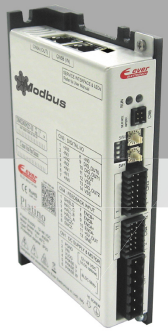
DW4D2400x2P1-00 - Controller

Installation instructions

Refer to installation use and maintenance manual for more information.



BLDC motor drive technical data

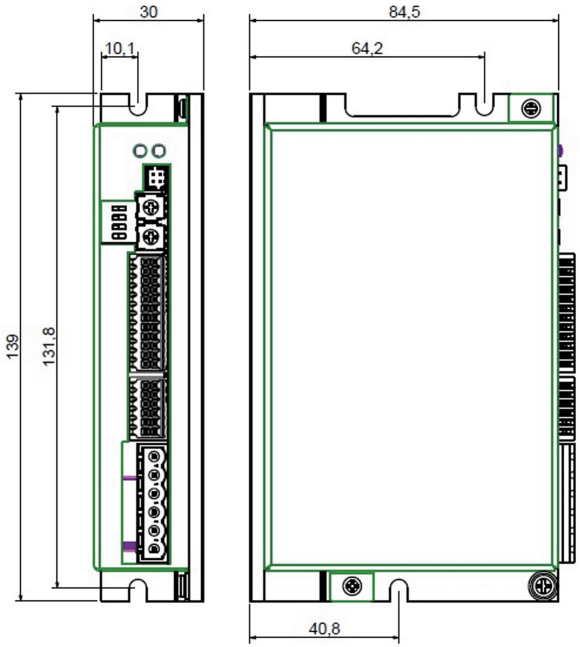
Platino
BLDC - SERVO - DRIVES

- *DC power supply: 12 ÷ 48 Vdc*
- *DC logic supply: 12 ÷ 48 Vdc (optional and not isolated)*
- *Phase current: up to 10Arms (28Apeak for 5s)*
- *Motor power: up to 400W*
- *Chopper frequency: ultrasonic 40KHz*
- *Protections against: over current, over/under voltage, overheating, short circuit between motor phase-to-phase and phase-to-ground*
- *Modbus or Canbus communication interfaces: DW4D2400M2P1-00 for Modbus or DW4D2400C2P1-00 for Canbus*
- *Encoder input (not isolated): 5V Differential (RS422) or 5V Single-Ended (TTL/CMOS) incremental encoder*
- *Hall input (not isolated): 5V Single-Ended (TTL/CMOS) hall effects*
- *Service SCI interface for programming and real time debugging*
- *6 digital inputs (opto-coupled)*
- *3 digital outputs (opto-coupled)*
- *2 analog inputs (not isolated)*
- *Dimensions: 139 x 84,5 x 30 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*

