

Installation instructions

i Refer to installation use and maintenance manual for more information.
Available user manual at link <http://www.everelettronica.it/manhw.html>



2 phase servo drive technical data:

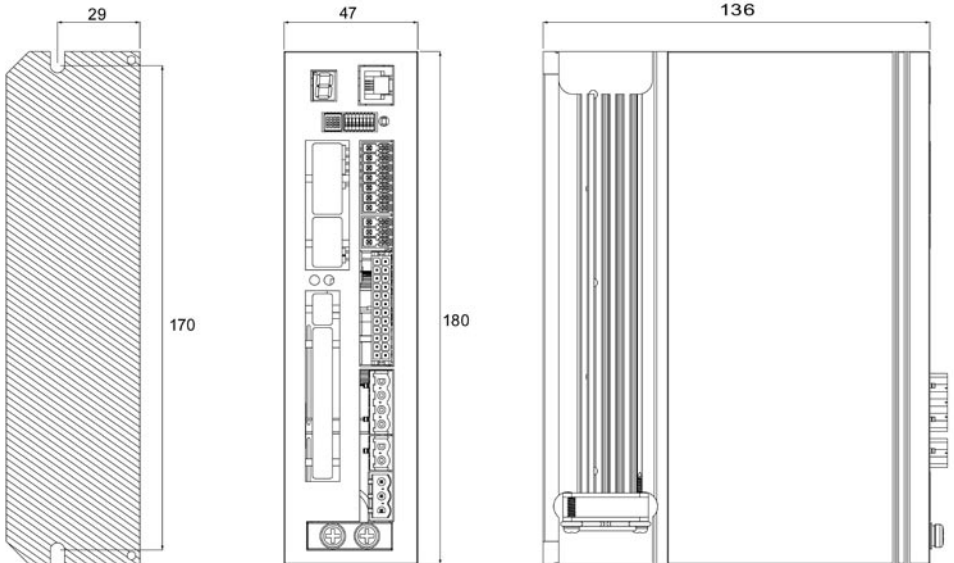
TITANIO
VECTOR - STEPPER - DRIVES

- AC power supply: 85 - 265Vac monophase or triphase;
- DC logic supply: 24 Vdc (mandatory);
- Phase current: up to 5.2 Arms (7.3 Apk) with 265VAC MAX or 8 Arms (11.3 Apk) with 120VAC MAX
- Chopper frequency: ultrasonic 40KHz
- 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
- Ethernet communication interface (Modbus TCP/IP protocol)
- Incremental Encoder Input: 5V Differential (RS422) or 5V single-ended TTL/CMOS
- Incremental Encoder Output: 5V Differential (RS422)
- SSI Absolute Encoder Input
- Service SCI interface for programming and real time debugging
- Safe Torque Off (STO) inputs (opto-coupled)
- 16 digital inputs (opto-coupled) SW5A9052E2G1-30 or 4 digital inputs (opto-coupled)
- 12 digital outputs (opto-coupled) SW5A9052E2G1 or 3 digital outputs (opto-coupled)
- 2 analog inputs (opto-coupled) SW5A9052E2G1-30 only
- 2 analog outputs (opto-coupled) SWA9052E2G1-30 only
- Dimensions: 180 x 136 x 47 mm (without connectors)
- Protection degree: IP20;
- Pollution degree 2
- Overvoltage Category III
- Working temperature 5°C ÷ 40°C ; Storage temperature -25°C ÷ 55°C
- Humidity: 5% ÷ 85% not condensing

