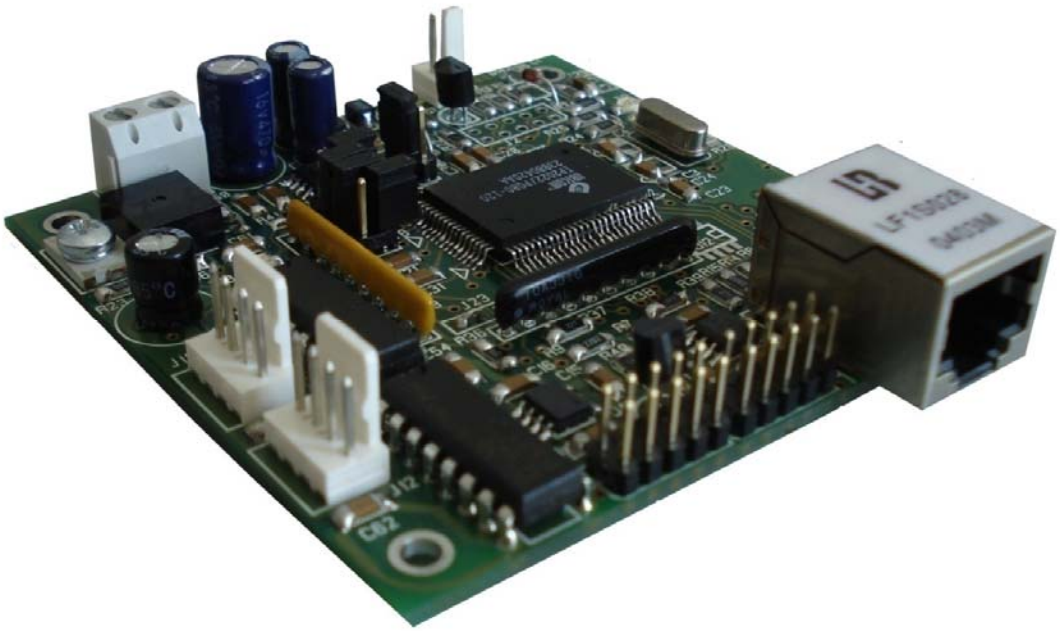
AXES CONTROL UNIT MT2ETH AND MT2ETHMS
USER MANUAL

Rel. 01.04.0004
(Hardware code: MT2ETH AND MT2ETHMS)



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This manual in English is the original version.

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WARNING!
ELECTRICAL DEVICES COULD DAMAGE EQUIPMENT OR PROPERTY OR CAUSE PERSONAL INJURY

This guide contains instructions and technical features of the MT2ETH AND MT2ETHMS.
Read with attention before attempting to install.
It is the responsibility of the technician to undertake all the safety rules provided by the law during the installation and the use of this device.
For any information which is not contained in this guide, please contact:

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REVISION HISTORY

Manual revision history

Revision/ Date	Change description	Author
01.00.0000 January, 2004	First version Released	Mancuso C.
01.01.0000 November, 2004	Updated according ISO 9001 guidelines	Mancuso C.
01.02.0000 December, 2006	Captions and “Limit switch examples”, “Box”, “Demo software” and “LabVIEW Library” paragraphs	Dugato S.
01.03.0000 January, 2009	Updated “Demo software” and “LabVIEW Library” paragraphs. Inserted “Product codes” paragraph.	Rivolta A.
01.04.0000 June, 2009	Added controls for ramp and telnet timeout. Updated J7 use.	Zancanato A.
01.04.0001 November, 2009	Changed description of sxn and syn commands	Mancuso C.
01.04.0002 April, 2010	Changed connection of “End-of-run” signal received by optical sensors	Zancanato A.
01.04.0003 June, 2015	Update document layout	Bottaccioli M.

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GENERAL FEATURES

MT2ETH and MT2ETHMS are small-size low-power **control devices**, which can control **two stepper motors** (unipolar or bipolar) and their respective limit/home detection sensors (two for each axis, with programmable polarity).
The motor **control** and the device **configuration** are achieved through **Ethernet interface**, managed by the TCP/IP communication protocol.
To avoid connections without authorisation, the access is protected by a *password*, which can be set by the user.
The **motor rotation speed** can be easily configured **independently** to answer user needs.
Moreover, the device has an **auxiliary output** with a dedicated control for its activation.

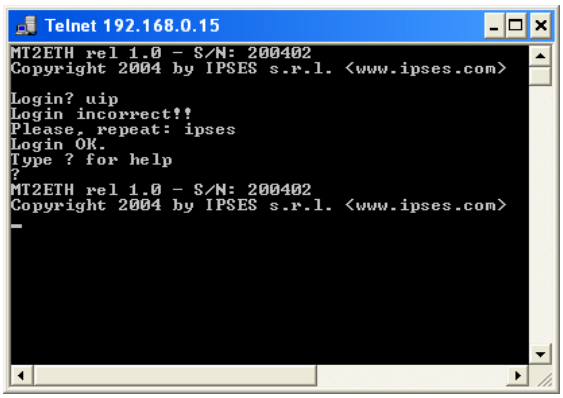
The MT2ETHMS version is equipped with a PWM current control on the motor phases and can reach a movement precision of 1/8 of step.

CONNECTION AND LOGIN

The default *TCP/IP* **address** of the device is 192.168.0.15; the **telnet port** used is number 23 (most servers use this port for telnet connection). These values can be changed through a specific command.

When a connection is established, the system will ask for a **login password**: the default password is "**ipses**", but it can be set by the user.

Shorting the **J8 jumper** (see further), it is possible to restore all the default values (TCP/IP address, telnet port, login password, motor speed, braking action, ramp and connection timeout), since the removal of that jumper (afterwards the memorized values will be considered effective).



Picture 1: login password request

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REMOTE CONTROL COMMUNICATION PROTOCOL

The communication of the MT2ETH and MT2ETHMS is established via **Ethernet interface** operating through a TCP/IP **telnet connection**. There is no need to connect the card to a Personal Computer: any PC capable of connection to an Ethernet-based network will suffice.
It is also possible to connect the system to internet through a router.
The protocol is case sensitive.

The following **commands** are implemented:

ax.x.x.x	Changes the system TCP/IP address: as usual, the new address has to be written as a set of four bytes divided by a dot [0<x<255]. To make the change effective, the new configuration parameters have to be memorized ("m" command), then the system has to be switched off and back on.
bx	Changes the device telnet port. The x parameter has to be between 0 and 65.535. To make the change effective, the new configuration parameters have to be memorized ("m" command), then the system has to be switched off and back on.
cxxxxxxx	Sets a new password. The password can be any combination of alphanumeric characters, with a maximum of sixteen characters. This command will be immediately effective (the new password will be requested at the next connection), but it will be no kept if the system is powered down without saving the configuration parameters using the "m" command.
da,b	Moves the axes by a and b (relative movements), where a and b are movement values in half or micro steps (both values must be between -2.147.483.647 and +2.147.483.647). It is possible to ignore the "b" parameter to move only the first axis.
ea,b	For the MT2ETH version: Sets the duty-cycle of the motor driving when the motors are stopped (braking action). The a parameter sets the X axis duty-cycle, the b parameter sets the Y axis. Both values must be between 0 (no braking action) and 100 (maximum of braking action). Too high values must be set very carefully to avoid overheating motors and system. For the MT2ETHMS version: Activates or deactivates the braking action, with PWM current control, when the motor is not running. The a and b parameters, relative respectively to X axis and Y axis, can have a value of 0 (no braking action) or 1 (braking action actives).
e?	Requests the braking action set by the user.
fxn	Sets the current position on X axis. The n parameter must be between -2.147.483.647 and +2.147.483.647.
fyn	Sets the current position on Y axis. The n parameter must be between -2.147.483.647 and +2.147.483.647.
gxn	Perpetual motion of the X axis ; when n>0 or omitted, forward movement starts; when n<0, backward movement starts.
gyn	Perpetual motion of the Y axis ; when n>0 or omitted, forward movement starts when n<0, backward movement starts.
h	Moves the two axes to the **home position** (limit detection).
hx	Moves the X axis to the home position (limit detection).
hy	Moves the Y axis to the home position (limit detection).
ia,b	Available only for MT2ETHMS version: Sets the motors movement mode (a for the X axis and b for the Y axis): • n = 0 whole step. • n = 1 half of step. • n = 2 1/4 of step. • n = 3 1/8 of step.
i?	Only for MT2ETHMS: shows the motors movement mode.
k	Stops immediately the movement of both axes.

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kx	Stops the movement on the X axis.
ky	Stops the movement on the Y axis.
l0	Deactivates auxiliary output.
l1	Activates auxiliary output.
lt	Activates auxiliary output for 3 seconds.
m	Saves the configuration parameters in the internal non-volatile memory (saved data are: TCP/IP address, telnet port, password, braking action, motor speed, movement mode and checksum).
pa,b	Moves the axes to position (a, b): a and b are the absolute positions in half-steps or micro-steps. Both a and b values must be between -2.147.483.647 and +2.147.483.647.
q	Disconnects the device from the telnet session. The current movements will be normally executed.
r0	Disable acceleration/deceleration ramp.
r1	Enable acceleration/deceleration ramp (default value).
r?	Requests the currently set of acceleration/deceleration ramp.
sxn	Sets the movement time (in ms) of the X axis for each half-step or microstep. The n parameter must be between 1 and 1.000. Default value is 10. WARNING: If you are moving simultaneously the two axes, due to resources absorbed during this process, the minimum value, only in this case, must be set as equal to or greater than 25.
syn	Sets out the movement time (in ms) of Y axis for each half-step or microstep. The n parameter must be included between 1 and 1.000. Default value is 10. WARNING: If you are moving simultaneously the two axes, due to resources absorbed during this process, the minimum value, only in this case, must be set as equal to or greater than 25.
sx?	Requests the currently set movement speed for the X axis.
sy?	Requests the currently set movement speed for the Y axis.
t0	Disable Telnet Timeout (default value).
tn	Sets the value o telnet timeout. The n parameter must be included between 3 and 3600 seconds. By default timeout is disable. When timeout is enable the device, if connect, close the connection if any char will be receive during a time equal the timeout value.
t?	Requests the currently telnet timeout value.
u	State request (see forward how the state is represented)
xa	Moves the X axis to an a position (absolute position in half-steps or micro-steps). The a parameter must be between -2.147.483.647 and +2.147.483.647
yb	Moves the Y axis to a b position (absolute position in half-steps or micro-steps). The b parameter must be between -2.147.483.647 and +2.147.483.647
w	Requests the current position.
?	Requests current firmware version and the serial number of the instrument. The answer will be an ASCII string similar to "MT2 ETH(MS)relx.x – S/Nyyyyyy", where x.x represents the firmware version of the device and yyyyyy is the serial number.

