


Installation instructions

 Refer to installation use and maintenance manual for more information.



2 phase stepper drive technical data:

- AC power supply: 18 ÷ 100 Vac (mono or three-phase)
- AC logic supply: 18 ÷ 100 Vac (optional and not isolated) (monophase)
- Phase current: up to 8.5 Arms (12Apeak)
- Chopper frequency: ultrasonic 40KHz
- Steplless 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
- Modbus or Canbus communication interfaces
- Encoder input (not isolated): 5V Differential (RS422) or 5V Single-Ended (TTL/CMOS) incremental encoder
- Service SCl interface for programming and real time debugging
- Up to 16 digital inputs (opto-coupled)
- Up to 12 digital outputs (opto-coupled)
- Up to 2 analog inputs (not isolated)
- Up to 2 analog outputs (isolated)
- Dimensions: 165 x 120 x 48 mm (without connectors)
- Protection degree: IP20
- Pollution degree: 2
- Category C3 following standard EN 61800-3
- Working temperature 5°C ÷ 40°C; Storage temperature -25°C ÷ 55°C
- Humidity: 5% ÷ 85% not condensing

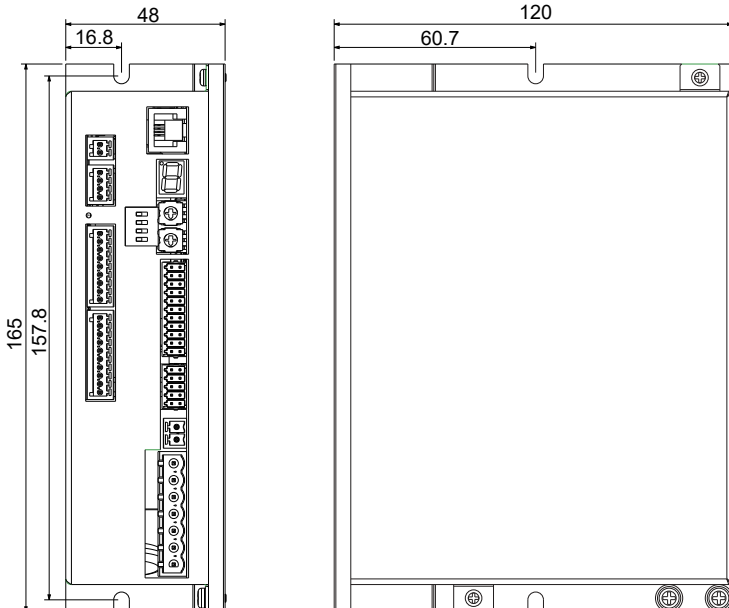
TITANIO
VECTOR - STEPPER - DRIVES

error
less
servo
efficient
else
technology
by Ever Electronics

CANopen
DS402



Mechanical data



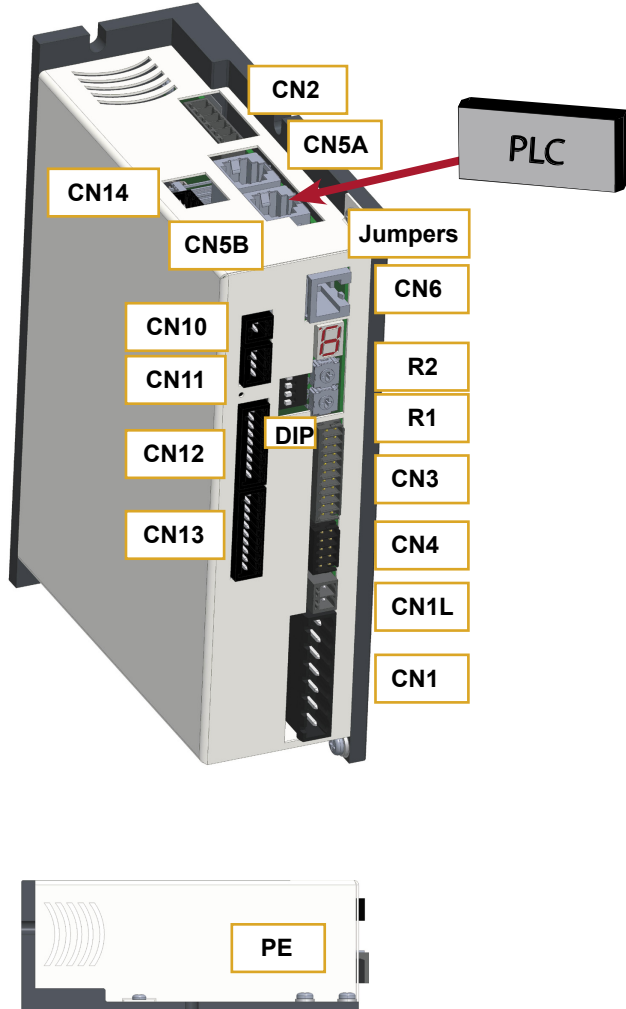
Models

MODELS IN THIS SHORT

System Code	Fieldbus	Digital inputs	Digital outputs	Analog inputs	Analog outputs
SW5A4085 C2N 1-00	CanOpen	6	4	2	0
SW5A4085 C2G 1-00	CanOpen	16	12	2	2
SW5A4085 M2N 1-00	ModBus	6	4	2	0
SW5A4085 M2G 1-00	ModBus	16	12	2	2

System connections

Connectors:

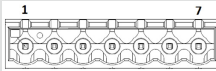


System connection

CN1: AC Power supply & Motor

7 positions, pitch 5.08mm, PCB header connector

