Products Tde Macno

Installation

Stack regulation module

Cod. MP00700E00 V_1.3

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1 DIMENSIONS

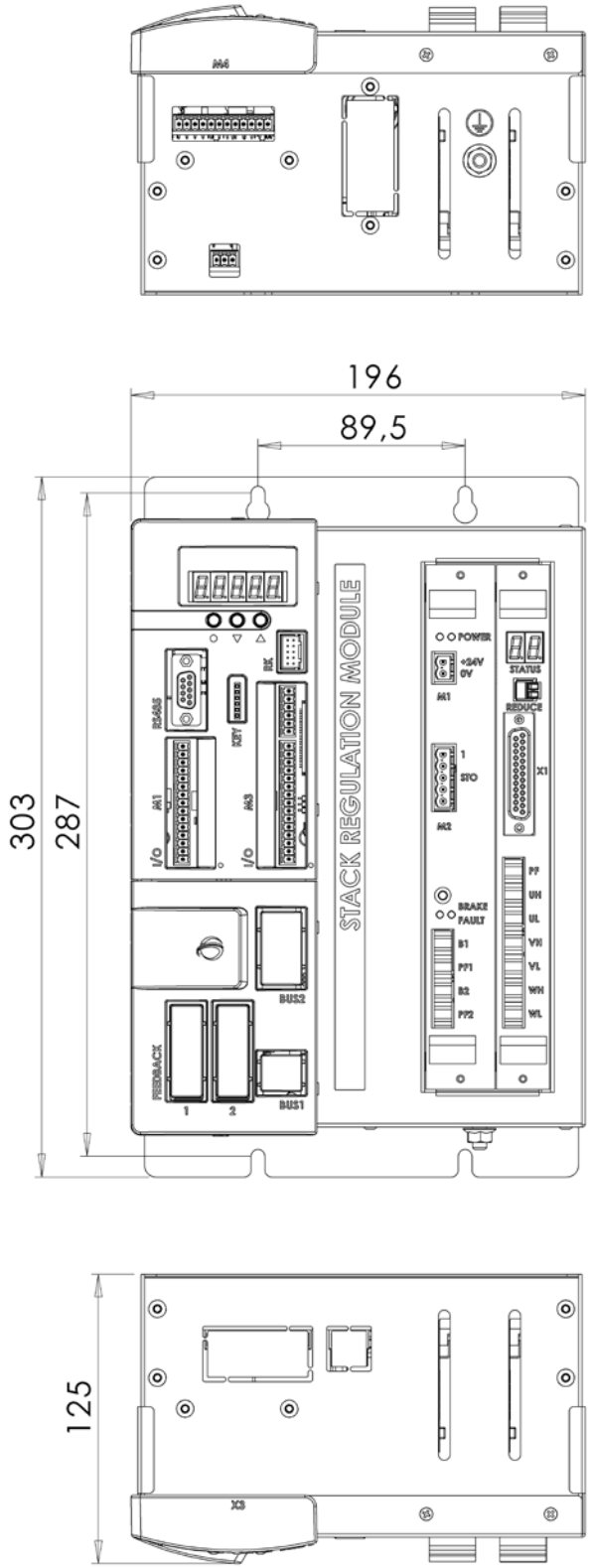


Fig.1A *(1 slot Control unit dimensions [mm])*

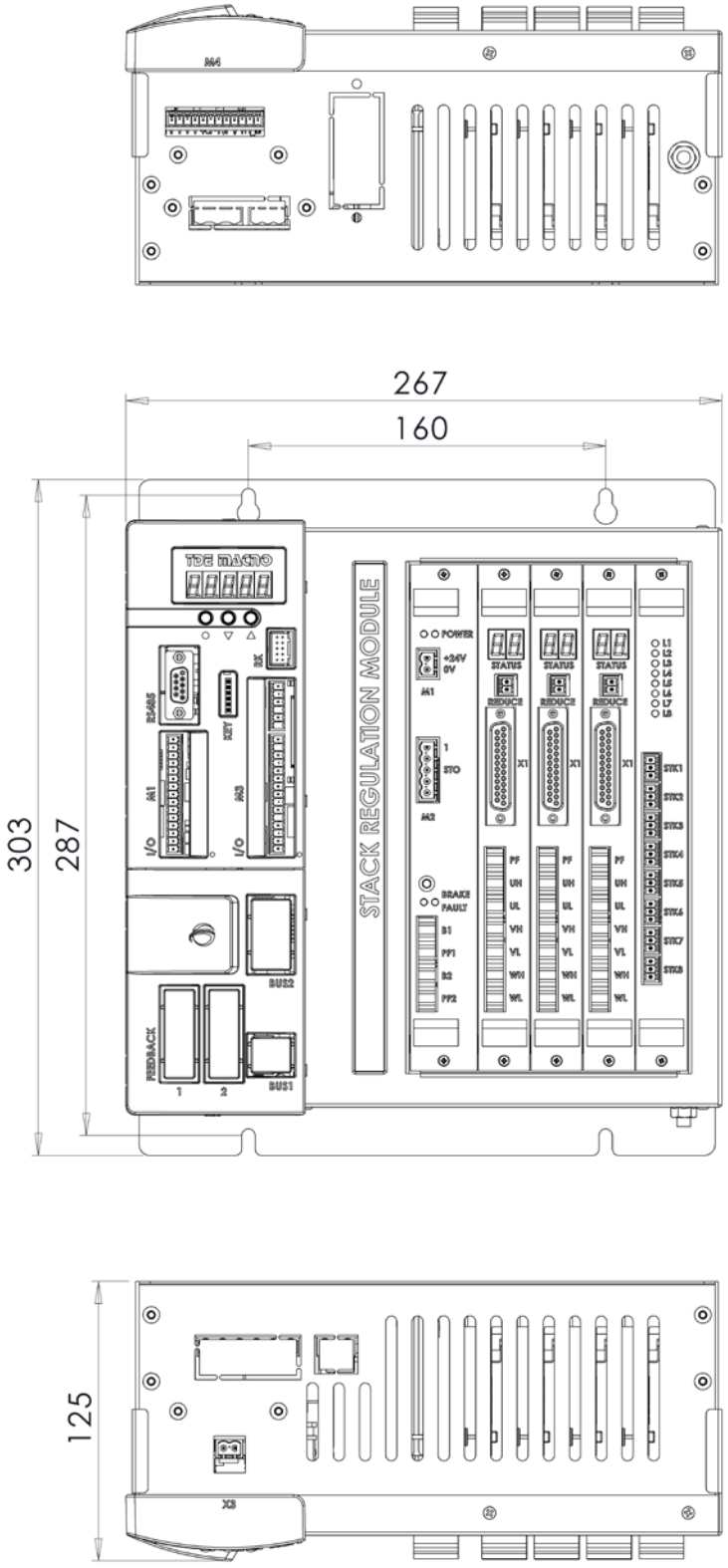


Fig.1B *(4 slot Control unit dimensions [mm])*

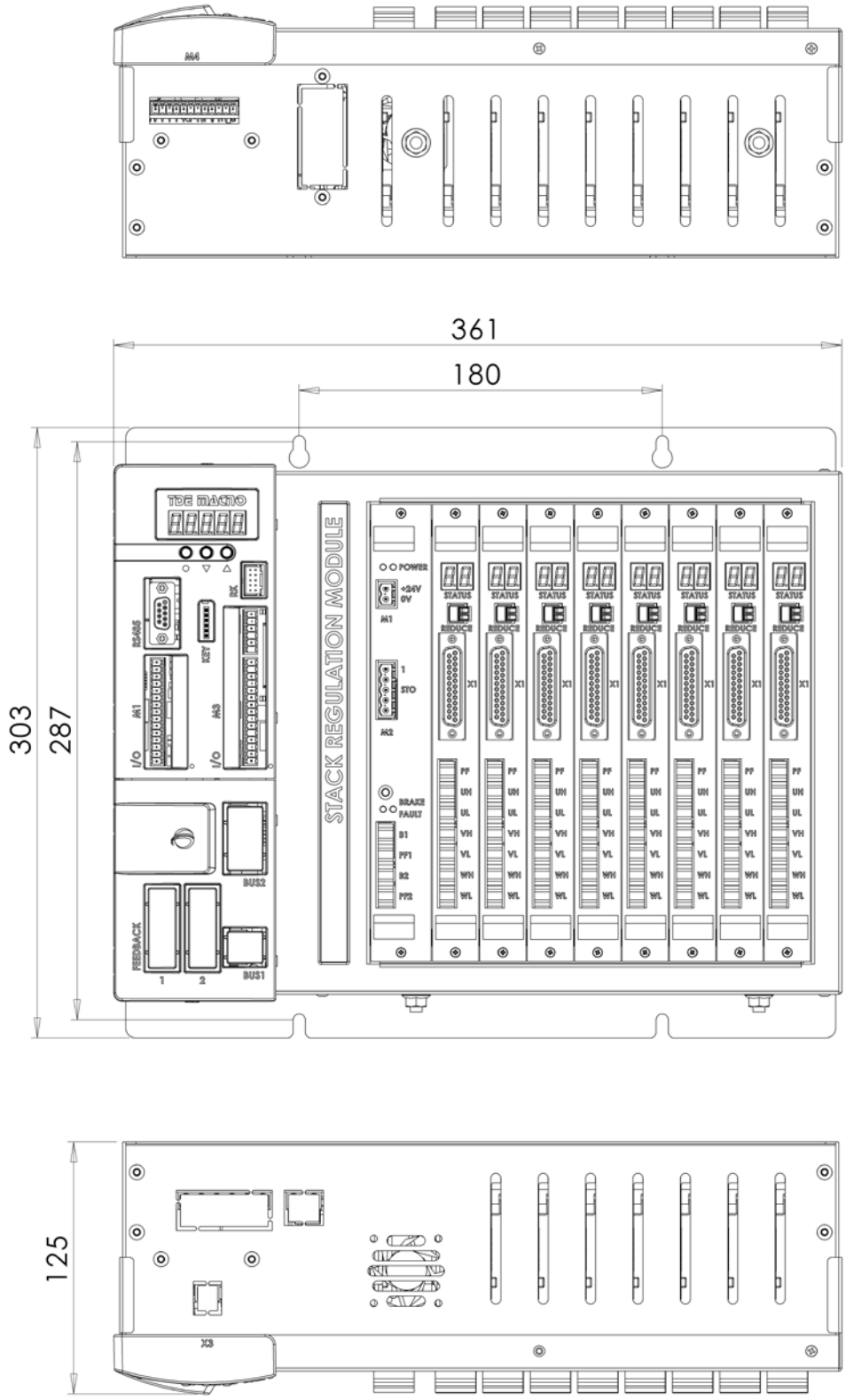
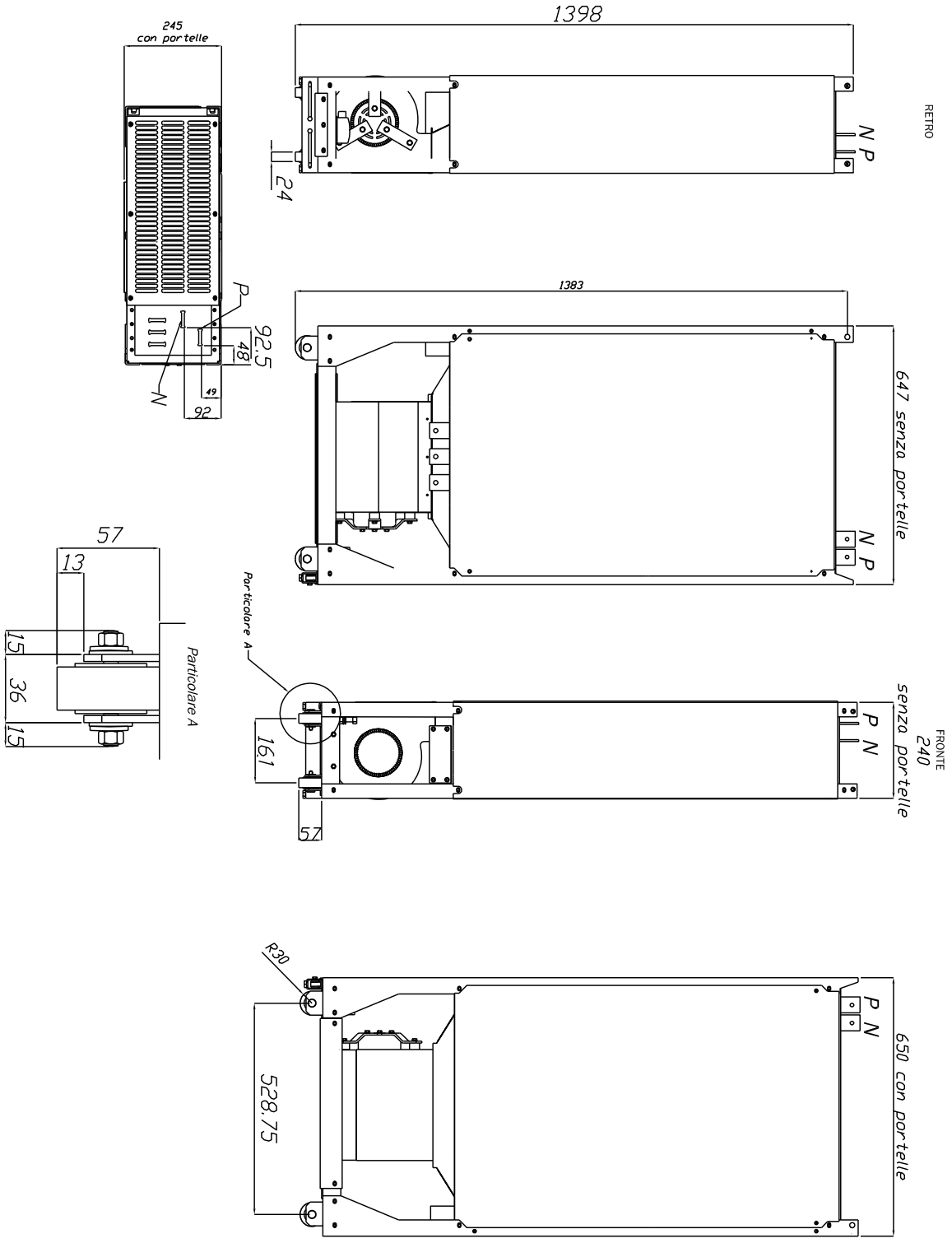


