

## Installation instructions

**i** For more information about drive installation, use and maintenance refer to user manual available at <http://www.everelettronica.it/manhw.html>



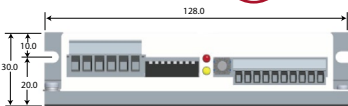
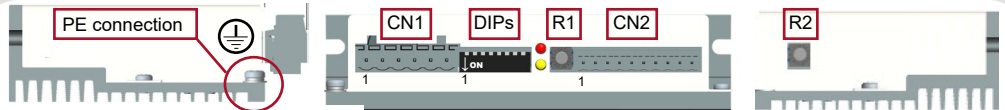
## 2 phase step motor bipolar chopper drive technical data

- DC power supply: 24 ÷ 80 Vdc;
- Phase current: 0,3+4,5 Apeak (3032 serie) or 2,4+10 Apeak (3070 serie)
- Chopper frequency: ultrasonic 40KHz;
- Emulated Step angle: Full Step, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256, 1/5, 1/10, 1/25, 1/50, 1/125, 1/250 configurable by means of Roto-Switches;
- Torque Filter to reduce vibrations, resonance and noise, configurable by means of Roto-Switches;
- Protections against: over current, over/under voltage, overheating, phase-to-phase and phase-to-ground short circuit;
- Dimensions: 128 x 74 x 30 mm (without connectors);
- Protection degree: IP20;
- Pollution degree: 2 ;
- Working temperature 5°C + 40°C ; Storage temperature -25°C + 55°C ;
- Humidity : 5% + 85% not condensing;



**TITANIO**  
VECTOR - STEPPER - DRIVES

## Connections



**CN1: Power supply and Motor 6 position, pitch 5.08mm, PCB header connector**

| CN1.1 | GND | PWR_IN  | Power supply GND      |
|-------|-----|---------|-----------------------|
| CN1.2 | V+  | PWR_IN  | Power supply Voltage  |
| CN1.3 | A   | PWR_OUT | Motor Output phase A  |
| CN1.4 | A/  | PWR_OUT | Motor Output phase A/ |
| CN1.5 | B   | PWR_OUT | Motor Output phase B  |
| CN1.6 | B/  | PWR_OUT | Motor Output phase B/ |

**CN2: Digital inputs and output 7 position, pitch 3.81mm, PCB header connector**

| CN2.1  | Boost+ | DIG_IN  | Boost + input                              |
|--------|--------|---------|--|
| CN2.2  | Boost- | DIG_IN  | Boost - input                              |
| CN2.3  | EN+    | DIG_IN  | Enable + input                             |
| CN2.4  | EN-    | DIG_IN  | Enable - input                             |
| CN2.5  | Step+  | DIG_IN  | Clock frequency + input (Clock_up +)       |
| CN2.6  | Step-  | DIG_IN  | Clock frequency - input (Clock_up -)       |
| CN2.7  | Dir+   | DIG_IN  | Motor direction + input (Clock down -)     |
| CN2.8  | Dir-   | DIG_IN  | Motor direction - input (Clock down -)     |
| CN2.9  | Out+   | PWR_IN  | Positive 24Vdc power supply digital output |
| CN2.10 | Out-   | DIG_OUT | Open emitter FAULT output                  |

## Dip-Switches Settings

| Motor Phase Current (Apeak) |          | DIPs |     |     |     | Default |
|-----------------------------|----------|------|-----|-----|-----|---------|
| LW3D3070                    | LW3D3032 | 1    | 2   | 3   | 4   |         |
| 2.4                         | 0.3      | off  | off | off | off | X       |
| 2.8                         | 0.4      | on   | off | off | off |         |
| 3.0                         | 0.5      | off  | on  | off | off |         |
| 3.2                         | 0.6      | on   | on  | off | off |         |
| 3.5                         | 0.7      | off  | off | on  | off |         |
| 3.8                         | 1.0      | on   | on  | on  | off |         |
| 4.2                         | 1.2      | off  | on  | on  | off |         |
| 4.5                         | 1.5      | on   | on  | on  | off |         |
| 5.0                         | 1.8      | off  | off | off | on  |         |
| 5.6                         | 2.0      | on   | off | off | on  |         |
| 6.0                         | 2.2      | off  | on  | off | on  |         |
| 6.3                         | 2.5      | on   | on  | off | on  |         |
| 7.0                         | 3.0      | off  | off | on  | on  |         |
| 8.0                         | 3.5      | on   | off | on  | on  |         |
| 9.0                         | 4.0      | off  | on  | on  | on  |         |
| 10.0                        | 4.5      | on   | on  | on  | on  |         |

| DIP 5 | Current reduction range         | Default |
|-------|---------------------------------|---------|
| off   | Idle current reduction to 70%   | X       |
| on    | Idle current reduction to 30%   |         |
| DIP 6 | Drive enable polarity           | Default |
| off   | Enable Asserted = Drive Disable | X       |
| on    | Enable Asserted = Drive Enable  |         |
| DIP 7 | Drive Control Mode              | Default |
| off   | Step and Dir. mode              | X       |
| on    | Clock_up / Clock_down mode      |         |
| DIP 8 | Motor stall detection           | Default |
| off   | Motor stall detection disabled  | X       |
| on    | Motor stall detection enabled   |         |



