 32 32. If line and column values are not compatible to the installed display, that command is ignored.

COMMANDS FOR CHARACTERS ERASURE

BACKSPACE

Code: **08**
Mnemonic: **BS**

The cursor shifts a character on the left by erasing the contents of the reached cell.
If the cursor is at Home position, the character placed in the last cell, down- on the right of the display, will be erased.

CLEAR PAGE

Code: **12** **(0C Hex)**
Mnemonic: **FF**

Complete erasure of the display and the cursor returns to Home position.

CLEAR LINE

Code: **25** **(19 Hex)**
Mnemonic: **EM**

The complete line where cursor is placed is erased and then the cursor goes at the beginning of the said line.

CLEAR END OF LINE

Code: **27 75** **(1B 4B Hex)**
Mnemonic: **ESC K**

All characters on the line where the cursor is placed are erased starting from cursor position up to the end of the line.

The cursor stays on the position as it was when **Clear End of Line** code arrives.

If, for example, the cursor is at the beginning of a display line, the complete line will be erased.

CLEAR END OF PAGE

Code: **27 107** **(1B 6B Hex)**
Mnemonic: **ESC k**

All characters starting from the Cursor point up to the end of the display, are erased. The cursor stays in the same position as it was before the **Clear end of Page** code arrival. If, for example, the cursor is at Home position, the display will be completely erased.

COMMANDS FOR CURSOR ATTRIBUTES MANAGEMENT

CURSOR OFF

Code: 27 80 (1B 50Hex)
Mnemonic: ESC P

The cursor is not active and it is not more visible.

STATIC CURSOR ON

Code: 27 79 (1B 4F Hex)
Mnemonic: ESC O

The cursor is started so it is visible. Now it is a not blinking line placed under the char.

Note: this command is not available if **Futaba 40x4** display is installed.

BLINKING "UNDERLINE" CURSOR

Code: 27 77 (1B 4D Hex)
Mnemonic: ESC M

The cursor is started so it is visible. Now it is a blinking line placed under the char.

Note: This command is available only for **Futaba** displays : **20x2** and **40x1** type.

BLINKING "BLOCK" CURSOR

Code: 27 81 (1B 51 Hex)
Mnemonic: ESC Q

The cursor is started so it is visible. Now it is a blinking rectangular form and it is alternatively visualized with the char put on the same.

Note: This command is available only for **LCD** displays otherwise is ignored

COMMANDS FOR EEPROM MANAGEMENT

REQUEST FOR ON EEPROM WRITING

Code: 27 51 (1B 33 Hex)
Mnemonic: ESC 3

This command asks the card if it is ready for writing data on its on-board **EEPROM**. This command must be executed any time there are messages to be memorized or some commands to be sent.

6	(ACK)	<i>QTP xx READY</i>
21 - 15 Hex	(NACK)	<i>QTPxx NOT READY</i>

If the **QTP** send back the NACK code, it is not yet possible to memorize a new data on EEPROM.

WRITING OF LIFE BYTE

Code: 27 33 78 key (1B 21 4E key Hex)
Mnemonic: ESC ! N ASCII (key)

The “Life Byte” of the card is set with the value indicated in the “key” parameter, this parameter can be included in **0÷255** range.

This byte has a reserved allocation on the on-board EEPROM that, once it is set with the value desired, it allows for example, to verify that **QTP 22** or **QTP 24** run correctly or if there are some communication problems on the serial line.

Note: This command means a data writing on the on-board EEPROM, so before executing it is better to verify that the card is ready for the next writing on that device otherwise the command is ignored.

READING OF LIFE BYTE

Code: 27 33 110 (1B 21 6E Hex)
Mnemonic: ESC ! ”

The **QTP xx** send back in serial mode the value of its “Life Byte”.

This command can be useful if you have to verify the presence or the correct running of the card.

COMMANDS FOR LEDS MANAGEMENT

LED ACTIVATION

Code: 27 50 n.LED Attr. (1B 32 n.LED Attr. Hex)
Mnemonic: ESC 2 ASCII(n.LED) ASCII(Attr.)

The LED shown in "n.LED" with the specified attribute in "Attr." is started.

If you use the **QTP 24** card LEDs numbers are included in a range of **0÷15** as shown in the picture of the card, while for **QTP 22** the LEDs numbers are included in a range of **0÷21**.

The attributes available are as follows:

0	Not enabled LED
255 (FF Hex)	Enabled LED
85 (55Hex)	Blinking LED

ex. If you wish to enable LED n.5 with blinking attribute, the following sequence has to be sent: **27 50 5 85**.

If the parameter with LED number or that one with the attribute, it is not valid, the command is ignored.

LEDS MASK ACTIVATION

Code: 27 52 byte1 byte2 byte3 (1B 34 byte1 byte2 byte3 Hex)
Mnemonic: ESC 4 ASCII(byte1) ASCII(byte2) ASCII(byte3)

All **QTP 24** and **QTP 22** LEDs are contemporarily managed as indicated in "byte1", "byte2" and "byte3" following this code:

byte1 (bit 0...7)	LED 0...LED 7	
byte2 (bit 0...7)	LED 8...LED 15	
byte3 (bit0...5)	LED 16...LED 21	(only for QTP 22)

If a bit is placed in 0 position, the correspondent LED is OFF, viceversa it will be ON if the correspondent bit is on 1 position.

If there are some LEDs having the blinking attribute, this latter will be disabled.

P.S.:

For **QTP 24** the "byte3" must be always sent even if it has no meaning for running the 16 LEDs of the said terminal.

