

RosettaCNC Board B - Installation and Maintenance manual



Dear Customer,

Thank you for purchasing this product. RosettaCNC Board B is developed and manufactured with high standards to give high quality performance, ease of use and installation. In case of difficulty during installation or use of the product, We recommend that you first consult the instructions or information on the www.rosettacnc.com site.

Need help?

Write in the forum on the www.rosettacnc.com site or send an email to the following address: support@rosettacnc.com, the RosettaCNC development team will be happy to answer you in a short time.

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Informations


				
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1	01.0	New manual	/	21/12/2018
2	01.0	Corrected of description connectors CN8-9 because reversed and CN20-25 for the same reason.	/	18/02/2019
3	01.0	New order code	/	03/05/2019
4	01.0	New CN11 description for RosettaCNC software version 1.6	/	31/07/2019
5	01.0	Update order code, add Laser connection, Fix translation	/	02/09/2019
6	01.0	Add new commercial version	/	21/11/2019
7	01.0	Add new order code with "Jerk control" feature	/	05/06/2020
8	01.0	New Motor control Type "A" (position closed loop). New expansion option.	/	31/03/2021

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1. Introduction

1.1 General description

RosettaCNC Board B is an ETHERNET motion controller that manages up to 6 interpolated axes. The ETHERNET port (instead of USB) ensures fast and secure transmission thanks to the protocol and at the galvanic insulation with the PC connection. Does not require the use of external electronic parts or protectors. The power supply is integrated and protected, The inputs and outputs are equipped with opto-insulation that guarantee, together with the metal container, high resistance to electromagnetic interference. The outputs are protected from short circuits and allow you to directly connect inductive loads (relays or solenoid valves), without having to add external components.

The control outputs of STEP/DIR type are generated by a powerful FPGA That allows to reach operating frequencies of **1MHz** making it possible to use both step-by-step drives and servo drives.

Rosetta CNC Board commands the axes using a look ahead that allows you to achieve high interpolation speeds.

The product can possibly be equipped with a handwheel, supplied already complete with connector, alternatively, it makes available inputs for the jog connection joystick type and other useful control signals.

Rosetta CNC Board is equipped with removable spring connectors to allow quick wiring, highly reliable and free to vibrations.

1.2 Symbols used in the manual



Useful Information and tips



Warnings, failure to comply with these warnings may result in inappropriate operation or damage to the device



Potential danger and possible risk of injury

1.3 System composition

RosettaCNC Motion® is a system composed of the following elements:

- RosettaCNC Board B which is the motion controller described in this document.
- RosettaCNC software, a complete Windows® application to configure, monitor, and execute G codes.
- The RosettaCNC Handwheel A accessory, a practical and economical handwheel.
- The RosettaCNC MPG A accessory, is a rotary device to change the override.

1.4 Product Compliance

CE Marking and reference standards

The controller has been designed for industrial environments in conformity to EC directive 2004/108/CE.

- EN 61000-6-4: Electromagnetic compatibility - Generic standard on emission for industrial environments
 - EN55011 Class A: Limits and measurement methods
- EN 61000-6-2: Electromagnetic compatibility - Generic standard on immunity for industrial environments
 - EN 61000-4-3: Immunity to radiated, radio-frequency electromagnetic field
 - EN 61000-4-4: Electrical fast transients
 - EN 61000-4-5: Surge immunity
 - EN 61000-4-6: Conducted disturbance induced by radio-frequency
- Moreover the product is conform to the following standards:
 - EN 60068-2-1: Environmental testing: Cold
 - EN 60068-2-2: Environmental testing: Dry heat

1.5 Package Contents

- n.1 RosettaCNC Board B
- n.1 Spring terminals kit

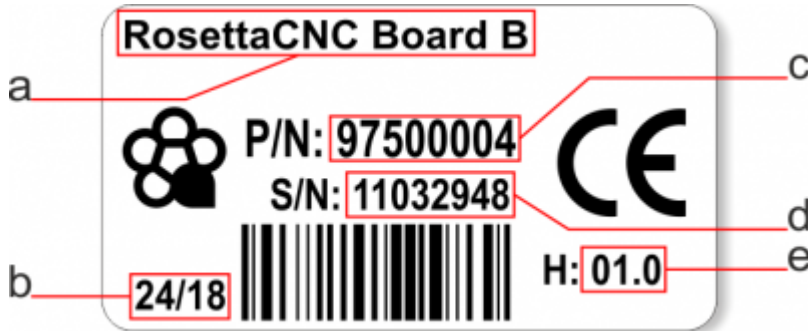


N.B.: The female connectors for CN2, CN3 and CN5 are not provided

1.6 Product identification

With the product ordering code it's possible to obtain exactly the features.
Check that the product features match your needs.

1.6.1 Product label



- **a - Ordering Code**
- **b - Week made:** indicates the week and year of manufacture
- **c - Part number:** unique code that identifies an ordering code
- **d - Serial number:** product serial number, different for individual product
- **e - Hardware release:** version of hardware release

1.6.2 Ordering code

Model	-	Features										
RosettaCNC B	-	6	/	0	/	0	/	1	/	1	/	1
												001
												Customization Code. (omitted if no customization is present)
												Functions "Group B". 0 = No functions enabled; 1 = Laser Acquisition;
												Functions "Group A". 0 = No Functions Enabled; 1 = RTCP; 2 = Jerk control; 3 = RTCP + Jerk control;
												Remote communication. 0 = No communication; 1 = OPC; 2 = OPC + RosettaCNC Data Exchange 4.0;
												I/O Expansion. 0 = Not present; 1 = CN21-CN22-CN24
												Motor control type. 0 = 125 KHz; 1 = 200Khz; 2 = 300Khz; 3 = 500Khz; 4 = 1Mhz; A = Position control loop ; E = EtherCAT
												Axis number. 5 = 5 axis; 6 = 6 axis;
Controller model. RosettaCNC B = Controller Board B												

1.6.3 Codes normally available

Part number	Model	Features
97500008	RosettaCNC B - 6/4/0/0/0/0	6 axes, max step freq 1 MHz
97500021	RosettaCNC B - 6/4/0/0/0/1	6 assi, max step freq 1 MHz, Laser Aquisition
97500013	RosettaCNC B - 6/4/0/1/0/0	6 axes, max step freq 1 MHz, OPC-UA server
97500014	RosettaCNC B - 6/4/0/0/1/0	6 axes, max step freq 1 MHz, RTCP
97500015	RosettaCNC B - 6/4/0/1/1/1	6 axes, max step freq 1 MHz, OPC-UA server, RTCP

1.7 Specification

Description	Value
Power supply	24VDC
Maximum absorption	12W
Axis number	6
Digital inputs	32
Handwheel interface	6-Axis Selector x1-x10-x100 Selector
EXTRA digital inputs	10 ¹⁾
Analog inputs	3
Digital outputs	32
Analog outputs	1
Axis control type	STEP/DIR
PC Communication	Ethernet 10/100Mb
Temperature range	0°C to +50°C
MPG inputs	3 + 1 ²⁾
Enclosure Protection Degree	IP20 (as from EN-60529 normative)

¹⁾ Available only if the "Controller Type" parameter is different from "HandWheel A"

²⁾ shared with handwheel

2. Safety

RosettaCNC Board it's powered in low voltage, 24VDC, the I/O line are opto-insulation and the PC connection is galvanically isolated, therefore the device is not a direct threat to the health and life of the user.

The design of a complete control system (electric panel), should draw attention to different aspects of, so that the whole machine system does not become a danger during the use.

It's good practice to always use NC contacts for the limit switches and for the emergency button So that a wiring error or a wire disconnection always lead to machine shutdown.

Special attention must be paid to the emergency stop circuit: The control system must be designed in such a way the that when you press the button for emergency stop, the machine immediately interrupts the movement of all axes. You should also consider the possibility of failure of particular components of the system, as the main controller, or the axes control units.

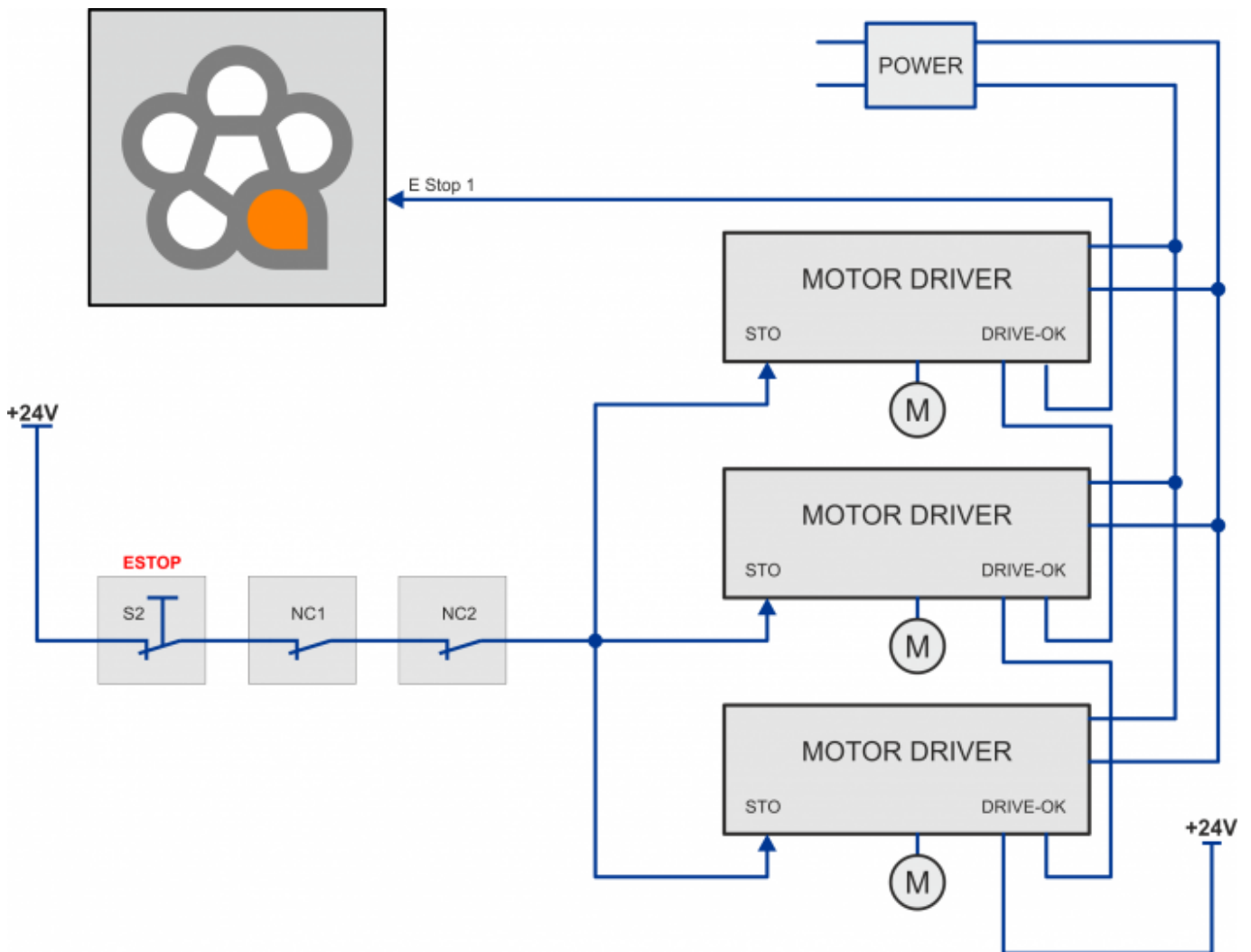


The safety of the machine is never the responsibility of the RosettaCNC Board Controller

Here are two examples of connection. The first uses the Safe Torque Off (STO) input Present in drives. The second uses a safety device to control the chain of emergency signals.



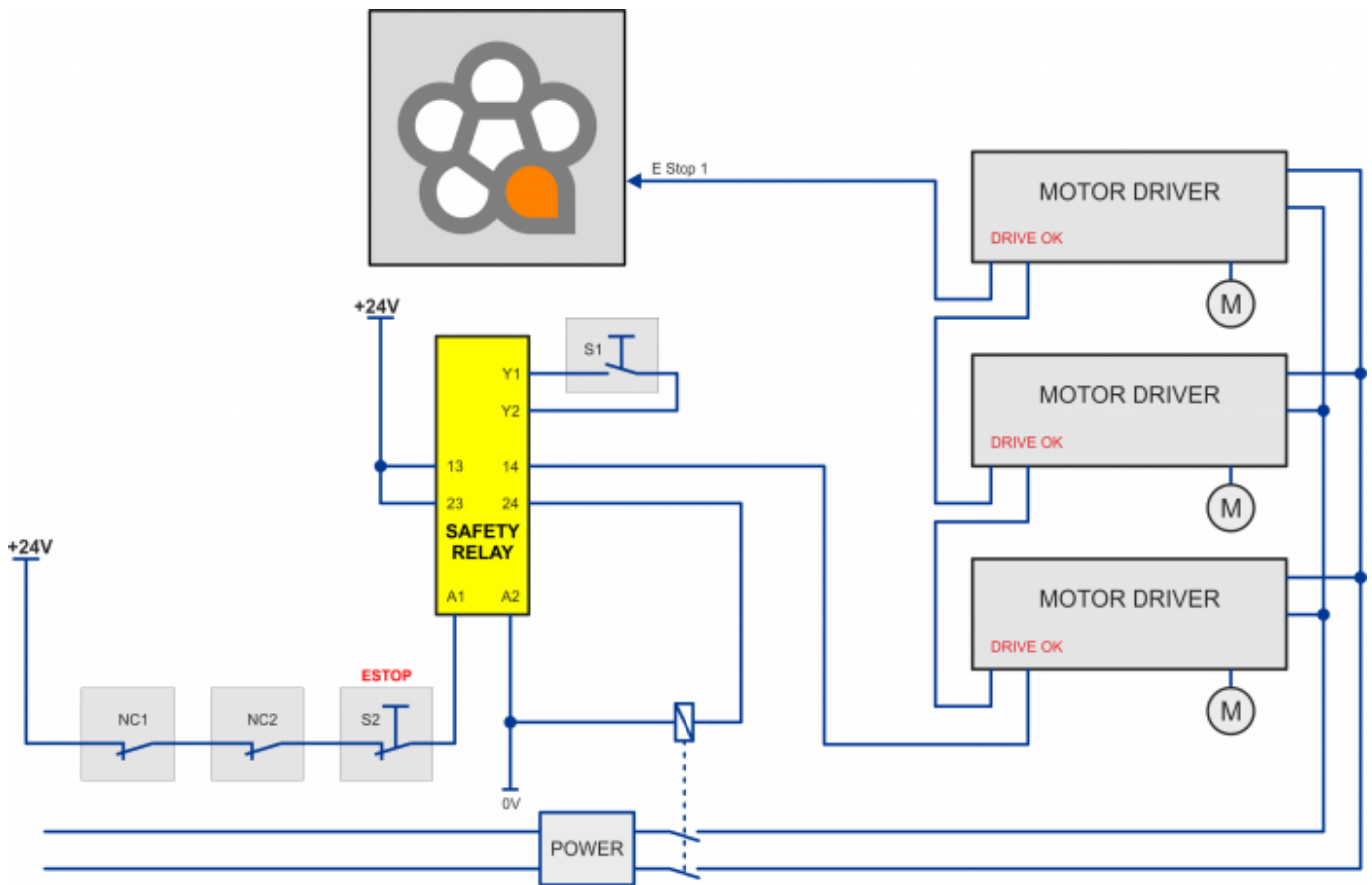
Both are only example schemes and each installer must then design its own scheme suitable for the machine according to the regulations.



In the below picture, is used a safety device Pilz model PNOZ X7. The emergency button, and possibly other alarm signals (safety barriers, crankcase opening, etc.) must be connected to the input circuits. An output must be connected to the EST1 input of RosettaCNC Board And in series also the drive ok outputs. The other exit of the safety module must be used to stop power to drives.

S1 is the Restore button.

S2 is the stop button in emergency.