For every kind of request sent (such as u, ?, Cx?, etc.) the device will return the property information string followed by <CR> and <LF> control characters (13 and 10 in decimal notation, respectively).

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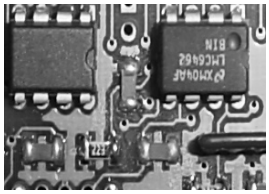

The movement and axes speed setting commands (for instance “p” and “sx”) can be executed only when the concerned axis is stopped.
The position request command returns the current coordinates as an *x*,*y* couple, where *x* and *y* are the absolute coordinates in half-steps or micro steps. In case of unknown position, the # character is returned.
The speed request messages return the current speed for the selected axis as a number representing the movement time (in ms) for each half-step or micro step.

All the positions and the movements are expressed in half-steps, for MT2ETH card, or in whole, half, 1/4 and 1/8 of full steps for MT2ETHMS version (depending on the configuration of the i parameter). The speed is always referred to half-steps per second in the case of MT2ETH version and in whole steps/s, half-steps/s, 1/4 of full steps/s or 1/8 of full steps/s in the case of MT2ETHMS card (depending on the configuration of the i parameter).

The status request message (“u”) forces the device to return a byte (2 hex characters in ASCII code) representing the actual status of the unit.

Return message interpretation table:

bit 7	error
bit 6	Auxiliary output activated
bit 5	Y axis home position reached (positive movements)
bit 4	Y axis home position reached (negative movements)
bit 3	X axis home position reached (positive movements)
bit 2	X axis home position reached (negative movements)
bit 1	Movement of the Y axis
bit 0	Movement of the X axis

If the error bit is high (i.e. if it answers with a code like 81), then another error code is added after a comma (for example 81,02). More than one error code can be active at the same time.

The possible error codes are:

bit 7	Internal error (irreversible).
bit 6	Buffer overflow.
bit 5	Invalid Checksum of the stored data in the non-volatile memory.
bit 4	Invalid data stored in the non-volatile memory.
bit 3	Error during the *Home position* search.
bit 2	Out of range parameter (e.g. set movement time is more than 1.000 ms).
bit 1	Illegal command (e.g. an absolute movement request when the positions are unknown or during movement).
bit 0	Syntax error

All the errors are reset after the state request command.
Differently from MT2(MS) and MT2USB(MS) versions, with the Ethernet cards it is possible to sent any other request during the execution of the *home* procedure.

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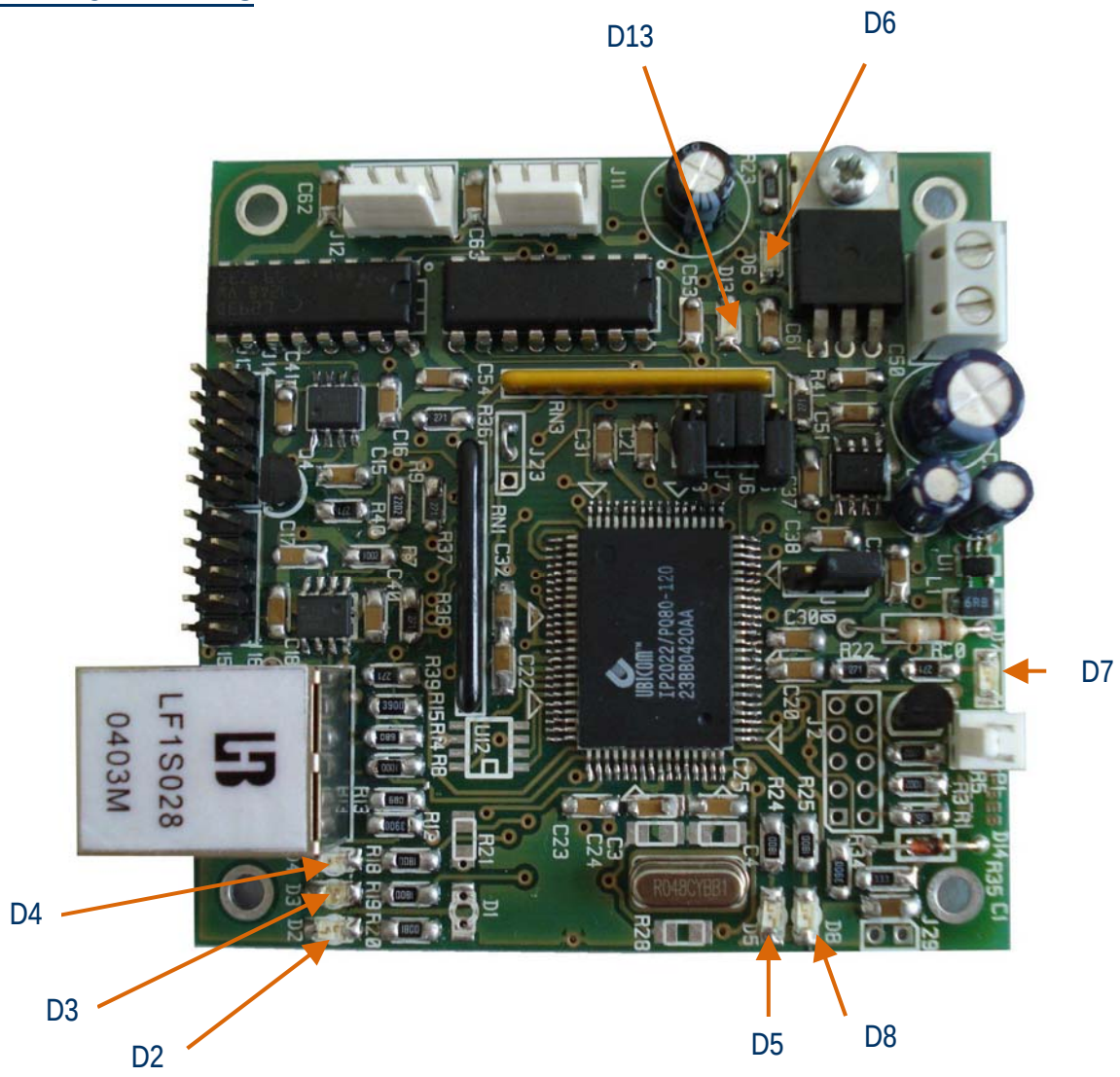
MT2ETH CARD LEDs



Picture 2:MT2ETH card LEDs

- *D2 (green):* established link on the Ethernet port.
- *D3 (yellow):* activity on the Ethernet port.
- *D4 (red):* packets collision on the Ethernet port.
- *D5 (green):* user on-line (authenticate).
- *D6 (red):* movement in progress.
- *D7 (red):* auxiliary output activated.
- *D8 (red):* error (use the “u” command to identify it).
- *D13 (green):* system powered.

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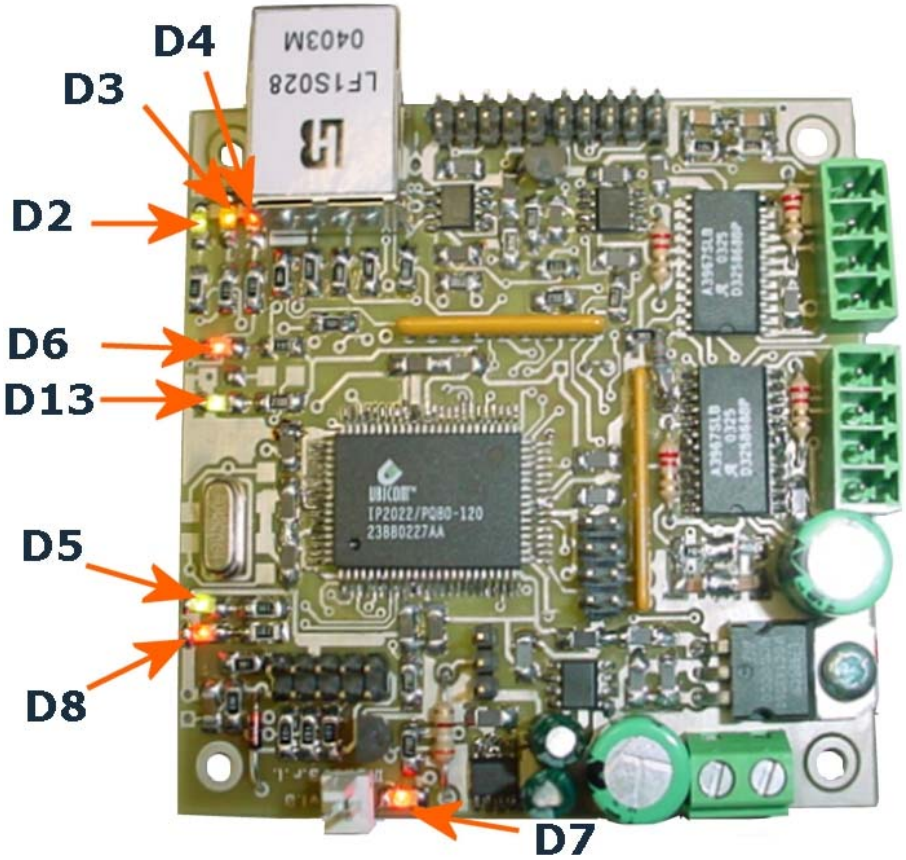
MT2ETHMS CARD LEDs



Picture 3: MT2ETHMS card LEDs

- *D2 (green):* established link on the Ethernet port.
- *D3 (yellow):* activity on the Ethernet port.
- *D4 (red):* packets collision on the Ethernet port.
- *D5 (green)* user on-line (authenticate).
- *D6 (red):* movement in progress.
- *D7 (red):* auxiliary output activated.
- *D8 (red):* error (use the "u" command to identify it).
- *D13 (green):* system powered.

