

The B17 Box Digital series of amplifiers carry the CE mark and are in full compliance to European Directives on Electromagnetic Compatibility and Low Voltage.



ATTENTION!
ELECTRICAL AND CONTROL EQUIPMENT CAN BE
DANGEROUS IF HANDLED IMPROPERLY

This manual describes the mechanical and electrical characteristics of the B17 Box Digital C200 and D300 servo amplifier series. It is important that the installation procedures are performed only by qualified personnel in accordance with local safety guidelines.

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VERSION: Service Manual B17 Digital gb Box Resolver '25 Luglio 2002

The Manufacturer: AXOR S.n.c.

Address: Viale Stazione 5, 36054 Montebello Vicentino (VI)

DECLARE under their own responsibility that the following line of products:

series - **B17 box DIGITAL**

with the relative options and accessories installed in accordance with the operating instructions furnished by the manufacture,

conform to the provisions of the following directives, including the latest modifications and all relative national issued legislation:

Machine directive (89/392, 91/368, 93/44, 93/68)

EMC directive (89/336, 92/31, 93/68)

and that the following technical standards were applied:

CEI EN 60204-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements.

CEI EN 60439-1 Low-voltage switchgear and control gear assemblies - Part 1: Type-tested and partially type-tested assemblies.

CEI EN 61800-3 Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test methods.
Recall: CEI EN 61000-4-2 CEI EN 60146-1-1.

CEI 28-6 Insulation co-ordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests.

CEI 64-8 Electrical system users of nominal voltage not exceeding a 1000V alternate current and a 1500V continuous current.

Montebello Vicentino, 21 September 1998

Management



L7: clockwise speed limitation in current mode; permits limiting speed in regards to max. setting

- 0: 0% no speed limitation
- 50: 50% of max. speed setting
- 99: 100% max. speed setting

L8: counter-clockwise speed limitation in current mode ; permits limiting speed in regards to max. setting

- 0: 0% no speed limitation
- 50: 50% of max. speed setting
- 99: 100% max. speed setting

MENU' F8:

A0: proportional current loop constant Id, KP_Id

A1: integral current loop constant Id, KI_Id

A2: proportional current loop constant Iq, KP_Iq

A3: integral current loop constant Iq, KI_Iq

A5: compensation f.c.e.m. iFeed -Forward:

compensates for the force against the motor cam and indicates the percentage of voltage in regards to continuous voltage at 1000rpm. Example: If a motor has F.c.e.m. of 60Vac at 1000Rpm, introducing parameter A5=20, and having a continuous voltage of 300Vdc, the compensation produces a voltage of 60V.

$$\text{voltage compensation} = \text{val. A5 in \%} \times \text{Vdc of Bus}$$

(Feed - Forward)

A6: multiplier KP_Id

multiply the KP_Id value by 1 ÷ 100

A7: multiplier KI_Id

multiply the KI_Id value by 1 ÷ 100

A8: multiplier KP_Iq

multiply the KP_Iq value by 1 ÷ 100

A9: multiplier KI_Iq

multiply the KI_Iq value by 1 ÷ 100

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1. Security Directives

1.1. Symbols



Danger Sign

This symbol is used where security directives should be adhered to, where substantial risks are involved, and where life endangerment or injury could occur. Installers must scrupulously adhere to prescribed directives and communicate them to the users.



Warning of the presence of Current

This symbol warns the user/installer to pay particular attention to the presence of dangerous current (up to 200Vdc).

It's recommended to always remove drive from the power supply net before working on it.



Warning

This symbol is present in all particularly important points. It's used where the intent is to highlight useful considerations, prescriptions, indications, and the correct execution procedures on every type of intervention and prevention of both system and drive damage.

1.2. General Security Directives

Along with what is prescribed in the manual, pay attention to the security directives for prevention of accidents and risks.

Always remove the power supply (disable) from both the system and the drive prior to any type of intervention on electrical or mechanical parts.

It is required that you read all of the prescriptions contained in this manual prior to setting up, mounting and using the drive !

P1: current transducer offset lv

0: max. negative offset

50: zero offset

99: max. positive offset

P2: speed reference of fset

0: offset of 0,6% clockwise

50: zero offset

99: offset of 0,6% counter-clockwise

P4: ATTENTION: Do not modify parameter

P5: ATTENTION: Do not modify parameter

P6: ATTENTION: Do not modify parameter

P9: ATTENTION: Do not modify parameter

MENU' F7:

L0: Speed or torque control

0: speed control

1: torque control

L1: Analogue or Digital referent

0: analogue reference

1: digital reference

If L1=0, then the speed reference or torque is analogue, otherwise use digital set with parameters L2 and L3.

L2: Speed reference value

0: max. negative speed reference

50: zero speed reference

99: max. positive speed reference

L3: Torque reference value

0: max. negative torque value

50: zero torque value

99: max. positive torque value

L4: Inversion of speed or torque reference

0: direct speed or torque reference

1: negated speed or torque reference

L5: Internal or external current limit

0: internal current limit

1: external current limit

L6: Torque reference in common or differential mode

0: common mode reference

1: differential reference



E6: peak current limitation percentage

- 0: 0% of peak current
- 99: 100% of peak current

E8: nominal rpm variation; allows varying nominal rpm of those selected by type of motor used

- 0: -50% of nominal rpm
- 50: 0%
- 99: +10% of nominal rpm

E9: analogue excursion reference; allows receiving nominal rpms with an analogue input less than or equal to 10V

- 80: 8V= max. speed
- 99: 10V= max. speed

MENU' F5:

h0: initialization at start -up

- 0: initialization enabled
- 1: initialization disabled

h1: enabling auto matic phasing

- 0: automatic phasing deactivated
- 1: automatic phasing enabled only if h0=1

h3: changing parameters when operatin g

- 0: parameter modification deactivated
- 1: parameter modification activated

h5: nominal speed in thousands and hundreds

h6: nominal speed in tens and ones

- Example: to set 3000rpm
- h5 = 30
 - h6 = 00

h7: ATTENTION: Do not modify parameter

h8: motor power phase inversion; allows changing the power phasecycle sense without inverting the cables

- 0: Axor standard
- 1: inversion

h9: ATTENTION: Do not modify parameter

MENU' F5:

P0: lu transductor current offset

- 0: max. negative offset
- 50: zero offset
- 99: max. positive offset

The B17 box Digital must only be installed by trained, qualified and authorized personnel.

Any intervention or modifications effected on the B17 Box Digital, and it's components or accessories, constitutes loss of guarantee.

Once attached to the net, the B17 Box Digital, the power components, and some elements of the controller will have current.

Contact with these elements could be life threatening!

Isolate the drive from the power supply net before removing it (by removing fuses or turning off the principle power switch).

After removing current, wait for at least 5 minutes before extracting the internal drive. the condensers could have current present up to 310Vdc which must be discharged through the resistors.

The drive is equipped with electronic protections that diactivate it in case of abnormalities, therefore the motor becomes uncontrolled; this could cause the stopage or idle motor (for a period determined by the type of system used).

In some cases the drive could restart automatically when the reason for blockage is corrected.

In this case, some systems could be damaged or destroyed endangering the welfare of personnel.

For such instances, the user must remove the drive's and system's power supply so that the motor cannot automatically restart or prevent such an event in the controller's program.

The B17 Box Digital's terminals must always be grounded as per the instructions in this manual.

This instruction manual must be read, understood and adhered to by all personnel designated for use. For any clarifications do not hesitate to contact the manufacturer.



The manufacturer declines all responsibility for verifying malfunctions or damages of any nature derived through non-compliance with this service manual.

In following the politics of product improvement, the manufacturer reserves the right to make necessary modifications to improve product performance even if modifications are not described in this manual.



d2: ramp deceleration after alarm intervention; time required to take motor from nominal speed to zero speed after alarm intervention of max. motor or drive temperature and at intervention of one of the limit switches dx - sx

0 = no ramp
50 = 2 seconds
99 = 4 seconds

d3: enabling Limit Switch +/- inputs

0 = disabled
1 = enabled

d4: contact opening of relay OK outside of limit alarm intervention

0 = relay OK doesn't open
1 = relay OK opens

d7: enabling REF ON and ENABLE with negative logic

0 = negative logic disabled
1 = negative logic enabled

MENU' F4:

E1: positive peak current ; the max. positive current allowed by drive defined in %

0: 0% zero current
99: 100% max. current

E2: negative peak current ; the max. negative current allowed by drive defined in %

0: 0% zero current
99: 100% max. current

E3: limit adjustment intervention time; allows furnishing the motor peak current for a period in accordance to the electrical frequency (linear function between 0 and 16Hz)

E4: limit constant; allows furnishing motor with the peak current set with parameters E1 and E2, for a limited time in accordance with type of motor.

E5: nominal current; the nominal current in accordance with the peak values set at parameters E1 and E2 defined in %

0: 0% zero nominal current
99: 100% nominal current equal to peak current



MENU' F2:

- c0: number of pairs of motor poles
- c1: number of pairs of resolver poles

$$n^{\circ} \text{ pairs of poles} = \frac{n^{\circ} \text{ poles}}{2}$$

c2: simulated encoder impulse revolutions

- 0: simulated encoder impulses= 16384 imp/rev
- 1: simulated encoder impulses= 8192 imp/rev
- 2: simulated encoder impulses= 4096 imp/rev
- 3: simulated encoder impulses= 2048 imp/rev
- 4: simulated encoder impulses= 1024 imp/rev
- 5: simulated encoder impulses= 512 imp/rev
- 6: simulated encoder impulses= 256 imp/rev
- 7: simulated encoder impulses= 128 imp/rev

c3: simulated encoder impulse direction

- 0: standard simulated impulse direction
- 1: negative simulated impulse direction

c9: programmable analog output

- 0: no visualization
- 1: motor current
- 2: current Iq
- 3: current Id
- 4: current reference Iq

MENU' F3:

d0: ramp acceleration; time required to take motor from zero speed to nominal speed

- 0= no ramp
- 50=1 second
- 99= 4 seconds

d1: ramp deceleration; time required to take motor from nominal speed to zero speed