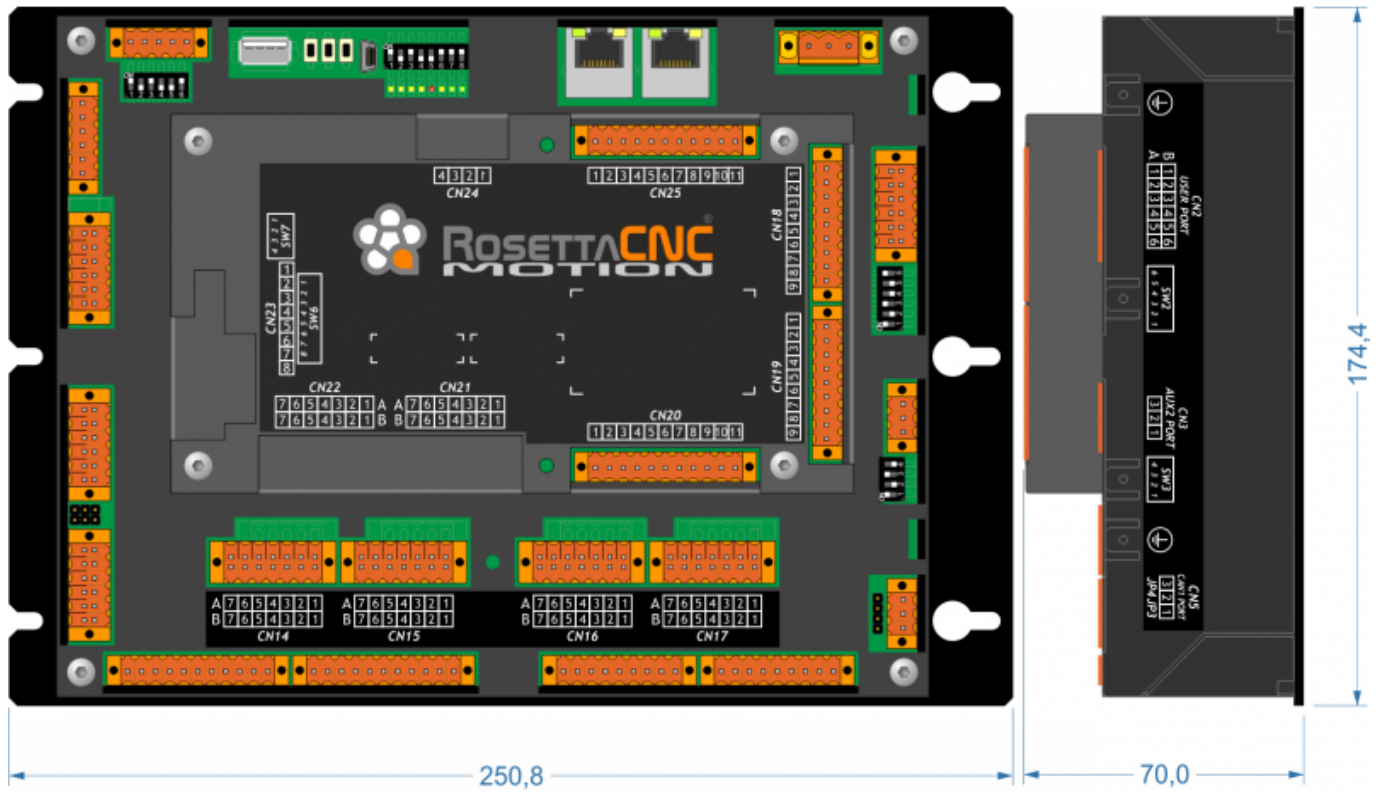


3. Mechanical Installation

3.1 Mechanical dimensions



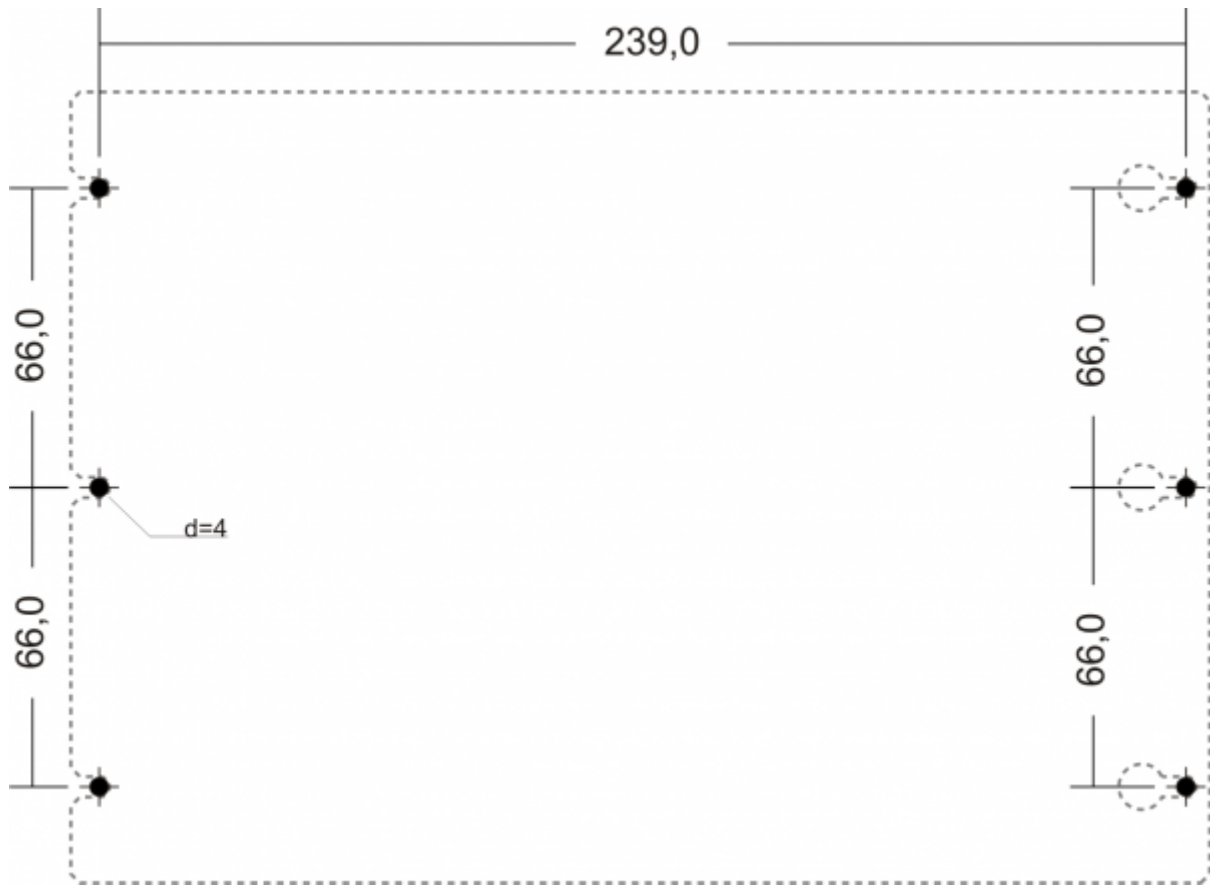
Dimensions in mm



3.2 Hole template



Dimensions in mm



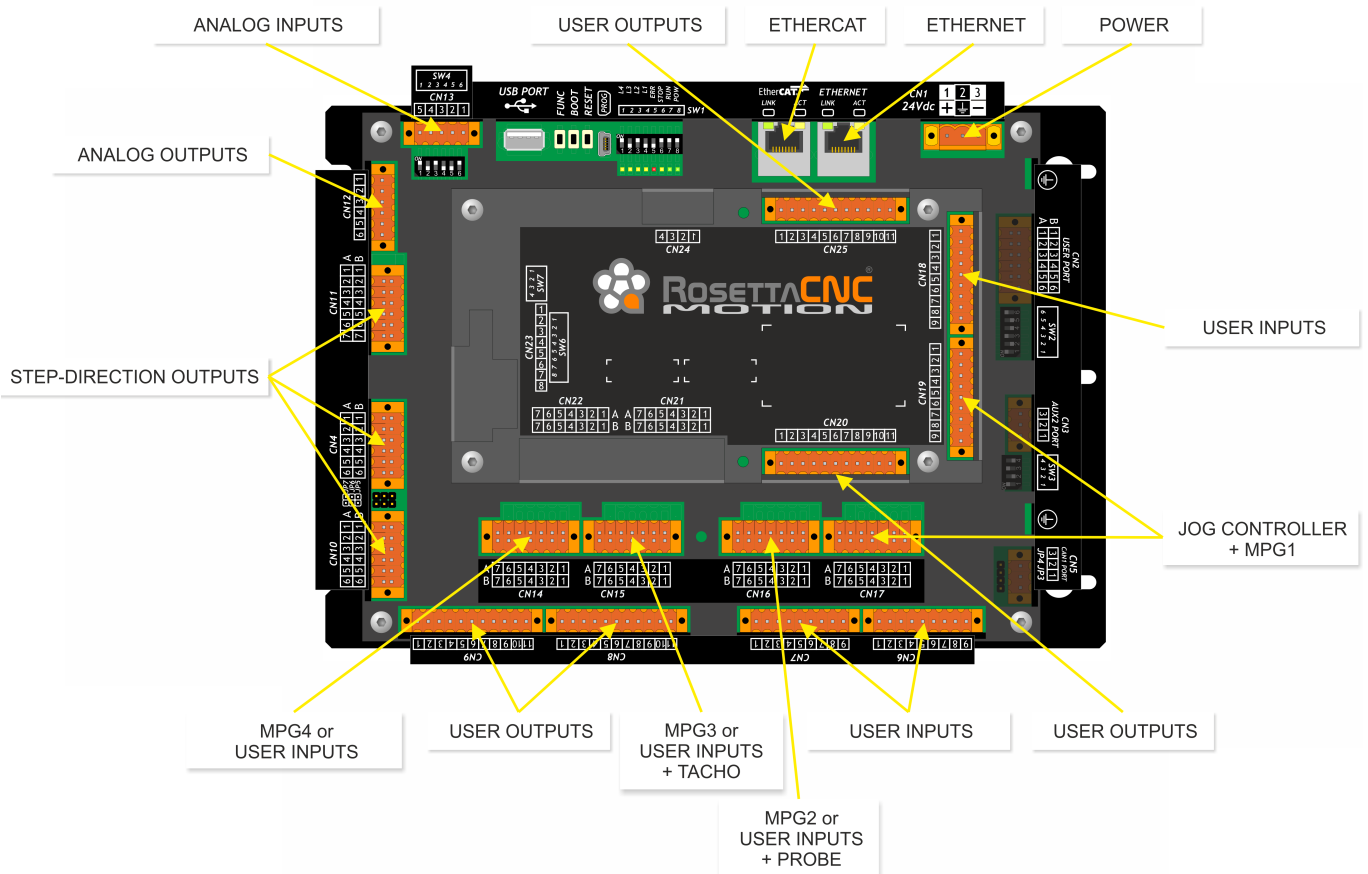
[Mechanical drawings](#)

4. Connectors

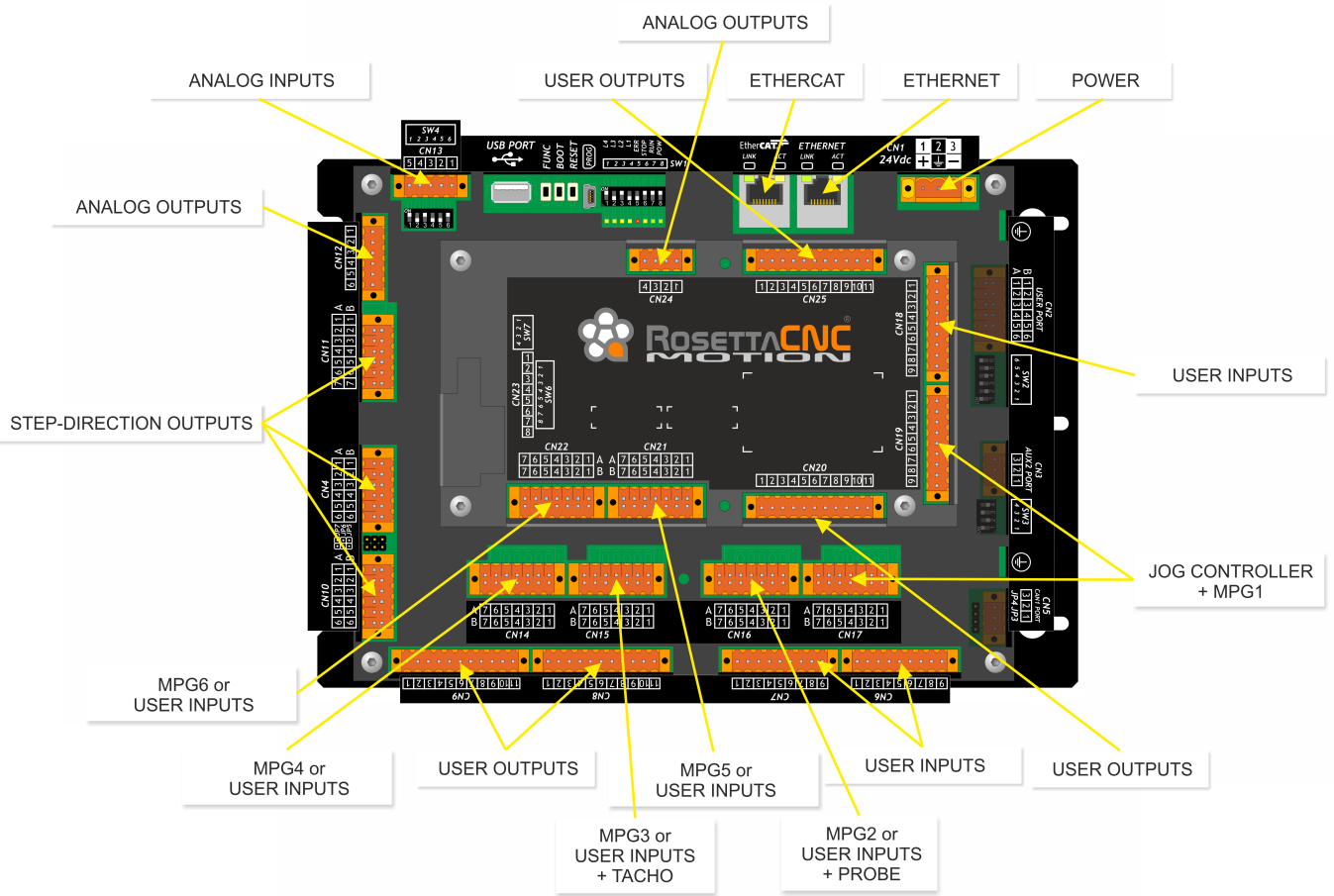


For information about the usable cable sections and the used connectors, see the Application Note [AN001](#)

4.1 Expansion I/O = 0



4.2 Expansion I/O = 1



4.3 Power supply



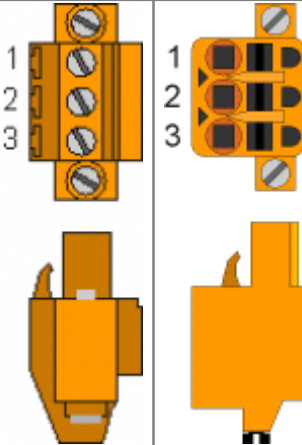
The wiring must be carried out by specialized personnel and provided with appropriate anti-static measures.

Before handling the instrument, remove voltage and all parts connected to it.

To ensure with the CE compliance, The supply voltage must have a galvanic insulation of at least 1500 Vac.

Available power supplies	24 Vdc
Valid range	22 ÷ 27 Vdc
Max. absorption	10W

Connector

CN1		Terminal	Symbol	Description
	1	1	+	Positive power supply
	2	2	GROUND	Ground-PE (signals)
	3	3	—	0V power supply

Connection examples




Is prescribed the use of insulated power supply with 24Vdc output complies with EN60950-1.

	<p>Use two separate power supplies: one for the control part and one for the power part</p>
	<p>In the case of a single power supply, Use two separate lines: one for control and one for power</p>
	<p>Do not use the same lines as the power part</p>

4.4 Serial Connections


4.4.1 ETHERNET port

ETHERNET PORT	Description
	<p>RJ45 connector.</p> <p>LED:</p> <ul style="list-style-type: none">* LINK: green led = connected cable (the LED on indicates that the cable is connected to both sides)* DATA: yello led = data exchange (the blinking LED indicates the data exchange between the connected devices)


4.5 Digital inputs

The digital inputs called “User input” can be configured by the RosettaCNC software to perform some functions. For example; ESTOP 1, Spindle ok speed, Spindle zero speed, Limit, Start, Safety barriers, etc.