Fig.1C *(8 slot Control unit dimensions [mm])*



Senza portelle	**Without doors**
FRONTE	**FRONT VIEW**
Particolare A	**Detail A**
Con portelle	**With doors**
RETRO	**BACK VIEW**

Fig.1D *(Stack dimensions [mm])*

2 POWER SECTION

2.1 CONNECTING TO THE NETWORK IN AFE CONFIGURATION

The wiring diagrams for connecting the drive to the network in AFE configuration are shown here below:

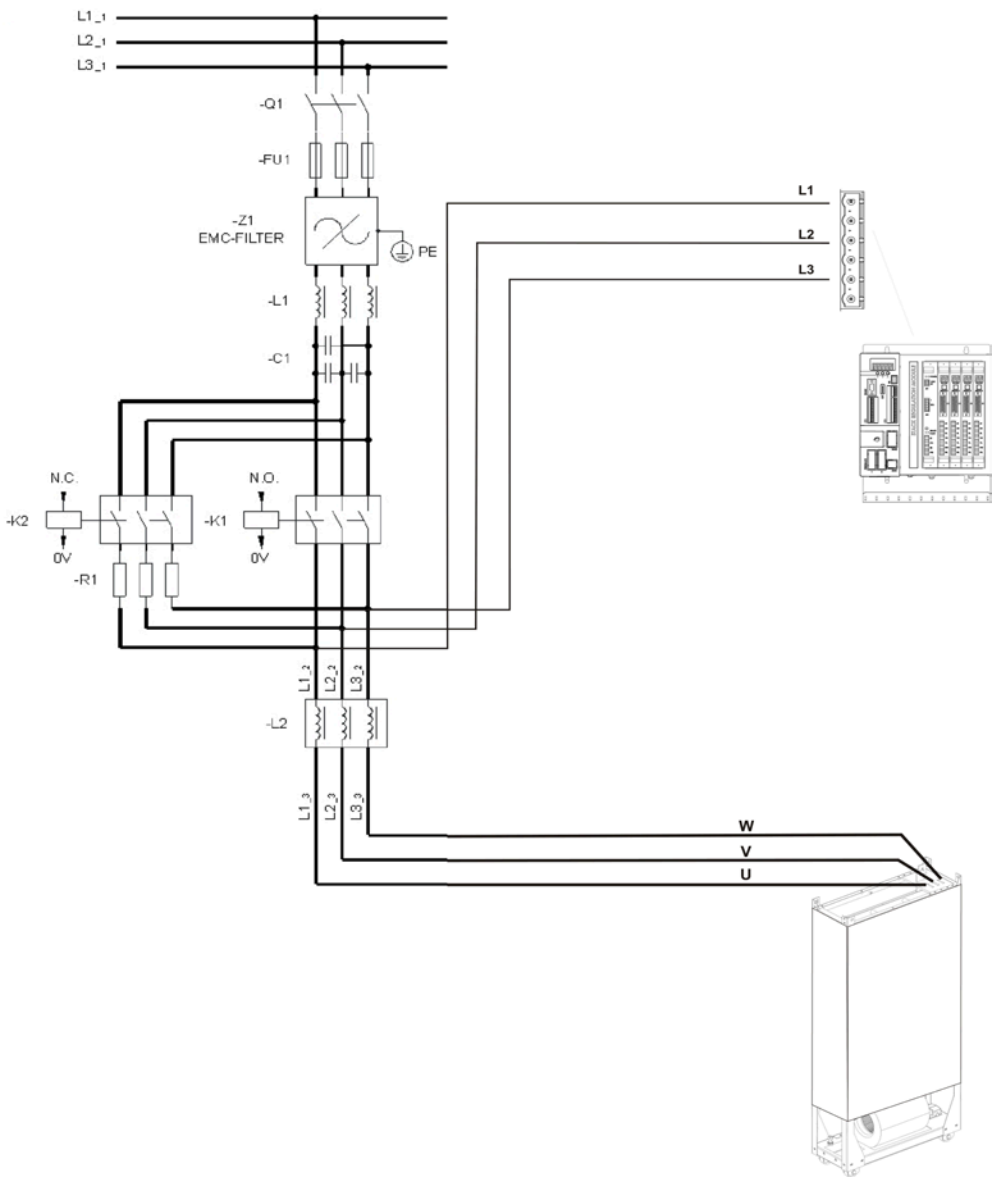


Fig. 2 *(Connection of a stack to the network)*

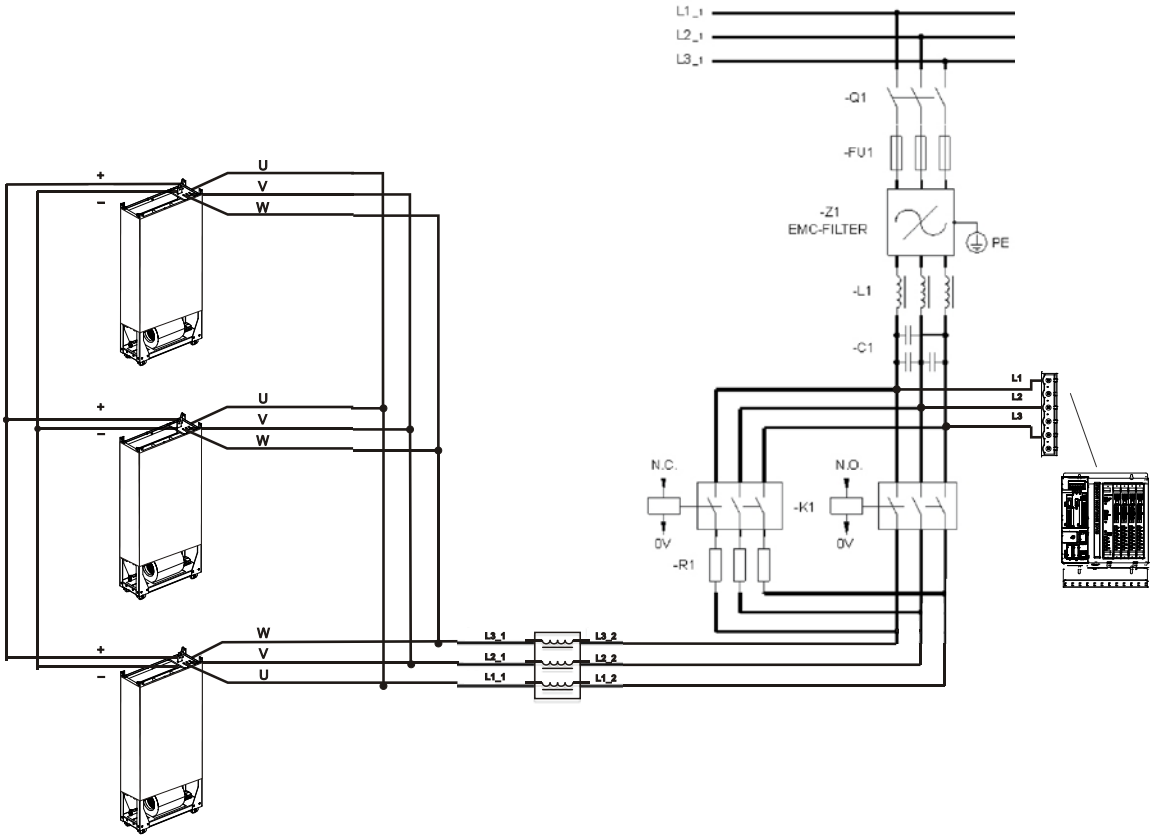


Fig. 3 *(Connection of several stacks to the network)*

Where:

FU1 Line fuses.

Z1 EMC filter assembly.

L1 Optional line inductance (to be foreseen, if the line drop is lower than 3%).

C1 Capacitor bank for filter.

K1 Main Contact. It is normally open and is closed only at the end of the pre-charge.

K2 Secondary contactor. It is normally closed and can open only when the pre-charge of the DC BUS has ended. It can be controlled by the command coming out from the Relay RL1, also without delays with reference to the control K1. K2 is a contactor of AC-3 type.

R1 Resistor assembly for DC BUS pre-charge.

L2 Main AFE inductance mandatory. (Line drop equal to 10%).

