NGQx

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User Guide

PROMAX Motion & Control

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Rev. 3.00.6

1 Features

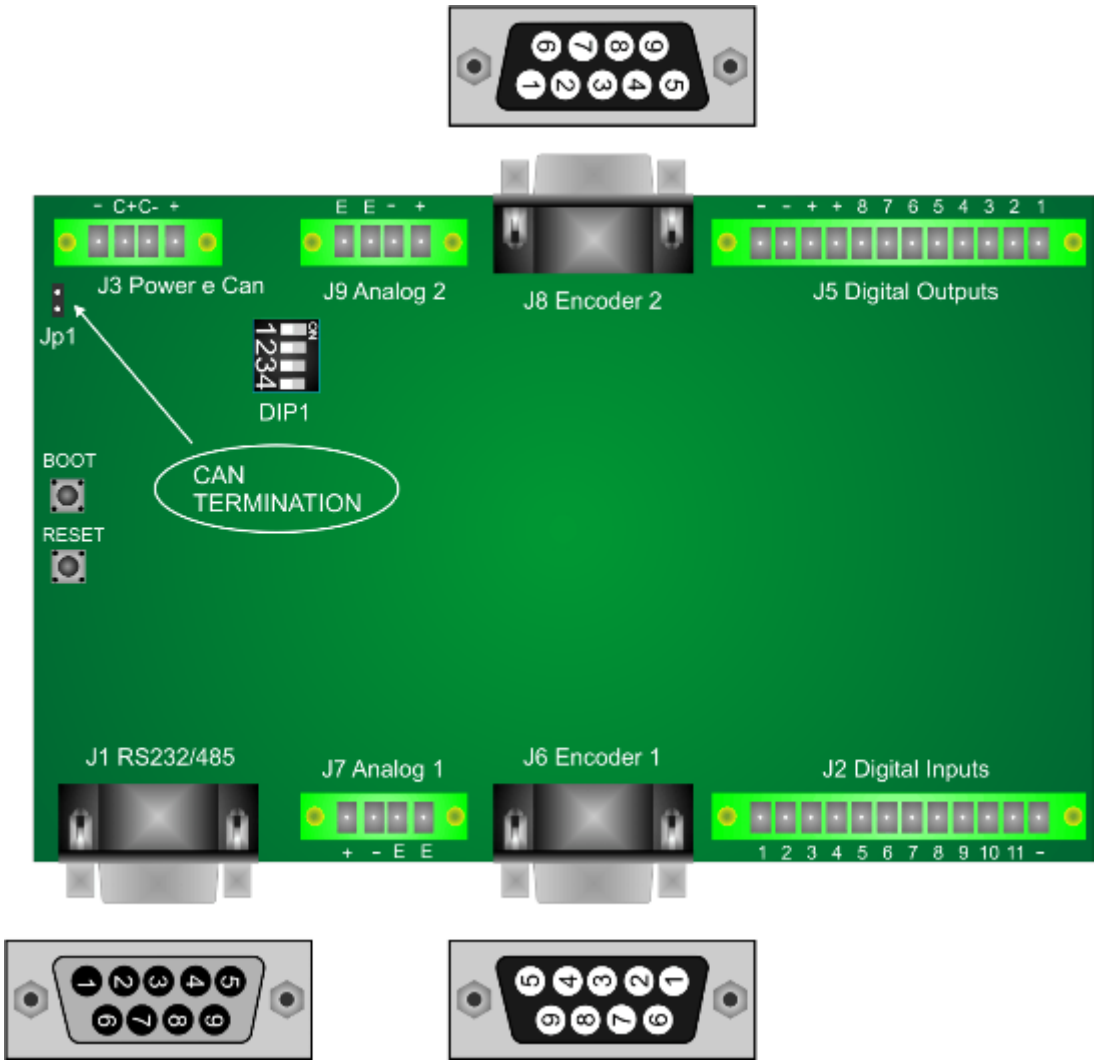
The system NGQxis a numerical control based on the Freescale MCF5213 ColdFire microprocessor. NGQx born as a stand alone and can also be used as SLAVE CANOPEN with appropriate firmware.