4.5.1 CN7

CN7	Terminal	User inputs		Homing inputs	
		Symbol	Description	Symbol	Description
	1	0V	Common of digital Inputs		
	2	I1	User input I1		
	3	I2	User input I2		
	4	I3	User input I3	HMX	Homing X
	5	I4	User input I4	HMY	Homing Y
	6	I5	User input I5	HMZ	Homing Z
	7	I6	User input I6	HMA	Homing A
	8	I7	User input I7	HMB	Homing B
	9	I8	User input I8	HMC	Homing C

4.5.2 CN6

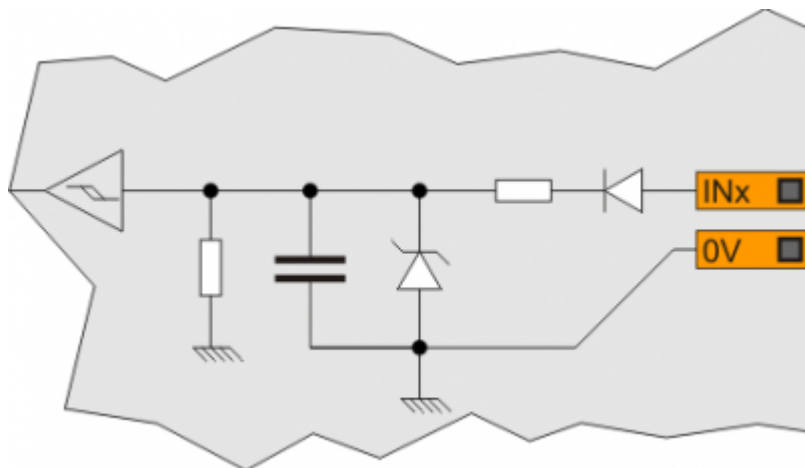
CN6	Terminal	User inputs	
		Symbol	Description
	1	0V	Common of digital Inputs
	2	I9	User input I9
	3	I10	User input I10
	4	I11	User input I11
	5	I12	User input I12
	6	I13	User input I13
	7	I14	User input I14
	8	I15	User input I15
	9	I16	User input I16

4.5.3 CN18

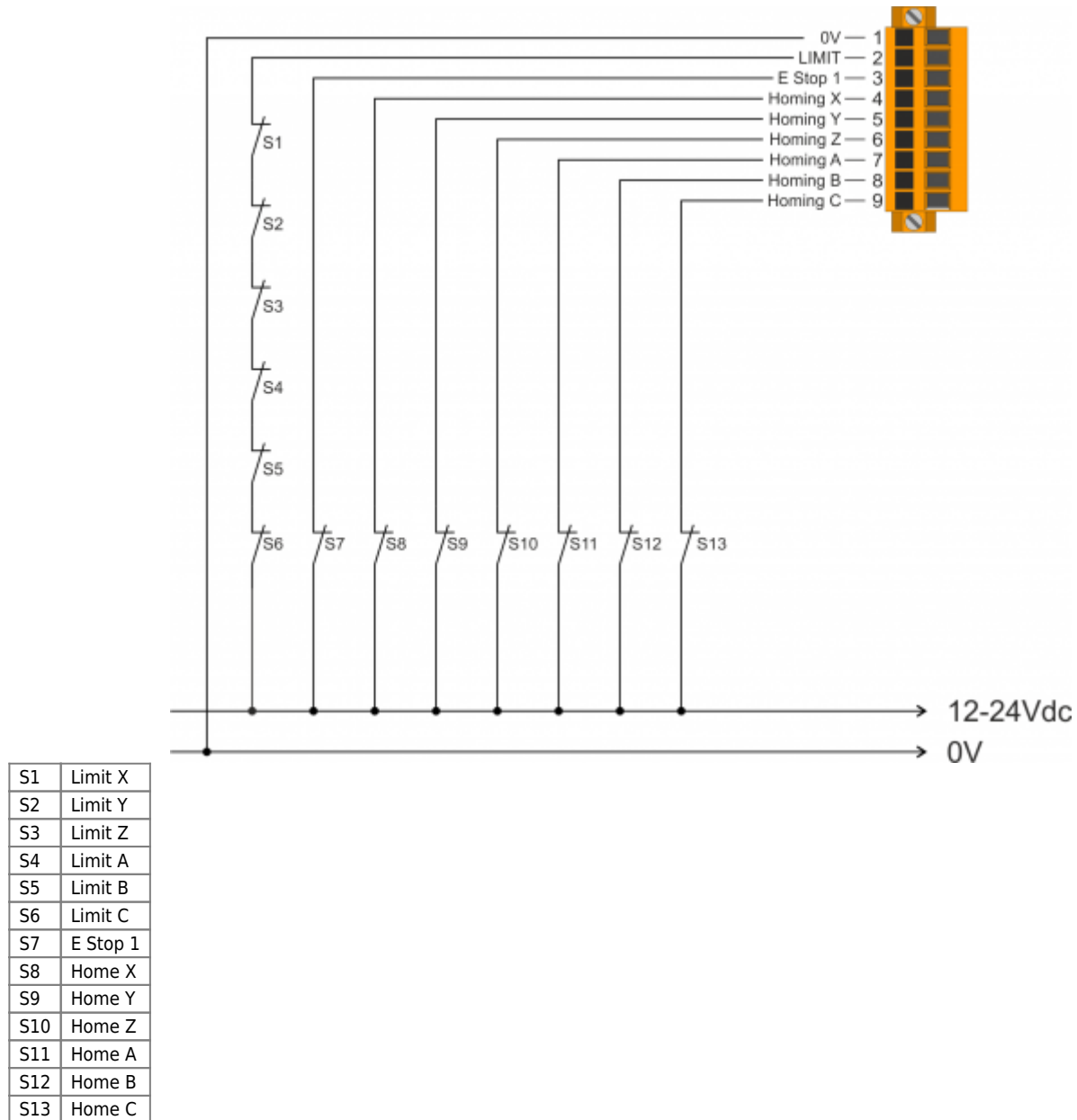
CN18	Terminal	User inputs	
		Symbol	Description
	1	0V	Common of digital Inputs
	2	I17	User input I17
	3	I18	User input I18
	4	I19	User input I19
	5	I20	User input I20
	6	I21	User input I21
	7	I22	User input I22
	8	I23	User input I23
	9	I24	User input I24

4.5.4 Electrical features

Type	PNP
Minimum acquisition time (hardware)	3ms
Rated operating voltage	12÷24Vdc
Maximum voltage	26.5Vdc
Voltage state logic 0	< 2 V
Voltage state logic 1	> 10.5 V
Absorbed current	2mA@10.5V / 8mA@26.5V



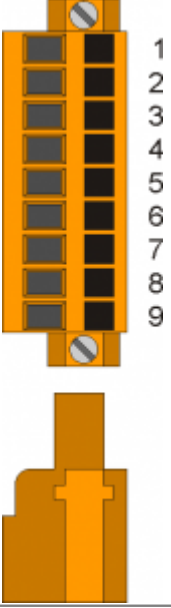
4.5.5 Connection examples

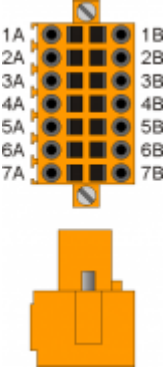


4.5.6 CN19 and CN17

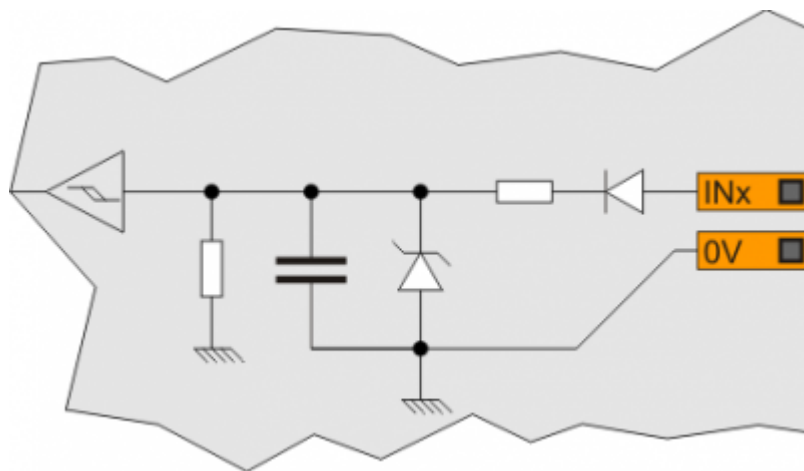
The following connectors are used for different functionalities depending on the value of the “Controller type” parameter. This parameter is present in the “RosettaCNC card settings” panel → Jog. Furthermore, the digital inputs named MPG can be configured through the RosettaCNC software to manage override. The settings are found in the “RosettaCNC Tab Settings” → “Overrides” panel. The following override can be managed:

- Jog Speed
- Fast Speed (G0)
- Feed Speed (G1,G2,ecc)
- Spindle Speed

CN19	Terminal	“Jog Controller Type” parameter						Ingressi utente	
		HandWheel A		Single Joystick		Multiple Joystick		Simbolo	Descrizione
		Symbol	Description	Symbol	Description	Symbol	Description		
	1	0V	Common of digital inputs	0V	Common of digital inputs	0V	Common of digital inputs	0V	Comune degli ingressi digitali
	2	HSX	Handwheel Sel.Axis X	CSX	Controller Sel.Axis X	JXP	Jog X+	I33	User input I33
	3	HSY	Handwheel Sel.Axis Y	CSY	Controller Sel.Axis Y	JXM	Jog X-	I34	User input I34
	4	HSZ	Handwheel Sel.Axis Z	CSZ	Controller Sel.Axis Z	JYP	Jog Y+	I35	User input I35
	5	HSA	Handwheel Sel.Axis A	CSA	Controller Sel.Axis A	JYM	Jog Y-	I36	User input I36
	6	HMO	Handwheel Multiplier x1	ZERO	Zero	JZP	Jog Z+	I37	User input I37
	7	HMT	Handwheel Multiplier x10	JP	Jog +	JZM	Jog Z-	I38	User input I38
	8	HMH	Handwheel Multiplier x100	JM	Jog -	JAP	Jog A+	I39	User input I39
	9	HSB	Handwheel Sel.Axis A	CSB	Controller Sel.Axis B	JAM	Jog A-	I40	User input I40

CN17	Terminal	“Jog Controller Type” parameter							
		HandWheel A		Single Joystick		Multiple Joystick		MPG 1 / User inputs	
		Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
	1A	5V	5 Volts DC output	5V	5 Volts DC output	5V	5 Volts DC output	5V	5 Volts DC output
	2A		-					I41	User input I41
	3A		-					I42	User input I42
	4A	HSC	Handwheel Sel.Axis A	CSC	Controller Sel.Axis C			I43	User input I43
	5A	0V	To Connect with 5B		To Connect with 5B		To Connect with 5B		To Connect with 6A
	6A		To Connect with 6B		To Connect with 6B		To Connect with 6B		To Connect with 6B
	7A		To Connect with 7B		To Connect with 7B		To Connect with 7B		To Connect with 7B
	1B								
	2B	HPA	Handwheel Controller PHA - [MPG 1]	CPA	Controller PHA - [MPG 1]	CPA	Controller PHA - [MPG 1]	CPA	Controller PHA - [MPG 1]
	3B	HPB	Handwheel Controller PHB - [MPG 1]	CPB	Controller PHB - [MPG 1]	CPB	Controller PHB - [MPG 1]	CPB	Controller PHB - [MPG 1]
	4B								
	5B		To Connect with 5A		To Connect with 5A		To Connect with 5A		To Connect with 5A
	6B		To Connect with 6A		To Connect with 6A		To Connect with 6A		To Connect with 6A
	7B		To Connect with 7A		To Connect with 7A		To Connect with 7A		To Connect with 7A

Type	PNP
Minimum acquisition time (hardware)	3ms
Rated operating voltage	12÷24Vdc
Maximum voltage	26.5Vdc
Voltage state logic 0	< 2 V
Voltage state logic 1	> 10.5 V
Absorbed current	2mA@10.5V / 8mA@26.5V

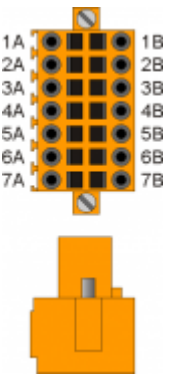


Type	PNP
Maximum frequency	200KHz
Minimum acquisition time	5μs
Insulated	1000Vrms
Nominal operating voltage	24Vdc
Voltage State Logic 0	0 ÷ 2 V
Voltage State Logic 1	10,5 ÷ 26,5 V
Internal Voltage Drop	1,2V
Input resistance	3100Ω

For the connection of the Handwheel refer to the [Handwheel A](#) documentation

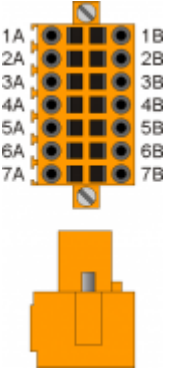
4.5.7 CN14

It Can be used as MPG4 or as “User Inputs”.

CN14	Terminal	User inputs		MPG4	
		Symbol	Description	Symbol	Description
	1A	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output
	2A	I25	I25 User Input		
	3A	I26	I26 User Input		
	4A	I27	I27 User Input		
	5A		Connected with 5B		Connected with 5B
	6A		Connected with 6B		Connected with 6B
	7A		Connected with 7B		
	1B				
	2B			PHA	A Phase
	3B			PHB	B Phase
	4B				
	5B		Connected with 5A		Connected with 5A
	6B		Connected with 6A		Connected with 6A
	7B		Connected with 7A		

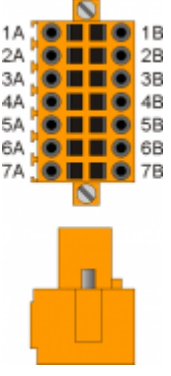
4.5.8 CN15

It Can be used as MPG3 or as “User Inputs”. It's also possible to connect the spindle tachometer signal.

CN15	Terminal	User Inputs		MPG3		TACHO	
		Symbol	Description	Symbol	Description	Symbol	Description
	1A	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output
	2A	I28	I28 User Input				
	3A	I29	I29 User Input				
	4A	I30	I30 User Input				
	5A		Connected with 5B		Connected with 5B	TACHO	TACHO Sensor
	6A		Connected with 6B		Connected with 6B		
	7A		Connected with 7B				Connected with 7B
	1B						
	2B			PHA	A Phase		
	3B			PHB	B Phase		
	4B						
	5B		Connected with 5A		Connected with 5A		
	6B		Connected with 6A		Connected with 6A		
	7B		Connected with 7A				Connected with 7A

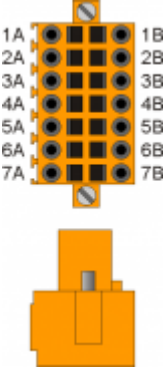
4.5.9 CN16

It can be used as MPG2 or as “User Inputs”. It's also allowed to connect the PROBE.

CN16	Terminal	User inputs		MPG2		PROBE	
		Symbol	Description	Symbol	Description	Symbol	Description
	1A	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output
	2A	I31	I31 User Input				
	3A	I32	I32 User input				
	4A	I50	I50 User input			PROBE	PROBE Sensor
	5A		Connected with 5B		Connected with 5B		
	6A		Connected with 6B		Connected with 6B		
	7A		Connected with 7B				Connected with 7B
	1B						
	2B			PHA	A Phase		
	3B			PHB	B Phase		
	4B						
	5B		Connected with 5A		Connected with 5A		
	6B		Connected with 6A		Connected with 6A		
	7B		Connected with 7A				Connected with 7A

4.5.10 CN22

Può essere usato come “Ingresso encoder Asse A”.

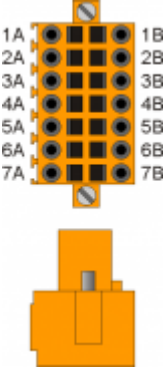
CN22	Terminal	User inputs		MPG6	
		Symbol	Description	Symbol	Description
	1A	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output
	2A	I47	I47 User Input		
	3A	I48	I48 User input		
	4A	I49	I49 User input		
	5A		Connected with 5B		Connected with 5B
	6A		Connected with 6B		Connected with 6B
	7A		Connected with 7B		
	1B				
	2B			PHA	A Phase
	3B			PHB	B Phase
	4B				
	5B		Connected with 5A		Connected with 5A
	6B		Connected with 6A		Connected with 6A
	7B		Connected with 7A		



CN22 connector available only with field **I/O Expansion** = 1, in order code.

4.5.11 CN21

Può essere usato come “Ingresso encoder Asse B”.

