Next Generation System

NGM EVO

User Manual

User Manual

Revision 1.00.00

© Promax s.r.l. – Via Newton, 5/G – Z.I. Malacoda – CastelFiorentino (Fi) - Italy

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1 Features

The system **NGMEVO** is a numerical control based on the Freescale MCF52259.

NGM EVO CPU

- ***Microprocessor type MCF52259 up to 80MHz***
- ***192 KbFlash***
- ***32 Kb RAM***
- ***16/32 Kb FRAM Permanent Memory***
- ***1 ETHERNET port 10/100 Mb RJ45***
- ***2 RS232 ports (1 RS485)***
- ***1 CAN OPEN Master/Slave***
- ***8 analog-inputs 12 bit configurable (0-10V dc) or (4-20mA)***
- ***1 Analog Output 0-10 V***
- ***16 Digital Inputs PNP 24 Vdc***
- ***14 Digital Outputs PNP 24 VDC up to 1 A***
- ***4 Channels STEP/DIR 400 Khz Position Mode, 125 Khz Interpolation Mode. Line Drive or Open Collector***

NGMIO EXPANSION (Max 7 Expansions) 1)

- ***16 Digital Inputs PNP 24 Vdc***
- ***14 Digital Outputs PNP 24 VDC up to 1 A***

NGMsX EXPANSION (Max 3 Expansions) 1)

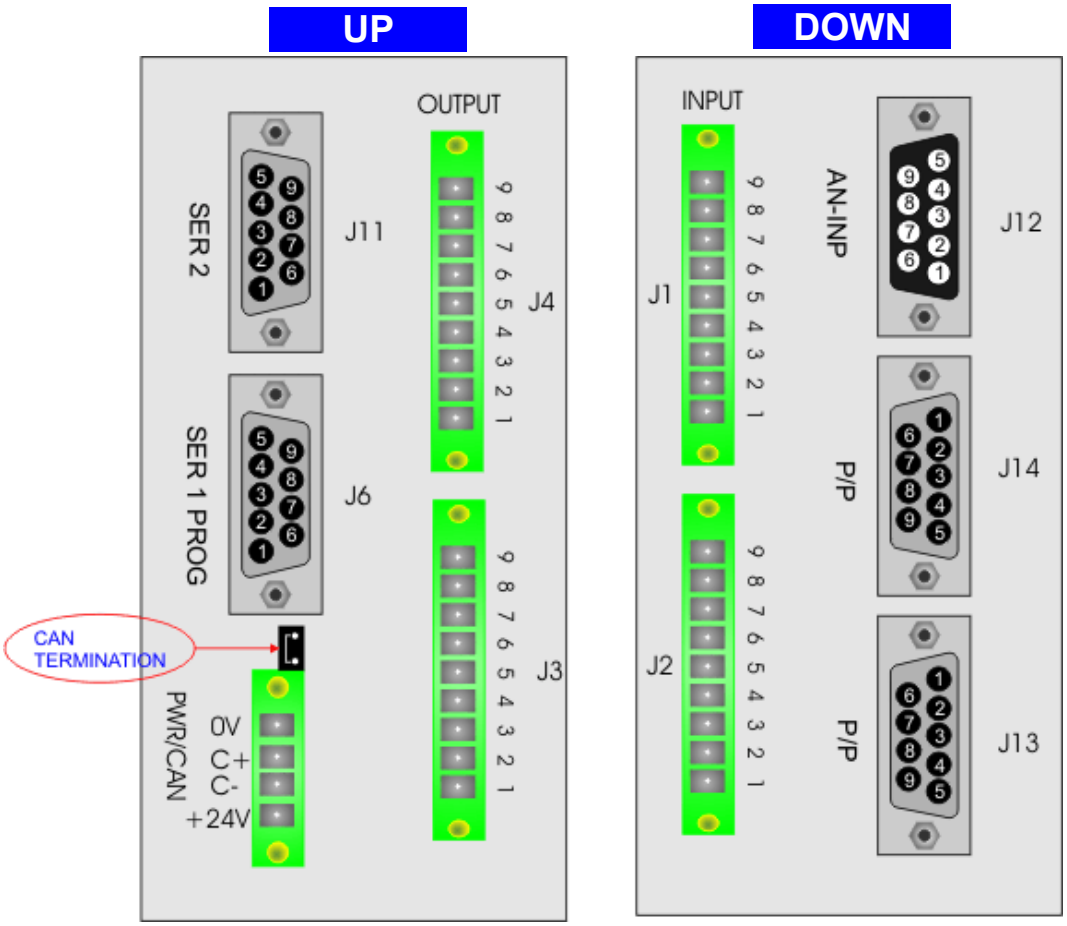
- ***2 Channels STEP/DIR 500 Khz Position Mode e Interpolation Mode. Line Drive***
- ***2 Channels encoder Line Drive 500 Khz***
- ***2 Analog Outputs +/- 10V 12 bit***

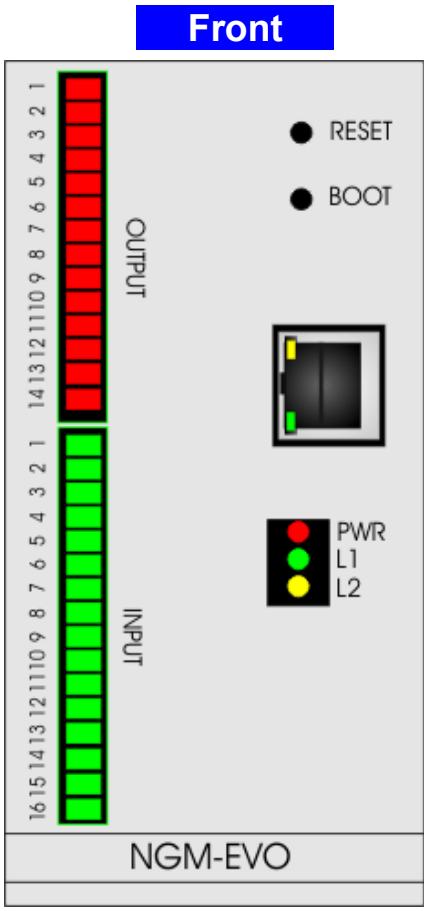
1) The max number of expansions combined, NGMIO and NGMsX is 7

2 Identification Code NGM EVO

ORDER CODE NGM EVO	
NGMEVO/ ☐ - ☐ - ☐ - ☐ - ☐ - ☐ xxxxxxxx	
0	Without STEP/DIR
1	4 – STEP/DIR Channels Open Collector
2	4 – STEP/DIR Channels Line Drive
0	Without ETHERNET
1	1 - ETHERNET Port 10/100 Mb RJ45
0	2 - RS232
1	1 - RS232 1 - RS485 on SER2
B	Analog Inputs 0-10V
C	Analog Inputs i 4-20 Ma
0	Without Analog Outputs
1	1 – Analog Output 0-10 V on Digital Out 1
0	16 Kb FRAM Permanent Memory
1	32 Kb FRAM Permanent Memory
xxxxxxxx – Number configured channels analog inputs ex: B123 – Channels 1,2,3 - 10 Volt	
ORDER CODE NGMIO	
NGMIO	
ORDER CODE NGMsX	
NGMsX/ ☐ - ☐ - ☐	
1	1 – Channel STEP/DIR Line Drive 500 Khz
2	2 – Channels STEP/DIR Line Drive 500 Khz
0	Without Encoder Channel
2	2 – Channels Encoder Line Drive
0	Without Analog Output
1	2 – Analog Outputs +/- 0V
Possible combinations: NGMsX/2-0-2 NGMsX/1-2-2 NGMsX/2-0-0 NGMsX/1-2-0	

3 Connections NGM EVO





4 Connections Description

4.1 Power

The NGMEVO requires two separate power supplies:

- ***Logical Power, PWR***
- ***Digital Outputs Power, J3 e J4***

To supply the digital outputs, see the relevant chapter.
As regards the supply of the logic section, this is necessary for normal operation of the card

4.1.1 Electrical Characteristics

	U.m.	Min	Standard	Max
DC IN	Vdc	12	24	35
Power (to 24Vdc)	W		2,6	

THE SYSTEM IS PROTECTED FROM POLARITY INVERSION

WARNING

DO NOT EXCEED THE MAXIMUM VOLTAGE VALUE ADMITTED BECAUSE THE CARD CAN BE DAMAGED

4.2 Serial Ports

The serial ports on the **NGMEVO** allow communication with external devices to the control, PC-type, PLC and other.