- ***Microprocessor type MCF 51JM128 to 48MHz***
- ***128 Kb Flash***
- ***16 Kb RAM***
- ***2 serial ports RS232/RS485***
- ***1 port CAN OPEN***
- ***1 analog-input 12 bit configurable (5-10-12-24 Vdc) or (4-20mA)***
- ***11 Digital Inputs PNP 24 Vdc***
- ***8 Digital Outputs PNP 24 VDC up to 1 A***
- ***2 Encoder Inputs line drive 400 Khz***
- ***2 Analog Outputs +/- 10V***
- ***2 Rele' Outputs up to 1A***

2 Identification Code NGQx

ORDER CODE NGQx	
NGQx/ -	
A	1 - Analog Input 5 V
B	1 - Analog Input 12 V
C	1 - Analog Input 10 V
D	1 - Analog Input 4-20 Ma
E	1 - Analog Input 24 V
0	SER1 - RS232 SER2 - RS232
1	SER1 - RS232 SER2 - RS485

3 Connection NGQx



4 Connections Description

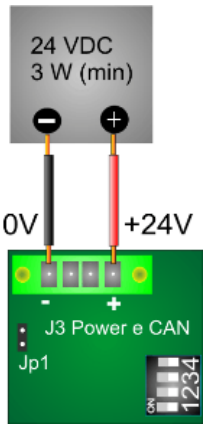
4.1 Power

The NGQx requires two separate power supplies:

- ***Logical Power J3***
- ***Digital Outputs Power J5***

To supply the digital outputs, see the relevant chapter 4.7

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	

4.1.2 Connections J3

PIN	Description
1	+ 24 VDC
2	CAN L
3	CAN H
4	GND

THE SYSTEM IS PROTECTED FROM POLARITY INVERSION

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

4.2 Serial Ports

The serial ports on the **NGQx** 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 NGQx ports

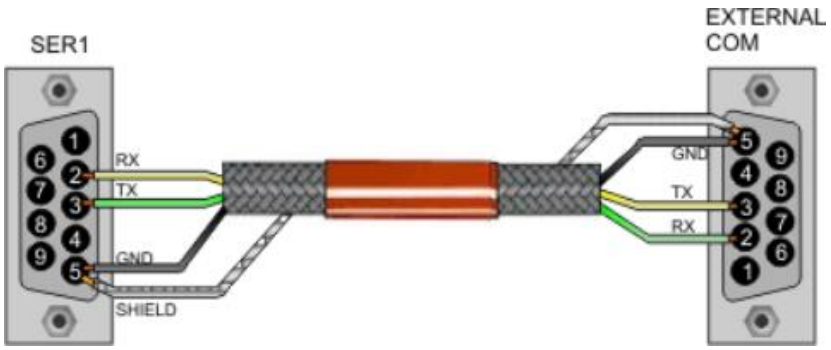
Generally the RS232 connection, uses a NULL MODEM cable (pin 2,3,5) CROSSOVER (with inversion on pin 2,3)

Always check the external device that type of connection it accepts

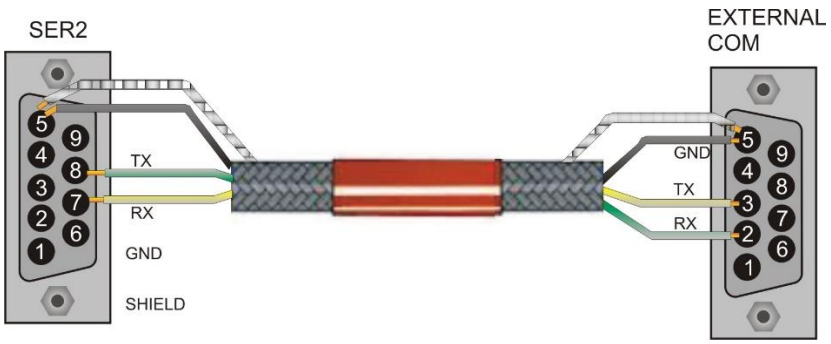
THE J1 CONNECTOR IS NOT IN STANDARD RS232 MODE