LEDS MAP OF THE QTP 24 TERMINAL

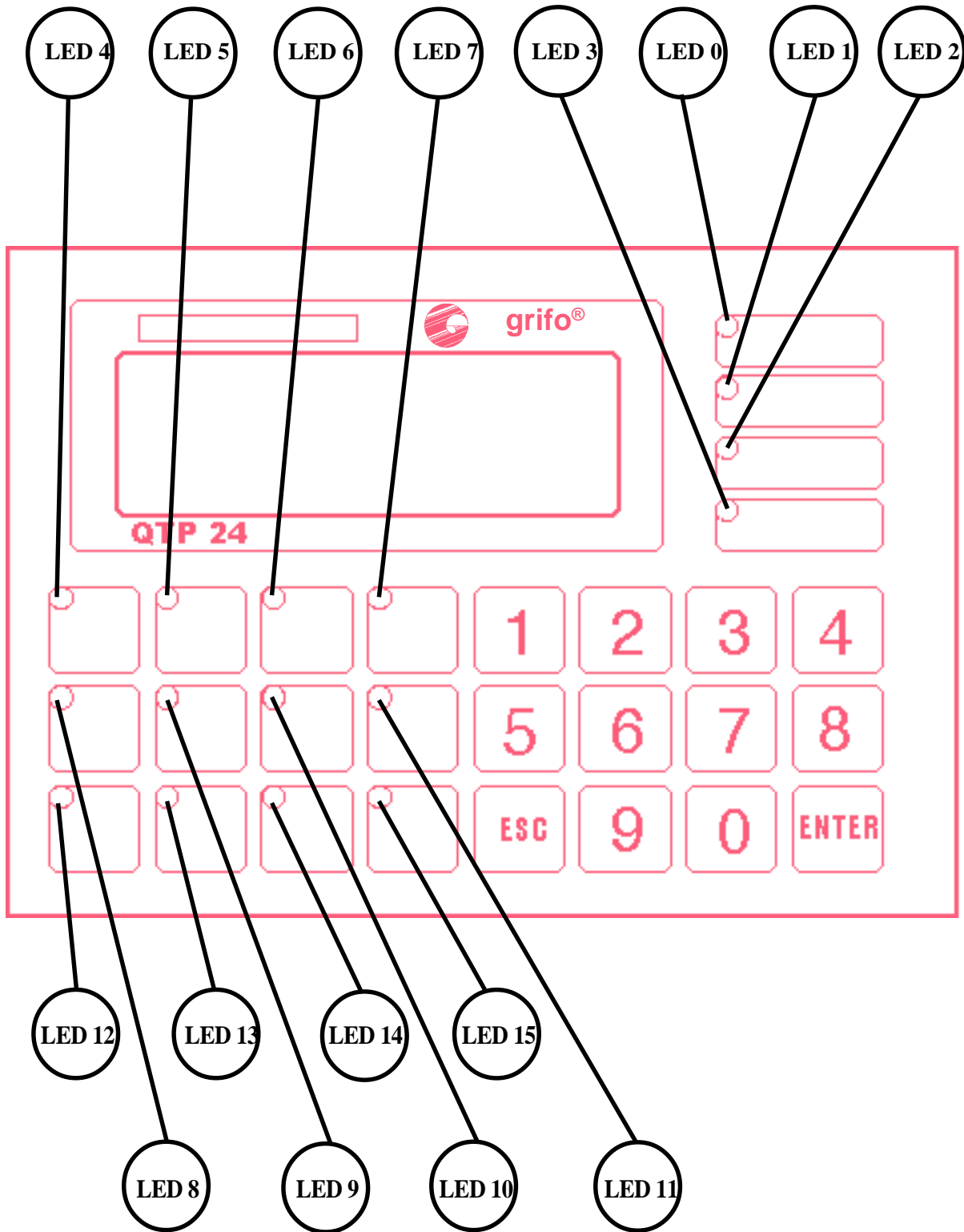


FIGURE 29: LEDS MAP OF THE QTP 24 TERMINAL

LEDS MAP OF THE QTP 22 TERMINAL

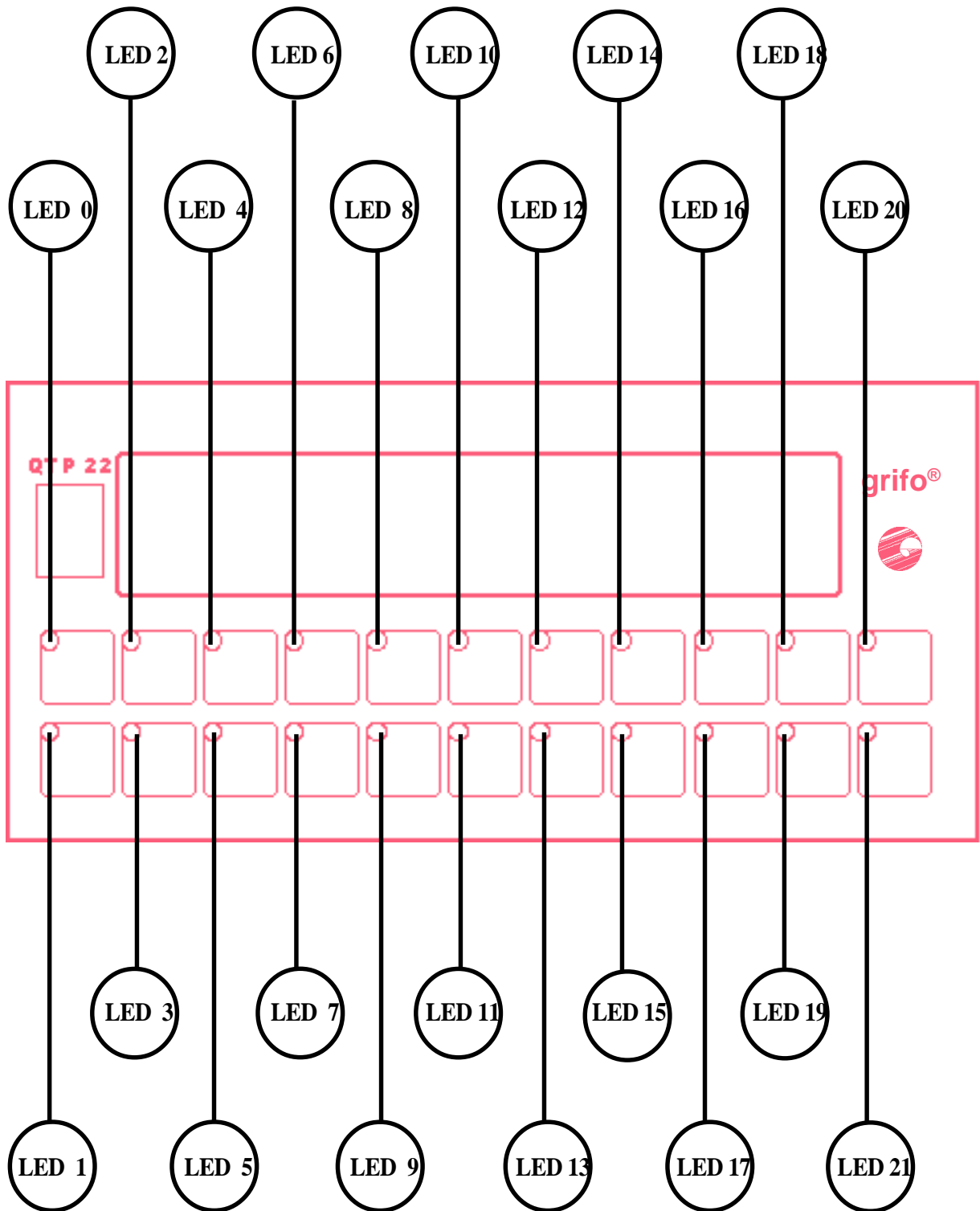


FIGURE 30: LEDS MAP OF THE QTP 22 TERMINAL

COMMANDS FOR KEYBOARD MANAGEMENT

KEY RECONFIGURATION

Code: 27 55 key no. code (1B 37 key no. code Hex)
Mnemonic: ESC 7 ASCII(key no.) ASCII(code)

When the selected key is reconfigured, each time it is pressed, the card will send the new specified code in serial mode. The number of the key to be reconfigured is obtainable by looking at the **QTP** picture and it must be included in a range of **0÷27 (0÷1B Hex)** if this is not done the command is ignored. The code value can vary in a range of **0÷254 (0÷FE Hex)** as the **255** value (**FF Hex**) indicates that the key must be disabled so when it is pressed the **QTP** will not send any codes in serial mode.

P.S.

The said command needs a data writing on the on-board EEPROM so before executing it, it is better to be sure that the card is ready for a new writing on such device otherwise the command will be ignored.

KEYCLICK ON WITHOUT MEMORIZATION

Code: 27 54 (1B 35 Hex)
Mnemonic: ESC 5

The **KeyClick** function is switched-on so there is a sound feedback when a key is pressed. This parameter is not stored in the on-board EEPROM so if the card is re-set it goes back to the previous condition.

KEYCLICK OFF WITHOUT MEMORIZATION

Code: 27 54 (1B 36 Hex)
Mnemonic: ESC 6

The **KeyClick** function is disabled so there is not sound feedback when a key is pressed. This parameter is not stored in the on-board EEPROM so if the card is re-set it goes back to the previous condition.

KEYCLICK ON WITH MEMORIZATION

Code: **27 33 53** **(1B 21 35 Hex)**
Mnemonic: **ESC ! 5**

The **KeyClick** function is switched-on so there is a sound feedback when a key is pressed. This parameter is stored in the on-board EEPROM even if the power voltage fails.

P.S.