- 0= no ramp
- 50=1 second
- 99= 4 seconds

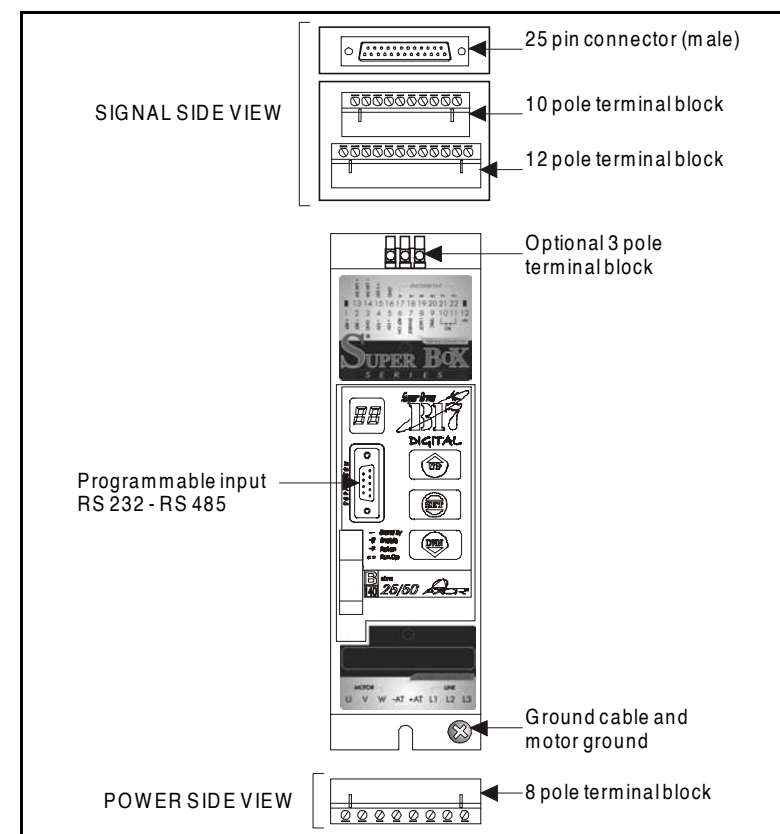
2. General Description

2.1. Drive Description

The B17 Box Digital amplifier, is a stand alone four quadrant, bi-directional converter with sinusoidal waves suitable for driving AC Brushless Servomotors with Resolver feedback.

The power stage is Power Mosfet or IGBT, and piloted PWM with 20 KHZ modulation, which renders it fit for driving small and medium brushless servomotors from 0,1 - 20Nm, where dynamic performance and quick response is required.

The braking power of each B17 box Digital is in accordance with drive size and model. There is also the possibility to increase the braking power up to 400 or 800W nominal. The inputs and output are illustrated in the following photo.





- 2 extractable terminals of 12 and 10 pins for C-N.C. or axis board signal input or output.
- 25 pole connector (male) for motor signal output connection
- 8 pole extractable terminal for motor phases and alternate power supply three phase of single phase connection L1-L2-L3.
- 3 pole fixed connector for eventual external brake resistors with power of 400W or optional 800W.
- Input terminals RS232 and 485 for B17 box digital programming.

For eventual use of external braking, contact the manufacturer for additional information.



The following tables show the available B17 Box Digital Models and Sizes:

Model	Power Supply (Vac)
B17 box C Digital -200	145 *
B17 box D Digital -300	220 *

Size	Nominal Current Arms	Peak Current Arms	Peak Time I ² t in s
2/4	2	4	2
4/8	4	8	2
8/16	8	16	2
10/20	10	20	2
14/28	14	28	2
20/40	20	40	1

*

b3: low pass filter signal feedback constant

0: 0ms

99: 14ms

b4: derivative low pass filter signal feedback constant for derivative control

0: 0ms

99: 14ms

b7: speed ring derivative constant multiplier Kd

multiply the value of b2 by the indicated value: $1 \div 99$

b8: proportional speed ring constant multiplier Kp

multiply the value of b0 by the indicated value: $1 \div 99$

b9: integral speed ring constant multiplier Ki

multiply the value of b1 by the indicated value: $1 \div 99$

General speed ring adjustment rules

- The dynamic adjustment is done through use of an oscilloscope, inserting the probe on pin 1 of the 9 pin terminal block on front of drive and 0 (probe shield) to metal edge of the terminal block.
- To increase the speed ring bandwidth, increase KP constant, decrease KI constant. This action produces an increase in response speed.
- To reduce the elasticity, increase the KI constant. This makes the system stiffer.
- To reduce speed overshoot increase the KP constant or the KD constant and decrease KI.

Low integral proportional gain.	Diagram
Increase the KP and KI gain until you receive a response similar to the one illustrated on the right.	
To reduce overshoot increase KD until you receive a response similar to the one illustrated on the right.	
Attention: do not exceed the gain; could cause motor overheating due to current oscillation.	



4.6. Parameter programming and visualization

Through use of the keys "UP", "SET", "DOWN" and the display, It's possible to modify the drive parameters using the following passages:

- 1 push "SET" once to get principle menu consisting of F1-F8;
- 2 to get additional menus, use "UP" or "DOWN";
- 3 once a menu of F1 thru F8 is chosen, press the "SET" button, this allows access to submenus up to 9 parameters;
- 4 to go from one parameter to the other press the "UP" or "DOWN" keys;
- 5 once parameter is chosen, press "SET" and with the "UP" and "DOWN" keys modify the value;
- 6 to memorize the new value press "SET";
- 7 The display will then display the parameter chosen. If no keys are pressed for 15 seconds, the display returns to visualize the drive's status.
- 8 pressing "UP" and then "SET", you return to the previous visualization.
- 9 To rapidly return to the menu or the sub-menus, keep the "UP" button pressed, and press the "SET" button several times.

It is possible to modify parameters while on the drive while the motor is functioning. This option is enabled using the following procedure:

- 1 make parameter h3 of the F5 menu "1" and press "SET";
 - 2 shut off and restart drive;
 - 3 when the drive is back on, modify desired parameters;
- return parameter h3 of the F5 menu to "0" and press "SET";



The following parameters can be seen but not modified:

c0, c1, E0, E1, E2, E3, E4, E5, E7, P0, P1, P3, P4, P5, P9, A0, A1, A2, A3, A6, A7, A8, A9.

MENU' F1:

b0: proportional speed ring constant KP

0: min.
99: max.

b1: integral speed ring constant KI

0: min.
99: max.

b2: derivative speed ring constant Kd

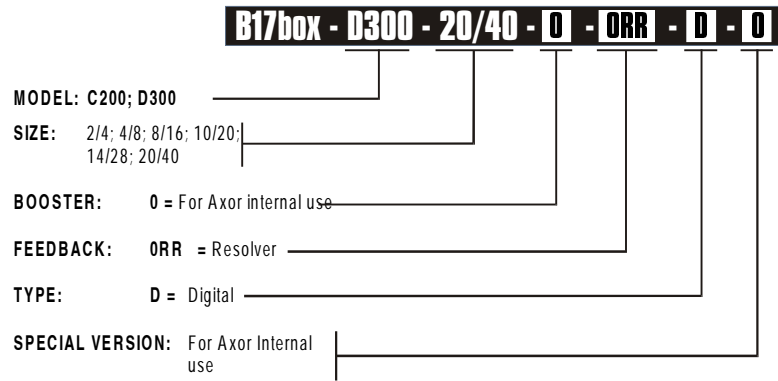
0: min.
99: max.

- Weight of BI7 box Digital:
- Working temperature: 0/40°C - stocking temperature: -10/70°C
- Encoder interface AM26LS33 differential or in common mode at 5V or IET7273 at 12V on request.
- Two AC Power Supplies 145-240
- Resolver speed feedback 2-4-6 poli
- Encoder emulation: 4096-2048-1024-512-256-128-64-32 impulse/rev. and tacca di zero secondo i poli (2 poles: 1 notch; 4 poles: 2 notches; 6 poles: 3 notches)
- Banda passante anello di corrente 2.5kHz
- Microcontroller 32bit RISC
- Galvanic isolation (**only available with D300 version**)
- Programmable interfaces RS232 and RS485
- On-board positioning system
- Positive Limit Swith (P-STOP) and negative limit swith (N-STOP)
- Due ingressi digitali programmabili in alternativa ai Limits Switch
- Differential input reference +/-10V
- Torque mode analogue input +/-10 V
- Derived thermal circuit differential reference +/- 1.8μV/°C
- Motor current monitor +/-8V =I max.
- Motor speed monitor +/-8V =Vel.max.
- Auxilary voltage +/-10V max 2mA
- Diagnostic display for status symbols and allarms
- Motor short-circuit protection
- I²t motor protection
- Drive I²t intervention memory
- Motor overheating protection
- Power supply over/under voltage protection
- Drive overheating protection
- Inverse polarity protection
- Missing Speed feedback protection
- Missing voltage protection +AT
- EEPROM writing protection error
- Protection MAX-REC
- Pre alarm Protezione MAX-REC
- Contemporary Allarm Limit-Switch
- Segnalazione dell'inversione delle fasi di potenza del motore e del seno con il coseno
- Error signal for improper motor or resolver pole input

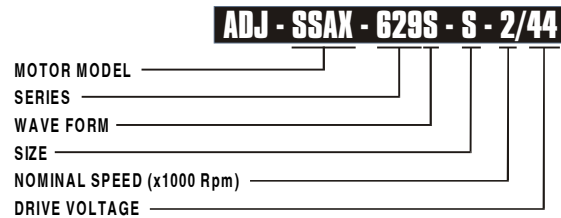


2.2. Drive label description B17 box Digital

The drive label is present 3 times on every B17 box Digital: once on the front cover, once on the side of the box, and the last is on the 24 pin DIN connector inside the drive.



ADJ is the model of motor for which the drive was adjusted. if the product is furnished standard, you will find STD (standard) in the ADJ position (see Chapter 4.1 "Start-up"). The following example is with an Axor motor.



ORD is the order number relating to the furnished product. Always use this number as a reference for eventual requests.

