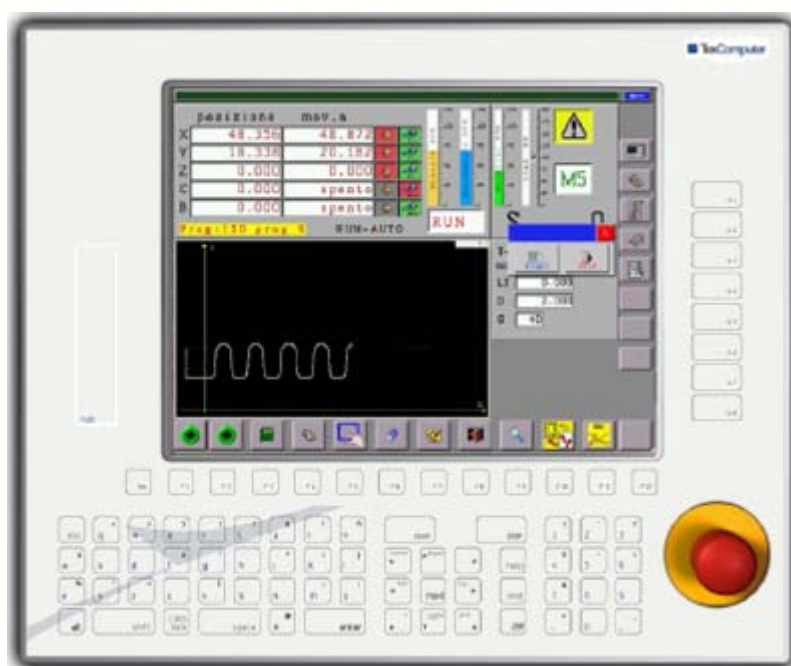


## Programmable Automation Controller to manage 16/24 interpolated axes



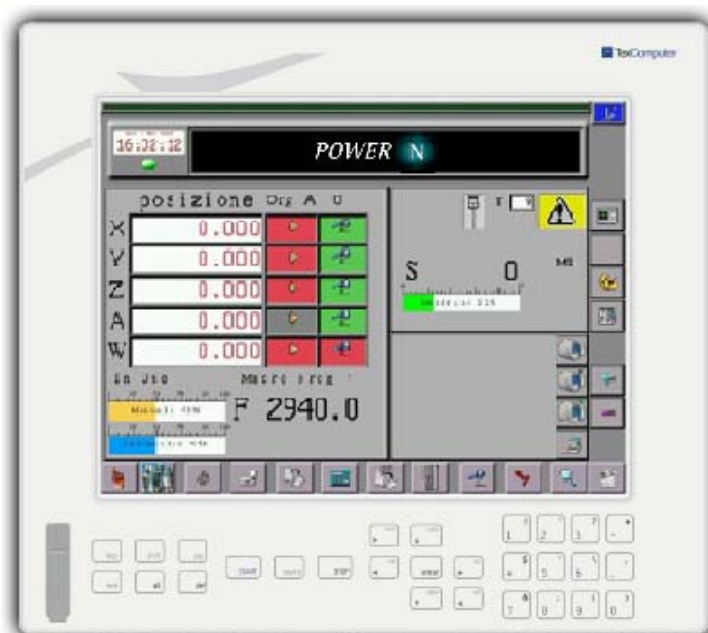
### Power N 10.4" XGA

- TFT XGA display (1024x768) with touch screen
- 80-key thermoformed membrane keypad
- door for access to Ethernet, USB and CF memory
- mushroom-head emergency button
- electronic handwheel with axis selector and movement resolution selector (optional)
- overfeed potentiometers (optional)
- dimensions 434x400x160 (WxHxD in mm)



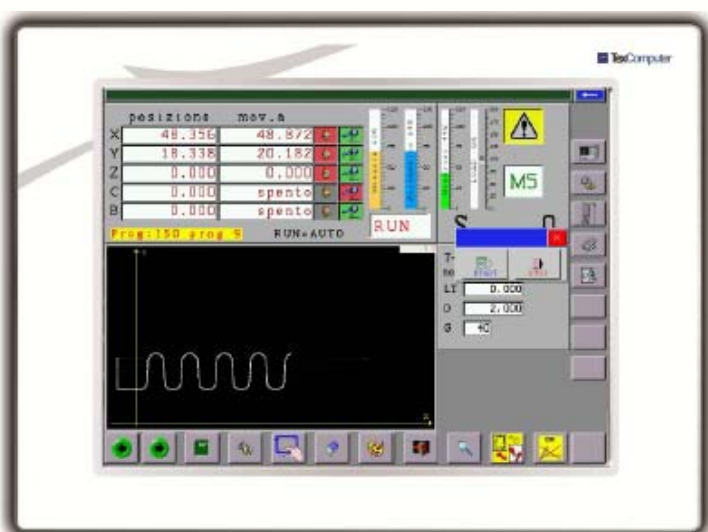
### Power N 15" - 80 keys

- TFT XGA 1024x768 pixel display with or without touch screen
- 80-key thermoformed membrane keypad
- door for access to CF
- mushroom-head emergency button
- dimensions 490x400x160 (WxHxD in mm)



### Power N 15" - 28 keys

- TFT XGA 1024x768 pixel display with touch screen
- 28-key thermoformed membrane keypad
- USB socket
- dimensions 400x355x160 (WxHxD in mm)



### Power N 15" - Only touch

- display TFT XGA (1024x768) with touch screen
- dimensions 398x296x100 (WxHxD in mm)



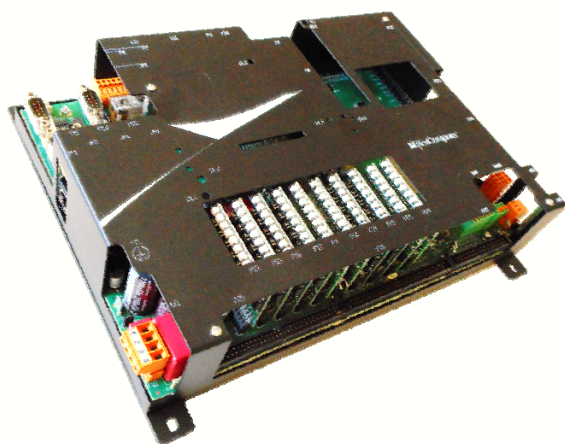
### Fixed remotable terminal

- 10,4" WSVGA 1024x600 display with touch screen, dimensions 310x192x60 (WxHxD in mm)
- 15" XGA 1024x768 display with touch screen, 398x296x60 (WxHxD in mm)
- connection to Power N Box through 36-pole LVDS cable 10 m. long



#### 10.4" Passive mobile terminal

- ergonomic plastic case
- connection to Power N Box through 36-pole LVDS cable, 10 m. long
- TFT WSVGA 1024x600 pixel display with touch screen
- 4-key keypad
- dual-contact mushroom-head emergency button
- optional "dead man" button



#### Power N Box

- fixing from inside panel
- dimensions 300x240x160 (LxHxP in mm)

## Technical Data

| Description                                                         |                             | Notes / Options                                                                                                                                                |
|---------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU                                                                 | <b>RISC 32 bit</b>          | 264 MHz clock                                                                                                                                                  |
| Flash memory (F volume included)                                    | <b>8 MB</b>                 |                                                                                                                                                                |
| Serial Flash memory                                                 | <b>16 MB</b>                | Optional, can hold icons and character set                                                                                                                     |
| RAM memory (ritentive)                                              | <b>8 MB</b>                 |                                                                                                                                                                |
| RAM memory (not ritentive)                                          | <b>4/8 MB</b>               |                                                                                                                                                                |
| Digital inputs 24 Vdc pnp - npn                                     | <b>44</b>                   |                                                                                                                                                                |
| Protected outputs, 1 Amp. 24 Vdc pnp                                | <b>32</b>                   |                                                                                                                                                                |
| Configurable digital inputs / outputs                               | <b>8</b>                    | On I/O module inserted in slot P10                                                                                                                             |
| Analog inputs 0...10 V - 12 bit                                     | <b>8</b>                    | On request:<br>4 may be 0..5V<br>4 may be 0..20mA                                                                                                              |
| Analog inputs 0...5 volts - 12 bit                                  | <b>3</b>                    | On on-board terminal board                                                                                                                                     |
| Analog input +/-10 volts                                            | <b>1</b>                    | On on-board terminal board                                                                                                                                     |
| 0-20 mA analog input                                                | <b>1</b>                    | On on-board terminal board                                                                                                                                     |
| Analog outputs +/-10V, - DAC 16 bit                                 | <b>8</b>                    | Expandable on FDC card                                                                                                                                         |
| 5 V Push Pull encoder interface                                     | <b>8</b>                    | Expandable on FDC card                                                                                                                                         |
| 5V Line Driver encoder interface without index inputs (encoder # 9) | <b>1</b>                    | On on-board terminal board                                                                                                                                     |
| Digital 24V PNP inputs i28 & i29                                    | <b>2</b>                    | On request, as alternative to encoder # 9                                                                                                                      |
| Absolute encoder interfaces                                         | <b>for 8/16 SSI encoder</b> | On optional SF80328 card                                                                                                                                       |
| STEP / DIRECTION outputs                                            | <b>for 8/16 axes</b>        | On optional T15-GENFR5 card                                                                                                                                    |
| PWM Outputs                                                         | <b>for 8 axes</b>           | + 8 optional on FDC card                                                                                                                                       |
| RS 232 serial port                                                  | <b>2</b>                    | On request, 1 can be RS485                                                                                                                                     |
| CANopen fieldbus port                                               | <b>3</b>                    | CiA standard Profile 401, 402 and 406                                                                                                                          |
| EtherCAT fieldbus port                                              | <b>1</b>                    | Optional with CoE, EoE end FoE protocols                                                                                                                       |
| Mechatrolink II fieldbus port                                       | <b>1</b>                    | On optional INT-Mechatrolink card                                                                                                                              |
| Ethernet port 10-100 T                                              | <b>1</b>                    | TCP/IP, FTP, ModbusTCP and WEB server                                                                                                                          |
| USB port                                                            | <b>2</b>                    |                                                                                                                                                                |
| SPI interface                                                       | <b>1</b>                    | On 20 pins flat cable connector                                                                                                                                |
| LVDS interface                                                      | <b>1</b>                    | Optional: <ul style="list-style-type: none"> <li>on 26 pin conn. for obsolete active remote terminals</li> <li>on 36 pin conn. for remote terminals</li> </ul> |
| Relay safety outputs                                                | <b>1</b>                    |                                                                                                                                                                |
| Power supply                                                        | <b>24 Vdc</b>               |                                                                                                                                                                |

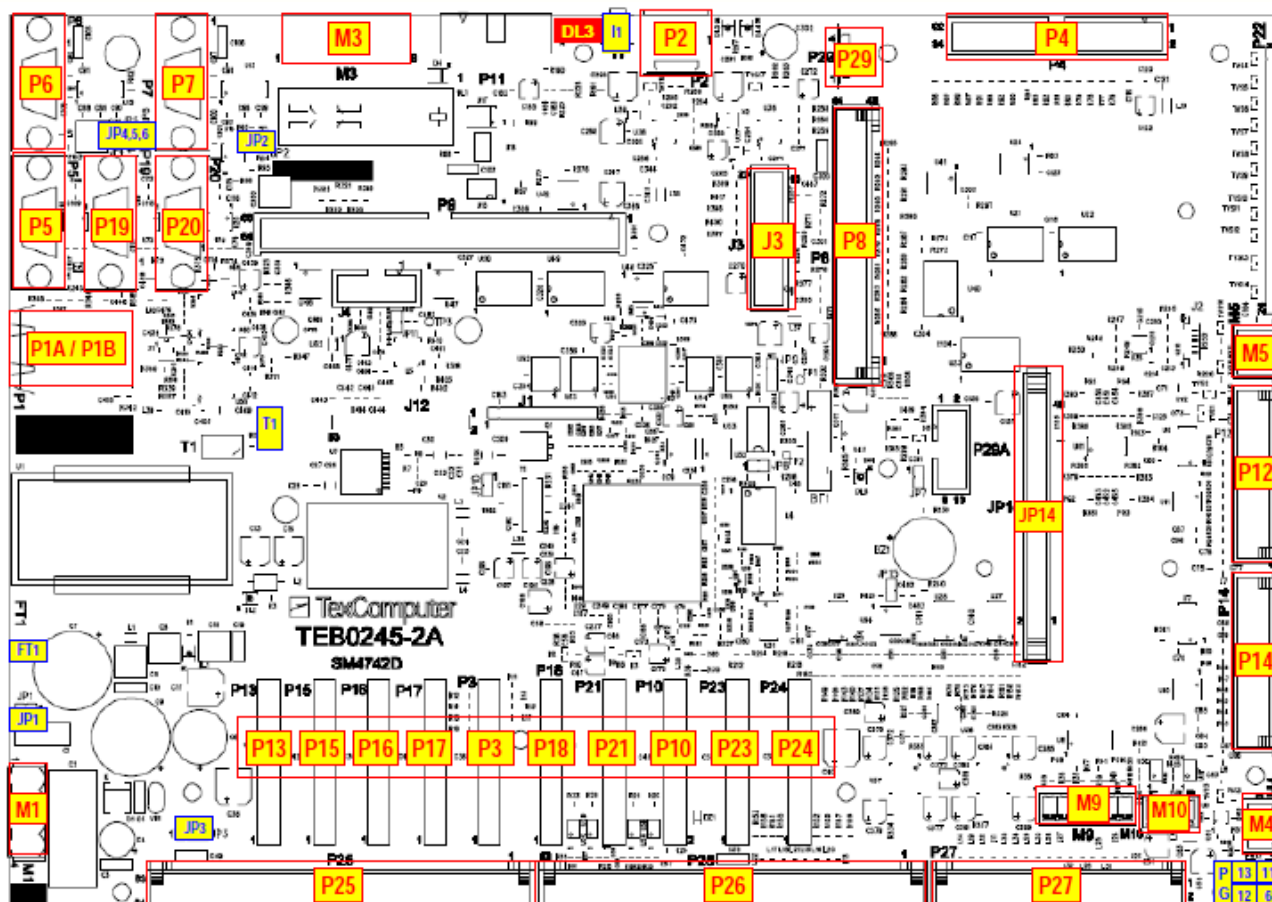
## Warnings

Before powering up the controller you should always check the following:

1. That the power is supplied only via terminal M1
2. That the supply voltage never exceeds 27 VDC
3. That the connections between the + and - of the power supplies are not reversed, both incoming or exiting the controller
4. That the encoders are not fed with voltages other than those provided by the controller
5. That the position of connectors having the same number of poles have not been inverted



Failure to observe any of these recommendations could cause irreparable damage to the controller.