CN1.1	ACin	PWR_IN	AC power supply input (18-100Vac)
CN1.2	ACin	PWR_IN	AC power supply input (18-100Vac)
CN1.3	ACin	PWR_IN	AC power supply input (18-100Vac)
CN1.4	A	PWR_OUT	Motor output phase A
CN1.5	A/	PWR_OUT	Motor output phase A/
CN1.6	B	PWR_OUT	Motor output phase B
CN1.7	B/	PWR_OUT	Motor output phase B/



CN1L: AC Logic Supply

2 positions, pitch 3.81mm, PCB header connector

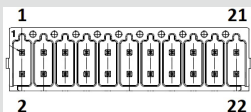
CN1L.1	ACLog	PWR_IN	AC logic supply input (18-100Vac)
CN1L.2	VLOG	PWR_IN	AC logic supply input (18-100Vac)



CN3: Digital Inputs / Outputs

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

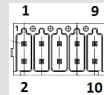
CN3.1	+B0_IN3	DIG_IN	Digital input B0_IN3 positive side
CN3.2	-B0_IN3	DIG_IN	Digital input B0_IN3 negative side
CN3.3	+B0_IN2	DIG_IN	Digital input B0_IN2 positive side
CN3.4	-B0_IN2	DIG_IN	Digital input B0_IN2 negative side
CN3.5	+B0_IN1	DIG_IN	Digital input B0_IN1 positive side
CN3.6	-B0_IN1	DIG_IN	Digital input B0_IN1 negative side
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_OUT0	DIG_OUT	PNP digital output B0_OUT0
CN3.10	B0_OUT1	DIG_OUT	PNP digital output B0_OUT1
CN3.11	V-OUT	PWR_IN	24Vdc input supply for digital output
CN3.12	VSS	PWR_IN	Negative input supply for digital output
CN3.13	B0_OUT2	DIG_OUT	PNP digital output B0_OUT2
CN3.14	B0_OUT3	DIG_OUT	PNP digital output B0_OUT3
CN3.15	+B0_IN9	DIG_IN	Digital input B0_IN9 positive side
CN3.16	-B0_IN9	DIG_IN	Digital input B0_IN9 negative side
CN3.17	+B0_IN8	DIG_IN	Digital input B0_IN8 positive side
CN3.18	-B0_IN8	DIG_IN	Digital input B0_IN8 negative side
CN3.19	n.c.		Not connected
CN3.20	n.c.		Not connected
CN3.21	n.c.		Not connected
CN3.22	n.c.		Not connected



