# SW5A9030x2x1-xx - Controller

**ever** — e-MOTION SOLUTIONS

## Installation instructions

ℹ️ Refer to installation use and maintenance manual for more information.
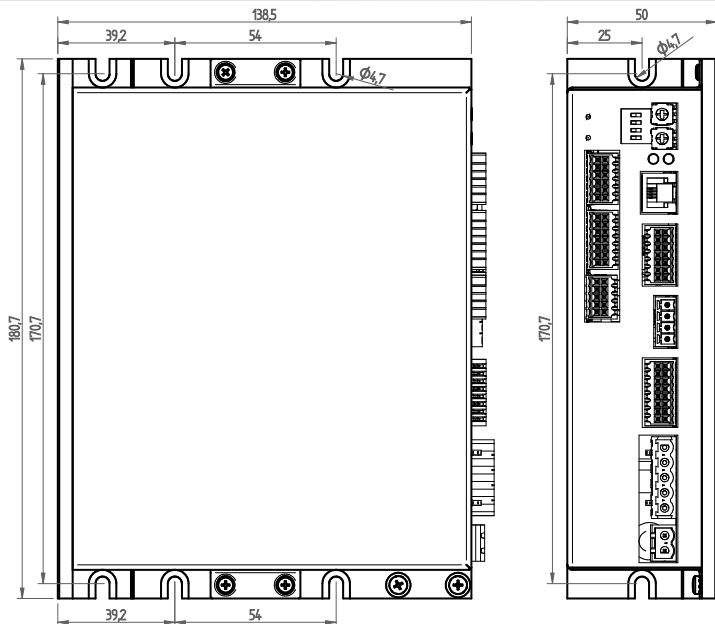
**T I T A N I O**
VECTOR - STEPPER - DRIVES

error less servo efficient **else** technology ®
by Ever Elettronica

CE — RoHS COMPLIANT

## 2 phase bipolar stepper drive technical data

- AC supply: 100 ÷ 240 Vac (monophase)
- Phase current: up to 3.0 Arms (4.2 Apk)
- Chopper frequency: ultrasonic 40 kHz
- Stepless Control Technology (65536 position per turn)
- Protections against: over current, over/under voltage, overheating, short circuit between motor phase-to-phase and phase-to-ground.
- Canbus + Modbus RTU or EtherCAT or Ethernet or Profinet communication interfaces
- Incremental Encoder Input: 5V Differential (RS422) or 5V single-ended TTL/CMOS (isolated)
- Absolute Encoder Input: 5V BiSS-C or SSI interface (isolated)
- Service SCI interface for programming and real time debugging
- Safe Torque Off (STO) inputs (isolated)
- up to 16 digital inputs (isolated)
- up to 12 digital outputs (isolated)
- up to 2 analog inputs (isolated)
- up to 2 analog outputs (isolated)
- Dimensions: see image below (without connectors)
- Protection degree: IP20
- Pullution degree 2
- Overvoltage Category III
- Short Circuit Current: 5 KA
- Protection Class: Class I Equipment
- Working temperature 5°C ÷ 50°C;  Storage temperature -25°C ÷ 55°C
- Humidity: 5% ÷ 85% not condensing

STO Safe Torque Off SIL3 PLe

c **UL** US

CANopen®
Modbus
EtherCAT®
Modbus TCP/IP
PROFINET®
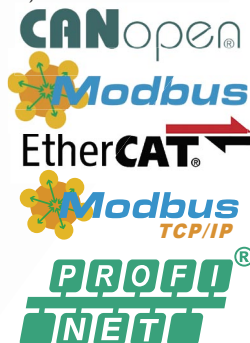
## Mechanical data

## Available models

| System code | STO | Communication interfaces | Digital inputs | Digital outputs | Analogue inputs | Analogue Outputs |
|---|---|---|---|---|---|---|
| SW5A9030**L22**1-20 | Yes | Canbus + Modbus RTU | 4 | 3 | 0 | 0 |
| SW5A9030**L2G**1-20 | Yes | Canbus + Modbus RTU | 16 | 12 | 2 | 2 |
| SW5A9030**H22**1-20 | Yes | EtherCAT | 4 | 3 | 0 | 0 |
| SW5A9030**E2G**1-20 | Yes | Ethernet (Modbus TCP/IP) | 16 | 12 | 2 | 2 |
| SW5A9030**T22**1-20 | Yes | Profinet | 4 | 3 | 0 | 0 |