- speed ring proportional constant Iq, KP_Iq
- simulated encoder impulse direction
- analogic reference excursion
- nominal speed setting (tens and ones)
- nominal speed setting (thousands and hundreds)
- simulated encoder impulse revolutions
- enabling Limit Switch +/- inputs
- motor power phase inversion
- speed or torque reference inversion
- internal or external current limit
- enabling REF ON and ENABLE with negative logic
- speed ring derivative constant multiplier Kd
- speed ring proportional constant multiplier KP
- speed ring integral constant multiplier KI
- multiplier KI_Id
- multiplier KI_Iq
- multiplier KP_Id
- multiplier KP_Iq
- number of poles - motor
- number of poles - resolver
- speed reference offset
- current transducer offset Iu
- current transducer offset Iv
- peak current limitation percentage
- ramp time acceleration
- ramp time deceleration
- ramp time deceleration after allarm intervention
- reference torque value
- reference speed value
- variation of nominal rpm
- torque reference in common mode or differential
- programmable analogue output
- signaling of external relay intervention OK
- intervention time adjustment I²t
- speed or torque control
- analogue or digital reference
- parameter variation during operation
- nominal rpm variation

- MENU F8 A2
- MENU F2 c3
- MENU F4 E9
- MENU F5 h6
- MENU F5 h5
- MENU F2 c2
- MENU F3 d3
- MENU F5 h8
- MENU F7 L4
- MENU F7 L5
- MENU F3 d7
- MENU F1 b7
- MENU F1 b8
- MENU F1 b9
- MENU F8 A7
- MENU F8 A9
- MENU F8 A6
- MENU F8 A8
- MENU F2 c0
- MENU F2 c1
- MENU F6 P2
- MENU F6 P0
- MENU F6 P1
- MENU F4 E6
- MENU F3 d0
- MENU F3 d1
- MENU F3 d2
- MENU F7 L3
- MENU F7 L2
- MENU F4 E8
- MENU F7 L6
- MENU F2 c9
- MENU F3 d4
- MENU F4 E3
- MENU F7 L0
- MENU F7 L1
- MENU F5 h3
- MENU F4 E8



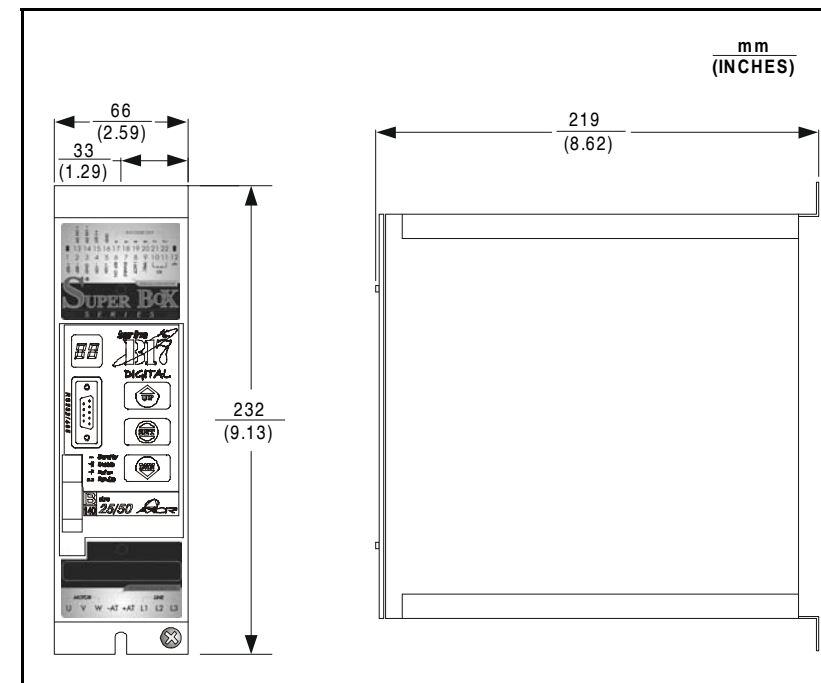
SYMBOL	DESCRIPTION	REMEDY
	Signaling setting error of number of poles for motor or resolver active only during autophasing or start-up	<ul style="list-style-type: none"> Check setting for number of poles for motor or resolver
	Signaling contemporary opening of Limit Switches	<ul style="list-style-type: none"> Check limit switch contacts. Check for the presence of positive voltage input to limit switch contacts. In case external power is used, check the iGNDi connection of said power to terminal 3 iGNDi.

4.5. Analytical programming index

- Autophasing enabling
- Enabling at Start-up
- ATTENTION: do not modify this parameter
- ATTENTION: do not modify this parameter
- ATTENTION: do not modify this parameter
- ATTENTION: do not modify this parameter
- ATTENTION: do not modify this parameter
- ATTENTION: do not modify this parameter
- compensation f.c.e.m. "feed - forward"
- negative peak current
- positive peak current
- nominal current
- speed ring derivative constant Kd
- low pass filter signal feedback constant
- low pass derivative filter signal feedback constant
- I²t constant
- integral speed ring constant KI
- integral speed ring constant Id, KI_Id
- integral speed ring constant Iq, KI_Iq
- proportional constant KP
- proportional speed ring constant Id, KP_Id

- MENU F5 h1
- MENU F5 h0
- MENU F5 h7
- MENU F5 h9
- MENU F6 P4
- MENU F6 P5
- MENU F6 P6
- MENU F6 P9
- MENU F8 A5
- MENU F4 E2
- MENU F4 E1
- MENU F4 E5
- MENU F1 b2
- MENU F1 b3
- MENU F1 b4
- MENU F4 E4
- MENU F1 b1
- MENU F8 A1
- MENU F8 A3
- MENU F1 b0
- MENU F8 A0

2.3. Drive Dimensions B17 box Digital

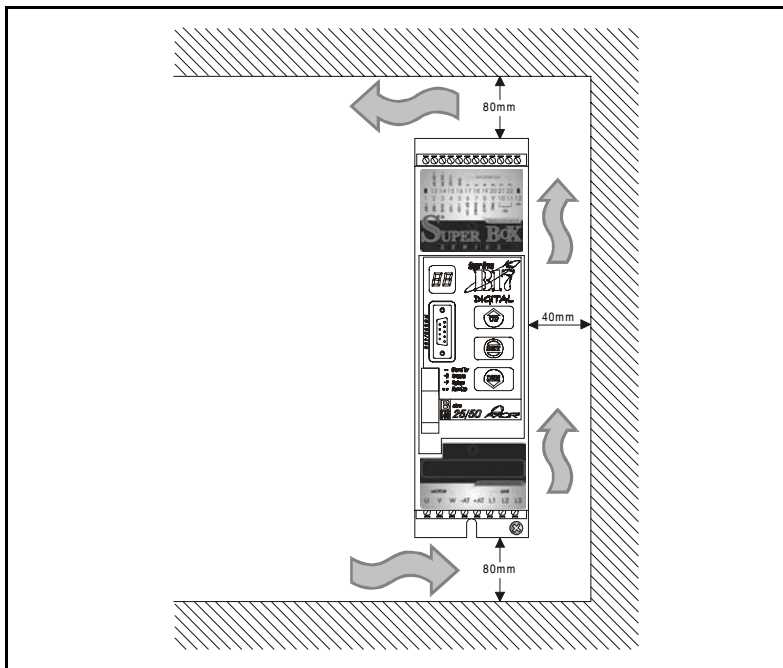








3. Installation

3.1. Assembly



- The B17 box Digital is predisposed for mounting inside of a container. the measurements required can be found in chapter 2.6 "B17 box Digital dimensions". the box must be affixed vertically on the rear of the container in order to guarantee efficient drive cooling. The B17 box Digital's positioning inside of the container must satisfy the following dispositions:
- For proper drive functioning guarantee that inside of the electrical container maintains a temperature of +0°C and +40°C with humidity of 10% to 95% without condensation.
- Protect the B17 box digital from excessive mechanical vibrations inside of the container.
- During installation avoid the possibility of any residue with metallic components falling into the B17 box Digital.
- Maintain a distance of 80mm from heat sources.
- The electric container must have predisposed air pockets opportunely filtered.
- Maintain the minimum distances indicated in the following design:



SYMBOL	DESCRIPTION	REMEDY
	Memorization of nominal current (I_n) intervention.	<p>The flashing symbol oL (overload) indicates that alarm 6 verification during working cycle. Such visualization does not cause drive blockage.</p> <p>Reset by removing power supply and restarting.</p>
	Signaling motor's thermal switch intervention. Such intervention opens the external OK contact.	<ul style="list-style-type: none"> • Lower the dynamic constant if motor vibrates in stall torque or while moving, this condition causes current oscillation in motor and its overheating. • Probable broken thermal switch. <p>Reset by removing power supply and restarting after the motor has cooled.</p>
	Signaling having reached max energy recovery during breaking phase. Such intervention opens the external OK contact.	<ul style="list-style-type: none"> • In case of external resistors, check for correct ohmic value and connections as indicated in manual. • Check B17 box Digital alternate power supply voltage.
	Signaling min. or max. continuous voltage.	<ul style="list-style-type: none"> • In case of external resistors, check for correct ohmic value and connections as indicated in manual. • Check B17 box Digital alternate power supply voltage.
	Signaling max. recovery pre-alarm intervention. Such an alarm is only visual, it indicates subsequent alarm 8 intervention.	<ul style="list-style-type: none"> • In case of external resistors, check for correct ohmic value and connections as indicated in manual. • Check B17 box Digital alternate power supply voltage.
	Signaling inverted motor power phases or resolver signals. Active only during autophasing or initialization.	<ul style="list-style-type: none"> • Check motor power phase connections. • Check resolver signal connections.



4.4. Alarms

In case of allarms being present "AL" alternately flashes along with the alarm number. The indication and alarm significance is as follows:

SYMBOL	DESCRIPTION	REMEDY
	EE-PROM. parameter memorization error. Such intervention opens the external OK contact.	Such an indication appears if a parameter memorization fails. Remove power supply, therefore restarting and memorize the parameter again; if the allarm persists contact the manufacturer.
	Signaling short-circuit intervention. Such intervention opens the external OK contact.	<ul style="list-style-type: none"> Check for short-circuit between motor and terminals or towards GND. Reset by removing power supply and restarting.
	Signaling drive's thermal switch intervention. Such intervention opens the external OK contact.	<ul style="list-style-type: none"> Verify forced ventilation is functioning. Verify environmental temperature. Reset by removing power supply and restarting after the dissipator has cooled.
	Signaling drive's missing resolver signal. Such intervention opens the external OK contact.	<ul style="list-style-type: none"> Verify resolver connections. Probable that resolver is broken. Reset by removing power supply and restarting.
	Signaling that motor is running with it's nominal current. If parameter d4 of menu F3 is set at 1 the external OK contact	<ul style="list-style-type: none"> Check work cycle, it could be too severe. Probable mechanical block. Inverted motor phases. Electromechanical brake not unblocked. Inverted resolver signals.