CN4: Encoder input connection

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

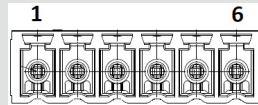
CN4.1	SHIELD	/	Cable shield connection
CN4.2	SHIELD	/	Cable shield connection
CN4.3	ENCZ+	DIG_IN	Encoder Zero input positive
CN4.4	ENCZ-	DIG_IN	Encoder Zero input negative
CN4.5	ENCB+	DIG_IN	Encoder Phase B input positive
CN4.6	ENCB-	DIG_IN	Encoder Phase B input negative
CN4.7	ENCA+	DIG_IN	Encoder Phase A input positive
CN4.8	ENCA-	DIG_IN	Encoder Phase A input negative
CN4.9	+5V	PWR_OUT	+5Vdc power supply output
CN4.10	GND	PWR_OUT	Negative side of supply



CN2: Analog inputs

8 positions, pitch 3.81mm, PCB header connector

CN2.1	V_POT	PWR Output	Voltage supply output for potentiometer
CN2.2	AGND	PWR Output	Output negative reference for potentiometer
CN2.3	+IN_AN0	Analog Input	Analog input 0 positive side
CN2.4	-IN_AN0	Analog Input	Analog input 0 negative side
CN2.5	+IN_AN1	Analog Input	Analog input 1 positive side
CN2.6	-IN_AN1	Analog Input	Analog input 1 negative side



CN10: I/O Expansion Supply (see drive version)

2 positions, pitch 2.5mm, PCB header connector

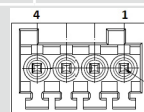
CN10.1	+24V	PWR_IN	24Vdc supply for I/O expansion
CN10.2	VSS#2	PWR_IN	Negative supply for I/O expansion and negative reference for digital I/O B1



CN11: Digital Inputs B0 (see drive version)

4 positions, pitch 2.5mm, PCB header connector

CN11.1	+B0_In10	DIG_IN	Digital input B0_In10 positive side
CN11.2	-B0_In10	DIG_IN	Digital input B0_In10 negative side
CN11.3	+B0_In11	DIG_IN	Digital input B0_In11 positive side
CN11.4	-B0_In11	DIG_IN	Digital input B0_In11 negative side

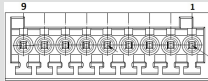


System connections

CN12: Digital Outputs B1 (see drive version)

9 positions, pitch 2.5mm, PCB header connector

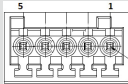
CN12.1	B1_OUT0	DIG_OUT	PNP digital output B1_OUT0
CN12.2	B1_OUT1	DIG_OUT	PNP digital output B1_OUT1
CN12.3	B1_OUT2	DIG_OUT	PNP digital output B1_OUT2
CN12.4	B1_OUT3	DIG_OUT	PNP digital output B1_OUT3
CN12.5	B1_OUT4	DIG_OUT	PNP digital output B1_OUT4
CN12.6	B1_OUT5	DIG_OUT	PNP digital output B1_OUT5
CN12.7	B1_OUT6	DIG_OUT	PNP digital output B1_OUT6
CN12.8	B1_OUT7	DIG_OUT	PNP digital output B1_OUT7
CN12.9	VSS#2	PWR_IN	Negative reference of expansion digital outputs B1



CN14: Analog Outputs (see drive version)

5 positions, pitch 2.5mm, PCB header connector

CN14.1	OUT_AN0	AN_OUT	Analog output 0 positive side
CN14.2	AVSS	PWR_OUT	Negative output reference for analog outputs
CN14.3	N.C.	---	Not connected
CN14.4	OUT_AN1	AN_OUT	Analog output 1 positive side
CN14.5	AVSS	PWR_OUT	Negative output reference for analog outputs