2.2 MOTOR CONNECTION

The motor is to be connected to the terminals as shown in the following figures:

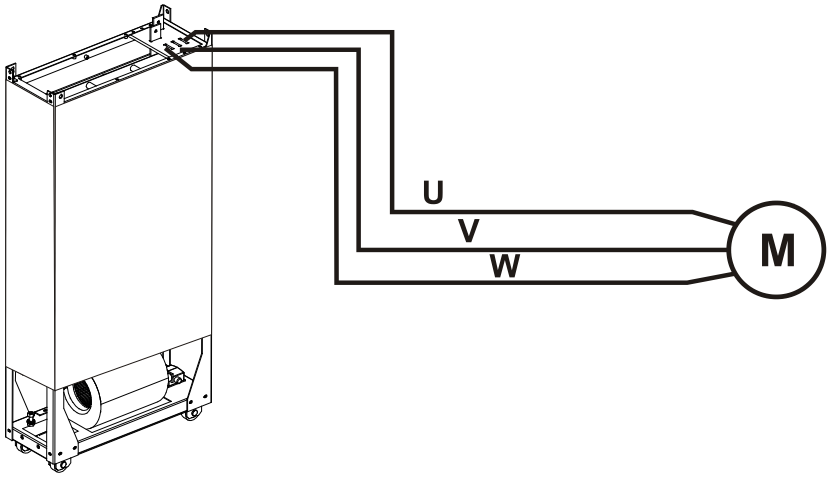


Fig. 4 *(Connection of the motor to a stack)*

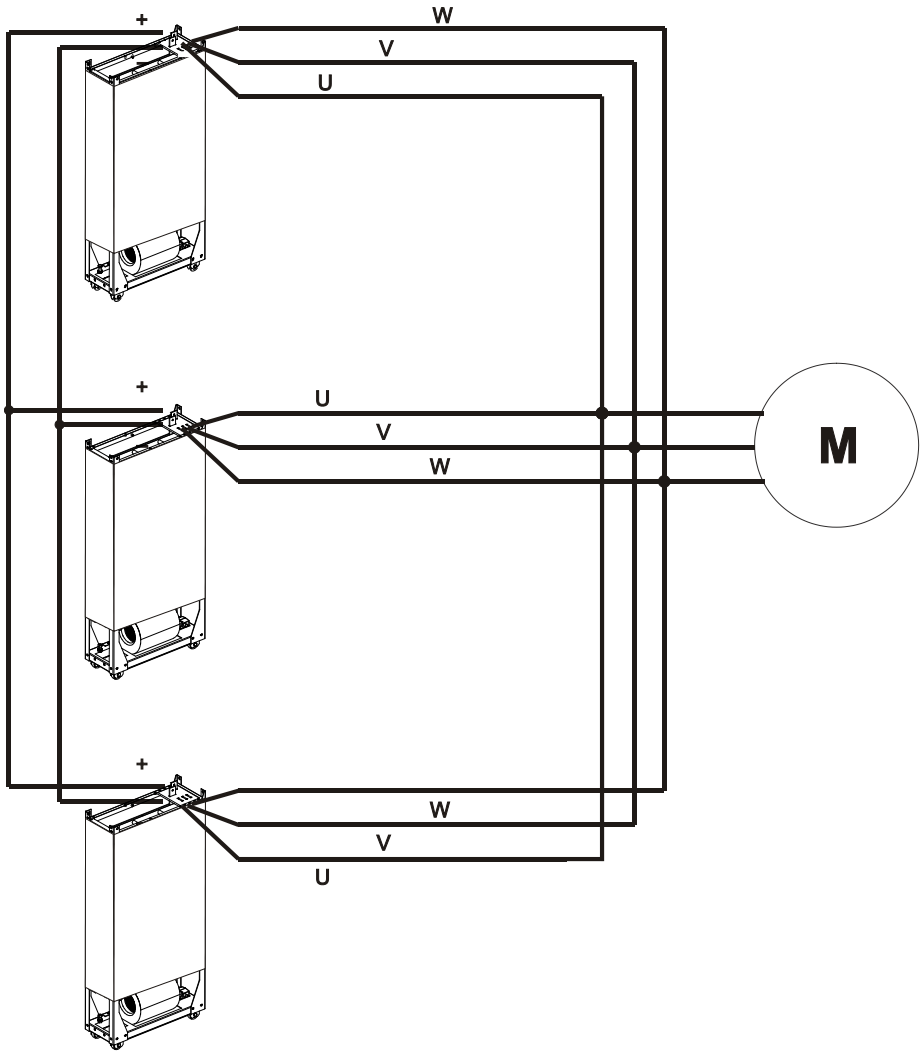


Fig. 5 *(Connection of the motor to several stacks)*

2.3 CONNECTION VIA BUS

The OPDE drives offer the possibility of being powered through a common bus by means of an appropriate DC power supply unit.
The benefits that may result from this configuration are the exchange of energy between the connected drives and the increase in the capacity of the available capacitor bank.