error
less
servo
efficient
Technology
else
by Ever Elettronica

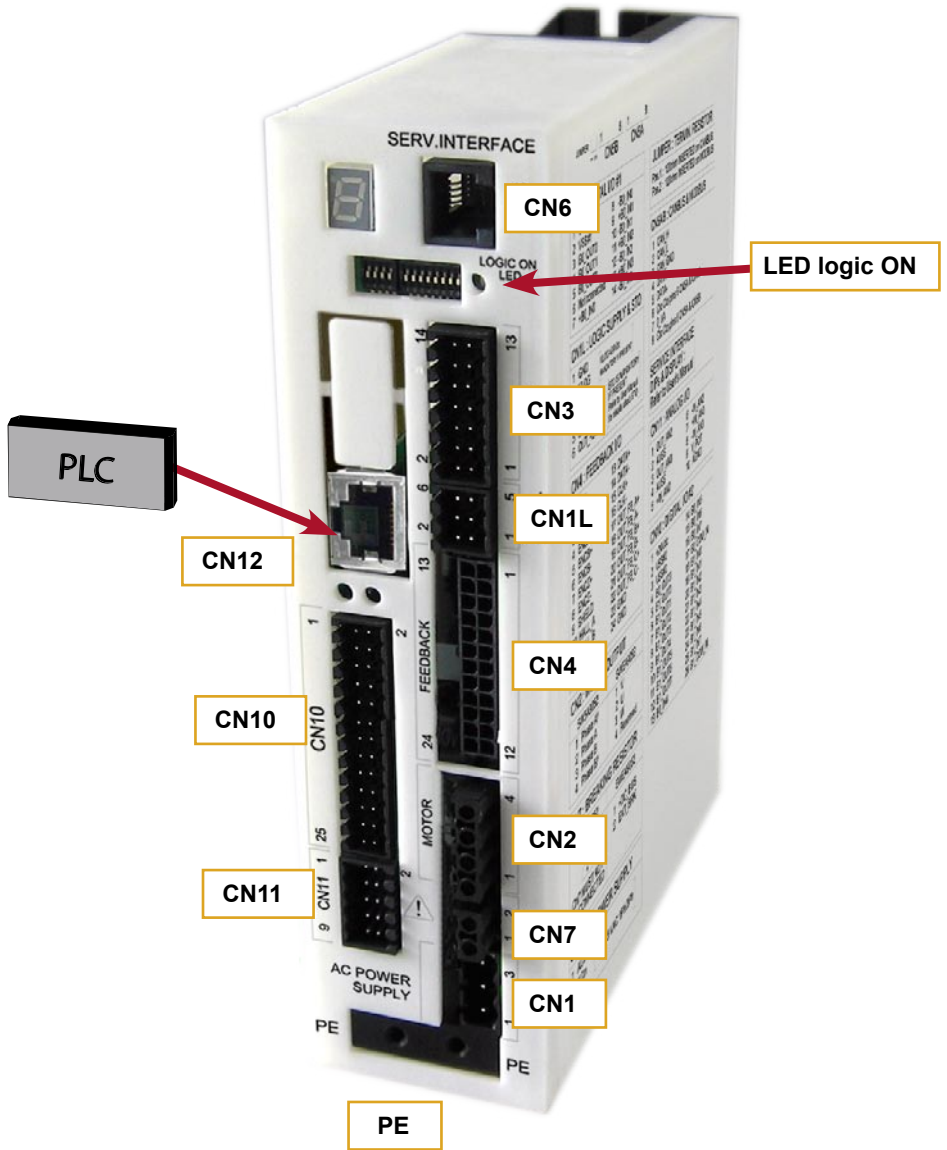


Mechanical data



System connections

Connectors:

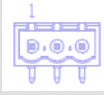


System connection

CN1: Power supply

3 positions, pitch 5.08mm double row, PCB header connector

CN1.1	ACin	PWR_IN	AC power supply input
CN1.2	ACin	PWR_IN	AC power supply input
CN1.3	ACin	PWR_IN	AC power supply input

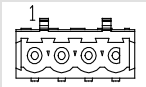


CN7 MUST NOT BE CONNECTED.

CN2: Motor connection

4 positions, pitch 4.2mm double row, PCB header connector

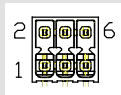
CN2.1	B/	PWR_OUT	Motor output phase B/
CN2.2	A	PWR_OUT	Motor output phase A
CN2.3	B	PWR_OUT	Motor output phase B
CN2.4	A/	PWR_OUT	Motor output phase A/



CN1L: 24Vdc Logic Supply and STO inputs

6 positions, pitch 3.5mm double row, PCB header connector

CN1L.1	GND	PWR_IN	Negative DC logic supply input
CN1L.2	VLOG	PWR_IN	Positive DC logic supply input
CN1L.3	STO1	DIG_IN	Safe Torque Off input 1
CN1L.4	OUT_+24Vdc	PWR_OUT	24 Vdc power output
CN1L.5	STO2	DIG_IN	Safe Torque Off input 2
CN1L.6	OUT_+24Vdc	PWR_OUT	24 Vdc power output



CN6: Service SCI Interface

RJ11, 6P4C, PCB header connector

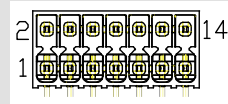
CN6.1	TX/RX	Transmit / Receive Line
CN6.2	DE/RE	Drive Enable Negated /Receive Enable
CN6.3	+5V	+5V power out
CN6.4	GND	GND power out