CN5A and CN5B: Canbus interface ("C" version)

RJ45, 8 positions shielded, PCB header connector

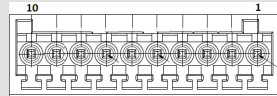
CN5.1	CAN_H	Digital I/O	Bus Line Domination HIGH
CN5.2	CAN_L	Digital I/O	Bus Line Domination LOW
CN5.3	CAN_GND	PWR_OUT	Signal Ground
CN5.4	N.C.	---	Not connected
CN5.5	N.C.	---	Not connected
CN5.6	N.C.	---	Not connected
CN5.7	N.C.	---	Not connected
CN5.8	N.C.	---	Not connected



CN13: Digital Inputs B1 (see drive version)

10 positions, pitch 2.5mm, PCB header connector

CN13.1	B1_IN0	DIG_IN	Digital input B1_IN0
CN13.2	B1_IN1	DIG_IN	Digital input B1_IN1
CN13.3	B1_IN2	DIG_IN	Digital input B1_IN2
CN13.4	B1_IN3	DIG_IN	Digital input B1_IN3
CN13.5	B1_IN4	DIG_IN	Digital input B1_IN4
CN13.6	B1_IN5	DIG_IN	Digital input B1_IN5
CN13.7	B1_IN6	DIG_IN	Digital input B1_IN6
CN13.8	B1_IN7	DIG_IN	Digital input B1_IN7
CN13.9	B1_COM_IN	PWR_IN	Reference common digital inputs B1
CN13.10	VSS#2	PWR_IN	Negative reference of expansion digital inputs B1



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



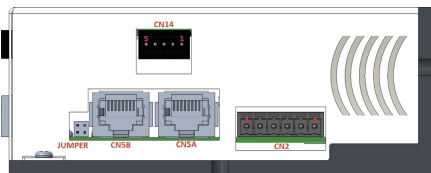
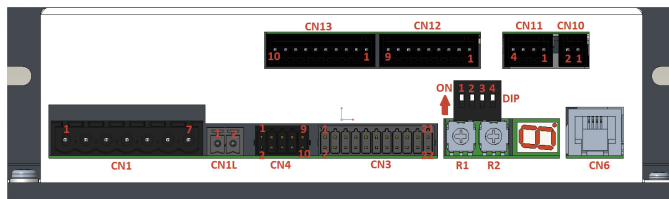
This connection is only possible with hardware and software provided by Ever.



CN5A and CN5B: Modbus interface ("M" version)

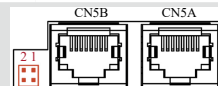
RJ45, 8 positions shielded, PCB header connector

CN5.1	Data +	Digital I/O	Bus Line Domination HIGH
CN5.2	Data -	Digital I/O	Bus Line Domination LOW
CN5.3	N.C.	---	Signal Ground
CN5.4	N.C.	---	Not connected
CN5.5	0V_A	PWR_OUT	Signal ground
CN5.6	N.C.	---	Not connected
CN5.7	N.C.	---	Not connected
CN5.8	N.C.	---	Not connected



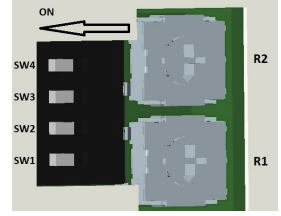
Jumper - Termination Resistor

Position 1	120 ohm resistor NOT inserted
Position 2	120 ohm resistor INSERTED



Dip-Switches & Roto-Switches settings

U0 Software defined		Baud rate selection				
SW1	SW2	SW3	SW4	Modbus	CANbus	
ON	OFF	OFF	OFF	115200	1M	
OFF (default)	OFF	OFF	ON	57600 (default)	500K (default)	
	OFF	ON	OFF	38400	250K	
	OFF	ON	ON	19200	125K	
	ON	OFF	OFF	9600	100K	
	ON	OFF	ON	4800	50K	
	ON	ON	OFF	2400	50K	
	ON	ON	ON	1200	50K	



Node ID Selection																		
R2	0	0	0	0	...	2	2	...	7	7	8	8	8	F	F	F
R1	0	1	2	3	...	C	D	...	E	F	0	1	2	D	E	F
Node-ID #	Reserved	1 (default)	2	3	...	44	45	...	126	127	Reserved							



NOTE: the device reads the Dip-Switches and the Roto-Switch 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.