## System connections

Connectors:
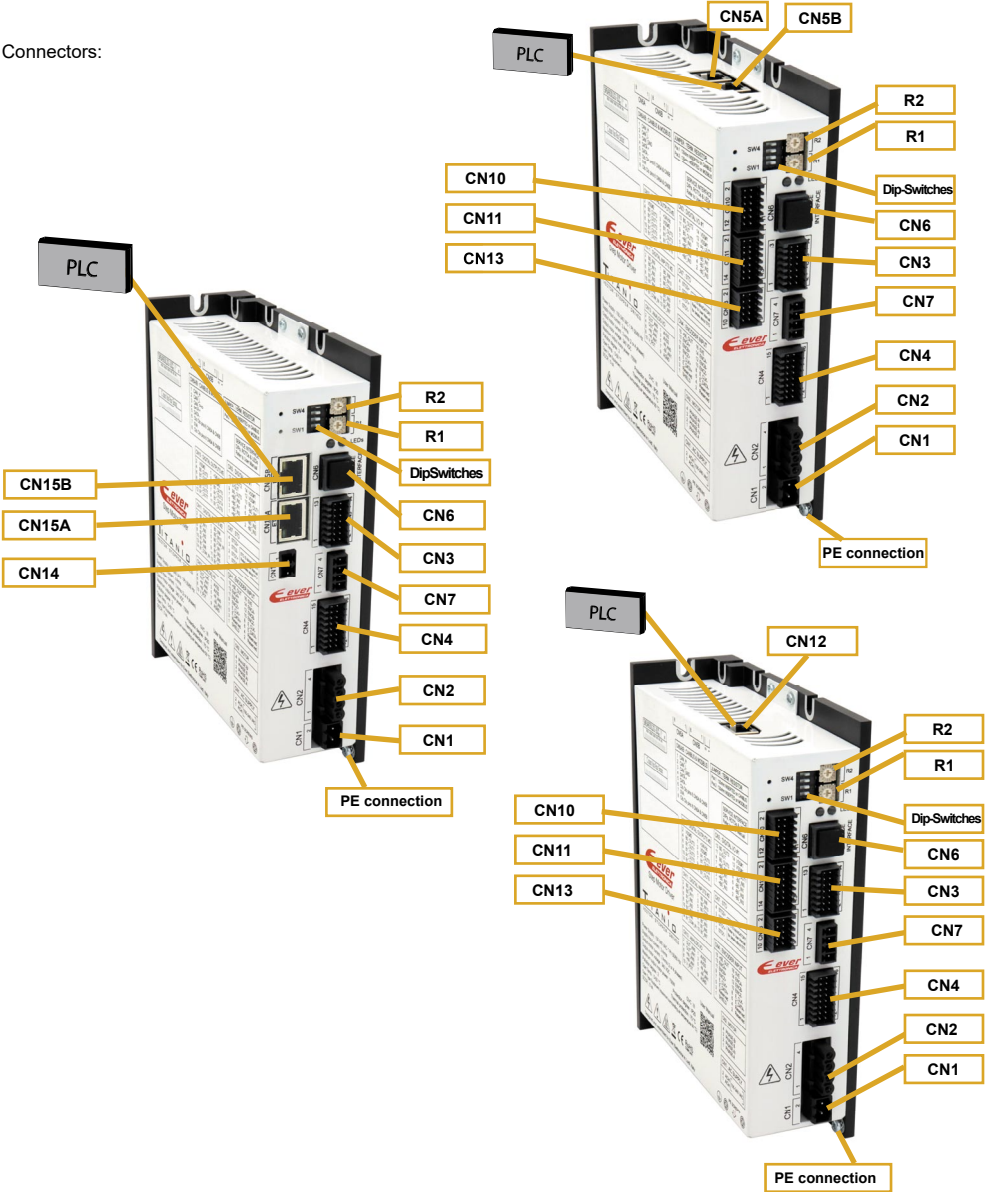
# System connection

## CN1: AC Power supply

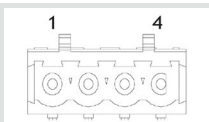2 positions, pitch 5.08mm, PCB header connector

| CN1.1 | ACin | PWR_IN | AC power supply input |
|---|---|---|---|
| CN1.2 | ACin | PWR_IN | AC power supply input |



## CN2: Motor connection

4 positions, pitch 5.08mm, PCB socket connector

| CN2.1 | A | PWR_OUT | Motor phase  A |
|---|---|---|---|
| CN2.2 | A/ | PWR_OUT | Motor phase  A/ |
| CN2.3 | B | PWR_OUT | Motor phase  B |
| CN2.4 | B/ | PWR_OUT | Motor phase B/ |



## CN6:  Service SCI Interface

RJ11, 6P4C, PCB header connector

| CN6.1 | TX/RX | Transmit / Receive Line |
|---|---|---|
| CN6.2 | DE/RE | Drive Enable Negated / Receive Enable |
| CN6.3 | +5V | +5V power out |
| CN6.4 | GND | GND power out |



**NOTE: This connection is _only_ possible with hardware and software provided by Ever motion Solutions.**

## CN7:  STO inputs (mandatory)

4 positions, pitch 3.81mm, PCB header connector

| CN7.1 | STO1 - | PWR_IN | STO1 input negative side |
|---|---|---|---|
| CN7.2 | STO1 + | PWR_IN | STO1 input positive side |
| CN7.3 | STO2 - | PWR_IN | STO2 input negative side |
| CN7.4 | STO2 + | PWR_IN | STO2 input positive side |
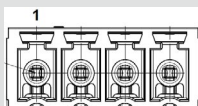


**STO inputs are 24Vdc MANDATORY and ISOLATED**

## CN3: Digital Inputs / Outputs  #1

14 positions, pitch 2.54mm double row, PCB header connector

| CN3.1 | +B0_IN3 | DIG_IN | Digital B0_IN3 positive side |
|---|---|---|---|
| CN3.2 | -B0_IN3 | DIG_IN | Digital B0_IN3 negative side |
| CN3.3 | +B0_IN2 | DIG_IN | Digital B0_IN2 positive side |
| CN3.4 | -B0_IN2 | DIG_IN | Digital B0_IN2 negative side |
| CN3.5 | +B0_IN1 | DIG_IN | Digital B0_IN1 positive side |
| CN3.6 | -B0_IN1 | DIG_IN | Digital B0_IN1 negative side |
| CN3.7 | +B0_IN0 | DIG_IN | Digital B0_IN0 positive side |
| CN3.8 | -B0_IN0 | DIG_IN | Digital B0_IN0 negative side |
| CN3.9 | B0_OUT0 | DIG_ | PNP digital output B0_OUT0 |
| CN3.10 | B0_OUT | DIG_ | PNP digital output B0_OUT1 |
| CN3.11 | V-OUT | PWR_IN | 24 Vdc supply for digital output |
| CN3.12 | VSS #1 | PWR_IN | Negative input supply for digital output on CN3 |
| CN3.13 | B0_OUT2 | DIG_ | PNP digital output B0_OUT2 |
| CN3.14 | VSS #2 | PWR_IN | Negative input supply for digital output on CN3 |
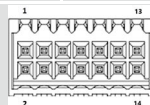


## CN4: Feedback connection

16 position, pitch 2.54mm double row, PCB header connector

| CN4.1 | SHIELD | / | Cable shield connection for feedback interface |
|---|---|---|---|
| CN4.2 | Reserved | --- | Reserved pin |
| CN4.3 | Reserved | --- | Reserved pin |
| CN4.4 | Reserved | --- | Reserved pin |
| CN4.5 | DATA+ | DIG_IN | Absolute encoder data input positive |
| CN4.6 | DATA- | DIG_IN | Absolute encoder data input negative |
| CN4.7 | CLK+ | DIG_OUT | Absolute encoder clock output positive |
| CN4.8 | CLK- | DIG_OUT | Absolute encoder clock output negative |
| CN4.9 | ENCZ+ | DIG_IN | Encoder zero differential input positive |
| CN4.10 | ENCZ- | DIG_IN | Encoder zero differential input negative |
| CN4.11 | ENCB+ | DIG_IN | Encoder phase B differential input positive |
| CN4.12 | ENCB- | DIG_IN | Encoder phase B differential input negative |
| CN4.13 | ENCA+ | DIG_IN | Encoder phase A differential input positive |
| CN4.14 | ENCA- | DIG_IN | Encoder phase A differential input negative |
| CN4.15 | +5E | PWR_OUT | +5Vdc power supply output |
| CN4.16 | 0VE | PWR_OUT | Negative side of supply |
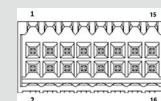