CN3: Digital Inputs / Outputs

14 positions, pitch 3.5mm double row, PCB header connector

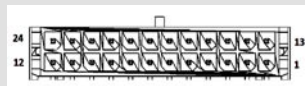
CN3.1	V-out	PWR_IN	24Vdc supply for digital output B0
CN3.2	VSS	PWR_IN	Negative input supply for digital output on CN3
CN3.3	B0_OUT0	DIG_OUT	PNP digital output B0_OUT0
CN3.4	B0_OUT1	DIG_OUT	PNP digital output B0_OUT1
CN3.5	B0_OUT2	DIG_OUT	PNP digital output B0_OUT2
CN3.6	N.C.	---	Not connected
CN3.7	+B0_IN0	DIG_IN	Digital input B0_IN0 positive side
CN3.8	-B0_IN0	DIG_IN	Digital input B0_IN0 negative side
CN3.9	+B0_IN1	DIG_IN	Digital input B0_IN1 positive side
CN3.10	-B0_IN1	DIG_IN	Digital input B0_IN1 negative side
CN3.11	+B0_IN2	DIG_IN	Digital input B0_IN2 positive side
CN3.12	-B0_IN2	DIG_IN	Digital input B0_IN2 negative side
CN3.13	+B0_IN3	DIG_IN	Digital input B0_IN3 positive side
CN3.14	-B0_IN3	DIG_IN	Digital input B0_IN3 negative side



CN4: Feedback connection

24 positions, pitch 3mm double row, PCB header connector

CN4.1	+5V	PWR_OUT	+5Vdc power supply output
CN4.2	GND	PWR_OUT	Negative side of supply
CN4.3	ENCA+	DIG_IN	Encoder Phase A differential input positive
CN4.4	ENCA-	DIG_IN	Encoder Phase A differential input negative
CN4.5	ENCB+	DIG_IN	Encoder Phase B differential input positive
CN4.6	ENCB-	DIG_IN	Encoder Phase B differential input negative
CN4.7	ENCZ+	DIG_IN	Encoder Phase Z differential input positive
CN4.8	ENCZ-	DIG_IN	Encoder Phase Z differential input negative
CN4.9	SHIELD	/	Cable shields connection for feedback interface
CN4.10	N.C.	---	Not connected
CN4.11	N.C.	---	Not connected
CN4.12	N.C.	---	Not connected
CN4.13	DATA+	DIG_IN	Absolute encoder data input positive
CN4.14	DATA-	DIG_IN	Absolute encoder data input negative
CN4.15	CLK+	DIG_OUT	Absolute encoder clock input positive
CN4.16	CLK-	DIG_OUT	Absolute encoder clock input negative
CN4.17	OUT_ENCA+	DIG_OUT	Encoder Phase A differential output positive
CN4.18	OUT_ENCA-	DIG_OUT	Encoder Phase A differential output negative
CN4.19	OUT_ENCB+	DIG_OUT	Encoder Phase B differential output positive
CN4.20	OUT_ENCB-	DIG_OUT	Encoder Phase B differential output negative
CN4.21	OUT_ENCZ+	DIG_OUT	Encoder Zero differential output positive
CN4.22	OUT_ENCZ-	DIG_OUT	Encoder Zero differential output negative
CN4.23	GND	PWR_OUT	Reference ground for feedback interface
CN4.24	GND	PWR_OUT	Reference ground for feedback interface



System connections

CN10: Digital I/O #2

26 positions, pitch 3.5mm double row, PCB header connector

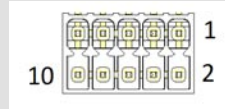
CN10.1	+24Vdc	PWR_IN	Positive power supply for digital
CN10.2	VSS#2	PWR_IN	Negative reference for digital inputs
CN10.3	VSS#2	PWR_IN	Negative reference for digital inputs
CN10.4	B0_OUT3	DIG_OUT	Digital output B0_OUT3 (Open Drain)
CN10.5	B1_OUT0	DIG_OUT	Digital output B1_OUT0 (PNP)
CN10.6	B1_OUT1	DIG_OUT	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)
CN10.13	B0_IN4	DIG_IN	Digital input B0_IN4
CN10.14	B0_IN5	DIG_IN	Digital input B0_IN5
CN10.15	B0_IN6	DIG_IN	Digital input B0_IN6
CN10.16	B0_IN7	DIG_IN	Digital input B0_IN7
CN10.17	B0_COM_IN	PWR_IN	Reference common inputs B0
CN10.18	B1_IN0	DIG_IN	Digital input B1_IN0
CN10.19	B1_IN1	DIG_IN	Digital input B1_IN1
CN10.20	B1_IN2	DIG_IN	Digital input B1_IN2
CN10.21	B1_IN3	DIG_IN	Digital input B1_IN3
CN10.22	B1_IN4	DIG_IN	Digital input B1_IN4
CN10.23	B1_IN5	DIG_IN	Digital input B1_IN5
CN10.24	B1_IN6	DIG_IN	Digital input B1_IN6
CN10.25	B1_IN7	DIG_IN	Digital input B1_IN7
CN10.26	B1_COM_IN	PWR_IN	Reference common inputs B1