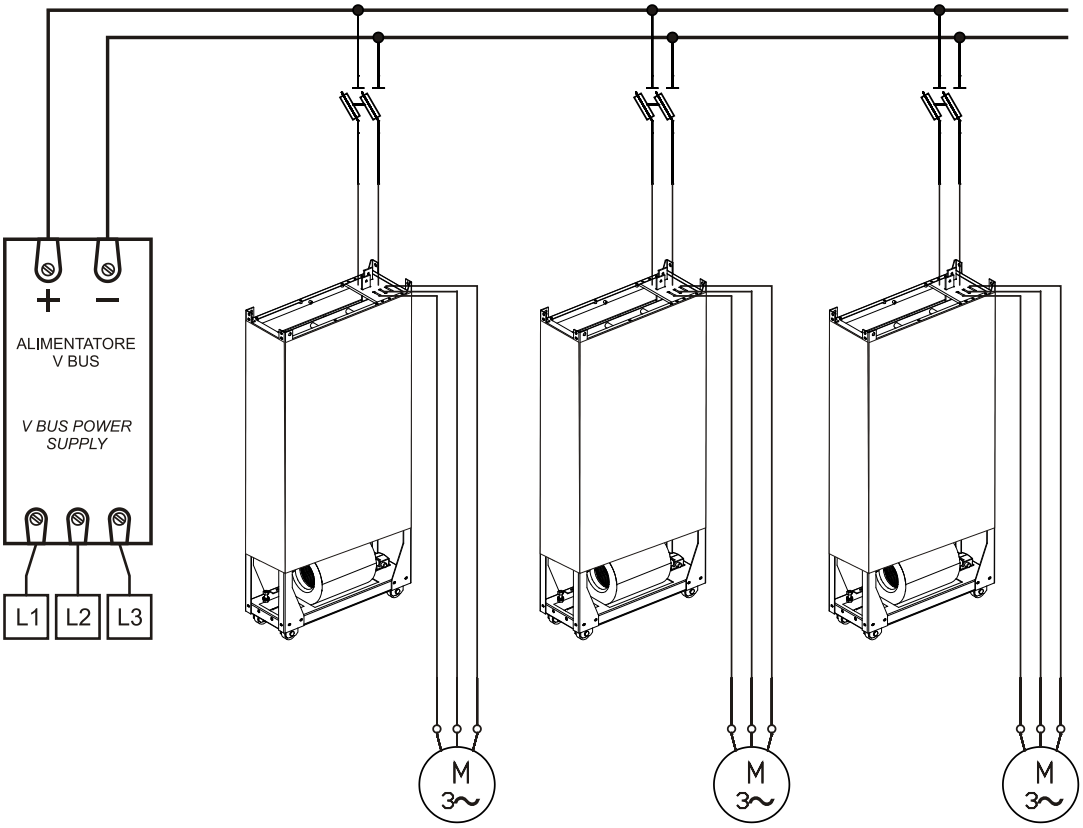


Fig. 6 *(Connection using a common bus)*

2.4 POWER CONNECTIONS ARRANGEMENT (MAINS, MOTOR)

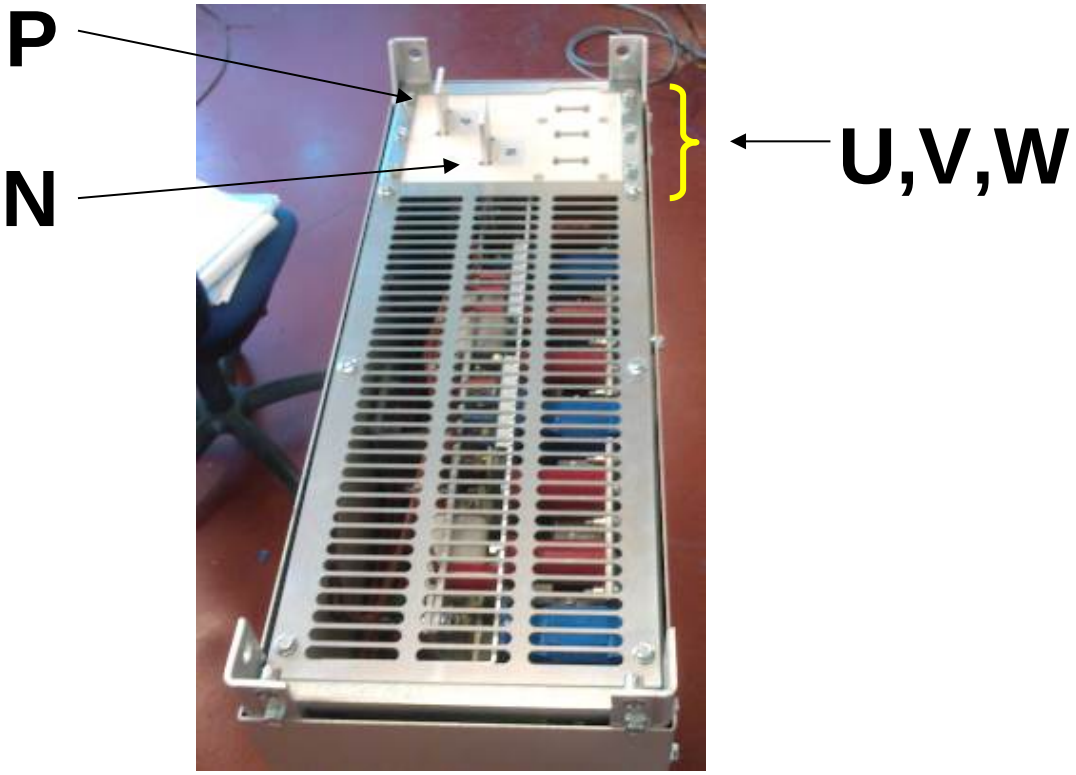


FIG. 7 *(Power connections arrangement)*

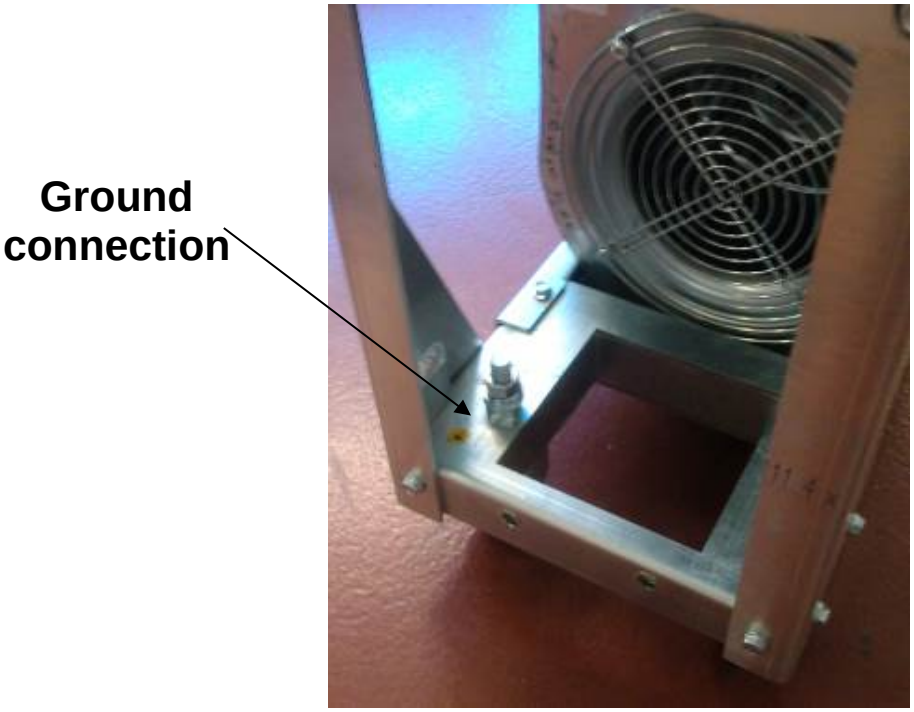


FIG. 8 *(Ground connections arrangement)*

2.5 AFE SYNCHRONISM CONNECTORS ARRANGEMENT

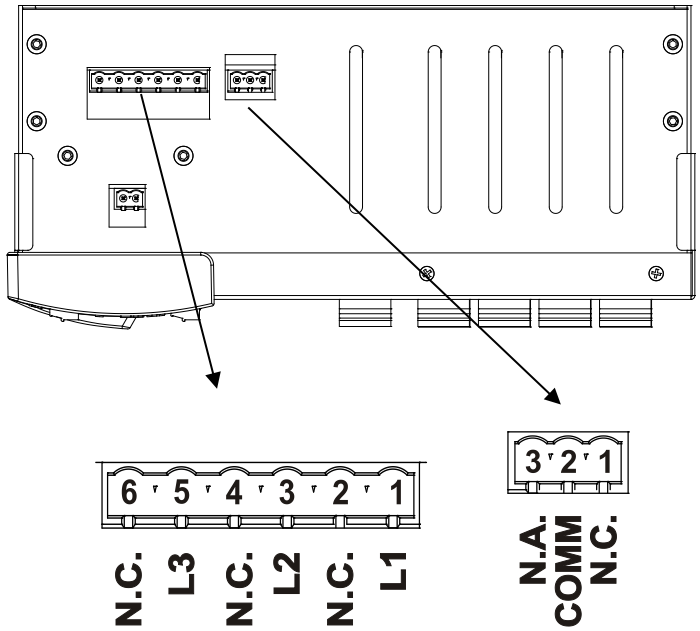
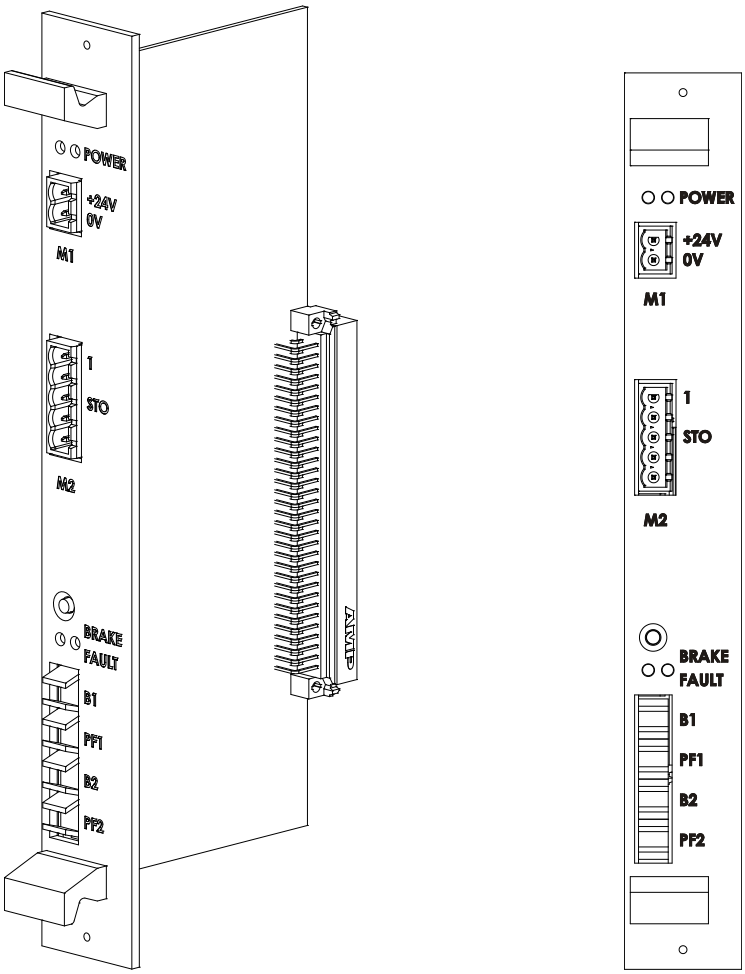


FIG. 9 (*AFE synchronism connectors arrangement)*

3 POWER SUPPLY UNIT



3.1 GENERAL DESCRIPTION OF THE POWER SUPPLY UNIT (4M0004.1)

The power supply card 4M0004.1 generates the necessary power for the control unit; it manages the second channel of the STO safety function and manages the control of two external stacks used as braking unit.

3.2 SIGNALING LEDS

On the front of the card 4M0004.1, there are several signaling and alarm LEDs.

NAME	DESCRIPTION
POWER	They indicate the presence of two supply voltages internal to the card. This means that the card fly-back is working properly.
BRAKE FAULT	They indicate the presence of a power alarm coming from the braking stacks. In particular, the red LED on the left indicates the presence of the alarm on the first braking stack (alarm given by PF1); while the right LED refers to the alarm provided by the second braking stack (PF2).

3.3 LOGIC POWER SUPPLY (M1)

The power supply card and, consequently, the entire control unit, must be powered via the terminal M1 as indicated below.

NAME	DESCRIPTION
+24V	Positive power supplied from outside: +24V±10%. The required current depends on the number of stacks controlled by the control unit. In the maximum configuration (8 stacks), 1A is required.
0V	Zero of the supply voltage.

3.4 STO SECOND CHANNEL (M2)

Below there are the signals present in the connector M2, present in the command module of the individual stack.

PIN	NAME	DESCRIPTION
1	STO_FB2_B	Clean N.C. contact max. 60Vdc max. 0.5A Monitor of the second channel of the STO function indicating whether the relay that interrupts the commands of the drivers to the IGBT is power supplied or not. With voltage present on the terminal S3, the contact is open.
2	STO_FB2_A	
3	-	
4	STO_2	+24V±10%. 20mA Supply voltage for the second of the two channels of the STO safety function. This channel allows interrupting the power supply of the drivers that control the optical fibers. During normal operation of the drive, the STO_2 voltage must be provided. On the contrary, to enable the STO function, it is necessary to disconnect the STO_2 voltage.
5	0P_STO_2	Zero the second channel of the STO function.

3.5 OPTICAL FIBERS

The table shows the meaning of the optical fibers present in the control module of the individual stack.

NAME	DESCRIPTION
B1	IGBT command of the first braking unit.
PF1	Alarm for the IGBT desaturation of the first braking unit.
B2	IGBT command of the second braking unit.
PF2	Alarm for the IGBT desaturation of the second braking unit.

3.6 RESET BUTTON

All alarms or signals present in the power supply card (4M0004.1) and stack control card (4M0005.1), besides bringing the control card in alarm status, are stored and displayed by means of 7-segment displays or LEDs. The alarm memory is retained even when the alarm signs disappear until:

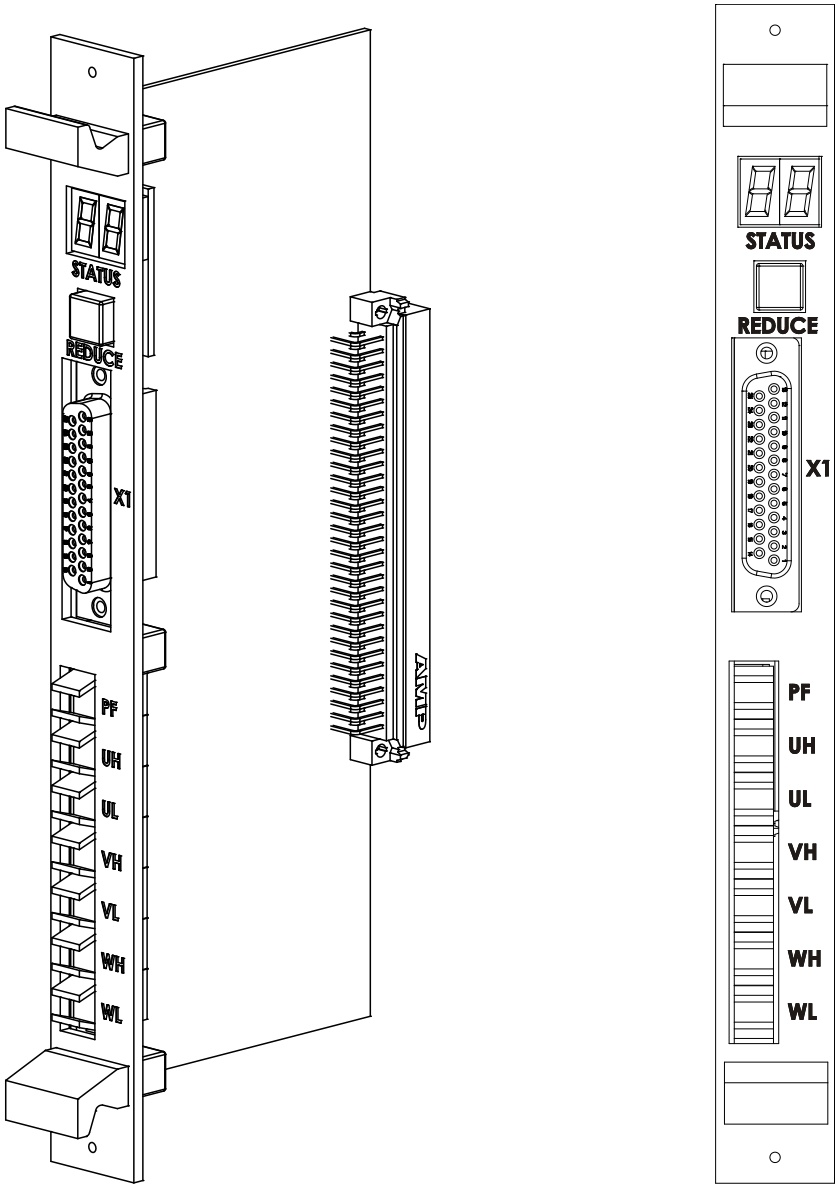
a) On the control card, a reset signal is provided and subsequently the converter run command is provided.
b) Power supply to the control unit (by M1) is disconnected and then provided again
c) The reset button present on the front of the card 4M0004.1 is pressed.

CAUTION: The reset button allows restoring only the display of the alarms on the various cards and NOT resetting the alarm of the regulation card.

4 CONTROL MODULE FOR STACK (4M0005.1)

The card 4M0005.1, together with the card 4M0007.1, acts as an interface between the control cards and power stack (STACK). The card, in fact, transmits the PWM commands of the DSP to the stack and receives the digital alarm signals and the analog feedback ones from the stack itself. As for the PWM controls, the card is just a simple amplifier as it transmits, through the optical fiber, the same signals received by the DSP.
The analog current signals are transferred to the regulation card, which uses them to control the motor. The card 4M0005.1 also uses them to generate overcurrent and electronic differential alarms, if their value is incorrect.
The control module consists of some parts described in detail below:
Signaling display (STATUS)
Button to enable the reduced function (REDUCE)
Connector for the connection to the stack (X1)
Optic fibers for the connection to the stack

4.1 FRONT PANEL OF THE STACK CONTROL MODULE (4M0005.1)



4.2 SIGNALING DISPLAY (STATUS)

The two seven-segment displays indicate the status of the stack to which the control card is connected. Both displays can indicate that the power stack:

a) is in alarm status (provide information on the type of alarm occurred)
b) shows no alarms and is not working
c) is working
d) the REDUCED function is active, which excludes the stack from the converter operation

4.3 REDUCE BUTTON

The REDUCE button is used to exclude from the control the stack connected to the control module. This allows working, if the application allows it, even if the stack is subject to a fault, which does not affect the operation of the system.

4.4 25-WAY CONNECTOR (X1)

Below there are the signals present in the connector M1, present in the command module of the individual stack.

PIN	NAME	DESCRIPTION
1	+15V	Supply voltage provided by the power stack (+15V).
2	-	
3	LEM_V	Current signal of the phase V.
4	+15	Supply voltage provided by the power stack
5	FUSE	Terminal of the normally closed contact that indicates the status of the fuses on the DC BUS.
6	-	
7	-	
8	+VAL	Terminal of the normally open contact that indicates the status of the DC BUS safety function.
9	-	
10	MAXVOLT	Digital alarm of maximum voltage of the power bus.
11	+VAL	Terminal of the normally closed contact that indicates the status of bi-metallic element present on the stack heat sink.
12	-	
13	STO	Terminal of the normally open contact that indicates the status of the DC BUS safety function.
14	LEM_W	Current signal of the phase W.
15	+VAL	Terminal of the normally closed contact that indicates the status of the fuses on the DC BUS.
16	0VAL	Common of the stack supply voltage
17	LEM_U	Current signal of the phase U.
18	+VAL	Terminal of the normally open contact that indicates the status of the fly-back present in the stack.
19	VBUS	Analog signal of the power bus voltage.
20	-	
21	BIT4	Stack identification bit.
22	BIT5	Stack identification bit.
23	RESET	Reset signal for the electronics within the stack.
24	OK	Terminal of the normally open contact that indicates the status of the fly-back present in the stack.
25	OVERTEMP	Terminal of the normally closed contact that indicates the status of bi-metallic element present on the stack heat sink.