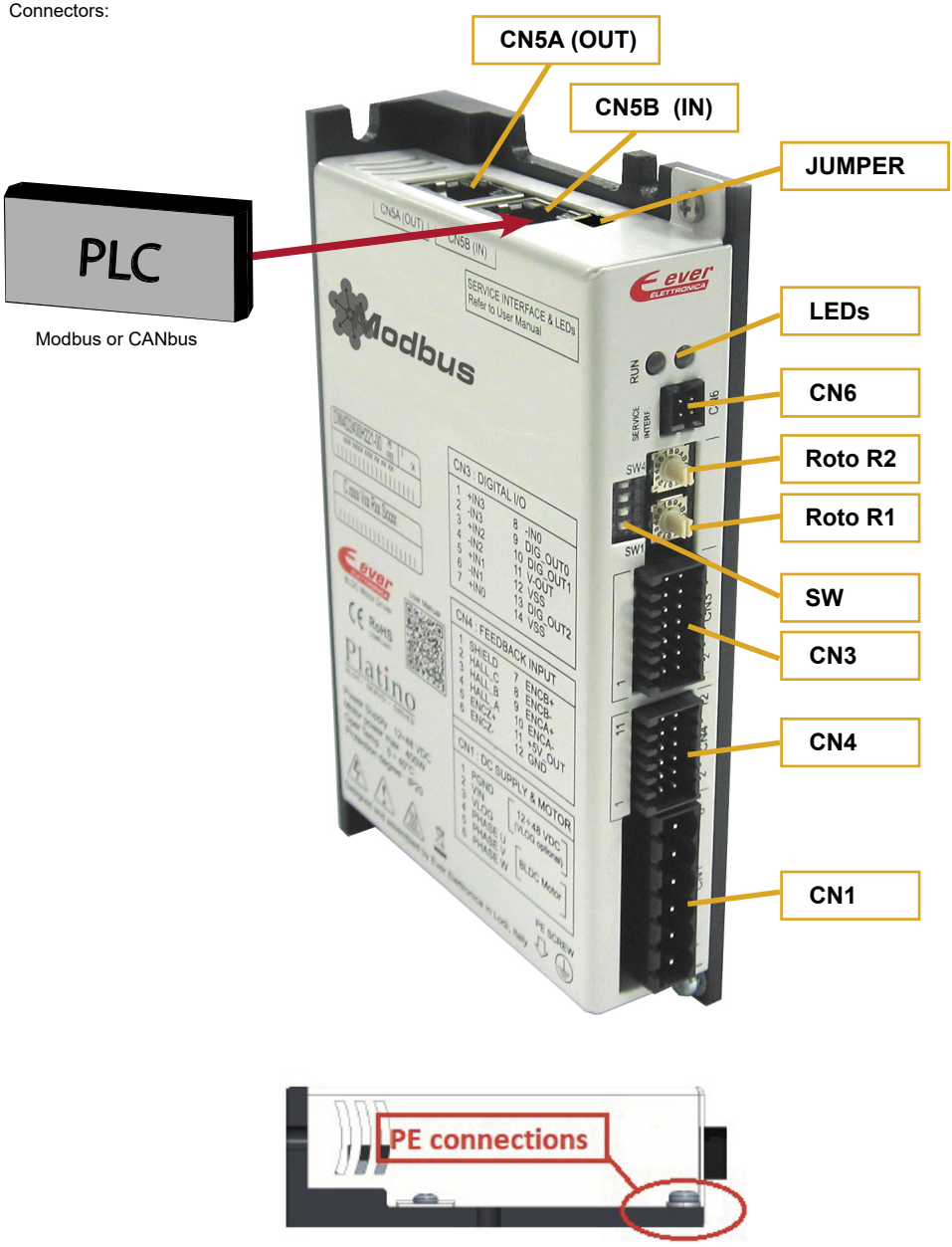
CANopen DS402

Modbus

Mechanical data



Connectors:



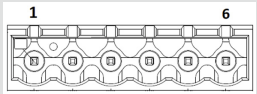
Power and Logic supplies are not isolated but they have common reference inside the drive.

System connection

CN1: DC Power supply and Motor

6 positions, pitch 5.08mm, PCB header connector

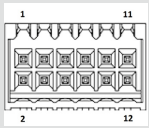
CN1.1	PGND	PWR_IN	Negative DC power supply input
CN1.2	VIN	PWR_IN	Positive DC power supply input
CN1.3	VLOG	PWR_IN	Positive DC logic supply input
CN1.4	U	PWR_OUT	Motor output phase U
CN1.5	V	PWR_OUT	Motor output phase V
CN1.6	W	PWR_OUT	Motor output phase W



CN4: Feedback input

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

CN4.1	SHIELD	/	Cable shield connection
CN4.2	HALL_C	DIG_IN	Hall effect signbal C input
CN4.3	HALL_B	DIG_IN	Hall effect signbal B input
CN4.4	HALL_A	DIG_IN	Hall effect signbal A input
CN4.5	ENCZ+	DIG_IN	Encoder Zero input positive
CN4.6	ENCZ-	DIG_IN	Encoder Zero input negative
CN4.7	ENCB+	DIG_IN	Encoder phase B input positive
CN4.8	ENCB-	DIG_IN	Encoder phase B input negative
CN4.9	ENCA+	DIG_IN	Encoder phase A input positive
CN4.10	ENCA-	DIG_IN	Encoder phase A input negative
CN4.11	+5V	PWR_OUT	+5Vdc power supply output
CN4.12	GND	PWR_OUT	Negative side supply