- **SER1-PRG**: is normally used both for the download of the programs on the control, both for the debugging from a PC application. It is also the port to use for updating the firmware

- **SER2**: Can be used for communication with other devices, such as a PLC, inverters or other. **CAN BE CONFIGURED RS485 MODE**.

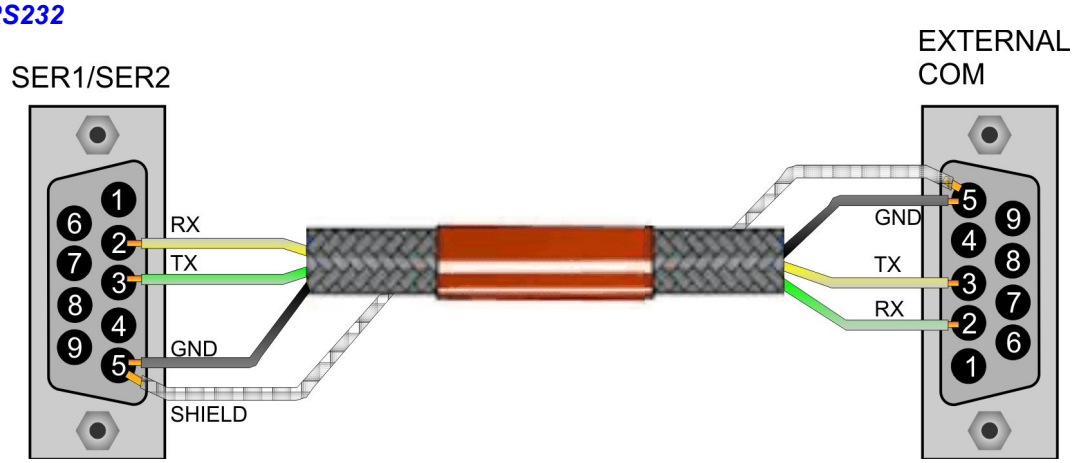
For the electrical signal, the serial ports are in compliance with RS232/RS485.

Use a **CABLE WITH SHIELD** for serial ports connections
Connect the **SHIELD to PIN 5** SER1 or SER2 to NGMEVO ports

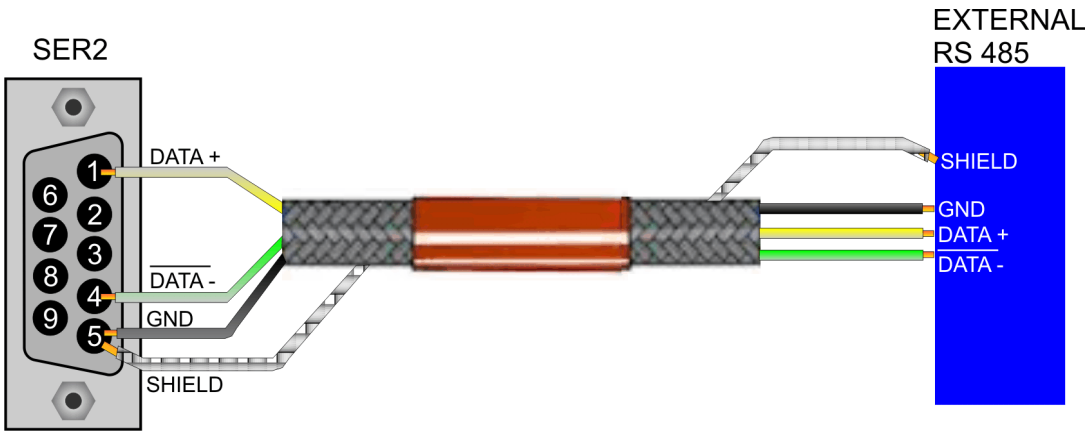
Generally the RS232 connection, uses a NULL MODEM cable (pin 2,3,5) CROSSOVER (with inversion on pin 2,3)

Always check the external device that type of connection it accepts

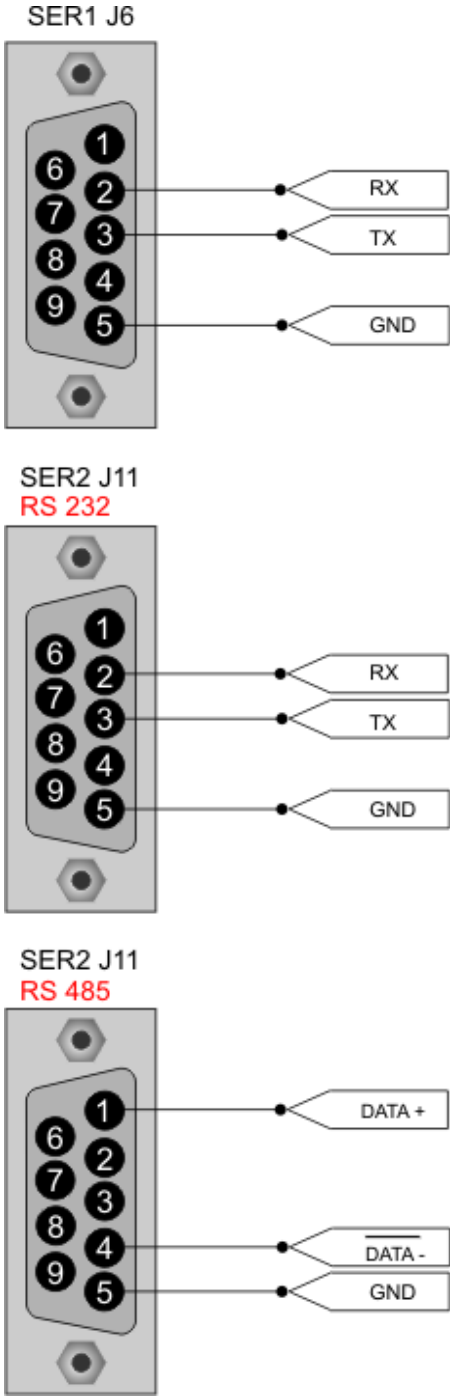
RS232



RS485
Normally the GND pin is not connect



4.2.1 Connections J6 SER1/PROG – J11 SER2



WARNING

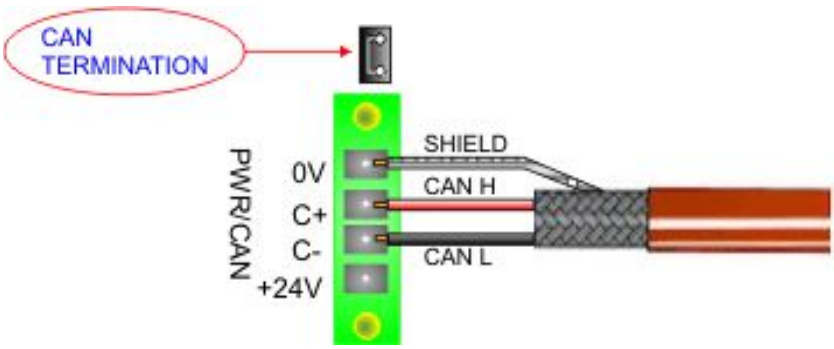
DO NOT INSERT THE CONNECTORS PORT WHEN THE POWER IS ON BECAUSE THE CARD CAN BE DAMAGED

4.3 CAN BUS Port

The port CAN BUS allows the communication of the card NGMEVO with type devices for motors drives, slave of various kinds, encoders, and more.
Communication takes place via the CAN OPEN protocol, based on its specifications DS401 and DS402 as regards the objects and the modes supported.
In terms of data exchange, the line complies with DS301.
The port can be configured as master or slave depending on the firmware present.
The port CAN-BUS meets the specifications of ISO 11898-24V.