CN11: Analog I/O

10 positions, pitch 3.5mm double row, PCB header connector

CN11.1	OUT_AN2	AN_OUT	Analog output 2 positive side
CN11.2	AVSS	PWR_OUT	Negative output reference for analog outputs
CN11.3	OUT_AN3	AN_OUT	Analog output 3 positive side
CN11.4	AVSS	PWR_OUT	Negative output reference for analog outputs
CN11.5	+IN_AN2	AN_IN	Analog input 2 positive side
CN11.6	-IN_AN2	AN_IN	Analog input 2 negative side
CN11.7	+IN_AN3	AN_IN	Analog input 3 positive side
CN11.8	-IN_AN3	AN_IN	Analog input 3 negative side
CN11.9	VPOT	PWR_OUT	Voltage supply output for potentiometer
CN11.10	AGND	PWR_OUT	Negative output reference for potentiometer



CN12: Ethernet Interface

RJ45, 8 positions shielded, PCB header connector

RJ45 connector
100BASE-TX (100Mb/sec) port
Accept standard Ethernet cable (CAT5 or higher)



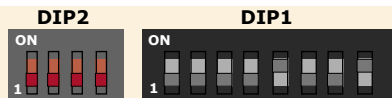
Service SCI connection



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



Dip-Switched Settings



The functionality of the Dip-Switches depends on the Firmware installed on the drive. (Refer to the Software Manual).



NOTE: the device reads the Dip-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.



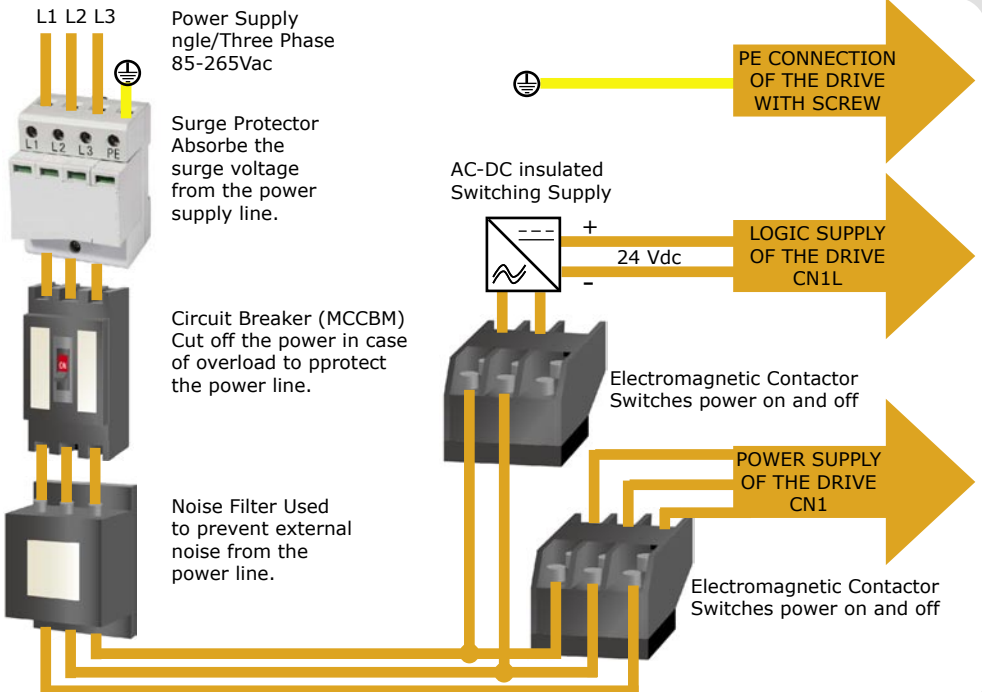
The default configuration of the DIPs is :
- DIP1.5 and DIP1.8 = ON other contacts DIP1 = OFF
- DIP2 = all OFF

Display Status

Operational statuses and their signals

---	Missing Operating System: no software application stored on drive
---	Firmware update: Updating of new software in progress.
---	Initialization: the drive executes the start-up procedure (a few seconds after the start-up procedure has begun).
---	Correct functioning
+ --	Warning: Power supply is near to the limit
+ ---	Warning : Drive temperature is near to the maximum value
+ ---	Warning: EEPROM near Write Overrun
+ ---	Warning: EEPROM near End of Life
flashing	Enable OFF, current zero
+ ---	Error: expired eePLC software trial
+ ---	Error: Security intervention of watchdog
+ ---	Error: Internal Software Error
+ ---	Error: Missing calibration values
+ ---	Error: Management EEPROM
+ ---	Error: eePLC application error
+ ---	Error: EEPROM Write Overrun
+ ---	Error: Feature Unavailable (the application tried to use a feature that is not available in the current drive configuration)
+ ---	Open motor phases
+ ---	Over/under voltage;
+ ---	Over current on the motor output;
+ ---	Over temperature of the drive;
+ ---	Motor Current Regulation is out of range
+ ---	eePLC User Protection (generated by setting bit #0 of eePLC_User_Settings)
+ ---	Motor feedback error