## CN5A and CN5B: CANbus & Modbus Interfaces

RJ45, 8 position shielded, PCB header connector

| CN5.1 | CAN_H | DIGITAL_I/O | Bus Line Dominant HIGH (Canbus) |
|---|---|---|---|
| CN5.2 | CAN_L | DIGITAL_I/O | Bus Line Dominant LOW (Canbus) |
| CN5.3 | CAN_GND | PWR_OUT | Signal Ground for Canbus |
| CN5.4 | Data + | DIGITAL_I/O | Positive RS485 signal (Modbus) |
| CN5.5 | Data - | DIGITAL_I/O | Negative RS485 signal (Modbus) |
| CN5.6 | Cto Cto between pins 6 of CN5A and CN5B | --- | IN-OUT for CAN_SHLD (Canbus) |
| CN5.7 | 0V_A | PWR_OUT | Signal Ground for Modbus |
| CN5.8 | Cto Cto between pins 8 of CN5A and CN5B | --- | IN-OUT for CAN_V+ (Canbus) |

# System connection

## CN10: Digital Outputs #2

12 positions, pitch 2.54mm double row, PCB header connector

| | | | |
|---|---|---|---|
| CN10.1 | +24Vdc | PWR_IN | 24Vdc supply for digital outputs on CN10 |
| CN10.2 | VSS#2 | PWR_IN | Negative reference for digital outputs on CN10 |
| CN10.3 | VSS#2 | PWR_IN | Negative reference for digital outputs on CN10 |
| CN10.4 | B0_OUT3 | DIG_OUT | PNP digital output B0_OUT3 |
| CN10.5 | B1_OUT0 | DIG_OUT | Digital output B1_OUT0 (PNP) |
| CN10.6 | B1_OUT1 | DIG_OUT | Digital output B1_OUT1 (PNP) |
| CN10.7 | B1_OUT2 | DIG_OUT | Digital output B1_OUT2 (PNP) |
| CN10.8 | B1_OUT3 | DIG_OUT | Digital output B1_OUT3 (PNP) |
| CN10.9 | B1_OUT4 | DIG_OUT | Digital output B1_OUT4 (PNP) |
| CN10.10 | B1_OUT5 | DIG_OUT | Digital output B1_OUT5 (PNP) |
| CN10.11 | B1_OUT6 | DIG_OUT | Digital output B1_OUT6 (PNP) |
| CN10.12 | B1_OUT7 | DIG_OUT | Digital output B1_OUT7 (PNP) |
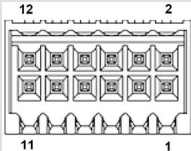


## CN13: Analog I/O

10 positions, pitch 2.54mm double row, PCB header connector

| | | | |
|---|---|---|---|
| CN13.1 | AVSS | PWR_OUT | Negative output reference for analog outputs |
| CN13.2 | OUT_AN0 | AN_OUT | Analog output 0 positive side |
| CN13.3 | AVSS | PWR_OUT | Negative output reference for analog outputs |
| CN13.4 | OUT_AN1 | AN_OUT | Analog output 1 positive side |
| CN13.5 | -IN_AN0 | AN_IN | Analog input 0 negative side |
| CN13.6 | +IN_AN0 | AN_IN | Analog input 0 positive side |
| CN13.7 | -IN_AN1 | AN_IN | Analog input 1 negative side |
| CN13.8 | +IN_AN1 | AN_IN | Analog input 1 positive side |
| CN13.9 | AGND | PWR_OUT | Negative output reference for potentiometer |
| CN11.10 | VPOT | PWR_OUT | Voltage supply output for potentiometers |
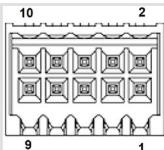


## CN11: Digital Inputs #2

14 positions, pitch 2.54mm double row, PCB header connector

| | | | |
|---|---|---|---|
| CN11.1 | B0_IN8 | DIG_IN | Digital input B0_IN8 |
| CN11.2 | B0_IN9 | DIG_IN | Digital input B0_IN9 |
| CN11.3 | B0_IN10 | DIG_IN | Digital input B0_IN10 |
| CN11.4 | B0_IN11 | DIG_IN | Digital input B0_IN11 |
| CN11.5 | B0_COM_IN | PWR_IN | Reference common inputs B0 on CN11 |
| CN11.6 | B1_IN0 | DIG_IN | Digital input B1_IN0 |
| CN11.7 | B1_IN1 | DIG_IN | Digital input B1_IN1 |
| CN11.8 | B1_IN2 | DIG_IN | Digital input B1_IN2 |
| CN11.9 | B1_IN3 | DIG_IN | Digital input B1_IN3 |
| CN11.10 | B1_IN4 | DIG_IN | Digital input B1_IN4 |
| CN11.11 | B1_IN5 | DIG_IN | Digital input B1_IN5 |
| CN11.12 | B1_IN6 | DIG_IN | Digital input B1_IN6 |
| CN11.13 | B1_IN7 | DIG_IN | Digital input B1_IN7 |
| CN11.14 | B1_COM_IN | PWR_IN | Referece commom inputs B1 on CN11 |
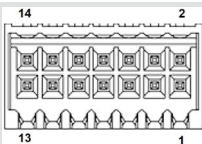


## CN14: 24 Vdc Expansion Supply

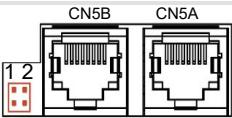**2 positions, pitch 5.08mm, PCB header connector**

| | | | |
|---|---|---|---|
| CN14.1 | VIN_EXP | PWR_IN | Positive DC expansion supply |
| CN14.2 | VSS_EXP | PWR_IN | Negative expansion supply |
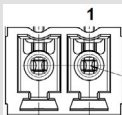


**24 Vdc MANDATORY and ISOLATED**

## JUMPERS - Terminator Resistor

| | |
|---|---|
| Position 1 | 120 ohm resistor INSERTED on Canbus network |
| Position 2 | 120 ohm resistor INSERTED on Modbus network |



## CN15A and CN15B: EtherCAT Interface

**RJ45, 8 position shielded, PCB header connector**

Dual RJ45 connectors (IN-OUT)

100BASE-TX (100Mb/sec) ports

Accept standard Ethernet cable (CAT5 or higher)



CN15A (OUT)  CN15B (IN)

EtherCAT.