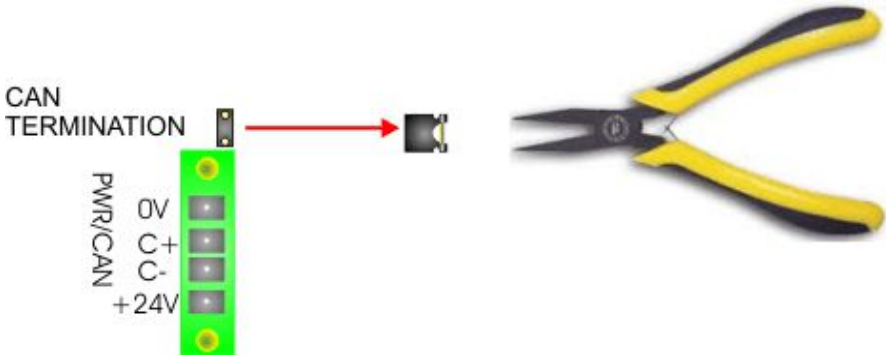
4.3.1 Connection CAN BUS

Is possible insert the TERMINATOR RESISTOR, inserting the JUMPER above the power connector.



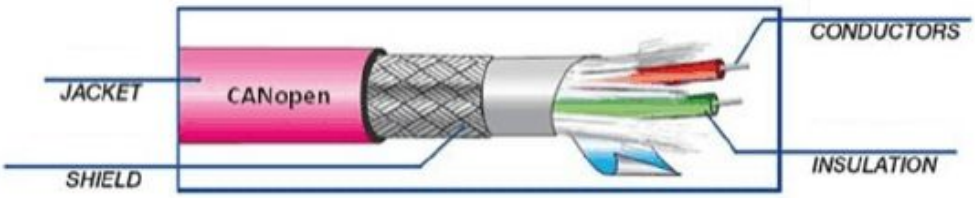
WARNING

If the NGMEVO board is configured as MASTER, insert always the TERMINATOR JUMPER
If the NGMEVO is configured as SLAVE, insert the TERMINATOR JUMPER if the board is the last node in the CanBus.
In another situations, remove the JUMPER



WARNING
USE THE CABLE FOR CANOPEN COMMUNICATION

4.3.2 CanOpen Cable



CONDUCTORS ELETTRIC RESISTANCE
22AWG: < 55,4 Ohm/Km
21AWG: < 43,6 Ohm/Km

PAIR CAPACITY
50 pF/m

IMPEDENCE
120 Ohm

TRASMISSION SPEED-CABLE LENGTH

Baud rate 1Mb	Length Max 25 Mt
Baud rate 800 Kb	Length Max 50 Mt
Baud rate 500 Kb	Length Max 100 Mt
Baud rate 250 Kb	Length Max 250 Mt
Baud rate 125Kb	Length Max 500 Mt

VOLTAGE EXERCISE
30 V

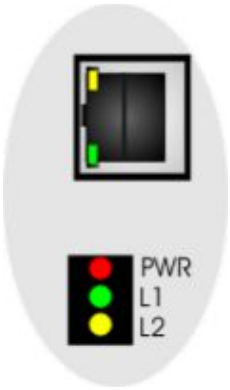
4.4 Porta Ethernet

The Ethernet port, allows the **NGMEVO** to communicate with other devices, llike PC and others. On data exchange level, it complies 10 BaseT and 100 BaseTX standards.
About protocols, it can be used in many ways:

- **NGMEVO** to **PC** communication, about on-line assistence, software and firmware download and other. . In this case it's used a PROMAX specific protocol;
- **PLC** and other devices comunication, with ModBus **TCP/IP** protocol;

4.4.1 Connections

The on board connector, complies the RJ45 standard,
It's recommended to use PC with Ethernet ports complies this standard. It's recommended to use cables length conformed the standard.
The connection cable can be CROSSOVER or NORMAL
The port is automatically adapted to cable type



WARNING

USE THE CABLE FOR ETHERNET COMMUNICATION

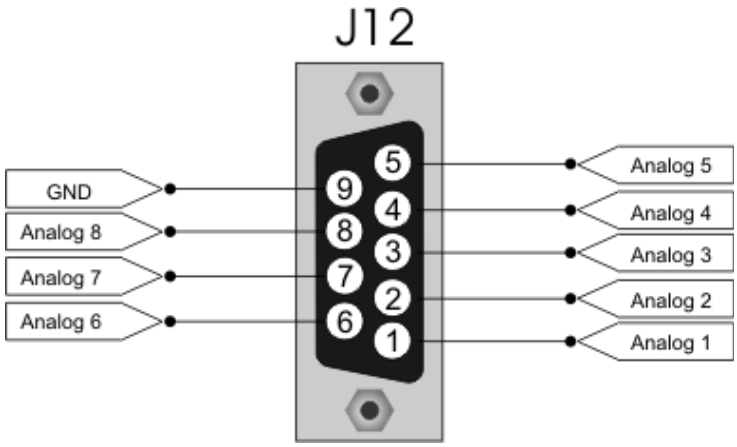
4.5 Analog inputs

The analog converter reads an input voltage from 0 to 10V or 4/20 mA with respect to GND. To get the full scale 12V or 24V, an external resistor must be inserted between the signal and card input. In any case, the value of the input voltage can exceed the full scale is not more than 0.2 V. **The use of analog input, remove automatically a digital input (see the following table)**

Tabella esclusione ingressi digitali

Analog Input Configured	Digital Input Removed
1	9
2	10
3	11
4	12
5	13
6	14
7	15
8	16

4.5.1 Analog Inputs Connections J12



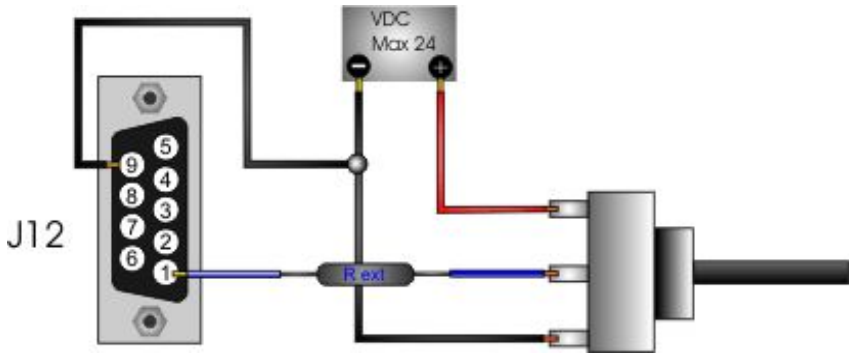
4.5.2 Input Resistance

	MIN	TIPICA	MAX
VDC	25 KΩ		72 KΩ
4-20 Ma		175 Ω	

4.5.3 External resistance for voltages other than 0-10V or 4-20Ma

VIN	Rext
0-12 V	63 KΩ
0-24 V	424 KΩ

4.5.4 Connection example



WARNING

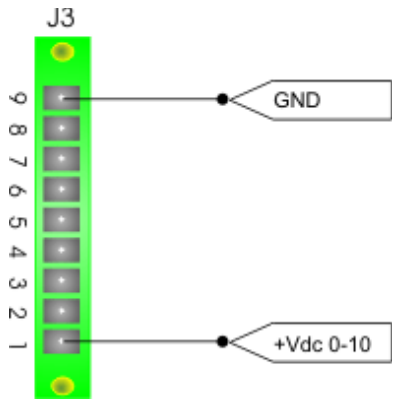
IF THE VOLTAGE, EXCEEDS 0,2 Volt THE MAXIMUM VALUE SELECTED THE ANALOG INPUT, CAN BE DAMAGED

4.6 Analog Output on NGMEVO

The NGMEVO board, can be configure one analog output 0-10V

4.6.1 Electric characteristics

		U.m.	Min	Max
Analog Output	Voltage	Vdc	0	10



WARNING

THIS CONFIGURATION, ELIMINATES THE DIGITAL OUTPUT 1

THE ANALOG OUTPUT, IS NOT PROTECTED BY OVERLOAD OR SHORT CIRCUIT

4.7 Channels STEP/DIR

The board NGMEVO can use, up to four channels STEP / DIR for a total frequency of 400 Khz in position mode (125 Khz in interpolation mode).
The outputs can be configured with **OPEN COLLECTOR** signals, or **LINE DRIVE**.