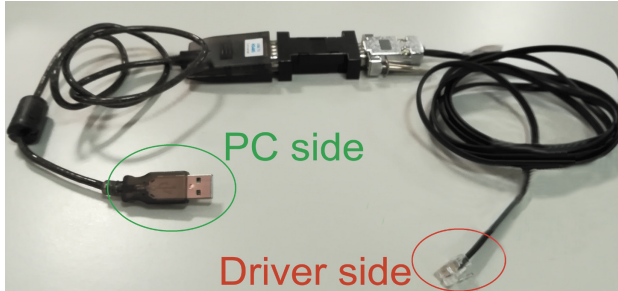
Display Status

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
	+ Voltage of DC bus near to the limit value (minimum or maximum)
	+ Drive temperature is near to the maximum value
	+ EEprom near Write Overrun
	+ EEprom near End of Life
	flashing Enable OFF, current zero
	flashing I _{nominal} not computed
	+ Error: expired eePLC software trial
	+ Security intervention of watchdog
	+ Internal Software Error
	+ Missing calibration values
	+ Management EEPROM
	+ EEPROM fail
	+ eePLC application error
	+ EEprom Write Overrun
	+ Feature unavailable
	+ Open motor phases
	+ Over/under voltage;
	+ Over current on the motor output;
	+ Over temperature of the drive;
	+ Missing Torque Enable ("missing Safe Torque Off")
	+ Drive Over Power Protection and/or Current Regulation out of range
	+ eePLC User Protection (generated by setting bit #0 of eePLC_User_Settings)
	+ Motor feedback error

Service SCI connection



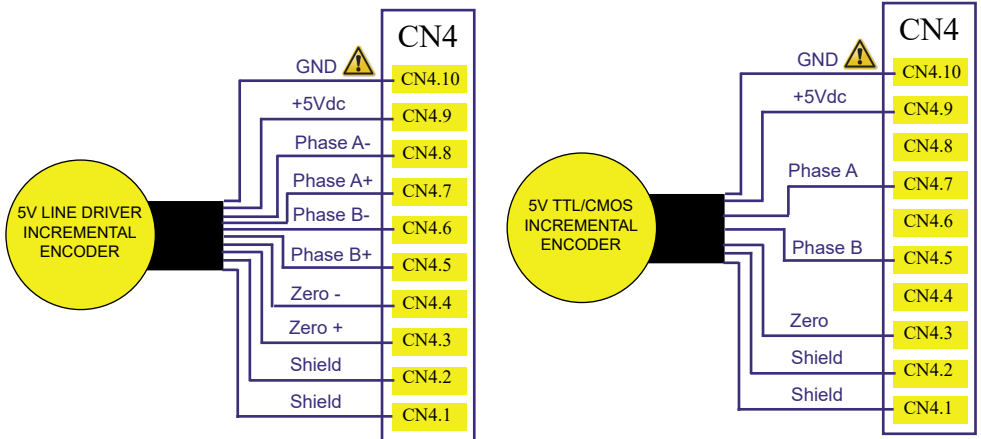
This connection is only possible with hardware and software provided by Ever.
Kit code: SW5_SERV00-SL or SW5-SERV00-EE.



Encoder input connection

Electrically NOT-isolated digital inputs:

- differential 5Vdc that meet the RS422 standard
- single-ended 5Vdc TTL/CMOS



Maximum supply current 100mA.