| Name  | Type                       | Function                                                                                                                       |
|-------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| P1A * | Bottom RJ5 connector       | EtherCAT (activation as option)                                                                                                |
| P1B * | Top RJ45 connector         | Ethernet 10/100 T                                                                                                              |
| P2    | USB connector              | USB port # 2                                                                                                                   |
| P5    | 9 pin D connector          | CAN A (0-63 addressable nodes)                                                                                                 |
| P6    | 9 pin D connector          | COM 1 RS232 (RS485 optional)                                                                                                   |
| P7    | 9 pin D connector          | COM 2 RS232                                                                                                                    |
| P8    | 40 pin flat connector      | Connection to FDC expansion card                                                                                               |
| P10   | Connector for I / O module | Set with 8 points digital input or output                                                                                      |
| P12   | 26 pin flat connector      | PWM and axes U, V, A and C DIR outputs<br>4 Analog inputs 0-10V / 0-2mA at 12 bit                                              |
| P14   | 26 pin flat connector      | PWM and axes X, Y, Z and W DIR outputs<br>4 Analog inputs 0-10 V / 0-5V at 12 bit set by PG6, 11, 12 and 13 (0-10V as default) |
| P19   | 9 pin D connector          | CAN B (64-127 addressable nodes) + VA power supply                                                                             |
| P20   | 9 pin D connector          | CAN C (128-191 addressable nodes)                                                                                              |
| P25   | 64 pin flat connector      | 31 Digital inputs (also for use as Home limit switch)<br>6 Configurable digital inputs / outputs<br>16 Digital outputs         |

| Name   | Type                               | Function                                                                                                                                                                                                                                                                                   |
|--------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P26    | 64 pin flat connector              | A, B and Z signals, encoders # 1, 2, 3 and 4<br>Analog outputs +/- 10 V # 1, 2, 3 and 4<br>Digital outputs, enabling of axes # 1, 2, 3 and 4<br>1 Emergency input<br>16 Digital inputs (also for use as Home limit switch)<br>2 Configurable digital inputs / outputs<br>9 Digital outputs |
| P27    | 40 pin flat connector              | A, B and Z signals, encoders # 5, 6, 7 and 8<br>Analog outputs +/- 10 V # 5, 6, 7 and 8<br>Digital outputs, enabling of axes # 5, 6, 7 and 8<br>3 Digital outputs<br>4 Digital inputs (also for use as Home limit switch)                                                                  |
| P29    | USB connector                      | USB port # 1                                                                                                                                                                                                                                                                               |
| M1     | 4 pin terminal board               | Controller and I/O power supply                                                                                                                                                                                                                                                            |
| M3     | 8 pin terminal board               | OMRON G78A-2A2B safety relay contacts                                                                                                                                                                                                                                                      |
| M4     | 3 pin terminal board               | Analog input +/- 10V + input 0-20mA – 12 bit                                                                                                                                                                                                                                               |
| M5     | 6 pin terminal board,              | 3 Analog inputs 0-5 Volt at 12 bit                                                                                                                                                                                                                                                         |
| M9 **  | 6-pin Terminal board clamp. Spring | A, B signals encoder # 9 - 5V Line Driver (5V Push Pull on request)                                                                                                                                                                                                                        |
| M10 ** | 3 pin terminal board               | Digital inputs i28 & i29, 24V PNP, alternative to encoder # 9                                                                                                                                                                                                                              |
| J3     | 20 pin flat connector              | SPI interface for internal optional card                                                                                                                                                                                                                                                   |
| PG2    | Spot welding                       | Change the analog input ADC (5) FS to 0-20mA                                                                                                                                                                                                                                               |
| PG3    | Spot welding                       | Change the analog input ADC (4) FS to 0-20mA                                                                                                                                                                                                                                               |
| PG4    | Spot welding                       | Change the analog input ADC (35) FS to 0-20mA                                                                                                                                                                                                                                              |
| PG5    | Spot welding                       | Change the analog input ADC (36) FS to 0-20mA                                                                                                                                                                                                                                              |
| PG6    | Spot welding                       | Decreases the analog input ADC (3) FS at 5V                                                                                                                                                                                                                                                |
| PG11   | Spot welding                       | Decreases the analog input ADC (2) FS at 5V                                                                                                                                                                                                                                                |
| PG12   | Spot welding                       | Decreases the analog input ADC (1) FS at 5V                                                                                                                                                                                                                                                |
| PG13   | Spot welding                       | Decreases the analog input ADC (0) FS at 5V                                                                                                                                                                                                                                                |
| JP1    | Jumper                             | Short-circuiting of logic GND and analog GND                                                                                                                                                                                                                                               |
| JP2    | Jumper                             | RS485 port termination resistor                                                                                                                                                                                                                                                            |
| JP4    | Jumper                             | CAN A port termination resistor                                                                                                                                                                                                                                                            |
| JP5    | Jumper                             | CAN B port termination resistor                                                                                                                                                                                                                                                            |
| JP6    | Jumper                             | CAN C port termination resistor                                                                                                                                                                                                                                                            |
| FT1    | Faston                             | 2,5 mm <sup>2</sup> cable earth connection                                                                                                                                                                                                                                                 |
| I1     | Micro-pushbutton                   | Start of Boot function                                                                                                                                                                                                                                                                     |

\* The Ethernet connectors are mounted horizontally and stacked, so when the Box versions are installed a gap of about 5 cm should be left on this side of the controller.

\*\* The connectors M9 and M10 are alternatives to each other; M10 connector must be requested when ordering.

**For connectors without numbering, pin 1 is highlighted in red.**

### M1 TERMINAL BOARD (power supply)

| Terminal | Function                                   |
|----------|--------------------------------------------|
| 1        | VA +24 Vdc Controller and I/O power supply |
| 2        | GNDA 0Vdc power supply                     |
| 3        | GNDA 0Vdc power supply                     |
| 4        | VA +24 Vdc Controller and I/O power supply |

### M3 TERMINAL BOARD (safety relay)

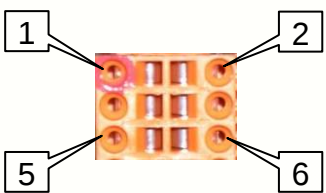
| Terminal | Function                                                         |
|----------|------------------------------------------------------------------|
| 1        | K1A-NA1 safety relay NO contact (normally open contact of o40)   |
| 2        | K1A-NA2 safety relay NO contact (normally open contact of o40)   |
| 3        | K1B-NA1 safety relay NO contact (normally open contact of o40)   |
| 4        | K1B-NA2 safety relay NO contact (normally open contact of o40)   |
| 5        | K1A-NC1 safety relay NC contact (normally closed contact of o40) |
| 6        | K1A-NC2 safety relay NC contact (normally closed contact of o40) |
| 7        | K1B-NC1 safety relay NC contact (normally closed contact of o40) |
| 8        | K1B-NC2 safety relay NC contact (normally closed contact of o40) |

The internal relay K1, which can be activated by output o40, is an TE CONNECTIVITY SR4D4024 safety relay with two pairs of forced-guide contacts called K1A and K1B. Redundancy is obtained by connecting the 2 NO contacts in series with each other and the 2 NC contacts in parallel. The relay K1 is powered by the voltage VA through an internal electronic circuit.

### M4 TERMINAL BOARD (+/- 10V and 0-20 mA input)

| Terminal | Function                                                                                |
|----------|-----------------------------------------------------------------------------------------|
| 1        | +/- 10 V Analog input readable with ADC(32) operator, range 1640...14744, res..12 bit   |
| 2        | GND                                                                                     |
| 3        | 0-20 mA Analog input readable with ADC(27) c operator, range 0... 16384, resolut.12 bit |

### M5 TERMINAL BOARD (3 analog inputs at 5V)

| Morsetto | Funzione                                           | Layout                                                                                |
|----------|----------------------------------------------------|---------------------------------------------------------------------------------------|
| 1        | Analog GND                                         |  |
| 2        | 5 V Analogue input readable with ADC(256) operator |                                                                                       |
| 3        | 5 V Analogue input readable with ADC(257) operator |                                                                                       |
| 4        | 5 V Analogue input readable with ADC(258) operator |                                                                                       |
| 5        | Analog GND                                         |                                                                                       |
| 6        | + 5V for potentiometer power supply                |                                                                                       |

### M9 TERMINAL BOARD (encoder # 9, as alternative to M10)

| Terminal | Function                                           | Note                           |
|----------|----------------------------------------------------|--------------------------------|
| 1        | CLK A channel A straight encoder # 9 / input i28 * | 5V Line Driver or Push Pull ** |
| 2        | CLK/ A channel A negated encoder # 9               |                                |
| 3        | CLK B channel B straight encoder # 9 / input i29 * | 5V Line Driver or Push Pull ** |
| 4        | CLK/B channel B negated encoder # 9                |                                |
| 5        | GND power supply ground encoder # 9                |                                |
| 6        | VDC +5Vdc power supply for encoder # 9             |                                |

\* The hardware configuration parameter "EMIOS30 function" allows you to use pin 1 & 3 as encoder inputs (the default) or as user inputs i28 & i29.

\*\* On request, encoder's inputs can be supplied in 5V Push-Pull configuration; in this case the input signals must be connected to the straight channels and the negated channels must be left disconnected.

The encoder inputs can be filtered by software acting on Info 1623 and Info 1648.

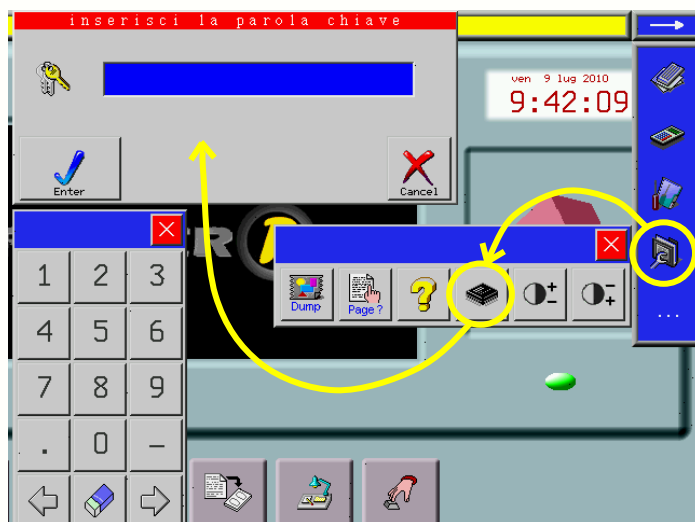
### **M10 TERMINAL BOARD (24V PNP inputs, as alternative to M9)**

| <b>Morsetto</b> | <b>Funzione</b>                                                |
|-----------------|----------------------------------------------------------------|
| 1               | User input i28N - 24V PNP, inverted logic (1 to 0 V, 0 to 24V) |
| 2               | 24 VA +24 Vdc Controller and I/O power supply                  |
| 3               | User input i29N - 24V PNP, inverted logic (1 to 0 V, 0 to 24V) |

These inputs must be enabled through "EMIOS30 function" Hardware configuration parameter.

## Ethernet Connection

There is one parameter to enable Ethernet connection, one to set its IP address and one to declare its subnet mask; the first and the third one are accessible in the machine parameters, while the Ethernet address is in the “change card parameters” list accessible from the Boot menu (see also “Basic touch screen functions” in this data sheet). If the controller does not have a full hardware keyboard, the Boot menu should be accessed through the touch screen tool bar (remember that this access is protected by a password):



For further information, refer to the “User interface” section of the html manual. By default, the connection is already enabled and the controller can be accessed at IP address 192.168.0.200, subnet mask 255.255.255.0; to make a direct connection to a PLC (peer to peer mode), use a crossover Ethernet cable with 8-pin RJ45 connectors.

## BOX Version

A “keyboard + display” kit is available for temporary connection to the BOX version for access to all the diagnostic and parameter setting functions only accessible by means of the HMI base of the Operating System. To activate its operation, set the type of display of the kit connected (generally an 8.4" VGA display) by switching on the controller with the F6 + 1 keys held down.

After use, the kit can be removed, remember to set the screen type as BOX again by switching on the controller with keys F7 + 0 held down, or using the Smart Bios configuration program.

## Volatile RAM memory

In order to use more than 16 interpolated axes you need more RAM; for this reason, from 2015, you can request the option to add to the controller 4 or 8 Mbytes of volatile static RAM, that resets at every power on.

This memory is dedicated to the following functions:

- As a buffer to hold the compiled PLC code, before the transfer in Flash
- As a buffer to hold the CNC queue of movements (Look-Haed function)
- As a buffer to contain any extra additional V variables

## Names of axes

This hardware configuration parameter associates the names of the axes to the hardware resources on the motherboard. These resources can be identified per type and differ for a consecutive numbering (e.g. encoder # 1, encoder # 2, PWM # 5 etc.). In the default configuration, to the first 16 axes are assigned the following names: XYZWUABCDVEFGHIJ; these names can also be modified but must

consist of only 1 letter. The position adopted by each letter, starting from 0, is the number with which the axis will be identified, if it is installed; therefore, the default is: X is the axis # 0, J is the axis # 15.

### Installed axes

In order to install axis and make them operative, the axes must be entered in the specific hardware configuration parameter. It's possible to modify default allocations of the hardware sources working on the respective special parameters of each axis.

For example: installing axes X and Y and modifying the "encoder number" parameter of the "X axis special parameters" from the "default" value to value "4" transfers the X axis feedback from encoder # 1 to encoder # 4, while the Y axis feedback will remain the default correlation to # 2.

The freed resources (encoder # 1 in the example) can be used by other axes or managed through specific commands available in the programming language.

### Number of axes beyond 16

If the optional volatile RAM is available, this parameter specifies the number of axes that you want to add to the first 16 (min.1, max. 8). In this case the names of added axes must be declared in their "long name" parameter. Additional axes are assigned to the positions 16 to 23; those that are not enabled by this parameter will still be used as an encoder because a reduced set of their "special parameters" will be available for them.

### Parameters to associate hardware resources to the axes

"PWM/DAC/freq output number": destination of the PID output of the axis (valid values from 1 to 24).

"encoder number": velocity/position feedback of the axis (valid values from 1 to 24)

"enabling output": output to enable the drive of the axis (any available user output is valid).

"zero sensor": input to change the position of the axis (only interrupt inputs are valid)

"minimum sensor": input to limit the minimum stroke of the axis (any available input is valid).

"maximum sensor": input to limit the maximum stroke of the axis (any available input is valid).

The output which controls the direction of the axis cannot be changed from the default setting.