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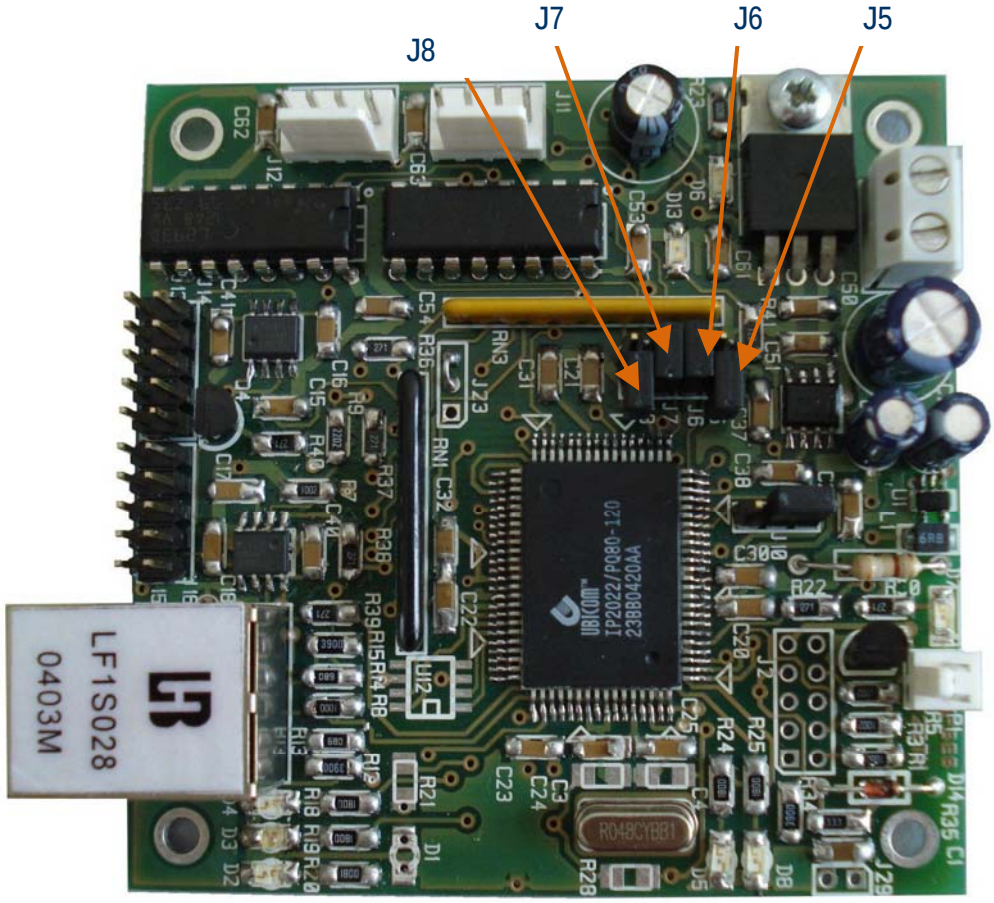
MT2ETH CONFIGURATION INSTRUCTIONS

Through the **jumpers** placed on the card it is possible to **program** the following function modes:

- jumper J5: if inserted, it enables the automatic search for *home position* at power up.
- *jumper* J6: sets the polarity of the limit detection sensors. It defines the logical high or low trigger level signal.
- *jumper* J7: forbids the axes movement to go beyond limit-home detection (negative and positive run). When the jumper is inserted the system always stops the motor when, during a negative or positive movement, the end-of-run position is achieved.
- *jumper* J8: restores the default software configuration (TCP/IP address, telnet port, password and so on).



Picture 4: MT2ETH programmer jumpers

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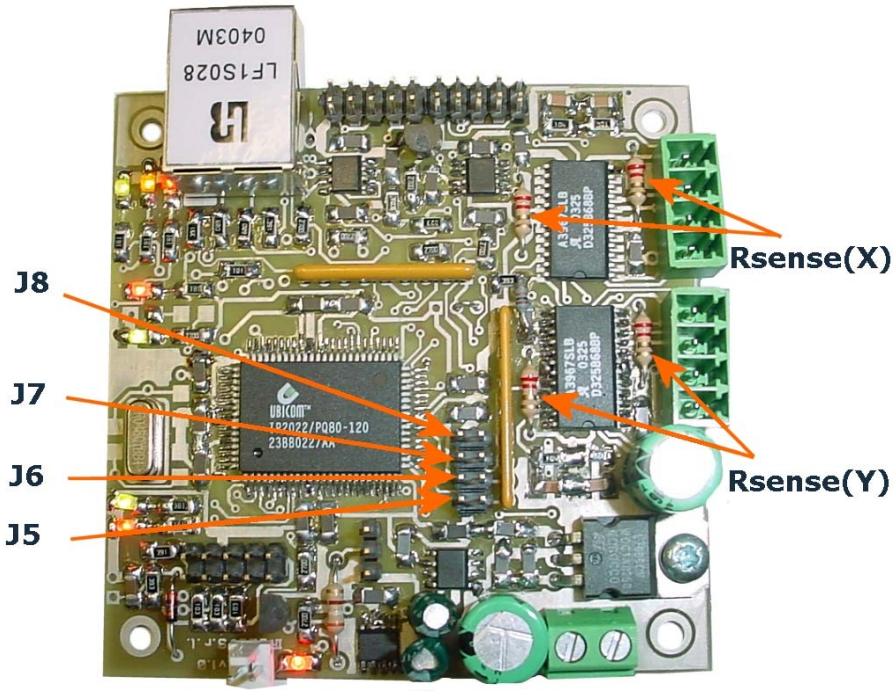
MT2ETHMS CONFIGURATION INSTRUCTIONS

Through the jumpers placed on the MT2ETHMS , shown in Picture 5, it is possible to program the same function modes described in the previous page for the MT2ETH version.



Picture 5: MT2ETHMS configuration jumpers and sense resistors

Through the four sense resistors it is possible to set the nominal current of the connected motors.

It is suggested to use resistors with tolerance less than 2%. The correct sense resistor value can be found using the following formula or the table on the next page:

$$R_{sense} = {0,5}/{I_{nom}}$$

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Here below there is a resistor value table in which are reported powers and minimum/maximum current values:

Resistor	Minimum current	Maximum current
0,68 Ω (½ W)	700 mA	750 mA
0,75 Ω (½ W)	640 mA	700 mA
0,82 Ω (½ W)	580 mA	640 mA
0,91 Ω (½ W)	525 mA	580 mA
1,0 Ω (½ W)	460 mA	525 mA
1,2 Ω (¼ W)	375 mA	460 mA
1,5 Ω (¼ W)	305 mA	375 mA
1,8 Ω (¼ W)	250 mA	305 mA
2,2 Ω (¼ W)	205 mA	250 mA
2,7 Ω (¼ W)	170 mA	205 mA
3,3 Ω (¼ W)	140 mA	170 mA
3,9 Ω (¼ W)	120 mA	140 mA
4,7 Ω (¼ W)	100 mA	120 mA
5,6 Ω (¼ W)	80 mA	100 mA
6,8 Ω (¼ W)	70 mA	80 mA
8,2 Ω (¼ W)	55 mA	70 mA
10,0 Ω (¼ W)	45 mA	55 mA

The board is equipped with four 1,2Ω (¼ W) resistors. On request, it is possible to have resistors with other values.

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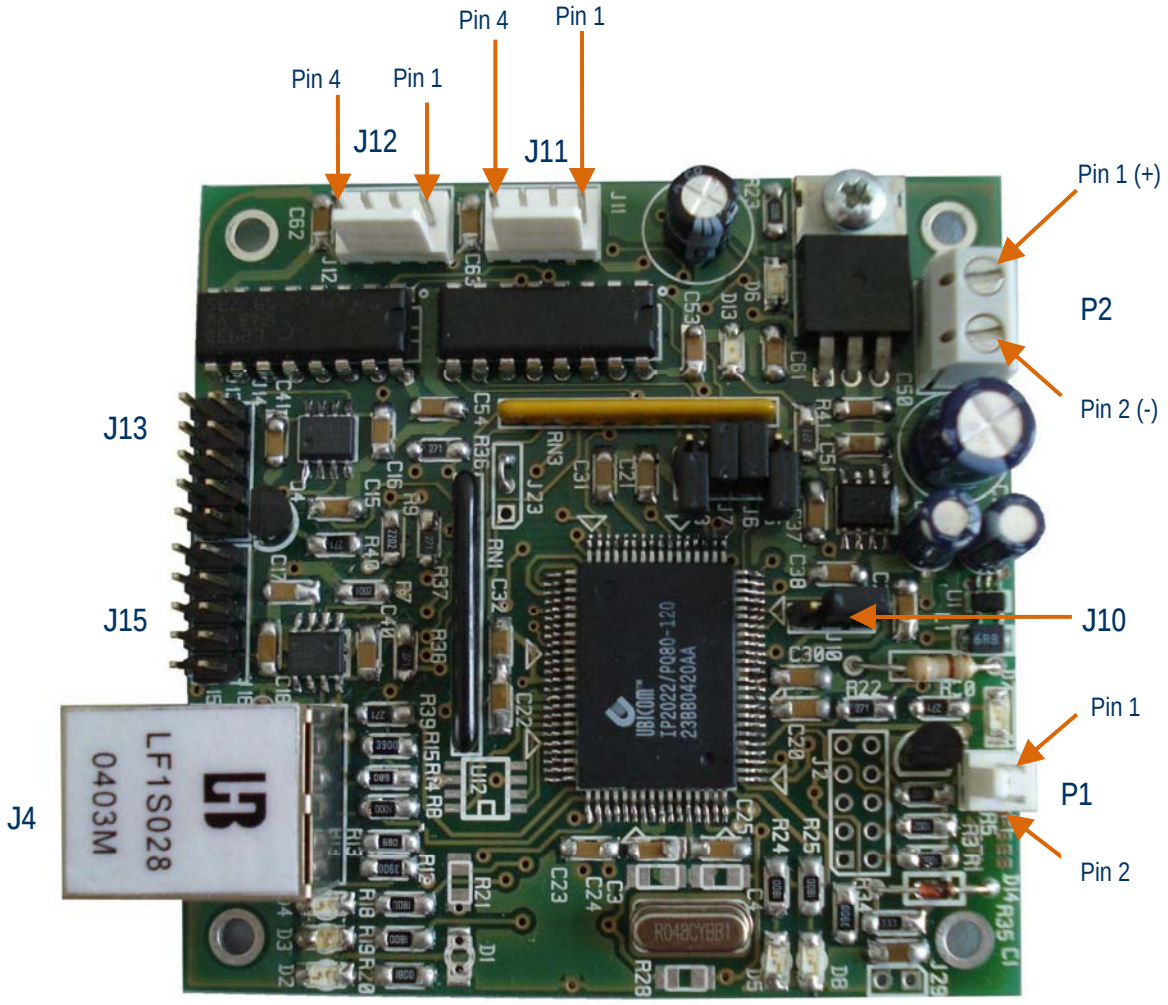
MT2ETH CONNECTION INSTRUCTIONS

The device needs a supply for the motors driving (see P2 connector in Picture 6) that can range from 7 up to 15V.

Besides, it is possible, when necessary, to connect a limit/home detector to the card, two for each motor (see J13 and J15 connectors).
It is also possible to use an *open collector* auxiliary output (see P1 connector) to communicate with a PLC or to activate externally control electronic systems.