SER1 and SER2 are connect to same connector J1

SER1 in RS232 mode

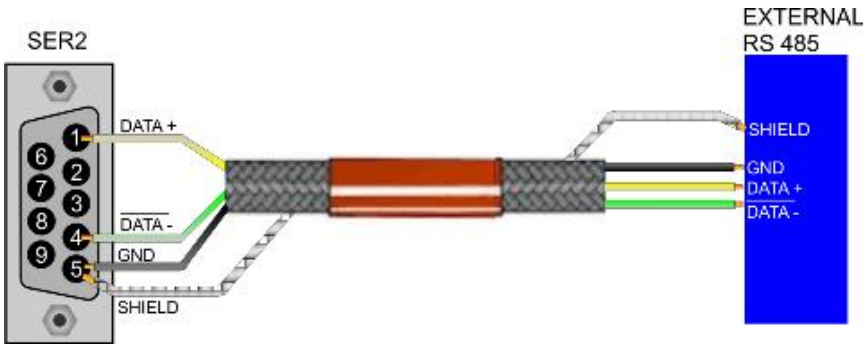


SER2 in RS232 mode

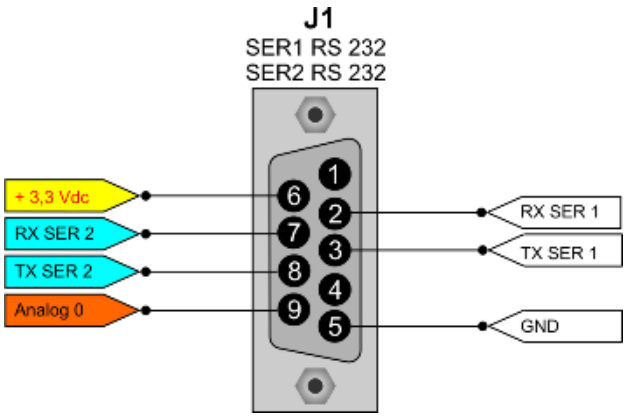


SER2 in RS485 mode

Normally the GND pin is not connect

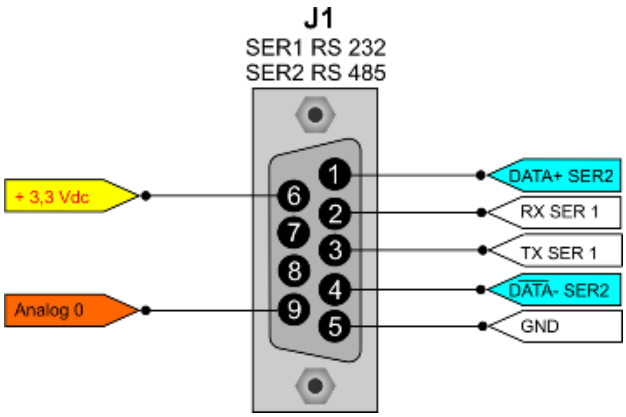


4.2.1 Connection J1



WARNING
THE PIN 6 +3.3 Vdc MUST NEVER BE CONNECTED

ONLY FOR FUTURE USE



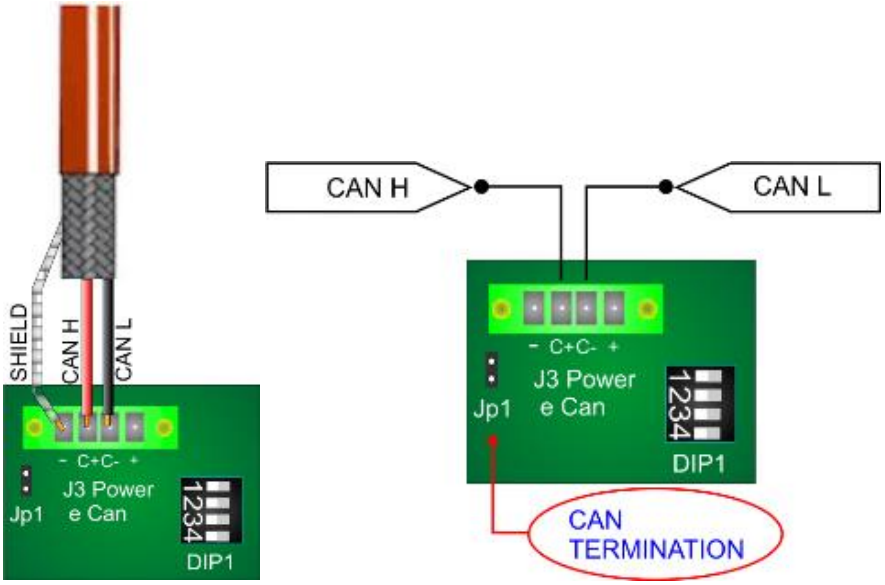
WARNING
DO NOT INSERT THE CONNECTORS PORT WHEN THE POWER IS ON BECAUSE THE CARD CAN BE DAMAGED