## CN15A and CN15B: Profinet Interface

**RJ45, 8 position shielded, PCB header connector**

Dual RJ45 connectors (P1-P2)

100BASE-TX (100Mb/sec) ports

Accept standard Ethernet cable (CAT5 or higher)



CN15A (P1)  CN15B (P2)

PROFINET®

## CN12: Ethernet Interface

**RJ45, 8 position shielded, PCB header connector**

Dual RJ45 connectors (IN-OUT)

100BASE-TX (100Mb/sec) ports
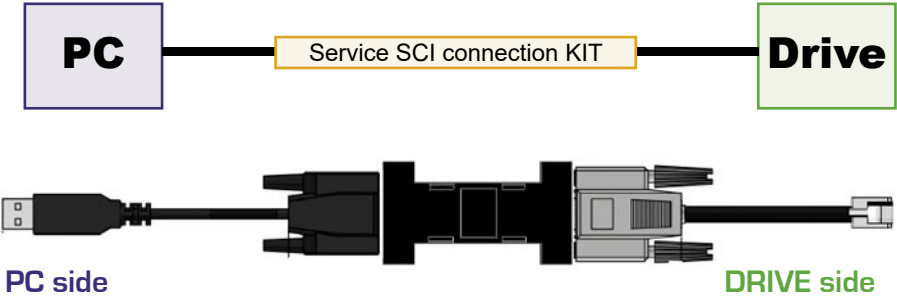
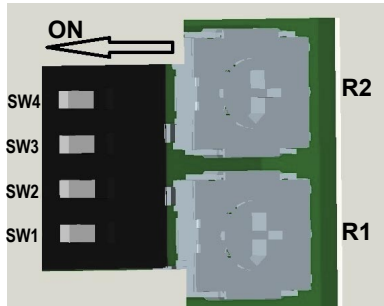Accept standard Ethernet cable (CAT5 or higher)



CN12

Modbus TCP/IP

# Service SCI connection

⚠️ *This connection is __only__ possible with hardware and software provided by Ever.*
*Kit code: SW5_SERV00-SL or SW5-SERV00-EE.*

| PC | — Service SCI connection KIT — | Drive |

**PC side**   **DRIVE side**

# Dip-Switches and Roto-Switches settings

**ON**

SW4
SW3
SW2
SW1

R2
R1

| Drives's Baud Rate Selection | | | | |
|---|---|---|---|---|
| **SW2** | **SW3** | **SW4** | **Modbus** | **Canbus** |
| OFF | OFF | OFF | 115200 | 1 M |
| OFF | OFF | ON | 57600 (default) | 500 K (default) |
| OFF | ON | OFF | 38400 | 250 K |
| OFF | ON | ON | 19200 | 125 K |
| ON | OFF | OFF | 9600 | 100 K |
| ON | OFF | ON | 4800 | 50 K |
| ON | ON | OFF | 2400 | 50 K |
| ON | ON | ON | 1200 | 50 K |

| SW1 - U0 Software defined | |
|---|---|
| ON | |
| OFF | X (Default) |

| Node-ID Selection | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **R2** | 0 | 0 | 0 | 0 | ... | 2 | 2 | ... | 7 | 7 |
| **R1** | 0 | 1 | 2 | 3 | ... | C | D | ... | E | F |
| **Node-ID #** | Reserved | 1 (default) | 2 | 3 | ... | 44 | 45 | ... | 126 | 127 |

| Reserved | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 8 | ... | ... | ... | ... | F | F |
| 0 | 1 | ... | ... | ... | ... | E | F |
| Reserved | | | | | | |

⚠️ *NOTE: the device reads the Dip-Switches and the Roto-Switches only during the Power up. If it's necessary a setting change, shut down the system, change the settings and start up the system again to make the changes operating.*

ℹ️ In EtherCAT, Profinet and Ethernet versions the functionality of the Dip-Switches & Roto-Switches depends on the firmware installed on the drive (Refer to the Software Manual).
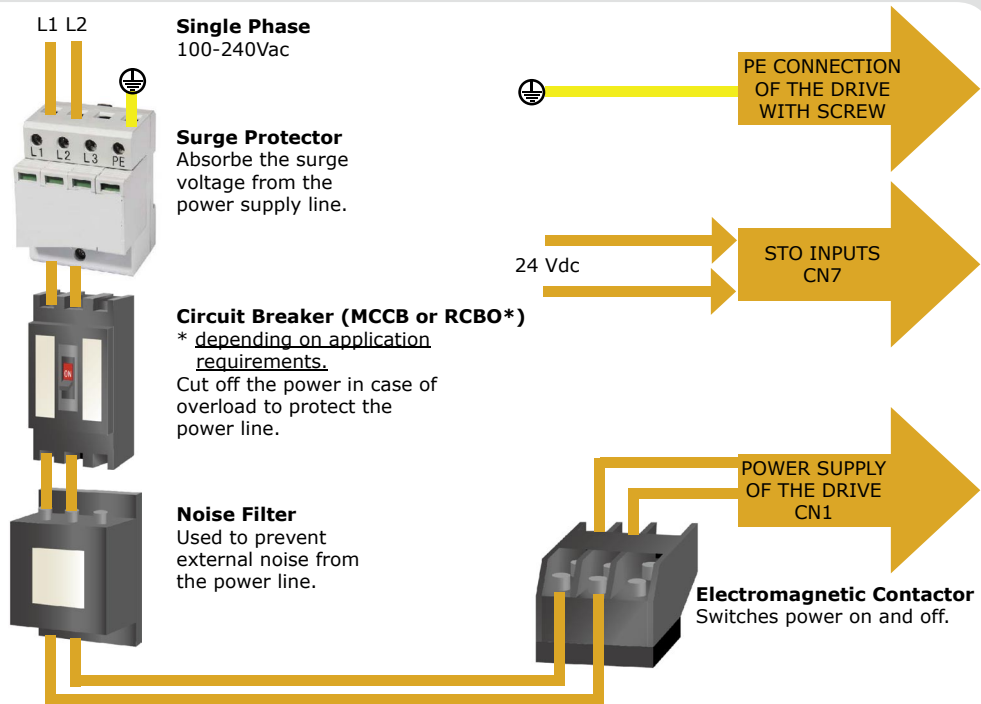
# Working Status (LED) - Canbus/Modbus version

| | Visualization status | | Description |
|---|---|---|---|
| 1 | 🟢 | Green ON | Correct functioning. |
| 2 | ⚪ | Green BLINKING | Enable OFF, current zero |
| 3 | 🔵 | Blue ON | Error: connect with Service SCI kit and check with software |
| 4 | 🔵 🟡 | Blue ON   Yellow ON | Drive in boot mode. A new firmware should be downloaded to drive |
| 5 | 🔵 ⭕ | Blue ON   Red BLINKING (200 ms) | Initialization phase. Should last few seconds. While in this condition the drive is not fully operational. |
| 6 | 🟡 | Yellow ON | Missing setting of Inominal |
| 7 | ⚪ | Yellow BLINKING (500 ms) | Warning: connect with Service SCI kit and check with software |
| 8 | 🔴 | Red ON | Protection: motor is in open phase condition |
| 9 | ⭕ | Red BLINKING (200 ms) | Current protection |
| 10 | 🔴 ⚪ | Red ON (1 sec)  Yellow 1 BLINK | Under/Over voltage protection |
| 11 | 🔴 ⚪⚪⚪ | Red ON (1 sec)  Yellow 3 BLINK | Thermal protection |
| 12 | 🔴 ⚪⚪⚪⚪ | Red ON (1 sec)  Yellow 4 BLINK | Motor Feedback Error |
| 13 | 🔴 ⚪⚪⚪⚪⚪ | Red ON (1 sec) Yellow 5 BLINK | Missing Safe Torque Off |
| 14 | 🔴 ⚪⚪⚪⚪⚪⚪ | Red ON (1 sec)  Yellow 6 BLINK | Motor Current Regulation is out of range |
| 15 | 🔴 ⚪⚪⚪⚪⚪⚪⚪ | Red ON (1 sec)  Yellow 7 BLINK | eePLC User Protection (generated by setting bit #0 of eePLC_User_Settings) |