**NOTE: the device reads the Dip-Switches only at powering up. To change the setting, shut down the drive, change the settings and power the system up again to make the new setting operating.**

# R1 Roto-Switch Settings (Step Resolution and Clock Test)

| Position | Step angle         |
|----------|--------------------|
| 0        | Full step          |
| 1        | 1/2 step           |
| 2        | 1/4 step (default) |
| 3        | 1/8 step           |
| 4        | 1/16 step          |
| 5        | 1/32 step          |
| 6        | 1/64 step          |
| 7        | 1/128 step         |
| 8        | 1/256 step         |
| 9        | 1/5 step           |
| A        | 1/10 step          |
| B        | 1/25 step          |
| C        | 1/50 step          |
| D        | 1/125 step         |
| E        | 1/250 step         |
| F        | Clock test         |

## Clock Test

To activate the clock test function set the Roto-switch R1 at F position. The test shows by the drive's leds the step input frequency range. During the test the drive is disabled.

| Clock [Hz]       | Green             | Red | Yellow |
|------------------|-------------------|-----|--------|
| 0                | on                | on  | off    |
| 1 < clock < 1000 | Blinking (200 ms) | off | on     |
| clock ≥ 1000     | Blinking (200 ms) | on  | off    |



**NOTE:** the device reads the R1 Roto-Switches only at powering up. To change the setting, shut down the drive, change the settings and power the system up again to make the new setting operating.

# R2 Roto-Switch Settings (Torque Filter)

| Position      | 0              | .... | 7      | .... | F    |
|---------------|----------------|------|--------|------|------|
| Torque Filter | None (default) |      | Medium |      | High |



**NOTE:** the R2 Roto-Switches is read and executed in real time. Before a setting change, take all the measures necessary to avoid possible dangerous events.



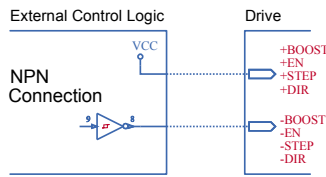
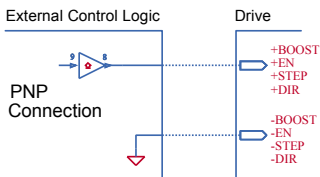
**ATTENTION:** Different Torque Filter settings can cause a variation of available motor's torque and power. The user must evaluate for any motor type and application the best tradeoff between noise and torque. It's good practice to execute tests starting with no torque filtering (R2 at 0 position) and increasing the filter until the best suitable value has been reached.

# Working Status (Leds)

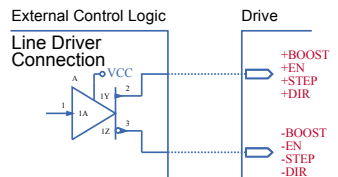
- Driver disabled : green blinking (1s)
- Driver enabled : green on
- Motor open phase: red on
- Motor phase shortcut : red blinking (200 ms)
- Over voltage: red on (2 sec) – yellow on (1 sec)
- Under Voltage: red on (2 sec) – yellow on (1 sec) – yellow on (1 sec)
- Motor stall : yellow blinking (200 ms)
- Over temperature : red on (2 sec) – yellow on (1 sec) – yellow on (1 sec) – yellow on (1 sec)

# Drive's inputs connection

## Digital input voltage range: 3.3 - 24 Vdc



## Voltage range: 2 - 24 VDC



## Drive's inputs electrical characteristics

| Type                                     | Characteristics                | Min.                | Max  | Unit |
|--|--------------------------------|---------------------|------|------|
| Standard <sup>(1)</sup><br>(EN, BOOST)   | Supply Voltage                 | 2 <sup>(1)</sup>    | 24   | Vdc  |
|  | Inputs Frequency               | -                   | 10   | KHz  |
|  | Threshold switching voltage    | 1.61 <sup>(1)</sup> | -    | Vdc  |
|  | Current at 2Vdc <sup>(1)</sup> | -                   | 3.13 | mA   |
|  | Current at 3,3Vdc              | -                   | 5.84 | mA   |
|  | Current at 5Vdc                | -                   | 6.28 | mA   |
|  | Current at 24Vdc               | -                   | 8.75 | mA   |
| High-Speed <sup>(1)</sup><br>(STEP, DIR) | Supply Voltage                 | 2 <sup>(1)</sup>    | 24   | Vdc  |
|  | Inputs Frequency               | -                   | 1    | MHz  |
|  | Threshold switching voltage    | 1.61 <sup>(1)</sup> | -    | Vdc  |
|  | Current at 2Vdc <sup>(1)</sup> | -                   | 2.53 | mA   |
|  | Current at 3,3Vdc              | -                   | 5.84 | mA   |
|  | Current at 5Vdc                | -                   | 6.28 | mA   |
|  | Current at 24Vdc               | -                   | 8.75 | mA   |

(1) N.B. : It's recommended to use 2Vdc digital inputs only in Line-Driver configuration to have more noise immunity.