CN5A and CN5B: Canbus interface (SW4D2400C2P1-00 model)

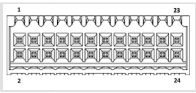
RJ45, 8 positions shielded, PCB header connector

CN5.1	CAN_H	DIGITAL I/O	Bus line dominant HIGH
CN5.2	CAN_L	DIGITAL I/O	Bus line dominant 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

CN3: Digital inputs/outputs

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

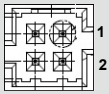
CN3.1	V_POT	PWR_OUT	Voltage supply output for potentiometer
CN3.2	AGND	PWR_OUT	Output negative reference for potentiometer
CN3.3	+IN_AN1	AN_IN	Analog input 1 positive side
CN3.4	-IN_AN1	AN_IN	Analog input 1 negative side
CN3.5	+IN_AN0	AN_IN	Analog input 0 positive side
CN3.6	-IN_AN0	AN_IN	Analog input 0 negative side
CN3.7	+B0_IN3	DIG_IN	Digital input B0_IN3 positive side
CN3.8	-B0_IN3	DIG_IN	Digital input B0_IN3 negative side
CN3.9	+B0_IN2	DIG_IN	Digital input B0_IN2 positive side
CN3.10	-B0_IN2	DIG_IN	Digital input B0_IN2 negative side
CN3.11	+B0_IN1	DIG_IN	Digital input B0_IN1 positive side
CN3.12	-B0_IN1	DIG_IN	Digital input B0_IN1 negative side
CN3.13	+B0_IN0	DIG_IN	Digital input B0_IN0 positive side
CN3.14	-B0_IN0	DIG_IN	Digital input B0_IN0 negative side
CN3.15	+B1_IN1	DIG_IN	Digital input B1_IN1 positive side
CN3.16	-B1_IN1	DIG_IN	Digital input B1_IN1 negative side
CN3.17	+B1_IN0	DIG_IN	Digital input B1_IN0 positive side
CN3.18	-B1_IN0	DIG_IN	Digital input B1_IN0 negative side
CN3.19	B0_OUT0	DIG_OUT	PNP digital output B0_OUT0
CN3.20	B0_OUT1	DIG_OUT	PNP digital output B0_OUT1
CN3.21	V-OUT	PWR_IN	24 Vdc supply for digital output
CN3.22	VSS	PWR_IN	Negative input supply for digital output
CN3.23	B0_OUT2	DIG_OUT	PNP digital output B0_OUT2
CN3.24	VSS	PWR_IN	Negative input supply for digital output



CN6: Service SCI interface

4 positions, pitch 2mm double row, PCB header connector

CN6.1	TX/RX	Transmit / Receive Line
CN6.2	$\overline{DE}$/RE	Drive Enable Negated / Receive Enable
CN6.3	+5V	+5V power out
CN6.4	GND	DNG power out

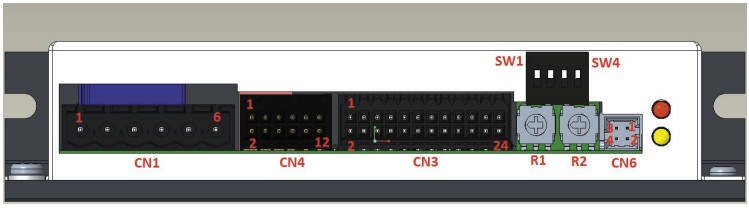


This connection is only possible with hardware and software provided by Ever.