3.2. Ventilation

The environmental temperature for the B17 box Digital should be between +0°C and +40°C. In accordance with current size and drive model inserted into the B17 box Digital, a fan is inserted during the production phase. The sizes that are ventilated are the following:

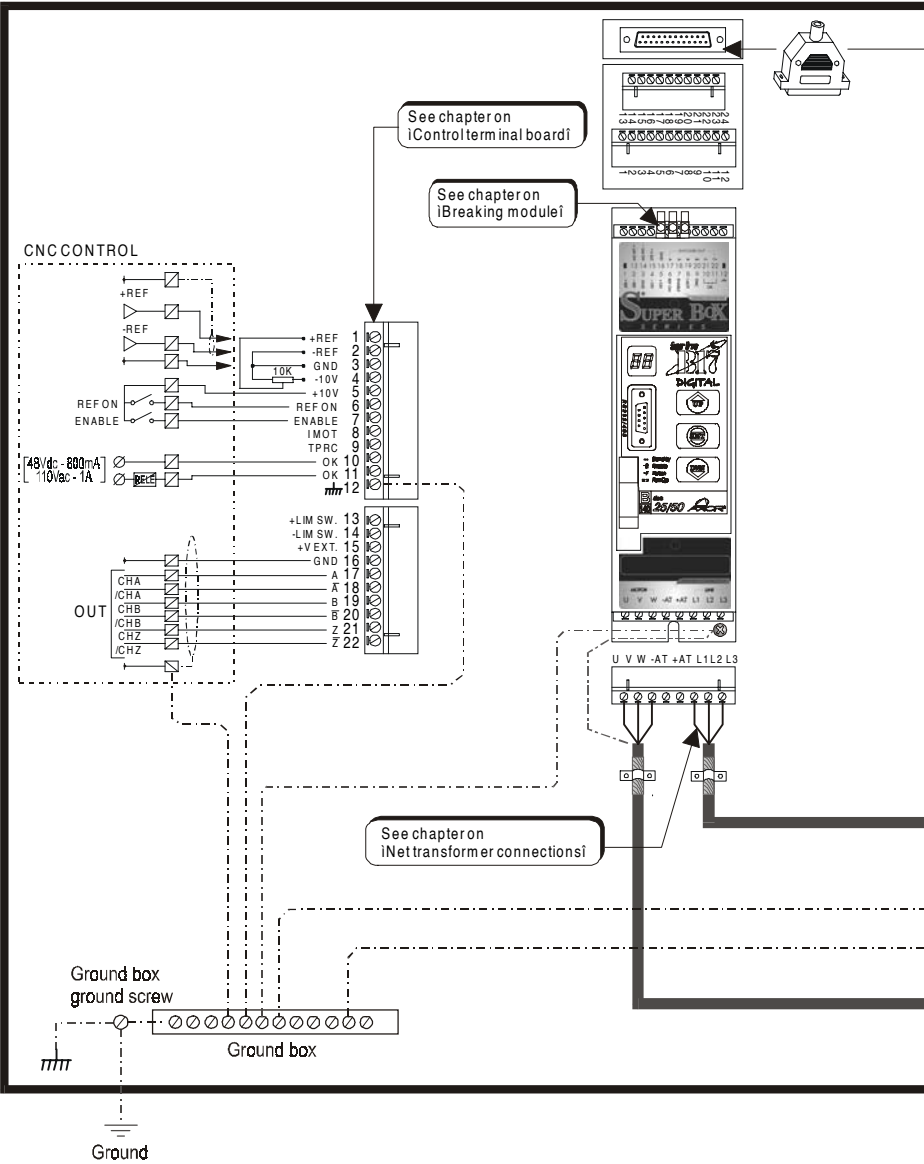
Model	2/4	4/8	8/16	10/20	14/28	20/40
200	-	-	-	V	V	V
300	-	-	-	V	V	V

Note: V=Forced ventilation








If in some cases the B17 box digital is installed in an environment where the temperature cannot be guaranteed to be between +0°C and +40°C, inform the manufacturer for eventual provisions.

3.3. General connections



Start-up and adjustments

SYMBOL	DESCRIPTION	REMEDY
	The drive is powered correctly, without REF ON and ENABLE and no allarm present	
	Missing supply to ENABLE input. The motor shaft is free.	<ul style="list-style-type: none"> Supply ENABLE with positive logic: be sure supply voltage is between +10/30Vdc and that drive is set for positive logic. Supply ENABLE with negative logic: be sure supply voltage is between +10/30Vdc; make sure the drive is set for negative logic. If enabled with external voltage, check is GND of said voltage is connected to pin 3 of the control terminal.
	Missing REF ON enable input. The motor shaft is in stall torque mode.	<ul style="list-style-type: none"> Enable REF ON with positive logic: be sure supply voltage is between +10/30Vdc and that drive is set for positive logic. Enable REF ON with negative logic: be sure supply voltage is between +10/30Vdc; make sure the drive is set for negative logic. If REF ON is enabled with external voltage, check is GND of said voltage is connected to pin 3 of the control terminal.
	Drive enable in Torque mode, or rotating clockwise or counter-clockwise if reference voltage is present	<ul style="list-style-type: none"> If motor is not rotating, check for reference voltage at terminals 1 and 2 of the terminal board.
	Signals missing continuous +AT power supply	Such an indication comes on when external 24Vdc auxiliary voltage for resolver is present and continuous +AT voltage is missing.



• Initialization

Initialization permits the exact verification of phasing verifying the report between motor and resolver poles and motor and resolver cable connection. To enable initialization follow the following steps:

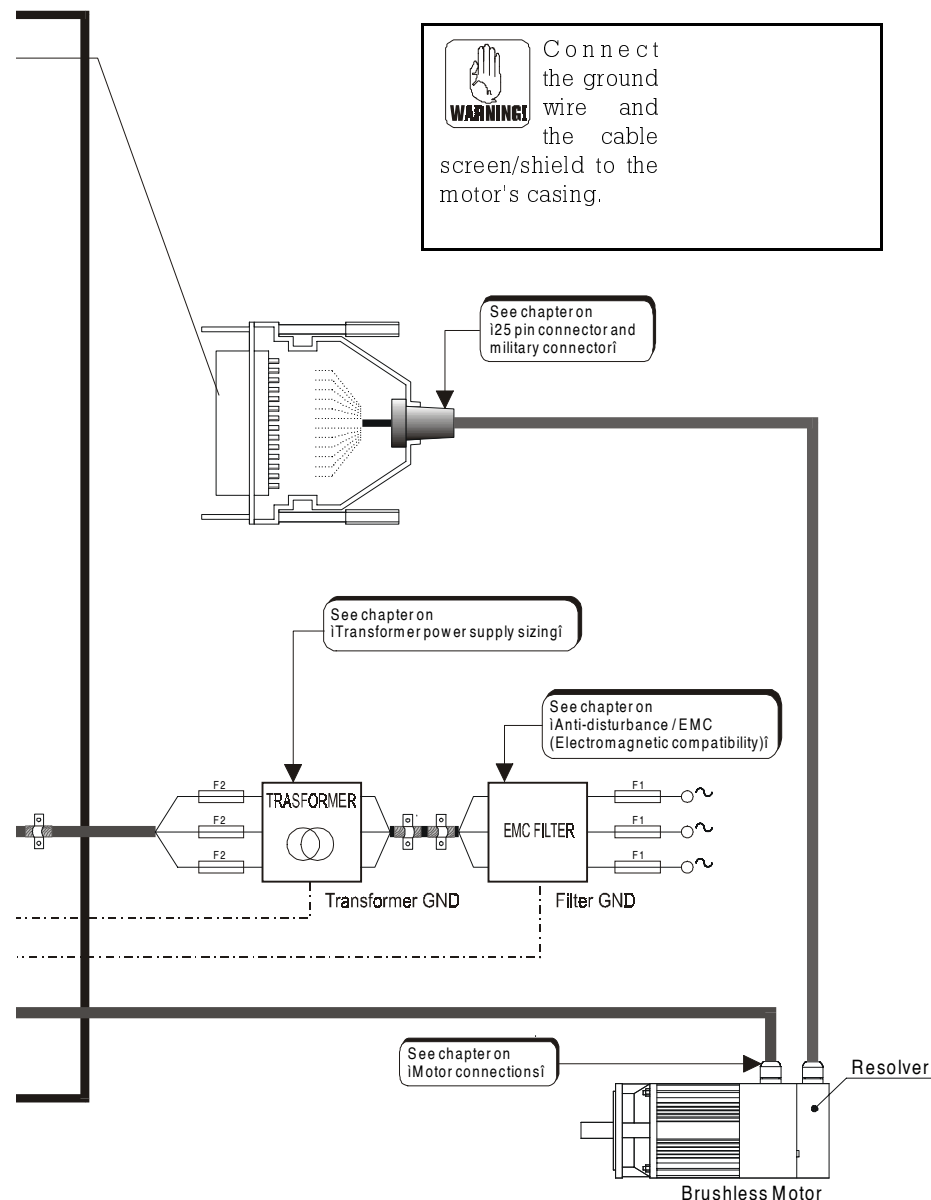
- 1 verify that the motor shaft is free from the mechanical load;
- 2 verify that the "REF ON" and "ENABLE" inputs are disabled;
- 3 set parameter P9=0;
- 4 from F5 menu set parameter h0=1 and enable the "ENABLE" input;
- 5 after enabling the "ENABLE" input the motor will snap into a precise position. Then press the "SET" key;
- 6 after pressing the "SET" key the motor will begin rotating and the display will show "In" flashing;
- 7 after completing a mechanical rotation the initialization procedure is complete.

complete.

If during initialization an alarm occurs, in particular alarms "11" and "12", consult chapter 4.4 "Alarms".