⚠️ *Note: Drive could be considered in a correct status if leds Red, Yellow and Blue are all OFF.*
*In general :    - Led Blue indicates a software internal fault or a non-operative condition*
*- Led Red indicates an alarm or a drive protection*
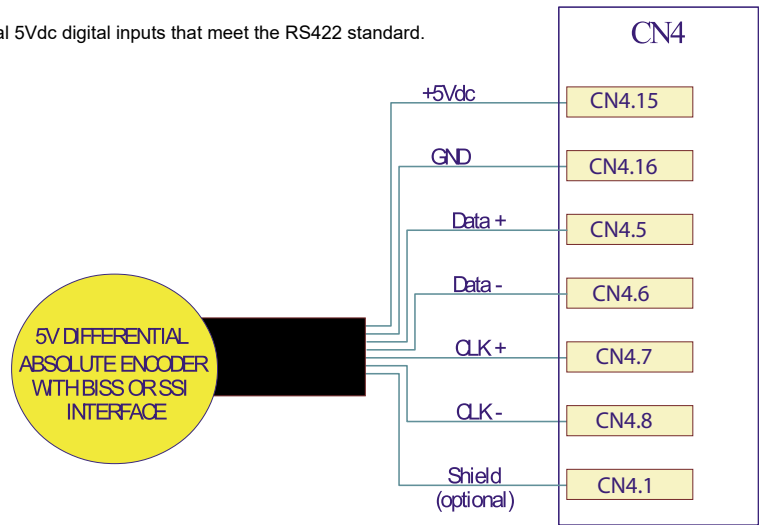*- Led Yellow indicates a warning*

# Power Supply connections

**L1 L2**

**Single Phase**
100-240Vac

**Surge Protector**
Absorbe the surge voltage from the power supply line.

**Circuit Breaker (MCCB or RCBO\*)**
\* depending on application requirements.
Cut off the power in case of overload to protect the power line.

**Noise Filter**
Used to prevent external noise from the power line.

PE CONNECTION OF THE DRIVE WITH SCREW

24 Vdc

STO INPUTS CN7

POWER SUPPLY OF THE DRIVE CN1

**Electromagnetic Contactor**
Switches power on and off.

N.B. In order to comply with cURus certification other requirements must be met, refer to chapter UL REGULATION REQUIREMENTS.

# Absolute Encoder input connection (isolated)

(Maximum supply current 100mA)

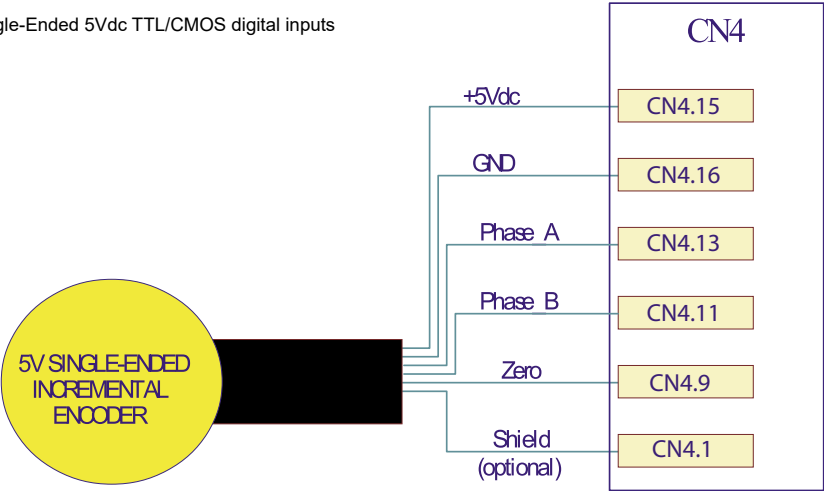Differential 5Vdc digital inputs that meet the RS422 standard.

CN4

| | |
|---|---|
| +5Vdc | CN4.15 |
| GND | CN4.16 |
| Data + | CN4.5 |
| Data - | CN4.6 |
| CLK + | CN4.7 |
| CLK - | CN4.8 |
| Shield (optional) | CN4.1 |

5V DIFFERENTIAL ABSOLUTE ENCODER WITH BISS OR SSI INTERFACE

# Incremental Encoder input connection (isolated)

(Maximum supply current 100mA)

Differential 5Vdc digital inputs that meet the RS422 standard.

| CN4 | |
|---|---|
| +5Vdc | CN4.15 |
| GND | CN4.16 |
| Phase A + | CN4.13 |
| Phase A - | CN4.14 |
| Phase B + | CN4.11 |
| Phase B - | CN4.12 |
| Zero + | CN4.9 |
| Zero - | CN4.10 |
| Shield (optional) | CN4.1 |

5V DIFFERENTIAL INCREMENTAL ENCODER
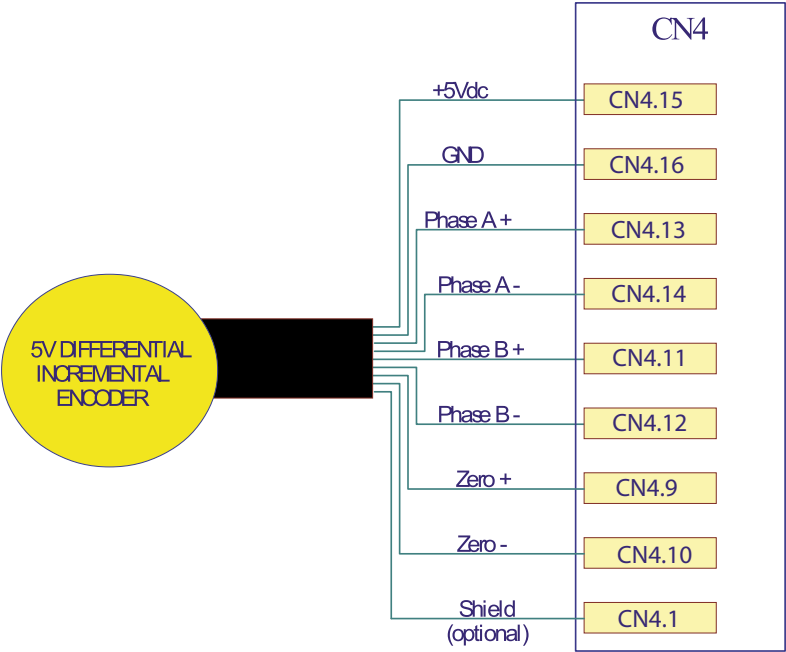
Single-Ended 5Vdc TTL/CMOS digital inputs

| CN4 | |
|---|---|
| +5Vdc | CN4.15 |
| GND | CN4.16 |
| Phase A | CN4.13 |
| Phase B | CN4.11 |
| Zero | CN4.9 |
| Shield (optional) | CN4.1 |