Picture 6: MT2ETH connectors

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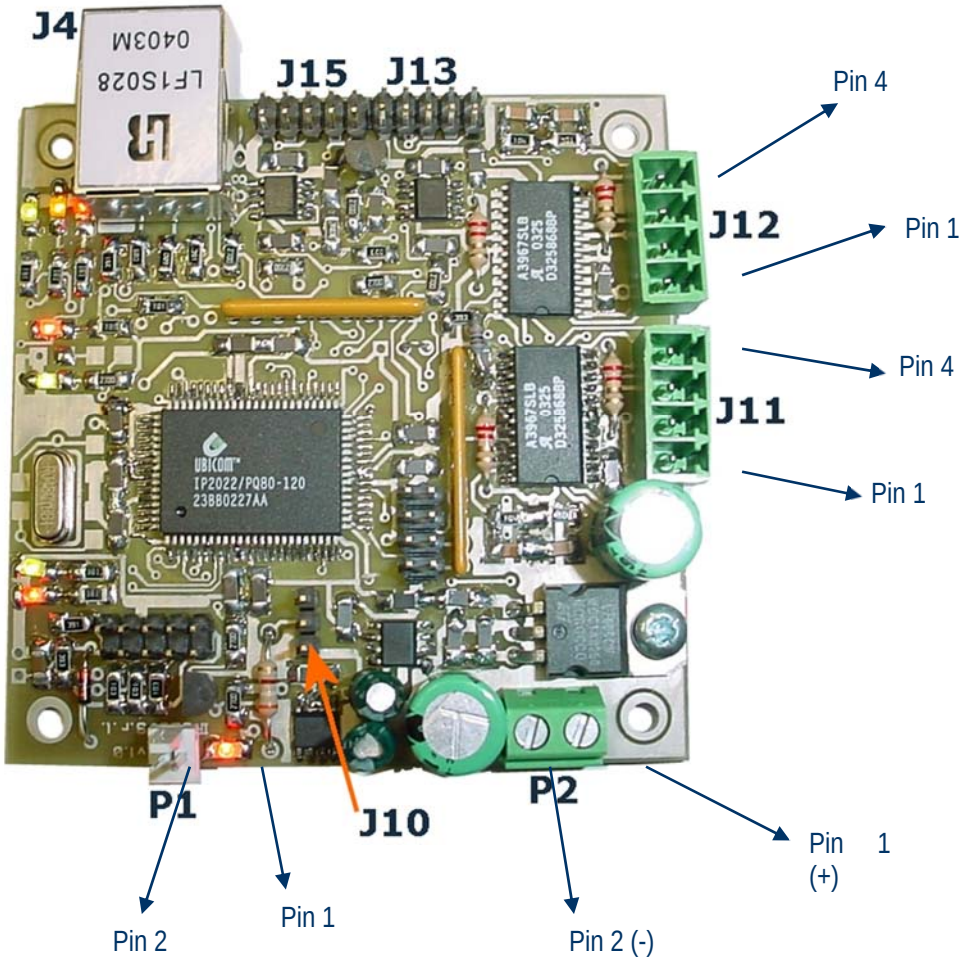
MT2ETHMS CONNECTION INSTRUCTIONS

The device needs a supply for the motors driving (see P2 connector in

Picture 7), which can range from 7 up to 15V.

Besides, it is possible, when necessary, to connect a limit/home detector to the card, two for each motor (see J13 and J15 connectors).
It is also possible to use an *open collector* auxiliary output (see P1 connector) to communicate with a PLC or to activate externally control electronic systems.



Picture 7: MT2ETHMS connectors

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CONNECTION

P1 (auxiliary exit):
pin1: positive voltage (limited by using a resistor).
pin2: *open-collector* towards GND.

P2 (power supply):
pin1: positive voltage.
pin2: GND.

J4 (RJ45): *Ethernet connector*.
pin1: RX+
pin2: RX-
pin3: TX+
pin6: TX-

	MT2ETH	MT2ETHMS
J11 (X axis):	*pin1*: Phase A+ *pin2*: Phase A- *pin3*: Phase B+ *pin4*: Phase B-	*pin1*: Phase A+ *pin2*: Phase B+ *pin3*: Phase A- *pin4*: Phase B-
J12 (Y axis):	*pin1*: Phase A+ *pin2*: Phase A- *pin3*: Phase B+ *pin4*: Phase B-	*pin1*: Phase A+ *pin2*: Phase B+ *pin3*: Phase A- *pin4*: Phase B-

To connect motors to J11 and J12 use 3,81 mm Phoenix Contact connectors[2] for MT2ETHMS version, and 2,54 AMP connectors[3] with its female crimp terminals[4] for MT2ETH version.

Through jumper J10, it is possible to set the voltage on pin1 of auxiliary output: it can has a value of +5Vdc or the same value as the motor supply.

5Vdc

Motors Vcc

The card is equipped with two limit home detectors for each axis: when both detectors are used, it is possible to limit the run of each axis between two fixed points. J13 is used for limiting home run of the X axis, J15 is used for limiting home run of the Y axis. The input connectors pinout is the same for both axes and is the following:

[2] Rs code # 220-4670 or Distrelec code # 141128
[3] Rs code # 293-0048 or Distrelec code # 114606
[4] Rs code # 293-0098 or Distrelec code # 114661

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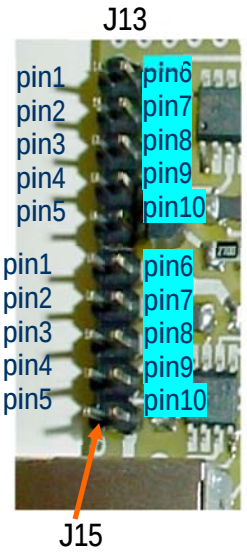

- *pin1:* positive power supply out (5Vdc, without current limitation) to supply a possible external detection logic for negative run detection.
- *pin2:* positive power supply out for infrared LED of the negative run detector (for optical limit home detectors).
- *pin3:* input for the negative run limit home detector.
- *pin4:* negative power supply out for infrared LED of the negative run detector (for optical limit home detectors).
- *pin5:* GND.
- *pin6:* positive power supply out (5Vdc, without current limitation) to supply a possible external detection logic for positive run detection.
- *pin7:* positive power supply out for infrared LED of the positive run detector (for optical limit home detectors).
- *pin8:* input for the positive run limit home detector.
- *pin9:* negative power supply out for infrared LED of the positive run detector (for optical limit home detectors).
- *pin10:* GND.

BE CAREFUL!
Do not connect or disconnect the motor (or any of its phases) when the card is powered!

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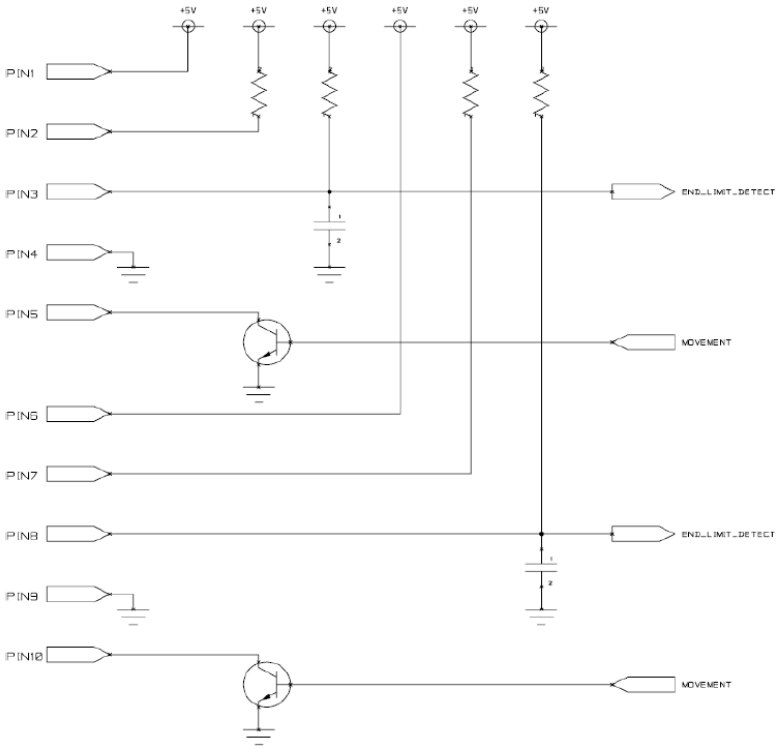
LIMIT SWITCH EXAMPLES

The next Picture 8 shows the implementation scheme of MT2ETH e MT2ETHMS J13 connector for limit switch signal acquisition along X axis (J15 is analogous for Y axis).



Picture 8: implementation scheme of J13 connector (J15 is analogous).

During motors running, MT2ETH and MT2ETHMS read home position reached when *pin3* (for X negative movement) and *pin8* (for X positive movement) of J13 connector change their electric potential. J6 sets the limit switch polarity: if inserted, the "End-of-run" signal is active when GND is applied; otherwise if J6 is not inserted, the "End-of-run" signal is active when the voltage is set at +5V.
In case of mechanics limit switches: for normally opened (N.O.) ones, J6 must be inserted; for normally close (N.C.) ones, J6 must not.

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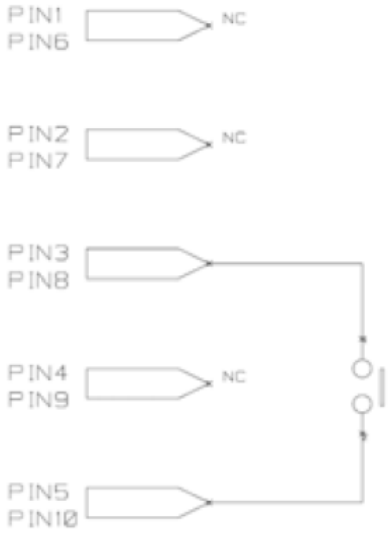
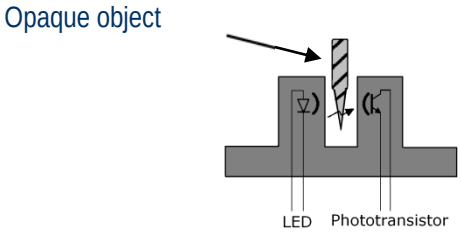


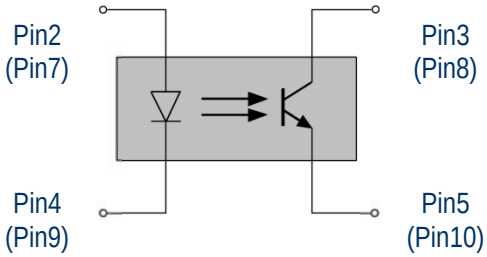
Picture 9: mechanics limit switches commutation.