4.3 CAN BUS Port

The port CAN BUS allows the communication of the card NGquark 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 CAN BUS Connection

Is possible insert the terminator resistor with jumper JP1



4.3.2 CanOpen Max PDO Number

Normally the max PDO number managed by NGQx Canopen system , is **10**.
It is a total for PDO Rx and PDO Tx ex:

7 → PDO Tx
3 → PDO Rx

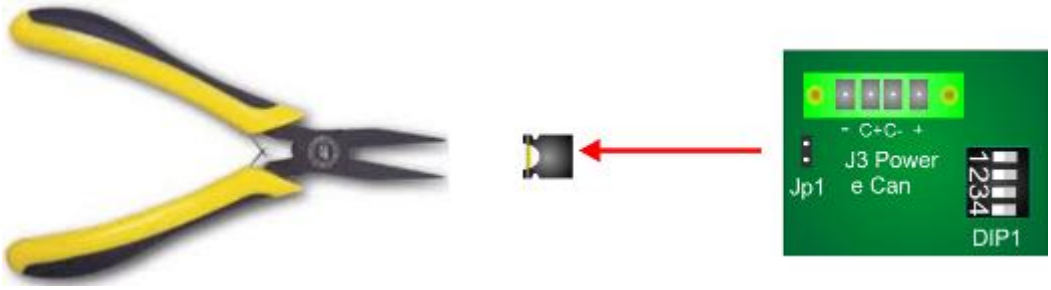
WARNING
USE THE CABLE FOR CANOPEN COMMUNICATION

4.3.3 Set Node Number – SLAVE MODE

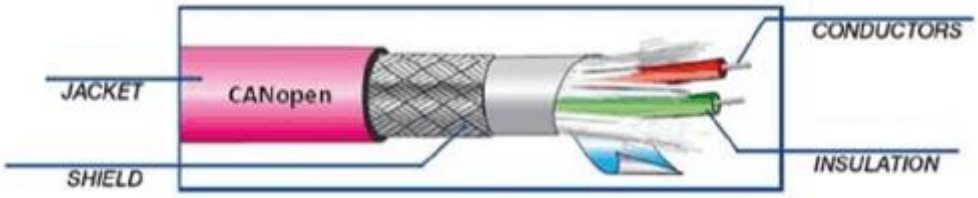
When the **NGQx** is in SLAVE MODE, you must select the CanOpen Node number by DIP 1. This is codified in binary mode (node 1 to 15)

WARNING

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



4.3.4 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

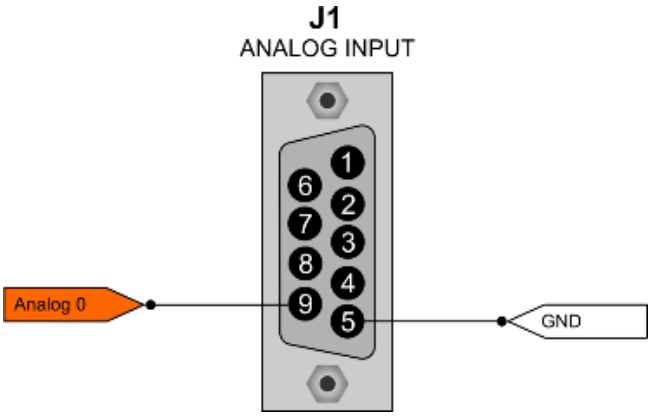
Baud rate 1Mb Length Max 25 Mt
Baud rate 800 Kb Length Max 50 Mt
Baud rate 500 Kb Length Max 100 Mt
Baud rate 250 Kb Length Max 250 Mt
Baud rate 125Kb Length Max 500 Mt