4.5 OPTICAL FIBERS

The table shows the meaning of the optical fibers present in the control module of the individual stack.

NAME	DESCRIPTION
PF	Desaturation alarm of the stack IGBTs.
UH	High IGBT command of the phase U.
UL	Low IGBT command of the phase U.
VH	High IGBT command of the phase V.
VL	Low IGBT command of the phase V.
WH	High IGBT command of the phase W.
WL	Low IGBT command of the phase W.

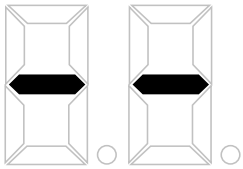
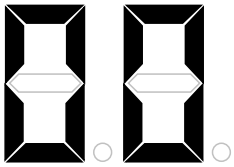
4.6 STATUS SIGNALING DISPLAYS

The two seven-segment displays (STATUS) indicate the status of the stack to which the control card 4M0005.1 is connected. As previously mentioned, the STATUS may show three different conditions:

1) No alarms
2) Alarms present
3) Operation in reduced mode

The following paragraphs specify in detail all the possible signals related to each of the three status conditions.

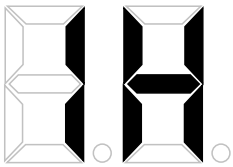
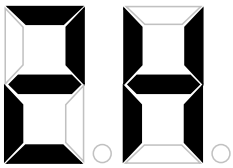
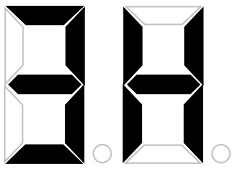
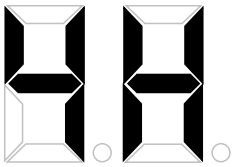
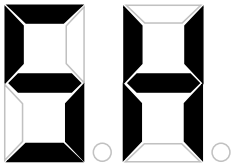
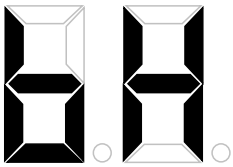
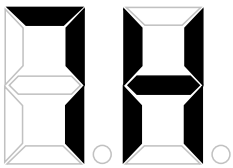
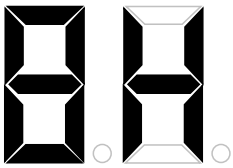
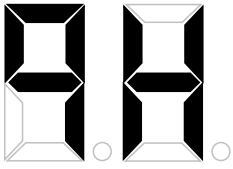
4.6.1 NO ALARMS

	**STOP WITHOUT ALARMS** The control module of the stack does not show any alarms and is ready to receive from the control card the run enabling command and the six commands of the IGBTs.
	**OPERATION ON** The control module is providing the stack with the six commands of the IGBTs, transmitting to the control card the current feedback signals and the status of the alarms coming from the stack itself.

4.7 ALARMS PRESENT

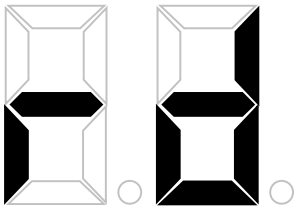
The card 4M0005.1 stores and transfers to the control card the alarms coming from the stack. The number of active alarms is high and currently it cannot be handled directly by the DSP. The function of the 4M0005.1, therefore, is to summarize them in a limited number. In this way, in presence of an alarm, the control card blocks thus protecting the power part of the converter. On the card 4M0005.1, there are two seven-segment displays (STATUS) that have the purpose of providing a complete diagnostic of the status in which the stack itself is. In presence of an alarm condition or when it is necessary to provide a simple alert, the control card of the stack reaches the status of "Alarms present". In this case, on the seven-segment display on the left appears, in rotation, the alarm or signal code. The display on the right, instead, shows the alarm status. (L = inactive alarm/warning H = active alarm/warning). There may be several alarms present simultaneously for which, for a correct diagnosis, it is important to check the status of all the alarm codes.

Here below, there are the signaling codes present in the module.
The description is also referred to the possible alarm code of the control card of the entire converter.

	**MAXIMUM VOLTAGE** Maximum voltage HW alarm of the power bus. This alarm occurs when the voltage of the power bus reaches a level beyond which the stack power components could be damaged. Its tripping blocks also the control card that shows the alarm code A11H (maximum voltage of the power bus).
	**OK** Failure of the 1000Vdc power supply unit present within the stack. This is just a warning that does not lead to the system block if in the stack there is also an auxiliary +24V power supply that keeps the power supply voltage active. Only a warning occurs, given that the 1000V fly-back failure does not compromise the correct operation of the system.
	**POWER FAULT** Desaturation alarm of the power IGBTs. This alarm code indicates that on at least one of the six power IGBTs a too high current passed, due to an external short circuit or an internal fault. Its tripping blocks the converter due to the alarm code A3H.
	**OVERTEMPERATURE** The temperature of the radiator has reached an excessive level. The converter regulation card reaches an alarm status (A5.1H).
	**SAFE TORQUE OFF** Enabling of the first channel of the safety function. This alarm indicates that there is a failure of the power supply voltage of the circuits that turn on the power IGBTs. The indication on the displays of each stack and the signal provided by the control card (A13.1H) should NOT be used as a monitor of the channel. In the stack, in fact, this is a normally closed clean contact that performs this task.
	**OVERCURRENT** The module has detected an excessive current provided by the stack on at least one of the three output phases. The relief of the supplied currents (for all three phases) is carried out by analyzing the current signals supplied by the stack itself and used by the converter to control the motor. Given that it is an alarm related to the power part, also in this case the converter is brought to alarm status with A3H code.
	**DIFFERENTIAL** The sum of the three output currents of the stack must be equal to zero. If this does not occur, the alarm trips that blocks also the converter (A3H alarm). In case of several parallel stacks, this alarm may also indicate an imbalance of the phase currents between one stack and the other.
	**FUSES** This error code indicates the opening of at least one of the two fuses placed on the DC BUS within the stack. It is not possible to continue to work; therefore, the control card is brought to alarm with A5.1H code.
	**POWER SUPPLY** The stack provides a supply voltage to the control module. If this fails, the 9H alarm code trips. Also the converter blocks with A3H code.

4.8 REDUCED STATUS

To indicate the status of reduced operation, the two seven-segment displays flash and indicate the rd code



4.8.1 OPERATION IN REDUCED MODE

When a converter consists of several stacks parallel connected to one another and the application allows it, it is possible to work with a stack less excluding it using the REDUCE button located on the front. In this condition, the six commands of the IGBTs are no longer supplied and the alarms coming from the stack are inhibited. This to prevent the stack, bypassed due to an internal fault, from interacting with the converter that should continue to work.

The operation in reduced mode has to be considered exceptional and, therefore, this operation mode has to be accessed only when:

a) the converter consists of several stacks parallel connected.
b) one of the stacks features an internal failure that does not compromise the correct operation of the other elements connected on the DC BUS.
c) The application allows working at a reduced rate and, thus, reducing the current supplied by the inverter.

To access this operation mode it is necessary to:

a) Disconnect the power supply to the power equipment.
b) When the stack to be excluded shows an IGBT short circuit, it is necessary to disconnect and isolate the output phases U, V and W of the stack. In case of a short circuit on the DC BUS, if the fuses inside the faulty stack have not tripped yet, it is necessary to disconnect also the connection of the faulty stack also from the DC BUS.
c) Press and hold the REDUCE button of the stack to be excluded until the 7-segment display STATUS shows the text "rd" flashing.
d) Limit the maximum output current and reduce the duty cycle so as to reduce the requested thermal current so as not to overload too much the remaining stacks. This requires the involvement of personnel able to handle this kind of mode.
e) Provide voltage again to the power equipment.
f) Reset any alarms: the converter is again ready to work.

CAUTION: The operation in reduced mode requires the involvement of skilled personnel; therefore, it is necessary to press the button REDUCE EVERY time that the control card is powered. The operation in reduced mode, in fact, DOES NOT keep memory when the supply voltage is shut down.

5 LOGICAL CONNECTIONS

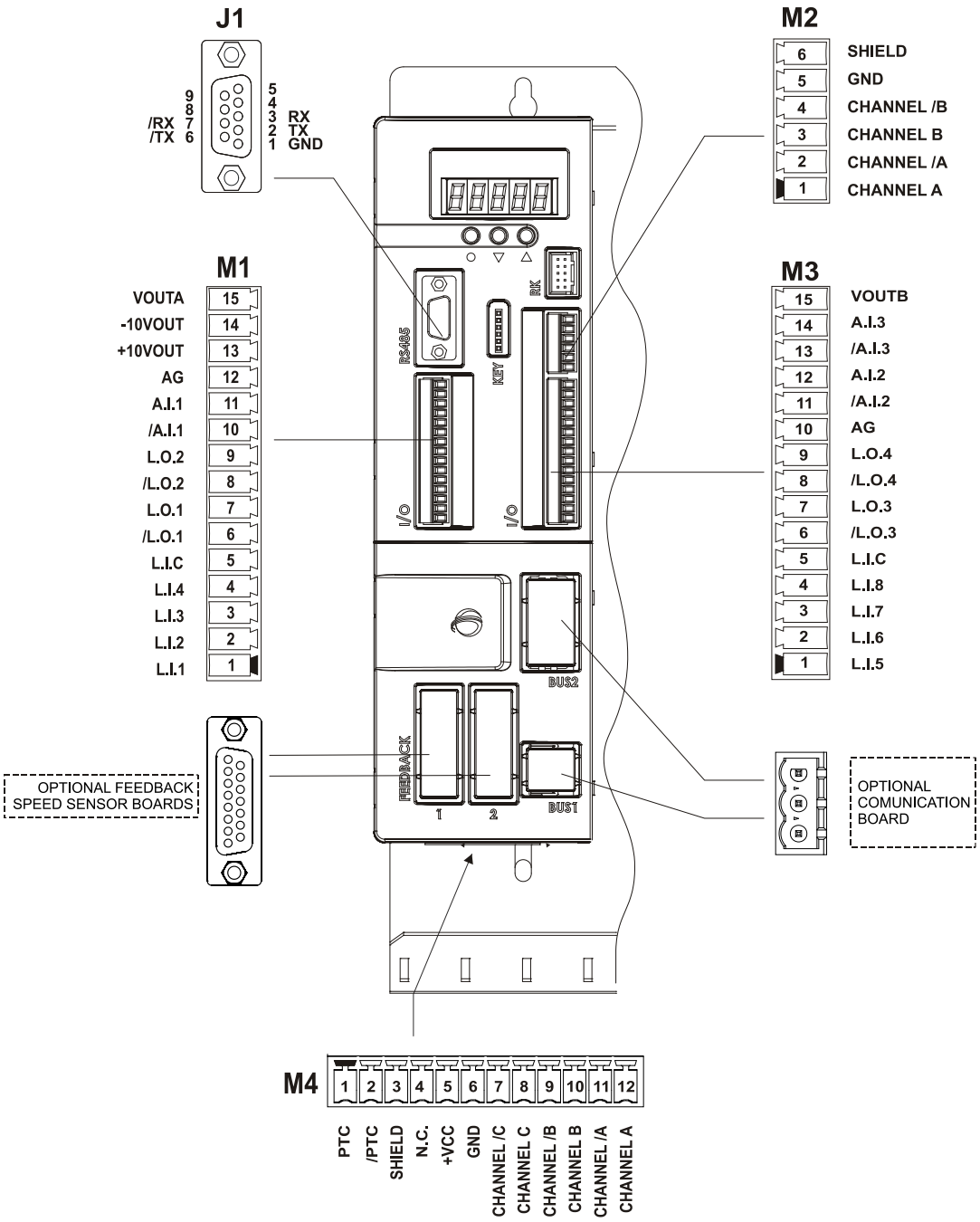
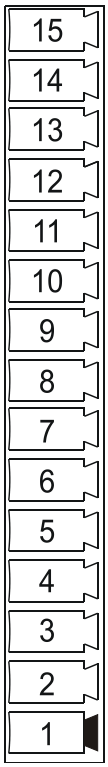
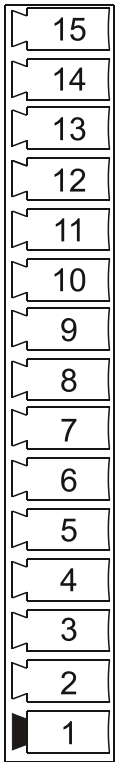