4.7.1 OPEN-COLLECTOR

POWER	**MAX 48 VDC**
LOAD	**100 Ma continuativo 500 Ma picco**
STATE ON (voltage)	**MIN 0V MAX 1V**
FREQUENCY	**MAX 30 Khz**

4.7.2 LINE DRIVE

OUTPUT DIFFERENTIAL	**MIN 2.2V MAX 3.3V specific TIA/EIA-422-B (RS422)**
FREQUENCY	**MAX 400 Khz in position mode –125 Khz in interpolation mode**

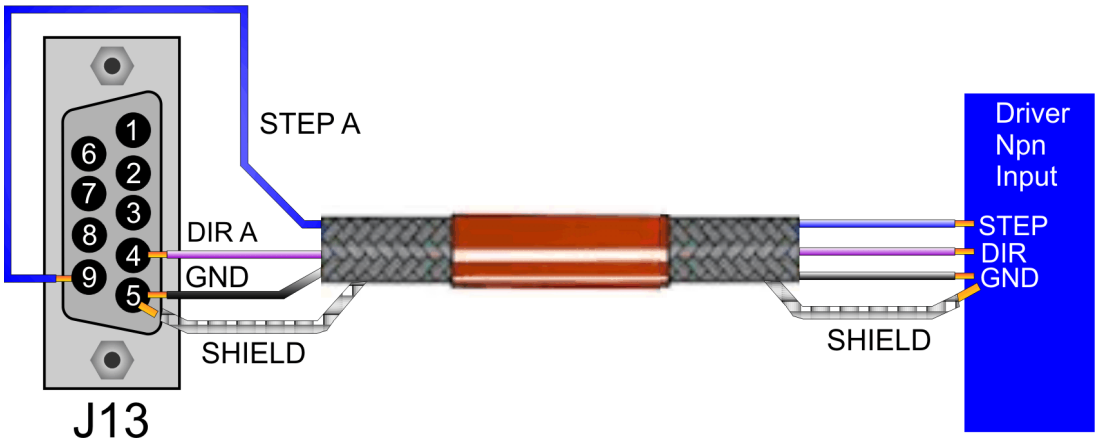
specific TIA/EIA-422-B (RS422)

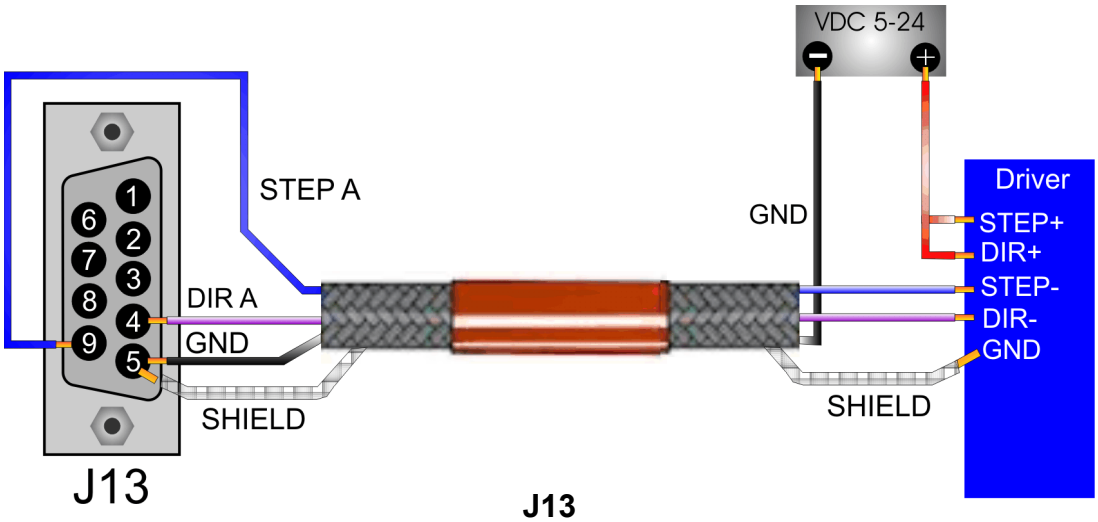
LOAD	V Min	V Typical
3,9 KΩ		3,2 V
100 Ω	2	2,6 V