### Management of the limit switches dedicated to the axes

Inputs with a preset function are associated by default to each axis installed:

- **Zero Limit Switch**, allows you to modify axis position at its deactivation or at reception of a pulse generated by the encoder through a "0 Notch" signal. The input must be controllable in interrupt mode.
- **Minimum Limit Switch**, when activated, it stops axis movement and switches to alarm status and prevents any movement towards lower position values. Input must remain active until the axis physical bottom limit is reached.
- **Maximum Limit Switch**, when activated, it stops axis movement and switches to alarm status and prevents any movement towards higher position values. Input must remain active until the axis physical top limit is reached.

Generally Zero Limit Switch can also simultaneously work as one of the two limit switches (minimum or maximum), therefore by default the Zero and Minimum Limit Switchs use the same input.

### +/- 10V Analog input

To use correctly analog input connected to pin 1 of terminal M4, you have to execute linearization of the value read through ADC (32) operator, considering that:

- an input value of -10V corresponds to a value of 1640  $\mu$ m
- an input value of 0V corresponds to a value of 8192  $\mu$ m
- an input value of +10V corresponds to a value of 14744  $\mu$ m

As the converter's resolution is 12 bit, the minimum change noticeable will be 1,5996  $\mu$ m

### Other analog inputs

All analog inputs read by the operator ADC (xx) must be linearized with respect to the value of full scale (FS) of the input taking into account that:

- an input value of 0 % FS corresponds to a value of 0  $\mu\text{m}$
- an input value of 100% FS corresponds to a value of 16384  $\mu\text{m}$

As the converter's resolution is 12 bit, the minimum change noticeable will be 4  $\mu\text{m}$

### 64-bit math libraries

The Power N as default is supplied with firmware provided with math libraries to perform calculations in floating point 32-bit .

However, there are some applications where it is often necessary to increase the accuracy of the calculations in order to ensure maximum accuracy in the generation of the trajectories of the axes; for these cases there is also a version of the firmware compiled with 64-bit math libraries.

Logically, in order to obtain greater precision in the calculations you need to keep busy longer the CPU on the same mathematical instructions resulting in decreased processing speed of the application program.

For more information please contact the technical staff of Tex Computer.

## P25 CONNECTOR (Digital I/O)

| Pin | DESCRIPTION                                       | NOTES                          |
|-----|---------------------------------------------------|--------------------------------|
| 1   | GNDA I/O power supply ground                      |                                |
| 2   | VA +24 I/O power supply                           |                                |
| 3   | GNDA I/O power supply ground                      |                                |
| 4   | VA +24 I/O power supply                           |                                |
| 5   | RUN CNC runs the last program executed by the CNC | User input i36                 |
| 6   | HOLD blocks axis movement                         | User input i38                 |
| 7   | RUN PLC activates the PLC program                 | User input i37                 |
| 8   | User input i39                                    | Axis # 9 (B) home limit switch |
| 9   | User output o0                                    |                                |
| 10  | User input i0                                     |                                |
| 11  | User output o1                                    |                                |
| 12  | User input i1                                     |                                |
| 13  | User output o2                                    |                                |
| 14  | User input i2                                     |                                |
| 15  | User output o3                                    |                                |
| 16  | User input i3                                     |                                |
| 17  | User output o4                                    |                                |
| 18  | User input i4                                     |                                |
| 19  | User output o5                                    |                                |
| 20  | User input i5                                     |                                |
| 21  | User output o6                                    |                                |
| 22  | User input i6                                     |                                |
| 23  | User output o7                                    |                                |
| 24  | User input i7                                     |                                |
| 25  | User output o8                                    |                                |
| 26  | User input i8                                     | Non usabile in interrupt       |
| 27  | User output o9                                    |                                |
| 28  | User input i9                                     | Non usabile in interrupt       |
| 29  | User output o10                                   |                                |
| 30  | User input i10                                    | Non usabile in interrupt       |
| 31  | User output o11                                   |                                |
| 32  | User input i11                                    | Non usabile in interrupt       |
| 33  | User output o12                                   |                                |
| 34  | User input i12                                    | Non usabile in interrupt       |
| 35  | User output o13                                   |                                |
| 36  | User input i13                                    | Non usabile in interrupt       |
| 37  | User output o14                                   |                                |
| 38  | User input i14                                    | Non usabile in interrupt       |
| 39  | User output o15                                   |                                |
| 40  | User input i15                                    | Non usabile in interrupt       |
| 41  | VA +24 I/O power supply                           |                                |
| 42  | User input i16                                    |                                |
| 43  | VA +24 I/O power supply                           |                                |
| 44  | User input i17                                    |                                |
| 45  | GNDA I/O power supply ground                      |                                |
| 46  | User input i18                                    |                                |
| 47  | GNDA I/O power supply ground                      |                                |

| Pin | DESCRIPTION                        | NOTES                                         |
|-----|------------------------------------|-----------------------------------------------|
| 48  | User input i19                     |                                               |
| 49  | GNDA I/O power supply ground       |                                               |
| 50  | User input i20                     |                                               |
| 51  | User input i33                     |                                               |
| 52  | User input i21                     |                                               |
| 53  | User input i34                     |                                               |
| 54  | User input i23                     |                                               |
| 55  | User input i35                     |                                               |
| 56  | User input i22                     |                                               |
| 57  | User input i50 / User output o50 * | if input, it's Axis # 6 (V) home limit switch |
| 58  | User input i51 / User output o51 * |                                               |
| 59  | User input i52 / User output o52 * | if input, it's Axis # 7 (A) home limit switch |
| 60  | User input i53 / User output o53 * |                                               |
| 61  | User input i54 / User output o54 * | if input, it's Axis # 8 (C) home limit switch |
| 62  | User input i55 / User output o55 * |                                               |
| 63  | GNDA I/O power supply ground       |                                               |
| 64  | VA +24 I/O power supply            |                                               |

\* Depends on the I/O module inserted in slot P10

## P26 CONNECTOR (axes 1-4 and digital I/O)

| Pin | DESCRIPTION                               | NOTES                                                                          |
|-----|-------------------------------------------|--------------------------------------------------------------------------------|
| 1   | GNDANAL X X axis analog ground            |                                                                                |
| 2   | VREF X reference signal, +/- 10V          | axis # 1                                                                       |
| 3   | GNDANAL Y Y axis analog ground            |                                                                                |
| 4   | VREF Y reference signal, +/- 10V          | axis # 2                                                                       |
| 5   | GNDANAL Z Z axis analog ground            |                                                                                |
| 6   | VREF Z reference signal, +/- 10V          | axis # 3                                                                       |
| 7   | GNDANAL W W axis analog ground            |                                                                                |
| 8   | VREF W reference signal, +/- 10V          | axis # 4                                                                       |
| 9   | GND logic ground for connection to screen |                                                                                |
| 10  | GND logic ground for connection to screen |                                                                                |
| 11  | CLKA X encoder # 1 channel                |                                                                                |
| 12  | CLKB X encoder # 1 channel                |                                                                                |
| 13  | NOTCH 0 X 0 channel encoder # 1           | User input i56 only non optoinsulated IPT, 5V                                  |
| 14  | GND logic ground for encoder power supply |                                                                                |
| 15  | CLKA Y encoder # 2 channel                |                                                                                |
| 16  | CLKB Y encoder # 2 channel                |                                                                                |
| 17  | NOTCH 0 Y 0 channel encoder # 2           | User input i57 only non optoinsulated IPT, 5V                                  |
| 18  | GND logic ground for encoder power supply |                                                                                |
| 19  | CLKA Z encoder # 3 channel                |                                                                                |
| 20  | CLKB Z encoder # 3 channel                |                                                                                |
| 21  | NOTCH 0 Z 0 channel encoder # 3           | User input i58 only non optoinsulated IPT, 5V                                  |
| 22  | GND logic ground for encoder power supply |                                                                                |
| 23  | CLKB W encoder # 4 channel                |                                                                                |
| 24  | CLKB W encoder # 4 channel                |                                                                                |
| 25  | NOTCH 0 W 0 channel encoder # 4           | User input i59 only non optoinsulated IPT, 5V                                  |
| 26  | GND logic ground for encoder power supply |                                                                                |
| 27  | VDC +5Vdc power supply for encoder        |                                                                                |
| 28  | VDC +5Vdc power supply for encoder        |                                                                                |
| 29  | VDC +5Vdc power supply for encoder        |                                                                                |
| 30  | VDC +5Vdc power supply for encoder        |                                                                                |
| 31  | User output o16                           | By default ENBX enabling of driver # 1                                         |
| 32  | VA +24 I/O power supply                   |                                                                                |
| 33  | User output o17                           | By default ENBY enabling of driver # 2                                         |
| 34  | SELPNP/NPN                                | <b>Note 1</b>                                                                  |
| 35  | User output o18                           | By default ENBZ enabling of driver # 3                                         |
| 36  | GNDA I/O power supply ground              |                                                                                |
| 37  | User output o19                           | By default ENBW enabling of driver # 4                                         |
| 38  | GNDA I/O power supply ground              |                                                                                |
| 39  | User input i46                            | By default Axis # 4 (W) zero limit stop                                        |
| 40  | User input i40                            | By default Axis # 1 (X) zero limit stop                                        |
| 41  | FCEMG emergency, Machine Running          | s23, if EMG is deactivated becomes user input i47                              |
| 42  | User input i41                            | By default Axis # 1 (X) max limit stop                                         |
| 43  | User output o32                           | Can become DIRO X axis # 1 direction output if "drive type" parameter = 2 or 4 |
| 44  | User input i42                            | By default Axis # 2 (Y) home limit stop                                        |
| 45  | User output o33                           | Can become DIRO Y axis # 2 direction output if "drive type" parameter = 2 or 4 |
| 46  | User input i43                            | By default Axis # 2 (Y) max limit stop                                         |

| Pin | DESCRIPTION                        | NOTES                                                                          |
|-----|------------------------------------|--------------------------------------------------------------------------------|
| 47  | User output o34                    | Can become DIRO Z axis # 3 direction output if "drive type" parameter = 2 or 4 |
| 48  | User input i44                     | By default Axis # 3 (Z) home limit stop                                        |
| 49  | User output o35                    | Can become DIRO W axis # 4 direction output if "drive type" parameter = 2 or 4 |
| 50  | User input i45                     | By default Axis # 3 (Z) max limit stop                                         |
| 51  | VA +24 I/O power supply            |                                                                                |
| 52  | GND A I/O power supply ground      |                                                                                |
| 53  | User input i48 / User output o48 * | if input, it's Axis # 5 (U) home limit stop                                    |
| 54  | User input i49 / User output o49 * |                                                                                |
| 55  | User input i32                     |                                                                                |
| 56  | GND A I/O power supply ground      |                                                                                |
| 57  | User input i25 **                  | Axis # 10 (D) home limit switch                                                |
| 58  | User input i24 **                  | Not usable in interrupt mode                                                   |
| 59  | User input i26 **                  | By default Axis # 11 (E) home limit switch                                     |
| 60  | User input i27 **                  | By default Axis # 12 (F) home limit switch                                     |
| 61  | GND A I/O power supply ground      |                                                                                |
| 62  | VA +24 I/O power supply            |                                                                                |
| 63  | User output o39                    | Can become DIRO C axis # 8 direction output if "drive type" parameter = 2 or 4 |
| 64  |                                    |                                                                                |

\* Depends on the I/O module inserted in slot P10

\*\* It is recommended to use these resources only after you have used all those available in the removable I/O modules.

**Note 1** this PIN polarises all inputs called "User input": if connected to VA it sets them as NPN, or if connected to GND A it sets them as PNP.

Encoder inputs are CMOS type RC filter at input.

Logic level 0 of the encoder signal must be less than 1 Volt; logic level 1 must be higher than 4 Volts.

If the frequency is higher than 250Khz use of the LINE-DRIVER interface is recommended.

The GNDANAL signals must be connect to the differential input of the drive, if they have one. If this is not the case the GNDANAL input signal must be free.

In this case, the GND is used as common reference signal between POWER N and DRIVE.

In the case of DRIVES without differential input, it might be necessary to connect the screened cable to ground at both ends or to connect the -vref signal of the drive directly to ground in the gnd drive.

It depends on the specifications of drive and on how the control panel is constructed.

**P27 CONNECTOR (axes 5-8)**

| Pin | DESCRIPTION                       | NOTES                                                                          |
|-----|-----------------------------------|--------------------------------------------------------------------------------|
| 1   | U axis GNDANAL                    |                                                                                |
| 2   | VREF U reference signal, +/- 10V  | axis # 5                                                                       |
| 3   | V axis GNDANAL                    |                                                                                |
| 4   | VREF V reference signal, +/- 10V  | axis # 6                                                                       |
| 5   | GND                               |                                                                                |
| 6   | User output o20                   | By default ENBU enabling of driver # 5                                         |
| 7   | User output o21                   | By default ENBV enabling of driver # 6                                         |
| 8   | GND A                             |                                                                                |
| 9   | +VDC +5V for encoder power supply |                                                                                |
| 10  | CLKA U encoder # 5 channel        |                                                                                |
| 11  | GND encoder logic ground          |                                                                                |
| 12  | CLKb U encoder # 5 channel        |                                                                                |
| 13  | GND encoder logic ground          |                                                                                |
| 14  | NOTCH 0 U 0 channel encoder # 5   | User input i60 only non optoinsulated IPT, 5V                                  |
| 15  | +VDC +5VOLT ENCODER               |                                                                                |
| 16  | CLKA V encoder # 6 channel        |                                                                                |
| 17  | GND encoder logic ground          |                                                                                |
| 18  | CLKB V encoder # 6 channel        |                                                                                |
| 19  | G N D encoder logic ground        |                                                                                |
| 20  | NOTCH 0 V 0 channel encoder # 6   | User input i61 only non optoinsulated IPT, 5V                                  |
| 21  | +VDC +5VOLT ENCODER               |                                                                                |
| 22  | CLKA encoder # 7 channel          |                                                                                |
| 23  | GND encoder logic ground          |                                                                                |
| 24  | CLKB encoder # 7 channel          |                                                                                |
| 25  | GND encoder logic ground          |                                                                                |
| 26  | NOTCH 0 A 0 channel encoder # 7   | User input i62 only non optoinsulated IPT, 5V                                  |
| 27  | +VDC +5VOLT ENCODER               |                                                                                |
| 28  | CLKA encoder # 8 channel          |                                                                                |
| 29  | CLKB encoder # 8 channel          |                                                                                |
| 30  | NOTCH 0 0 channel encoder # 8     | User input i63 only non optoinsulated IPT, 5V                                  |
| 31  | A axis GNDANAL                    |                                                                                |
| 32  | A axis VREF                       | axis # 7                                                                       |
| 33  | C axis GNDANAL                    |                                                                                |
| 34  | C axis VREF                       | axis # 8                                                                       |
| 35  | GND logic ground                  |                                                                                |
| 36  | User output o22                   | By default ENBA enabling of driver # 7                                         |
| 37  | User output o23                   | By default ENBC enabling of driver # 8                                         |
| 38  | User output o36                   | Can become DIRO U axis # 5 direction output if "drive type" parameter = 2 or 4 |
| 39  | User output o37                   | Can become DIRO V axis # 6 direction output if "drive type" parameter = 2 or 4 |
| 40  | User output o38 XDIROA            | Can become DIRO A axis # 7 direction output if "drive type" parameter = 2 or 4 |