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

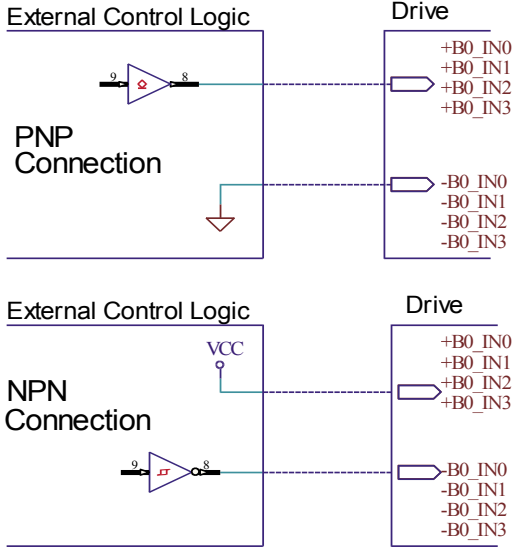
Digital inputs connection B0

B0_IN0 to B0_IN3 and B0_IN8 to B0_IN11

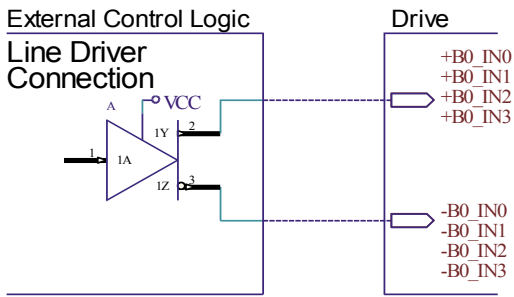


Differential PNP, NPN and Line Driver type.

3.3 - 24V INPUT



2 - 24V INPUT



Standard Digital Inputs (B0_IN0, B0_IN1 ans B0_IN8 to B0_IN11)			
Characteristics	MIN.	MAX.	Unit
Supply voltage	2 ⁽¹⁾	24	Vdc
Inputs frequency	--	10	kHz
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

High-Speed Digital Inputs (B0_IN2 and B0_IN3)			
Characteristics	MIN.	MAX.	Unit
Supply voltage	2 ⁽¹⁾	24	Vdc
Inputs frequency	--	500	kHz
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 2Vdc digital inputs only in differential Line-Driver configuration to have more noise immunity.

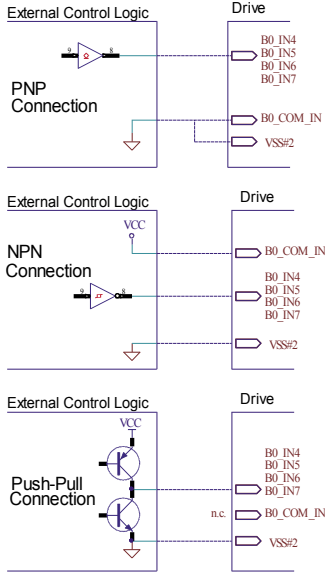
Digital inputs connection B1

B1_IN0 to B1_IN7



Single-Ended PNP, NPN, Push-Pull.

5 - 24V INPUT



Low-Speed Digital Inputs (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

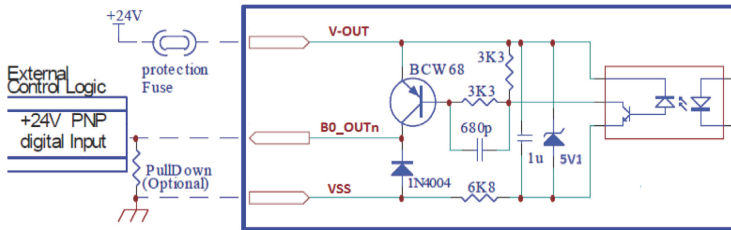
N.B.: All these inputs must be connected with the same configuration (PNP, NPN or Push-Pull).