The said command involves a data writing on the on-board EEPROM so before executing it, it is better to be sure that the card is ready for a new writing on such device otherwise the command will be ignored.

KEYCLICK OFF WITH MEMORIZATION

Code: **27 33 54** **(1B 21 36 Hex)**
Mnemonic: **ESC ! 6**

The **KeyClick** function is disabled so there is not sound feedback when a key is pressed. This parameter is stored in the on-board EEPROM even if the power voltage fails.

P.S.

The said command needs a data writing on the on-board EEPROM so before executing it, it is better to be sure that the card is ready for a new writing on such device otherwise the command will be ignored.

COMMANDS FOR DIFFERENT FUNCTIONS

BEEP

Code: **07**
Mnemonic: **BEL**

The buzzer is enabled for 1/10 second time

RELAY ACTIVATION

Code: **27 56** **(1B 38 Hex)**
Mnemonic: **ESC 8**

The relay on the card, if any, is enabled and the normal open contact is shut (**N.O.**) and the normal shut contact is open (**N.C.**)

RELAY DEACTIVATION

Code: **27 57 4** **(1B 39 Hex)**
Mnemonic: **ESC 9**

The relay on the card, if any, is disabled and the normal shut contact is shut (**N.C.**) and the normal open contact is open (**N.O.**)

READING OF VERSION NUMBER

Code: **27 86** **(1B 56 Hex)**
Mnemonic: **ESC V**

In serial mode is sent back a string of 3 char. containing the program managing version resident on-board of **QTP 22** or **QTP 24**.

COMMANDS FOR MESSAGES MANAGEMENT

NUMBER READING OF THE LAST STORED MESSAGE

Code: 27 110 (1B 6E Hex)
Mnemonic: ESC n

The number of the last stored message is sent back in serial mode; it varies in compliance with the EEPROM quantity installed on the card, please refer to the below table

EEPROM SIZE	MAX N.	EEPROM SIZE	MAX N.
256 Bytes	9	2304 Bytes	111
512 Bytes	22	2560 Bytes	124
2048 Bytes	99	4096 Bytes	201

FIGURE 31: NUMBER OF MESSAGES STORAGEABLE ON EEPROM

STORED MESSAGE

Code: 27 33 67 mess.no. char. 0... char.19
 (1B 21 43 mess.no. char. 0... char.13 Hex)
Mnemonic: ESC ! C ASCII(mess.no.) ASCII(char.0)...ASCII(char.19)

The 20 char .message, with code indicated as “mess.no.” is stored in the on-board EEPROM. The 20 char. which form the message must be visualized on the display so that are included in a range of 32÷255 (20÷FF Hex) otherwise the command is ignored.

The message number must be included in the range of 0÷max. no., where “max.no.” is the number of the last stored message just previously described.

P.S.

This command needs a data writing in on-board EEPROM so before executing it be sure that the card is ready for the new writing on that device otherwise the command will be ignored.

MESSAGE READING

Code: 27 33 69 mess.no. (1B 21 45 mess.no. Hex)
Mnemonic: ESC ! E ASCII(mess.no.)

The 20 char. message corresponding to “mess. no. it is read by the EEPROM and sent in serial mode beginning from the first char. of the string.

At the end of the message, the **CR+LF** codes are sent but if the **QTP** is set for Master-Slave function the said codes are not more sent.

The message number must be included in the range of **0÷max. no.**, where “max.no.” is the number of the last stored message just previously described. If this number is not compatible with the EEPROM quantity installed on the **QTP**, this command is ignored.

MESSAGES VISUALIZATION

Code: 27 33 68 mess.no. n (1B 21 44 mess.no. n Hex)
Mnemonic : ESC ! D ASCII(mess.no.) ASCII(n)

On the display “n.” 20 char.messages are visualized beginning from cursor position.

The first of the “n” messages is that one having the code corresponding to ‘mess.no.’ while the remaining messages are those ones immediately subsequents in EEPROM.

The number of “mess.no” must be included in the range of **0÷max.no**, where “max.no.” has the same meaning we have previously seen in figure n.31. If this number is not compatible with the EEPROM quantity installed on the **QTP**, this command is ignored.

The “n” quantity of messages to be visualized depends only on the model of the display and it is included in these ranges:

<i>20x2 or 40x1 Display</i>	<i>n between 1÷2</i>
<i>20x4 or 40x2 Display</i>	<i>n between 1÷4</i>
<i>40x4 Display</i>	<i>n between 1÷8</i>

If “n” value is not compatible with the model of the installed display, the command is ignored.

The cursor is placed in the next cell of the last message visualized; if the last char. of the said message occupies the last position of the display, the cursor will be placed in Home position.

For example; if you wish to visualize the message no. 20 and 21, it will be necessary to send the following sequence **27 33 68 20 2** to the card.

P.S.

Visualization of messages on **Futaba displays**, takes some time and it varies depending on the display size.

Here there are some visualization time of a number of messages which occupy the whole Futaba display:

<i>20x2 or 40x1 Display</i>	<i>(2 messages):</i>	<i>8 msec about</i>
<i>20x4 or 40x2 Display</i>	<i>(4 messages):</i>	<i>16 msec about</i>
<i>40x4 Display</i>	<i>(8 messages):</i>	<i>32 msec about</i>

MESSAGES VISUALIZATION IN SLIDING MODE

Code: 27 33 83 mess.no. n.char (1B 21 53 mess.no. n.char Hex)
Mnemonic : ESC ! S ASCII(mess.no.) ASCII(n.char)

This command visualizes a "**n.char**" message on the **display first line** the characters appears in sliding mode. The message is shifted from right to left and so the user can visualize a very long string on the display. The string of "**n.char**" characters, begins with the first character of the "**mess.no.**" message already stored in EEPROM. The "**mess.no.**" value must be included in the range **0÷max.no.**, where "max.no." has the same meaning described in figure n.31. If the value is out of range this command is ignored.

The "**n.char**" parameter is used as follow:

- 0** -> Stops the message visualization in sliding mode.
- 20÷200** -> Sliding string length, when a 20 characters for line display is installed.
- 40÷200** -> Sliding string length, when a 40 characters for line display is installed.

If "n.char." value is out of the specified ranges or it points after the last character stored in EEPROM, the command will be ignored.

The message visualization in sliding mode is positioned on the first display line and the cursor position and attributes are held.

For example, if you wish to visualize a 23 characters string in sliding mode, formed by the fifth message (i. e. 20 characters) and by the sixth message (3 characters) , it will be necessary to send the following sequence: **27 33 83 5 23**.

Note: The message visualization in sliding mode is managed in background and so there is a slowing down of serial data interpretation. This is the reason why it is necessary to wait for few **msec** between the transmission of 20÷30 bytes data blocks. In this way misunderstanding in interpreting the received data is completely void.

COMMANDS FOR BADGE READER MANAGEMENT

QTP 22 and **QTP 24** terminals are able to acquire single track magnetic badge readers. These latter can be both insertion and manual types, able to read track n.1 2 or 3. **QTP** by means of a specific command can be set in compliance with the badge reader at which it is connected.

When **QTP** is configured to manage the automatic Badge Reader, it can manage 2 Kbytes of EEPROM max (instead of 4 Kbytes) and it can not manage the Real Time Clock. These last options are so installable on **QTP 22** or **QTP 24** only if these terminals do not manage the Badge Reader. When the card is inserted into the Automatic Badge Reader slot, the **QTP** automatically acquires the string there contained. More specifically the "forward motor" is activated until the card has been read and the followed string interpreted. If a mistake in reading occurs, other two attempts of acquisition will take place before declaring that string not valid; during this phase the "reverse motor" is activated in order to re-position the initial part of the card to be read for the new reading. Once the reading procedure is over, the result of such reading is memorized and, sent in serial mode as it happens when it is question of the manual badge reader. The card stays inside the badge reader until the ejection command is sent. The **QTP** has a further command that allows to "eat" the card; more exactly the "forward motor" is activated up to the card goes out from the back side of the reader. Just to have the card dropped into the little basket. This command is executed only when the flag of the configuration byte is abled. Here below there are the commands for managing such structures.