4.3. Status signaling

The front display shows the drive status using the following symbols:

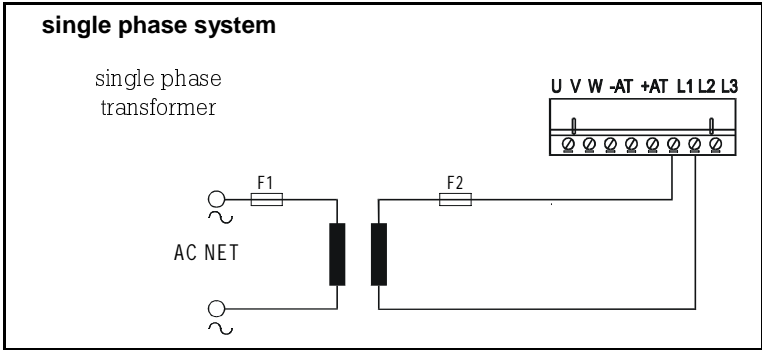


3.4. Power transformer dimensions

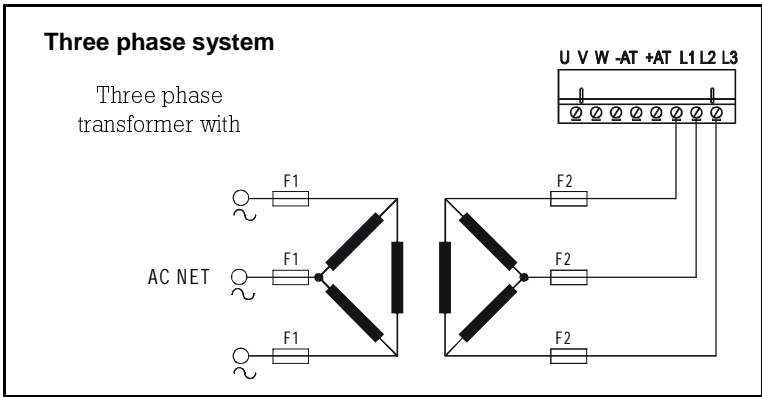
The B17 box Digital converters are divided into two versions:



- Series C200 absolutely only uses single or three phase transformers with triangle output.



Utilize single phase power supply only if absolutely necessary; three phase configuration is recommended.



For transformers with characteristics different from those described, consult with manufacturer before installation.

Start-up and adjustments

- Enable the B17 box ensuring that the **Ref On** and **Enable** are disabled.
- Verify that the symbol " . . " is shown on the display..
- Set-up autophasing or initialization (see ch. 4.2 "Autophasing and initialization").
- Enable the "Enable" input and verify that the symbol **-F I** is shown on the display. In these conditions the motor should be in torque but not rotating and without vibrations or speed offset.
- Supply a +0.5V reference and enable the "REF ON" input, the motor should rotate counter-clockwise at a speed corresponding to 1/20 of the motor's nominal speed and on the display there should be a symbol rotating in the same direction. Give a +10 and -10V reference and verifying the max. speed functions in a clockwise and counter-clockwise sense.
- Shut off drive and apply load to motor.
- Turn-on and adjust the dynamic constant (see "Parameter programming and visualization").
- Execute a work cycle, even under worst conditions verifying that no alarms are present or I²t intervention.

4.2. Autophasing and initialization

• Phasing

The autophasing calculates the correct angle phase, verify the exact number of motor and resolver poles and the motor and resolver cable connections. To enable autophasing follow the following procedures:

- verify that motor shaft is free of mechanical load;
 - verify that "REF ON" and "ENABLE" inputs are disabled;
 - from F5 menu set parameter h1=1 and press the "SET" key;
 - from F5 menu set parameter h0=1 and enable the "ENABLE" input;
 - after enabling the "ENABLE" input, the motor will move to a precise position. Then press the "SET" key;
 - after pressing the "SET" key the motor will begin rotating and the display will show "Ph" flashing;
 - after completing a mechanical rotation the phasing procedure is complete.
- If during phasing allarm intervention occurs, in particular allarms "11 and "12", consult ch. 4.4 "Allarms". the phasng angle is shown in parameter "P4" and is expressed in hundreds of angle rotation.



4. Start-up and adjustments

4.1. Start-up

The drive comes adjusted for the required motor, if not specified it's adjusted **standard (STD)** with the following characteristics:

- Drive peak current.
- Drive nominal current.
- resolver 2 poles
- motor 6 poles
- nominal speed with 10V reference at 3000RPM.
- simulated encoder: 4096imp/giro.

After verifying that the drive is setup for motor that it must drive, proceed as indicated:

- 1 Verify that transformer or autotransformer voltage output that powers the B17 box conforms with ts of the B17 box's input.
- 2 Verify that the B17 Digital inserted into the super Box is the correct model regarding the alternate voltage that will power the B17 box (see chapter 3.4 "Power Supply Transformer sizing").
- 3 Verify that terminal 12 is connected as specified (see chapter 3.9 "Control Terminals").
- 4 Verify that the earth terminal of B17 box is connected as specified (see chapter 3.6 "Net Transformer connection").
- 5 Verify that the following cable shields are connected as specified:
 - Motor power cable (see ch. 3.7 "Motor connections").
 - Primary and secondary transformer cables (see ch. 3.6 "Net Transformer connections").
 - Motor resolver signal cable (see ch. 3.8 "Military connector and terminal connection").
 - Controller speed reference cable (see ch. 3.10 "Speed and torque reference").
- 6 Drive's simulated encoder channel cable to controller (see ch. 3.13 "Simulated encoder channel").
- 7 Verify eventual external brake resistors (see ch. 3.14 "Braking module").
- 8 Verify that motor shaft is load free.

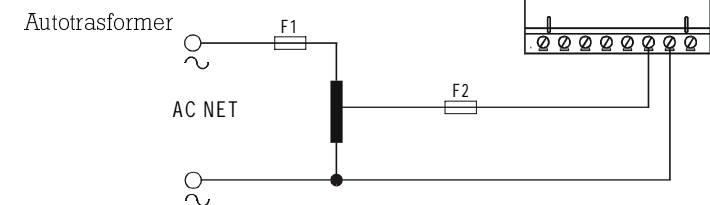
If the case of motor having a mechanical brake, give the pre-decided terminals a continuous voltage respecting the polarity. Also verify that the motor shaft is free.



- D300 Opto -isolated series uses:
 - single or three phase transformers with star or triangle output.
 - single or three phase autotransformers.

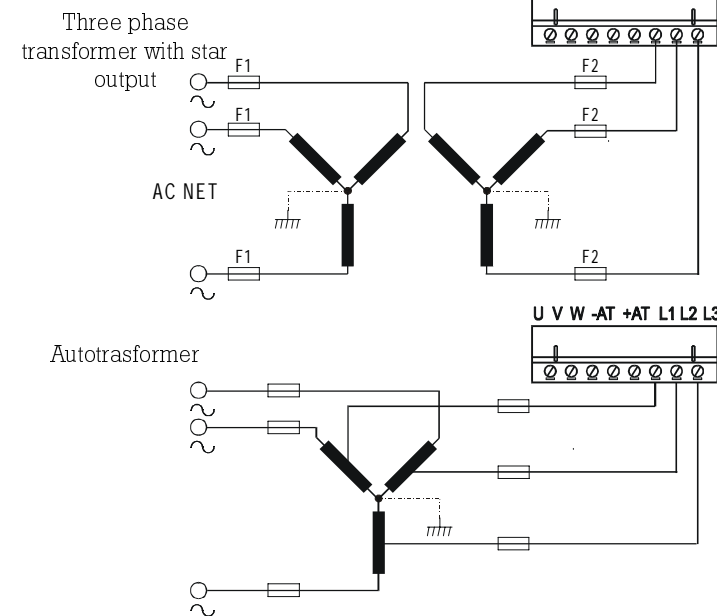
The manufacturer does not allow for supplying the b17 box digital directly from the "220 Vac" net, but only with auxiliary from transformers or autotransformers.

Single phase system



Utilize single phase power supply only if absolutely necessary; three phase configuration is recommended.

Three phase





- **VOLTAGE:** the primary voltage is linked to the available line voltage. The secondary voltage is calculated based upon the parameters of the motor to be driven,

$$V(\text{secondary}) = \frac{V(\text{motor})}{0,9 \times 1,36}$$

V(secondary) = secondary voltage in (Vac).
V(motor) = voltage required by motor to obtain max. speed at nominal

$$V(\text{motor}) = E_{\text{max}} + (R_i \times I_n)$$

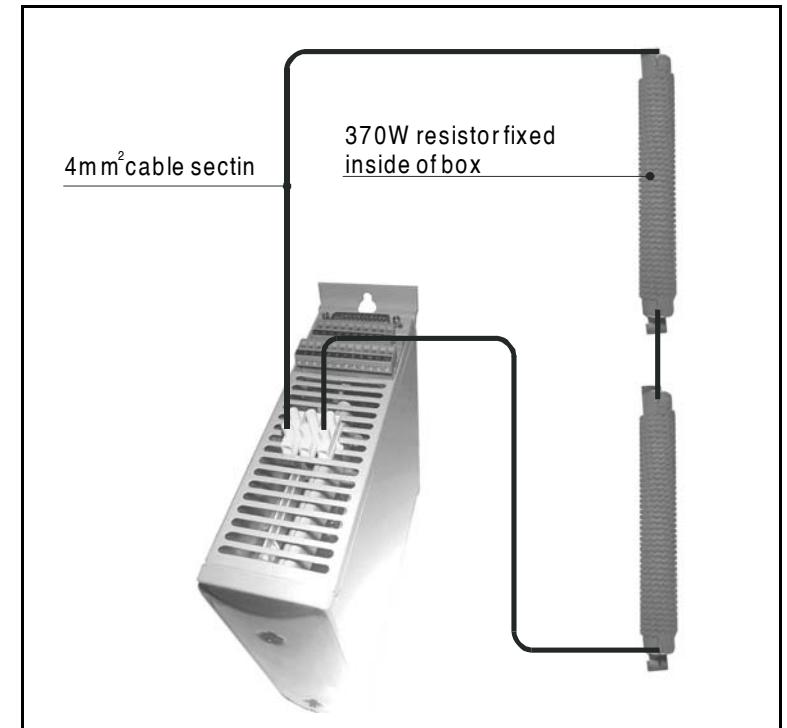
V(motor) = voltage required by motor to obtain max. speed at nominal torque (Vrms).
E_{max} = BEMF at rated speed (Vrms).
R_w = motor line resistance (Ω).
I_n = rated stall current (Arms).

The acceptable **nominal load** output voltage values to transformer or sutotransformer for the B17 box Digital are as

V(secondary)	52-145	Vac	forthe	B17box	C200
	100-240	Vac	forthe	B17box	D300

Power supply minimum and maximum declared values are directly related to the transformer or autotransformers voltage and load with max. accepted deviation of +5% and a voltage deviation of +/-10% on the net.