The "End-of-run" signal can be received by optical sensors. The following Picture 10 shows the functioning of optical sensors. The LED lights an element with a beam, for example a *phototransistor*; than this enlightened element changes its electrical properties. The *phototransistor* gives a conductive path; but it does not if the beam is interrupted by the interposition of an opaque object.



Picture 10: optical limit switch.

The next Picture 11 indicates the linkage with J13 connector when a *phototransistor* output sensor is used.



Picture 11: *phototransistor* output sensor; linkage with J13 pins are shown for X negative (positive) "End-of-run" detection.

To utilize a *phototransistor* output, sensor J6 must be removed.

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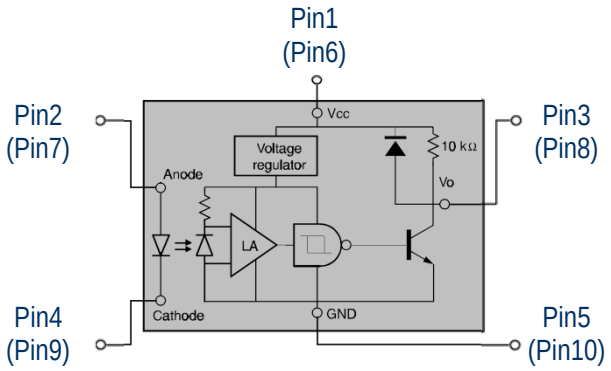
Better reliability in home position reading performances is achievable with electronic logic equipped optical sensors. In Picture 12 the scheme of electronic logic equipped with optical sensors is shown: the beam interruption by the interposition of an opaque object is detected by a power supplied system control. *pin1* (X negative) and *pin6* (X positive) give power supply.



Picture 12: electronic logic equipped optical sensors; linkage with J2 pins are shown for X negative (positive) "End-of-run" detection.

To use this kind of sensor, J6 must be inserted.

WARNING!
The maximum input voltage for *pin3* and *pin8* must not exceed +5Vdc.
For higher voltage the components of the board may damage irremediably.

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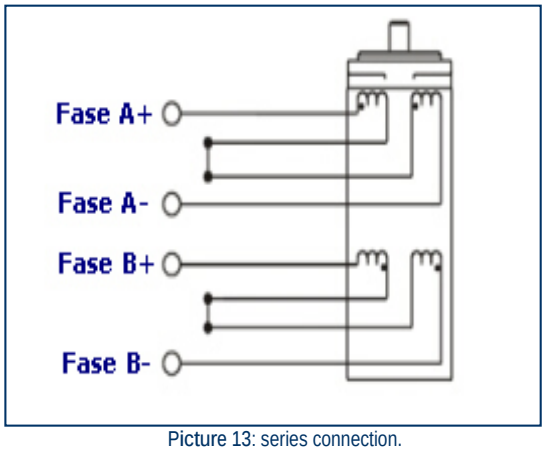
MOTORS CONNECTION

The MT2ETH and MT2ETHMS cards can control both two bipolar and two unipolar stepper motors, i.e. 8 and 4 lead motors, and 6 lead centre tapped motors. Here the possible different motor connections are shown.

MOTOR CONNECTION (8 LEAD MOTORS)

Series connection

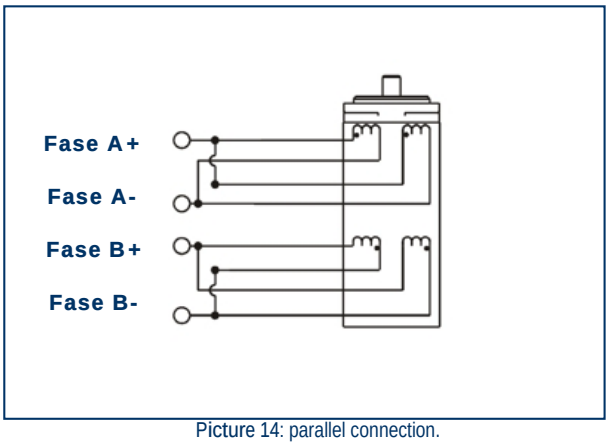
A series motor configuration would typically be used in application where a higher torque at lower speeds is required. Since this configuration has the most inductance, the performance will start to degrade at higher speeds.



Picture 13: series connection.

Parallel connection

An 8 lead motor in a parallel configuration offers a more stable, but lower torque at lower speeds. Thanks to the lower inductance, there will be higher torque at higher speeds.



Picture 14: parallel connection.

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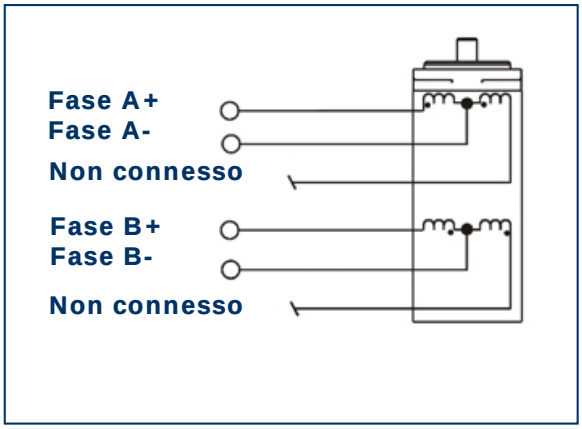
MOTOR CONNECTION (6 LEAD MOTORS)

Half coil configuration

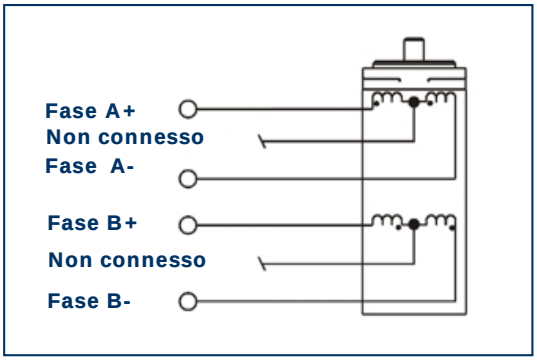
This configuration uses 50% of the motor phase windings. This gives lower inductance, hence, lower torque output. Like the parallel connection of 8 lead motor, the torque output will be more stable at higher speeds. This configuration is also referred to as **half copper**.



Picture 15: *half coil* configuration.

Full coil configuration

The full coil configuration on a 6 lead motor should be used in applications where higher torque at lower speeds is desired. This configuration is also referred to as **full copper**.



Picture 16: *full coil* configuration.

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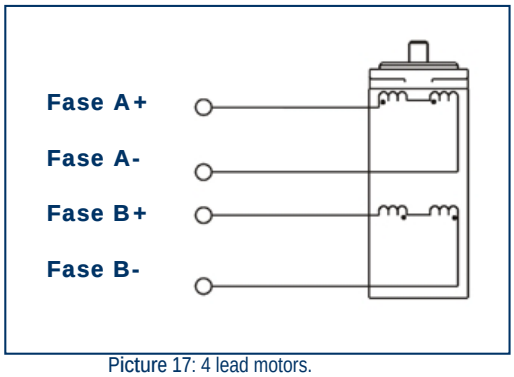
MOTOR CONNECTION (4 LEAD MOTORS)

4 lead motors

4 lead motors are the least flexible but easiest to wire. Speed and torque will depend on winding inductance



Picture 17: 4 lead motors.

NOTE

The physical direction of the motor with respect to the direction input will depend upon the connection of the motor windings. To switch the direction of the motor with respect to the direction input, switch the wires on either phase A or phase B outputs.

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TECHNICAL FEATURES

Power supply: 7 - 15Vdc regulated

Consumption: 250mA @ 12Vdc + motors and auxiliary output consumption.

Output current: MT2ETH: max 0,6A/phase (1,2A of peak)
MT2ETHMS: max 0,75A/phase (0,85A of peak)

Interface: 10base-T *Ethernet* (*RJ45* connector)

Auxiliary output: open collector (max 200mA).

Board dimensions: 75 x 75 x 15 mm (2,95 x 2,95 x 0,59 inch)
maximum high 0,20 mm (0,78 inch)

Motor movement: MT2ETH: half-step
MT2ETHMS: programmable from the whole step up to 1/8 of full step

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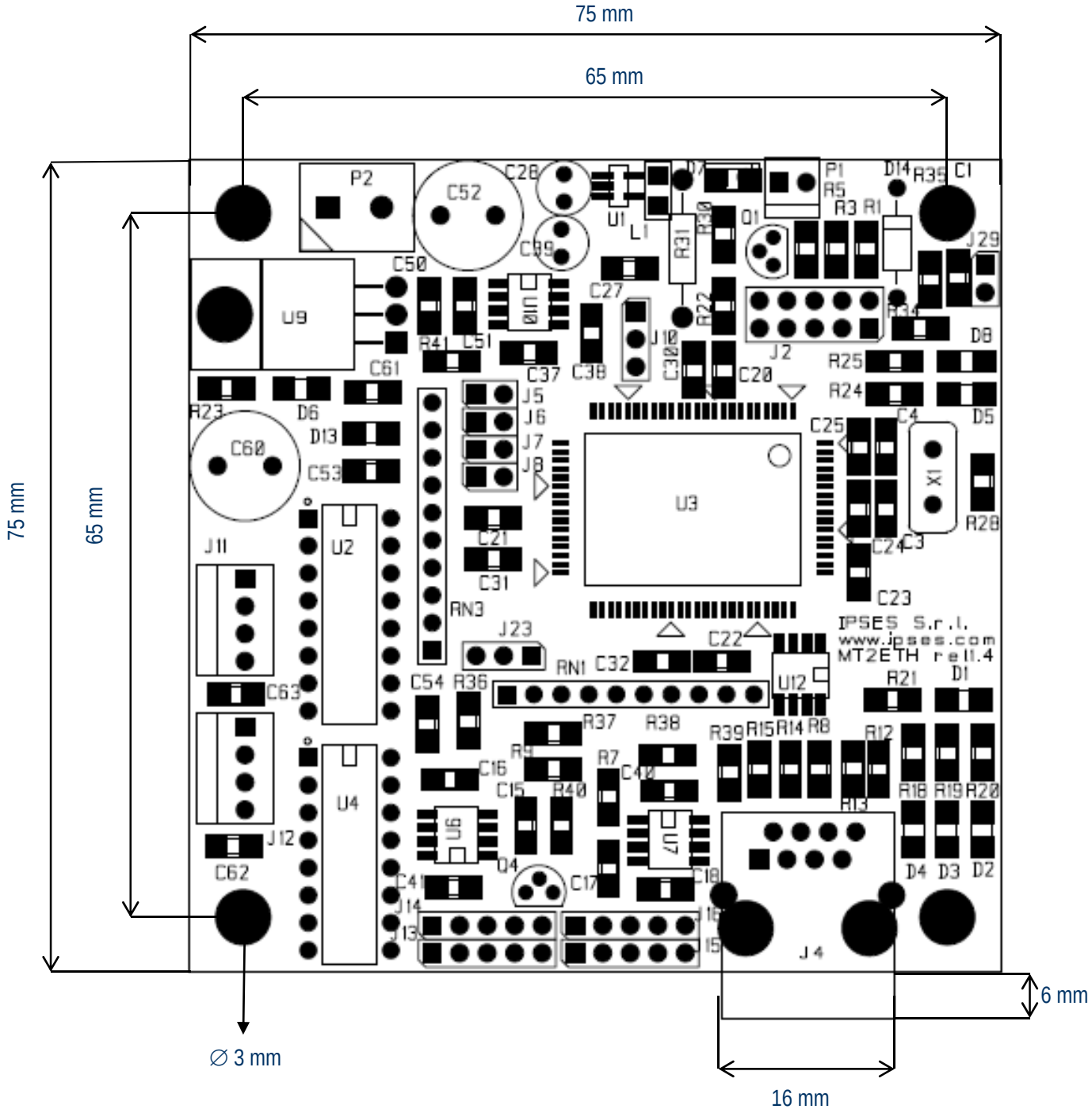