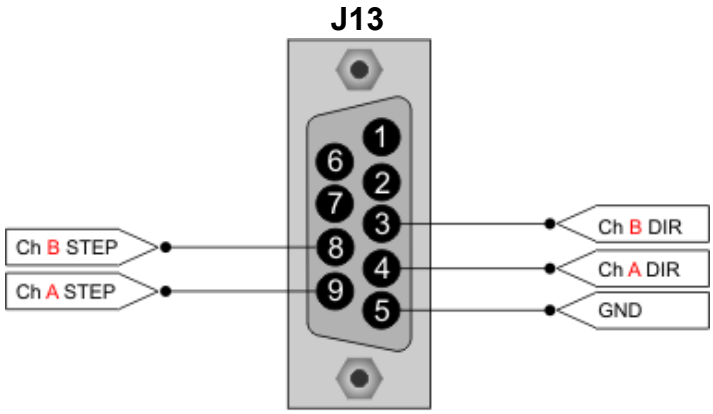
WARNING

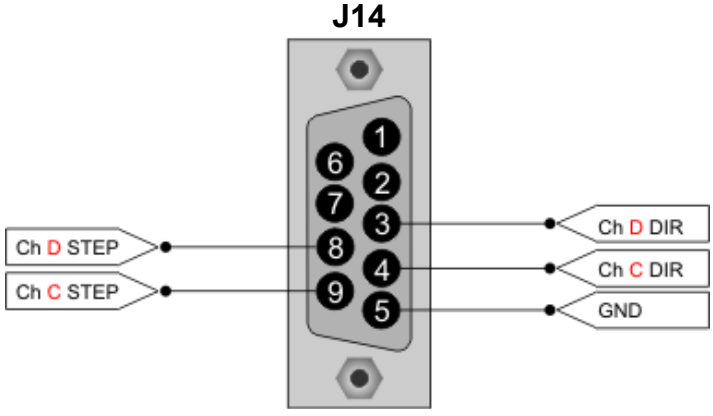
USE A CABLE WITH SHIELD FOR THE CONNECTIONS

4.7.3 Connections OPEN COLLECTOR J13 /J14

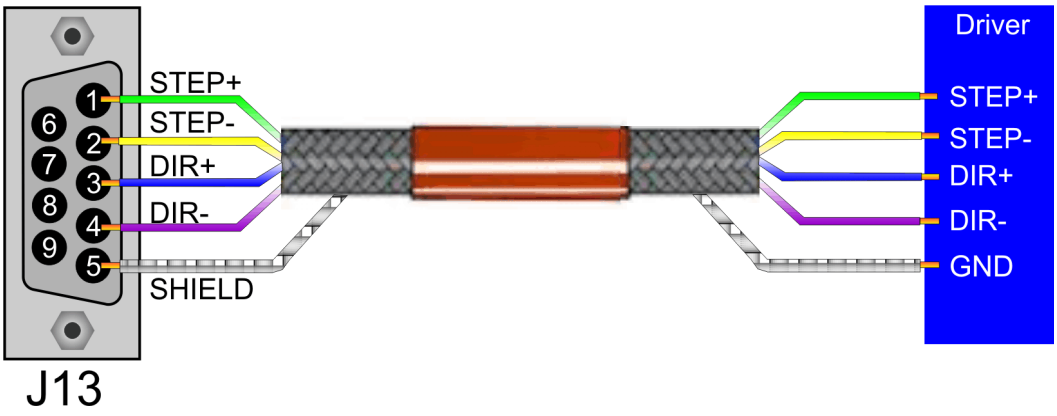


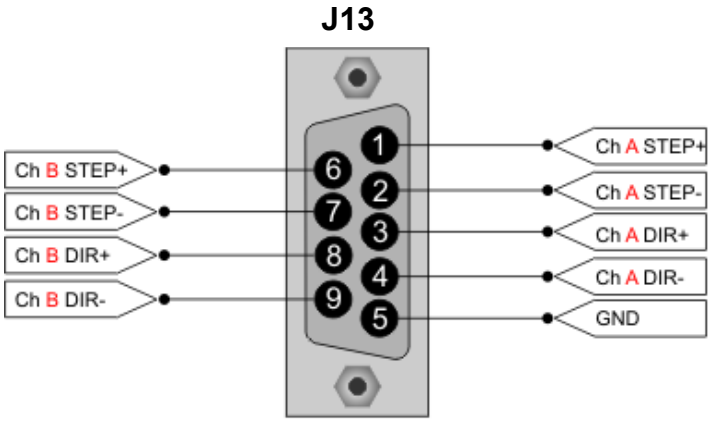


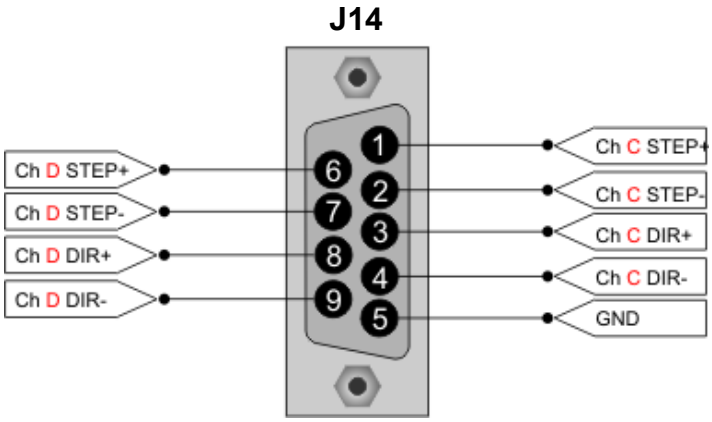




4.7.4 Connections LINE DRIVE







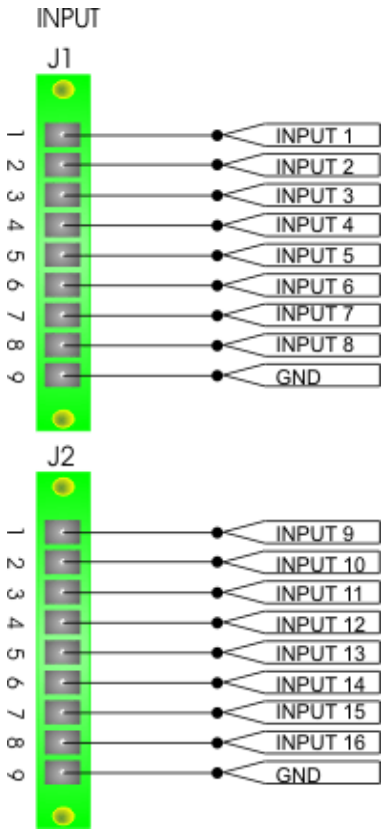
4.8 Digital Inputs

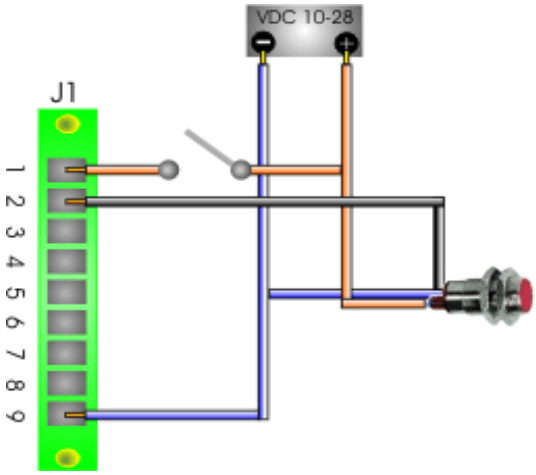
All these signals are PNP Tye optically isolated. Therefore, to enable an input must bring a positive VDC (24 Vdc typical) on the desired channel refers to the common inputs.

4.8.1 Electric characteristics

		U.m.	Min	Standard	Max
State On		Vdc	10	24	28
State Off		Vdc	0		4
Delay	ON	ms			3 (@ 24Vdc)
	OFF	ms			2 (@ 24Vdc)
Current		mA	4 (10Vdc)		14 (@ 28Vdc)

4.8.2 Connections J1/J2





WARNING

DO NOT EXCEEDS THE VOLTAGE LEVEL ABOVE DESCRIBED

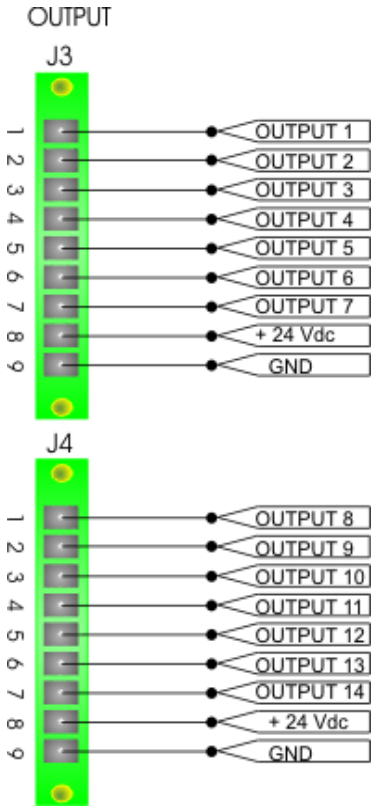
4.9 Digital Outputs

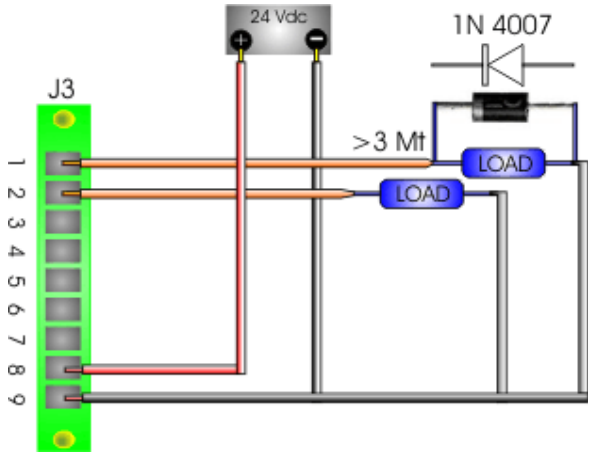
These outputs are optically isolated with respect to GND. In order to function should therefore feed them separately with a voltage of 24 Vdc. The load is driven by a transistor of the PNP type which when activated will provide a positive voltage equal to the voltage supply of the outputs. On the card there is a protection diode so you can also directly drive inductive loads. In case of inductive loads with absorption greater than or equal to 1 A or when the cable connection between the load and board exceeds a length of 3 meters, you should put the protection diode also close to the load (diode type 1N4007 or similar).

4.9.1 Electric characteristics

		U.m.	Min	Standard	Max	Note
Power		Vdc	10	24	30	
Load		A		1		Continue (T_{amb} 25°)
		A		2		Duty Cycle 25% (T_{amb} 25°)
		A			6	Peak (10 ms non ripet.)
Delay	ON	µs			5	
	OFF	µs			30	

4.9.2 Connections J3/J4





WARNING

DO NOT EXCEEDS THE VOLTAGE LEVEL ABOVE DESCRIBED

THE DIGITAL OUTPUTS, ARE NOT PROTECTED BY OVERLOAD OR SHORT CIRCUIT

5 Programming

5.1 Manual Boot

The board usually uses an automatic boot.
In case, the automatic boot is not available, it is necessary to proceed in the following way:

1) Run the program NGPROG (if used VTB skip step 2 and 3)
2) Set the COM and the type of card NGMEVO
3) Load the application. SREC and press TRANSFER APPLICATION
4) Press the keys simultaneously within 15 seconds RESET AND BOOT on the board
5) Release the RESET button

5.2 Upload VTB application

For upload VTB application, is possible use the following mode:
The board NGMEVO is automatically in BOOT MODE (if is not available, see 5.1) when you use the BUTTON UPLOAD APPLICATION. The application is automatically RUN when the transfer is finish.

5.3 NGPROG

The application was developed by Promax NGPROG to allow the update software and firmware of the new controls based on µP ColdFire.

