

Installation instructions



Refer to installation use and maintenance manual for more information.



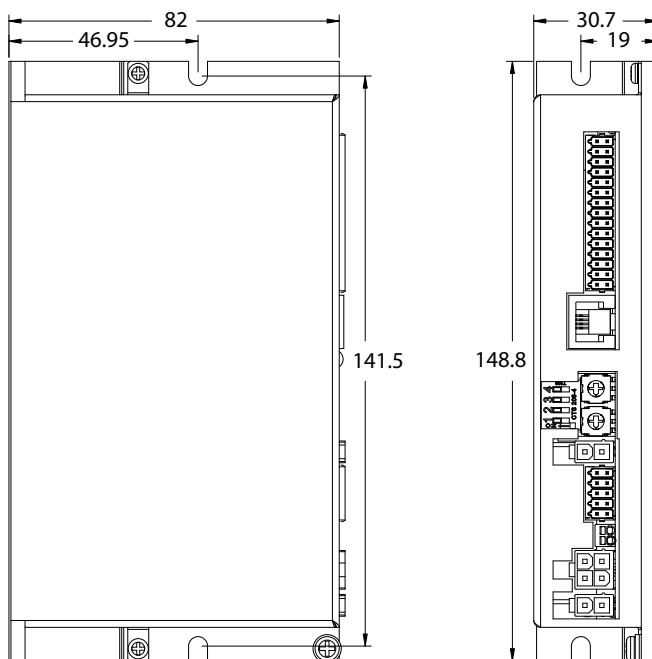
2 phase bipolar stepper drive technical data:

- AC power supply: 18 ± 56 Vac
- Phase current: 0.3 ± 4.5 Apeak (3032 serie) or 2.4 ± 10 Apeak (3070 serie)
- Chopper frequency: ultrasonic 40KHz
- Emulated Step angle: Full Step, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$, $\frac{1}{256}$, $\frac{1}{512}$, $\frac{1}{1024}$, $\frac{1}{2048}$, $\frac{1}{4096}$ configurable by means of Roto-Switches
- Protections against: over current, over/under voltage, overheating, short circuit between motor phase-to-phase and phase-to-ground
- Encoder input (not isolated): 5V Differential (RS422) or 5V Single-Ended (TTL/CMOS) incremental encoder
- Encoder output (not isolated): 5V Differential (RS422)
- Service SCI interface for programming and real time debugging
- 4 digital inputs (opto-coupled) and 1 FAULT digital output (opto-coupled)
- Dimensions: $148.8 \times 82 \times 30.7$ mm (without connectors)
- Protection degree: IP20
- Pollution degree: 2
- Category C3 following standard EN 61800-3
- Working temperature $5^{\circ}\text{C} \pm 40^{\circ}\text{C}$; Storage temperature $-25^{\circ}\text{C} \pm 55^{\circ}\text{C}$
- Humidity: $5\% \pm 85\%$ not condensing

TITANIO
VECTOR - STEPPER - DRIVES

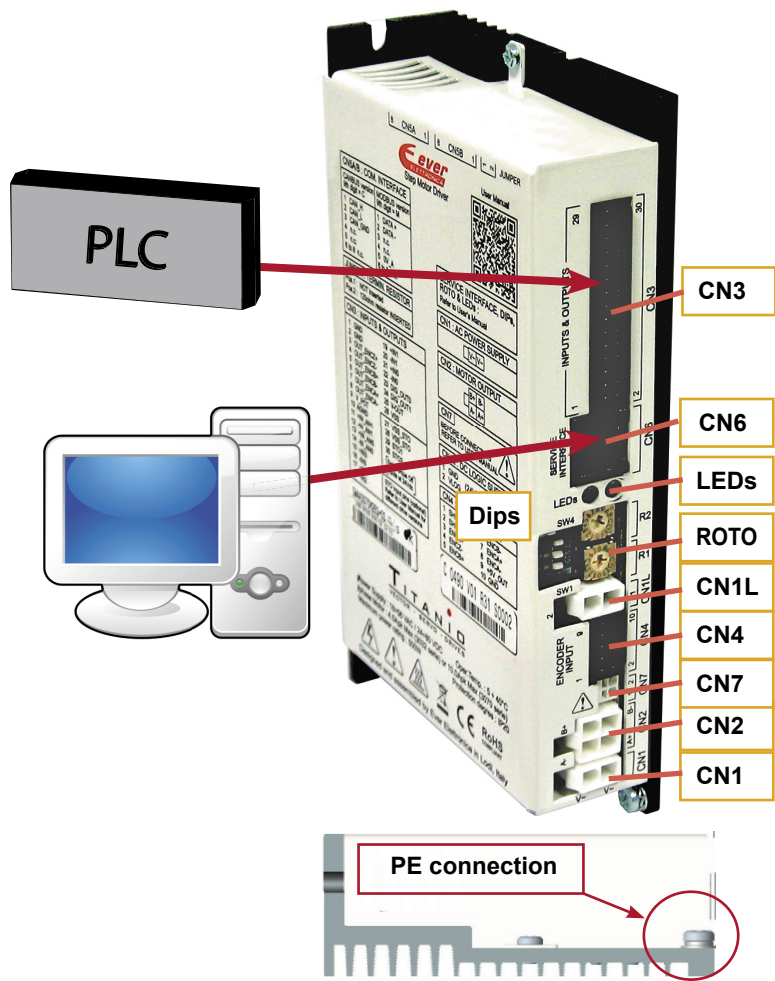
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Mechanical data