FIG. 10 (*Arrangement of the logical connections)*

5.1 DIGITAL AND ANALOG I/O CONNECTIONS

M1	PIN	FUNCTION	DESCRIPTION
	1	L.I.1	Configurable logical inputs **(see FIG. 11)**. All inputs are optically isolated from the internal regulation. L.I.C. is the common of the inputs L.I.1, L.I.2, L.I.3, L.I.4.
	2	L.I.2	
	3	L.I.3	
	4	L.I.4	
	5	L.I.C	Common of the logical inputs to be connected to the negative of the input power supply.
	6	/L.O.1	Configurable optically isolated logical output **(see FIG. 13)**. The transistor is conductive when the output is ON. Imax = 60 mA
	7	L.O.1	
	8	/L.O.2	Configurable logical outputs with relay contact. The contact is normally open. Imax = 1A @ 30VDC / 0.3A @ 125VAC.
	9	L.O.2	
	10	/A.I.1	Configurable analog input **(see FIG. 12)**. Input: +/-10V (max. 0.5 mA) or 4 ÷ 20 mA, settable with the appropriate jumper.
	11	A.I.1	
	12	AG	0V
	13	+10VOUT	Stabilized power supply - 10mA maximum (ref. PIN 12).
	14	-10VOUT	
	15	VOUTA	Configurable analog output **(see FIG. 14)**. Output: ± 10V /2mA.

TAB. 1 (*digital and analog I/O*)

M3	PIN	FUNCTION	DESCRIPTION
	1	L.I.5	Configurable logical inputs **(see FIG. 11)**. All inputs are optically isolated from the internal regulation. L.I.C. is the common of the inputs L.I.5, L.I.6, L.I.7, L.I.8.
	2	L.I.6	
	3	L.I.7	
	4	L.I.8	
	5	L.I.C	Common of all logical inputs to be connected to the negative of the input power supply.
	6	/L.O.3	Fast configurable logical outputs (max. 5 kHz) **(see FIG. 13)**. All outputs are optically isolated from the internal regulation. The transistor is conductive when the output is ON. Imax = 60 mA
	7	L.O.3	
	8	/L.O.4	Configurable logical outputs with relay contact. The contact is normally open. Imax = 1A @ 30VDC / 0.3A @ 125VAC
	9	L.O.4	
	10	AG	0V
	11	/A.I.2	Configurable analog inputs **(see FIG. 12)**. Inputs: +/-10V (max. 0.5 mA) or 4 ÷ 20 mA, settable with the appropriate jumpers.
	12	A.I.2	
	13	/A.I.3	
	14	A.I.3	
	15	VOUTB	Configurable analog output **(see FIG. 14)**. Output: ± 10V /2mA.

TAB. 2 (*digital and analog I/O*)

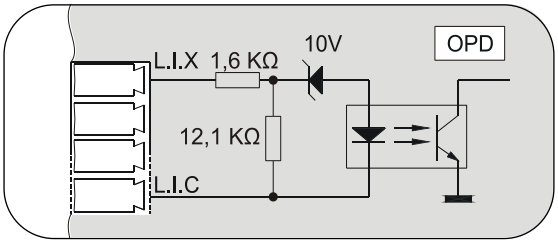


FIG. 11 (*Configurable logical inputs*)

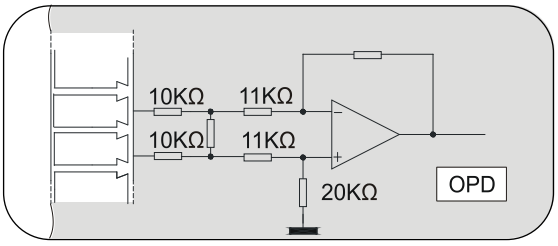


FIG. 12 (*Configurable analog inputs*)

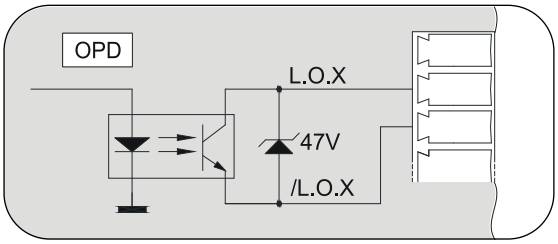


FIG. 13 (*Configurable logical outputs*)

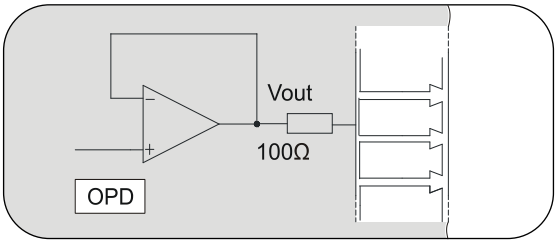
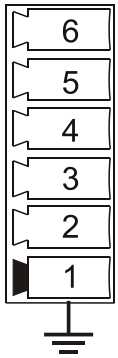


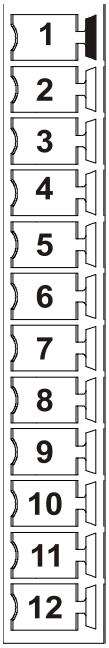
FIG. 14 (*Configurable analog outputs*)

5.2 FREQUENCY INPUT

M2	PIN	FUNCTION	DESCRIPTION
	1	E-A	Channel A input, if differential (otherwise not connected).
	2	E-/A (F)	Channel /A frequency input or frequency input.
	3	E-B	Channel B input, if differential (otherwise not connected).
	4	E-/B (UP)	Channel /B frequency or direction input. (UP/DOWN).
	5	GND	0V
	6		Shield

TAB. 3 (Frequency input)

5.3 MANAGEMENT OF THE MOTOR THERMAL SENSOR AND SIMULATED ENCODER

M4	PIN	FUNCTION	DESCRIPTION
	1	PTC Bi-metallic	Motor thermal probe input (PTC or NTC or KTY84).
	2	/PTC Bimetallic	
	3	PE	
	4	N.C.	
	5	+Vcc	
	6	GND	
	7	CHANNEL /C	Connections for Simulated Encoder
	8	CHANNEL C	
	9	CHANNEL /B	
	10	CHANNEL B	
	11	CHANNEL /A	
	12	CHANNEL A	

TAB. 4 (*Management of the motor thermal sensor and simulated encoder*)

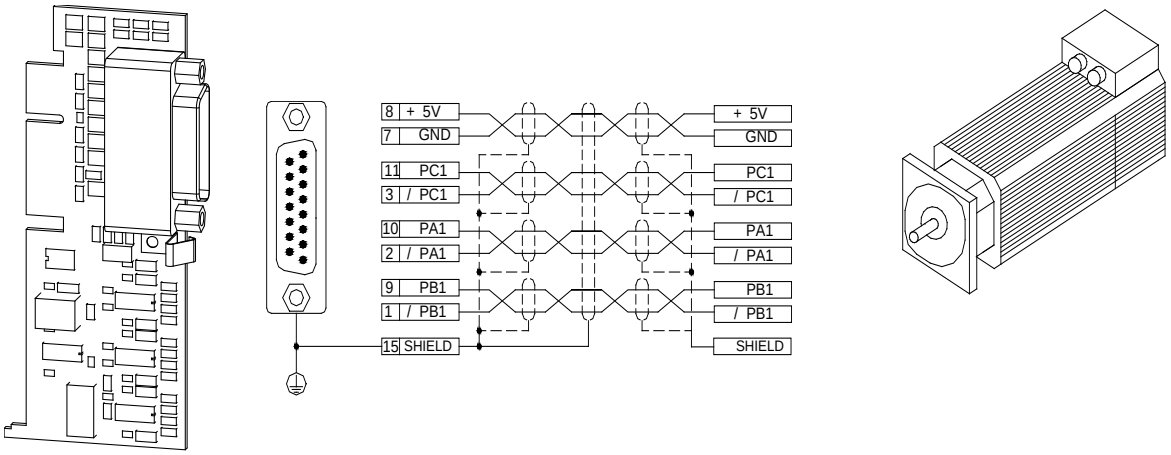
5.4 I/O DEFAULT CONFIGURATION

INPUT	DEFAULT	*CONNECTION*
L.I.1	Reset alarms.	C01 = 8
L.I.2	External consent.	C02 = 2
L.I.3	Enabling of the 14-bit analog reference A.I.1.	C03 = 3
L.I.4	Running drive (power stage enabled).	C04 = 0
L.I.5	Enabling of the 14-bit analog reference A.I.2.	C05 = 4
L.I.6	CW/CCW	C06 = 12
L.I.7	Speed jog enabling.	C07 = 5
L.I.8	Linear ramps enabling.	C08 = 22
OUTPUT	**DEFAULT**	***CONNECTION***
L.O.1	Running drive (power stage enabled).	C10 = 3
L.O.2	Drive ready.	C11 = 0
L.O.3	Ramp on the speed reference completed	C12 = 6
L.O.4	Speed greater than the minimum one	C13 = 2
OUTPUT	**DEFAULT**	***CONNECTION***
VOUTA	Module of the current delivered by the converter.	C15 = 11
VOUTB	Working frequency or motor speed.	C16 = 4

TAB. 5 (*I/O default configuration)*

5.5 OPTIONAL FEEDBACK CARDS

5.5.1 TTL ENCODER

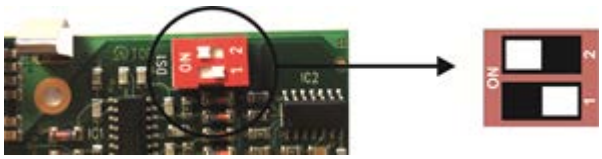


Use only twisted pair cables and individually shielded cables plus external shield

The encoder must be a 5V encoder with "Line Driver" output, with such a number of rotation pulses as not to exceed 300KHz per channel; the current absorbed by the Pin 5 "+5V" must not be greater than 100mA.

The encoder in the motor can also be at a different voltage than 5V (5÷24V). In such a case, it has to be supplied by an external source. Connect only the pin 7 (GND) of the drive with the negative of this source.

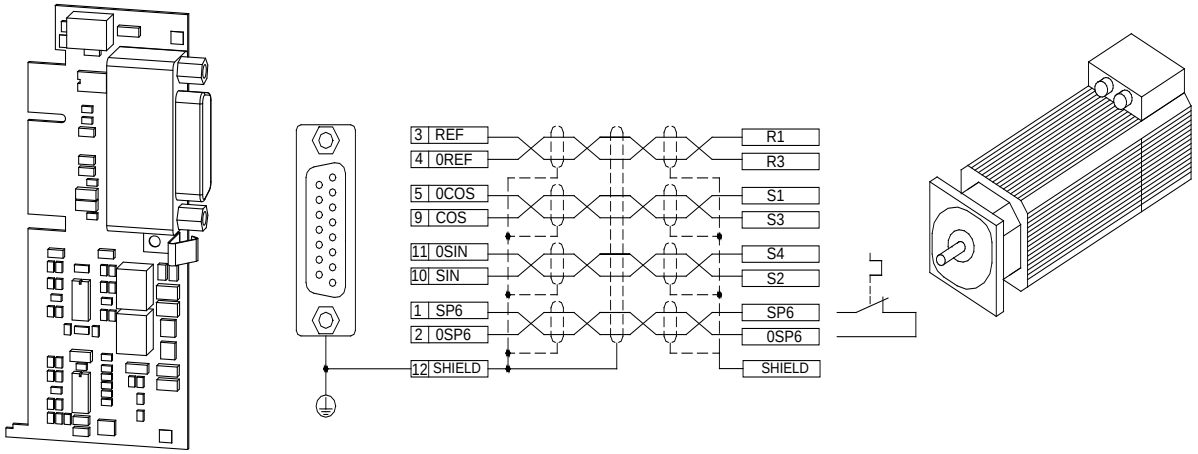
CAUTION: For encoders with internal power supply (drive in the standard version), it is necessary to connect the pin 8 (+5V) and position the DIP switch present on the card as shown below (closed)



CAUTION: for the encoders with external power supply, it is not necessary to connect the pin 8 (+5V), because this would seriously damage the drive. Position the DIP switch present on the card as shown here below (open)

ATTENTION: Any operation must be done only to drive off!!!!