5.3.1 Upload firmware

1) Press button **"FIRMWARE MANAGEMENT"** on NGProg
2) If you use **"UPDATE da File"** use the standard windows Browser for find the .SREC file
2) If you use "UPDATE da Server" you must have a intenet active connection, NGPROG search in Promax server the new version of firmware
3) Select the serial port to PC and NGMEVO (or NGM13 if not present) board type
4) Start the upload firmware

5.3.2 Upload VTB application

1) Select the NGMEVO (or NGM13 if not present) Board
2) Select the COM on PC
3) Selct the .SREC file by button **"LOAD"**
4) Start the upload by button **"Upload Application"**

6 Status Led

ST-1/L1 (Green led):

- · Fast blink – board in BOOT MODE
- · blink1 sec – application RUN

ST-2/L2 (Yellow led):

- · NO BLINK - No activity on RS232 or CAN SLAVE
- · BLINK - activity on RS232 or CAN SLAVE

PWR (Red led): Power On

7 NGMIO Connections

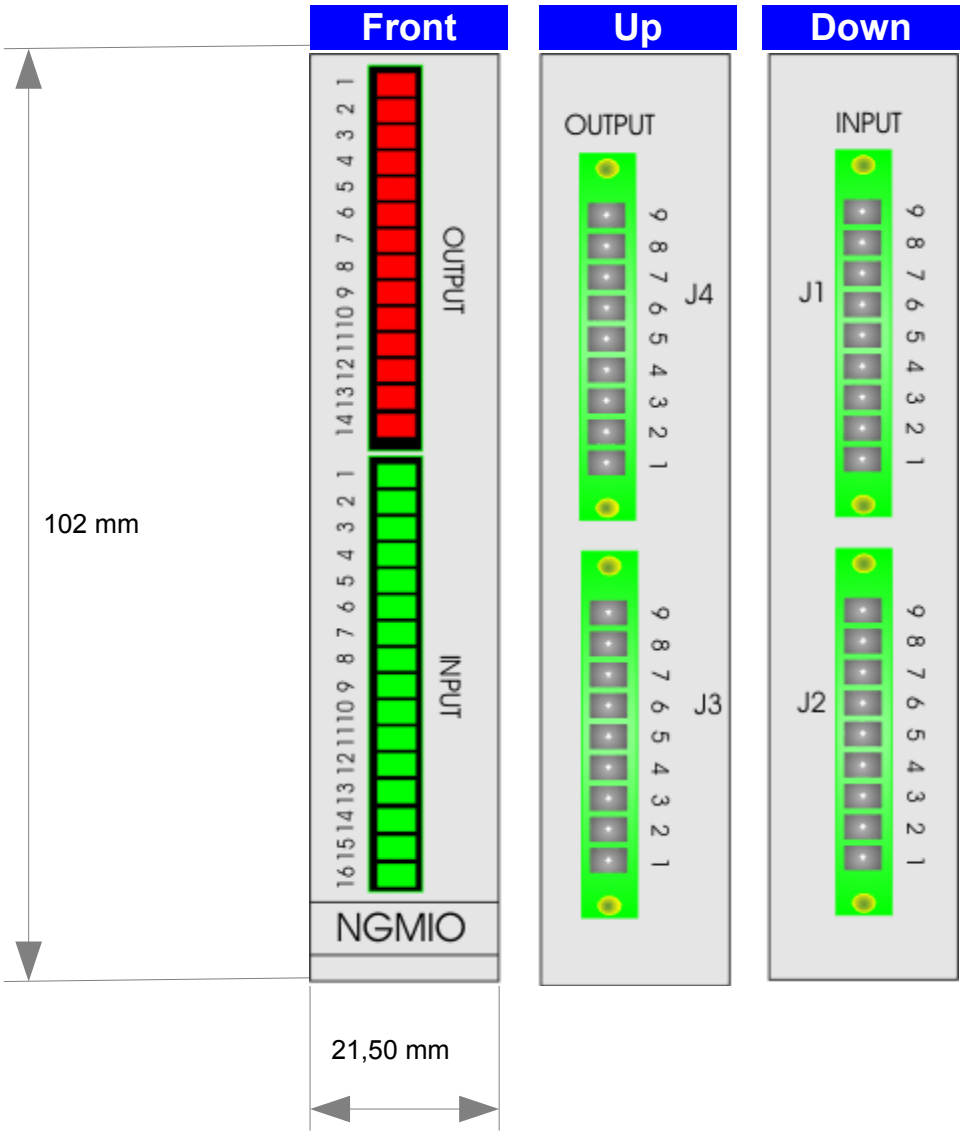
The NGMIO board, is an expansion for NGMEVO local BUS:

- ***16 Digital Inputs***
- ***14 Digital Outputs***

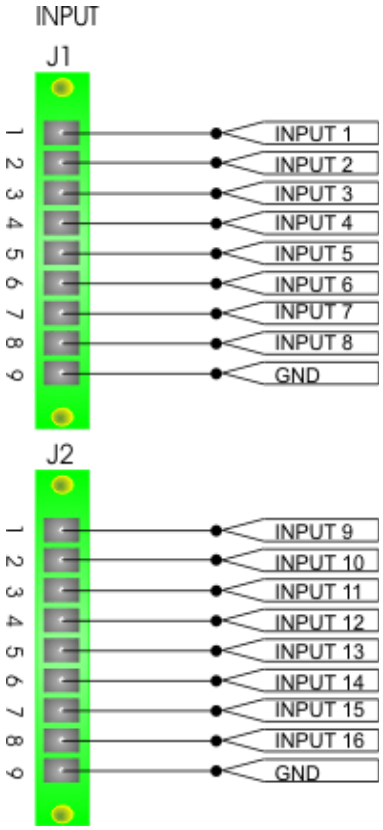
Can Be insert up to 7 expansions NGMIO for a total:

- ***128 Digital Inputs***
- ***112 Digital Outputs***

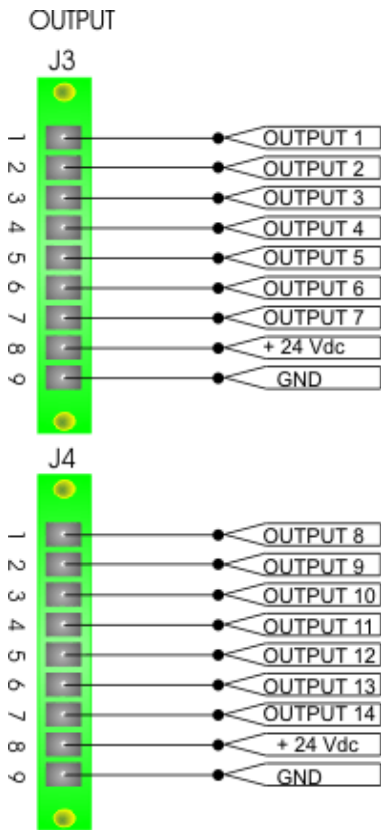
The digital I/O are the same specifics to NGMEVO I/O, see Chapr. 4.7 and 4.8



7.1 Connections NGMIO J1/J2



7.2 Connections NGMIO J3/J4



REFER TO CHAPTERS 4.8 AND 4.9 FOR CONNECTIONS AND WARNINGS

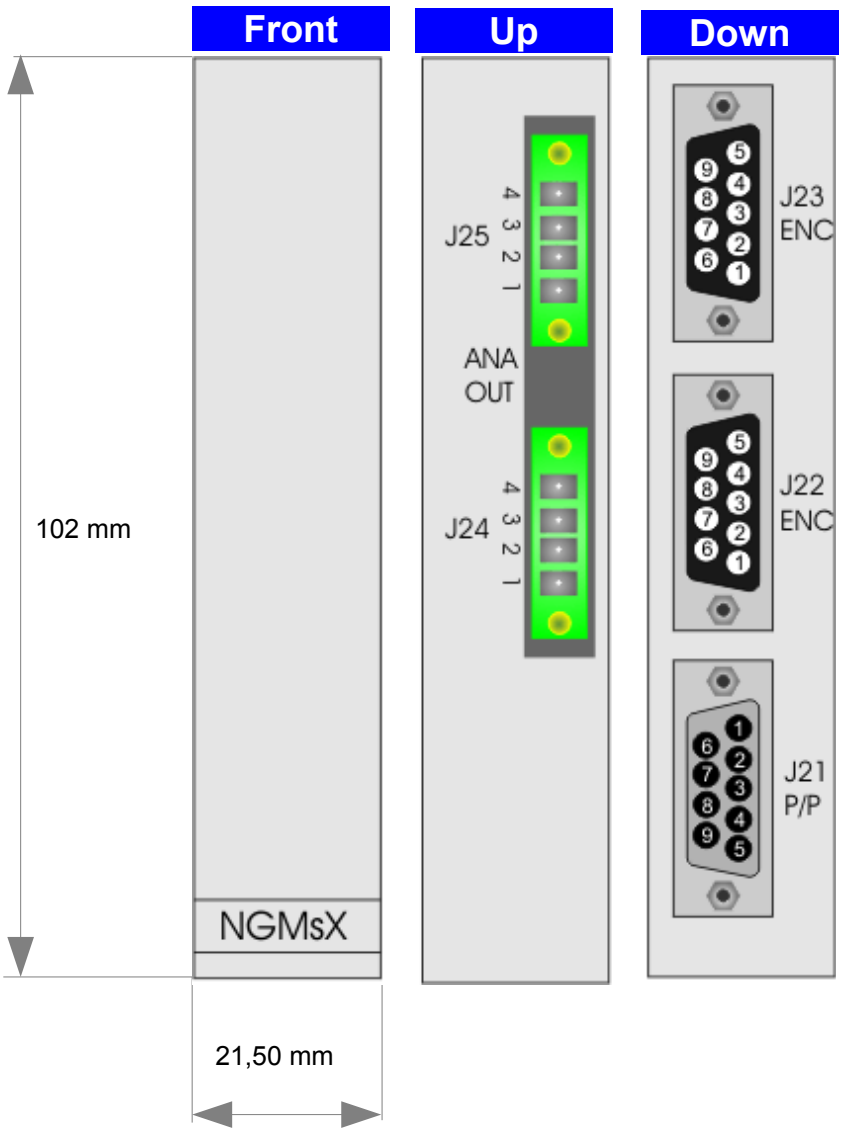
8 NGMsX Connections

The NGMsX board, is an expansion for NGMEVO local BUS:

- 2 Channels STEP/DIR 500 Khz clock interpolation and position mode
- 2 Channels encoder Line Drive 500 Khz
- 2 Analog Outputs +/- 10 V 12 bit

Can Be insert up to 3 expansions NGMsX
Can be managed the following combinations for a NGMsX expansion:

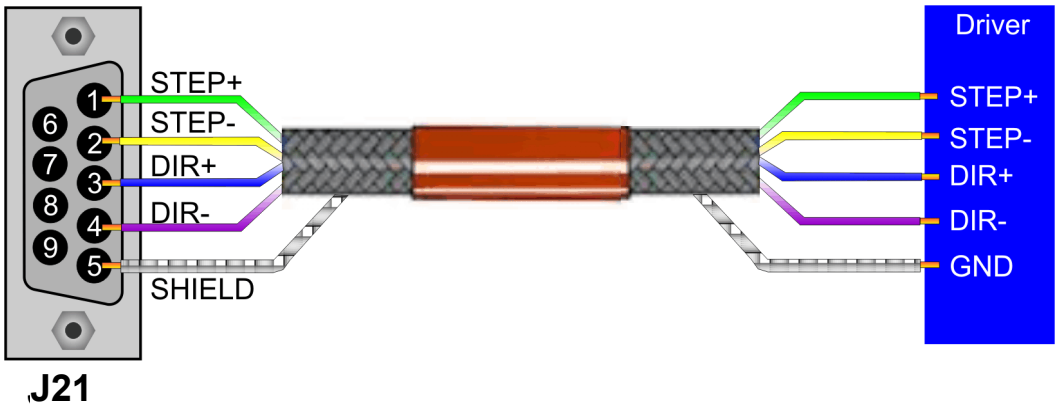
- **2** Channels STEP/DIR
- **2** Channels STEP/DIR and **2** Analog Outputs
- **1** Channel STEP/DIR , **2** Analog Outputse **2** Channels Encoder
- **1** Channel STEP/DIR and **2** Channels Encoder

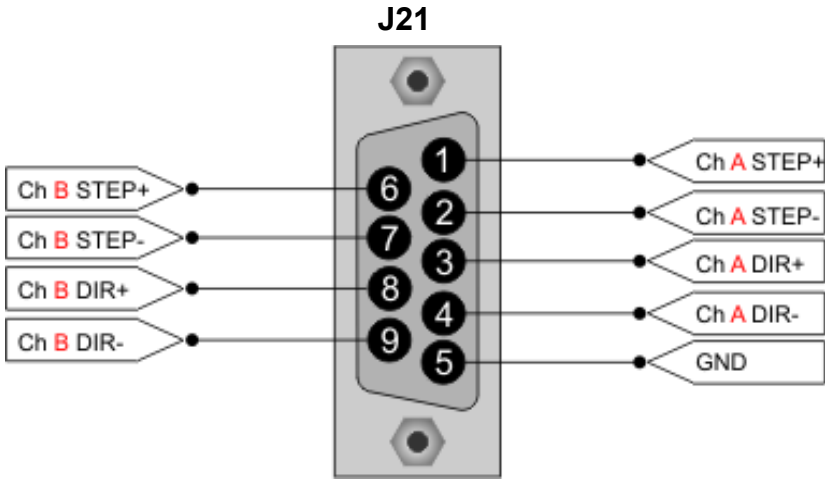


8.1 Channels STEP/DIR on NGMsX Expansion

The NGMsX board can use 2 channels STEP/DIR up to 500 Khz clock for single channel
The outputs are type LINE DRIVE 5V

OUPUT	**MIN 3V MAX 5V**
CLOCK	**MAX 500 Khz**





WARNING

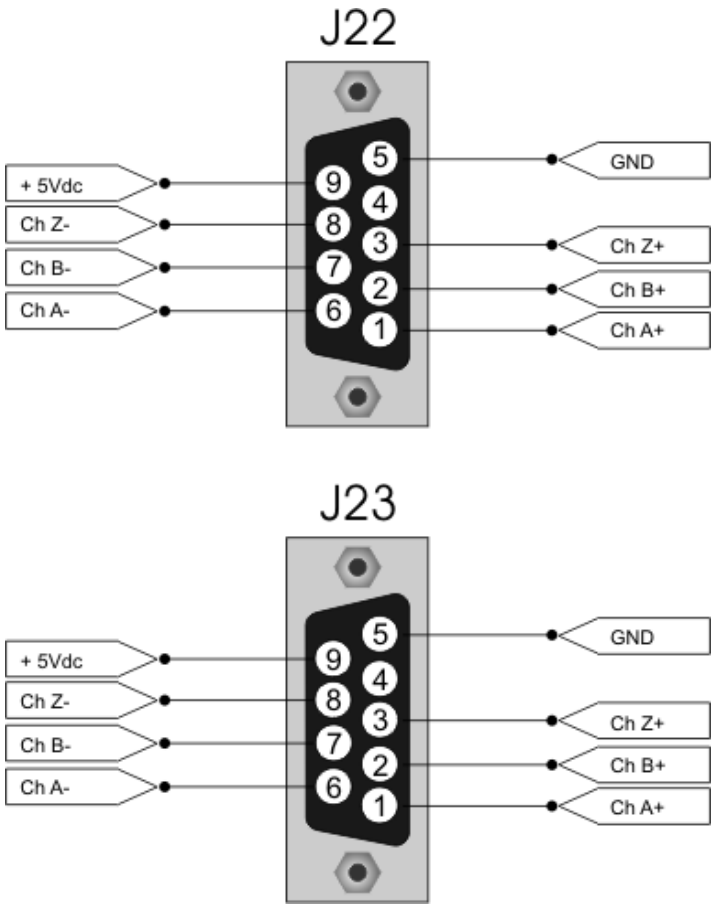
USE A CABLE WITH SHIELD FOR THE CONNECTIONS

8.2 Channels ENCODER on NGMsX Expansion

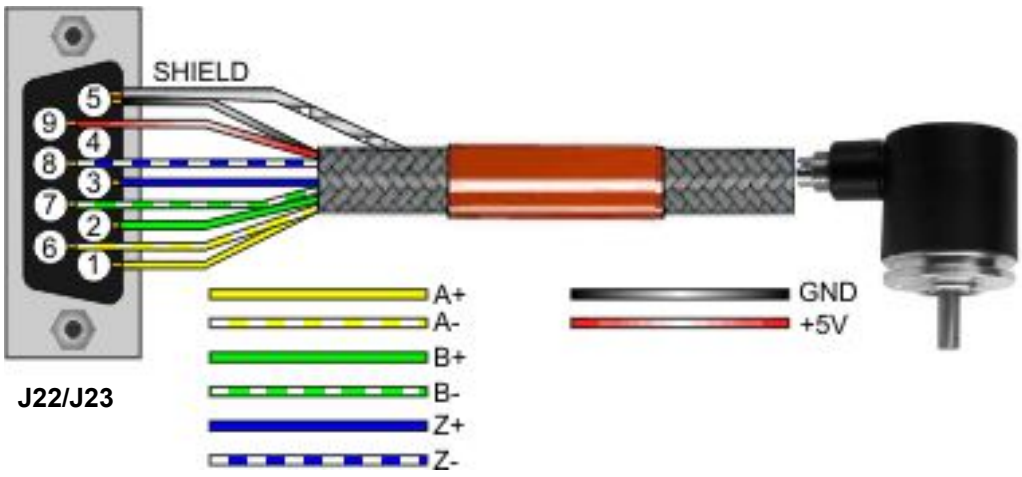
The NGMsX can use TWO channels ENCODER LINE DRIVE up to 500 Khz for channel.
The encoder (or optical line) must be connected with a shielded cable, to prevents electromagnetic interference . It's also recommended to have separated cable for each encoder and put far away the connection by interferences sources (inverters,high voltage cable, AC motors, ecc.).
NGIO is ready to use LINE-DRIVE encoders, also supplies the +5Vdc source voltage. It can't be used with PUSH-PULL or OPEN-COLLECTOR encoders.
In case of motor-drives encoder simulation, is not necessary to connect the Vdc supply, but only the GND.