WRITING OF THE BADGE READER CONFIGURATION BYTE

Code: 27 33 66 byte (1B 21 42 byte Hex)
Mnemonic: ESC ! B ASCII(byte)

The byte with the parameters for Badge reader is stored in the on-board EEPROM and kept there even if power voltage fails. Therefore **QTP 22** or **QTP 24** is re-configurable for the badge reader management in compliance with the parameters the said byte supplies: this configuration will be restored each time the **QTP** will be powered and it will maintain this configuration until a new setting byte will be sent. The meaning of the said byte is as follows:

- Bit 0** -> 0 The Badge reader connected to the **QTP** is of the **Insertion** Type (only if the reader is of manual insertion type, because if the reader is of automatic insertion type, this bit is ignored)
- 1 The Badge reader connected to the **QTP** is of the Sliding Type
- Bit 1** -> 0 The string memorized on to the magnetic card, it is acquired when this latter is during the **insertion phase** in the reader (only if the reader is of manual insertion type; when reader is manual or of the automatic insertion type, this bit is ignored).
- 1 The string memorized on to the magnetic card is acquired when this latter is during the **disinsertion phase** from the reader.
- Bit 2** -> 0 The Badge reader connected to the **QTP** reads **Track 1**
- 1 The Badge reader connected to the **QTP** reads **Track 2 or 3**
- Bit 3** -> 0 When a string is acquired from the Badge reader, this one is stored and immediately sent in serial mode. This function is not available in **Master-Slave mode**.
- 1 When a string is acquired from the Badge reader, this one is only stored and sent in serial mode only when the **QTP** receives the specific command.

Bit 4 ->	0	The magnetic card is inserted into the badge reader, starting from its beginning (only if the reader is of Manual Insertion Type, when the reader is of sliding or automatic type, this bit is ignored)
	1	The magnetic card is inserted into the Badge reader starting from its end .
Bit 5 ->	0	The badge reader is of Manual type.
	1	The badge reader is of Automatic type.
Bit 6 ->	0	Possibility of "EATING" the card ON (only if the reader is of automatic type, when the reader is of manual type this bit is ignored).
	1	Possibility of "EATING" the card OFF (only if the reader is of automatic type, when the reader is of manual type this bit is ignored).
Bit 7 ->	0	The badge reader management is ON
	1	The badge reader management is OFF

When the management of the automatic badge reader is ON, the **QTP** will execute the initialization of the device itself by acting the motor in a "Reverse mode" for about 0,5 seconds, just to eject a card may be kept inside. For example if you wish to configure the **QTP** for managing the Insertion Badge Reader which acquires the track 2 having the reading of the card during the disinsertion phase, it will be necessary to send the following sequence: **27 33 66 6** for getting a prompt response from **QTP**. If you send **27 33 66 14** the string acquired by **QTP** will be received only if **QTP** will be asked for it by using the specific command.

P.S.

This command needs a data writing in on-board EEPROM so before executing it be sure that the card is ready for the new writing on that device otherwise the command will be ignored.

READING OF THE BADGE READER CONFIGURATION BYTE

Code: **27 33 98** (**1B 21 62 Hex**)
Mnemonic: **ESC ! b**

The byte having the Badge reader configuration connected to the **QTP 22** or **QTP 24** is sent in serial mode. The meaning of this byte is the same one seen previously.

By this command it is so possible to know in any moment what is the configuration of **QTP 22** or **QTP 24**.

SINTAX OF THE STRING ACQUIRED BY THE BADGE READER

When the Badge reader acquires the magnetic card, the **QTP 22** or **QTP 24** stores the info coming from this reading and if it is OK also the char. contained in the card. If the **QTP** is set for sending immediately via serial line these info (Bit 3 of the set byte placed at 0 position) the following string will be transmitted:

C2 Hex C2 Hex cod. char. no. char.1.....char n 0D Hex 0A Hex

The first two characters of the said string is **C2 Hex** code repeated twice; it is needed to indicate that the next info are pertinent to the Badge reader. It would be useful that this code is not associated

to any key of the **QTP 22** or **QTP 24** in order to avoid complication in recognizing the beginning of the answering string.

If this association can't be avoided it is possible to discriminate the string answering from the badge reader, by checking the time break that elaps from the arrival of these codes.

The third byte of the string is named **cod**. It contains the info concerning the result of the acquisition just performed, in particular way:

- Bit 7** ->
- 1 It shows that the saved info are transmitted for the first time.
 - 0 It shows that the saved info have been transmitted at least one time, therefore no additional magnetic cards have been acquired.

The management of this bit is necessary because when a string is acquired by the badge reader through the specific command, it can be asked for various time so it is necessary to discriminate if the received answer concerns a new acquisition or it is question of a repetition of the previous one. Obviously, if the **QTP** is set for transmitting the answer immediately, during the first reception of the string autonomously transmitted by the terminal same, the result is that the said bit will be always at 1.

Bits 0÷6 -> of **cod**. byte have on the contrary the following meaning:

- Bits 0÷6** ->
- 0 Into **QTP** memory none string available at present.
 - 6 A string valid and complete has been received.
 - 21 A string has been received but CRC is not correct or START char. is omitted.
 - 26 Valid string has been received but END char. is omitted.

When manual insertion badge reader type is used, the string is considered valid only if START and END chars. have been indentified therefore the **QTP** is configured for such reader type and **QTP** will never send back the 26 code as the magnetic card must be always throughly acquired.

If it is question of an insertion reader, it is possible to get a partial card acquisition; for this reason the string is considered valid even if the END char. is not identified.

The forth byte of the answering string named **n.char**. contains the number of the chars. acquired by the magnetic card which will follow the answering string expect for the last chars. CR+LF.

If the acquired string is not valid that byte will contain 0 value and it will be only followed by CR+LF codes. On the contrary if the magnetic card is correctly acquired, after the byte named n.char. ASCII codes of chars. contained in the card will follow between START and END codes.

As said above the answering string will end with CR+LF codes.

BADGE READER REQUEST OF THE ACQUIRED STRING

Code: 27 76 (1B 4C Hex)
Mnemonic: ESC L

The answering string is sent via serial line with the sintax already described.

If **QTP 22** or **QTP 24** is set for communicating in Master-Slave mode, the answering string will not count **CR+LF** chars.

This command is available also when **QTP** is configured for sending the acquired string to the Badge reader.

ACQUISITION OF THE AUTOMATIC READER STATUS

Code: 27 67 (1B 43 Hex)
Mnemonic: ESC C

A byte containing some status info (card inside, motor ON ect.) is sent back. This byte has the following values:

- 0 -> No card inside the badge reader and motor is OFF.
- 1 -> The reader has a card inside and motor is OFF.
- 2 -> No card inside and motor is ON. This code is sent back, for example, during the initializing phase of the reader itself after a power-on of the **QTP** or while the card is "EATEN".
- 3 -> The reader has a card inside and motor is ON. This code is sent back, for example, during the card reading or during insertion/ejection phases of the same.
- 255 -> The badge reader is of manual type or the management of the card device is OFF.