5V SINGLE-ENDED INCREMENTAL ENCODER

# Safe Torque Off inputs (STO)

2 terminals, 24V compatible (optoisolated)

**CN7**

STO1 - — CN7.1
STO1 + — CN7.2
STO2 - — CN7.3
STO2 + — CN7.4

**STO**
Safe Torque Off
**SIL3**
**PLe**
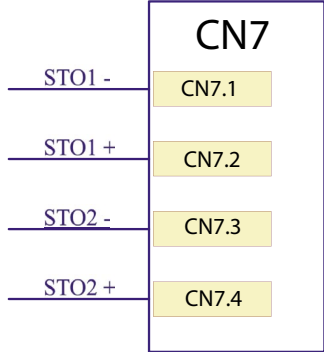
| STO1 | STO2 | Drive Status | Motor Status |
|---|---|---|---|
| +24Vdc | +24Vdc | Enable | SW controlled |
| +24Vdc | Not connected | Disable | Stop for inertia |
| Not connected | +24Vdc | Disable | Stop for inertia |
| Not connected | Not connected | Disable | Stop for inertia |

⚠ *STO inputs are optoisolated.*

| Safety specifications | | |
|---|---|---|
| Safety function | STO | Safe Torque Off |
| Category | 4 | In accordance with EN ISO 13849-1 |
| Performance Level | PLe | In accordance with EN ISO 13849-1 |
| Safety Integrity Level | SIL3 | In accordance with EN ISO 13849-1 table 3 |
| $DC_{avg}$ [%] | 99 | Average Diagnostic Coverage |
| $PFH_D$ [1/h] | $7{,}04 \times 10^{-9}$ | Probability of dangerous failure per hour |
| T Service Life [Years] | 20 | In accordance with EN ISO 13849-1 |
| Type test | | The STO function has been certified by an independent testing body. |

ℹ Refer to the "Safety Manual_STO on SW5A9030-AW5A9750-AW5A6750 Serie_GB" for more details of the Safe Torque Off function characteristics. Contact EVER in order to have a copy of the manual.

Principle of operation:
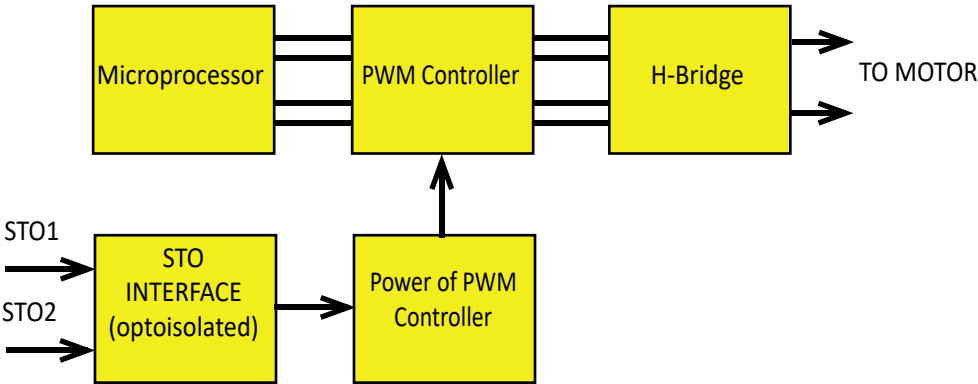


The drive has a safety feature that is designed to provide the Safe Torque Off (STO) function as defined in IEC 61800-5-2. Two input signlas are provided which, when not connected, prevent the upper and lower devices in the PWM outputs from being operated by the digital control core. This provides a positive OFF capability that cannot be overridden by the control firmware, or associated hardware components. When both STO signals are activated (current is flowing in the input diodes of the optocouplers), the control core will be able to control the on/off state of the PWM outputs.

ℹ If not using the STO feature, both signals must be connected to a 24Vdc supply in order enabled the drive.
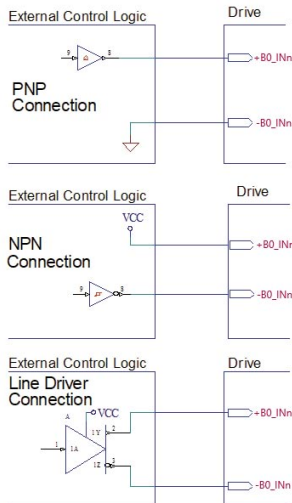
ℹ If a drive in operation mode is disabled by STO signal, it immediately finish to produce torque but the motor continues to run by inertia until it can stop.

# Digital inputs connection

## B0_IN0 to B0_IN3 inputs

**Differential PNP, NPN and Line Driver type (isolated)**

### 5 - 24Vdc INPUTS



**Standard (B0_IN0 and B0_IN1)**

| Characteristics | MIN. | MAX. | Unit |
|---|---|---|---|
| Supply voltage | 5 | 24 | Vdc |
| Inputs frequency | -- | 10 | kHz |
| Threshold switching voltage | 1.9 | 2.4 | Vdc |
| Current at 5 Vdc | -- | 6.28 | mA |
| Current at 24 Vdc | -- | 8.75 | mA |

**High speed (B0_IN2 and B0_IN3)**

| Characteristics | MIN. | MAX. | Unit |
|---|---|---|---|
| Supply voltage | 5 | 24 | Vdc |
| Inputs frequency | -- | 250 | kHz |
| Threshold switching voltage | 1.9 | 2.4 | Vdc |
| Current at 5 Vdc | -- | 7.52 | mA |
| Current at 24 Vdc | -- | 10 | mA |