CN21	Terminal	User inputs		MPG5	
		Symbol	Description	Symbol	Description
	1A	5Vdc	+5Vdc Output	5Vdc	+5Vdc Output
	2A	I44	I44 User Input		
	3A	I45	I45 User input		
	4A	I46	I46 User input		
	5A		Connected with 5B		Connected with 5B
	6A		Connected with 6B		Connected with 6B
	7A		Connected with 7B		
	1B				
	2B			PHA	A Phase
	3B			PHB	B Phase
	4B				
	5B		Connected with 5A		Connected with 5A
	6B		Connected with 6A		Connected with 6A
	7B		Connected with 7A		



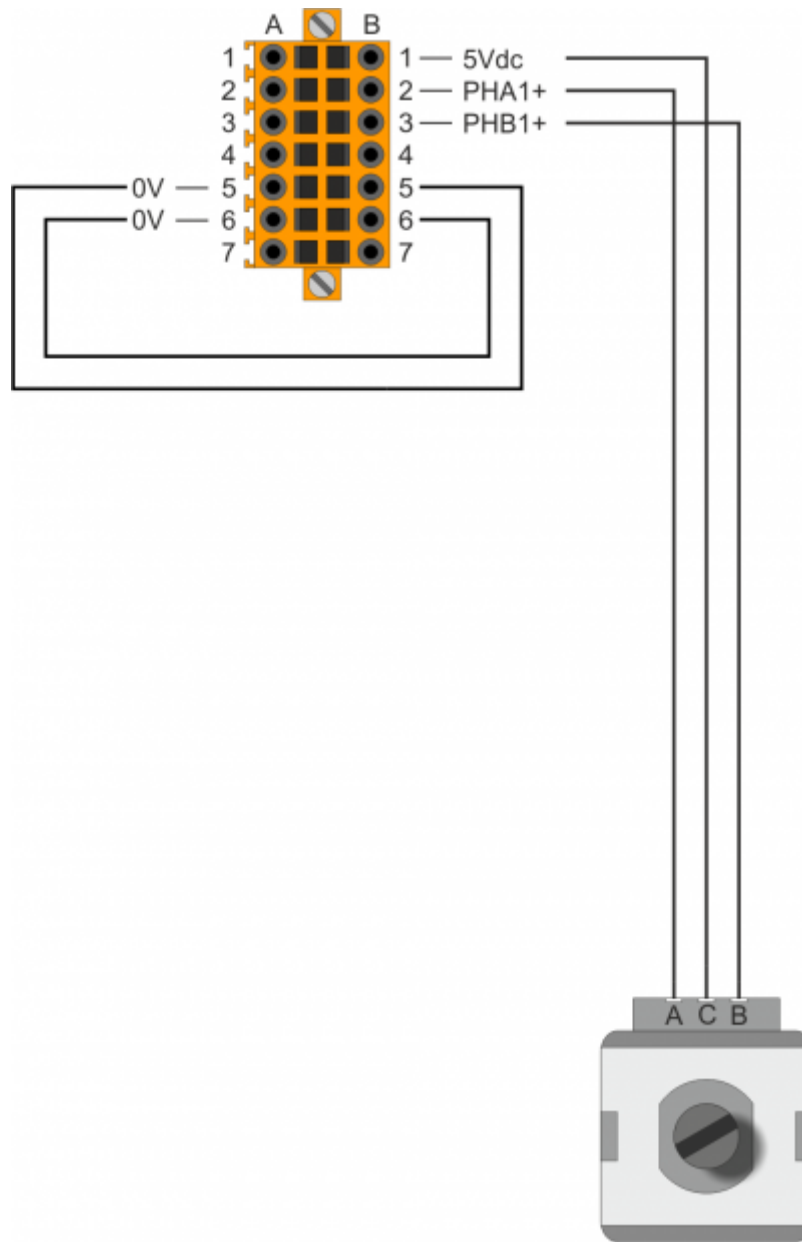
CN21 connector available only with field **I/O Expansion** = 1, in order code.

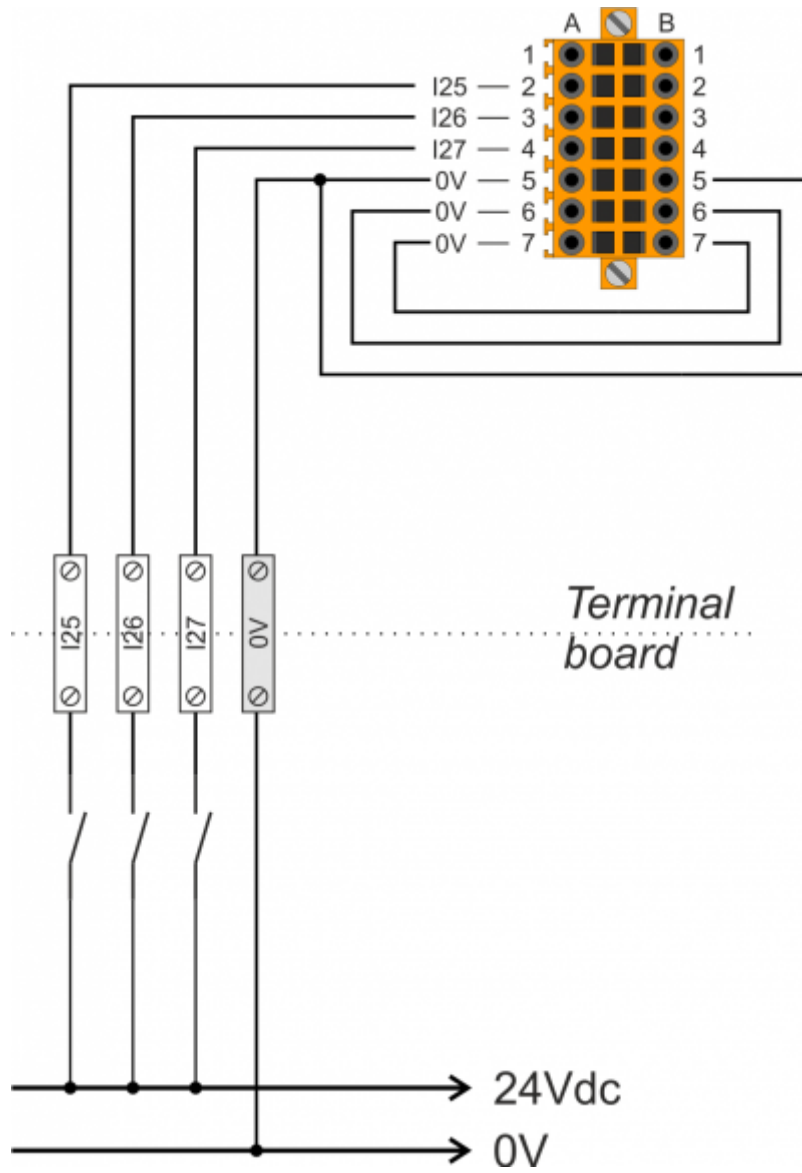
4.5.11.1 Electrical features

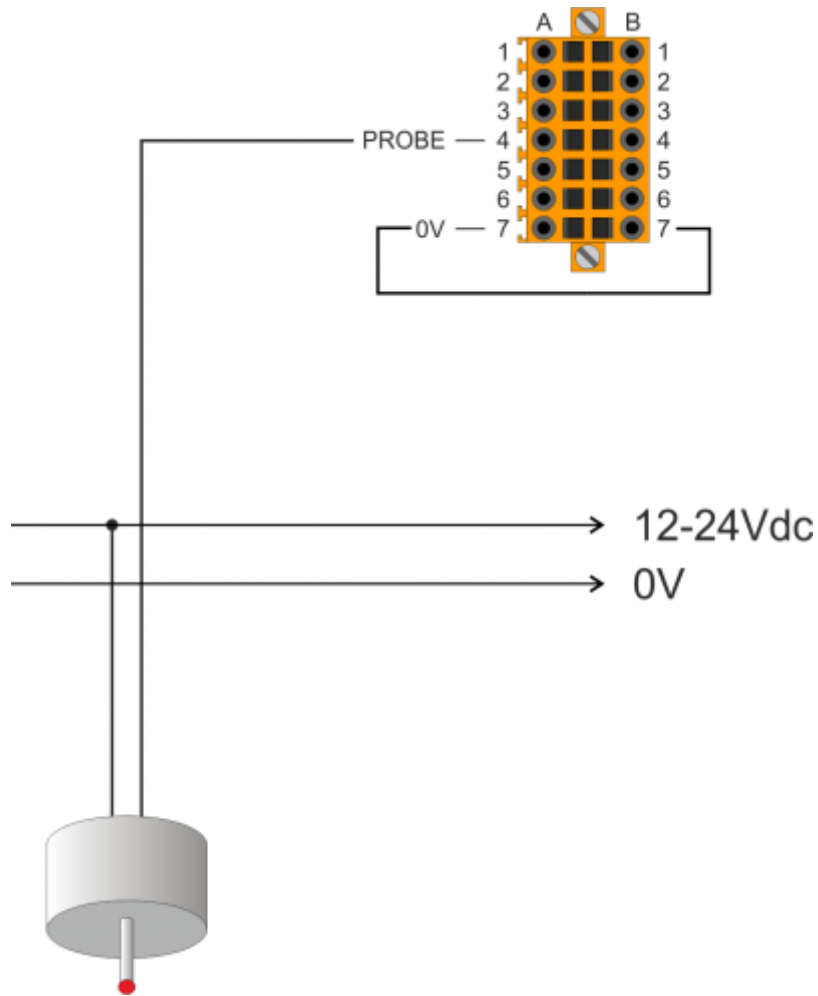
Type	PNP
Maximum frequency	200KHz
Minimum acquisition time	5 μ s
Insulated	1000Vrms
Nominal operating voltage	24Vdc
Voltage State Logic 0	0 ÷ 2 V
Voltage State Logic 1	10,5 ÷ 26,5 V
Internal Voltage Drop	1,2V
Input resistance	3100 Ω

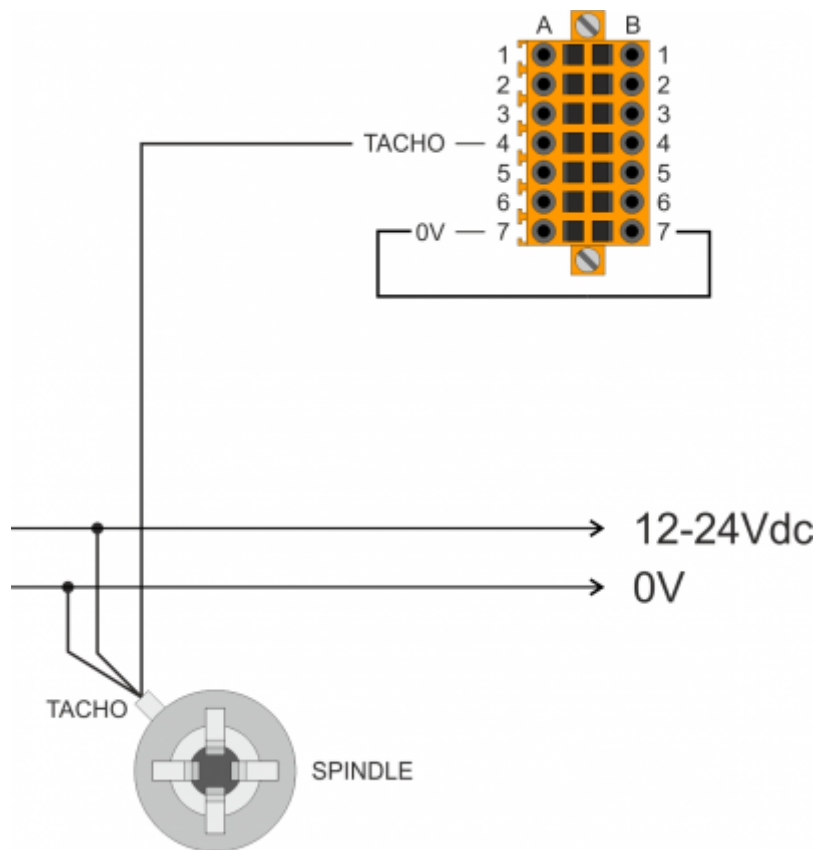
4.5.11.2 Connection examples

MPG to 5V dc



12-24V dc User inputs

PROBE 12-24V dc Input

TACHO 12-24V dc Input

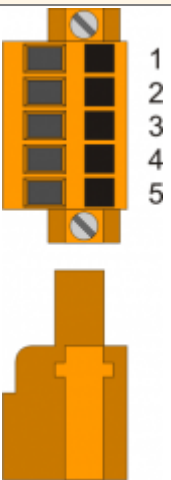
4.6 Analog inputs

Each analogue input can be configured via the RosettaCNC software to manage an override. The settings are found in the "RosettaCNC tab Settings " Panel → "Overrides".

The following parameters can be set:


- Jog Speed
- Fast (G0) Speed
- Feed (G1,G2,ecc) Speed
- Spindle Speed

4.6.1 CN13

CN13	Terminal	Symbol	Description	Address
	1	VREF	Reference Voltage ¹⁾	
	2	AI1	Analog input 1	2.AI01
	3	AI2	Analog input 2	2.AI01
	4	AI3	Analog input 3	2.AI03
	5	GAI	Common of Analogue Inputs	

¹⁾ For Potentiometric Inputs

4.6.2 Analog Inputs settings

SW4	Num. Dip	Analog input 1			Analog input 2			Analog input 3		
		Pot.	0-10V	0-20mA	Pot.	0-10V	0-20mA	Pot.	0-10V	0-20mA
	1	OFF	OFF	ON	X	X	X	X	X	X
	2	OFF	ON	OFF	X	X	X	X	X	X
	3	X	X	X	OFF	OFF	ON	X	X	X
	4	X	X	X	OFF	ON	OFF	X	X	X
	5	X	X	X	X	X	X	OFF	OFF	ON
	6	X	X	X	X	X	X	OFF	ON	OFF

X = Irrelevant setting

Pot. = Potentiometer input type

0-10V = Voltmetric type input

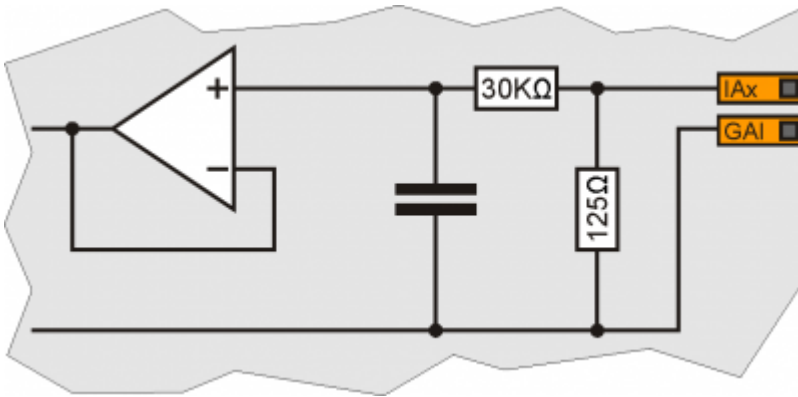
0-20mA = Amperometric type input

4.6.3 Electrical features

4.6.3.1 Analog Input with Amperometric configuration 0-20mA

Connection type	Amperometric (0-20 mA)
Resolution	12bit
Input resistance	125Ω
Value of damage	25 mA
Max. Linearity error	$\pm 0,1\%$ Vfs
Max. Offset error	$\pm 0,1\%$ Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present ¹⁾
Isolation	1000 Vrms

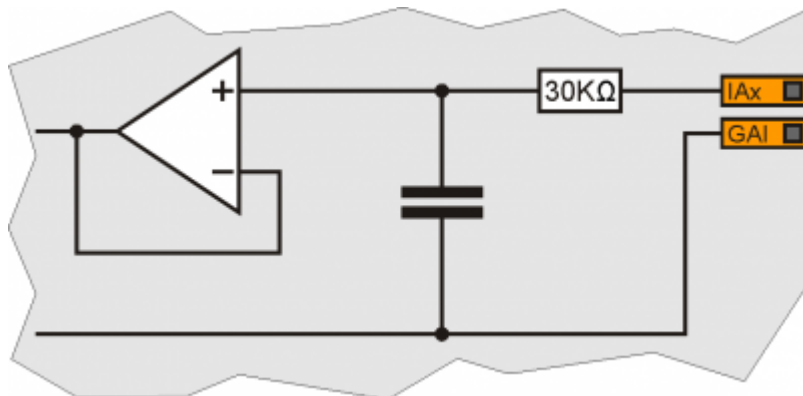
¹⁾ The sampling time of the device must be equal or higher than the conversion time



4.6.3.2 Analog input in potentiometric configuration

Connection type	Potentiometric $1K\Omega + 20K\Omega$
Resolution	12bit
Reference voltage output	2,5Vdc
Max output current from reference	10mA
Input resistance	$10M\Omega$
Max. Linearity error	$\pm 0,1\%$ Vfs
Max. Offset error	$\pm 0,1\%$ Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present ¹⁾
Isolation	1000 Vrms

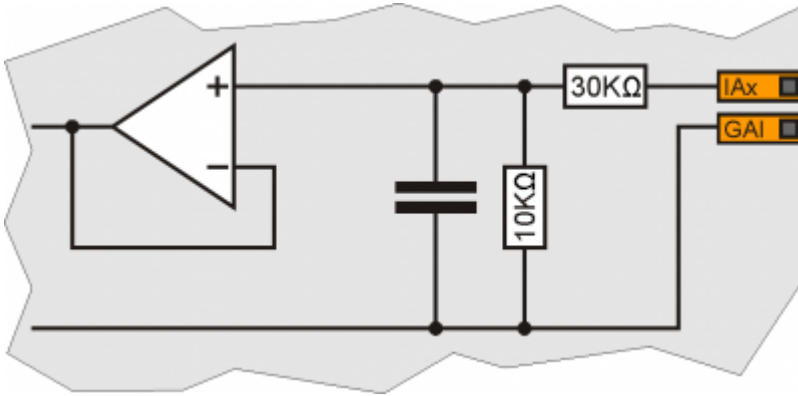
¹⁾ The sampling time of the device must be equal or higher than the conversion time