5.5.2 RESOLVER



R1	Red-White
R3	Yellow/White or White-Black
S1	Black
S2	Yellow
S3	Red
S4	Blue

Example of colors for the resolver

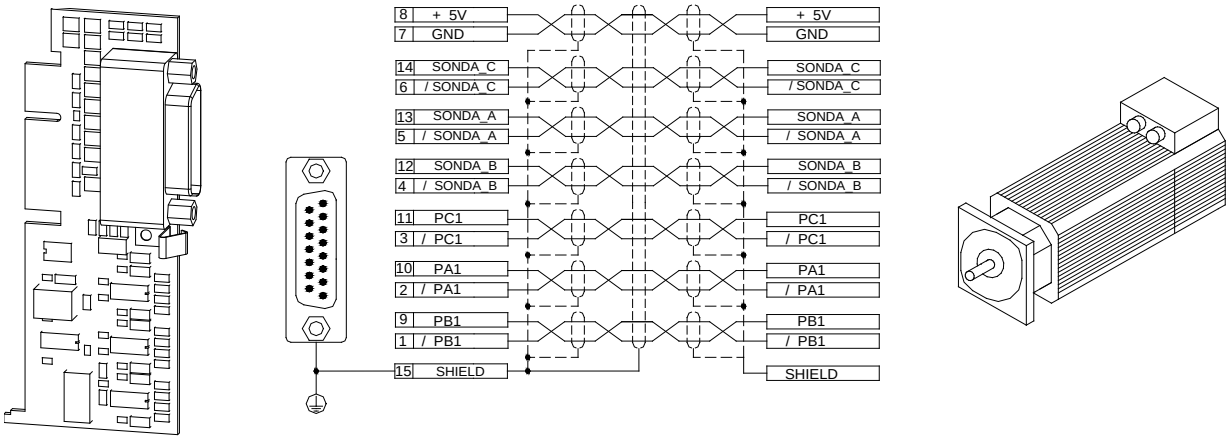
Use only twisted pair cables and individually shielded cables plus external shield.

The pin 12 and the metallic receptacle connector on the feedback card are connected internally to the drive ground.

By default, the drive manages a probe of bi-metallic type (pin SP6 and 0SP6). It is possible to manage several thermal probes (type NTC, PTC or KTY84… through the connector M4-X4) indicating the features upon order.

ATTENTION: Any operation must be done only to drive off!!!!

5.5.3 ENCODER AND HALL SENSOR

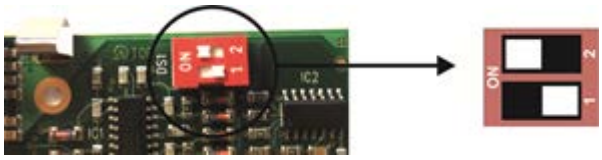


Use only twisted pair cables and individually shielded cables plus external shield.

The encoder must be a 5V encoder with "Line Driver" output, with such a number of rotation pulses as not to exceed 300KHz per channel; the absorbed current must not be greater than 100mA.

The encoder in the motor can also be at a different voltage than 5V (5÷24V). In such a case, it has to be supplied by an external source. Connect only the pin 7 (GND) of the drive with the negative of this source.

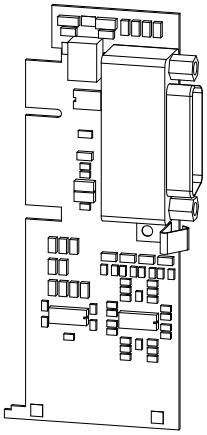
CAUTION: For encoders with internal power supply (drive in the standard version), it is necessary to connect the pin 8 (+5V) and position the DIP switch present on the card as shown below (closed)

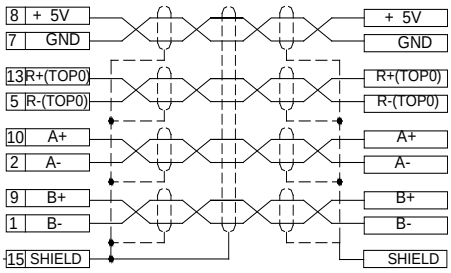


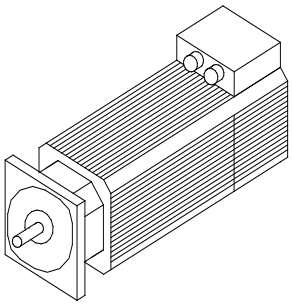
CAUTION: for the encoders with external power supply, it is not necessary to connect the pin 8 (+5V), because this would seriously damage the drive. Position the DIP switch present on the card as shown here below (open)

ATTENTION: Any operation must be done only to drive off!!!!

5.5.4 INCREMENTAL SIN COS ENCODER



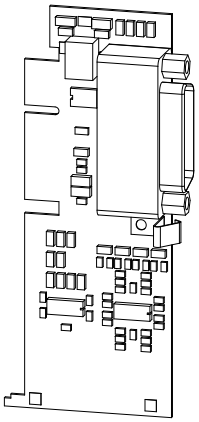


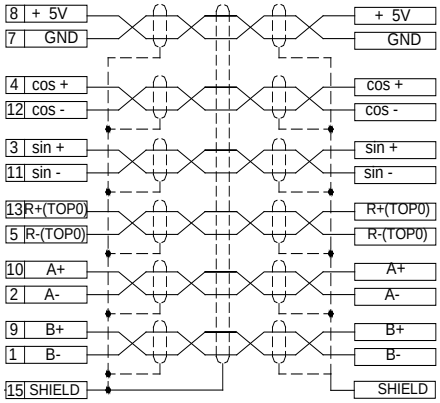


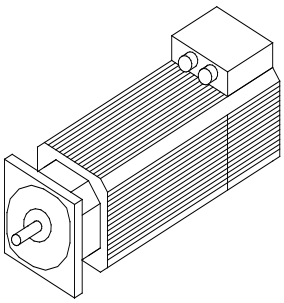
Use only twisted pair cables and individually shielded cables plus external shield.

The Sin Cos encoder must be a 5V encoder with such a number of rotation pulses as not to exceed 300KHz per channel; the absorbed current must not be greater than 100mA.

5.5.5 ABSOLUTE SIN COS ENCODER





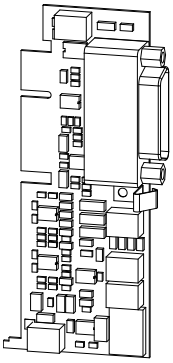


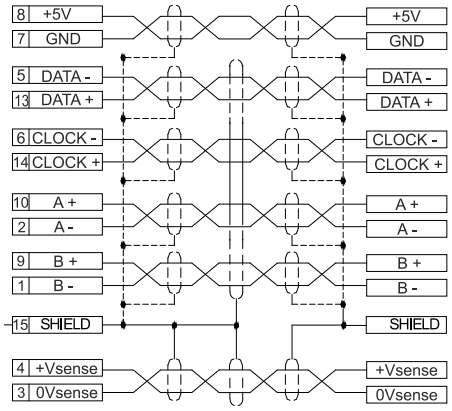
Use only twisted pair cables and individually shielded cables plus external shield.

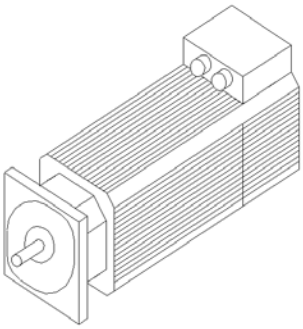
The Sin Cos encoder must be a 5V encoder with such a number of rotation pulses as not to exceed 300KHz per channel; the absorbed current must not be greater than 100mA.

ATTENTION: Any operation must be done only to drive off!!!!

5.5.6 ENDAT 2.1



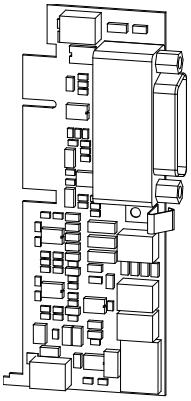


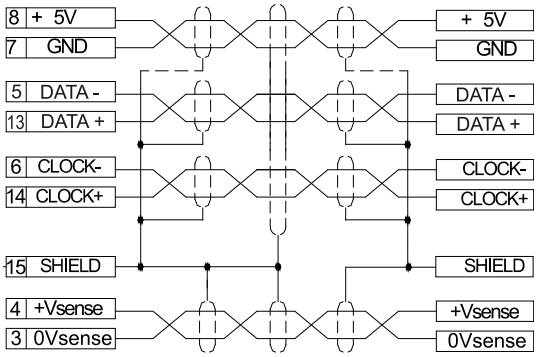


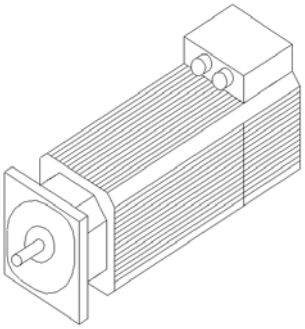
Use only twisted pair cables and individually shielded cables plus external shield.
The sensor shall be a 5V sensor; the absorbed current must not be greater than 100mA
To compensate the voltage drop due to the length of cable pin “Vsense” and “0Vsense”

To date, the following sensors are managed:
ECN 1113 having 13 bits per turn + 512 sin/cos pulses
EQN 1125 having 13 bits per turn, 12 bits multi-turn + 512 sin/cos pulses
ECN 1313 having 13 bits per turn + 512/2048 sin/cos pulses
EQN 1325 having 13 bits per turn, 12 bits multi-turn + 512/2048 sin/cos pulses

5.5.7 ENDAT 2.2 / BISS







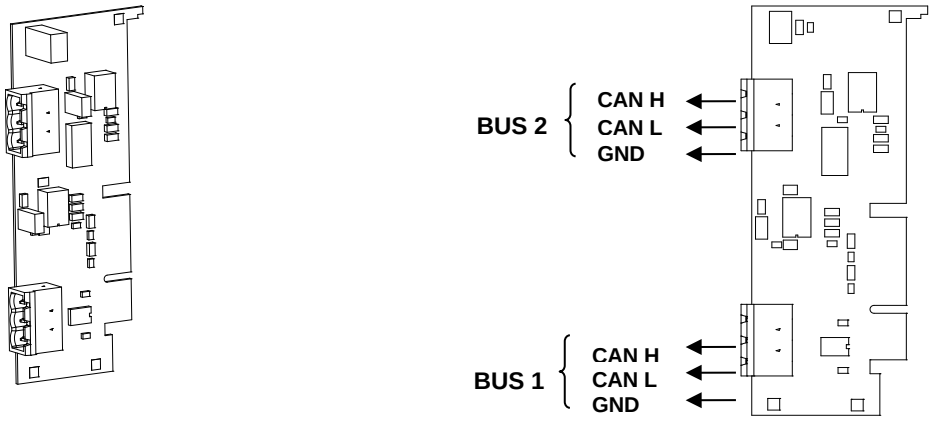
Use only twisted pair cables and individually shielded cables plus external shield
- The sensor shall be a 5V sensor; the absorbed current must not be greater than 350mA
- To perform the compensation of the voltage drop due to the length of the cable, connect the pins “+Vsense” and “0Vsense”

Managed BiSS sensors:
AD36 1219 with 19 bits per turn, 12 bits multi-turn.
RA18B con 18 bit su giro
Managed ENDAT 2.2 sensors:
ECI 1317 having 17 bits per turn
EQI 1329 having 17 bits per turn and 12 bits multi-turn
RCN 8580 with 29 bit on turn
ECN 125 with 25 bit on turn

ATTENTION: Any operation must be done only to drive off!!!!