Power & Logic Supply connections



SSI Absolute Encoder input connection

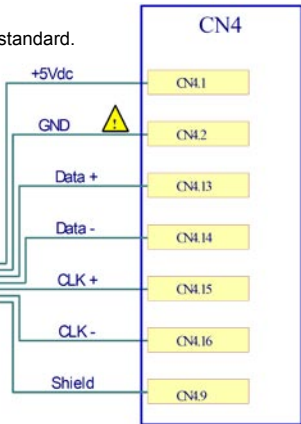
(Maximum supply current 100mA)

Differential 5Vdc (electrically NOT-isolated) digital inputs that meet the RS422 standard.



GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

5V DIFFERENTIAL
ABSOLUTE ENCODER
WITH SSI INTERFACE



Incremental Encoder input connection

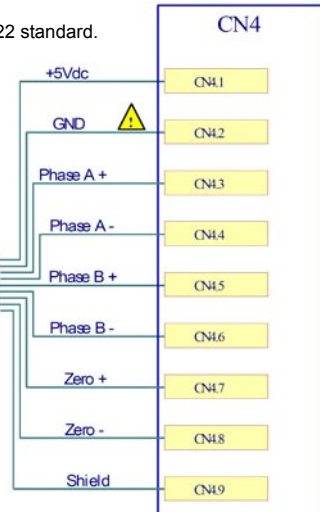
(Maximum supply current 100mA)

Differential 5Vdc (electrically NOT-isolated) digital inputs that meet the RS422 standard.



GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

5V DIFFERENTIAL
INCREMENTAL
ENCODER

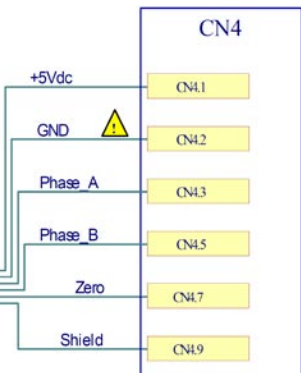


Single-Ended 5Vdc TTL/CMOS (electrically NOT-isolated) digital inputs



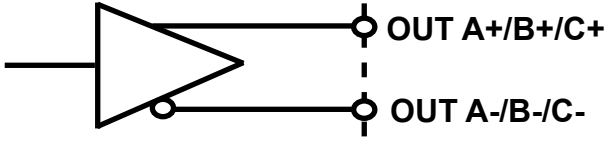
GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

5V SINGLE-ENDED
INCREMENTAL
ENCODER



Incremental Encoder output connection

Outputs reports the used interface for encoder input : Differential or Single-Ended.
Differential 5V (electrically NOT-isolated) digital outputs that meets RS422 standard.



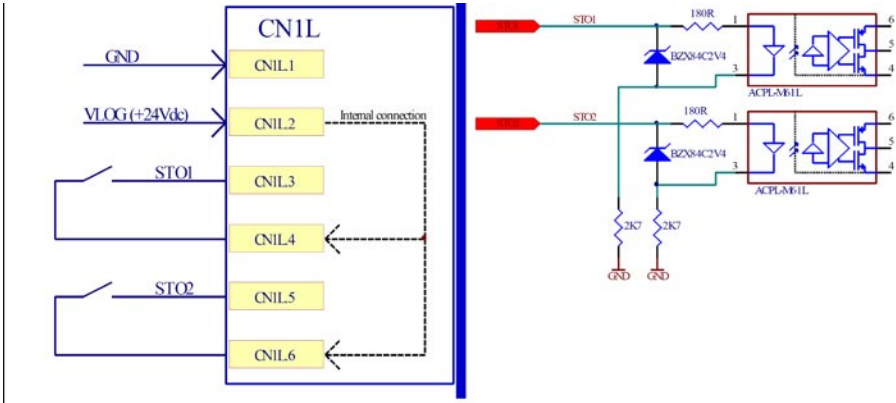
Output signal	Input signal
OUT_FB_A+	ENC_A+
OUT_FB_A-	ENC_A-
OUT_FB_B+	ENC_B+
OUT_FB_B-	ENC_B-
OUT_FB_C+	ENC_Z+
OUT_FB_C-	ENC_Z-



GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

Safe Torque Off inputs (STO)

2 terminals, 24V compatible (optoisolated)