VOLTAGE EXERCISE
30 V

4.4 Analog Input

The analog inputs of the NGQx can be configured to read voltage signals including 5-10-12-24 VDC, or in current between 4-20mA. Configuration is done for each input, making the system very flexible.
The input voltage can not exceed those limits by more than 0.2 V.
They can be configured up to a maximum of 4 analog inputs, one of which is always present.

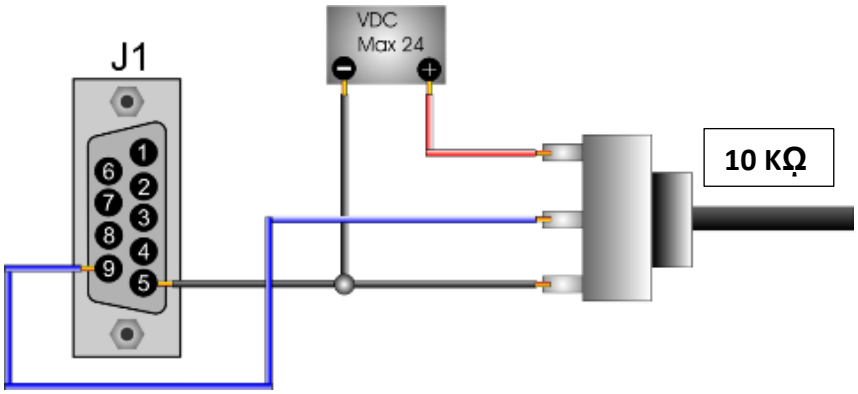
4.4.1 Analogs Connections J1



4.4.2 Input Resistance

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

4.4.3 Connection Example



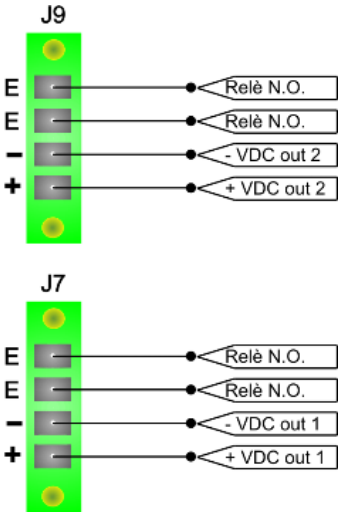
WARNING
DO NOT EXCEEDS 0,2 Volt THE MAXIMUM VALUE SELECTED
THE ANALOG INPUT, CAN BE DAMAGED THE BOARD

4.5 Analog Outputs

The NGQx board allows up to 2 analog outputs +/-10V and 2 relè outputs up to 1 A

4.5.1 Electrical

		U.m.	Min	Standard	Max
Analog Outputs	V Out	Vdc	-10		9,995
	Impedence	Ω	250		290
Relè Contact	V In	Vdc			35
	Current	A			1



WARNING

USE A CABLE WITH SHIELD FOR THE CONNECTIONS

DO NOT EXCEEDS THE VOLTAGE LEVEL ABOVE DESCRIBED

4.6 Encoder Channels

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.).
NGQx 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.
.