## B1_IN0 to B1_IN7 inputs

**Single-Ended PNP, NPN, Push-Pull (isolated)**

*N.B.: All these inputs must be connected with the same configuration (PNP, NPN or Push-Pull).*
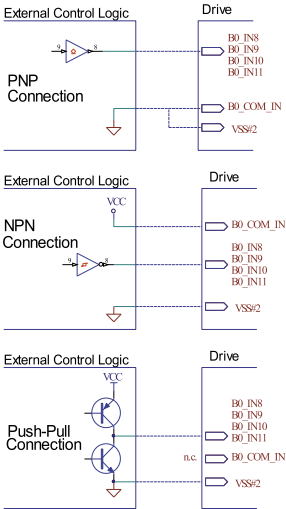
**Standard (B1_IN0 to B1_IN7)**

| Characteristics | MIN. | MAX. | Unit |
|---|---|---|---|
| Supply voltage | 5 | 24 | Vdc |
| Inputs frequency | -- | 250 | Hz |
| Threshold switching voltage | 2.5 | -- | Vdc |
| Current at 5 Vdc | -- | 2 | mA |
| Current at 24 Vdc | -- | 12 | mA |

## B0_IN8 to B0_IN11 inputs

**Single-Ended PNP, NPN, Push-Pull (isolated)**

*N.B.: All these inputs must be connected with the same configuration (PNP. NPN or Push-Pull).*

### 5 - 24V INPUT



**Standard (B0_IN8 to B0_IN11)**

| Characteristics | MIN. | MAX. | Unit |
|---|---|---|---|
| Supply voltage | 5 | 24 | Vdc |
| Inputs frequency | -- | 100 | kHz |
| Threshold switching voltage | 2 | -- | Vdc |
| Current at 5 Vdc | -- | 2 | mA |
| Current at 24 Vdc | -- | 12 | mA |

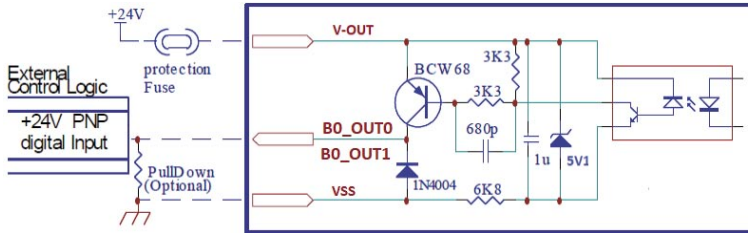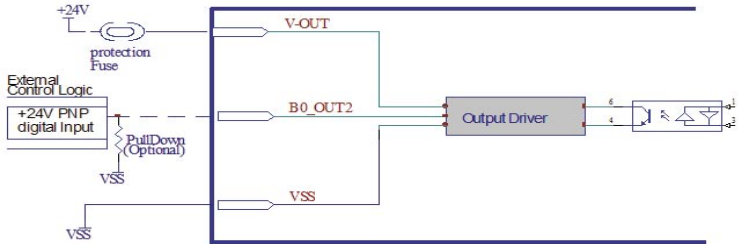### 5 - 24V INPUT
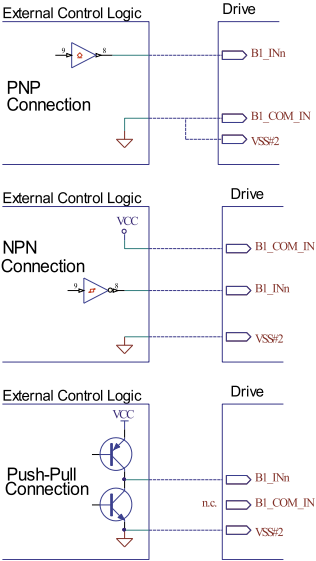
# Digital outputs connection

## B0_OUT0 and B0_OUT1

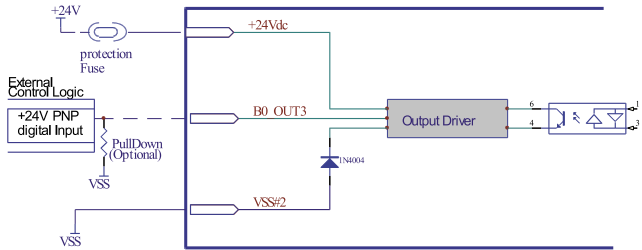ℹ️ PNP with $V_{OUT}max=24Vdc$, $I_{OUT}max=100mA$, Fmax = 250 kHz (isolated)



## B0_OUT2

ℹ️ PNP with $V_{OUT}max=24Vdc$, $I_{OUT}max=1.3A$, Fmax = 1 kHz (isolated)



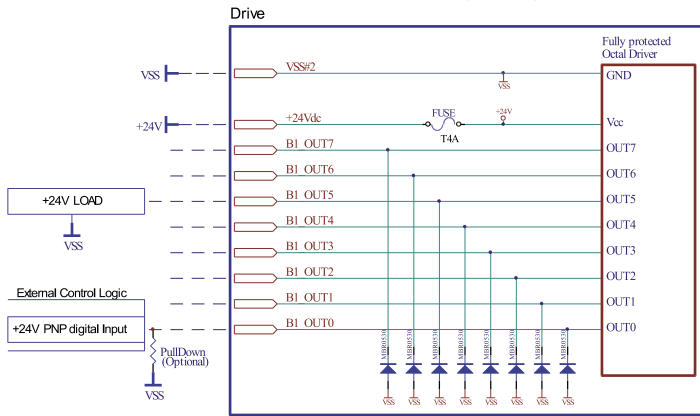## B0_OUT3

ℹ️ PNP with $V_{OUT}max=24Vdc$, $I_{OUT}max=500mA$, Fmax = 1 kHz (isolated)