Digital outputs connection B0

B0_OUT0, B0_OUT1 and B0_OUT3



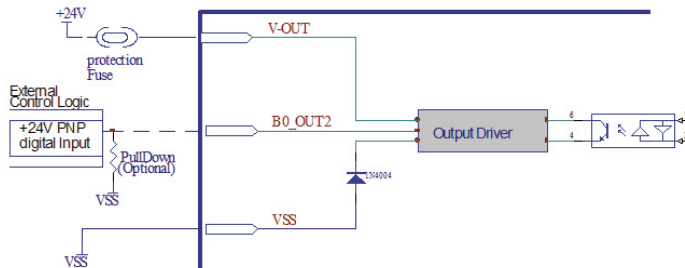
PNP with $V_{OUTmax}=24Vdc$, $I_{OUTmax}=100mA$, $F_{max} = 250kHz$



B0_OUT2



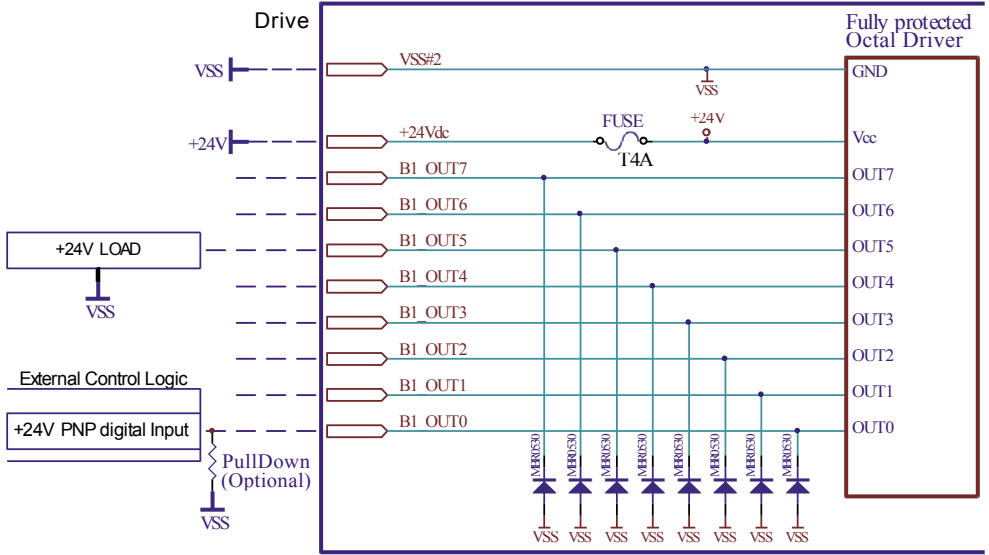
PNP with $V_{OUTmax}=24Vdc$, $I_{OUTmax}=1.3A$, $F_{max} = 1kHz$



Digital outputs connection B1

B1_OUT0 and B1_OUT7

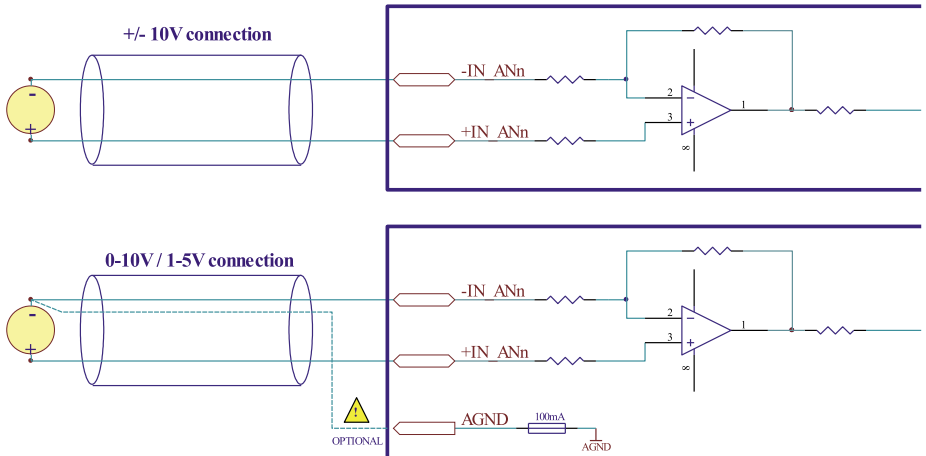
i PNP with $V_{OUTmax} = 24Vdc$, $I_{OUTmax} = 100mA$, $F_{max} = 250Hz$