System connections

Connectors:



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



Use two separate and isolated supply for logic and digital outputs.



Connect GND of the logic supply and VSS of the output supply to PE near to the origin of the supplies with two different wires.



Do not connect simultaneously PE to the secondary circuit of the power transformer and to GND of the logic supply, otherwise the drive breaks and becomes unusable.

System connection

CN1: Power supply

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

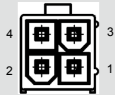
CN1.1	ACin	PWR_IN	AC power supply input
CN1.2	ACin	PWR_IN	AC power supply input



CN2: Motor connection

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

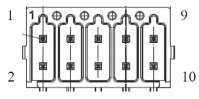
CN2.1	B/	PWR_OUT	Motor output phase B/
CN2.2	A	PWR_OUT	Motor output phase A
CN2.3	B	PWR_OUT	Motor output phase B
CN2.4	A/	PWR_OUT	Motor output phase A/



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



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	DNG power out



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

CN7: External capacitor connection

For connection refer to "Adding an External Capacitor" paragraph at pag. 8

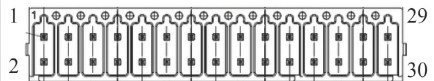
CN7.1	⚠	Reserved pin - DO NOT CONNECT
CN7.2	+DC_BUS	Positive side of the DC bus



CN3: Inputs and outputs

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

CN3.1	GND	PWR_OUT	Reference ground for encoder
CN3.2	GND	PWR_OUT	Reference ground for encoder
CN3.3	OUT_ENCZ+	DIG_OUT	Encoder Zero Output Positive
CN3.4	OUT_ENCZ-	DIG_OUT	Encoder Zero Output Negative
CN3.5	OUT_ENCB+	DIG_OUT	Encoder Phase B Output Positive
CN3.6	OUT_ENCB-	DIG_OUT	Encoder Phase B Output Negative
CN3.7	OUT_ENCA+	DIG_OUT	Encoder Phase A Output Positive
CN3.8	OUT_ENCA-	DIG_OUT	Encoder Phase A Output Negative
CN3.9	Reserved		Reserved
CN3.10	n.c.		Not connected
CN3.11	n.c.		Not connected
CN3.12	n.c.		Not connected
CN3.13	n.c.		Not connected
CN3.14	n.c.		Not connected
CN3.15	STEP +	DIG_IN	Clock frequency + input (Clock_up+)
CN3.16	STEP -	DIG_IN	Clock frequency - input (Clock_up-)
CN3.17	DIR +	DIG_IN	Motor direction + input (Clock_down+)
CN3.18	DIR -	DIG_IN	Motor direction - input (Clock_down-)
CN3.19	EN +	DIG_IN	Enable +
CN3.20	EN -	DIG_IN	Enable -
CN3.21	SD +	DIG_IN	Software defined + input
CN3.22	SD -	DIG_IN	Software defined - input
CN3.23	FAULT	DIG_OUT	PNP Fault digital output
CN3.24	n.c.		Not connected
CN3.25	V-OUT	PWR_IN	24Vdc supply for digital output
CN3.26	VSS	PWR_IN	Negative input supply for digital output
CN3.27	n.c.		Not connected
CN3.28	n.c.		Not connected
CN3.29	n.c.		Not connected
CN3.30	n.c.		Not connected



CN1L: External capacitor connection

For connection refer to "Adding an External Capacitor" paragraph at pag. 8

CN1L.1	PGND	PWR_IN	Negative side of the DC-bus
CN1L.2	VLOG	⚠	Reserved pin - DO NOT CONNECT