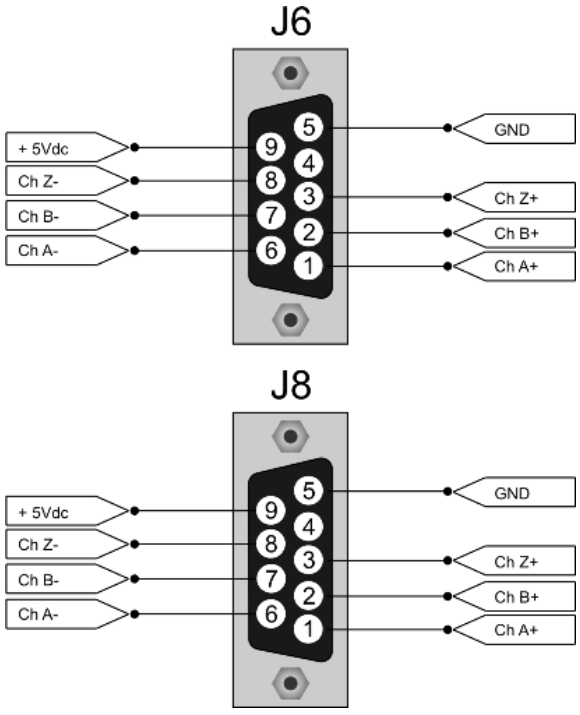
4.6.1 Electrical

		U.m.	Min	Soglia	Max
On voltage level		Vdc	0		0,8
Off voltage level		Vdc	4		12
R input		Ω	6		
Frequency		KHz			400
Z PNP	On Level	Vdc	2,5	2,2	7,7
	Off Level	Vdc	0		1,5
Z NPN	On Level	Vdc	0	1,4	1
	Off Level	Vdc	2		7,7

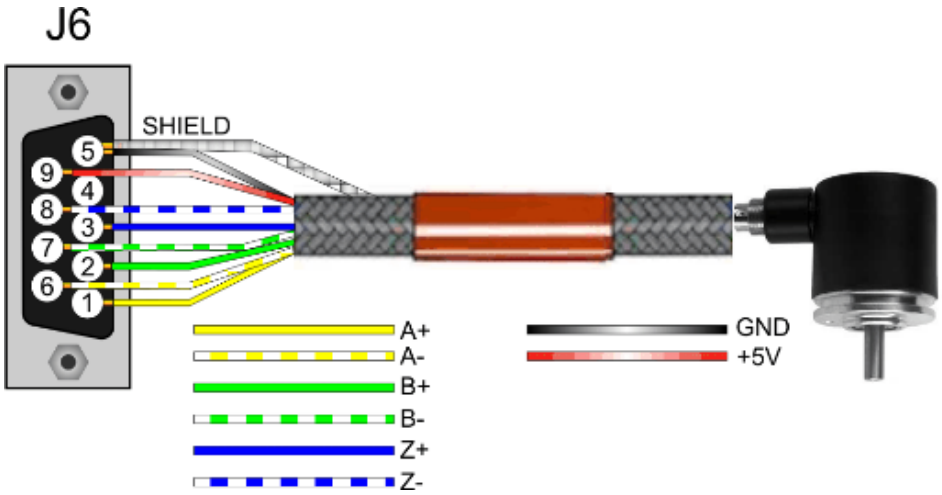
4.6.1 Electrical +5vdc output encoder supply

Channel	Min	Max	Output Cuurent
Ch1 J6	4,75 Vdc	5,25 Vdc	100 Ma
Ch2 J8	4,75 Vdc	5,25 Vdc	100 Ma