MT2ETH card dimensions

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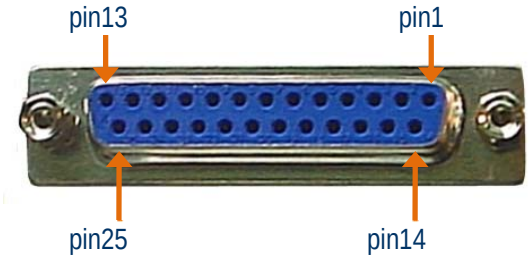
BOX

On demand, all MT2 stepper motor control cards are available on box with power pack included. Picture 18 shows MT2ETHMS-BOX.

a) b)

Picture 18: a) front and b) rear panel of MT2ETHMS box

Breadth, height and length of the box are respectively 158 mm, 85 mm and 170 mm (6.2 x 3.3 x 6.7 inches). On the rear side there is the socket to link the box to the electrical network (230Vac, 50/60Hz). On the front panel there are: the general power switch, an RJ45 socket to link the device to the Ethernet network, four LEDs (indicating working connection, motor movement, error condition and aux out activation) and two DB25 standard connectors to be used to connect to the motors. The pinout of the 25 poles connector is the following:



DB25 connector pin	Motor pin
1	positive power supply out (5Vdc, without current limitation) to supply a possible external detection logic for negative run detection
2	positive power supply for infrared LED (for optical limit detection)
3	input for the negative run limit home detector
4	negative power supply out for infrared LED of the negative run detector (for optical limit home detectors)
5	GND
6	positive power supply out (5Vdc, without current limitation) to supply a possible external detection logic for positive run detection

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7	positive power supply out for infrared LED of the positive run detector (for optical limit home detectors)
8	input for the positive run limit home detector
9	negative power supply out for infrared LED of the positive run detector (for optical limit home detectors)
10	GND
11	N.C.
12	N.C.
13	N.C.
14	AUX OUT: positive voltage (limited by using a resistor)
15	AUX OUT: *open-collector* to GND
16	N.C.
17	N.C.
18	N.C.
19	N.C.
20	N.C.
21	N.C.
22	Motor Phase B+
23	Motor Phase B-
24	Motor Phase A+
25	Motor Phase A-

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DEMO SOFTWARE

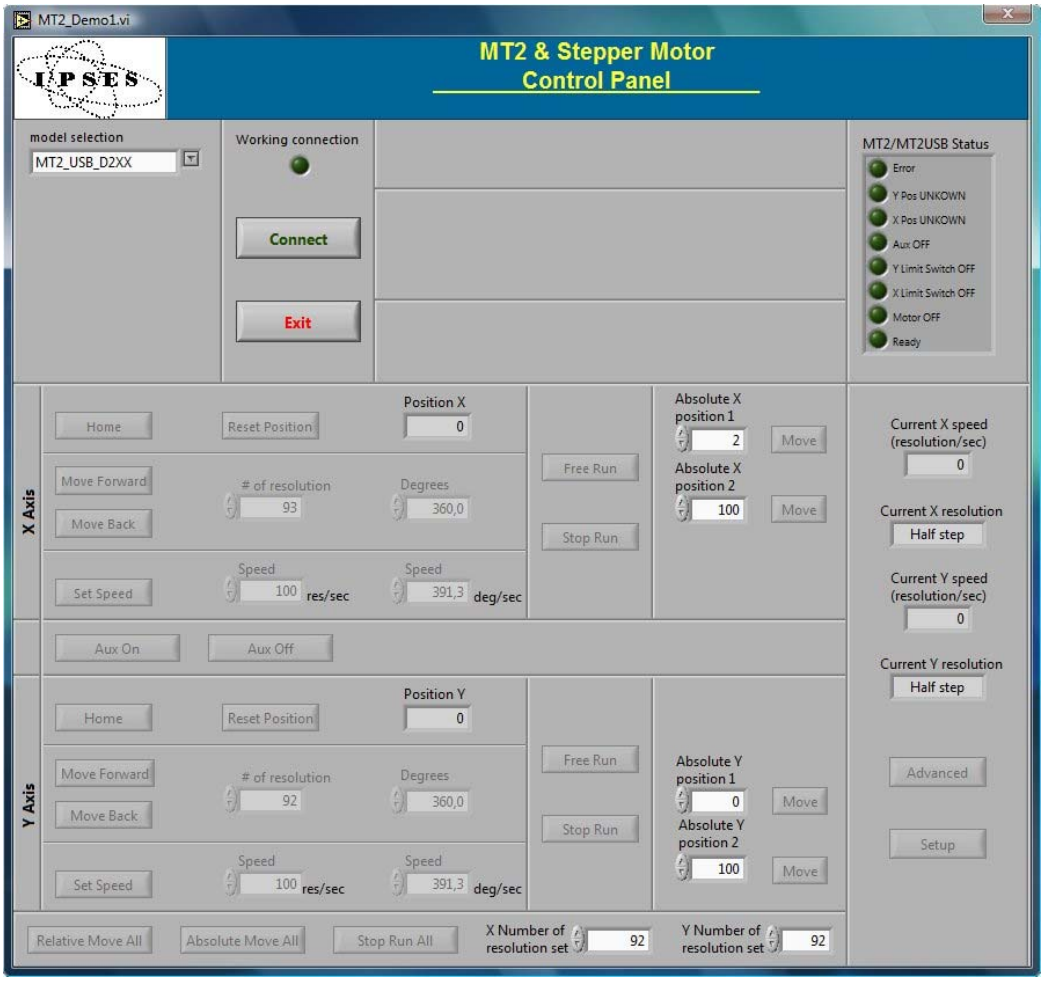
MT2_Demo is a demo software which allows MT2 device control testing from PC. Displayed Virtual control panel has intuitive functionalities which make you easy understand how it works.

INSALLATION

To install the software on your PC, execute "Setup.exe" and follow instructions displayed. Default destination folder of the executable file "MT2_Demo.exe" is "C:\Program Files\MT2_Demo".

EXECUTION

Execute "MT2_Demo.exe". Virtual control panel is displayed as showed in Picture 19:



Picture 19: virtual control panel

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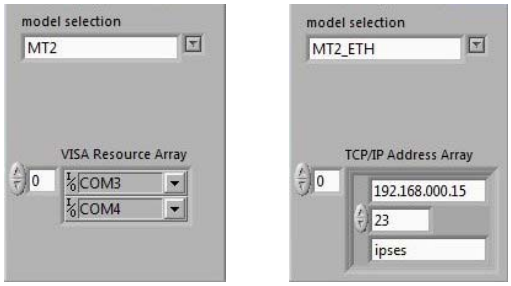
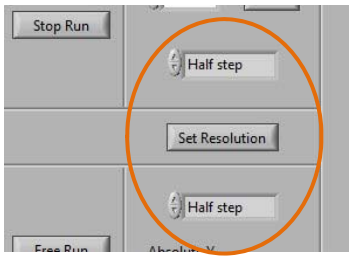
CONNECTION TO MT2 DEVICE

To start dialogue with MT2 device, select your card version in **model selection**. Specific connection parameter fields will be displayed for **Ethernet** models. User must indicate *IP address(es)*, *IP port(s)* and *password(s)*, as shown in Picture 20.
It is not possible to manage different model cards at the same time.
Connect starts connection, while **Exit** close the Demo software.



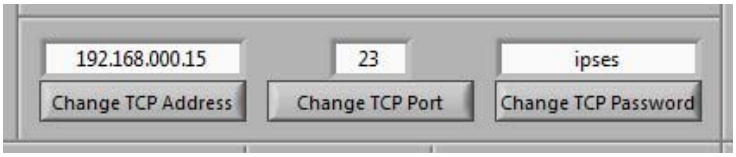
Picture 20: a) selection parameters fields for serial protocol communication (VCP) and b) selection parameters field for Ethernet protocol communication

If the connection procedure successfully pass, the fictitious LED **Working connection** turns on. The **S/N list** menu lists all connected devices and **Info device** field gives information about *firmware version* and *serial number* of the current selected board, as shown in Picture 23. All the panel commands are activated.
If the selected model is a *micro stepper* version, on the front panel will be showed also the selector controls to define the movement resolution of each motors. Press **Set Resolution** to apply the current settings.



Picture 21: controls to set motors' resolution

As shown in Picture 22, for all Ethernet models fields and commands to modify the TCP/IP protocol access parameters, such as *address*, *port* and *password*, will be activated.