## B1_OUT0 to B1_OUT7

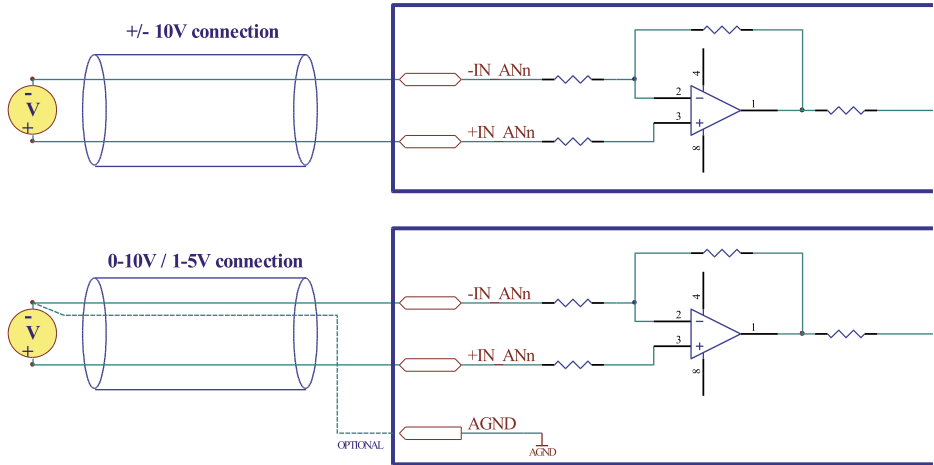ℹ️ PNP with $V_{OUT}max=24Vdc$, $I_{OUT}max=100mA$, Fmax = 250 Hz (isolated)
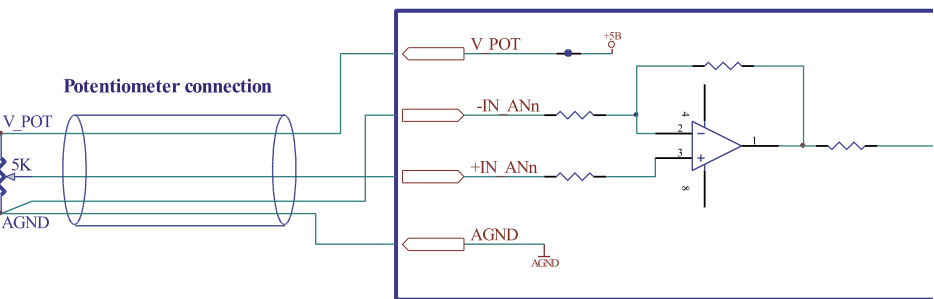
# Analog inputs connection

> **i** Isolated configurable analog inputs.
> The resolution of the analog inputs depends from the type of the connection which could be defined by software: differential or potentiometer.
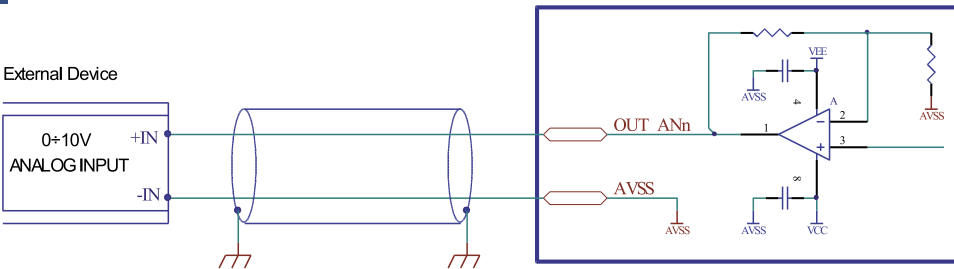
## DIFFERENTIAL CONNECTION

### +/- 10V connection



### 0-10V / 1-5V connection



## POTENTIOMETER CONNECTION

### Potentiometer connection



# Analog outputs connection

> **i** 0-10V isolated analog outputs

## Mating connectors

| Connector | Description |
|-----------|-------------|
| CN1 | Phoenix 1758856 |
| CN2 | Phoenix 1731196 |
| CN3 | Dinkle 0156-1B14-BK |
| CN4 | Dinkle 0156-1B16-BK |
| CN5A / CN5B | RJ45  8 positions |

| Connector | Description |
|-----------|-------------|
| CN7 | Phoenix 1839636 |
| CN10 | Dinkle 0156-1B12-BK |
| CN11 | Dinkle 0156-1B14-BK |
| CN12 | Ethernet standard cables (CAT5 or higher) |
| CN13 | Dinkle 0156-1B10-BK |
| CN14 | Phoenix 1827635 |
| CN15A / CN15B | Ethernet standard cables (CAT5 or higher) |

## Section of the cables

| Function | Cable | |
|----------|-------|-------|
| | Minimum | Maximum |
| Power supply and  PE | 0.5 mm² (AWG20) | 2.5 mm² (AWG12) |
| Motor output | 0.5 mm² (AWG20) | 2.5 mm² (AWG12) |
| Feedback | 0.12 mm² (AWG26) | 0.5 mm² (AWG20) |
| Inputs / Outputs | 0.12 mm² (AWG26) | 1.3 mm² (AWG16) |
| Canbus/Modbus interface | Min. 0.25 mm² (AWG23) CANbus CiA-CANOpen | |
| Ethernet interface | Ethernet standard cables (CAT5 or higher) | |

## Verify the installation

- Check all connection: power supply, logic supply and inputs/outputs.
- Make sure all settings right for the application.
- Make sure the power supply is suitable for the drive.
- If possible, remove the load from the motor shaft to avoid that wrong movements cause damage.
- Enable the current to the motor and verify the applied torque.
- Enable a movement of some steps and verify if the rotation direction is the desired one.
- Disconnect the power supply, connect the load on the motor and check the full functionality.

## Drive's fault 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. 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. |

⚠️ **When any of the following situations occur, the drive doesn't work and isn't placed in an error 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 current. | 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 or increase the supply voltage (always within the limits of the motor). |

# UL regulation requirements

In order to comply with cURus certification the following requirements must be met:
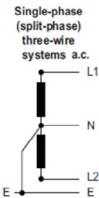


**File number E363861**

## Electrical ratings

### INPUT

| Input Voltage Range | Maximum Input Current |
|---|---|
| 100/50 - 240/120 VAC 1 Ph 50/60 Hz | 3.0 Arms |

The drive must be supplied by single-phase (split-phase) three-wire system a.c

| Phase-to-Phase / Phase-to-Earth Voltage |
|---|
| 100/50 - 240/120 VAC 1 Ph |



Single-phase
(split-phase)
three-wire
systems a.c.

### OUTPUT

| Maximum Output Voltage | Motor Phases Number | Maximum Output Current | Maximum Output Motor Power |
|---|---|---|---|
| 340 Vdc | 2 or 4 | 3.0 Arms | 0,75 kW |

- **Solid state short circuit protection**
  Integral solid state short circuit protection does not provide branch circuit protection. Branch
  circuit protection must be provided in accordance with the Manufacturer Instructions, National
  Electrical Code and any additional local codes.

- **External Fuses and Short Circuit Protection on Supply**
  Suitable for use on a circuit capable of delivering not more than 5000 Arms symmetrical  amperes, 250 Vac maximum when
  protected by semiconductor fuses model FWX-20A14F by Cooper Bussmann LLC

- **Discharge time of the capacitors on the AC power supply**

   WARNING/CAUTION – Risk of Electric Shock
  Wait at least No.153 seconds (3 minutes) after disconnecting AC power supply
  Time required for the capacitors to a safe discharge to a level below 50 Vdc.

- **Temperature rating of field installed conductors**
  For field installed conductor use 60/75°C wires only and use copper conductors only.

**Ever motion Solutions**
Via del Commercio, 2/4 - 9/11
Loc. San Grato Z. I
26900 - L O D I   - Italy
Phone +39 0371 412318  - Fax +39 0371 412367
email:infoever@evermotionsolutions.com
web: www.evermotionsolutions.com