## P14 CONNECTOR (PWM # 1, 2, 3 and 4 + analog inputs)

| Pin | DESCRIPTION                             | NOTES                                     |
|-----|-----------------------------------------|-------------------------------------------|
| 1   | VCC + 5Vdc power supply                 |                                           |
| 2   | # 1 PWM control output for PWM drivers  |                                           |
| 3   | GND Logic Ground                        |                                           |
| 4   | DIR # 1 output direction for PWM driver | User output o24 (5V TTL)                  |
| 5   | GND Logic Ground                        |                                           |
| 6   | # 2 PWM control output for PWM drivers  |                                           |
| 7   | GND Logic Ground                        |                                           |
| 8   | DIR # 2 output direction for PWM driver | User output o25 (5V TTL)                  |
| 9   | GND Logic Ground                        |                                           |
| 10  | # 3 PWM control output for PWM drivers. |                                           |
| 11  | GND Logic Ground                        |                                           |
| 12  | DIR # 3 output for PWM driver           | User output o26 (5V TTL)                  |
| 13  | + 12/15 Volt DC 0.05A max               |                                           |
| 14  | # 4 PWM control output for PWM drivers. |                                           |
| 15  | - 12/15 Volt DC 0.05A max               |                                           |
| 16  | DIR # 4 output direction for PWM driver | User output o27 (5V TTL)                  |
| 17  | ENABLE # 2 negated (0 = driver enabled) | User output o17 (O.C. max. 30V – 30mA)    |
| 18  | ENABLE # 1 negated (0 = driver enabled) | User output o16 (O.C. max. 30V – 30mA)    |
| 19  | ENABLE # 4 negated (0 = driver enabled) | User output o19 (O.C. max. 30V – 30mA)    |
| 20  | ENABLE # 3 negated (0 = driver enabled) | User output o18 (O.C. max. 30V – 30mA))   |
| 21  | VREF for analog inputs + 5Vdc           |                                           |
| 22  | AGND analog ground for analog inputs    |                                           |
| 23  | Analog input 1 – assignment to ADC (1)  | Note 1 - 0..10V (0..5V if PG12 is closed) |
| 24  | Analog input 0 – assignment to ADC (0)  | Note 1 - 0..10V (0..5V if PG13 is closed) |
| 25  | Analog input 3 – assignment to ADC (3)  | Note 1 - 0..10V (0..5V if PG6 is closed)  |
| 26  | Analog input 2 – assignment to ADC (2)  | Note 1 - 0..10V (0..5V if PG11 is closed) |

**Note 1:**

The buffered analog inputs have a resolution of 12 bits; their input resistance is 200 Kohm (0..10V setting) or 100 Kohm (0..5V setting).

## P12 CONNECTOR (PWM # 5, 6, 7 and 8 + analog inputs)

| Pin | DESCRIPTION                              | NOTES                                      |
|-----|------------------------------------------|--------------------------------------------|
| 1   | VCC + 5Vdc power supply                  |                                            |
| 2   | PWM # 5 PWM driver command output        |                                            |
| 3   | GND logic ground                         |                                            |
| 4   | DIR # 5 output direction for PWM driver  | User output o28 (5V TTL)                   |
| 5   | GND logic ground                         |                                            |
| 6   | PWM # 6 uscita comando per driver PWM    |                                            |
| 7   | GND logic ground                         |                                            |
| 8   | DIR # 6 output direction for PWM driver  | User output o29 (5V TTL)                   |
| 9   | GND logic ground                         |                                            |
| 10  | PWM # 7 output command for PWM driver.   |                                            |
| 11  | GND logic ground                         |                                            |
| 12  | DIR # 7 output direction for PWM driver  | User output o30 (5V TTL)                   |
| 13  | + 12/15 Volt DC 0.05A max                |                                            |
| 14  | PWM # 8 PWM driver command output        |                                            |
| 15  | - 12/15 Volt DC 0.05A max                |                                            |
| 16  | DIR # 8 output direction for PWM driver  | User output o31 (5V TTL)                   |
| 17  | ENABLE # 6 negated (0 = driver enabled)  | User output o21 (O.C. max. 30V – 30mA)     |
| 18  | ENABLE # 5 negated (0 = driver enabled)  | User output o20 (O.C. max. 30V – 30mA)     |
| 19  | ENABLE # 8 negated (0 = driver enabled)  | User output o23 (O.C. max. 30V – 30mA)     |
| 20  | ENABLE # 7 negated (0 = driver enabled)  | User output o22 (O.C. max. 30V – 30mA)     |
| 21  | VREF for analog inputs + 5Vdc            |                                            |
| 22  | AGND analog ground for analog inputs     |                                            |
| 23  | Analog input 5 – assignment to ADC (5)   | Note 2 - 0..10V (0..20mA if PG2 is closed) |
| 24  | Analog input 4 – assignment to ADC (4)   | Note 2 - 0..10V (0..20mA if PG3 is closed) |
| 25  | Analog input 36 – assignment to ADC (36) | Note 2 - 0..10V (0..20mA if PG5 is closed) |
| 26  | Analog input 35 – assignment to ADC (35) | Note 2 - 0..10V (0..20mA if PG4 is closed) |

### Note 2:

The analog inputs have a resolution of 12 bits and accept voltages between 0 and 10 volts.

They are buffered to make their input resistance high; if setted in order to accept input signals to 0-20 mA their input resistance is 499 ohm.

**WARNING:** this document only describes the electrical connections of the connectors most often used. For all further information about electrical connections refer to the "Electrical Connections" section of the electronic document entitled "**Power Family Controllers - USE AND PROGRAMMING MANUAL**". The constantly updated version of this manual, supplied as a compiled HTML Help file called "**Power Family.chm**", can be downloaded from the "Download Service" area of the [www.texcomputer.com](http://www.texcomputer.com) site.

## DIGITAL INPUTS (consecutive numbering)

| input | connector | pin | slot I/O    | notes                                                                                           |
|-------|-----------|-----|-------------|-------------------------------------------------------------------------------------------------|
| i0    | P25       | 10  | P13         |                                                                                                 |
| i1    | P25       | 12  |             |                                                                                                 |
| i2    | P25       | 14  |             |                                                                                                 |
| i3    | P25       | 16  |             |                                                                                                 |
| i4    | P25       | 18  |             |                                                                                                 |
| i5    | P25       | 20  |             |                                                                                                 |
| i6    | P25       | 22  |             |                                                                                                 |
| i7    | P25       | 24  |             |                                                                                                 |
| i8    | P25       | 26  | P15         | Not usable in interrupt mode                                                                    |
| i9    | P25       | 28  |             | Not usable in interrupt mode                                                                    |
| i10   | P25       | 30  |             | Not usable in interrupt mode                                                                    |
| i11   | P25       | 32  |             | Not usable in interrupt mode                                                                    |
| i12   | P25       | 34  |             | Not usable in interrupt mode                                                                    |
| i13   | P25       | 36  |             | Not usable in interrupt mode                                                                    |
| i14   | P25       | 38  |             | Not usable in interrupt mode                                                                    |
| i15   | P25       | 40  |             | Not usable in interrupt mode                                                                    |
| i16   | P25       | 42  | P16         |                                                                                                 |
| i17   | P25       | 44  |             |                                                                                                 |
| i18   | P25       | 46  |             |                                                                                                 |
| i19   | P25       | 48  |             |                                                                                                 |
| i20   | P25       | 50  |             |                                                                                                 |
| i21   | P25       | 52  |             |                                                                                                 |
| i22   | P25       | 56  |             |                                                                                                 |
| i23   | P25       | 54  |             |                                                                                                 |
| i24   | P26       | 58  | motherboard | Not usable in interrupt mode                                                                    |
| i25   | P26       | 57  |             | Not usable in interrupt mode                                                                    |
| i26   | P26       | 59  |             |                                                                                                 |
| i27   | P26       | 60  |             |                                                                                                 |
| i28N  | M10       | 1   |             | <b>Digital inputs 24V PNP with inverted logic, as alternative to encoder # 9 (M9 connector)</b> |
| i29N  | M10       | 3   |             |                                                                                                 |
| i32   | P26       | 55  | P17         |                                                                                                 |
| i33   | P25       | 51  |             |                                                                                                 |
| i34   | P25       | 53  |             |                                                                                                 |
| i35   | P25       | 55  |             |                                                                                                 |
| i36   | P25       | 5   |             | RUN CNC (executes the selected CNC program)                                                     |
| i37   | P25       | 7   |             | RUN PLC (activates the PLC program; interrupt MDA)                                              |
| i38   | P25       | 6   |             | HOLD (blocks axis movement)                                                                     |
| i39   | P25       | 8   |             |                                                                                                 |

| input | connector | pin | slot I/O    | notes                                            |
|-------|-----------|-----|-------------|--------------------------------------------------|
| i40   | P26       | 40  | P21         | Axis # 1 (X) home limit switch                   |
| i41   | P26       | 42  |             | Axis # 1 (X) max limit switch                    |
| i42   | P26       | 44  |             | Axis # 2 (Y) home limit switch                   |
| i43   | P26       | 46  |             | Axis # 2 (Y) max limit switch                    |
| i44   | P26       | 48  |             | Axis # 3 (Z) home limit switch                   |
| i45   | P26       | 50  |             | Axis # 3 (Z) max limit switch                    |
| i46   | P26       | 39  |             | Axis # 4 (w) home limit switch                   |
| i47   | P26       | 41  |             | s23 emergency in. (if EMG is deactivated => i47) |
| i48 * | P26       | 53  | P10         | Config. as o48* or Axis 5 (U) home limit switch  |
| i49 * | P26       | 54  |             | Configurable as o49*                             |
| i50 * | P25       | 57  |             | Config. as o50* or Axis 6 (V) home limit switch  |
| i51 * | P25       | 58  |             | Configurable as o51*                             |
| i52 * | P25       | 59  |             | Config. as o52* or Axis 7 (A) home limit switch  |
| i53 * | P25       | 60  |             | Configurable as o53*                             |
| i54 * | P25       | 61  |             | Config. as o54* or Axis 8 (C) home limit switch  |
| i55 * | P25       | 62  |             | Configurable as o55*                             |
| i56   | P26       | 13  | motherboard | X axis 0 notch (5 V TTL, TPU interrupt)          |
| i57   | P26       | 17  |             | Y axis 0 notch (5 V TTL, TPU interrupt)          |
| i58   | P26       | 21  |             | Z axis 0 notch (5 V TTL, TPU interrupt)          |
| i59   | P26       | 25  |             | W axis 0 notch (5 V TTL, TPU interrupt)          |
| i60   | P27       | 14  |             | U axis 0 notch (5 V TTL, TPU interrupt)          |
| i61   | P27       | 20  |             | V axis 0 notch (5 V TTL, TPU interrupt)          |
| i62   | P27       | 26  |             | A axis 0 notch (5 V TTL, TPU interrupt)          |
| i63   | P27       | 30  |             | C axis 0 notch (5 V TTL, TPU interrupt)          |
| i88   | -         | -   |             | Microswitch I1                                   |

\* Depends on the I/O module inserted in slot P10: if it's a digital input module the hardware configuration parameter ""direction I / O port user" must be set to 00000000.

WARNING: after this parameter is changed the PLC program must be recompiled

\*\* It is recommended to use these resources only after you have used all those available in the removable I/O modules.

## DIGITAL OUTPUTS (consecutive numbering)

| output | connector | pin | slot I/O    | notes                             |                                                                                                                          |
|--------|-----------|-----|-------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| o0     | P25       | 9   | P3          |                                   |                                                                                                                          |
| o1     | P25       | 11  |             |                                   |                                                                                                                          |
| o2     | P25       | 13  |             |                                   |                                                                                                                          |
| o3     | P25       | 15  |             |                                   |                                                                                                                          |
| o4     | P25       | 17  |             |                                   |                                                                                                                          |
| o5     | P25       | 19  | P3          |                                   |                                                                                                                          |
| o6     | P25       | 21  |             |                                   |                                                                                                                          |
| o7     | P25       | 23  |             |                                   |                                                                                                                          |
| o8     | P25       | 25  | P18         |                                   |                                                                                                                          |
| o9     | P25       | 27  |             |                                   |                                                                                                                          |
| o10    | P25       | 29  |             |                                   |                                                                                                                          |
| o11    | P25       | 31  |             |                                   |                                                                                                                          |
| o12    | P25       | 33  |             |                                   |                                                                                                                          |
| o13    | P25       | 35  |             |                                   |                                                                                                                          |
| o14    | P25       | 37  |             |                                   |                                                                                                                          |
| o15    | P25       | 39  |             |                                   |                                                                                                                          |
| o16    | P26       | 31  | P23         | ENB # 1 (X)                       | These outputs are available also on P14 connector (5V TTL ); they can be used like ENB negated for axes # 1, 2, 3 and 4. |
| o17    | P26       | 33  |             | ENB # 2 (Y)                       |                                                                                                                          |
| o18    | P26       | 35  |             | ENB # 3 (Z)                       |                                                                                                                          |
| o19    | P26       | 37  |             | ENB # 4 (W)                       |                                                                                                                          |
| o20    | P27       | 6   | P24         | ENB # 5 (U)                       | These outputs are available also on P12 connector (5V TTL ); they can be used like ENB negated for axes # 5, 6, 7 and 8. |
| o21    | P27       | 7   |             | ENB # 6 (V)                       |                                                                                                                          |
| o22    | P27       | 36  |             | ENB # 7 (A)                       |                                                                                                                          |
| o23    | P27       | 37  |             | ENB # 8 (C)                       |                                                                                                                          |
| o24    | P14       | 4   | motherboard | PWM DIR # 1 (X) (5V TTL)          |                                                                                                                          |
| o25    | P14       | 8   |             | PWM DIR # 2 (Y) (5V TTL)          |                                                                                                                          |
| o26    | P14       | 12  |             | PWM DIR # 3 (Z) (5V TTL)          |                                                                                                                          |
| o27    | P14       | 16  |             | PWM DIR # 4 (W ) (5V TTL)         |                                                                                                                          |
| o28    | P12       | 4   |             | PWM DIR # 5 (U) (5V TTL)          |                                                                                                                          |
| o29    | P12       | 8   |             | PWM DIR # 6 (V) (5V TTL)          |                                                                                                                          |
| o30    | P12       | 12  |             | PWM DIR # 7 (A) (5V TTL)          |                                                                                                                          |
| o31    | P12       | 16  |             | PWM DIR # 8 (C) (5V TTL)          |                                                                                                                          |
| o32    | P26       | 43  | P23         | DIRO X if drive # 1 type = 2 or 4 |                                                                                                                          |
| o33    | P26       | 45  |             | DIRO Y if drive # 2 type = 2 or 4 |                                                                                                                          |
| o34    | P26       | 47  |             | DIRO Z if drive # 3 type = 2 or 4 |                                                                                                                          |
| o35    | P26       | 49  |             | DIRO W if drive # 4 type = 2 or 4 |                                                                                                                          |

| output | connector | pin                | slot I/O    | notes                                          |
|--------|-----------|--------------------|-------------|------------------------------------------------|
| o36    | P27       | 38                 | P24         | DIRO U if drive # 5 type = 2 or 4              |
| o37    | P27       | 39                 |             | DIRO V if drive # 6 type = 2 or 4              |
| o38    | P27       | 40                 |             | DIRO A if drive # 7 type = 2 or 4              |
| o39    | P26       | 63                 |             | DIRO C if drive # 8 type = 2 or 4              |
| o40    | M3        | 1&2 3&4<br>5&6 7&8 | motherboard | Control of safety relay OMRON G7SA-2A2B        |
| o41    | -         | -                  |             | Reserved for buzzer control                    |
| o42    | -         | -                  |             | DL3 led management                             |
| o48 *  | P26       | 53                 | P10         | Configurable as i48* or Axis 5 (U) home switch |
| o49 *  | P26       | 54                 |             | Configurable as i49 *                          |
| o50 *  | P25       | 57                 |             | Configurable as i50 *                          |
| o51 *  | P25       | 58                 |             | Configurable as i51 *                          |
| o52 *  | P25       | 59                 |             | Configurable as i52 *                          |
| o53 *  | P25       | 60                 |             | Configurable as i53 *                          |
| o54 *  | P25       | 61                 |             | Configurable as i54 *                          |
| o55 *  | P25       | 62                 |             | Configurable as i55 *                          |