CN5A and CN5B: Modbus interface (SW4D2400M2P1-00 model)

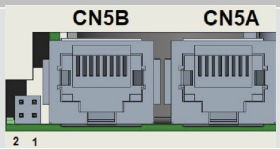
RJ45, 8 positions shielded, PCB header connector

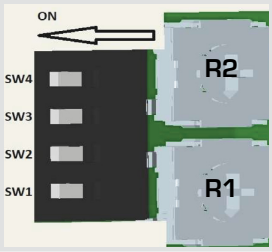
CN5.1	DATA +	DIGITAL I/O	Bus line dominant HIGH
CN5.2	DATA -	DIGITAL I/O	Bus line dominant LOW
CN5.3	N.C.	---	Not connected
CN5.4	N.C.	---	Not connected
CN5.5	0V_A	PWR_OUT	Signal Ground
CN5.6	N.C.	---	Not connected
CN5.7	N.C.	---	Not connected
CN5.8	N.C.	---	Not connected



Jumpers, Dip-Switches & Roto-Switches settings

Termination resistor	
JUMPER	**Description**
Position 1	**120 ohm resistor NOT inserted**
Position 2	**120 ohm resistor INSERTED**





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**
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 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.

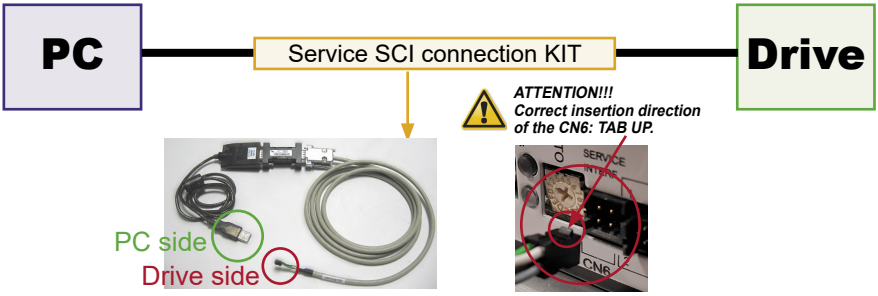
Working Status (Led)

	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 (200ms)**	Initialiazation phase. Should last few seconds. While in this condition the drive is not fully operational
6		**Yellow ON**	Missing setting of $I_{nominal}$
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 (200ms)**	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 6 Blink**	Motor current regulation is out of range
14		**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***

Service SCI connection

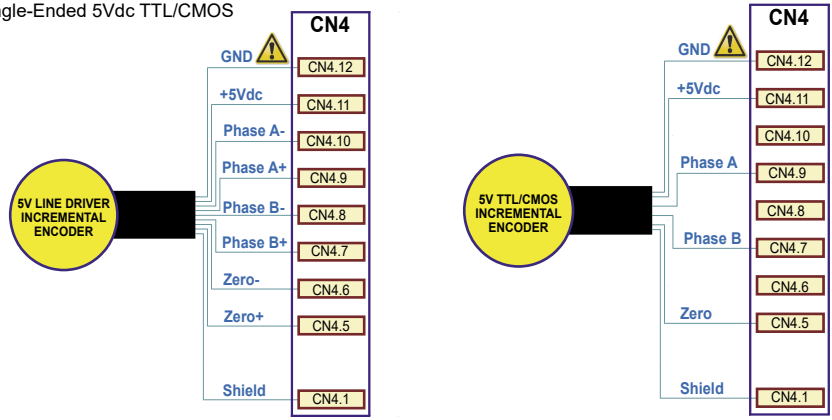
This connection is <u>only</u> possible with hardware and software provided by Ever.
Kit code: DW4_SERV00-SL.