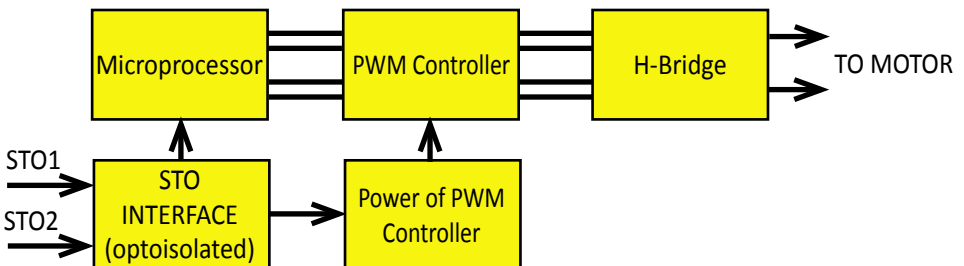
STO1	STO2	Drive Status	Motor Status
+24Vdc	+24Vdc	Enable	SW controlled
+24Vdc	Not connected	Disable	Stop for inertia
Not connected	+24Vdc	Disable	Stop for inertia
Not connected	Not connected	Disable	Stop for inertia

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 signals 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 OUT_+24Vdc (CN1L.4 and CN1L.5) 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.

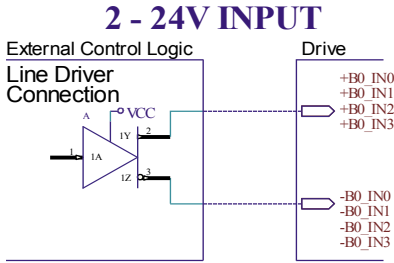
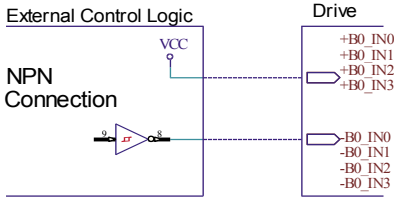
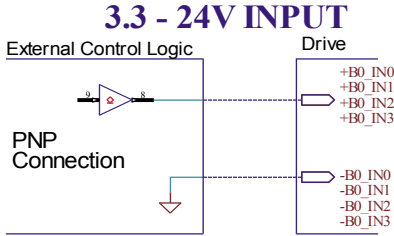
Principle of operation:



Digital inputs connection

Digital input connection (B0_IN0 to B0_IN3)

i Differential PNP, NPN and Line Driver type.

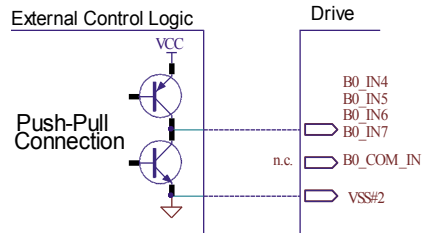
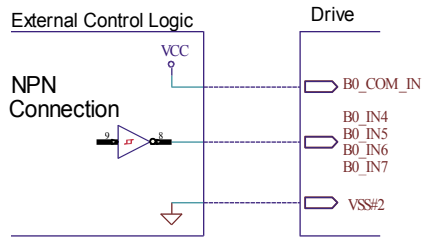
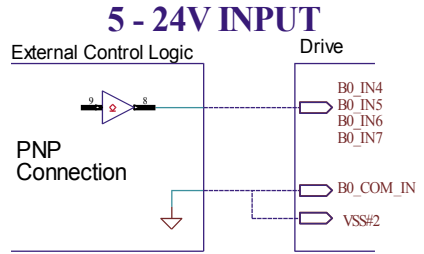


Characteristics	MIN.	MAX.	Unit
Supply voltage	2 ⁽¹⁾	24	Vdc
Inputs frequency	--	1	Mhz
Threshold switching voltage	1.61 ⁽¹⁾	--	Vdc
Current at 2 Vdc	--	2.53	mA
Current at 3.3 Vdc	--	5.84	mA
Current at 5 Vdc	--	6.28	mA
Current at 24 Vdc	--	8.75	mA

⁽¹⁾ N.B.: It's recommended to use 24 Vdc digital inputs only in differential Line-Driver configuration to have more noise immunity.

Digital inputs connection (B0_IN4 to B0_IN7)

i Single-Ended PNP, NPN, Push-Pull



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

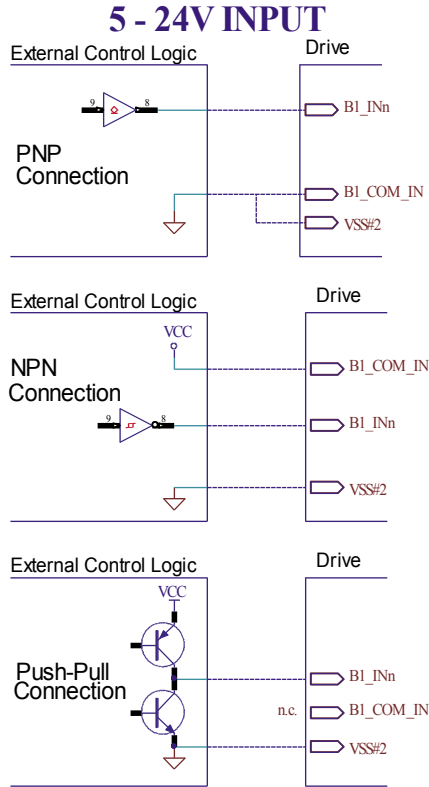
N.B.: All these inputs must be connected with the same configuration (PNP, NPN or Push-Pull).