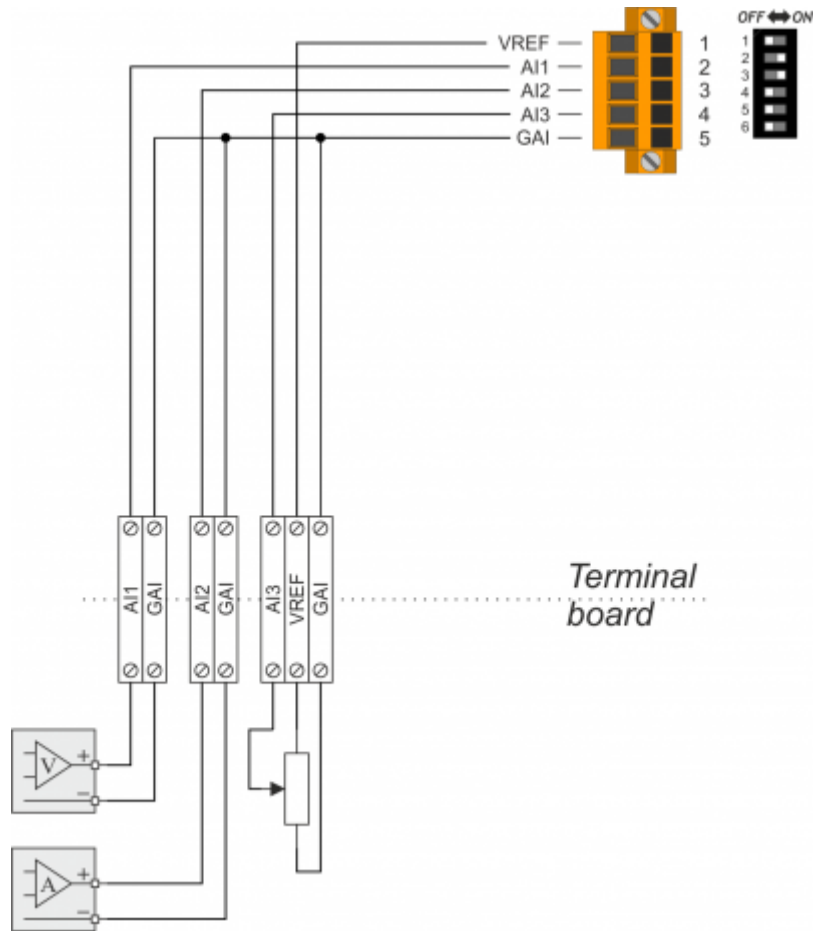
4.6.3.3 Analog input in voltmetric configuration

Connection type	Voltmetrico 0÷10V
Resolution	12bit
Input resistance (Rin)	40K Ω
Value of damage	20V
Max. Linearity error	$\pm 0,1\%$ Vfs
Max. Offset error	$\pm 0,1\%$ Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present ¹⁾
Isolation	1000 Vrms

¹⁾ The sampling time of the device must be equal or higher than the conversion time



4.6.4 Connection example



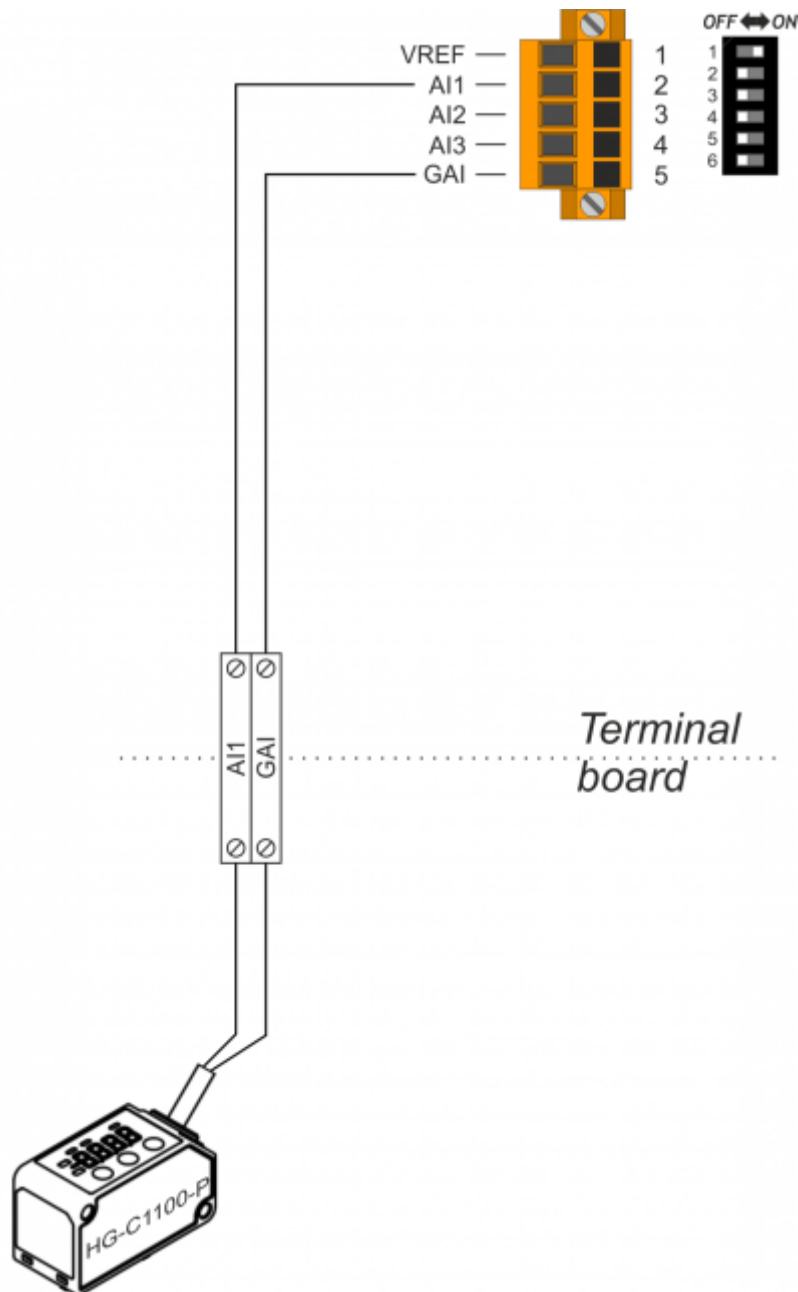
4.6.5 Example of connection of HG-C1100-P laser scanning probe

It is possible to connect a Panasonic HG-C1100-P Micro Laser Distance Sensor to the AI1 input.

The following operations are possible through the laser sensor:

- Surface scan for 3D model (model STL file creation and TXT file with acquired data cloud).
- Scan for surface flatness mapping (creation of surface STL files and TXT files with acquired data cloud).

To function properly the sensor must be reset to the factory settings and analogue input AI1 must be set in 0-20mA amperometric configuration.




4.7 Digital outputs


The digital outputs, called “User Output ”, can be configured by the RosettaCNC software to make some functions. For example: Spindle start with clockwise rotation, Spindle start with anti-clockwise rotation, air activation, water activation, aux outputs 1.. 4, etc.

4.7.1 32 Protected Outputs

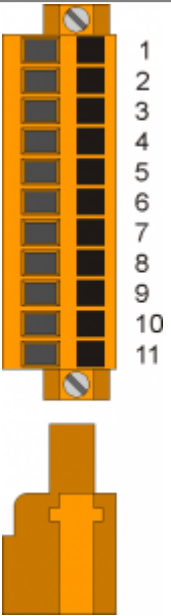
4.7.1.1 CN8

CN8	Terminal	Symbol	Description
	1	V+	Output power supply input (12÷28V dc)
	2	O9	9 User output
	3	O10	10 User output
	4	O11	11 User output
	5	O12	12 User output
	6	V+	Output power supply input (12÷28V dc)
	7	O13	13 User output
	8	O14	14 User output
	9	O15	15 User output
	10	O16	16 User output
	11	V-	Output power supply input (0V dc)

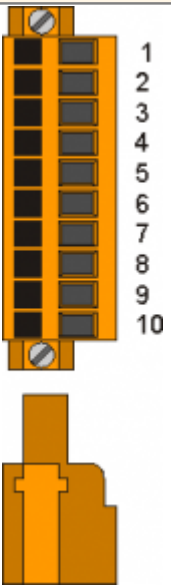
4.7.1.2 CN9

CN9	Terminal	Symbol	Description
	1	V+	Outputs power input (12÷28V dc)
	2	O1	1 User output
	3	O2	2 User output
	4	O3	3 User output
	5	O4	4 User output
	6	V+	Outputs power input (12÷28V dc)
	7	O5	5 User output
	8	O6	6 User output
	9	O7	7 User output
	10	O8	8 User output
	11	V-	Outputs power input (0V dc)

4.7.1.3 CN20

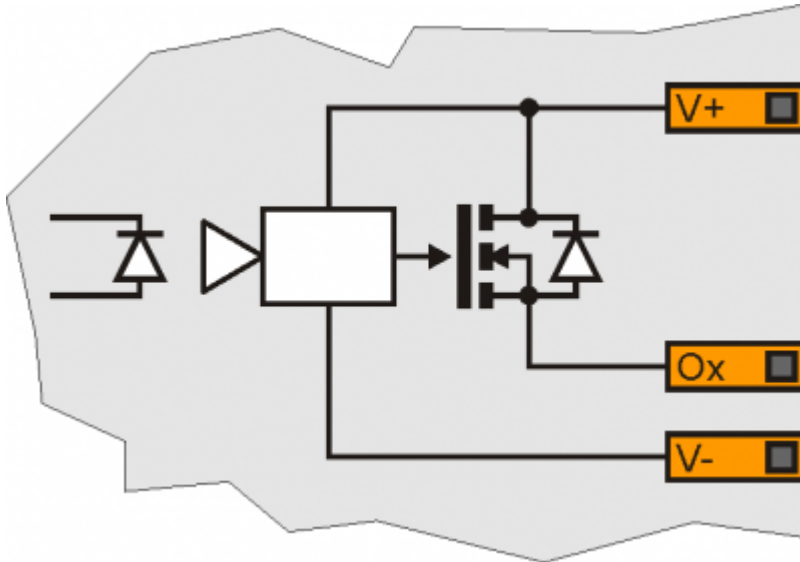
CN20	Terminal	Symbol	Description
	1	V+	Outputs power input (12÷28V dc)
	2	O25	25 User Outputs
	3	O26	26 User Outputs
	4	O27	27 User Outputs
	5	O28	28 User Outputs
	6	V+	Outputs power input (12÷28V dc)
	7	O29	29 User Outputs
	8	O30	30 User Outputs
	9	O31	31 User Outputs
	10	O32	32 User Outputs
	11	V-	Outputs power input (0V dc)

4.7.1.4 CN25

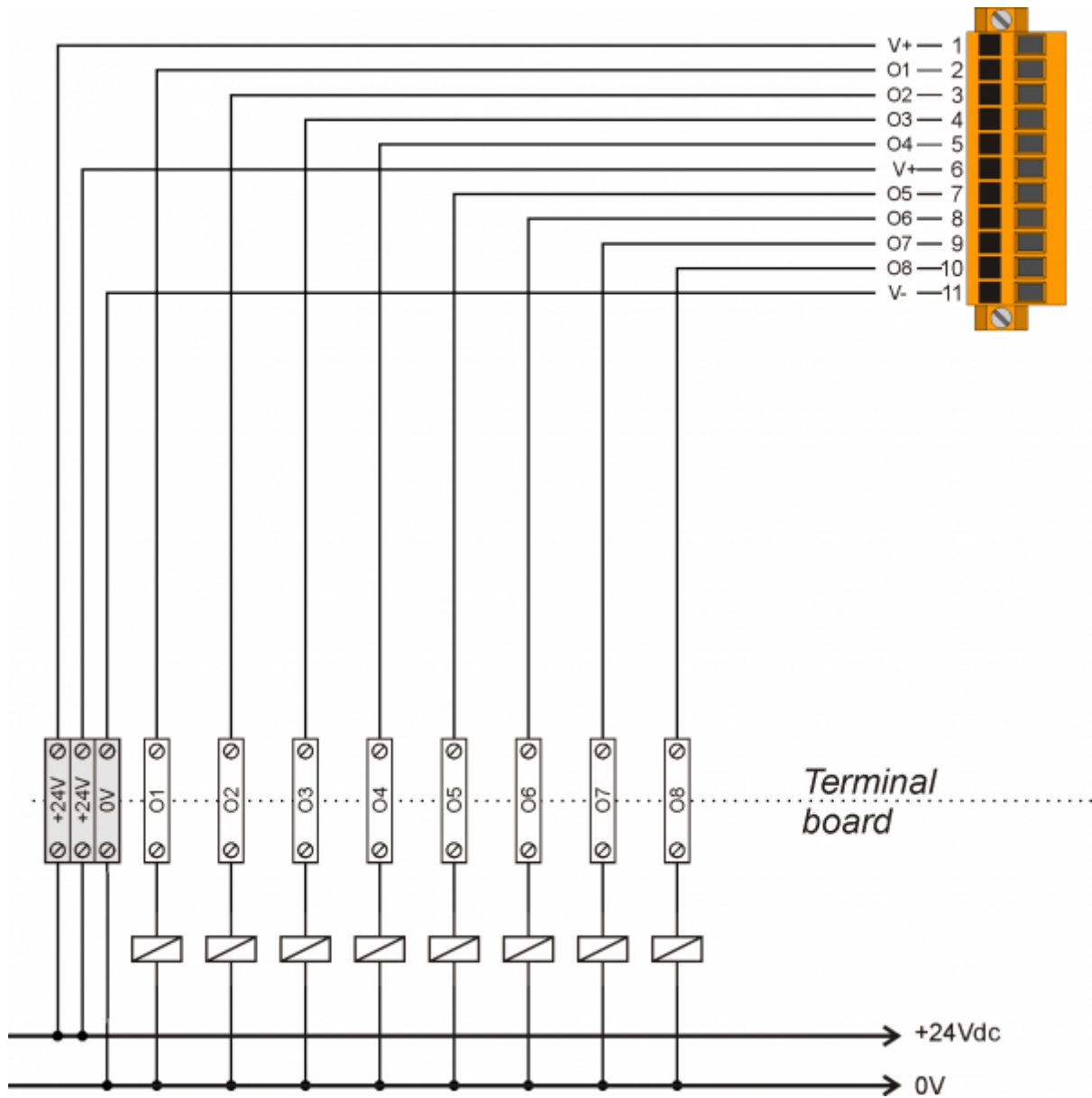
CN25	Terminal	Symbol	Description
	1	V+	Output power Input (12÷28V dc)
	2	O17	17 User Outputs
	3	O18	18 User Outputs
	4	O19	19 User Outputs
	5	O20	20 User Outputs
	6	V+	Output power Input (12÷28V dc)
	7	O21	21 User Outputs
	8	O22	22 User Outputs
	9	O23	23 User Outputs
	10	O24	24 User Outputs
	11	V-	Output power Input (0V dc)

4.7.1.5 Electrical features

Type	PNP
Maximum operating voltage	28V
Maximum internal voltage drop	600mV
Maximum current	500mA
Maximum switching time from ON to OFF	270µs
Maximum switching time from OFF to ON	250µs

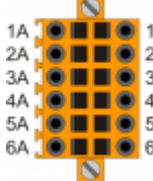



4.7.1.6 Connection examples

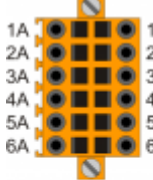



4.7.2 STEP-DIRECTION Outputs

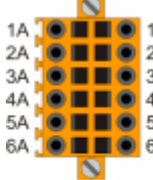

4.7.2.1 CN10

Description		Symbol	Terminal	CN10	Terminal	Symbol	Description
External STEP/DIR Power outputs		VDx	1A		1B	VDx	External STEP/DIR Power outputs
PNP / Line Driver	X DIRECTION Output	DIR1+	2A		2B	DIR1-	X Complementary DIRECTION Output
	X STEP Output	STEP1+	3A		3B	STEP1-	X Complementary STEP Output
	Y DIRECTION Output	DIR2+	4A		4B	DIR2-	Y Complementary DIRECTION Output
	Y STEP Output	STEP2+	5A		5B	STEP2-	Y Complementary STEP Output
Common of Stepper outputs		0V	6A		6B	0V	Common of Stepper outputs

4.7.2.2 CN4

Description		Symbol	Terminal	CN4	Terminal	Symbol	Description
External STEP/DIR Power outputs		VDx	1A		1B	VDx	External STEP/DIR Power outputs
PNP / Line Driver	Z DIRECTION Output	DIR3+	2A		2B	DIR3-	Z Complementary DIRECTION Output
	Z STEP Output	STEP3+	3A		3B	STEP3-	Z Complementary STEP Output
	A DIRECTION Output	DIR4+	4A		4B	DIR4-	A Complementary DIRECTION Output
	A STEP Output	STEP4+	5A		5B	STEP4-	A Complementary STEP Output
Common of Stepper outputs		0V	6A		6B	0V	Common of Stepper outputs

4.7.2.3 CN11

Description		Symbol	Terminal	CN11	Terminal	Symbol	Description
External STEP/DIR Power outputs		VDx	1A		1B	VDx	External STEP/DIR Power outputs
PNP / Line Driver	B DIRECTION Output	DIR5+	2A		2B	DIR5-	B Complementary DIRECTION Output
	B STEP Output	STEP5+	3A		3B	STEP5-	B Complementary STEP Output
	C DIRECTION Output	DIR6+	4A		4B	DIR6-	C Complementary DIRECTION Output
	C STEP Output	STEP6+	5A		5B	STEP6-	C Complementary STEP Output
Common of Stepper outputs		0V	6A		6B	0V	Common of Stepper outputs

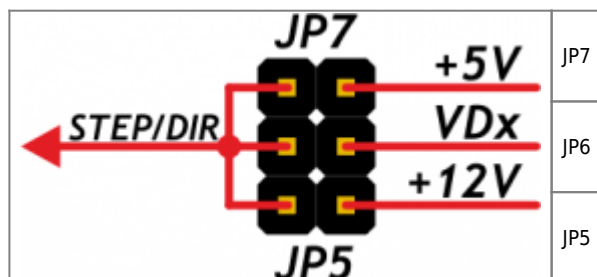
4.7.2.4 STEP-DIRECTION Output voltage Setting

Inserting one of the JP3, JP4 o JP5 jumpers, You can choose the operating voltage of the STEP and DIR outputs.