Analog inputs connection

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

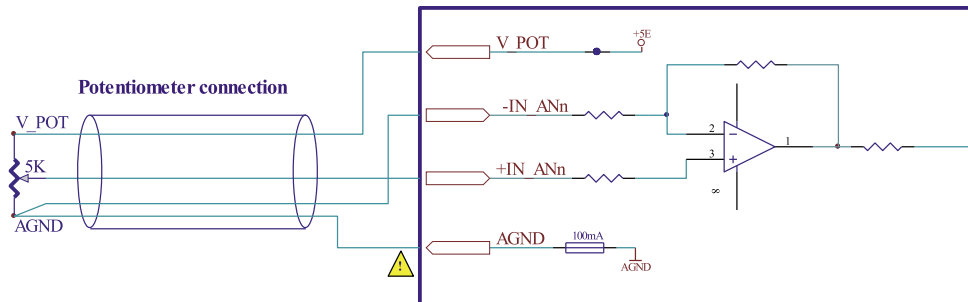
DIFFERENTIAL CONNECTION



The connection from an external reference and AGND should be preceded by a thorough riskanalysis on the machine/circuit in which the drive will be installed.

Analog inputs connection

POTENTIOMETER CONNECTION



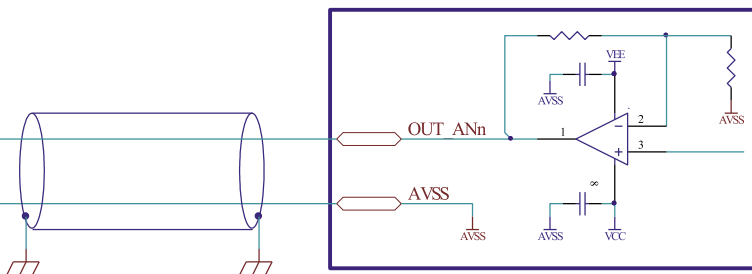
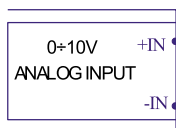
AGND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

Analog outputs connection



0-10V isolated analog outputs

External Device



Mating connectors

Connector	Description
CN1	Phoenix 1758623
CN1L	Phoenix 1827635
CN2	Phoenix 1839652
CN3	Phoenix 1844662
CN4	Phoenix 1844604
CN5A/B	RJ45, 8 positions
CN10	Phoenix 1709565
CN11	Phoenix 1701061
CN12	Phoenix 1768004
CN13	Phoenix 1700841
CN14	Phoenix 1799073

Section of the cables

Function	Cable	
	Minimum	Maximum
Power supply, Motor output and PE	0.50 mm ² (AWG20)	2.50 mm ² (AWG12)
Logic supply	0.14 mm ² (AWG26)	1.50 mm ² (AWG16)
Encoder input	0.14 mm ² (AWG26)	0.50 mm ² (AWG20)
Communication interfaces	0.25 mm ² (AWG23)	
Digital Inputs / Outputs and STO	0.14 mm ² (AWG26)	0.50 mm ² (AWG20)
Analog Inputs	0.14 mm ² (AWG26)	1.50 mm ² (AWG16)
Analog outputs	0.14 mm ² (AWG26)	0.50 mm ² (AWG20)

Verify the installation

- Check all connection: power 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 for the supply voltage
Open phase motor protection.	Motor windings to drive not proper connection.	Check motor cables and connections to the drive.



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

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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