Connection of 2 external resistors of 370W



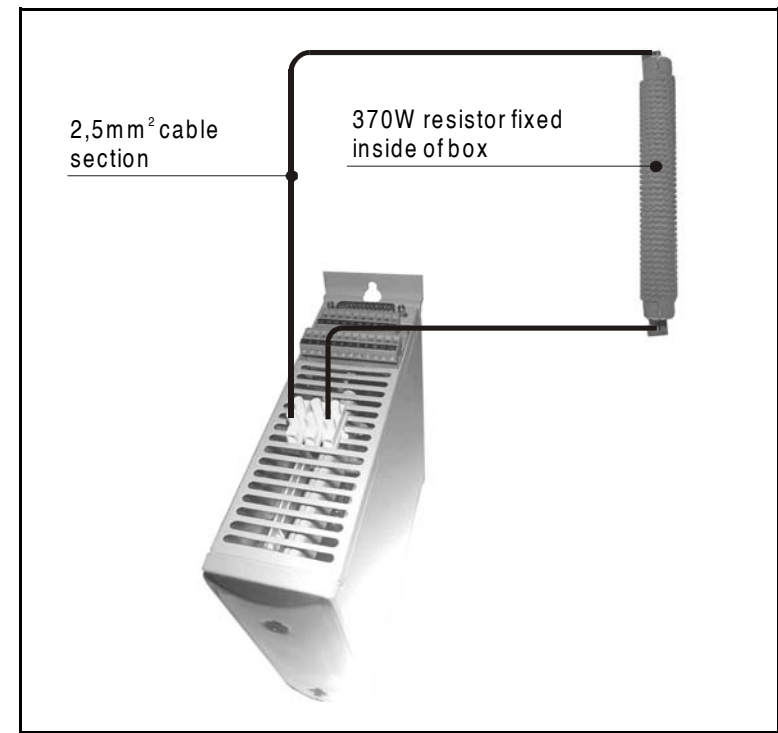
The table below shows the Ohm values and power in Watts of the available resistors:

B17 box Digital	C 200	D 300
400W	1 resistor 9 □	1 resistor 14 □
800W	No available	2 resistors 7 □

3.14. Brake module

The B17 box Digital has a braking system inside through the use of resistors. If during the motor's deceleration phase alarm #10 comes on (Pre-Alarm for max. recovery), in this case it's recommended increasing braking resistor. the choice of ohmic value and of power in Watts of resistor depends on the size of B17 box Digital and the wattage produced by the motor it mus get rid of. The eventual connection for such external resistance is shown below.

Connection of 1 external resistor of 370W



- POWER: If a transformer or autotransformer's power exceeds a determined value, the B17 Box Digital could be damaged in the power supply insertion phase, due to overcurrent while charging internal capacitors. Those values are:

- 1 max. power for transformers is 8KVA;
- 2 max. power for autotransformers is

If the said values are exceeded it's necessary to:

- 1 use two transformers or autotransformers which will supply
- 2 separate groups of B17 box Digitals.
- 2 Use a initial preloading system.

In both cases, contact the manufacturer for additional information and sizing

$$P_t = P_n + P_n + P_n + \dots$$

- Pt = transformer power (VA).
- Pn = nominal power for each motor (VA).

The nominal power of each motor is calculated:

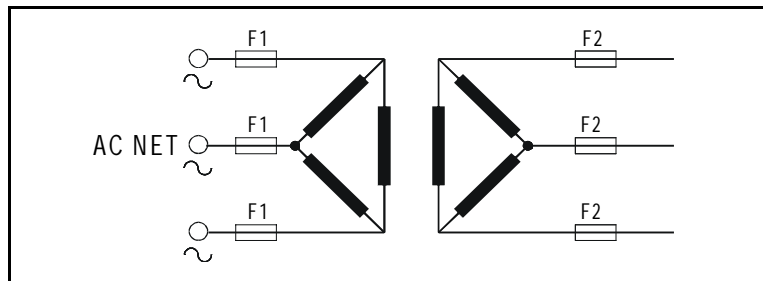
$$P_n = \frac{n}{9,55} \times C_n$$

- Pn = motor's nominal power (VA).
- n = motor's max. speed (rpm).
- Cn = motor's nominal torque (Nm).

In multi-axis applications, the transformer's or autotransformer's power can be up to 30-40% of used cycles.



- FUSES:** ensure placement of fuses F1 and F2 on primary and secondary of transformer or autotransformer. The F1 fuse inserted on the primary protects the transformer or autotransformer against current overload caused by the secondary.This fuse is the **"slow"** type. the F2 fuse inserted on the secondary protects the transformer or autotransformer against shortcircuits caused by the rectifier bridge itself. This fuse is the **"fast"** type. **The fuses may be replaced by magnetothermal switches.**



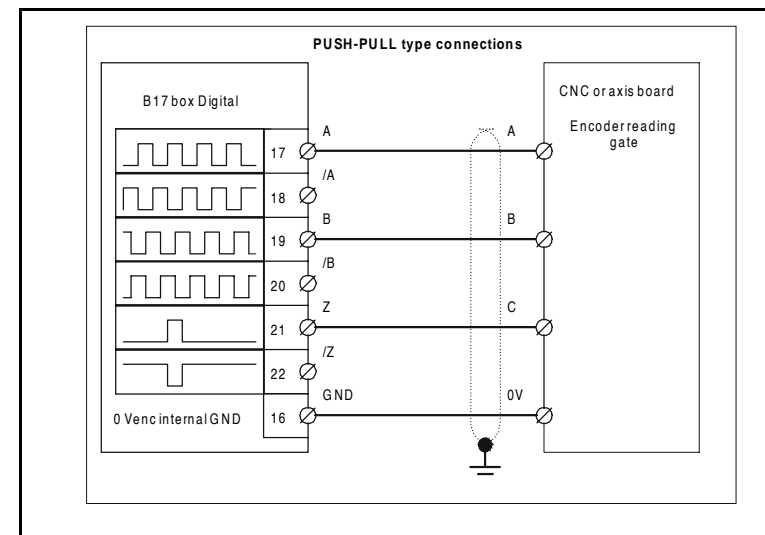
$$F1 = \frac{P_{\text{trasformer}} \times 1,1}{V(\text{primary}) \times 1,73}$$

P = transformer power (VA).
V = primary voltage in (Vac).

$$F2 = \frac{P_{\text{trasformer}} \times 1,1}{V(\text{secondary}) \times 1,73}$$

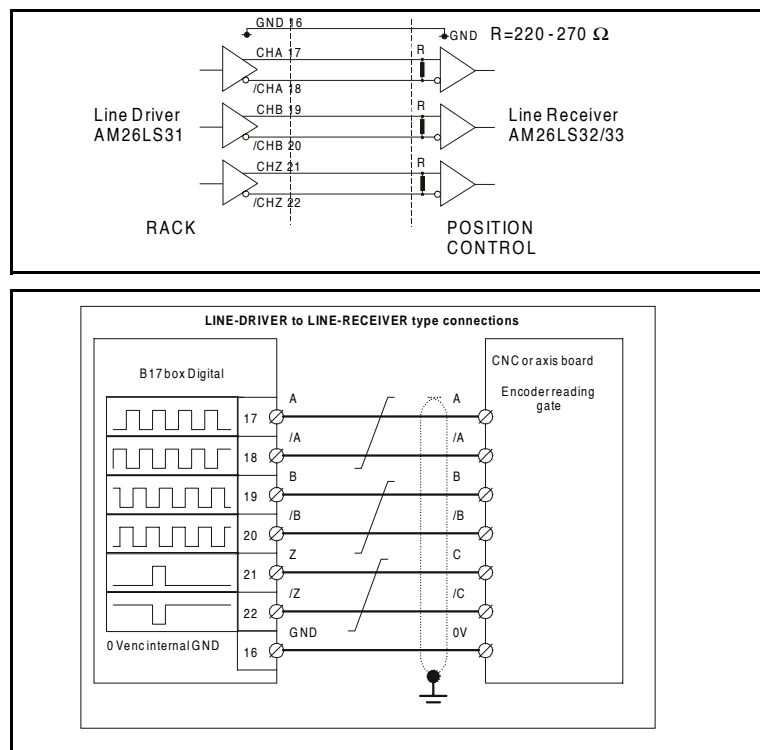
P = transformer power (VA).
V = primary voltage in (Vac).

Push-pull: utilize only the positive channels referring to common 0.



3.13. Simulated Encoder Channels

- All encoder channels can output a current of approx. 20mA. The output impulses can be divided in accordance to program execution, utilizing chapter 4.4 "Visualized and modifiable parameters". The simulated impulses may be used in the two modes that follow:
- Line-driver:** utilizes all positive and negative channels. In some cases axis boards or CNC may read the simulated impulses erroneously, this is due to disturbances in the cables. The max. distance to guarantee a clean signal depends on cable impedance and characteristics. In this case, it is recommended to connect a resistance of about 220 o 270Ω between channels A -A, B-B, Z-Z, at axis board or CNC input (se non già montate al suo interno). Nel caso in cui ci siano più schede assi o CNC, che leggono in parallelo i medesimi canali, le resistenze vanno collegate sulla scheda assi o sul CNC più lontano.

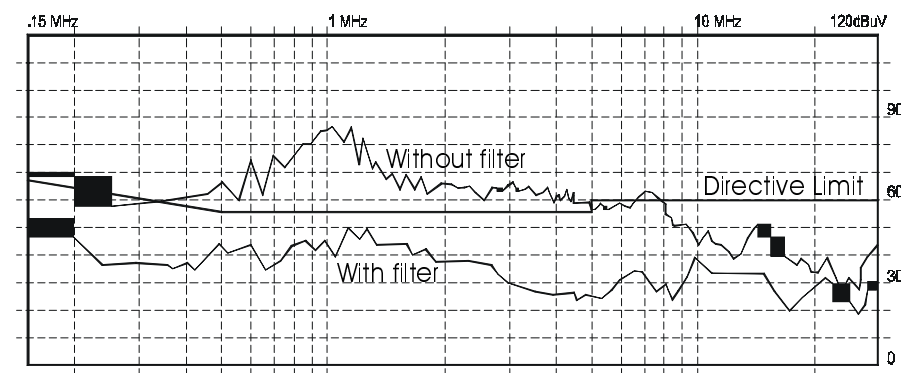


3.5. Anti-disturbance notice / EMC (Electromagnetic compatability)

The referenced standard used for conformity in electromagnetic compatability field is found in the Italian CE EN 61800 directive (all parts). The conformity is therefore ensured for the B17 Box Digital, only if it installed in accordance with precise cabling criteria as expressed below:

- 1 Use of adequate net filters
- 2 Use of shielded cables
- 3 Using discoupling cables technique.