4.6.2 Connections



4.6.3 Example



WARNING

USE A CABLE WITH SHIELD FOR THE CONNECTIONS

DO NOT EXCEEDS THE VOLTAGE LEVEL ABOVE DESCRIBED

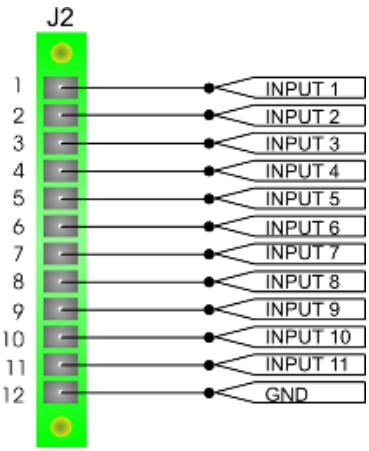
4.7 Digital Inputs

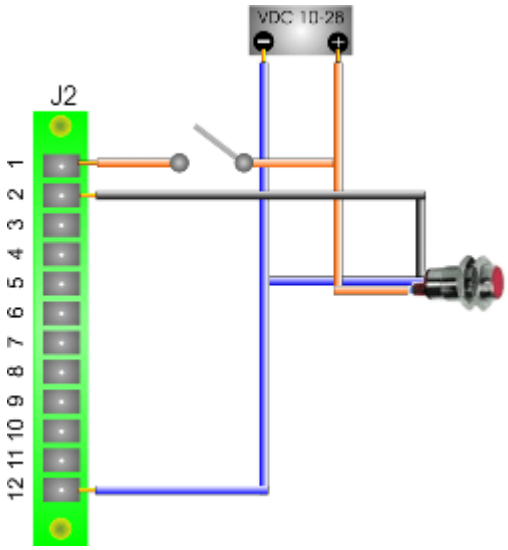
All these signals are PNP Tye optically isolated. Therefore, to enable an input must bring a positive VDC (24 Vdc typical) on the desired channel refers to the common inputs.

4.7.1 Electrical

		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)

4.7.2 Connections J2





WARNING
DO NOT EXCEEDS THE VOLTAGE LEVEL ABOVE DESCRIBED

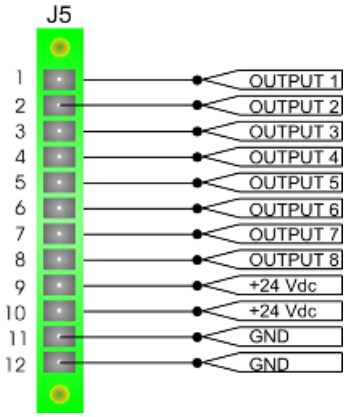
4.8 Digital Outputs

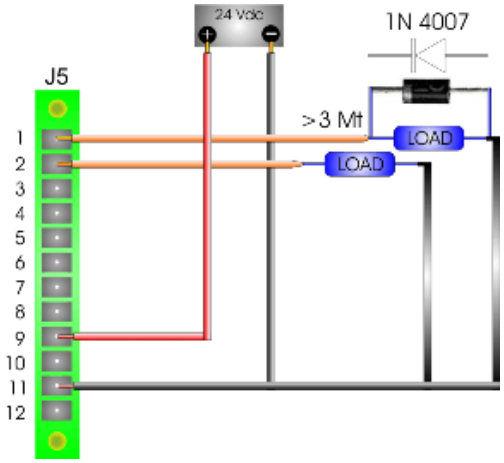
The outputs are optically isolated with respect to GND. In order to function should therefore feed them separately with a voltage of 24 Vdc. The load is driven by a transistor of the PNP type which when activated will provide a positive voltage equal to the voltage supply of the outputs.
On the card 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).

4.8.1 Electrical

		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)
Delay	ON	µs			5	
	OFF	µs			30	

4.8.2 Connections J5





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 NGQx (if is not present select NGQUARK)
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 NGQUARK 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 (If not present NGQUARK select NGM13)

1) Press button **"GESTIONE FIRMWARE"** 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 NGM13 board type
4) Start the upload firmware

5.3.2 Upload VTB application (If not present NGQUARK select NGM13)

1) Select the NGM13 Board
2) Select the COM on PC
3) Selct the .SREC file by button **"LOAD"**
4) Start the upload by button **"TRASFERISCI APPLICAZIONE"**

6 Status Led

ST-1/L1 (Green led):