5.5.8 CAN BUS

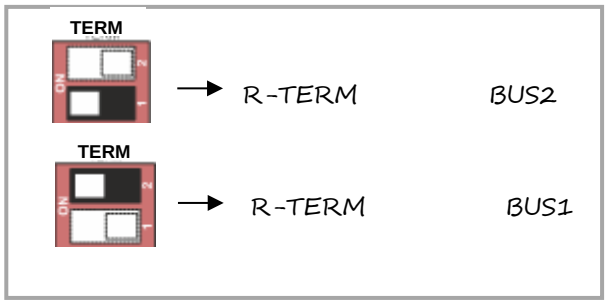
Here below there is the pin layout of the optional card for communication via CAN BUS



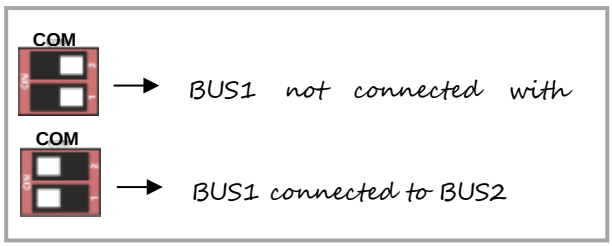
On the card there are also 2 double DIP switches marked as:

- TERM
- COM

The contacts of the DIP switch “TERM” (one for each connector can), if closed, connect the signal CAN H and CAN L of the involved connector by means of a 120 Ω resistor for the termination of the line



The contacts of the DIP switch “COM” common to the signals CAN L and CAN H of the two connectors so that they can be used one as input and the other as output

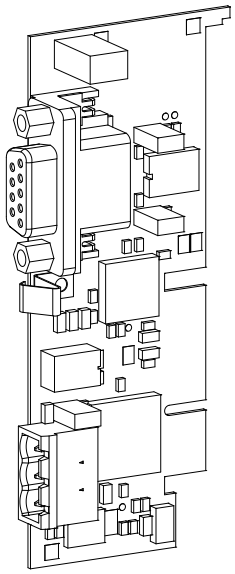


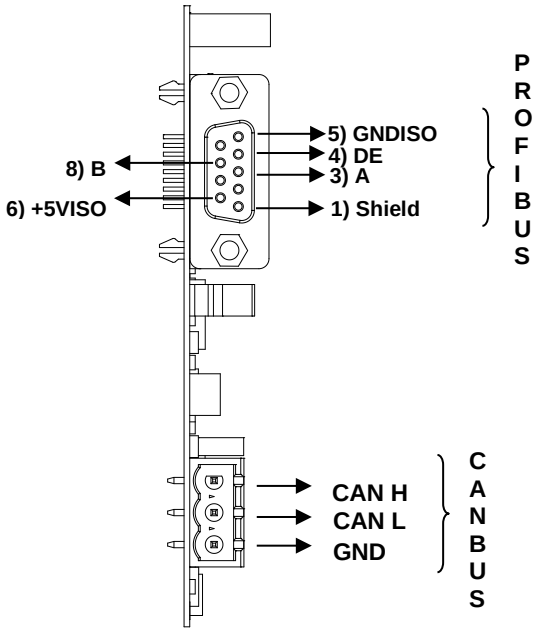
If BUS1 and BUS 2 are connected together, NEVER connect both the termination resistors

ATTENTION: Any operation must be done only to drive off!!!!

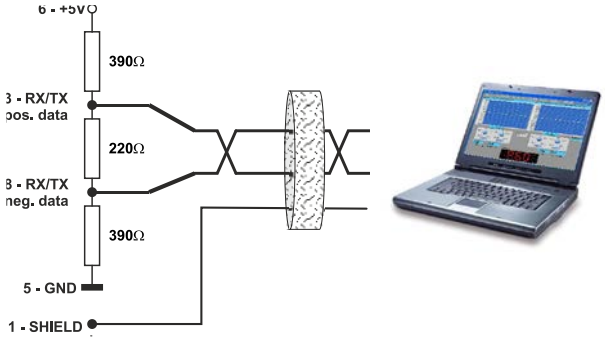
5.5.9 PROFIBUS

Here below there is the pin layout of the optional card for communication via PROFIBUS - CAN BUS





Pin n.	Name	Description
1	Shield	Protective shield
2	-	-
3	A	Rx/Tx positive data
4	DE	Control's signal for repeater
5	GNDISO	0V of supply
6	+5VISO	Output supply +5V
7	-	-
8	B	Rx/Tx negative data
9	-	

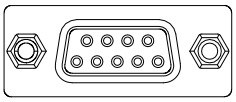


Profibus termination ex.

On the card, there is a double DIP switch marked as DS1, which, when closed, connects the signal CAN H and CAN L through a 120 Ω resistor for the termination of the line.

ATTENTION: Any operation must be done only to drive off!!!!

5.6 SERIAL LINE RS485 OPTICALLY INSULATED

J1	6 7 8 9  1 2 3 4 5	
PIN	**FUNCTION**	**DESCRIPTION**
1	GND	
2	TX	Transmission pos
3	RX	Receiving pos
4	- -	
5	+TERM	Termination pos
6	/TX	Transmission neg
7	/RX	Receiving neg
8	- -	
9	- TERM	Termination neg

TAB.6 (*Serial line*)

The serial line present on the MiniOPD EXP drives foresees the connection for the "4-wire" transmission of data and, therefore, it has the ability to communicate in full-duplex mode. In fact, by virtue of the protocol used (MODBUS RTU) it always communicates in "half-duplex" mode. Therefore, it is possible to perform the connection with only **"two wires"** by connecting to one another **RX** with **TX** and **/RX** with **/TX**.
In the J1 connector, the RX and /RX signals are the signals received by the drives; while the TX and /TX signals are transmission signals.
Here below there is an example of connection with a USB port

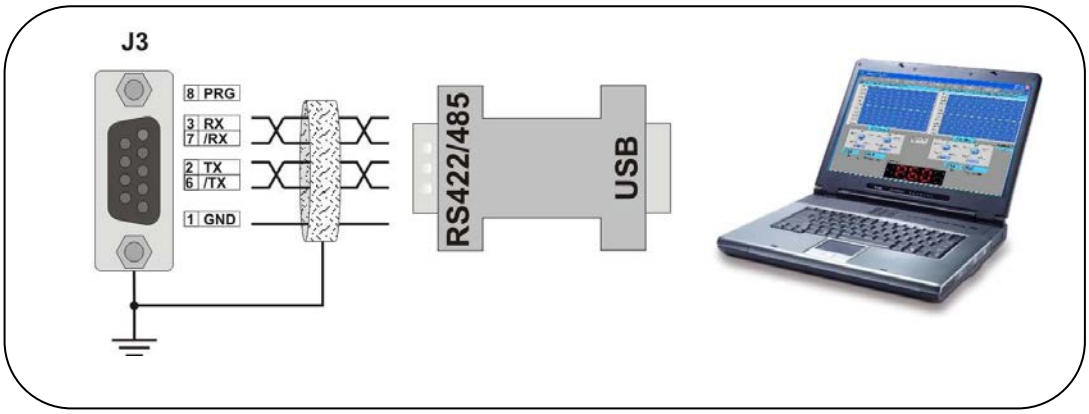


FIG. 15 (*Example of connection with USB port)*

Inside the drive there are the impedances to "terminate" the connection (120Ω) and polarize the line, as indicated in **FIG. 19**. To use such termination connect the terminals **5 - 3** and **9 - 7** of connector **J3** to one another (only for the last converter of the line).

The communication wires must be twisted. The shield may possibly be connected to the metal cap, because through the drive, the metallic receptacle is connected to the ground.

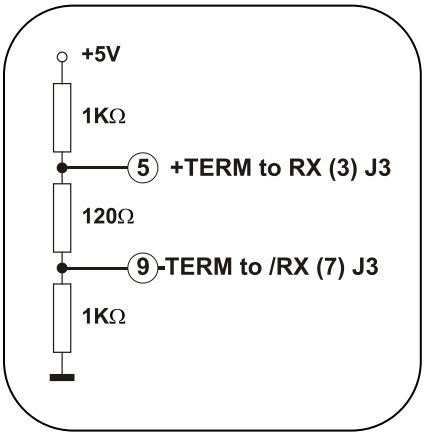


FIG. 16 (120Ω connections)

Upon request, TDE MACNO supplies a "serial package" consisting of the supervisor software and a cable with RS232/RS485 adapter.
For further information see the booklet **OPDE** Serial protocol MODBUS RTU.

6 SAFETY

6.1 REFERENCE DIRECTIVES AND STANDARDS

The drive involved was designed and manufactured keeping in mind the current state of the art, as well as the objectives set by the essential safety and health requirements set forth in the European Directives. TAB. 20 lists the European Directives and Standards (EN), to which reference is made:

REF.	NAME
2006/95/EC	"Low Voltage Directive - of the European Parliament and of the Council of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for usewithin certain voltage limits".
2004/108/EC	"Electromagnetic Compatibility Directive - of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibilityand repealing Directive 89/336/EC".
EN 60204-1 : 2006	Key safety standard on the electrical equipment of industrial machines.
CEI EN 61800-3 :1996	"Adjustable speed electrical power drive systems Part 3: Product standard relating to electromagnetic compatibility and specific test methods".
CEI EN 61800-5-2 : 2007	Part 5-2 Safety requirements - Functional".
IEC 61800-5-1 : 2005	"Semiconductor power converters for adjustable speed electric drive systems".

TAB. 7 (Reference Directives and Standards)

6.2 ANTI-INTERFERENCE MEASURES

Electrical and electronic equipment can influence each other due to network connections or other metal connections existing between them. In order to minimize or eliminate such mutual influence, it is necessary to properly install the drive itself, including also any anti-interference measures.
The following warnings apply to a not disturbed power supply network. If the network is disturbed, other measures must be taken to reduce noises.
In these cases it is not possible to provide general directions and if the anti-interference measures fail to attain the desired results, the customer may refer to us.
1) Make sure that all equipment in the cabinet is well connected to the ground bar using short star-connected cables. It is particularly important that any control equipment connected to the converter, such as a PLC, is connected to the same ground using short cables.
2) The drive has to be fastened with screws and serrated washers to assure a good electrical connection between the case and the metallic support, and connected to the ground of the panel; If necessary, remove the color to assure good contact.
3) To connect the motor use only shielded or armored cables and connect the shield to the ground on both the converter and the motor side. If it is not possible to use shielded cables, motor cables should be shielded by placing them in a grounded metallic cable-way.
4) Keep the wires connecting the motor, converter and the control cables separated and spaced from one another.
5) For connecting the braking resistor use a shielded cable and connect the shield to the ground on both sides (converter and resistor).
6) Lay the control cables at least 10 cm away from any parallel power cables.
Also in this case, it is advisable to use a separate metal cable-way connected to the ground. If the control cables should cross power cables, keep a crossing angle of 90°.
7) Provide for RC units or a free-wheeling diode for the contactor coils, relays and other electromechanical switches that might be installed in the same cabinet of the converter, mounted directly on the connections of the coil themselves.
8) Perform all external control, measurement and control connections using shielded cables.
9) Cables which can radiate interference must be placed separately and away from the control cables of the converter.

If the converter has to operate in an environment particularly sensitive to electromagnetic noise, besides the previous indications, it is necessary to take the following steps to reduce radiated and conducted interferences:
1) Insert a line filter between the converter and the line mounting it as close as possible to the converter using as short as possible connections.
2) Possibly, insert also a filter inductance of common type between the converter and the motor holding it as close as possible to the converter.

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