Picture 22: controls to modify the TCP/IP protocol connection parameters

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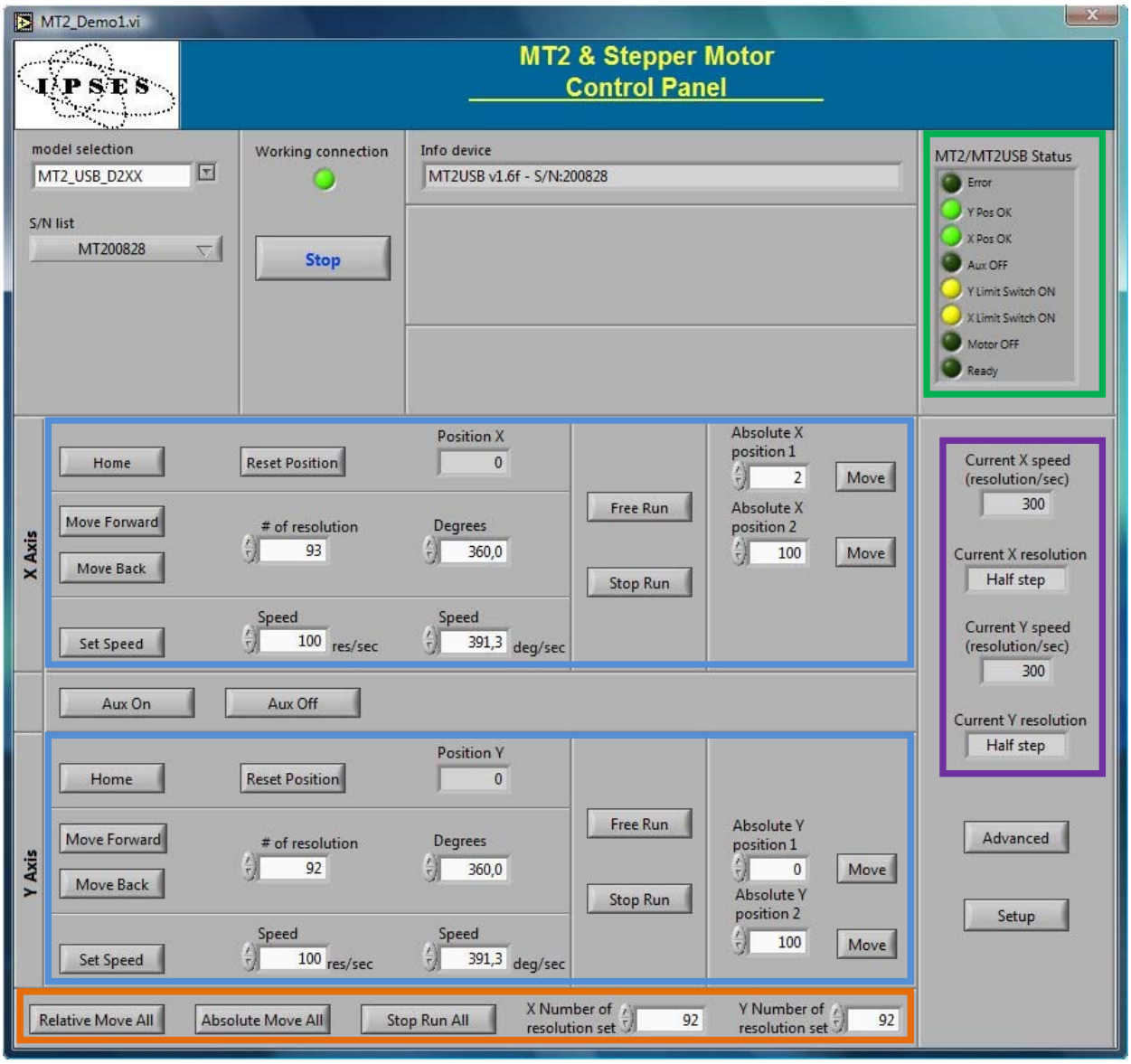
FUNCTIONALITIES

Virtual control panel is structured to make you easy understand implemented functions.



Picture 23: active panel

The blue boarded area in Picture 23 includes controls and commands for setting and for the movements of X and Y axes respectively.

Consider controls and commands for the X axis.

Home command moves the motor of the X axis to home position: during the execution of a home command, for serial and USB version, different from Ethernet ones, no more commands are received by the device. But it is possible to change the

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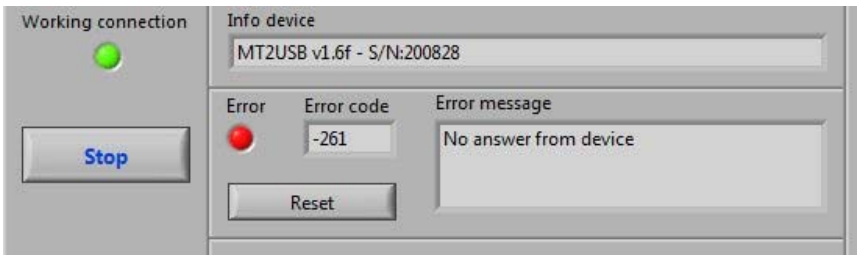
active control device by selecting a different S/N list item, or to abort the demo software by pressing the Quit button (that substitutes the Stop button under this condition). Reset position makes the actual position equivalent to zero displacement (Position X axis, displacement along X, is zero). # of resolution or Degrees define the relative positive or negative displacement, enabled by Move Forward or Move Back commands, respectively. Free Run allows perpetual motion of the X axis, while Stop Run arrests it. Speed can be declared in resolution per second or, similarly to the displacement, in degrees per second. Set Speed updates the current speed values.
Absolute X position 1 and Absolute X position 2 set the amount of two absolute displacements, referred to zero position. Move commands allow these movements.
There are analogue controls for Y motor control.
The lower panel area, surrounded in orange in Picture 23, includes the commands for the simultaneously movement of both axes, either in relative and absolute terms.
Aux On enables the auxiliary output of the card, while Aux Off disables it.
The indicators, surrounded in violet in Picture 23, show the current settings for motor speeds and resolutions of both axes.

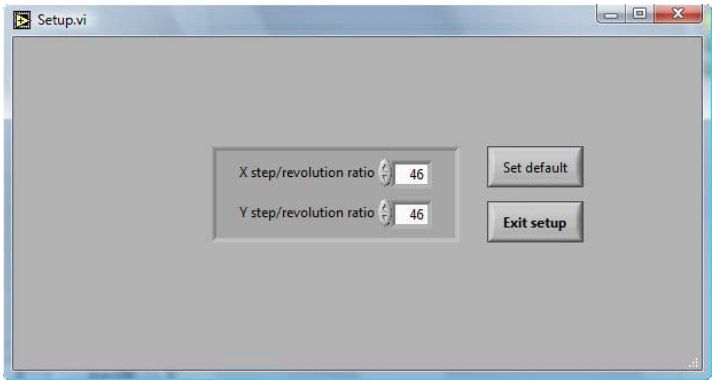
The software errors are generated as shown in Picture 24, where is represented an error occurred after a failed communication to the device.



Picture 24: error message

The re-enabling of the application functionalities is suborder to the Reset condition.

The Setup button opens a new window (see Picture 25) which allows to declare the numbers of steps (X step/revolution ratio and Y step/revolution ratio) necessary for a complete motor revolution, one for each axis. These values are automatically updated at the window closure, forced by Exit Setup. Set default restores the default values.



Picture 25: setup window

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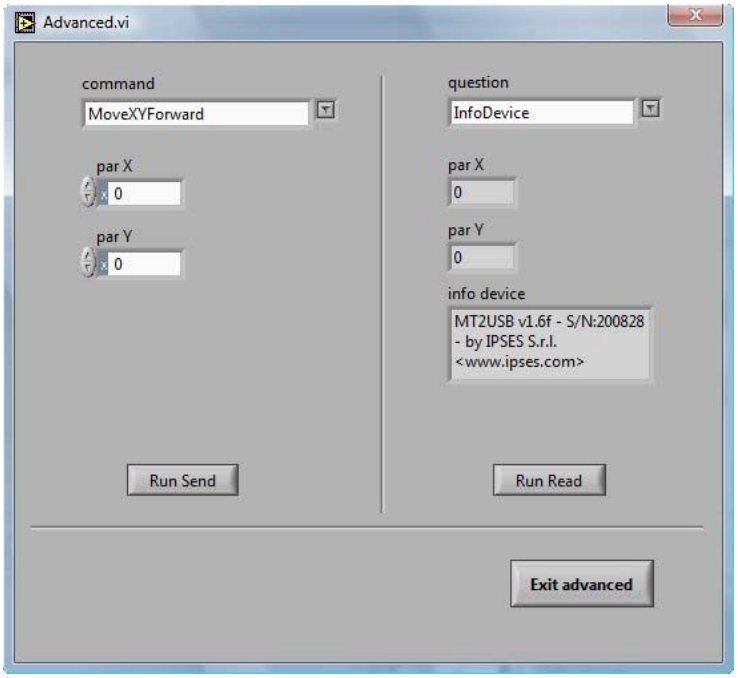
Advanced runs homonym subroutine, as shown in Picture 26 , where user can see the low level dialogue to the active device. Chosen instruction in command and associated parameter par X and par Y are communicated to the device when Run Send is set. Run read allows answer in the appropriate fields (info device, par X 1, par Y or status) to interrogations selected in question.



Picture 26: Advanced subroutine window

The surrounded green area on front panel (see Picture 23) refers about device status through the stylized LEDs: when a LED lights up, the condition described by the label on its side happens (in this case OFF becomes ON). The labeling descriptions are different between serial/USB and Ethernet version. Picture 27 shown these differences.

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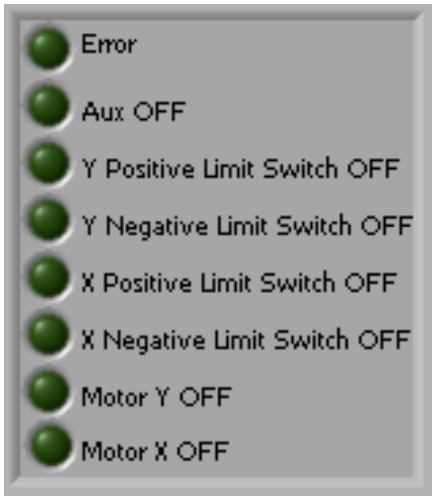
Error	Device error
Y Pos UNKNOWN	Unknown Y axis position
X Pos UNKNOWN	Unknown X axis position
Aux OFF	Auxiliary output active
Y Limit Switch OFF	Y axis home position reached
X Limit Switch OFF	X axis home position reached
Motor OFF	Motor moving
Ready	Device ready

a)



Error	Device error
Aux OFF	Auxiliary output active
Y Positive Limit Switch OFF	Y positive end-of-run signal presents
Y Negative Limit Switch OFF	Y negative end-of-run signal presents
X Positive Limit Switch OFF	X positive end-of-run signal presents
X Negative Limit Switch OFF	X negative end-of-run signal presents
Motor Y OFF	Y axis motor moving
Motor Y OFF	Y axis motor moving

b)

Picture 27:a) status LEDs for serial or USB devices; b) status LEDs for Ethernet devices.