\* Depends on the I/O module inserted in slot P10 : if it's a digital output module the hardware configuration parameter ""direction I / O port user" must be set to 00000010.

**WARNING: after this parameter is changed the PLC program must be recompiled**

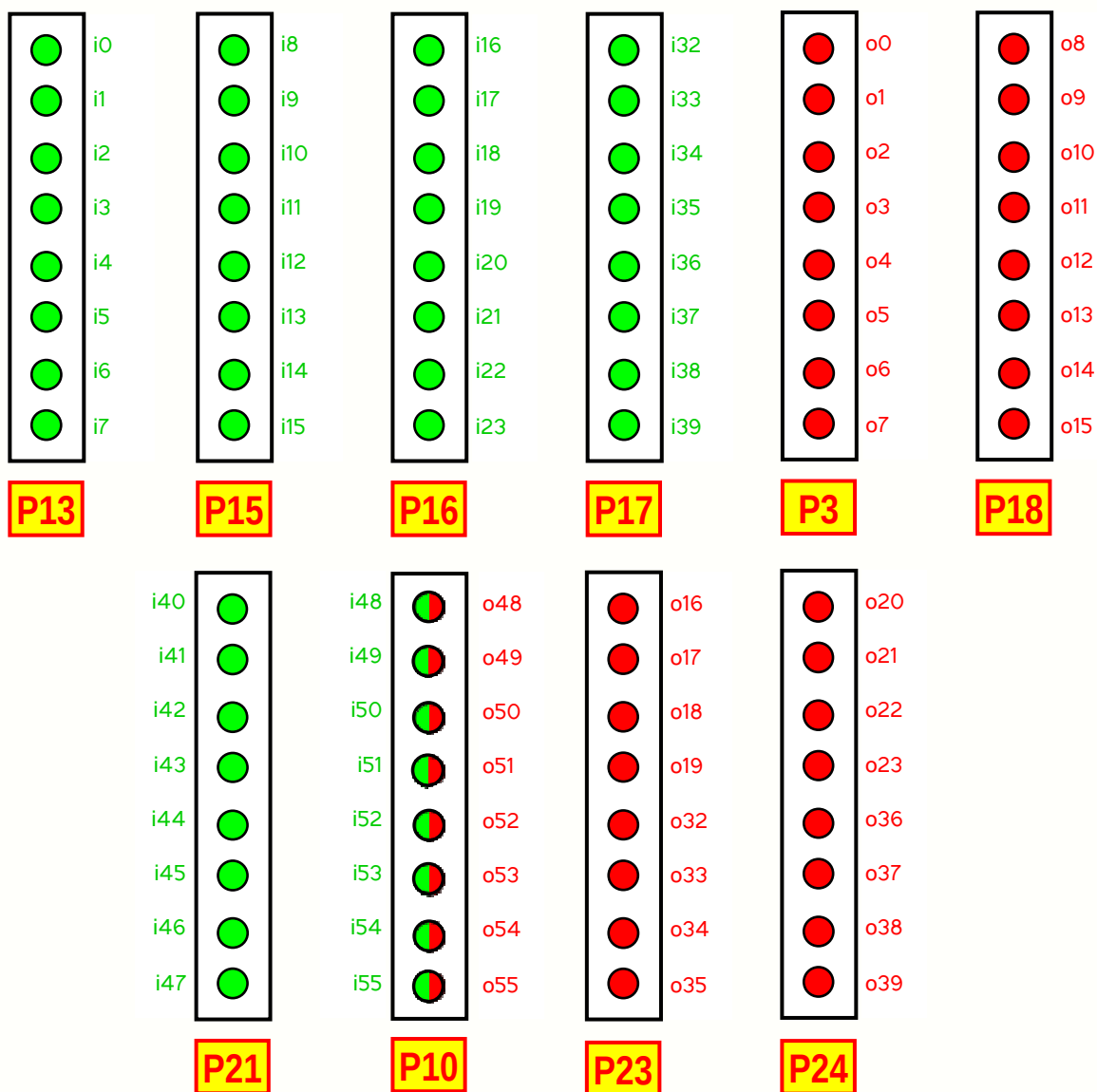
### Power supply for outputs separate from VA

On slots P3, P10, P18, P23 and P24 are pluggable the output modules that, by default, are powered by the voltage VA which supplies the controller.

In each module there are a faston and a jumper: removing the jumper disconnects the faston from VA so that it can be used to apply to the module a different voltage supply.

The max. applicable voltage is 30 Vdc, with the positive on the faston, and the negative in common with the power supply of the controller (GNDA); the max. output current from each output is 1A, but the whole module must not supply more than 3A.

## Diagnostic LED layout



**ANALOG INPUTS (consecutive numbering)**

| input | connector | pin | full scale | notes                |
|-------|-----------|-----|------------|----------------------|
| 0     | P14       | 24  | 0-10V      | 0-5V with Pg13 close |
| 1     |           | 23  |            | 0-5V with Pg12 close |
| 2     |           | 26  |            | 0-5V with Pg11 close |
| 3     |           | 25  |            | 0-5V with Pg6 close  |
| 4     | P12       | 24  | 0-10V      | 0-20 mA on request   |
| 5     |           | 23  |            |                      |
| 27    | M4        | 3   | 0-20 mA    |                      |
| 32    |           | 1   | +/- 10V    |                      |
| 35    | P12       | 26  | 0-10V      | 0-20 mA on request   |
| 36    |           | 25  |            |                      |
| 256   | M5        | 2   | 0-5V       |                      |
| 257   |           | 3   |            |                      |
| 258   |           | 4   |            |                      |

**ANALOG OUTPUTS (consecutive numbering)**

| output | connector | pin | full scale | notes                            |
|--------|-----------|-----|------------|----------------------------------|
| 1      | P26       | 2   | +/- 10V    | from DAC with 16 bits resolution |
| 2      |           | 4   |            |                                  |
| 3      |           | 6   |            |                                  |
| 4      |           | 8   |            |                                  |
| 5      | P27       | 2   |            |                                  |
| 6      |           | 4   |            |                                  |
| 7      |           | 32  |            |                                  |
| 8      |           | 34  |            |                                  |

## CONNECTION EXAMPLES

This section is an extract of the information provided in the "Electrical Connections" section of the manual supplied with the controller, to which you must always refer for the wiring of the system according to the constructor's technical recommendations.

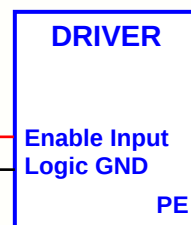
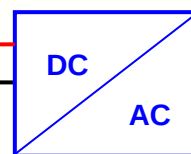
### Power supply and ground connection

| Pin | Connector M1          |
|-----|-----------------------|
| 1   | 24 VA +24 Vdc +/- 10% |
| 2   | GND A 0Vdc            |
| 3   | GND A 0Vdc            |
| 4   | 24 VA +24 Vdc +/- 10% |

FT1

### Digital input and output connection

| Pin | Connector P26                    |
|-----|----------------------------------|
| 34  | SEL PNP/NPN                      |
| 35  | ENBZ Z driver enabling           |
| 36  | GND A I/O power supply ground    |
| 37  | ENBW W driver enabling           |
| 38  | GND A I/O power supply ground    |
| 39  | FCZEROW W axis home limit switch |
| 40  | FCZEROX X axis home limit switch |
| 41  | FCEMG emergency stop             |
| 42  | FCMAX X X maximum limit switch   |
| 43  |                                  |
| 44  | FCZEROY Y axis home limit switch |
| 45  |                                  |
| 46  | FCMAX Y Y maximum limit switch   |
| 47  |                                  |
| 48  | FCZEROZ Z axis home limit switch |
| 49  | User output o35                  |
| 50  | FCMAX Z Z maximum limit switch   |
| 51  | VA +24 I/O power supply          |
| 52  | GND A I/O power supply ground    |
| 53  | User input i48                   |
| 54  | User input i49                   |
| 55  | User input i32                   |
| 56  | GND A I/O power supply ground    |
| 57  | User input i25                   |
| 58  | User input i24                   |
| 59  | User input i26                   |
| 60  | User input i27                   |
| 61  | GND A I/O power supply ground    |
| 62  | VA +24 I/O power supply          |
| 63  | User output o39                  |
| 64  |                                  |



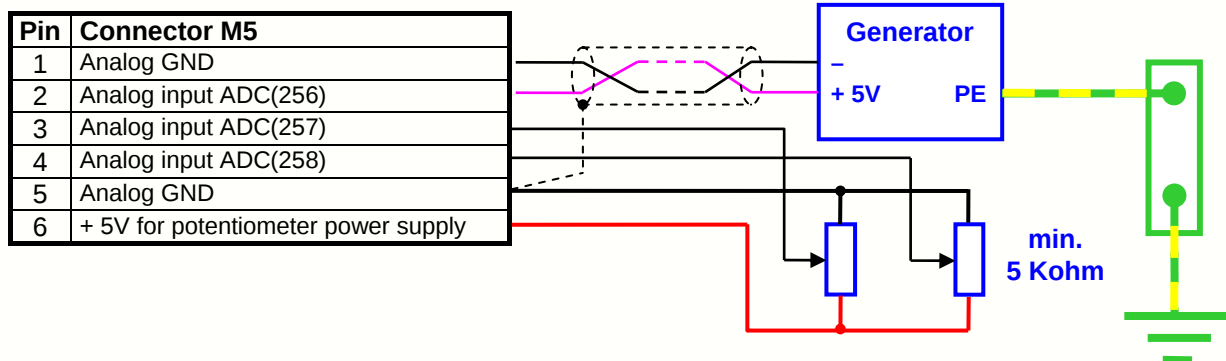
**DIGITAL OUTPUT**  
Protected against short-circuit Max 30 Vdc -1A  
Max current on all outputs of one module is 3A.

**DIGITAL INPUTS**  
Max 30 Vdc  
Input resistance: 2 Kohm  
Typical absorption: 1,2 mA at 24Vdc

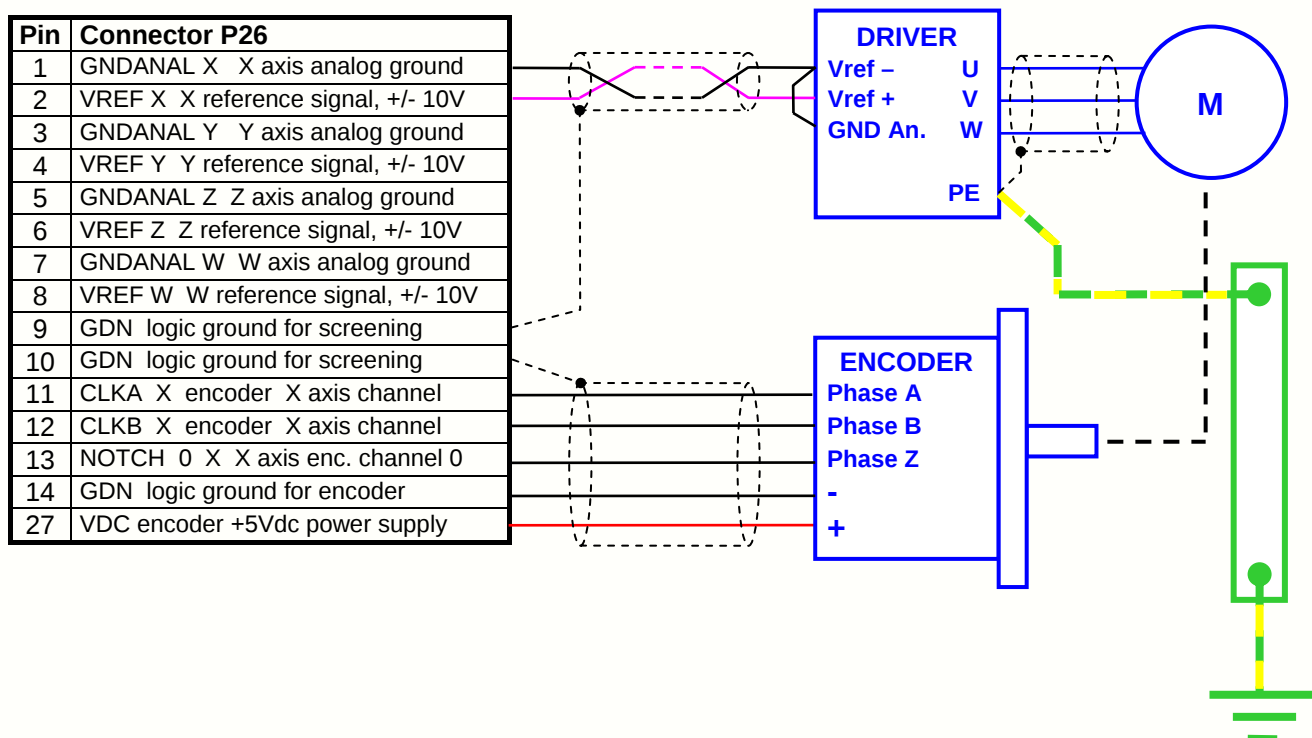
**DIGITAL OUTPUT**  
Protected against short-circuit Max 30 Vdc -1A  
Max current on all outputs of the same module: 3A

**NB:** CE regulations recommended to place the free-wheeling diode in proximity of each inductive load to prevent the spread of electromagnetic interference along the wiring cables.