8.2.1 Electric characteristics

		U.m.	Min	Soglia	Max
On voltage level		Vdc	0		0,8
Off volatge level		Vdc	4		12
R input		Ω	6		
Frequency		KHz			800
T0 PNP	On level	Vdc	2,5	2,2	7,7
Index	Off level	Vdc	0		1,5
T0 NPN	On level	Vdc	0	1,4	1
Index	Off level	Vdc	2		7,7



8.2.2 Example



WARNING

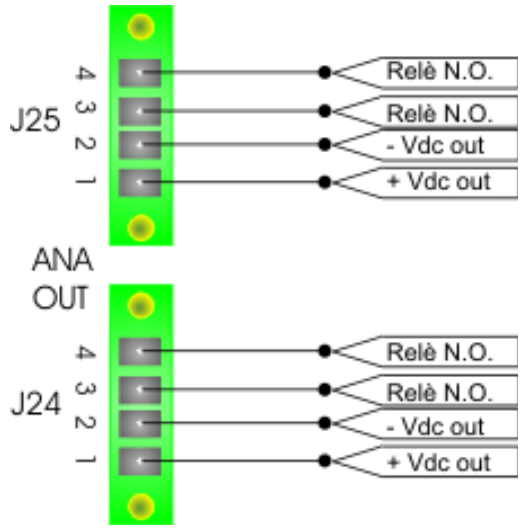
USE A CABLE WITH SHIELD FOR THE CONNECTIONS

8.3 Analog Outputs on NGMsX Expansion

The NGMsX board can use TWO analog outputs +/-10 V 12 bit and TWO RELE' CONTACTS

8.3.1 Electric characteristics

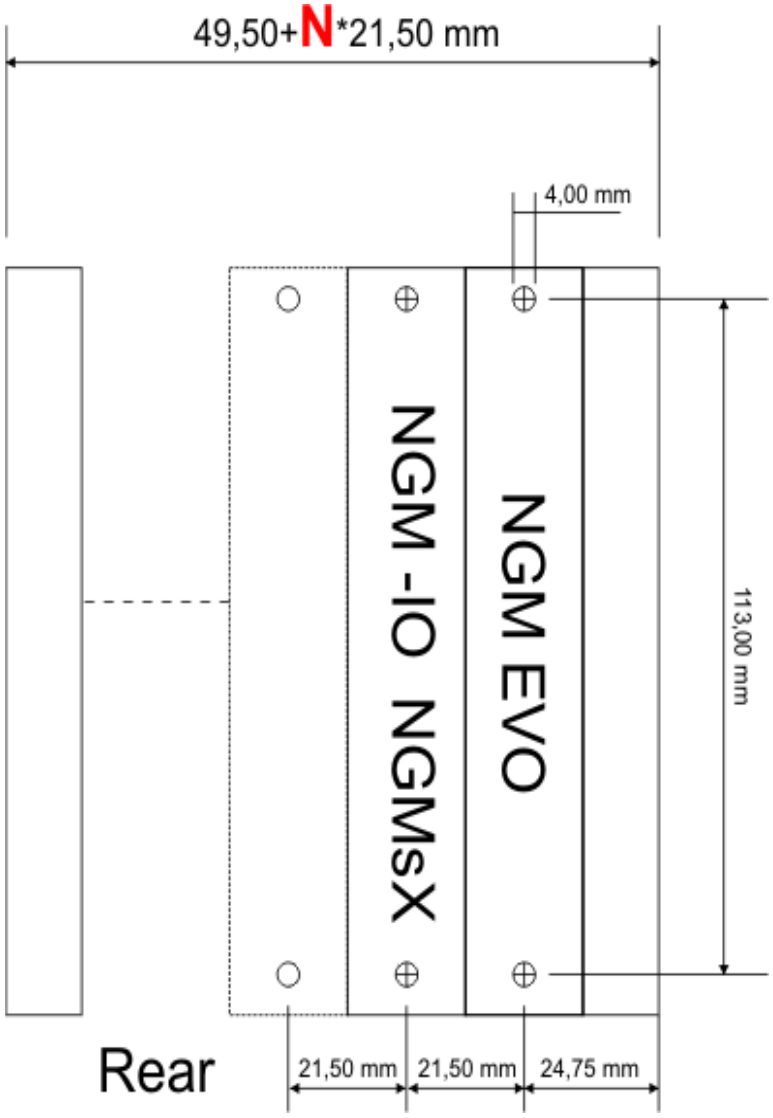
		U.m.	Min	Standard	Max
Analog Output	Output voltage	Vdc	-10		9,995
	Output impedence	Ω	250		290
Relè Conctat	Voltage	Vdc			35
	Current	A			1



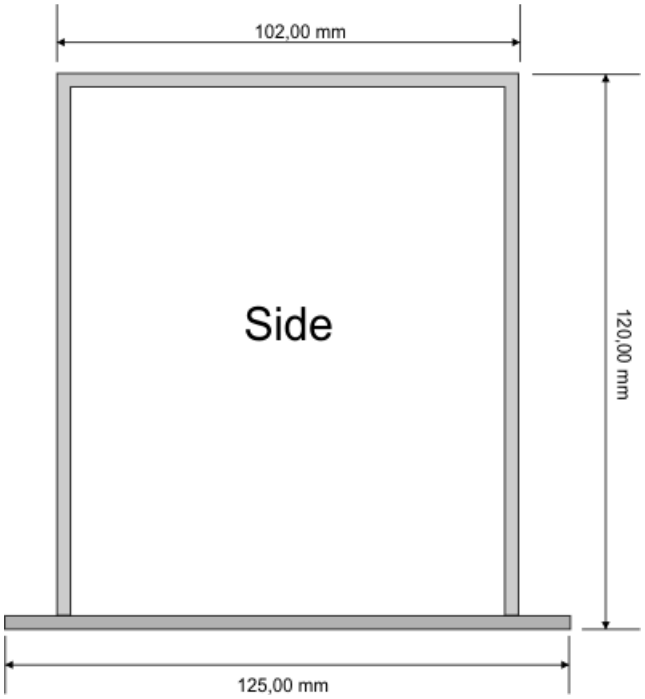
WARNING

USE A CABLE WITH SHIELD FOR THE CONNECTIONS

9 Dimensions



N=expansions number
NGMIO or NGMsx



10 Notes on the CE legislation

NGMEVO
We have two directives about electronic devices, regarding the NGMEVO : la 2006/42/CE (machine directive) about safety use of the devices and 2004/108/CE about electromagnetic compatibility.
About the first (machine directive) electric/electronic devices, must complies the "low voltage" directive (2006/95/CE) but it can be applied on devices supplied at 50-1000Vac o 75-1500Vdc. NG35 works at a voltage of 24Vdc (thus Intrinsically “safe”), so it belongs to "very low voltage" devices (class 0 legislation CEI 11.1), on which it isn't no legislation about.

On electromagnetic compatibility, regarding the 2004/108/CE norm, this device can be classified as a "finished appliance".Due to the fact that the NG35 will be normally integrated inside a complex electromechanics system, the machine electric board, by a manufacturer in an industrial ambit and not by a final customer, it haven’t any certification duty.

PROMAX however, can institute some specific measure as a pre-compliance, in case of particular demands of costumers, regarding the device electromagnetic characterization.
For example, can be made some measure under the CEI EN 61000-6-1 norm (2007 generic norms – residential , commercial and light industrial ambient immunity) or CEI EN 61000-6-1 (2007 generic norms - residential , commercial and light industrial ambient emission)

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