Only one jumper must be inserted at a time
If one of the two voltages is selected, 5V(JP5) or 12V(JP3), both the 1A and 1B terminals must remain disconnected.

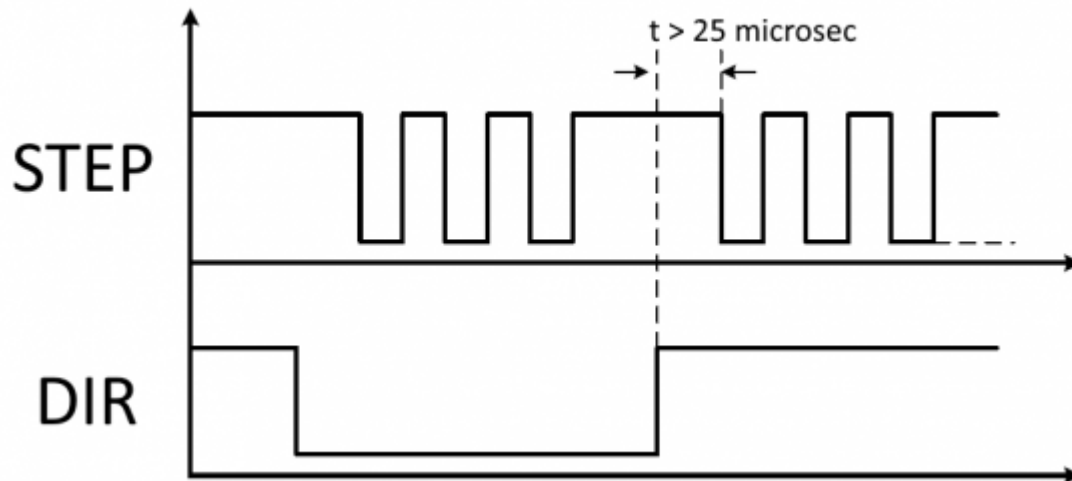
	Name jumper	Setting	Nominal voltage
	JP7	INSERTED 	Selects the STEP/DIR signal voltage to 5V
	JP6	INSERTED 	The STEP/DIR signals have a voltage equal to the value in the 1A or 1B terminals. These terminals must be supplied with an external power supply.
	JP5	INSERTED 	Selects the STEP/DIR signal voltage to 12V



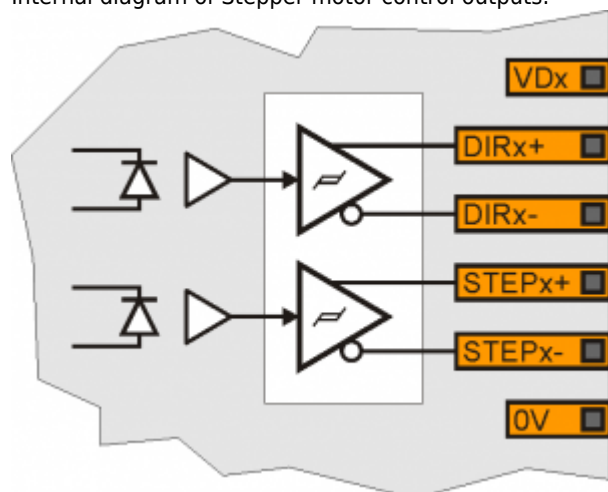
4.7.2.5 Electrical features

Polarization type	PNP / Line-Driver
Maximum output frequency	1MHz to 5volt, 300KHz to 12 or 24 volt
Insulated	1000Vpp
Maximum operating current	20mA
Maximum VDX voltage	27Vdc

Step signal during the change of direction:

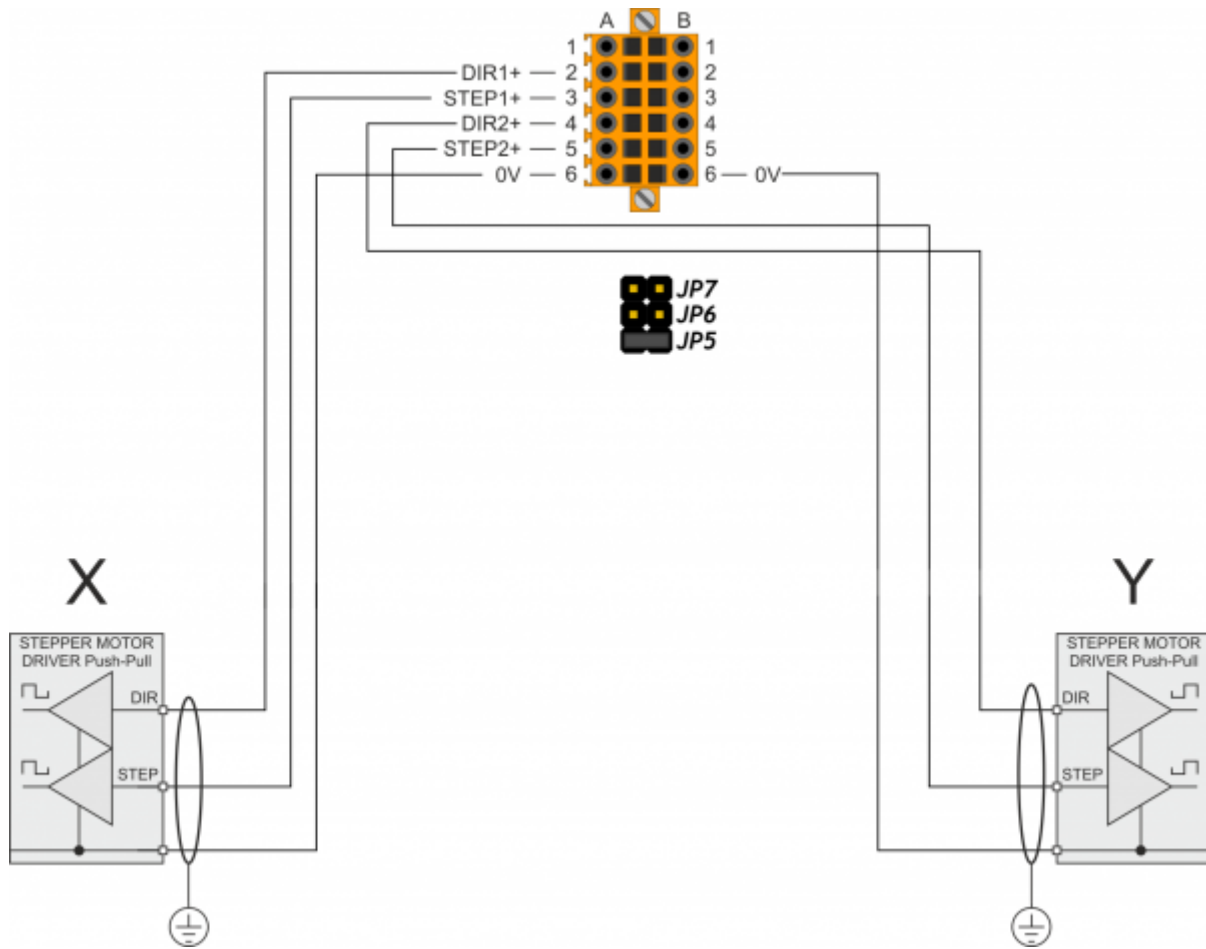


Internal diagram of Stepper motor control outputs:

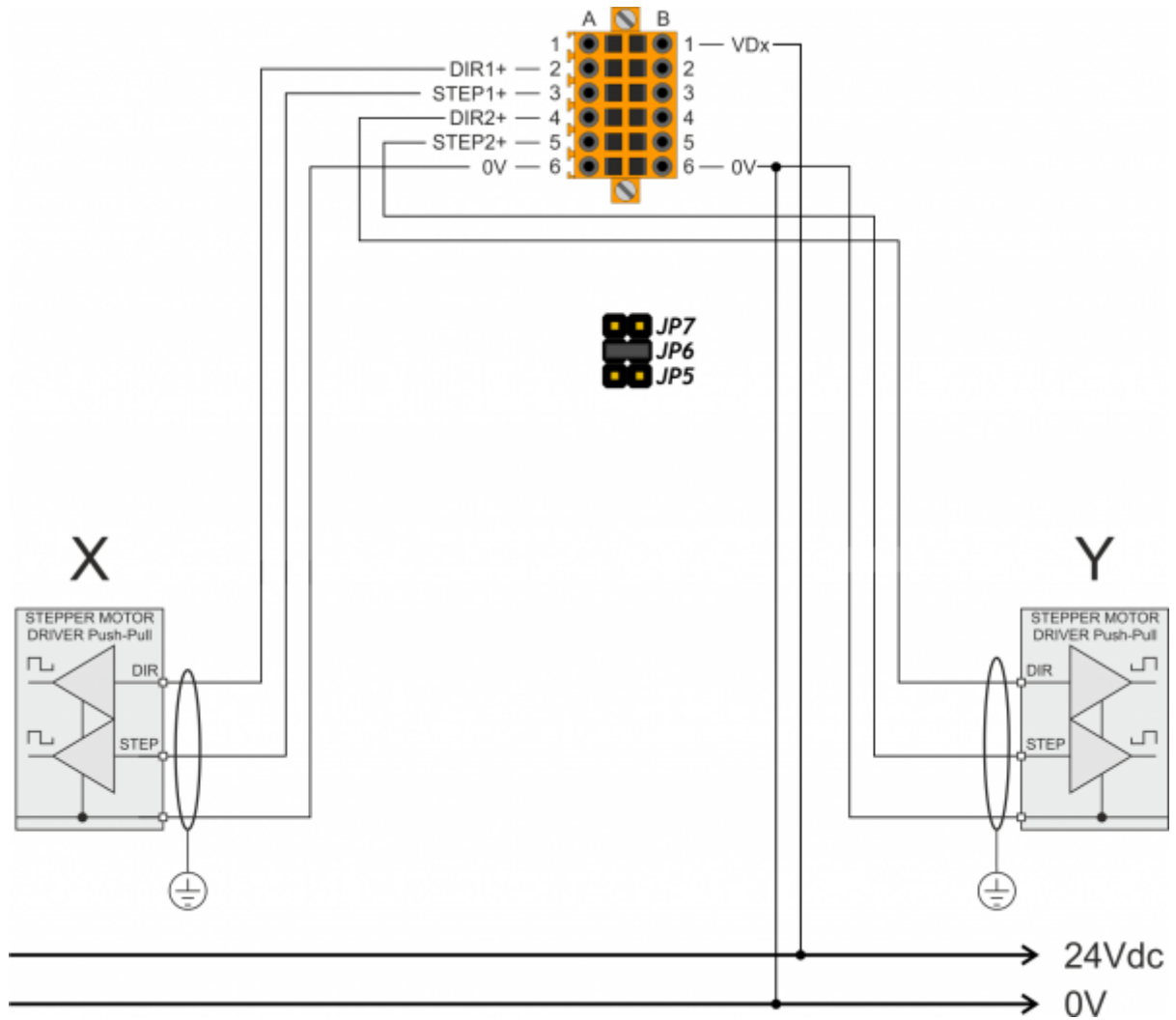


4.7.2.6 Connection examples

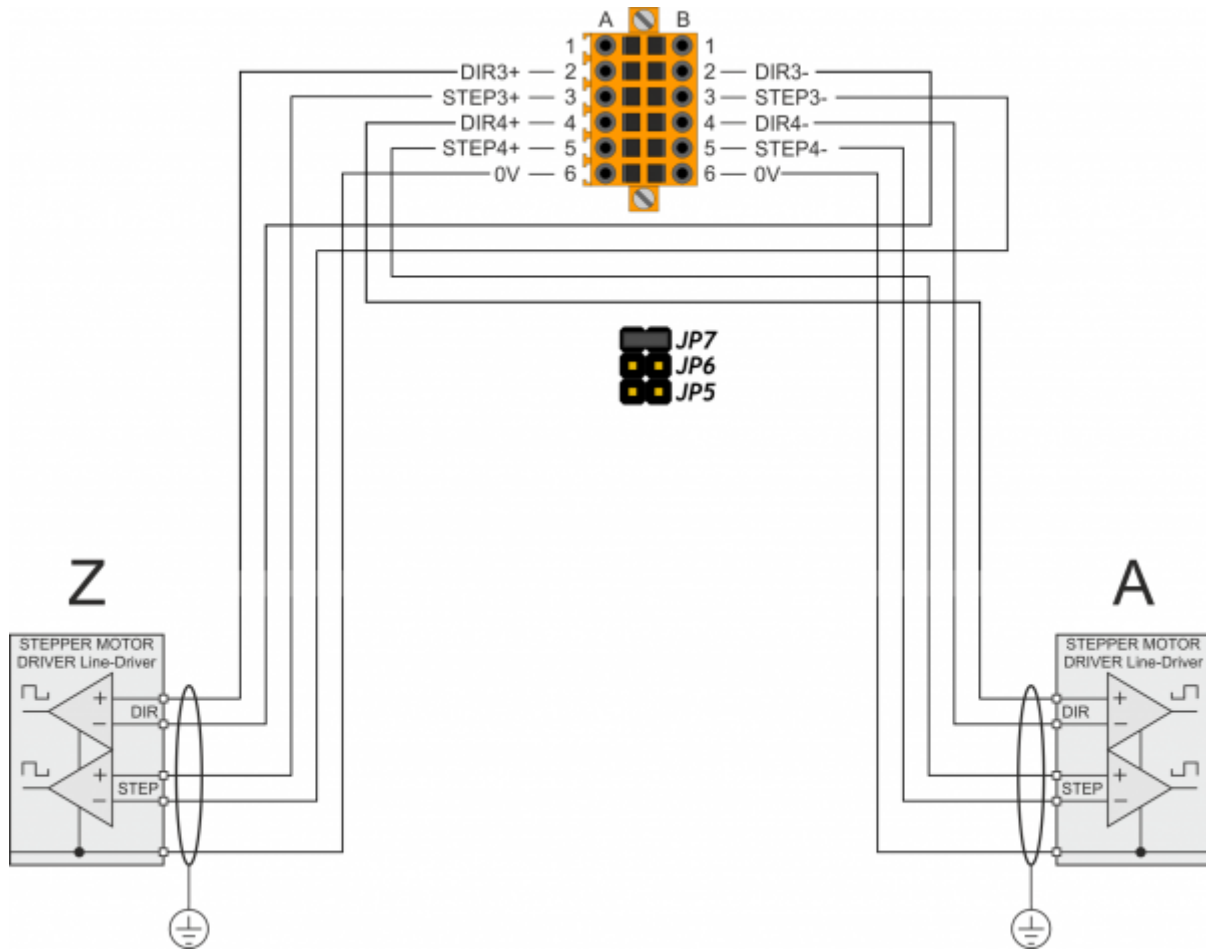
X and Y PNP to 12Vdc Axes



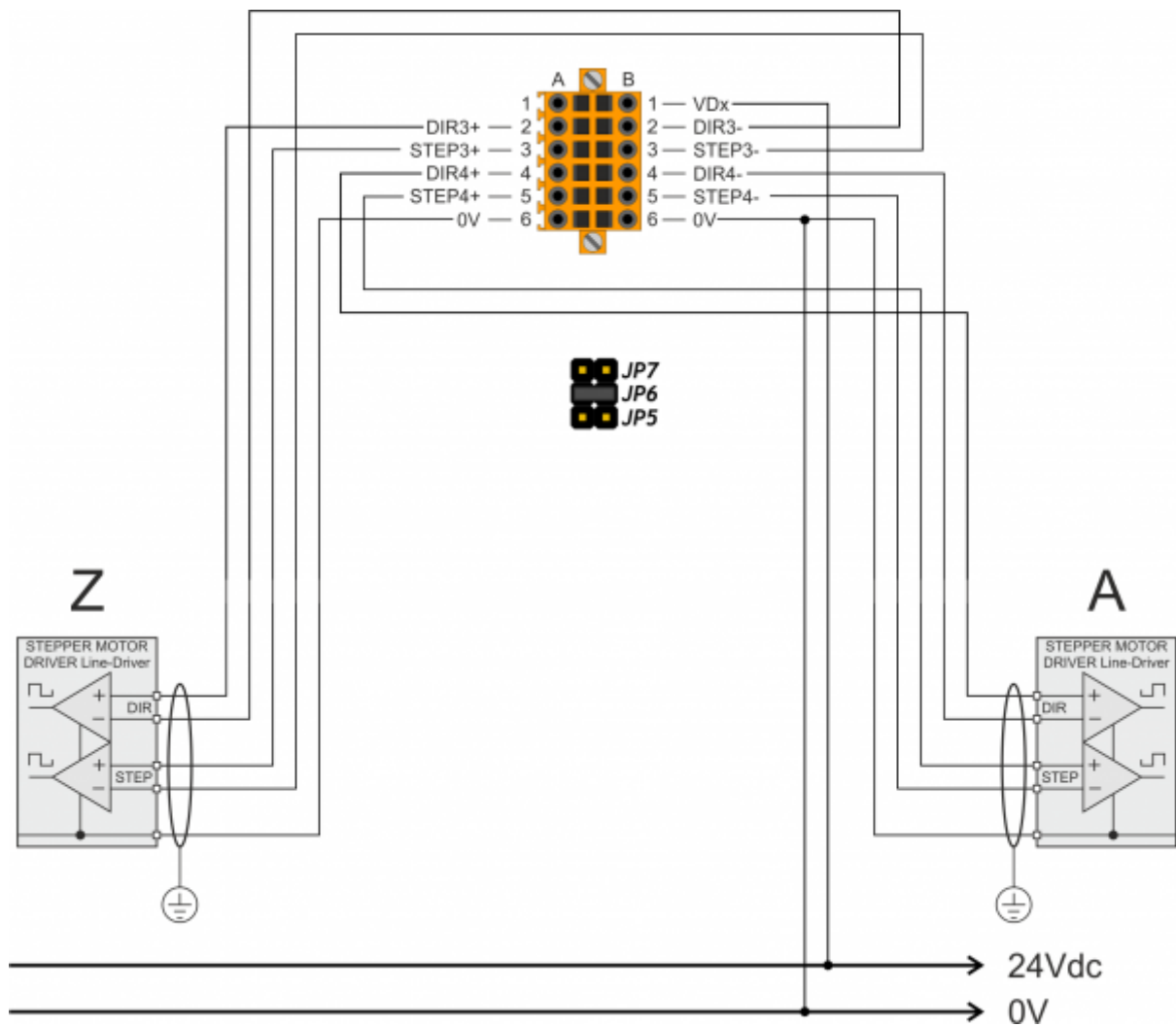
The voltage level of the outputs is selected via the JP5 jumper

X and Y PNP to 24Vdc Axes

The voltage level of the outputs, by selecting the jumper JP6, is equal to the voltage supplied to terminals 1A or 1B

A and Z Line-Driver to 5Vdc Axes


The voltage level of the outputs is selected via the JP7 jumpers

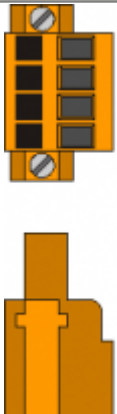
A and Z Line-Driver to 24Vdc Axes

The voltage level of the outputs is selected via the JP6 jumpers

4.8 Analog outputs

4.8.1 Connector

CN12	Terminal	Symbol	Description
	1	GAO	Common of analog outputs
	2	AO1	Analog outputs 1
	3	AO2	Analog outputs 2
	4	GAO	Common of analog outputs
	5	AO3	Analog outputs 3
	6	AO4	Analog outputs 4

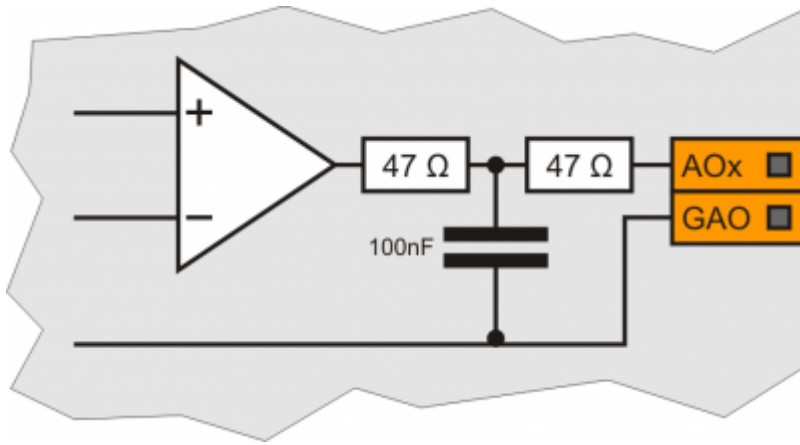
CN24	Morsetto	OPZIONE ESPANSIONE I/O = "1"		OPZIONE ESPANSIONE "A/1"	
	1	GAO	Comune uscite analogiche	GAO	Comune uscite analogiche
	2	A05	Uscita analogica 5	A05	Uscita analogica Asse A
	3	A06	Uscita analogica 6	A06	Uscita analogica Asse B
	4	GAO	Comune uscite analogiche	GAO	Comune uscite analogiche



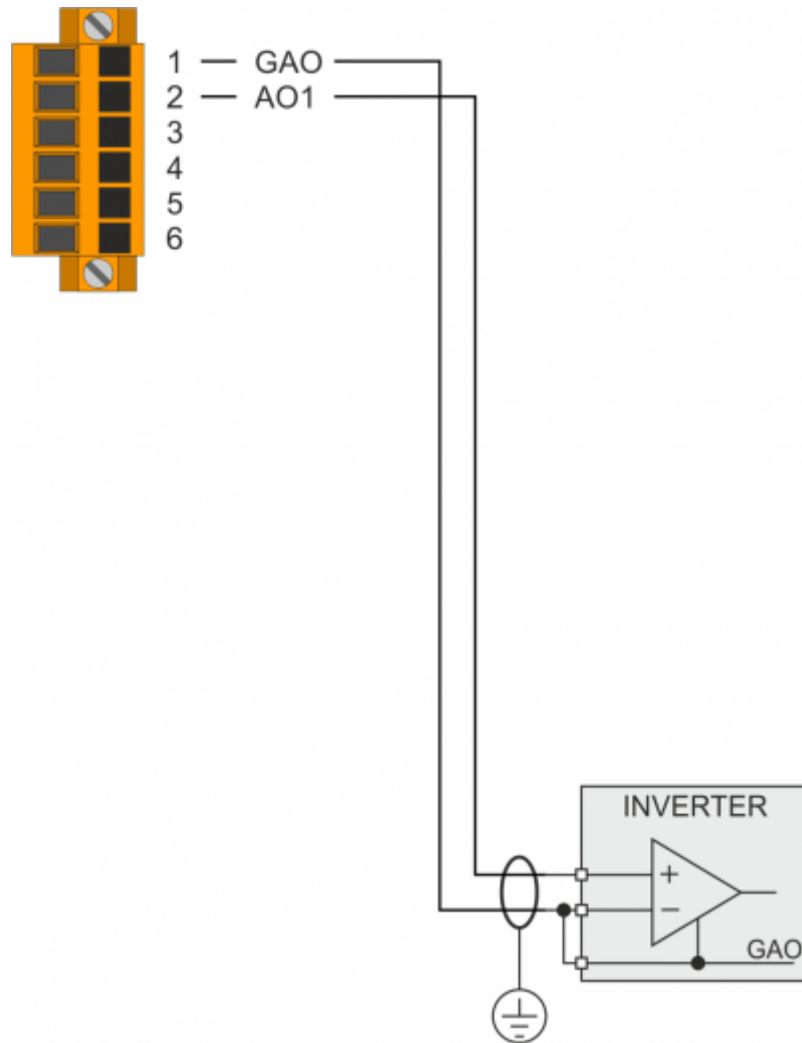
CN24 connector available only with field **I/O Expansion** = 1, in order code.

4.8.2 Electrical features

Connection type	In a common mode
Insulated	1000Vrms
Voltage range (minimum empty)	0÷10V
Maximum offset variation depending on temperature	+/- 5mV
Resolution	16bit
Maximum current	1mA
Variation of output depending on load	100 µV/mA
Output resistance	249Ω



4.8.3 Connection examples



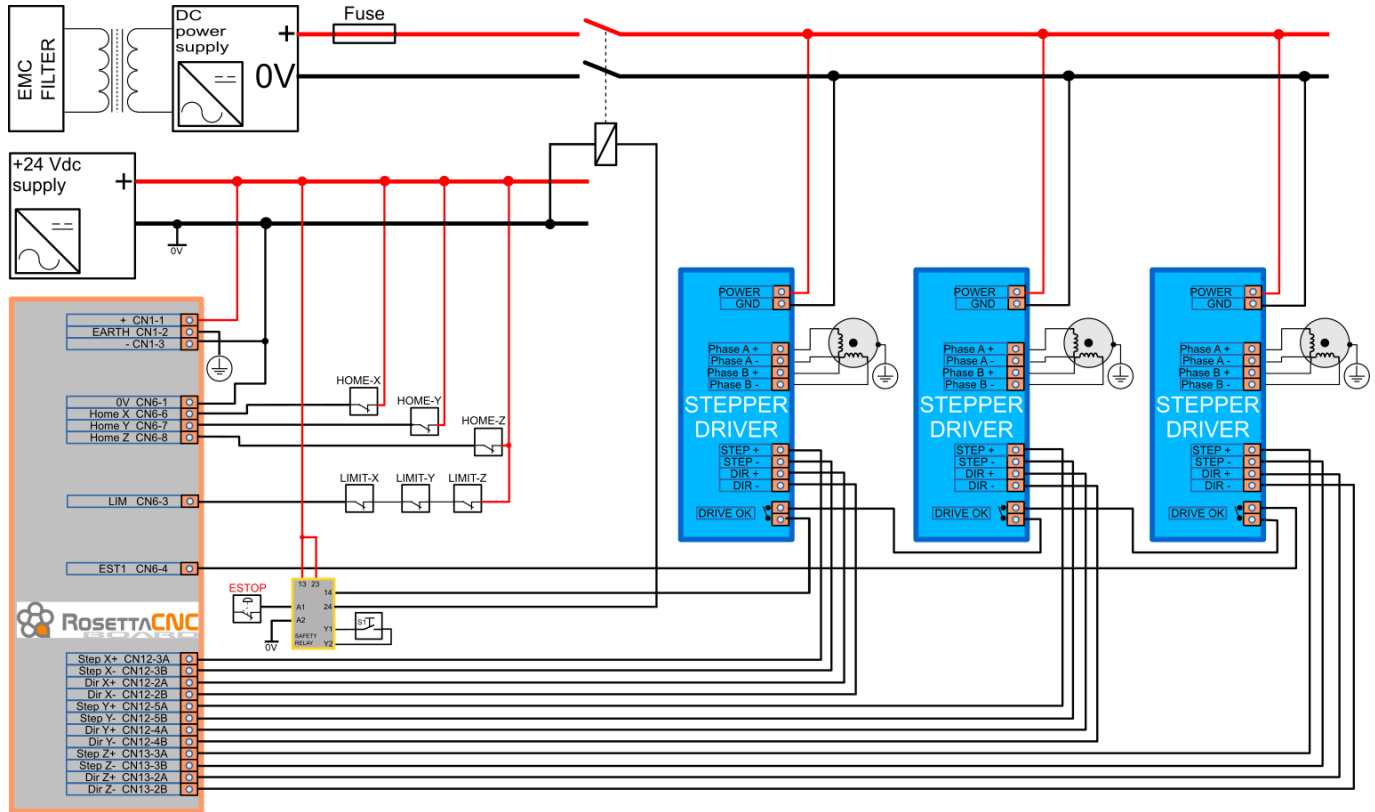
Analogue output Connection to an inverter

5. Connection and configuration examples

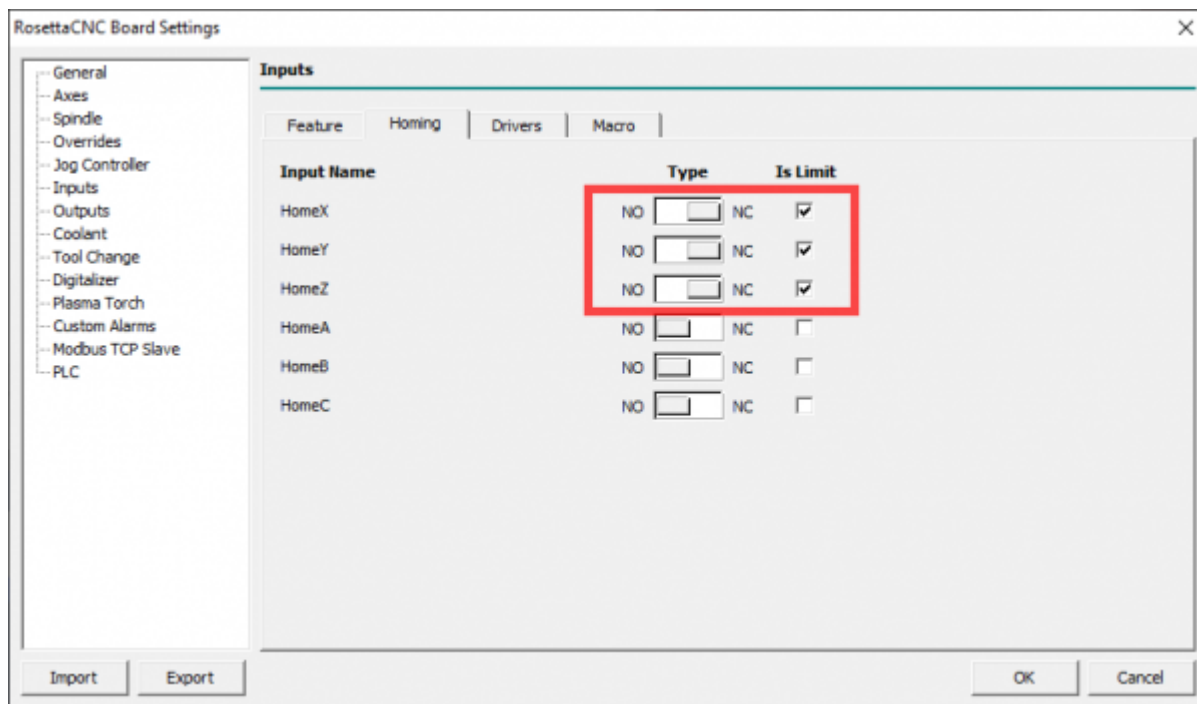
Below we will illustrate some useful wiring diagrams as an example for the design of the complete control system (electric panel).

5.1 Connecting of an XYZ pantograph

In the following example we see a wiring diagram of three stepper drives. The HOME switches are also used as a limit for the direction of movement where the homing procedure is executed. For the other direction, uses three NC switches in series and connected with the LIM input.



In this case the correct setting of the inputs in the configuration panel will be:



5.2 Configuring the Spindle command

The following outputs are available for the spindle control:

- Digital output for clockwise rotation control
- Digital output for counterclockwise rotation control
- Analog output for Speed variation

The choice of the digital outputs to use for these functions is performed in the “Outputs” panel in “RosettaCNC card settings” As shown in the picture:

RosettaCNC Board Settings

Outputs

M-Code | Feature

M-Code **Output Number** **Complementary M-Code**

M3 (Spindle ON CW) 1 M5 (Spindle OFF CW & CCW)

M4 (Spindle ON CCW) 1

AUX Outputs Controlled by M62 Pn (ON) & M63 Pn (OFF)

Pn	Output Number	Description
1	None	
2	None	
3	None	
4	None	
5	None	
6	None	
7	None	
8	None	

Import Export OK Cancel

The M3 or M4 codes will activate the outputs, M5 will disable them.

If RosettaCNC Board controls also the spindle rotation speed then you must connect the analog output 0÷10V to the analog input of the drive. In the maximum speed parameter, you must set the the speed reached by the drive to the maximum voltage of 10V.

The “Start Time” parameter if set delays the execution of the Gcode to allow the spindle to reach the set speed. This time is also used when turning off the spindle.