Digital inputs connection

Digital inputs connection (B1_IN0 to B1_IN7)



Single-Ended PNP, NPN, Push-Pull



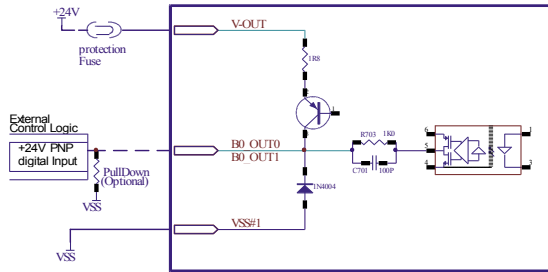
Characteristics	MIN.	MAX.	Unit
Supply voltage	5	24	Vdc
Inputs frequency	--	100	Khz
Threshold switching voltage	2	--	Vdc
Current at 5 Vdc	--	2	mA
Current at 24 Vdc	--	12	mA

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

Digital outputs connection

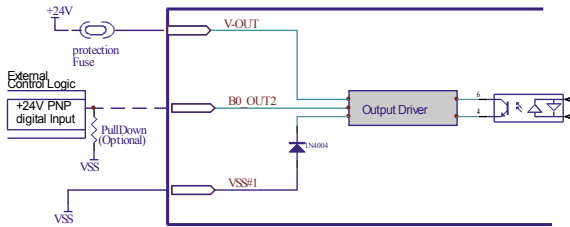
Digital outputs connection (B0_OUT0 and B0_OUT1)

i PNP with $V_{OUTmax}=24Vdc$, $I_{OUTmax}=100mA$, $F_{max} = 500KHz$



Digital outputs connection (B0_OUT2)

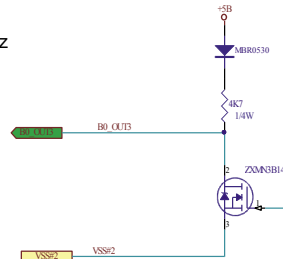
i PNP with $V_{OUTmax}=24Vdc$, $I_{OUTmax}=500mA$, $F_{max} = 1KHz$



Digital outputs connection (B0_OUT3)

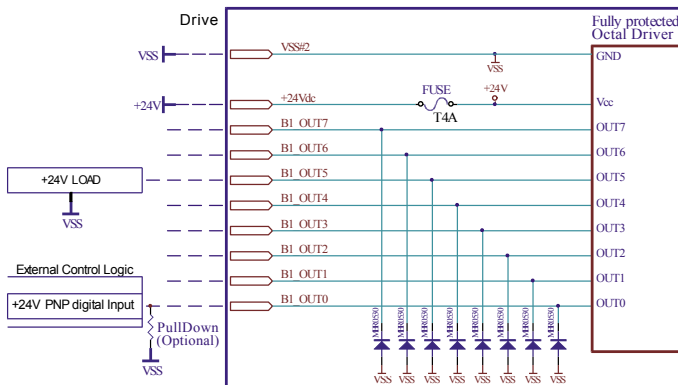
i Open-Drain output $I_{OUTmax} = 100mA$, $F_{max} = 100KHz$

They can sink up to 100mA from external loads operating from power supplies to +24Vdc. The internal diode in the output is for driving inputs that are opto-isolated and connected to +24Vdc. The diode prevents conduction from +24Vdc through the 4.7 kΩ resistor to +5Vdc in the drive. This could turn the input on, giving a false indication of the drive output state.



Digital outputs connection (B1_OUT0 and B1_OUT7)