## Drive's output connection

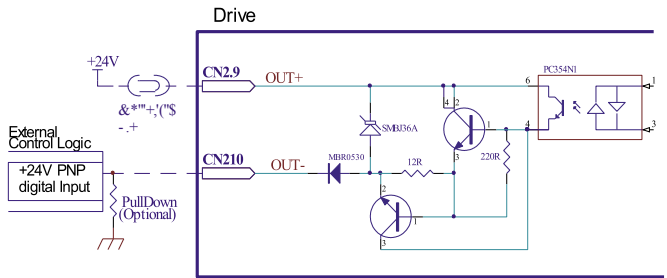
Output maximum ratings:  $V_{OUTmax}=24Vdc$ ,  $I_{OUTmax}=100mA$  and it's protected from inversion of the polarity.  
Drive status: OK = Output Transistor Closed - FAULT = Output Transistor Open



**Attention: the FAULT output is not protected in current.**

Provide an external current limitation device ( $I_{OUTmax} = 100mA$ ).

The protective device may be placed on the output power conductor +24VDC (CN2.10).



## Mating connectors


|     |                 |         |
|-----|-----------------|---------|
| CN1 | PHOENIX CONTACT | 1757051 |
| CN2 | PHOENIX CONTACT | 1803659 |

## Cables section

| Function            | Cable                        |                             |
|---------------------|------------------------------|-----------------------------|
|                     | Minimum                      | Maximum                     |
| Power supply and PE | 0.5 mm <sup>2</sup> (AWG20)  | 1.5 mm <sup>2</sup> (AWG15) |
| Motor output        | 0.5 mm <sup>2</sup> (AWG20)  | 1.5 mm <sup>2</sup> (AWG15) |
| Digital inputs      | 0.14 mm <sup>2</sup> (AWG25) | 0.5 mm <sup>2</sup> (AWG20) |
| Digital output      | 0.14 mm <sup>2</sup> (AWG25) | 0.5 mm <sup>2</sup> (AWG20) |

## Before first powering on:

- Check all connections : Power supply, Stepper motor and control logics.
- Make sure that all settings are correct for the application.
- Make sure that the characteristics of the DC power supply are appropriate for the drive.
- If possible, remove the load from the rotor of the motor to avoid wrong movements and possible damagings.
- Supply power and make sure that the green led is on or blinking. If the led is OFF, shut power down immediately and check if all the connections are correct.
- Enable the current supply to the motor (without STEP Clock) and, if possible, check its Holding Torque.
- Execute a movement of some steps to be sure that the rotation direction is the expected one.

 To reverse the rotation direction leaving the DIR input unchanged turn the connection of a phase leads of the motor on CN1, for example A with A/.

- Disconnect the power supply, fit the motor to the load and check the full functionality.

## Drive's faults analysis

When any of the following situations occur, the drive is placed in a fault condition.



| DEFECT   | CAUSE  | ACTION   |
|--|--|--|
| Intervention of the thermal protection.            | Can be caused by a heavy working cycle or a high current in the motor. | Improve the drive cooling by natural or fan air flow.<br>Consider to use a motor with a higher torque vs current rating. |
| Intervention of the current protection.            | Short circuit on the motor powering stage(s) of the drive.             | Check motor windings and cables to remove the short circuits replacing faulty cables or motor if necessary.              |
| Intervention of the over/under voltage protection. | Supply voltage out of range.   | Check the value of the supply voltage.   |
| Open phase motor protection.                       | Motor windings to drive not proper connection.                         | Check motor cables and connections to the drive.   |

At any of the following situations occurring the drive stops working entering a fault condition.



| DEFECT   | CAUSE   | ACTION   |
|--|---|--|
| Noisy motor movement with vibrations.                        | Can be caused by a lack of power supply to a phase of the motor or a poor regulation of the winding currents. | Check the cables and connections of the motor and/or change the motor speed to avoid a resonance region.                             |
| The external fuse on the power supply of the drive is burned | Can be caused by a wrong connection of the power supply.  | Connect the power supply correctly and replace the fuse.   |
| At high speed, the motor torque is not enough.               | Can be due to a "self-limitation" of motor current and torque.  | Increase the motor current (always within the limits), increase the supply voltage, change motor connection from series to parallel. |

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