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

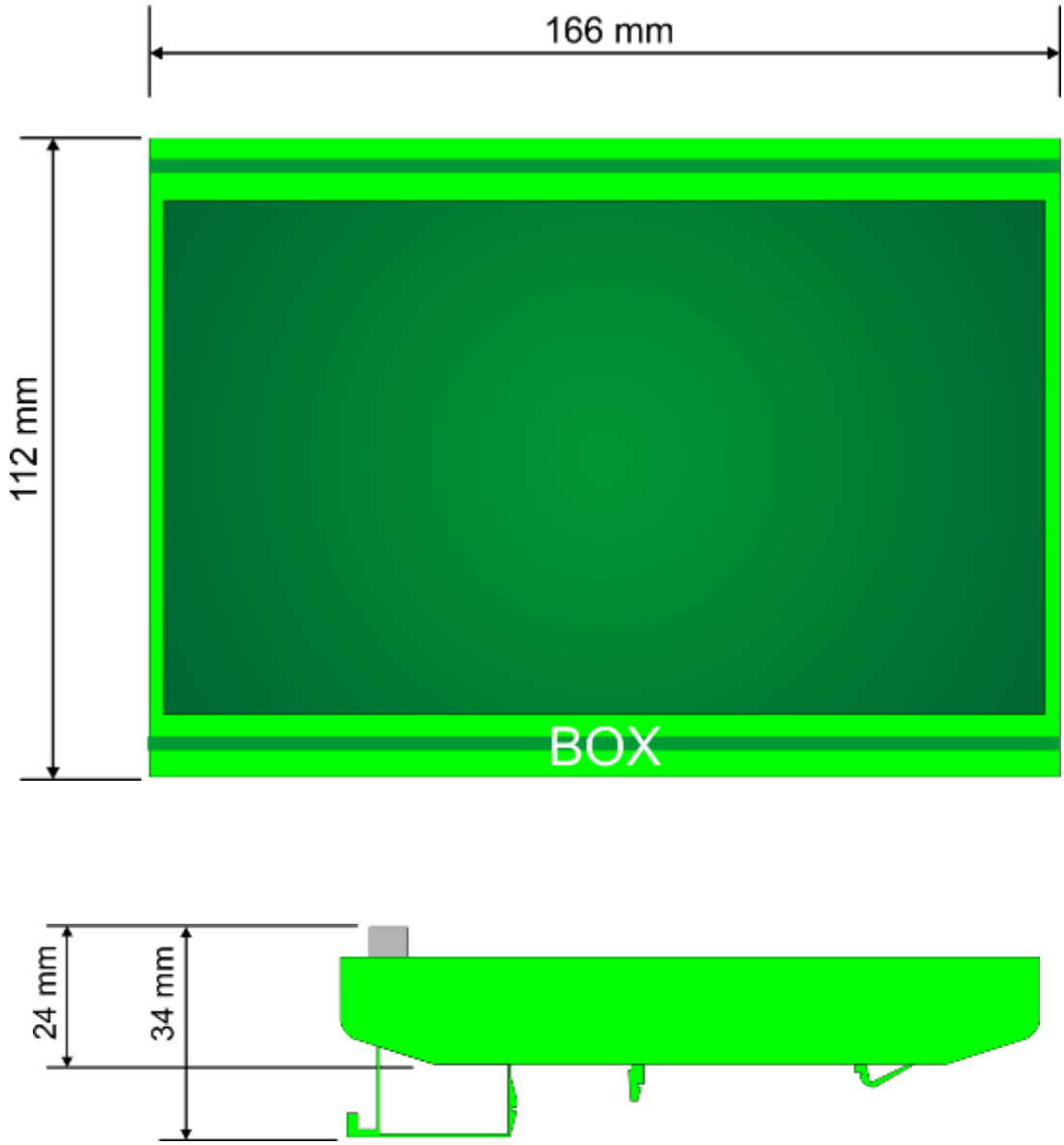
ST-2/L2 (Yellow led):

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

PWR (Red led): Power On

7 Dimensions

8



9 Notes on the CE legislation

We have two directives about electronic devices, regarding the **NGQx**: the 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 Union harmonisation legislation (Low Voltage Directive), Directive 2006/95/EC (until April 19th, 2016) and Directive 2014/35/EU (from April 20th, 2016) but it can be applied on devices supplied at 50-1000Vac or 75-1500Vdc. **NGQx** 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 Union harmonisation legislation Directive 2004/108/CE (until April 20th, 2016) and Directive 2014/30/EU (from April 20th, 2016), the device can be considered inherently benign in terms of electromagnetic compatibility because its inherent physical characteristics are such that:
a) it is incapable of generating or contributing to electromagnetic emissions which exceed a level allowing radio and
telecommunications equipment and other equipment to operate as intended;
b) it will operate without unacceptable degradation in the presence of the electromagnetic disturbance normally present in its intended environment
Moreover, this device cannot be classified as a "finished appliance with an independent functionality", due the **NGQx** haven’t any use outside a complex electromechanics system, the machine electric board, made by a manufacturer in an industrial ambit and not by a final user.
Thus, it hasn’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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