In RosettaCNC Board are available also two digital inputs that can be used to inform the Controller when the spindle has reached the set speed or when it's stopped. The following picture shows where to set the reference speed to 10V, The start time and the configuration of the inputs:

RosettaCNC Board Settings

General | Axes | **Spindle** | Overrides | Jog Controller | Inputs | Outputs | Coolant | Tool Change | Digitalizer | Plasma Torch | Custom Alarms | Modbus TCP Slave | PLC

Spindle

General | Feature | Tachometer

Spindle Max Speed: 3000 rpm

Spindle Start Time: 0 s

Import Export OK Cancel

RosettaCNC Board Settings

General | Axes | **Spindle** | Overrides | Jog Controller | Inputs | Outputs | Coolant | Tool Change | Digitalizer | Plasma Torch | Custom Alarms | Modbus TCP Slave | PLC

Spindle

General | Feature | Tachometer

Feature	Input Number	Type
Spindle CW Input	None	NO <input type="checkbox"/> NC
Spindle CCW Input	None	NO <input type="checkbox"/> NC
Spindle Stop Input	1	NO <input type="checkbox"/> NC
At Speed Input	2	NO <input type="checkbox"/> NC
Zero Speed Input	None	NO <input type="checkbox"/> NC
Spindle Not Ready Input	None	NO <input type="checkbox"/> NC
Spindle S1	None	NO <input type="checkbox"/> NC
Spindle S2	None	NO <input type="checkbox"/> NC
Spindle S4	None	NO <input type="checkbox"/> NC
Spindle S5	None	NO <input type="checkbox"/> NC

PS: For Spindle S3 Feature Look At Tachometer Tab

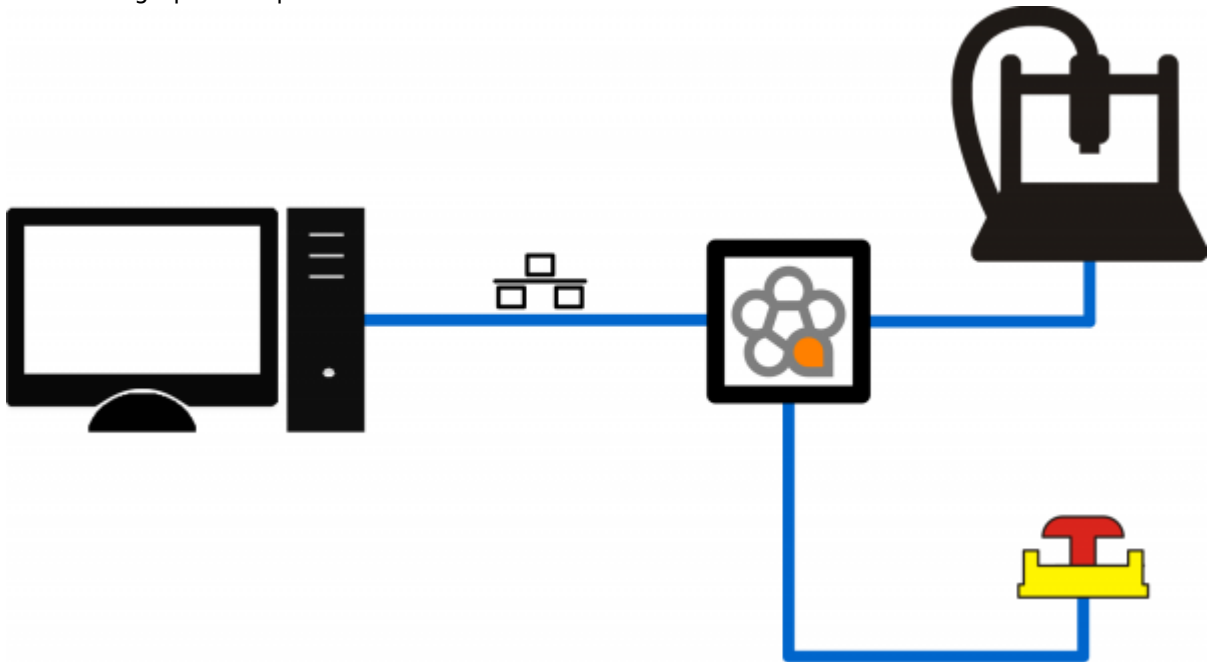
Import Export OK Cancel

If the inputs are configured then the value in the start time parameter always indicates the minimum wait time although the logic level of the input does not require a wait.

5.3 Control console connection

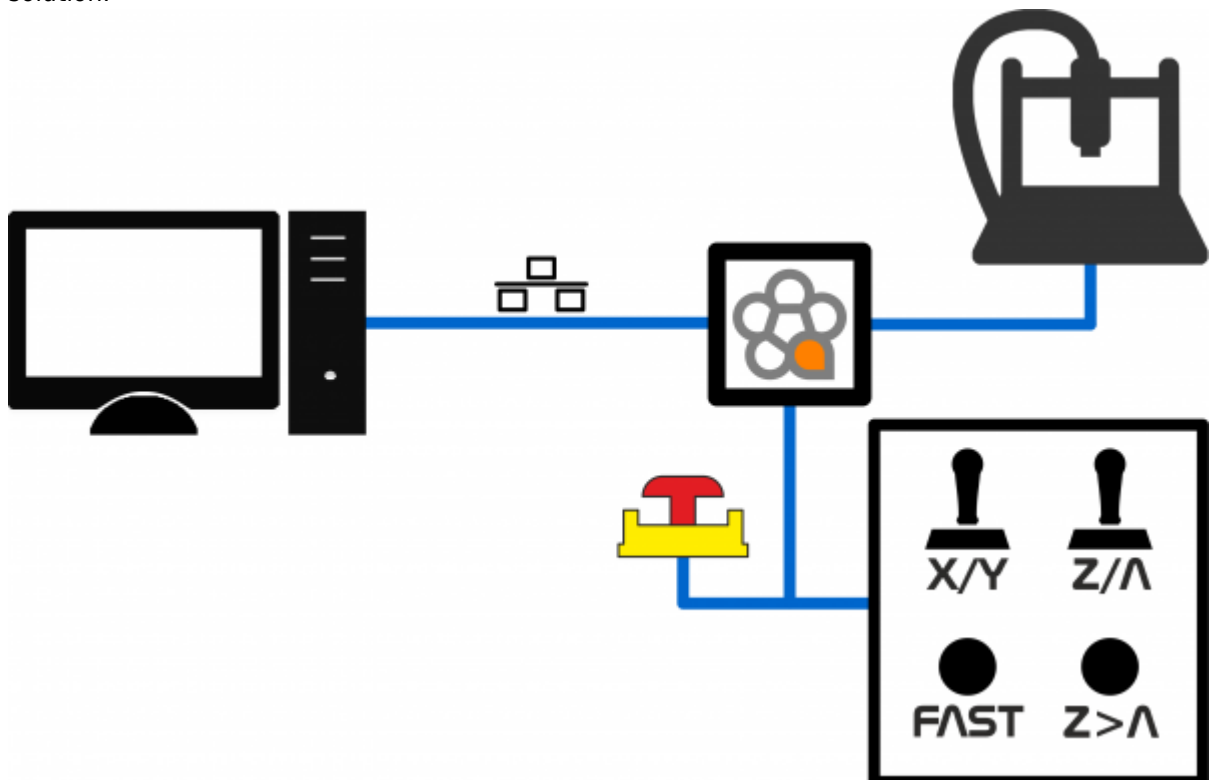
The following shows four examples:

- The easiest way is to always operate in the personal computer where the software RosettaCNC is installed. Here will be commanded the Jogs, the homing sequences, starting and stopping the Gcode programs, etc. Below is a graphical representation of the solution:



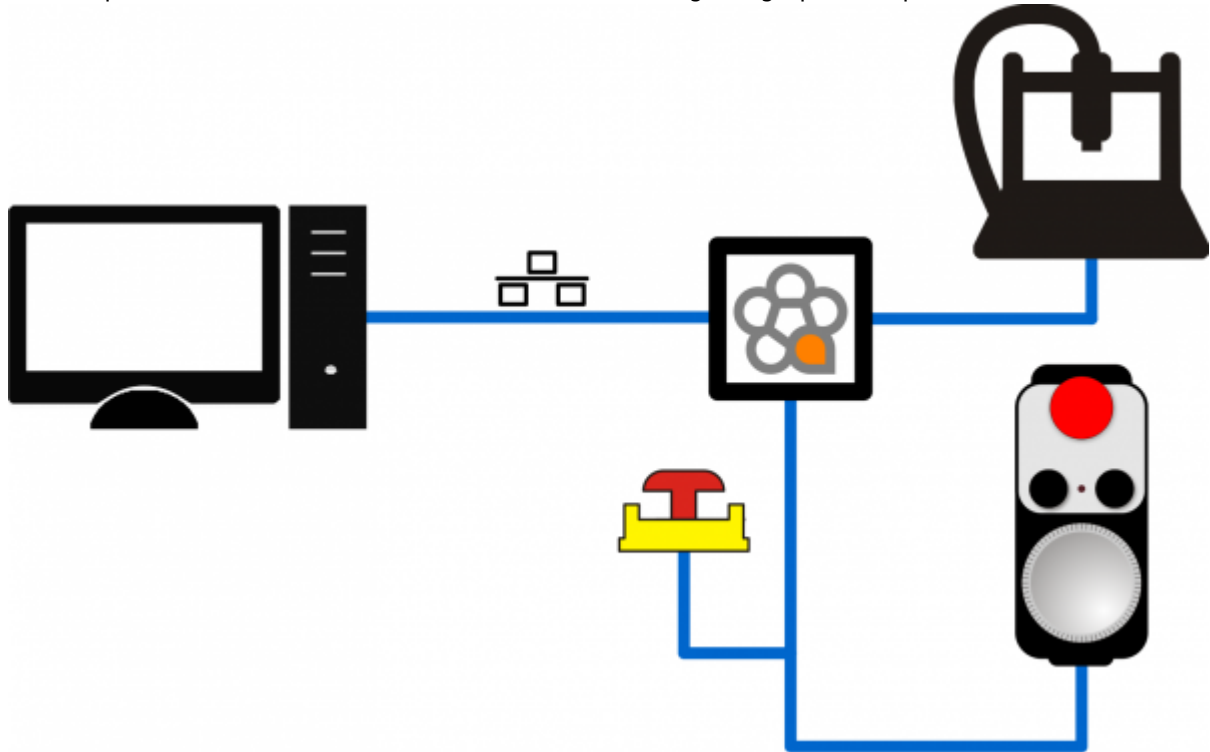
On the machine side only the ESTOP emergency button will be present (and possibly the reset button). In addition, MPG devices can be set up to control the override (up to four devices), or analogue potentiometers (up to three devices). In this case the value of the “Controller type” parameter is not significant. The CN19 connector remains unconnected and the CN17 connector can be used as MPG1.

- With the following solution, the following control devices are wired near the machine (in addition to the ESTOP emergency button): Joystick for the X-Y-Z jog. A button for selecting Jog Fast speeds. Possible button to modify the joystick control Z in A B or C. The following is a graphical representation of the solution:



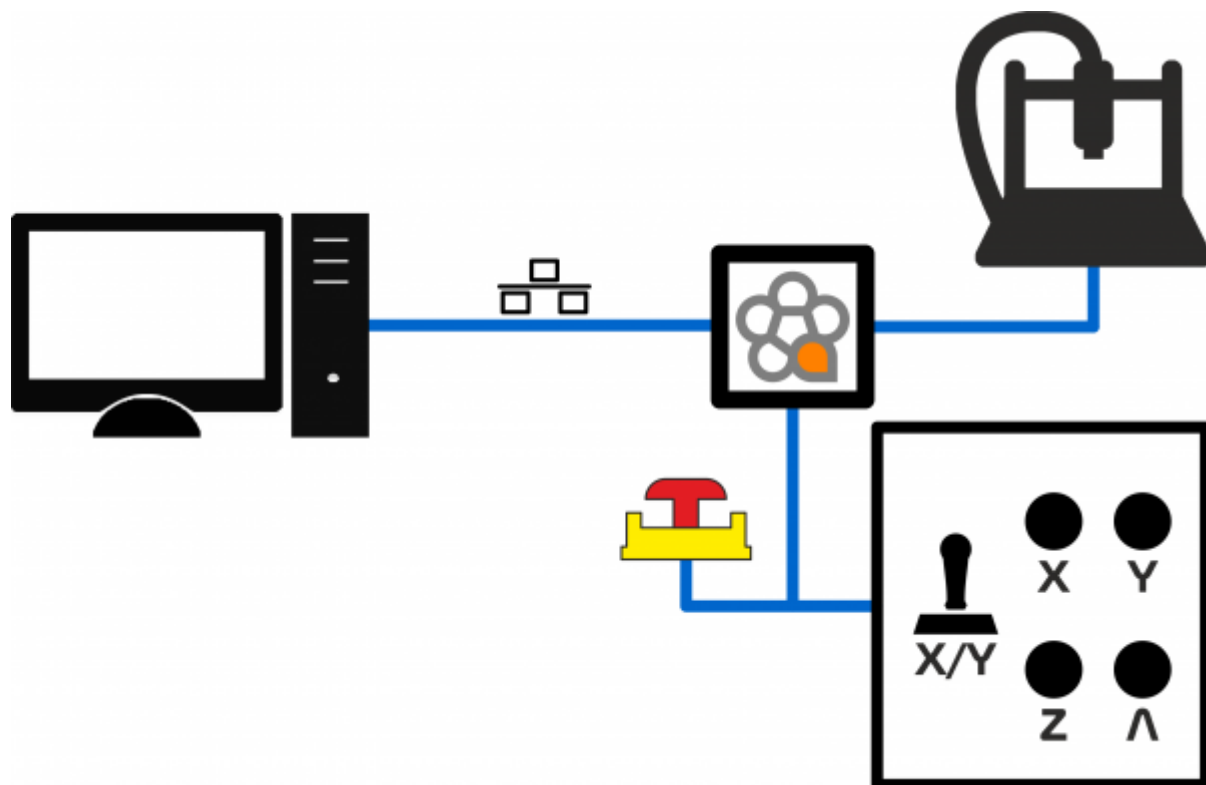
In addition an MPG device can be set up for control of override (up to three devices), or analogue potentiometers (up to three devices). In this case the value of the “Controller type” parameter must be set to “Dual Joystick”.

- With the following solution a handwheel is installed near the machine to check manual movements. During operation, if set in configuration, the handwheel can also be used to control the override (configuring the operation of the MPG1 device). Finally, always if set in configuration the handwheel button can also be used to perform a reset of the selected axis. The following is a graphical representation of the solution:



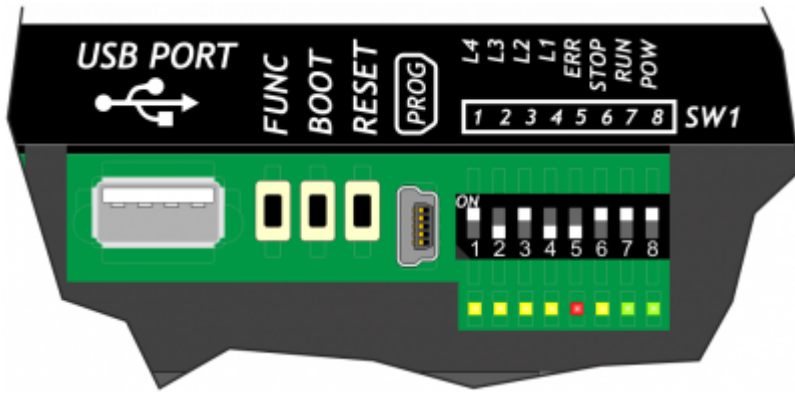
In addition to the flyer, an MPG device for override control can be set up near the machine (up to three devices), or analogue potentiometers (up to three devices). In this case, the value of the “Controller type” parameter must be set to “HandWheel A”.

- With the following solution, the following control devices are wired near the machine (in addition to the ESTOP emergency button): a Joystick for the jog+ and Jog-. Up to six buttons for axis selection. A button to reset the axis. The following is a graphical representation of the solution:



In addition, an MPG device can be set up to control the override (up to four devices), or analogue potentiometers (up to three devices). In this case the value of the “Controller type” parameter must be set to “Single Joystick”.

6. Diagnostic



- Green Led POW, indicates that the device is powered.
- Green Led RUN, indicates that the device is working.
- Yellow Led STOP, indicates that the device is in a stop state.
- If flashes the Red Led ERROR, the controller is in an error state. You can try turning off and on again, if the problem persists, the product should be sent to technical support through the purchase channel used.

7. Virtul Inputs Outputs

The firmware implements a series of virtual user inputs and outputs that can be used with Modbus ® communication.

Below is the list of virtual user inputs and their relationship with the numbering of virtual inputs in Modbus ®.

User input number	Virtual input number
51	01
52	02
53	03
54	04
55	05
56	06
57	07
58	08
59	09
60	10
61	11
62	12
63	13
64	14

Below is the list of virtual user outputs and their relationship with the virtual output numbering in Modbus ®.

User outputs number	Virtual outputs number
33	01
34	02
35	03
36	04
37	05
38	06
39	07
40	08

8. Index Inputs

Starting from 1.52 firmware version it is possible to use these user inputs as index during homing.

User Inputs number	Connector
27	CN14
30	CN15
50	CN16
43	CN17
49	CN22
46	CN21

9. Grants

We thank in advance all those who want to contribute to the improvement of this documentation by indicating inaccuracies or contents. Write to the address: support@rosettacnc.com

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