1 Use of adequate net filters: Of the systems stated above, certainly the use of net filters is to be considered fundamental for the suppresssion of disturbances, but also the most expensive . Axor while testing pin-pointed particular solutions which are considered optimal, exclusively for Axor products. the proper functioning of these filters on other products are not guaranteed. the illustration is an example of the level of disturbances measured with and without the use of a filter for the B17 box Digital.



Note: The illustration is purely a demonstration and does not represent data for

The addition of an inductance to the net filter in series with motor, in some cases, betters the circulating current factor and also the entity of disturbance emission, thereby permitting the use of less expensive filters. The electromagnetic capability testing were executed using SHAFFNER filters.

Other filters with the same characteristics may be equally sufficient, but have not been tested or evaluated in applications using the B17 Box Digital. When other products are tested and have positive results, they will be published.



Being implicit for the filter functioning properly to deviate the undesired frequency to ground or earth , this requires that such dispositive produces towards ground the leakage current in MilliAmps. It is therefore neccessary for your system security to connect the filter to ground before enabling power supply. A connection error makes the filter itself inefective.

In relation to the Leakage current and the variable nominal current, as it applies to working temperature, remeber this must be considered during differential dispositive adjustment in order to avoid unrequired intervention.

Choosing the best filter is done using the following points:

- size of transformer or autotransformer;
- calculate the circulating nominal current value on transformer's primary or single / three-phase autotransformer utilizing the following formula:

Three-phase:

$$I \text{ (primary)} = (Pt / 1.73xV(\text{primary}))x1.1$$

I(primary) = primary current (A).
Pt = transformer power(KVA).
V(primary) = primary voltage(Vac)

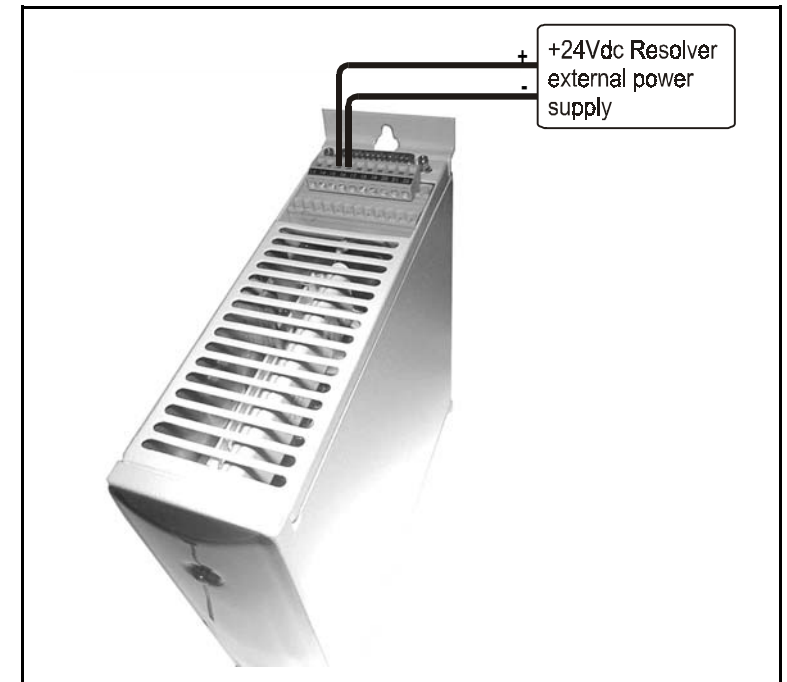
Single-phase:

$$I \text{ (primary)} = (Pt / V(\text{primary}))x1.1$$

I(primary) = primary current (A).
Pt = trasformer power (KVA).
V(primary) = primary voltage (Vac)

3.12. External resolver power supply and logic board

It is possible to power the logic board and the resolver utilizing an external power supply of 24Vdc + 25% / -30%, by connecting the supply's positive pole to terminal 15 "+V ext" and terminal 16 "GND" as in illustration. This permits maintaining simulated encoder output signals even when the drive is shut off.



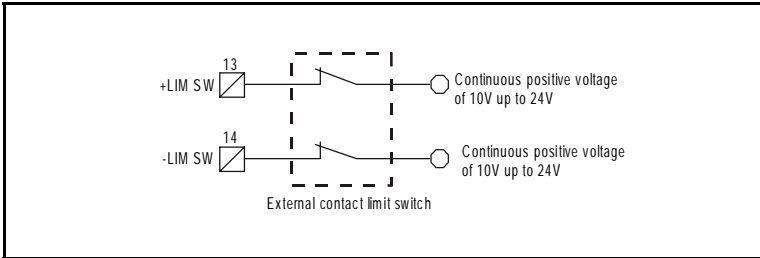
Pay attention to the external power supply's voltage polarity.

3.11. Limit Switch +/-

Terminal 13 "+LIM SW" and 14 "-LIM SW" on control terminal may be programmed as ending points by setting parameter d3 of menu F3 with value 1. If said parameter is value 0 the ending point is disactivated. The ending point function is as follows:

- if motor rotates clockwise and at terminal 13 "+LIM SW" the external contact is open or the positive signal is accidentally to "GND" the motor will stop.
- if motor rotates counter-clockwise and at terminal 14 "-LIM SW" the external contact is open or the positive signal is accidentally to "GND" the motor will stop.

In case both external contacts are open the drive visualizes allarm number 13 (see chap. 4.4).



If external voltage is utilized, connect the GND of said power supply to terminal 3 "GND" of the "Control Terminal".

- choose a filter with the same or higher nominal current than that of the transformer's or autotransformer's primary; the filter is inserted into the transformer's or autotransformer's primary.

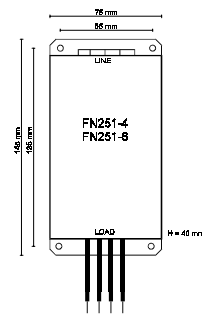
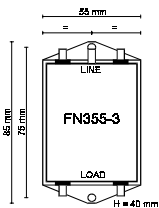
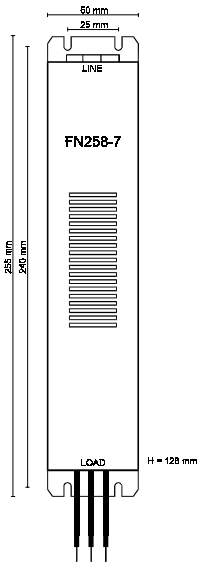
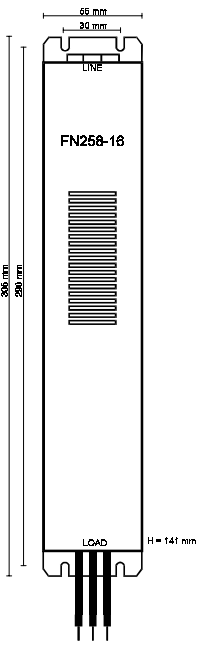
This method, besides offering the best results from a disturbance suppression point of view, allows the use of filters capable of supporting much less current thereby exploiting the transformers transformation ratio, which means more cost effective.

SINGLE AXIS CONFIGURATION B17 Box Digital	Filter's Nominal Current (A)	Filter Model
B17 Box Digital C200	7	FN258-7
	8	FN251-8
	16	FN258-16
	3	FN355-3
B17 Box Digital D 300	7	FN258-7
	8	FN251-8
	16	FN258-16
	3	FN355-3

Current leakage and nominal current::

MODEL	CURRENT RATING (A)	CURRENT LEAKAGE (mA)	POWER LOSS (W)	WEIGHT (Kg)
FN251 - 4	4 (40∞)/4,6 (25∞)	1,31 (400V 50Hz)	5,5	0,75
FN251 - 8	8 (40∞)/9,2 (25∞)	1,31 (400V 50Hz)	7	0,75
FN258 - 7	7 (50∞)/8,4 (40∞)	71 (250V 60Hz)	4,5	0,75
FN258 - 16	16 (50∞)/19,2 (40∞)	84 (250V 60Hz)	9	1,2
FN355 - 3	20 (40∞)/23 (25∞)	0,41 (400V 50Hz)	1,5	0,25

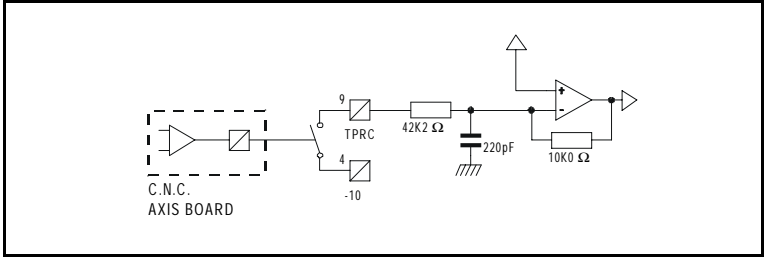
Mechanical and electrical characteristics:

NET FILTERS			
			
Furnished standard with line input on terminal and output towards the load on isolated cable. Max.wk V : 440Vac Max.curr. : 8A @ 40°C Wk Temp. : -25° +85°C	Forniti standard con linea in ingresso e verso il carico su faston. Max.wk V: 420Vac Max.curr. : 3A @ 40°C Wk temp. : -25° +85°C	Furnished standard with line input on terminal and output towards the load on isolated cable. Max.wk. V : 480Vac Max.curr. : 7A @ 50°C Wk. Temp. : -25° +85°C	Furnished standard with line input on terminal and output towards the load on isolated cable. Max.wk. V : 480Vac Max. curr. : 16A @ 50°C Wk. Temp. : -25° +85°C



If sigle-phase is used, connect only the two inputs denominated L1 and L2.

Example of current mode with digital input without limitation of maximum rpms.