EXECUTION OF A NEW READING PROCEDURE

Code: 27 33 76 (1B 21 4C Hex)
Mnemonic: ESC ! L

A new reading procedure of the card inside the automatic badge reader is executed. If there are other operations on the same device or the **QTP** is configured for the manual reader, this command is ignored.

Note: Each card reading procedure include 3 attempts max, if a mistake in acquiring the same occurs.

CARD EJECTION FROM AUTOMATIC READER

Code: 27 33 101 (1B 21 65 Hex)
Mnemonic: ESC ! e

The ejection of the card inside the automatic badge reader is executed. This command is ignored when: a) no card inside the reader, b) other operations are taking place on the device, c) the **QTP** is configured for the manual reader.

COMMAND FOR "EATING" THE CARD

Code: 27 33 84 (1B 21 54 Hex)
Mnemonic: ESC ! T

The card inside the badge reader is "eaten" (it goes out from the back of the reader itself just to drop it into its basket). This operation is executed only if the correspondent bit in the configuration byte is cleared (**bit 6=0**). This command is ignored when: a) no card inside the reader, b) other operations are taking place on the device, c) the **QTP** is configured for the manual reader.

COMMANDS FOR MANAGING THE ON-BOARD REAL TIME CLOCK

CLOCK SET-UP

Code: 27 33 70 0 byte....6 byte (1B 21 46 0 byte.....6 byte Hex)
Mnemonic: ESC ! F ASCII (0 byte)ASCII(6 byte)

The on-board Real Time Clock is set with the data contained in the bytes named **0 byte6 byte**; if one of these ones has a value included in the allowed range, the RTC allocation is not programmed. Here under is listed the meaning of the 7 bytes of above and their allowed range.

BYTE	RANGE	FUNCTION
0	0 ... 23	HOURS
1	0 ... 59	MINUTES
2	0 ... 59	SECONDS
3	1 ... 31	DAY
4	1... 12	MONTH
5	0 ... 99	YEAR
6	0 ... 6	Week day: 0 -> SUNDAY 6 -> SATURDAY

FIGURE 32: 7 BYTES FUNCTION FOR REAL TIME CLOCK SETTING

CLOCK READING

Code: 27 33 102 (1B 21 66 Hex)
Mnemonic: ESC ! f

The 7 bytes named **0 byte7 byte** are sent back via serial line with the date, time and day of the week which are drawn from the on-board Real Time Clock. The meaning of these bytes is the same listed in figure n.32.

WRITING OF A BYTE OF THE REAL TIME CLOCK RAM

Code: 27 33 71 addr byte (1B 21 47 addr byte Hex)
Mnemonic: ESC ! G ASCII(addr) ASCII(byte)

On-board Real Time Clock RAM byte it is written with the value shown in "byte". The address where memorize the said byte is shown at "addr" and it must be included in the range **32...255 (20...FF Hex)** otherwise the command is ignored.

READING OF A BYTE OF THE REAL TIME CLOCK RAM

Code: 27 33 71 addr (1B 21 47 addr Hex)
Mnemonic: ESC ! g ASCII(addr)

The on-board Real Time Clock RAM byte placed at the address shown at "addr" is sent back via serial line. This byte must be included in the range **32...255 (20..FF Hex)** otherwise the command is ignored.

TIME VISUALIZATION ON THE DISPLAY

Code: 27 33 116 r c frm (1B 21 74 r c frm Hex)
Mnemonic: ESC ! t ASCII(r) ASCII(c) ASCII(frm)

The time drawn from the on-board Real Time Clock is displayed starting from the position shown by the "r" and "c" bytes. These codes express the row and column values of the display at which an off set of **32 (20 Hex)** must be added. If the row and column values are not compatible to the display installed, this command will be ignored. The "frm" parameter is used to specify the visualization format, in particular way:

- Bit 0** -> 1 The time is visualized and automatically managed in "r", "c" position.
0 The visualization of the time is interrupted.
- Bit 1** -> 1 The time is visualized in AM/PM format: **HH:MM:SSm** i.e.: **HH** (hours), **MM** (minutes), **SS** (seconds), **m** (**a**=AM or **p**=PM).
0 The time is visualized in 24H format: **HH:MM:SS** i.e.: **HH** (hours), **MM** (minutes), **SS** (seconds).
- Bit 2÷7** -> 0 Reserved for future expansion. They must be set to "0" value.

For example, if you wish to visualize the time starting from Home position (0 row, 0 column) and in 24 H format, it will be necessary to send the following sequence: **27 33 116 32 32 1**.

Note: The time drawn is managed in background and so there is a slowing down of serial data interpretation. This is the reason why it is necessary to wait for few **msec** between the transmission of 20÷30 bytes data blocks. In this way misunderstanding in interpreting the received data is completely void.

DATE VISUALIZATION ON THE DISPLAY

Code: 27 33 100 r c frm (1B 21 64 r c frm Hex)
Mnemonic: ESC ! d ASCII(r) ASCII(c) ASCII(frm)

The date drawn from the on-board Real Time Clock is displayed starting from the position shown by the "r" and "c" bytes. These codes express the row and column values of the display at which an off set of **32 (20 Hex)** must be added. If the row and column values are not compatible to the display installed, this command will be ignored. The "frm" parameter is used to specify the visualization format, in particular way:

- Bit 0** -> 1 The date is visualized and automatically managed in "r", "c" position.
0 The visualization of the date is interrupted.
- Bit 1** -> 1 The format that visualizes the date is as follows: **MM-DD-YY**, i.e **MM** (month), **DD** (day), **YY** (year).
0 The format that visualizes the date is as follows: **DD-MM-YY**, i.e **DD** (day), **MM** (month), **YY** (year).
- Bit 2÷7** -> 0 Reserved for future expansion. They must be set to "0" value.

Please note that the week day is not managed.

For example, if you wish to visualize the date starting from Home position (0 row, 0 column) and in MM-DD-YY format, it will be necessary to send the following sequence: **27 33 110 32 32 3**.

Note: The date drawn is managed in background and so there is a slowing down of serial data interpretation. This is the reason why it is necessary to wait for few **msec** between the transmission of 20÷30 bytes data blocks. In this way misunderstanding in interpreting the received data is completely void.

QTP 22/QTP 24 COMMAND CODES SUMMARY TABLES

COMMAND	CODE	HEX CODE	MNEMONIC
HOME	01	01	SOH
CURSOR LEFT	21	15	NACK
CURSOR RIGHT	06	06	ACK
CURSOR DOWN	10	0A	LF
CURSOR UP	26	1A	SUB
CARRIAGE RETURN	13	0D	CR
CR+LF	29	1D	GS
Cursor absolute positioning with 20H offset	27 89 r c	1B 59 r c	ESC Y ASCII(r) ASCII(c)
BACKSPACE	08	08	BS
CLEAR PAGE	12	0C	FF
CLEAR LINE	25	19	EM
CLEAR END OF LINE	27 75	1B 4B	ESC K
CLEAR END OF PAGE	27 107	1B 6B	ESC k
Cursor OFF	27 80	1B 50	ESC P
Static cursor ON	27 79	1B 4F	ESC O
Blinking "Underline" cursor	27 77	1B 4D	ESC M
Blinking "Block" cursor	27 81	1B 51	ESC Q