### Analog input connection

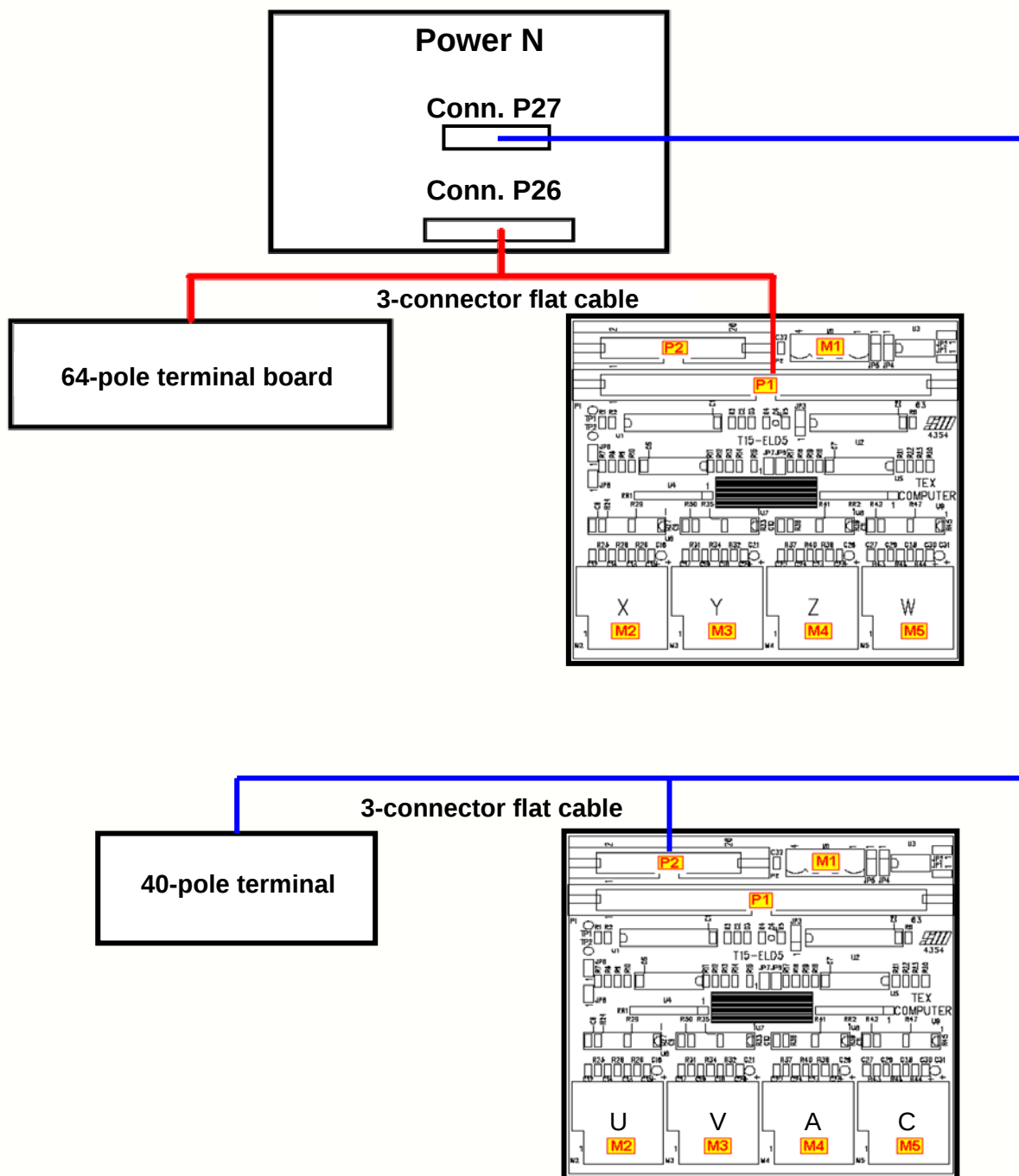


### Connection to 5 V Push Pull encoder



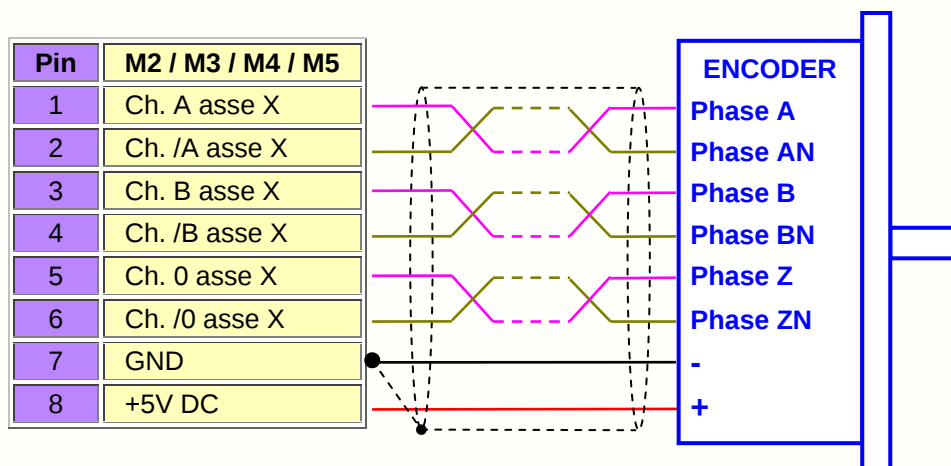
### Connection to 5V Line Driver encoder

An interface card called **T15ELD** must be added to connect encoders with Line Driver type output to the controller. This interface must be connected with a 3-connector flat cable which makes all the necessary electrical connections available on 4 different terminal boards, called **M2**, **M3**, **M4** and **M5**. If T15ELD is connect to the Driver's "simulated encoder" you don't have to connect + 5Vdc terminal.

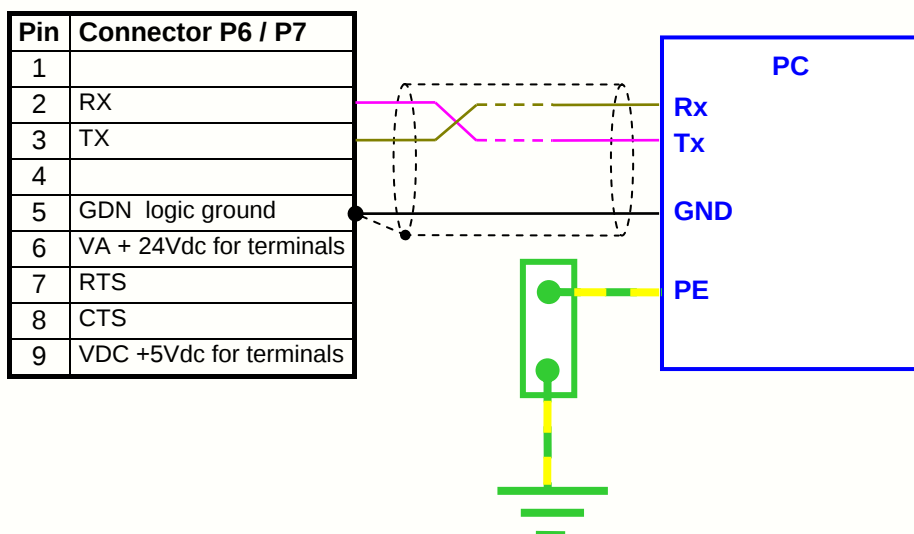


## T15ELD interface connections

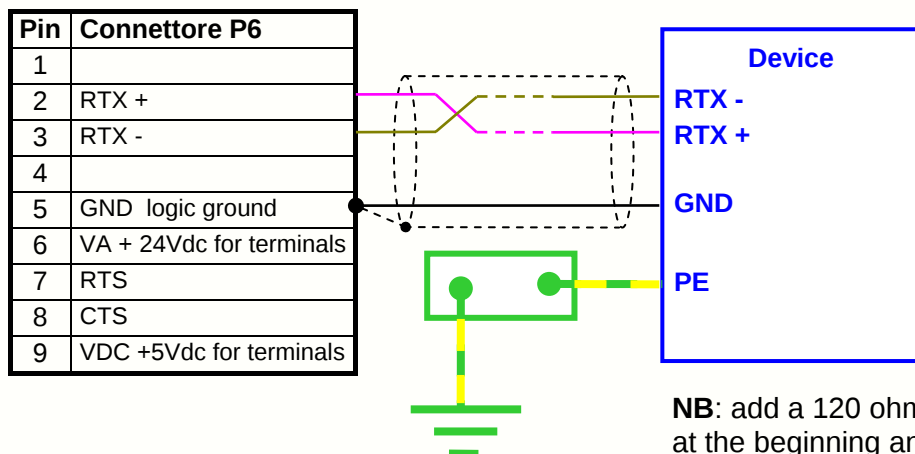
The connections must be made by means of twisted screened cable. If the “simulated encoder” outputs generated by the driver are connected to the T15ELD interface instead of the encoder, the + 5Vdc terminal is not connected.



## Connection of RS232 serial interface



## Connection of RS485 serial interface COM 1 (optional)



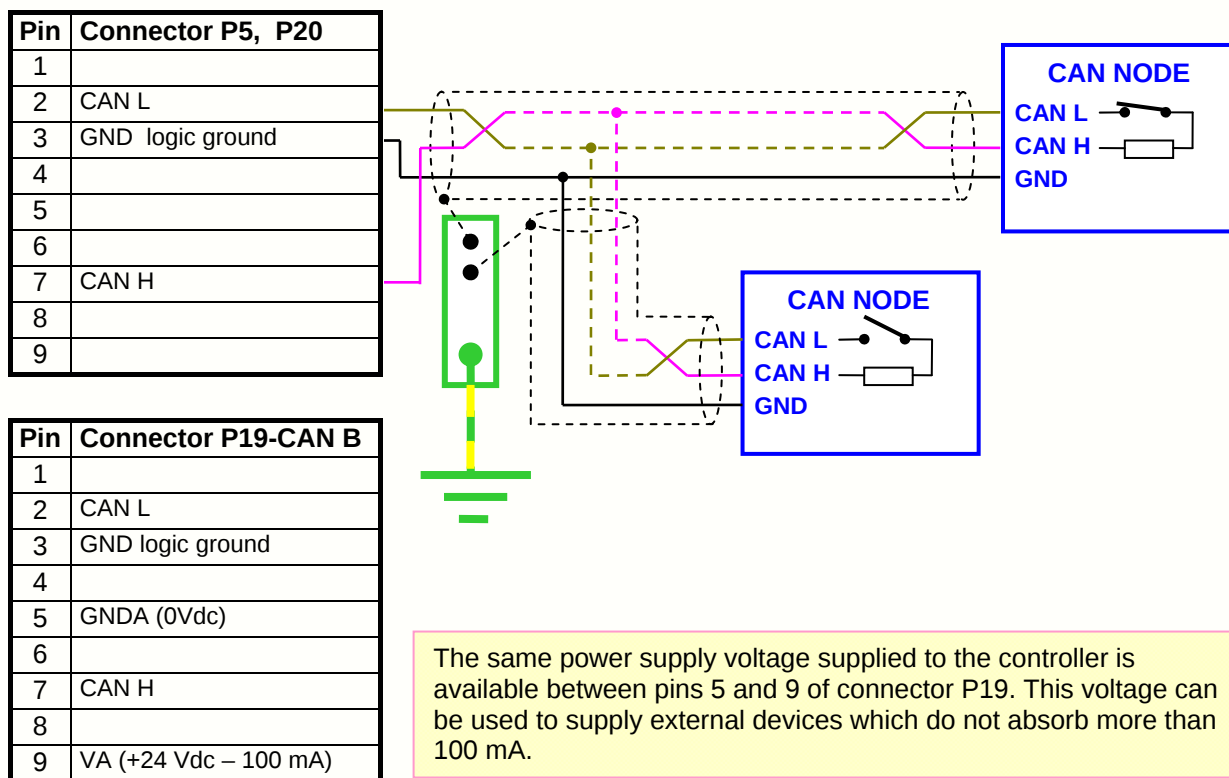
## CANopen interface connection

The Power N is able to control up to 3 CAN ports using both the CiA 301 general communication protocol and the specific profiles CiA 401 (I/O devices), CiA 402 (drives) and CiA 406 (encoder).

**Be careful not to use in the same network devices CiA 401 and CiA 402 because it could result in a malfunction.**

The CAN network must be done with twisted screened cables and the furthest ends of CAN H and CAN L signals must be charged through a 120 ohm termination resistance.

In the Power N, the termination resistances are already connected by default and can be disconnected by removing jumpers JP4 (P5), JP5 (P19) and JP6 (P20), but you have to install the termination resistance at the other end of the network.



## Connection to an active remote Panel

If the Power N BOX is equipped with an optional graphics card with LVDS (Low Voltage Differential Signaling) interface, you can connect to the controller, up to a maximum distance of 10 m, any front Panel complete with display, touch screen, keyboard and USB port.

On board of the active remote panel must be present the intelligent card TRM-003 which manages, through its own microprocessor, the keyboards with 16, 28, 56, 75 or 80 keys (for this last with the exclusion of the vertical keys from A4 to A8).

The keys and the local I/O of the card are encoded and transmitted via RS232 to the controller, which takes care of the direct management of LCD, touch screen and USB port using the signals present in the LVDS cable.

Through the same LVSD cable the electrical contacts ,relative to an emergency button and to a "dead man" safety button, can be transferred on the M6 terminal of the controller.

The serial port used is the COM 2 (P7 connector of the controller) on which you will find, already inserted, a connector with the cable to link it with the graphics card; to function properly, the communication must be set with the following parameters:

- baud rate: 57600
- parity = N
- format: 8 bit data + 1 bit stop

**IMPORTANT:** the remote panel chassis must be connected to ground by means of a cable with gauge of at least 2.5 mm<sup>2</sup>.

## Connection to 8.4" active mobile terminal

Since March 2016 the active 8.4 "mobile terminal is equipped with smart card TRM-003 and therefore are valid the considerations done in the previous paragraph.