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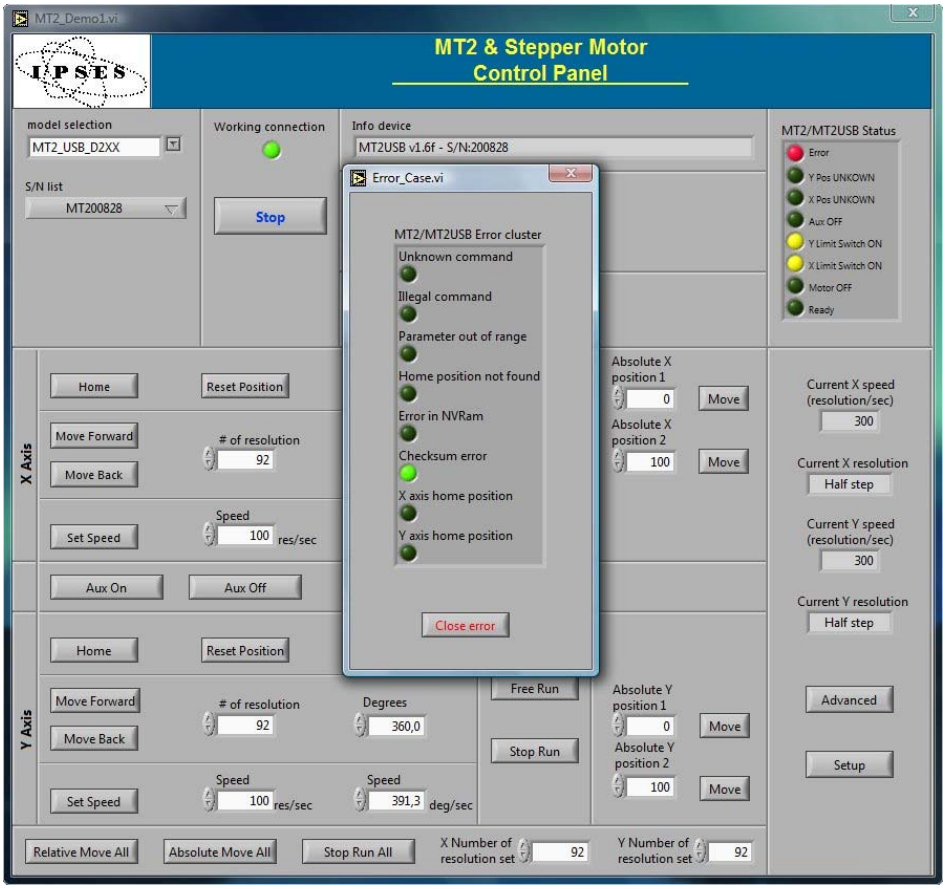
Picture 28 shows the notification of a device error message. To re-enable the operative conditions press Close error.



Picture 28: device error message example

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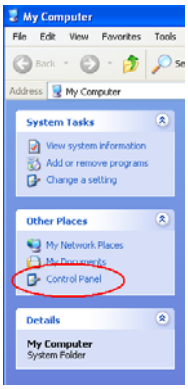
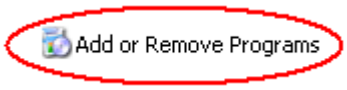
REMOVAL

To correctly remove the software, follow the instructions listed below.

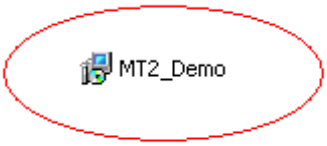


1) From Desktop, click “My Computer” icon and choose “Control Panel”.



2) Click “Add or Remove Programs” from the resource list displayed.

3) From program installed list select “MT2_Demo” and proceed removal with “Change/Remove”.



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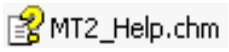
LABVIEW LIBRARY

LabVIEW development tool gives the feasibility of MT2 device remote control.
This control can be achieved through the use of the eleven functions implemented in *LabVIEW 7.1* and included in the library MT2_Library: thanks to these functions you do not have to know the details of the communication protocol and the application development is quick and easy.
The functions have two development levels: *MT2_Low_Level_Communication.llb* contains the six functions through which is possible to manage the connection with the MT2 card.

MT2_Application.llb contains the other five functions realized through the use of the previous ones: these higher level functions allow the assignment of the commands recognized by the device. Use *MT2_Application.llb* for application development, while *MT2_Low_Level_Communication.llb* for maximize performances.

	Function	Properties
MT2_Low_Level_Communication.llb	*Close_Device.vi*	Closes the connection established with one of the available protocols.
	Open_Device.vi	Opens the connection with one of the available protocols.
	Write&Read.vi	Sends and receives ASCII characters.
	Write_Command.vi	Sends ASCII characters.
	SetBitMode.vi	Sets the values of two more output configured as open collector (valid only for USB versions).
	GetBitMode.vi	Reads the values of two more output configured as open collector (valid only for USB versions).
MT2_Application.llb	*Close_dialogue.VI*	Ends the communication with the MT2 card.
	Read.vi	Sent a request to the device and read its answer.
	Send_Command.vi	Imparts the commands implemented on the device.
	Start_dialogue.vi	Starts dialogue session with the MT2 card.
	Return_Info.vi	Drafts the serial number list of connected devices.

MT2_Library is provided with a help file, *MT2_Help.chm*.



The help explains deeper the functions in the library.
MT2_Help.chm, information of which are available in *LabVIEW* too, gives structural description of all the eleven functions. Graphical representations are realized, so that the user may easily understand how they work in the tool in which they were build. Next picture displays the help of the library.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
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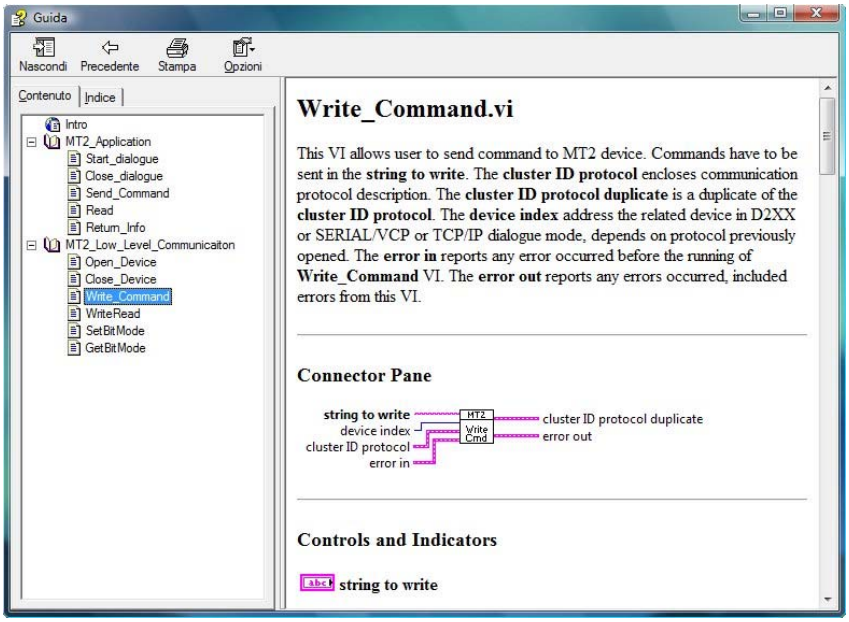

Picture 29: *LabView* functions help

MT2_Library is available on demand.

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Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

PRODUCT CODES

Code	Description
MT2ETH	Two axes stepper motor control card with 10MB Ethernet interface
MT2ETHMS	Two axes microstepper motor control card with 10MB Ethernet interface
MT2ETH-box	Two axes control system with MT2ETH card and power supply integrated in a case
MT2ETHMS-box	Two axes control system with MT2ETHMS card and power supply integrated in a case
MT2Library	LabVIEW 7.1 (and further version) library for MT2 card series
MC-connect	Bundle of 2 MC male connectors (for motors) + 2 AMP connectors (for limit home detectors) *(for MT2USB, MT2USBMS, MT2, MT2MS and MT2ETHMS)*
AMP-connect	Bundle of 2 AMP connectors for MT2ETH (for motors and limit detectors)

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

OTHER AVAILABLE MODELS

IPSES can realize customized versions of this device to answer to any clients' demand.
Particularly, it is possible to have this instrument in any size (so as to easily integrate it in any mechanical system) and with customized communication protocol.

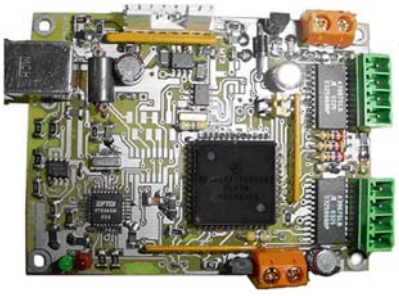
There are also available axes control cards with serial interface *RS232* (see the *MT2* and *MT2MS* systems) and with USB interface (see the *MT2USB* and *MT2USBMS* systems).
On request we can conceive and develop system with any communication interface, according to our client's specifications.
For each version on demand is available the box configuration.

For further information, please visit the website *http://ww.ipses.com.*

MT2

MT2MS

MT2USB



MT2USBMS

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Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

CONTACTS

IPSES S.r.l. conceives, projects and markets electronic and scientific instruments. The customized planning of our devices allows us to answer specific necessities for customers asking for embedded systems. IPSES clients enjoy access to a dedicated project engineering team, available as needed.
Our pool consists of highly competent professionals whose experience in this field is extremely strong. Thanks to constant updating and technical development, IPSES is a leading company, combining the dynamism of a young group into the competence and reliability of a qualified staff.

IPSES S.r.l.

Research and development office:
Via Suor Lazzarotto, 10
20020 Cesate (MI)
Italy

tel. (+39) 02 39449519 - (+39) 02 320629547
fax (+39) 02 700403170
e-mail: info@ipses.com
http://www.ipses.com

SUPPORT INFORMATION

The customer is at liberty to contact the relevant engineer at IPSES S.r.l. directly.

Telephone	:	(+39) 02 39449519
		(+39) 02 320629547
Fax	:	(+39) 02 700403170
Email	:	support@ipses.com

PROBLEM REPORT

The next page is a standard template used for reporting system problems. It can be copied and send as a fax. Alternative bugs may be reported by emails, in this case please insure that the mail contains similar information listed in the *Engineering Problem Report* form.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

ENGINEERING PROBLEM REPORT

Problem describer

Name			**IPSES s.r.l.** **Via Suor Lazzarotto, 10** **Cesate (MI)** **Italy** **Fax (+39) 02 700403170** **e-mail *support@ipses.com***
Company			
Date	Tel.	Fax	

Product

Name	Version	Serial No.

Report Type (bug, change request or technical problem)

Major bug	☐	Urgency:	
Minor bug	☐	High	☐
Change request	☐	Medium	☐
Technical problem	☐	Low	☐

Problem Description

Reproduction of Problem

IPSES s.r.l. Action notes

Received by	Date	Report No.	Action

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Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

(Product code MT2ETH AND MT2ETHMS Rel. 01.04.0004)

IPSES S.r.l.
Via Suor Lazzarotto, 10
20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 – (+39) 02 320629547
Fax (+39) 02 700403170
e-mail: info@ipses.com
support@ipses.com