Encoder input connection

Electrically NOT-isolated digital inputs:
- Differential 5Vdc that meet the RS422 standard
- Single-Ended 5Vdc TTL/CMOS

<u>N.B. Maximum supply cuttent of the 5V is 100 mA.</u>

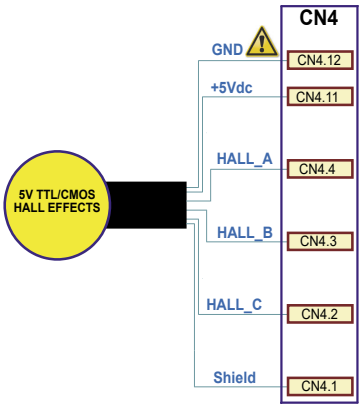


GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

Hall effects input connection

Electrically NOT-isolated digital inputs: Single-Ended 5Vdc TTL/CMOS

<u>N.B. Maximum supply cuttent of the 5V is 100 mA.</u>

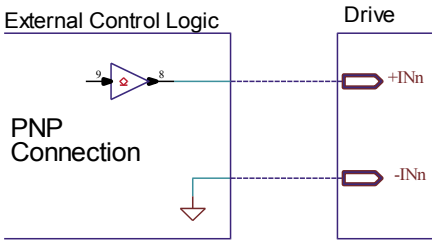


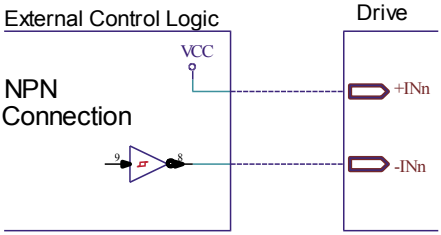
GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

Digital inputs connection

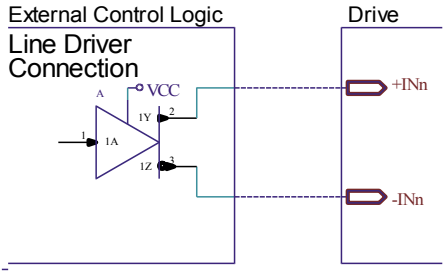
Differential PNP, NPN and Line Driver type.

3.3 - 24V INPUT





2 - 24V INPUT



Standard Digital Inputs (B0_IN0 and B0_IN1)			
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 (1)	--	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 (1)	--	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

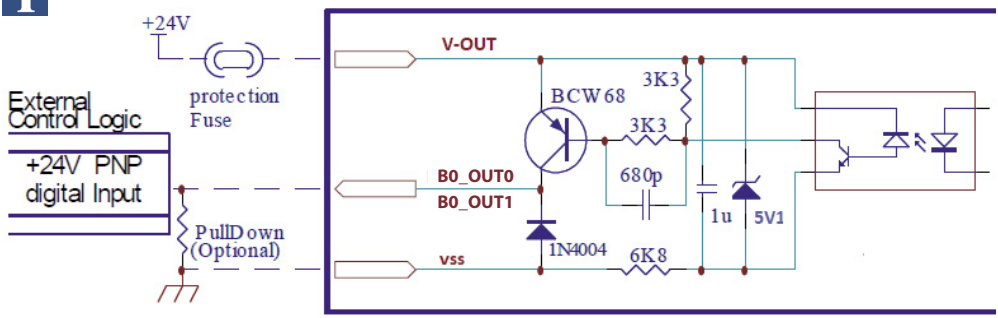
Low-Speed Digital Inputs (B1_IN0 and B1_IN1)			
Characteristics	**MIN.**	**MAX.**	**Unit**
Supply voltage	5	24	Vdc
Inputs frequency	--	250	Hz
Threshold switching voltage	2.5	--	Vdc
Current at 5 Vdc	--	2	mA
Current at 24 Vdc	--	12	mA