FIGURE 33: COMMAND CODES SUMMARY: TABLE 1

COMMAND	CODE	HEX CODE	MNEMONIC
BEEP	07	07	BEL
LED Activation	27 50 n.LED Attr.	1B 32 n.LED Attr.	ESC 2 ASCII(n.LED) ASCII(Attr.)
LEDs Mask Activation	27 52 byte1 byte2 byte3	1B 34 byte1 byte2 byte3	ESC 4 ASCII(byte1) ASCII(byte2) ASCII(byte3)
Relay Activation	27 56	1B 38	ESC 8
Relay Deactivation	27 57	1B 39	ESC 9
Request for on EEPROM writing	27 51	1B 33	ESC 3
Writing of life byte	27 33 78 key	1B 21 4E key	ESC ! N ASCII(key)
Reading of life byte	27 33 110	1B 21 6E	ESC ! n
Characters show	32÷255	20÷FF	“space”÷ASCII(255)
Keyclick ON without memorization	27 53	1B 35	ESC 5
Keyclick OFF without memorization	27 54	1B 36	ESC 6
Key reconfiguration	27 55 n.Key cod.	1B 37 n.Key cod.	ESC 7 ASCII(n.Key) ASCII(cod.)
Keyclick ON with memorization	27 33 53	1B 21 35	ESC ! 5
Keyclick OFF with memorization	27 33 54	1B 21 36	ESC ! 6
Reading of version number	27 86	1B 56	ESC V

FIGURE 34: COMMAND CODES SUMMARY: TABLE 2

COMMAND	CODE	HEX CODE	MNEMONIC
Number reading of the last stored message	27 110	1B 6E	ESC n
Stored message	27 33 67 n.mess. char.0...char.19	1B 21 43 n.mess. char.0...char.13	ESC ! C ASCII(n.mess.) ASCII(char.0)...ASCII(char.19)
Message reading	27 33 69 n.mess.	1B 21 45 n.mess.	ESC ! E ASCII(n.mess.)
Messages visualization	27 33 68 n.mess. n	1B 21 44 n.mess. n	ESC ! D ASCII(n.mess.) ASCII(n)
Messages visualization in sliding mode	27 33 83 n.mess. n.char.	1B 21 53 n.mess. n.char.	ESC ! S ASCII(n.mess.) ASCII(n.char.)
Writing of the Badge Reader configuration byte	27 33 66 byte	1B 21 42 byte	ESC ! B ASCII(byte)
Reading of the Badge Reader configuration byte	27 33 98	1B 21 62	ESC ! b
Badge Reader request of the acquired string	27 76	1B 4C	ESC L
Acquisition of the automatic reader status	27 67	1B 43	ESC C
Execution of a new reading procedure	27 33 76	1B 21 4C	ESC ! L
Card ejection from automatic reader	27 33 101	1B 21 65	ESC ! e
Command for "EATING" the card	27 33 84	1B 21 54	ESC ! T
Clock SET UP	27 33 70 "string"	1B 21 46 "string"	ESC ! F ASCII("string")
Clock reading	27 33 102	1B 21 66	ESC ! f
Time visualization on the display	27 33 116 r c frm	1B 21 74 r c frm	ESC ! t ASCII(r) ASCII(c) ASCII(frm)
Date visualization on the display	27 33 100 r c frm	1B 21 64 r c frm	ESC ! d ASCII(r) ASCII(c) ASCII(frm)
Writing of a byte of the Real Time Clock RAM	27 33 71 addr byte	1B 21 47 addr byte	ESC ! G ASCII(addr) ASCII(byte)

FIGURE 35: COMMAND CODES SUMMARY: TABLE 3

MASTER-SLAVE COMMUNICATION MODE

The Master-Slave mode uses the 9 bits communication technique. In addition to the 8 data bit also a 9th bit is managed as it is needed for recognizing between a call coming from the "**Master**" to any of the "**Slave**" structures and a simple info transmission between Master and the selected device. When 9th bit is placed at 1, the data byte have to contain the name, or identifying code, of the device towards it needs to communicate, while by placing this particular bit at 0 position, it is possible to take out or supply with info at this device.

As far as communications to **QTP 22** and **QTP 24**, the identifying code must be that one set by the local Set up programm of the terminal itself.

When this byte is sent (with 9th bit placed at 1 position) the **QTP xx** recognizes itself and it waits the string containing chars., data or commands; this string must be of **25 bytes** max. In this string there must only be a comand that involves the return of an information sent via serial line on **QTP xx** part; if there is an higher number, the remaining commands of these type are ignored.

Between the transmission of a char. and the next one there must be an interval of time shorter than the **Time-Out**, as elapsed this delay, the **QTP xx** will consider the data string ended and it will begin the answering phase.

Baud Rate		Time-Out	
187500	Baud	110	μ sec
38400	Baud	550	μ sec
19200	Baud	990	μ sec
9600	Baud	1540	μ sec
4800	Baud	3080	μ sec
2400	Baud	6105	μ sec
1200	Baud	12100	μ sec

When the Time-Out is over, the **QTP xx** begins the answering phase which consists in a byte containing the code of the pressed key (**FF Hex**, none key is pressed) or a data string related to a reading command sent in the previous request. For example if a string containing the reading command of the version is transmitted, we will get that for this particular request the pressed key code will be sent back, while in the next one the number of the required version previously asked for, will be transmitted .

After that the last char. of the string has been transmitted to the **QTP xx**, it will be necessary to wait a time of:

$$\text{"char. transmission time"} + \text{Time-Out}$$

before reaching the first char. of the answering string transmitted by the **QTP 22** or **QTP 24**. For example if we are working at 187.5 Baud, when the transmission of the last char. has been completed, it is necessary to wait for about 160 μ sec, before completening the reception of the first answering byte on **QTP xx** part.

Between a call and the next one, it is necessary to wait for a time that is related to the number of commands sent and type of operations these latter ones involve.

APPENDIX A: DISPLAYS CHARACTERS TABLES

		Higher 4-bit (D4 to D7) of Character Code (Hexadecimal)																			
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F				
Lower 4-bit (D0 to D3) of Character Code (Hexadecimal)	0	CG RAM (1)	+		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
	1	CG RAM (2)	+	!	2	3	4	5	6	7	8	9	A	B	C	D	E	F			
	2	CG RAM (3)	7	"	z	B	R	B	r	e	B	e	'	w	e	e					
	3	CG RAM (4)	7	#	0	5	e	a	b	c	'	'	'	'	'	'	'	'	'	'	'
	4	CG RAM (5)	7	+	0	T	t	a	b	c	'	'	'	'	'	'	'	'	'	'	'
	5	CG RAM (6)	7	2	E	L	e	v	a	b	e	'	'	'	'	'	'	'	'	'	'
	6	CG RAM (7)	7	0	F	U	V	v	a	b	'	'	'	'	'	'	'	'	'	'	'
	7	CG RAM (8)	7	'	7	a	v	e	s	'	'	'	'	'	'	'	'	'	'	'	'
	8	CG RAM (1)	7	0	N	N	v	e	'	'	'	'	'	'	'	'	'	'	'	'	'
	9	CG RAM (2)	7	0	T	Y	v	a	b	'	'	'	'	'	'	'	'	'	'	'	'
	A	CG RAM (3)	7	+	2	Z	a	b	'	'	'	'	'	'	'	'	'	'	'	'	'
	B	CG RAM (4)	7	+	K	N	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
	C	CG RAM (5)	7	.	<	\	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
	D	CG RAM (6)	7	-	N	m	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
	E	CG RAM (7)	7	.	>	N	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
	F	CG RAM (8)	7	/	0	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'