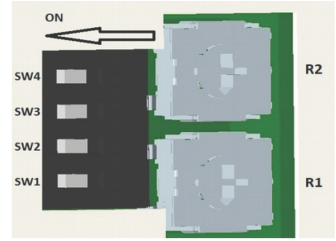
Dip-Switches and Roto-Switches settings

SW1 - Motor Phase Current Selection		
	3032 drive serie	3070 drive serie
OFF (default)	2 Arms (2.8Apk)	4.2 Arms (6Apk)
ON	3 Arms (4.2Apk)	6 Arms (8.5Apk)

SW2 - Drive Enable Polarity	
OFF (default)	Enable Asserted = Drive Disable
ON	Enable Asserted = Drive Enable 4.2 Arms (6Apk)

SW3 - Drive Control Mode	
OFF (default)	Step and Dir mode
ON	Clock_up/clock_down mode

SW4 - Motor Direction	
OFF (default)	Same of DIR signal
ON	Reverse of DIR signal



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.

R1 - Step Resolution											
Position	Value	Position	Value	Position	Value	Position	Value	Position	Value	Position	Value
0	Full Step	3	1/8	6	1/64	9	1/5	C	1/50		
1	1/2	4	1/16	7	1/128	A	1/10	D	1/125	F	All configurations set by software
2	1/4 (default)	5	1/32	8	1/256	B	1/25	E	1/250		



NOTE: the device reads 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.

R2 - Feedback K Tuning											
Position	Value	Position	Value	Position	Value	Position	Value	Position	Value	Position	Value
0	Reserved	3	K3	6	K6	9	K9	C	K12	F	K15
1	K1 (default)	4	K4	7	K7	A	K10	D	K13		
2	K2	5	K5	8	K8	B	K11	E	K14		



NOTE : the device reads the Roto-Switch R2 in real-time.



If it's necessary to customize the configurations, shut down the system, set R1 in position F, start up the system again, connect the drive to a PC with Service SCI interface and set all parameters by software. In this situations the position of dip-switches and roto-switches are not considered by the drive.

Working Status (Led)

Visualization status			Description
1		Green ON	Correct functioning
2		Green BLINKING	Enable OFF, current zero
3		Yellow ON	Missing setting of Inominal.
4		Yellow BLINKING (500 ms) & Red OFF & Blue OFF	Warning: connect with Service SCI kit and check with software.
5		Red ON	Protection: motor is in open phase condition.
6		Red BLINKING (200 ms)	Current protection.
7		Red ON (1 sec) and Yellow 1 BLINK	Overvoltage protection.
9		Red ON (1 sec) and Yellow 3 BLINK	Thermal protection
10		Red ON (1 sec) and Yellow 4 BLINK	Motor feedback error.
11		Red ON (1 sec) and Yellow 5 BLINK	Missing Torque Enable (missing Safe Torque Off)
12		Red ON (1 sec) and Yellow 6 BLINK	Motor current regulation is out of range.
13		Blue ON	Error: connected with Service SCI kit and check with software.
14		Blue ON and Yellow ON	Drive in boot mode. A new firmware should be downloaded to drive.
16		Blue ON and Red BLINKING (200 ms)	Initialization phase. Should last few seconds. While in this condition the drive is not fully operational.

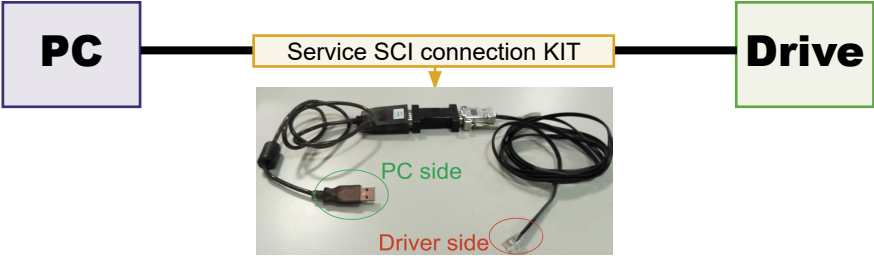


Note: Drive could be considered in a correct status if leds Red, Yellow and Blue are all OFF.
In general: - Led Blue indicates a software internal fault or a non-operative condition
- Led Red indicates an alarm or a drive protection
- Led Yellow indicates a warning