On board there is the M1 connector, which supports the following electrical connections:

| Pin | M1 terminal board                                |
|-----|--------------------------------------------------|
| 1   | 1 EMG CONTACT (N.C.)                             |
| 2   | 2 EMG CONTACT (N.C.)                             |
| 3   | 1 & 2 EMG CONTACT (Common)                       |
| 4   | VA terminal power supply, coming from LVDS cable |
| 5   | Dead man CONTACT                                 |
| 6   |                                                  |
| 7   | GND                                              |
| 8   | GND                                              |
| 9   |                                                  |
| 10  | GND                                              |

The logic states of the **key-switch** and **buzzer** installed on the mobile terminal are visible from the application program through system's parameters:

s331: key-switch

s332: buzzer

For more information refer to TRM-003 data sheet.

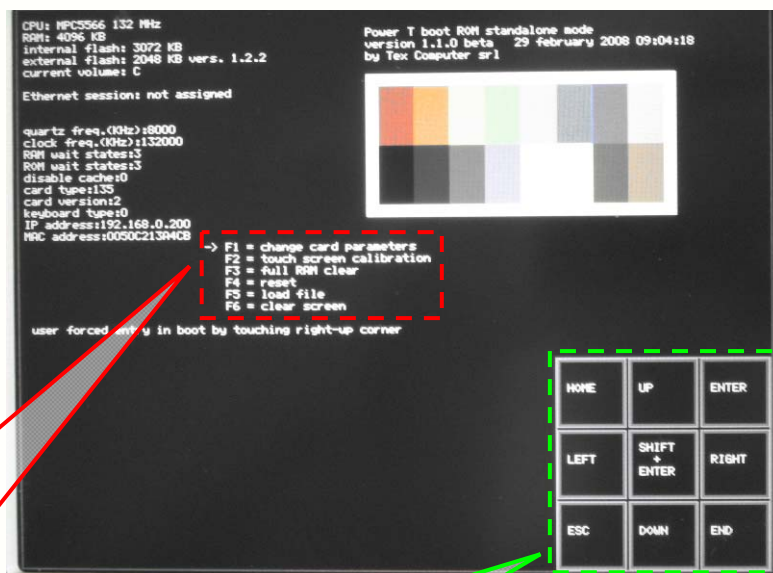
## Basic functions of the touch screen

On the controllers equipped with touch screen, a number of basic functions can be accessed immediately without having to enable and calibrate the screen.

1. If at start up the system detects pressure in the top right-hand corner of the screen, it accesses the **Boot menu**:

### FUNZIONI DI BOOT

F1 = change card parameter  
F2 = touch screen calibration  
F3 = full ram clear  
F4 = reset  
F5 = load file  
F6 = clear screen  
F7 = save current firmware  
F8 = export card parameter



Touch keys to browse the boot functions

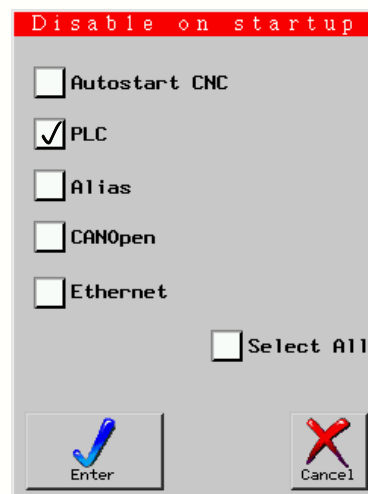
**WARNING:** the Boot menu only manages the USB memories and not any other peripherals, such as the keypad and the mouse, which may be connected to the same USB port by means of a hub.

Once you are in Boot menu, we suggest you to calibrate the touch screen so that the touch function is still active when the system is switched on again, even after running functions F3 and F4 which partially or totally clear the RAM memory.

We recommend not to alter the card's basic configurations without contacting first the Tex Computer's technical staff.

2. If at start up the system detects a pressure at the top left-hand corner of the screen you enter the menu which allows the operator to disable some functions during the current start-up phase. The following check list will be displayed:

Touching the screen on each of the white boxes allows the user to check or un-check the functions to be disabled during the current start-up phase. Pressing ENTER you confirm the selections made, which affect the current start-up phase only and not the following ones



For further information about the functions of the touch screen, refer to the manual with the same name.

## Power N 10.4" XGA with electronic handwheel

In this version, the controller is supplied equipped with the optional INT-CFC-USB1 card fitted behind the front door which gives access to the Ethernet port, the USB slot and the CF removable memory connector.

The following resources are electrically connected to the INT-CFC-USB1 card and terminal board M5:

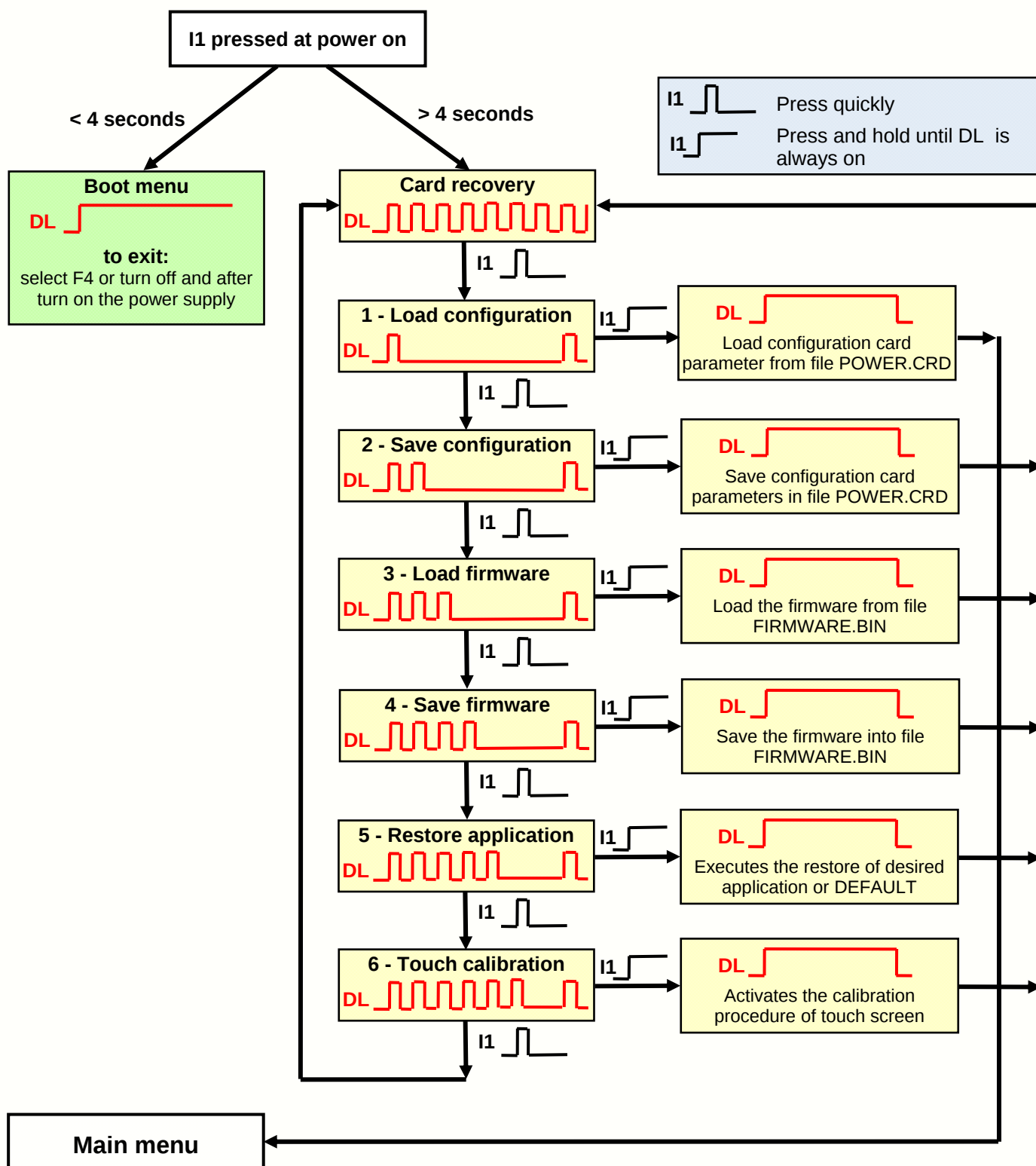
| Name                    | Typical function with ISO program                                                                                                                                                             | Resource                                                                                           |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Electronic Handwheel    | 100 ppr incremental encoder which can be used to move the axis selected with the axis selector in electric shaft mode.                                                                        | Encoder # 9                                                                                        |
| Axis selector           | Allows selection of the axis to be linked to the control knob in electric shaft mode; just one input will be active corresponding to the letter shown. In OFF position, no inputs are active. | i224 (X axis)<br>i225 (Y axis)<br>i226 (Z axis)<br>i227 (A axis)<br>i228 (B axis)<br>i229 (C axis) |
| Numerical selector knob | Can be used to change the resolution of electric shaft movement of the axis connected to the electronic handwheel                                                                             | i232 (setting 1)<br>i233 (setting 2)<br>i234 (setting 3)<br>i235 (setting 4)                       |
| Axis overfeed           | Regulates the axis feed speed                                                                                                                                                                 | ADC(256) *                                                                                         |
| Spindle Overfeed        | Regulates the spindle rotation speed                                                                                                                                                          | ADC(257) *                                                                                         |

\* Analog inputs on terminal board M5



To enable operation of card INT-CFC-USB1 the “has a INT-FDC-CFC-USB” parameter must be set as “yes”.

## Recalling Boot and Card recovery Functions from I1



The controller is equipped with a microswitch, called I1, located on one side of the motherboard; next to it there is also a red LED DL3. Pressing the microswitch I1 at power on you can access both the **Boot menu** and the **Card recovery** functions which allow you to upload from a removable storage device, a text file, called POWER.CRD, where there are listed the values of the main card configuration parameters, including the IP address of the controller; these features are particularly useful for Box version controllers.

Starting from **firmware 1.4.2 & boot 1.6.3** the following functions have been added:

- **3 - Load firmware** can load indifferently both the Main and the Boot of the controller if ,in the storage medium , they are called FIRMWARE.BIN.
- **5 - Restore application** with which you can activate the procedure that allows you to instantly load the backup of an application program, present on the main root of a removable storage drive, whose name is defined in the operator parameter *Restore at reset*. If this parameter is empty it will be automatically searched for an application program called DEFAULT
- **6 - Touch calibration** that gives you instant access to the calibration of the touch screen

You can exit the Card recovery menu at any time by turning off and on the power supply of controller.

## Interchangeability with Power M

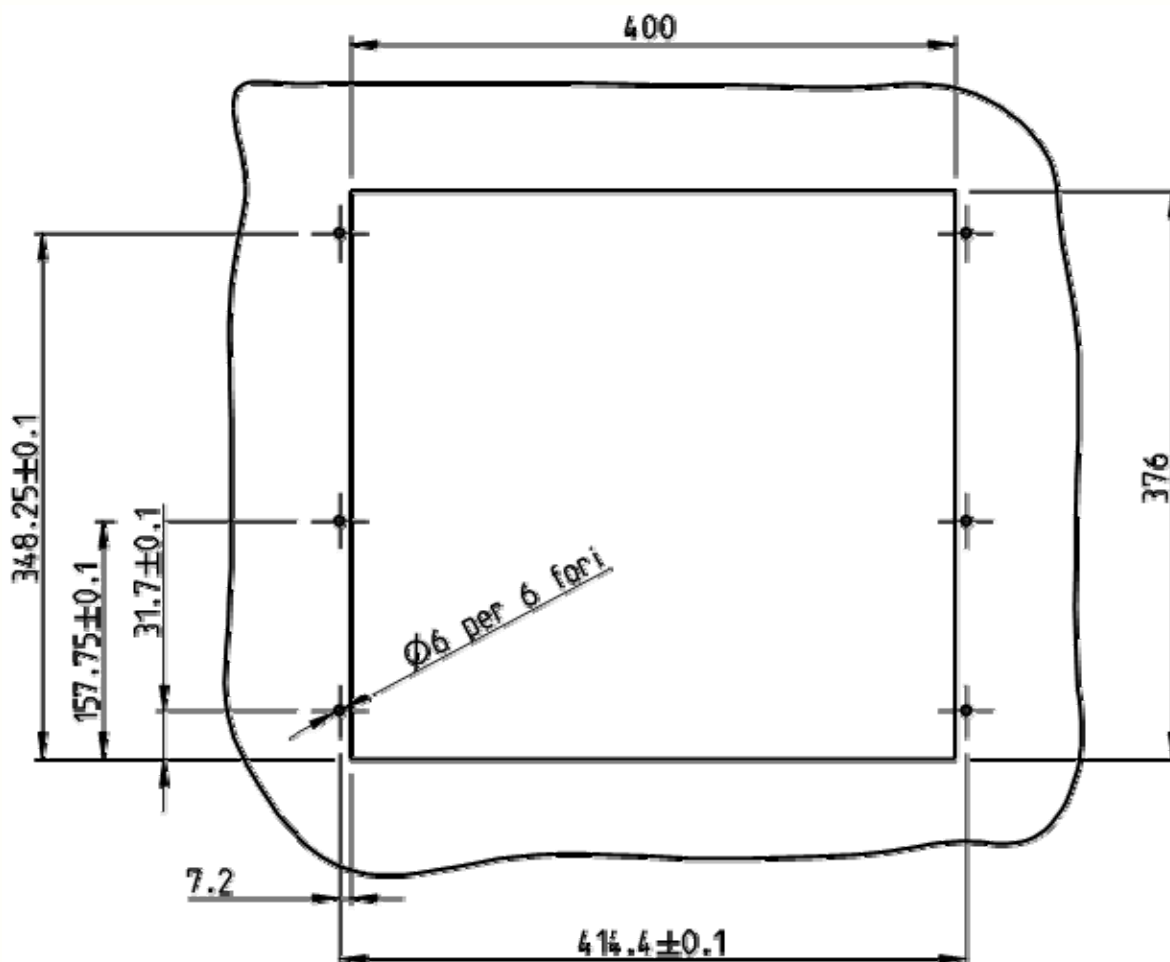
Power N has been designed in such a way as to make possible to increase the performance of machines equipped with Power M by making only minor modifications to the electrical wiring and to the program.