FIGURE 36: LCD 20x2 CHARACTERS TABLE



MSB 0000	LOWER 4-BIT													
	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
LSB XXXX0000	(0) 0	1	2	3	4	5	6	7	8	9	A	B	C	D
XXXX0001	(1) 1	2	3	4	5	6	7	8	9	A	B	C	D	E
XXXX0010	(2) 2	3	4	5	6	7	8	9	A	B	C	D	E	F
XXXX0011	(3) 3	4	5	6	7	8	9	A	B	C	D	E	F	G
XXXX0100	(4) 4	5	6	7	8	9	A	B	C	D	E	F	G	H
XXXX0101	(5) 5	6	7	8	9	A	B	C	D	E	F	G	H	I
XXXX0110	(6) 6	7	8	9	A	B	C	D	E	F	G	H	I	J
XXXX0111	(7) 7	8	9	A	B	C	D	E	F	G	H	I	J	K
XXXX1000	(8) 8	9	A	B	C	D	E	F	G	H	I	J	K	L
XXXX1001	(9) 9	A	B	C	D	E	F	G	H	I	J	K	L	M
XXXX1010	(A) A	B	C	D	E	F	G	H	I	J	K	L	M	N
XXXX1011	(B) B	C	D	E	F	G	H	I	J	K	L	M	N	O
XXXX1100	(C) C	D	E	F	G	H	I	J	K	L	M	N	O	P
XXXX1101	(D) D	E	F	G	H	I	J	K	L	M	N	O	P	Q
XXXX1110	(E) E	F	G	H	I	J	K	L	M	N	O	P	Q	R
XXXX1111	(F) F	G	H	I	J	K	L	M	N	O	P	Q	R	S

FIGURE 37: LCD 20x4 AND 40x2 CHARACTERS TABLE



LOWER 4-BIT HEXADECIMAL

Upper 4 bits Lower 4 bits	0000 (0)	0010 (2)	0011 (3)	0100 (4)	0101 (5)	0110 (6)	0111 (7)	1010 (A)	1011 (B)	1100 (C)	1101 (D)	1110 (E)	1111 (F)
xxxx0000 (0)	CG RAM (1)		0	a	P	`	F		—	9	3	0	p
xxxx0001 (1)	(2)	!	1	A	Q	a	9	#	7	7	4	a	9
xxxx0010 (2)	(3)	"	2	B	R	b	r	r	4	W	X	P	0
xxxx0011 (3)	(4)	#	3	C	S	c	s	u	0	7	E	e	0
xxxx0100 (4)	(5)	*	4	D	T	d	t	\	I	T	T	u	0
xxxx0101 (5)	(6)	%	5	E	U	e	u	#	*	*	1	e	0
xxxx0110 (6)	(7)	@	6	F	V	f	v	7	0	2	0	P	Z
xxxx0111 (7)	(8)	'	7	G	W	g	w	7	+	2	0	9	0
xxxx1000 (8)	(1)	<	8	H	X	h	x	4	0	*	U	7	0
xxxx1001 (9)	(2)	>	9	I	Y	i	y	0	7	U	U	'	U
xxxx1010 (A)	(3)	*	:	J	Z	j	z	0	0	0	U	J	7
xxxx1011 (B)	(4)	+	:	K	[	k	[	0	*	0	E	0	0
xxxx1100 (C)	(5)	:	<	L	*	l	l	7	3	7	7	*	0
xxxx1101 (D)	(6)	—	—	N	]	n	]	0	2	>	U	U	+
xxxx1110 (E)	(7)	:	>	N	^	n	^	+	a	0	0	0	0
xxxx1111 (F)	(8)	/	?	0	_	o	o	0	0	U	7	0	0

FIGURE 38: LCD 40x1 AND 40x4 CHARACTERS TABLE



	D7	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1				
	D6	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1				
	D5	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1				
	D4	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1				
DDDD 3210		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F			
0000	0		DP		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0001	1				!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
0010	2				"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
0011	3				#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
0100	4	DIM	CU1		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
0101	5		CU2		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
0110	6		CU3		&	&	&	&	&	&	&	&	&	&	&	&	&	&	&	&
0111	7		DC		'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
1000	8	BS			((((((((((((((((
1001	9	HT))))))))))))))))
1010	A				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1011	B				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
1100	C				,	,	,	,	,	,	,	,	,	,	,	,	,	,	,	,
1101	D	CLR			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1110	E				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1111	F	ALD	RST		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

FIGURE 39: FLUORESCENT 20x2 CHARACTERS TABLE



	D7	D6	D5	D4	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
03020100	0	0	0	0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 0 0 0	0	DP			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 0 0 1	1	DC1	:	!	1	A	Q	a	q	o	a	t	e	e	e	e	e	e	e	e
0 0 1 0	2	DC2	"	2	B	R	b	r	e	e	e	r	r	o	n	#				
0 0 1 1	3	DEF	#	3	C	S	c	s	a	e	u	l	e	y	l					
0 1 0 0	4	DIM	\$	4	D	T	d	t	a	b	n	e	x	i	#	*				
0 1 0 1	5		%	5	E	U	e	u	a	b	n	n	-	A	u	*				
0 1 1 0	6		&	6	F	V	v	a	o	a	e	z	e	4	=					
0 1 1 1	7		'	7	a	w	a	w	c	u	a	x	3	T	w	e				
1 0 0 0	8	BS	(	8	H	X	x	e	y	z	n	s	o	w	e					
1 0 0 1	9	HT	)	9	I	V	v	e	o	r	t	o	b	e	*					
1 0 1 0	A	LF	*	1	J	Z	z	a	o	-	P	±	B	M	*					
1 0 1 1	B		+	1	K	R	r	c	i	e	v	o	r	a	*					
1 1 0 0	C		,	<	L	V	v	e	e	4	r		A	M	*					
1 1 0 1	D	CR	-	=	N	M	m	y	i	U	I	U	U	U	U	U	U	U	U	U
1 1 1 0	E		.	>	N	n	n	r	A	r	o	U	U	U	U	U	U	U	U	U
1 1 1 1	F	RST	/	?	o	o	o	o	A	r	o	U	U	U	U	U	U	U	U	U

FIGURE 40: FLUORESCENT 40x1 AND 40x2 CHARACTERS TABLE



	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000		DP		0	1	2	3	4	5	6	7	8	9	-	.	/
xxxx0001		DC1	:	!	@	#	\$	%	&	'	()	*	+	=	>
xxxx0010		DC2	;"	o	p	q	r	s	t	u	v	w	x	y	z	{
xxxx0011	DEF	DC3	#	3	4	5	6	7	8	9	.	/	:	;	<	=
xxxx0100	DIM	DC4	@	4	5	6	7	8	9	.	/	:	;	<	=	>
xxxx0101		DC5	%	5	6	7	8	9	.	/	:	;	<	=	>	?
xxxx0110			0	1	2	3	4	5	6	7	8	9	.	/	:	;
xxxx0111			7	8	9	.	/	:	;	<	=	>	?	@	#	\$
xxxx1000	BS		<	0	1	2	3	4	5	6	7	8	9	.	/	:
xxxx1001			>	1	2	3	4	5	6	7	8	9	.	/	:	;
xxxx1010		UP	*	2	3	4	5	6	7	8	9	.	/	:	;	<
xxxx1011	HM CLR	DWN	+	3	4	5	6	7	8	9	.	/	:	;	<	=
xxxx1100		RT	<	4	5	6	7	8	9	.	/	:	;	<	=	UF0
xxxx1101	CR + LF	LT	—	5	6	7	8	9	.	/	:	;	<	=	UF1	
xxxx1110			.	6	7	8	9	.	/	:	;	<	=	UF2		
xxxx1111		RST	/	7	8	9	.	/	:	;	<	=	UF2			