i PNP with $V_{OUTmax} = 24Vdc$, $I_{OUTmax} = 100mA$, $F_{max} = 250Hz$

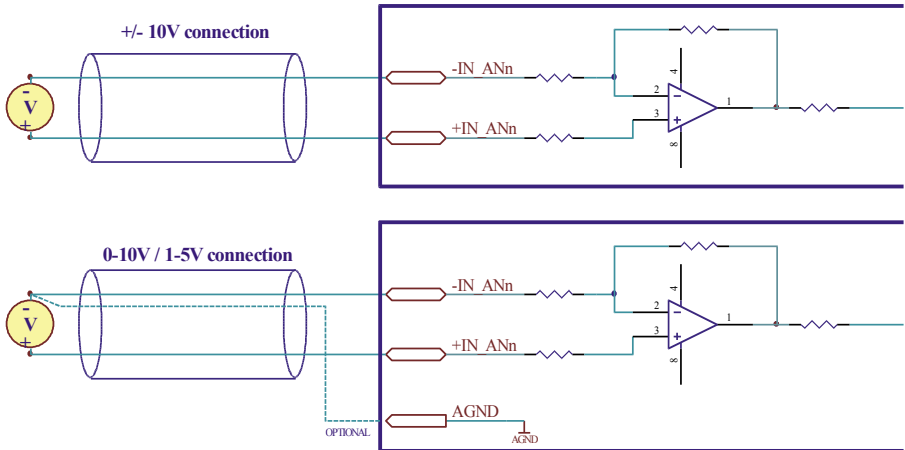


Analog inputs connection

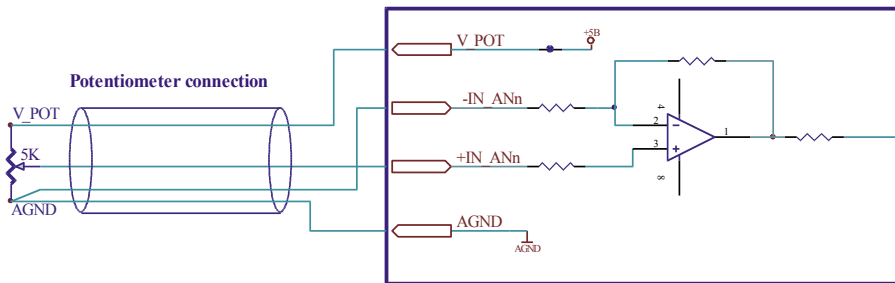


Optoisolated configurable analog inputs. The resolution of the analog inputs depends from the type of the connection which could be defined by software: differential or potentiometer.

Differential connection



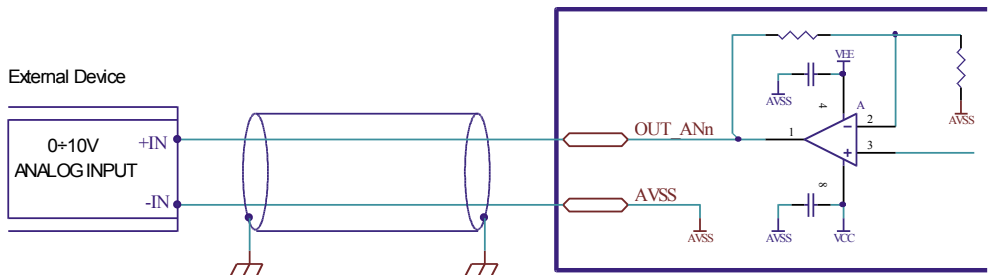
Potentiometer connection



Analog outputs connection



0-10V Optoisolated analog outputs.



Mating connectors

Connector	Description
CN1	Phoenix 1762208 (Green) or 1759509 (Black)
CN1L	Weidmüller 1727640000
CN2	Phoenix 1786190 (Green) or 1731196 (Black)
CN3	Weidmüller 1727680000
CN4	Molex 43025-2400
CN10	Weidmüller 1747950000
CN11	Weidmüller 1727660000
CN12	RJ45 for Ethernet standard cables (CAT5 or higher)

Section of the cables

Function	Cable	
	Minimum	Maximum
Power supply and PE	0.5 mm ² (AWG20)	2.5 mm ² (AWG12)
Motor output	0.5 mm ² (AWG20)	2.5 mm ² (AWG12)
Encoder	0.05 mm ² (AWG30)	0.12 mm ² (AWG26)
Logic supply and Inputs / Outputs	0.5 mm ² (AWG20)	1.3 mm ² (AWG16)
Communication interfaces	Ethernet standard cables CAT5 or higher	

Verify the installation

- Check all connection: power supply, logic supply, STO inputs 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.

Analysis of malfunctions



When one of the following situations occur, the drive doesn't function correctly and it is reported an error.

DEFECT	CAUSE	ACTION
The external fuse to the drive burns	May be due to a wrong connection of the power supply.	Adjust the connection and recover the fuse. Use a fuse suitable for the application.
Over temperature protection.	May be due to a duty cycle	Increase the air flux and if it is possible chose a motor with higher torque at same current value.
Over current protection.	May be due to a short circuit on the motor power stage.	Shut down the power supply and check if the motor is damaged
Noisy motor movement with vibrations.	May be caused due to a state of resonance.	Increase the resolution of the step angle and/or change the motor velocity to avoid resonance area
The motor produce torque but doesn't rotate	May be caused due to a wrong connection of the I/O's.	Check the connection of the I/O's

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