The table shows the changes needed to achieve interchangeability:

| Description                                      | Power M            | Power N                                         | Interchangeability                                                                                             |
|--------------------------------------------------|--------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>M1</b> - Pin 4 - power supply                 | VAX                | VA                                              | only if the JP2 on Power M is closed (default)                                                                 |
| <b>M3</b> - Pin 7 - safety power supply          | VAY                | -                                               | none                                                                                                           |
| <b>M3</b> - Pin 8 - safety output                | OUTK2              | -                                               | none                                                                                                           |
| <b>M5</b> - Pin 2 - 0-5V analog in               | ADC(37)            | ADC(256)                                        | with software modification                                                                                     |
| <b>M5</b> - Pin 3 - 0-5V analog in               | ADC(38)            | ADC(257)                                        | with software modification                                                                                     |
| <b>M5</b> - Pin 4 - 0-5V analog in               | ADC(34)            | ADC(258)                                        | with software modification                                                                                     |
| <b>M6</b> - Safety circuit                       | optional           | -                                               | none                                                                                                           |
| <b>P12</b> - Pins 23, 24,25 e 26 - analog inputs | 0..10V trimmerable | 0..10V (default)<br>0..5V (welding spot closed) | with trimmer set to 5V or 10V (default); in all other cases it is necessary to modify the application program. |

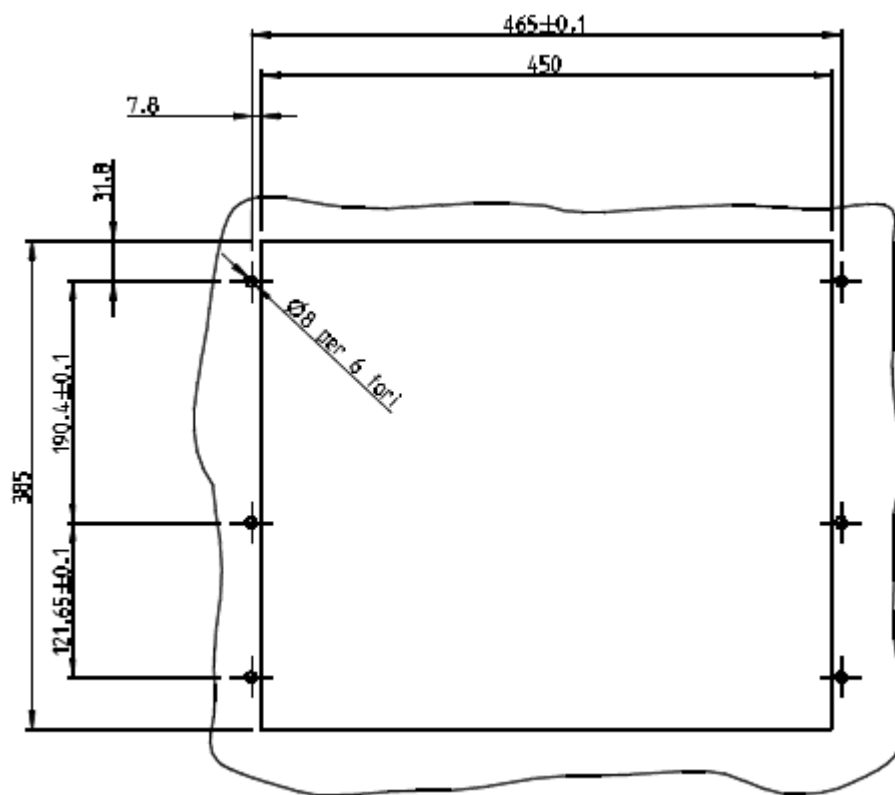
**Power N 10,4" XGA, 80 keys drilling template**

(Dimensions in mm)



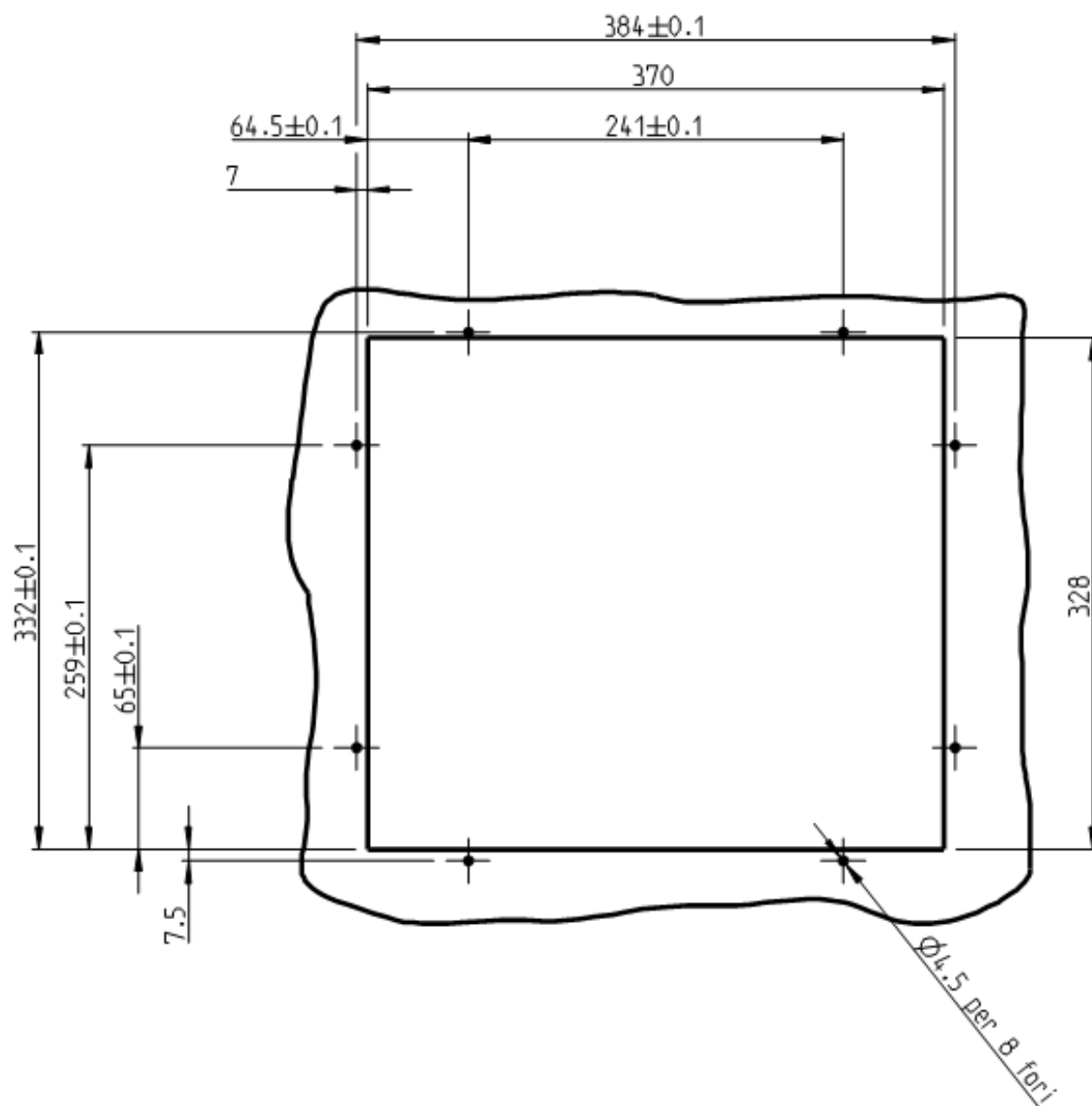
**Power N 15", 80 keys drilling template**

(Dimensions in mm)



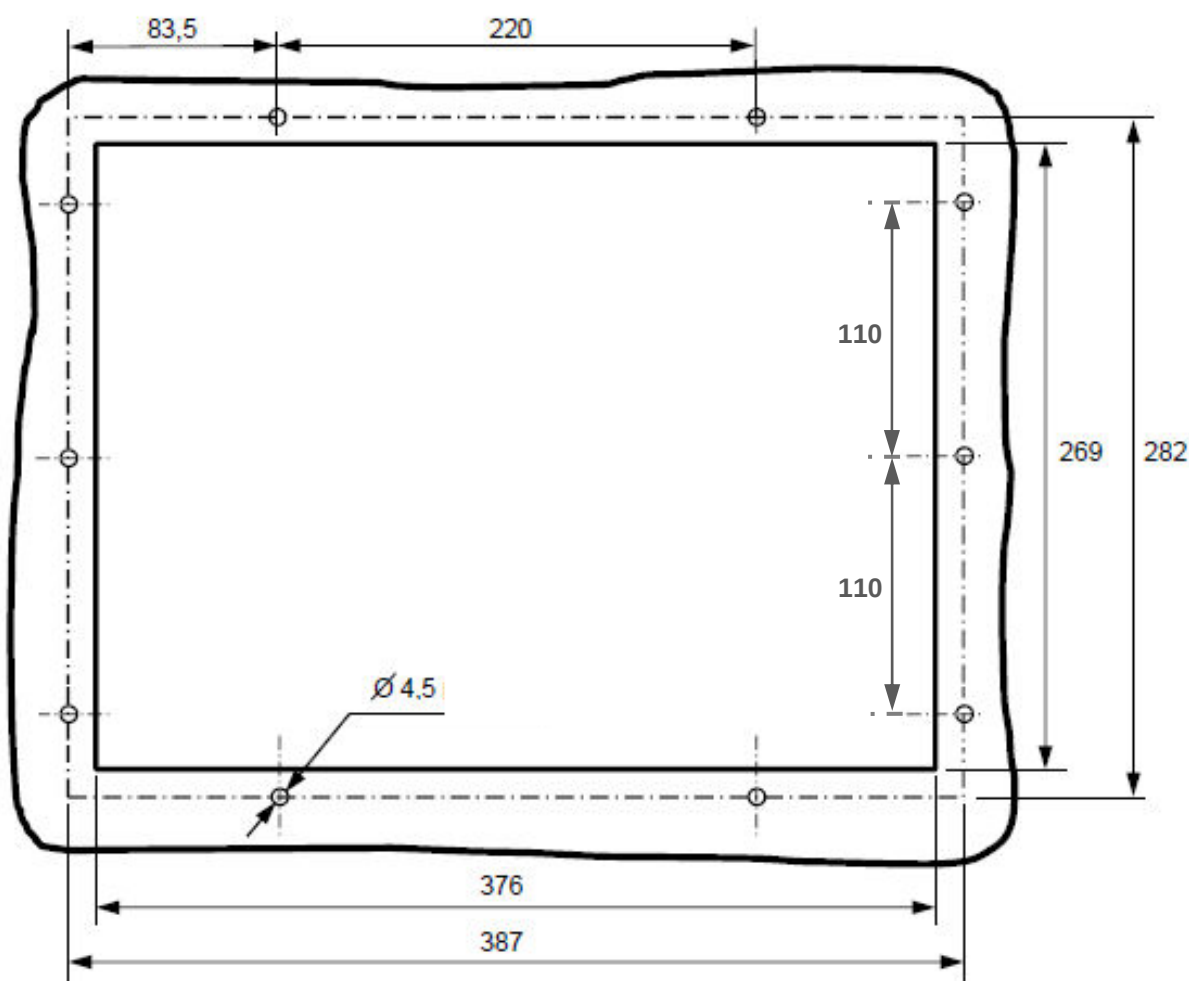
**Power N 15" - 28 keys drilling template**

(Dimensions in mm)



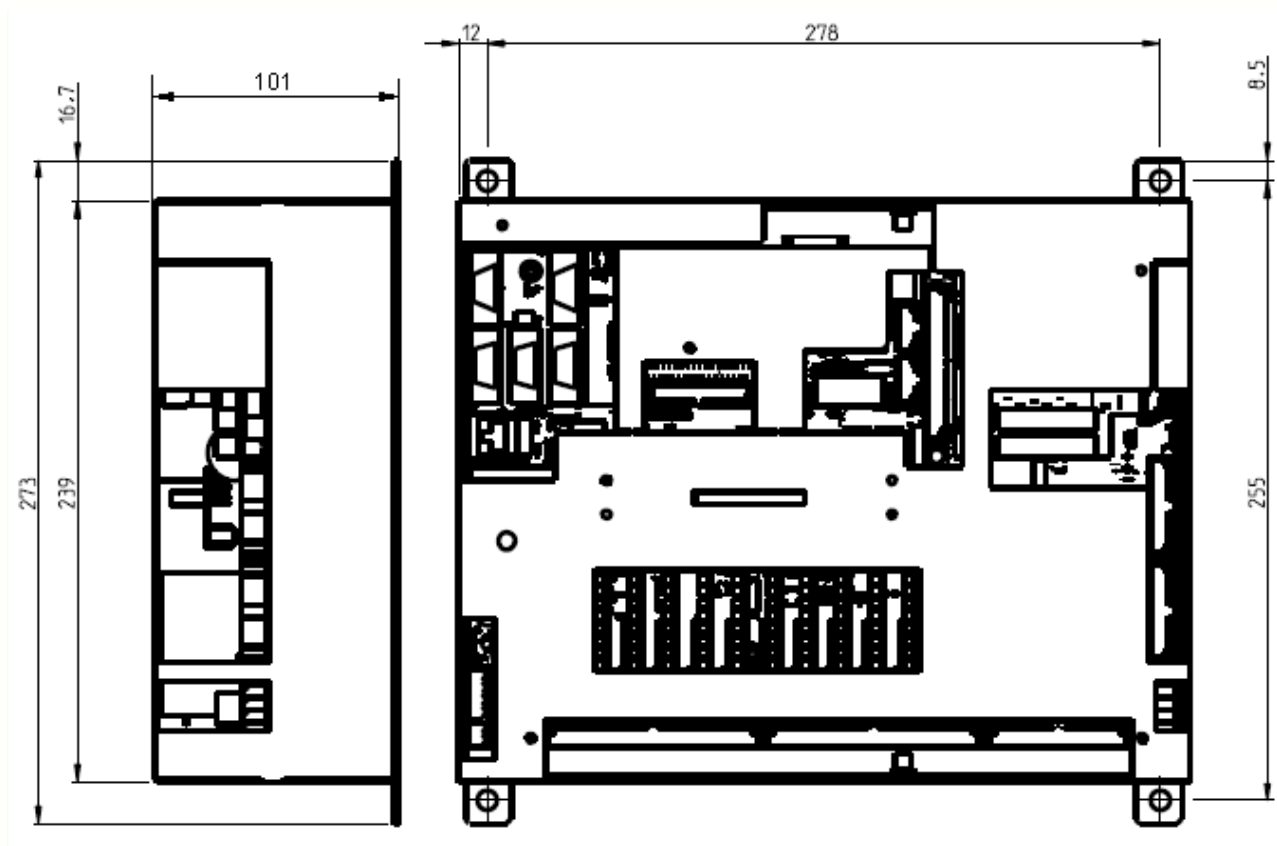
**Power N 15" only touch drilling template**

(Dimensions in mm)



**Power N Box, without FDC expansion board, dimensions**

(Dimensions in mm)



With FDC expansion board the overall height is 160 mm.

For the mounting hole positions and dimensions of other versions, refer to the Power Family html manual.

**Data subject to modification without notice**