FIGURE 41: FLUORESCENT 40x4 CHARACTERS TABLE





APPENDIX B: QTP LABELS INSERTION

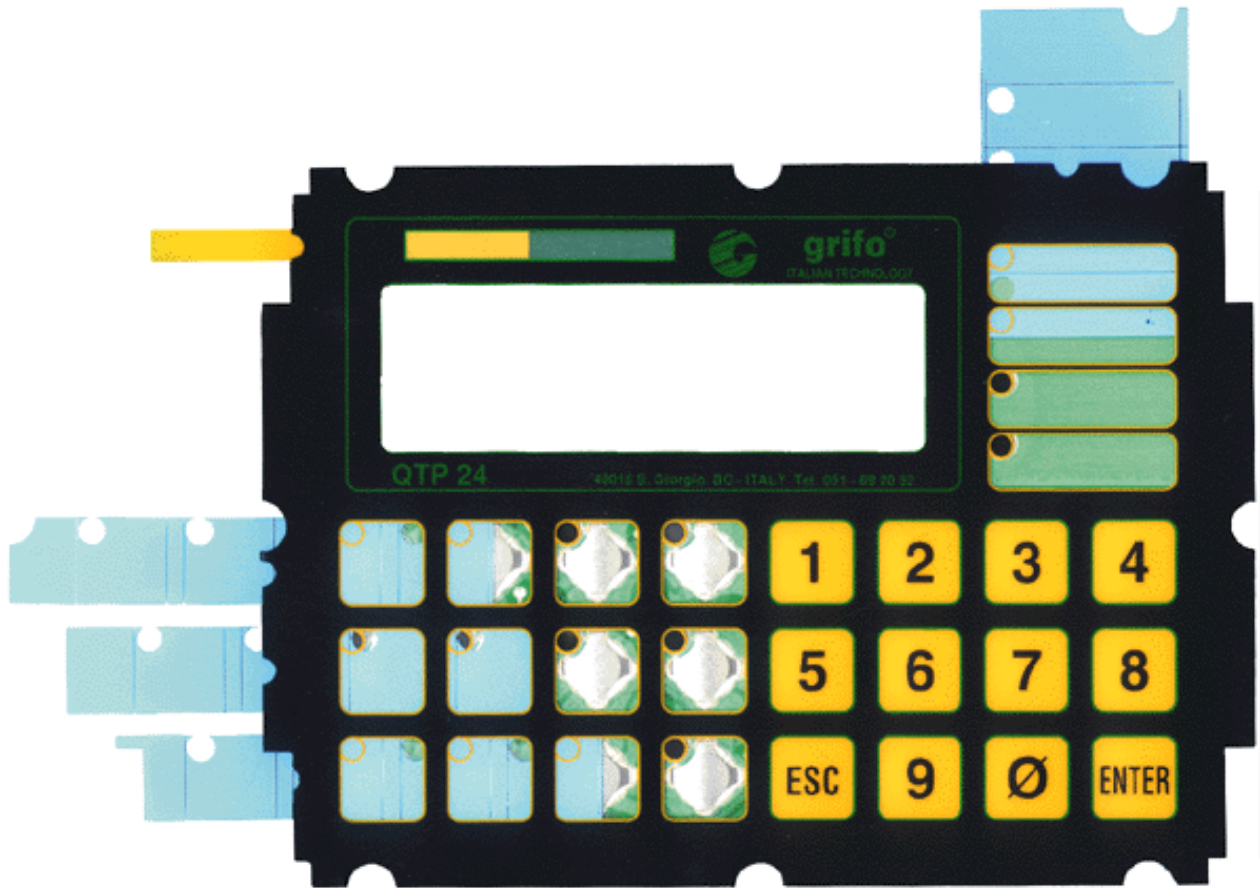


FIGURE 43: QTP 24 LABELS SLOTS

Note:

- A) Unscrew the 4 black screws from the front panel.
- B) Take the panel out and unscrew the 8 screws and their grey plastic spacers which are placed in the back (do not take the printed corcuit out from the keyboard).
- C) Now the keyboard is ready for getting the 5 personalization labels (see figure 43).
- D) Remount the panel following the previous instructions but on the back-way.

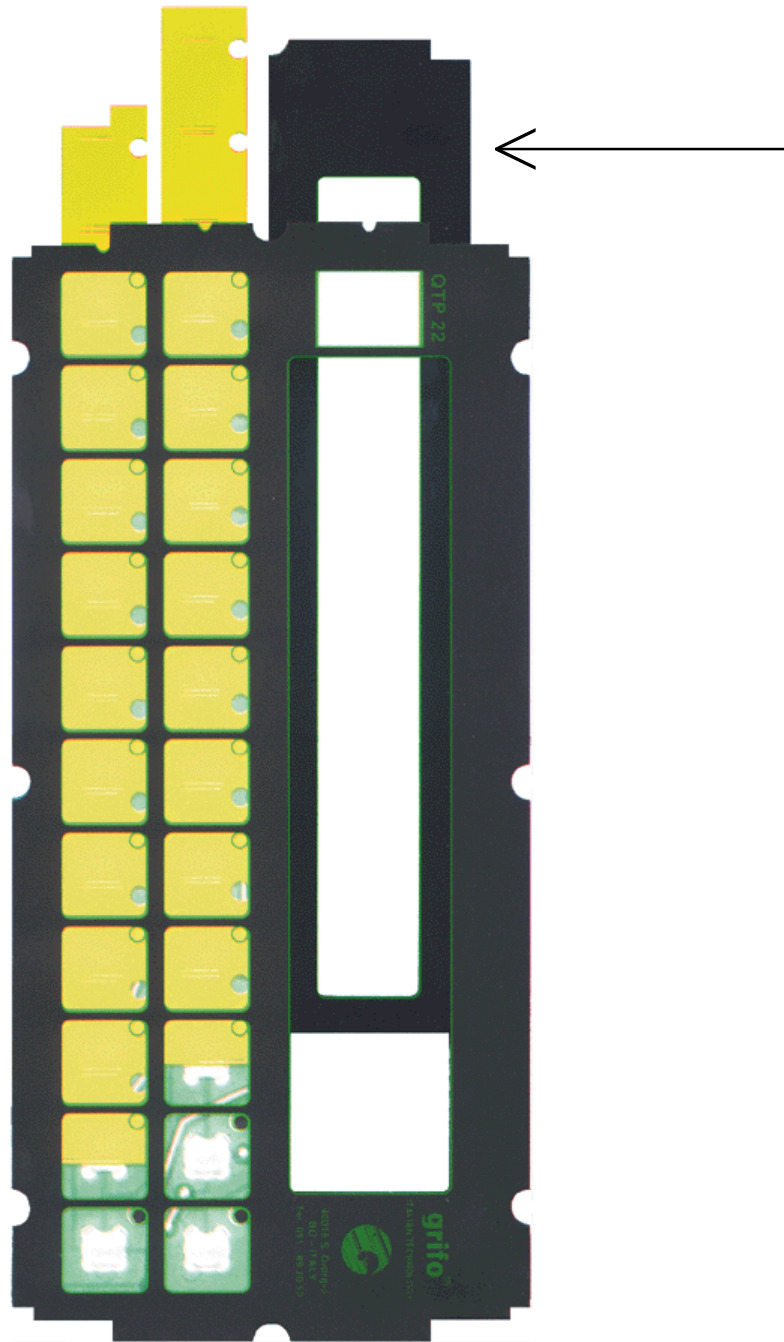


FIGURE 44: QTP 22 LABELS SLOTS

Note:

- A) Unscrew the 4 black screws from the front panel.
- B) Take the panel out and unscrew the 8 screws and their grey plastic spacers which are placed in the back (do not take the printed corcuit out from the keyboard).
- C) Now the keyboard is ready for getting the 2 personalization labels (see figure 44).
- D) Remount the panel following the previous instructions but on the back-way.
- E) The label indicated by the arrow is default inserted.

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