Service SCI connection

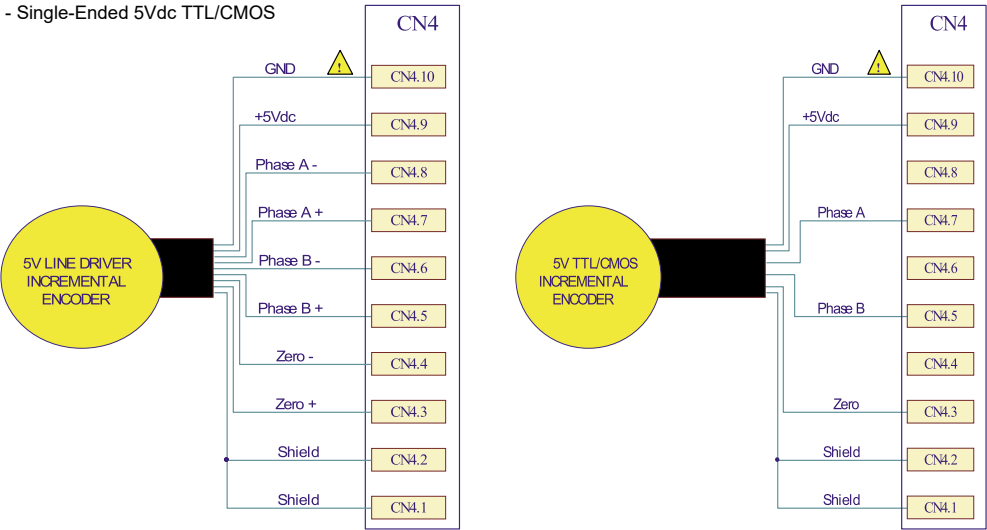


This connection is only possible with hardware and software provided by Ever.
Kit code: SW4_SERV10-SL or SW4-SERV10-EE.



Encoder input connection

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



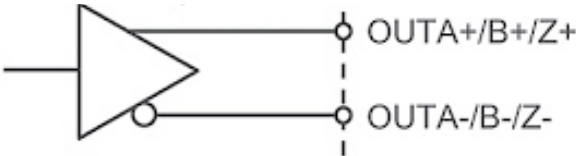
Maximum supply current 100mA.



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

Encoder output connection

Differential 5V (electrically NOT-isolated) digital outputs that meets RS422 standard.



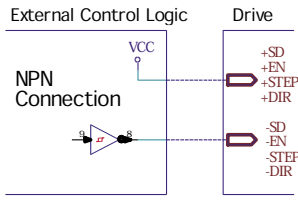
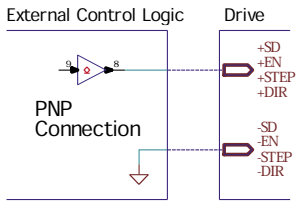
GND is internally in common with power ground, this is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.

Digital inputs connection

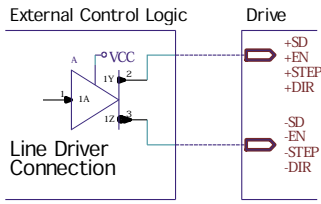


When a clock is applied to the STEP and/or DIR inputs, the initial frequency has to be lower then 8KHz ($T>125\mu\text{sec}$). The frequency can be increased further until the maximum value.

Voltage range: 3,3 – 24 VDC



Voltage range: 2 4 2/DC



Type	Characteristics	MIN.	MAX.	Unit
Standard ⁽¹⁾ (EN, SD)	Supply voltage	2 ⁽¹⁾	24	Vdc
	Inputs frequency	--	10	kHz
	Threshold switching voltage	1.61 ⁽¹⁾	--	Vdc
	Current at 2Vdc ⁽¹⁾	--	3.13	mA
	Current at 3.3 Vdc	--	5.84	mA
	Current at 5 Vdc	--	6.28	mA
High-Speed ⁽¹⁾ (STEP, DIR)	Supply voltage	2 ⁽¹⁾	24	Vdc
	Inputs frequency	--	1	MHz
	Threshold switching voltage	1.61 ⁽¹⁾	-	Vdc
	Current at 2Vdc ⁽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

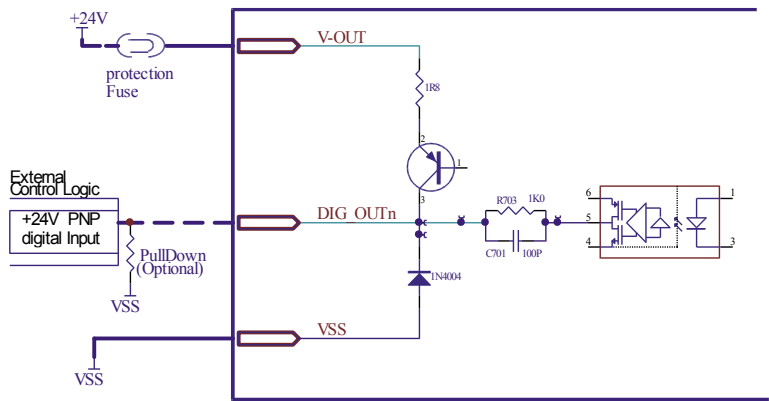
(1) N.B.: It's recommended to use 2 Vdc digital inputs only in differential Line-Driver configuration to have more noise immunity.