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

Digital outputs connection

B0_OUT0 and B0_OUT1

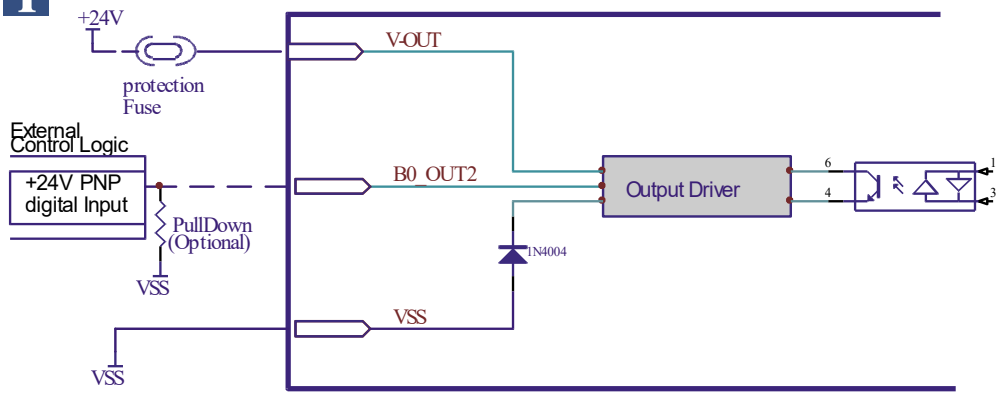
PNP with V_{OUTmax} = 24 Vdc, I_{OUTmax} = 100 mA, F_{max} = 250 kHz.



Digital outputs connection

B0_OUT2

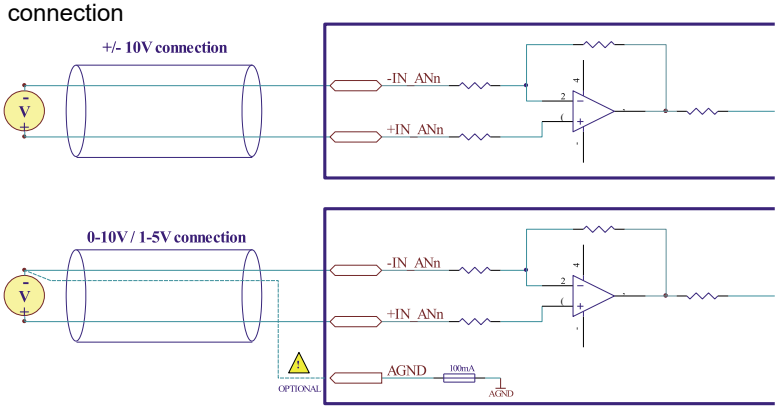
PNP with V_{OUTmax} = 24 Vdc, I_{OUTmax} = 1.3A, F_{max} = 250 Hz.



Analog inputs connection

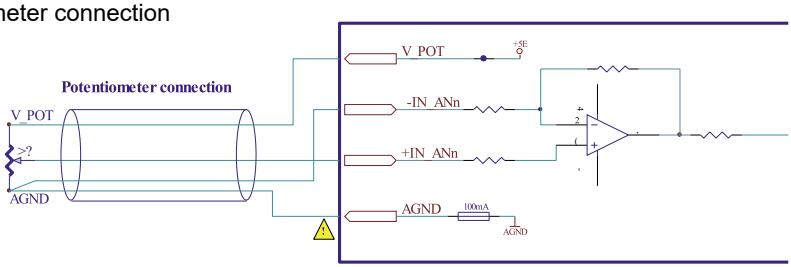
The resolution of the analog inputs depends from the type of the connection which could be defined by software: differential or potentiometer.

Differental connection



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

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.

Mating connectors

Connector	Description
CN1	Phoenix 1758830
CN3	Dinkle 0156-1B14-BK
CN4	Dinkle 0156-1B12-BK
CN5A / CN5B	RJ45, 8 positions 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 outputs	0.5 mm² (AWG20)	2.5 mm² (AWG12)
Feedback / encoder input	0.14 mm² (AWG26)	0.5 mm² (AWG20)
Inputs and Outputs	0.14 mm² (AWG26)	0.5 mm² (AWG20)
Communication interfaces	Min. 0.25 mm² (AWG23) CANbus CIA-CANOpen	

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.

Analysis of malfunctions

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

DEFECT	CAUSE	ACTION
Intervention of the themal protection.	Can be caused by a heavy working cycle or a high current in the motor.	Improve the drive cooling by a 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 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 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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