SD Input is Not Used by default but if it's necessary it could be used as a Software Define Input. Connect the drive to a PC with Service SCI interface to choose the SD Input functionality.

Digital outputs connection

The output is sized to function at VOUTmax=24Vdc, IOUTmax=100mA



FAULT Output Logic: OK = transistor Output Closed - FAULT = transistor Output Open

SW Output Logic: Defined by software (connect with Service SCI kit and check with software)

Adding an External Capacitor



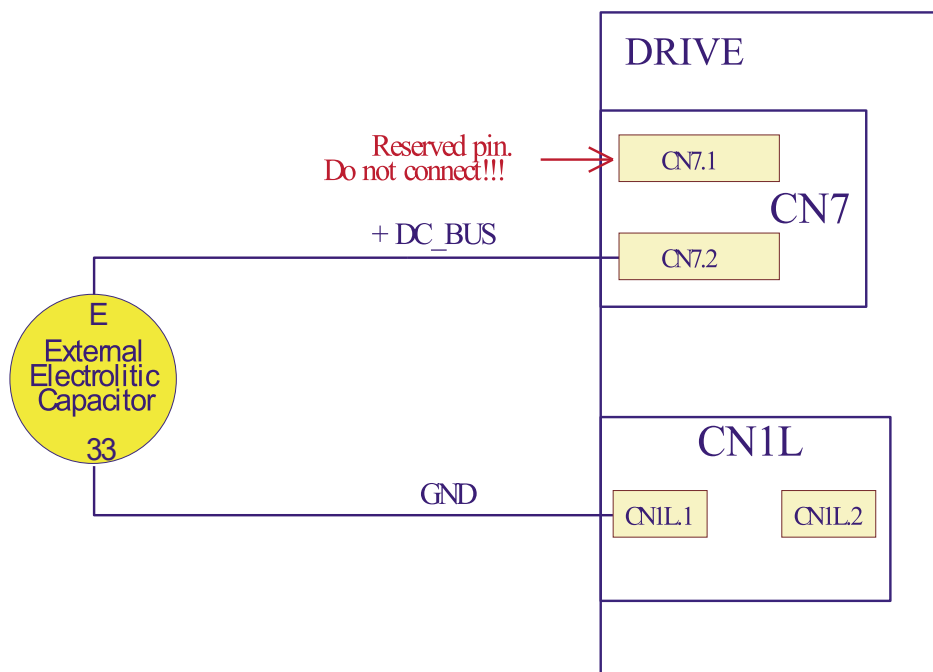
*On CN7 connector (pin 2) is reported only the **POSITIVE SIDE** of the DC_BUS.
Pin 1 **MUST BE NOT CONNECTED**.*



*On CN1L connector (pin 1) is reported only the **NEGATIVE SIDE** of the DC_BUS.
Pin 2 **MUST BE NOT CONNECTED**.*

Drive has an internal capacitor of 800uF on DC_BUS.

If it necessary in the application to extend the capacitance of the drive, it will be possible to add an external capacitor following the below connection diagram:



Before making this connection shut down the drive (both power and logic).



This connection is potentially dangerous. Take all necessary measures to avoid possible contacts in the final installation.



Cables between capacitor and drive must be short as possible and have also a very low inductance.

Mating connectors

Connector	Description
CN1	Molex 39-01-2025
CN1L	Molex 39-01-2025
CN2	Molex 39-01-2045
CN3	Phoenix 1844701
CN4	Phoenix 1844604

Section of the cables

Function	Cable	
	Minimum	Maximum
Power supply and PE	0.5 mm ² (AWG20)	1.3 mm ² (AWG16)
Motor outputs	0.5 mm ² (AWG20)	1.3 mm ² (AWG16)
Encoder input	0.14 mm ² (AWG26)	0.5 mm ² (AWG20)
Inputs and Outputs	0.14 mm ² (AWG26)	0.5 mm ² (AWG20)

Verify the installation

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



If the motion direction is not the desired one, it is possible to change it leaving the DIR input unchanged and changing the position of DIP1 or physically reversing the connection of a single phase of the motor to CN2, for example A with A/.

- Disconnect the power supply, fix the motor to the load 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 thermal 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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