MENU' F4:

E1: Positive peak current

- 0: 0% zero current
- 99: 100% max. current

E2: Negative peak current

- 0: 0% zero current
- 99: 100% max. current

E6: Limit percentage of peak current

- 0: 0% of peak current
- 99: 100% of peak current

$$\% \text{ di limit. } I_{picco} = \frac{I_{picco}}{100} \times \text{valore di limitazione tra 0 e 100}$$

MMENU' F7:

L0: Speed or torque mode

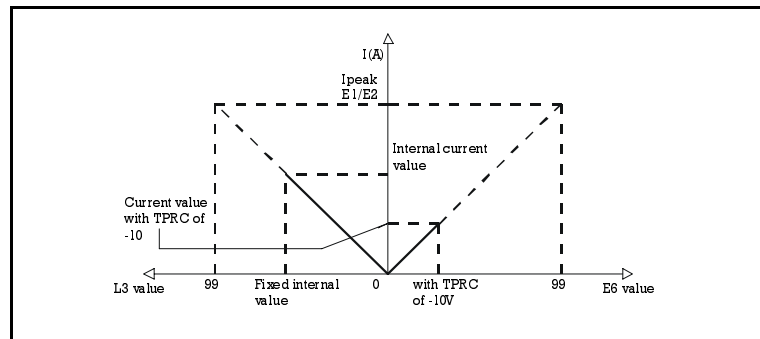
- 1: torque control

L1: Analogue or digital reference

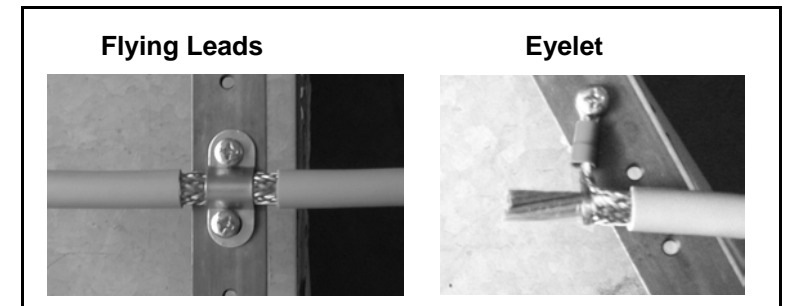
- 1: digital reference

L3: Torque reference value

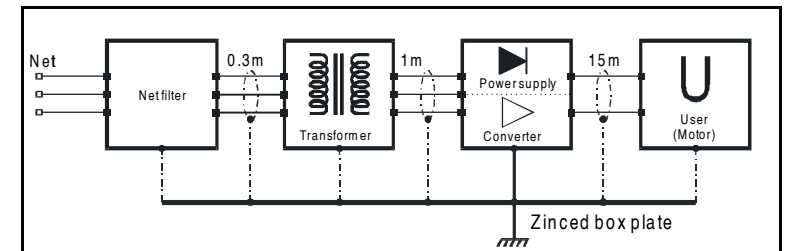
- 0: Max. negative torque reference
- 50: Zero torque reference



2 Using shielded cables: all net filter connections must be shielded, the cable utilized must have the shield screen resting on the zinc panel of the box in the immediate vicinity of both the power terminals and those of each motor using flying leads as illustrated in the figure below. It is indispensable that the panel on which the shield screen is resting is connected to ground.

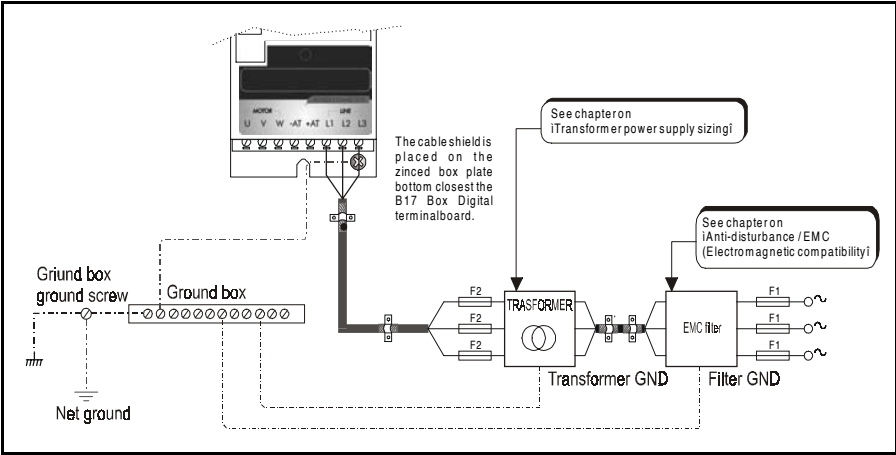


Cable projection and resting technique may be decisive for best system performance and disturbance suppression. The illustration below shows the correct connection and distances to be adhered to.




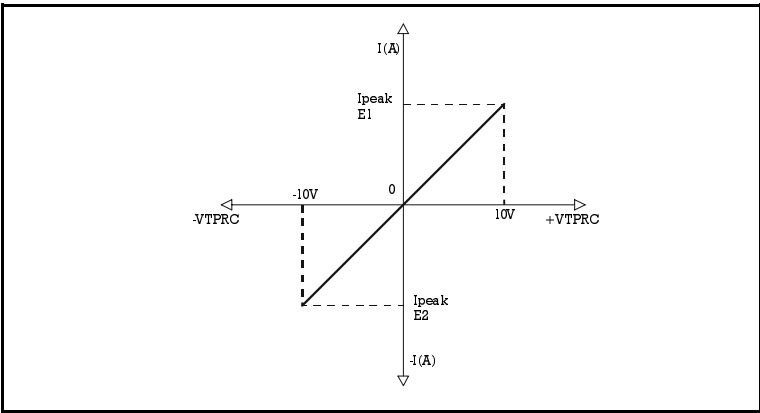
3 Using discouplig cable technique: when placing conductors you must remember the necessity to physically maintain **separation of power wires from command or signal wires**. You must avoid crossing, overlapping and kinking. If crossing is indispensible, try to cross at 90°. Where possible, use mettalic power conductor channels for placement, which are connected to ground.

3.6. Connecting transformer to the net.

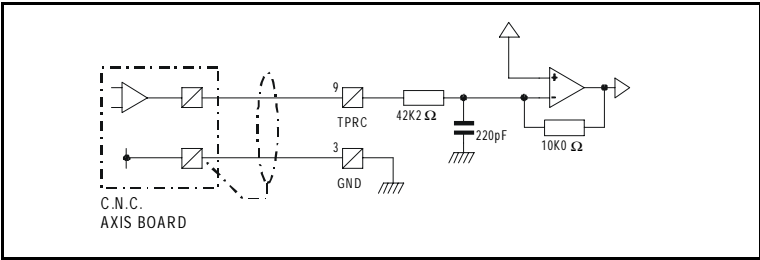


For power net connection the use of **shielded cable** is absolutely required after the EMC filter up to B17 box Digital input, understanding that cable screen must be zinned at box in the immediate vicinity of each flying lead joint interruption, as illustrated above, o with the use of fast-on ???

CODE	DESCRIPTION	
L1	(INPUT)	Secondary transformer alternate power supply
L2	(INPUT)	Secondary transformer alternate power supply
L3	(INPUT)	Secondary transformer alternate power supply
	(INPUT)	ISOLATED EARTH CONNECTION



Example of current control with common mode input without max. rpm limitation:



Current control with digital input without max. rpm limintation

This configuration allows having a fixed internal current value set with parameter L3, also with parameter E6 it's possible to limit the curent with a second value, both values are expressed in percentages in regards to the values set in parameters E1 and E2. The contact at input "TPRC", if open, the current value is determined by parameter L3, while if closed at terminal 4 "-10" the current value is limited in accordance with parameter E6. To obtain this type of control, set the parameters as follows:

• **Current mode with common mode input without max. rpm limitation**

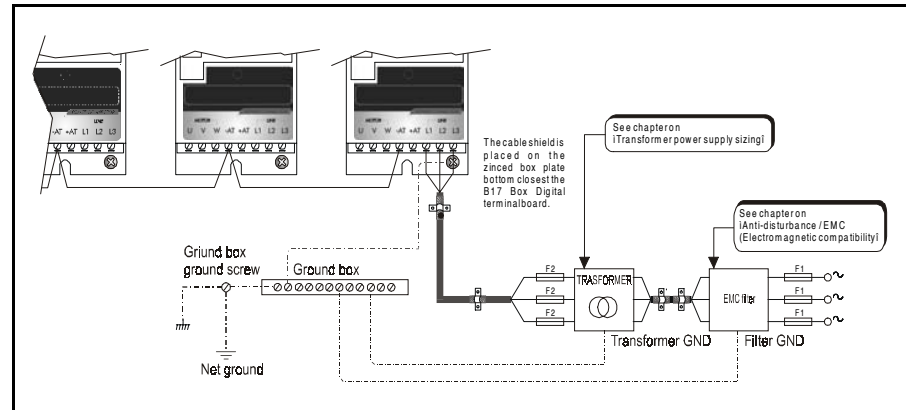
This configuration allows controlling drive's current with an analogue signal of +/-10V in common mode utilizing terminal 9 "TPRC". the current value depends upon the voltage present on terminal 9 "TPRC", the max. value cannot exceed the limit set by parameters E1 and E2. To obtain this type of control set the parameters as follows:

- MENU' F4:**
E1: peak positive current
 0: 0% zero current
 99: 100% max. current
E2: peak negative current
 0: 0% zero current
 99: 100% max. current

$$\% \text{ di limit. } Ip_{picco} = \frac{Ip_{picco}}{100} \times \text{valore di limitazione tra 0 e 100}$$

- MMENU' F7:**
L0: Speed or Torque mode
 1: torque mode
L1: analogue or digital reference
 0: analogue reference
L6: torque reference in common mode or differential
 0: common mode reference
L7: clockwise speed limitation in current mode
 0: 0% no speed limitation
L8: counter-clockwise speed limitation in current mode
 0: 0% no speed limitation

3.7. Motor connection



For motor connection the cable utilized must be 3P + T (shielded type). Ensure the U-V-W phases of motor correspond to the U-V-W of B17 box Digital, the earth cable to the corresponding screw and the screen/shield of motor cable laying on box bottom (zinc-plated) by pressed cable (flying lead), as illustrated, or by using fast-on eyelet in the immediate vicinity of the terminal itself. Such cables must be channeled separate from respecting signal cables and with the following sections:

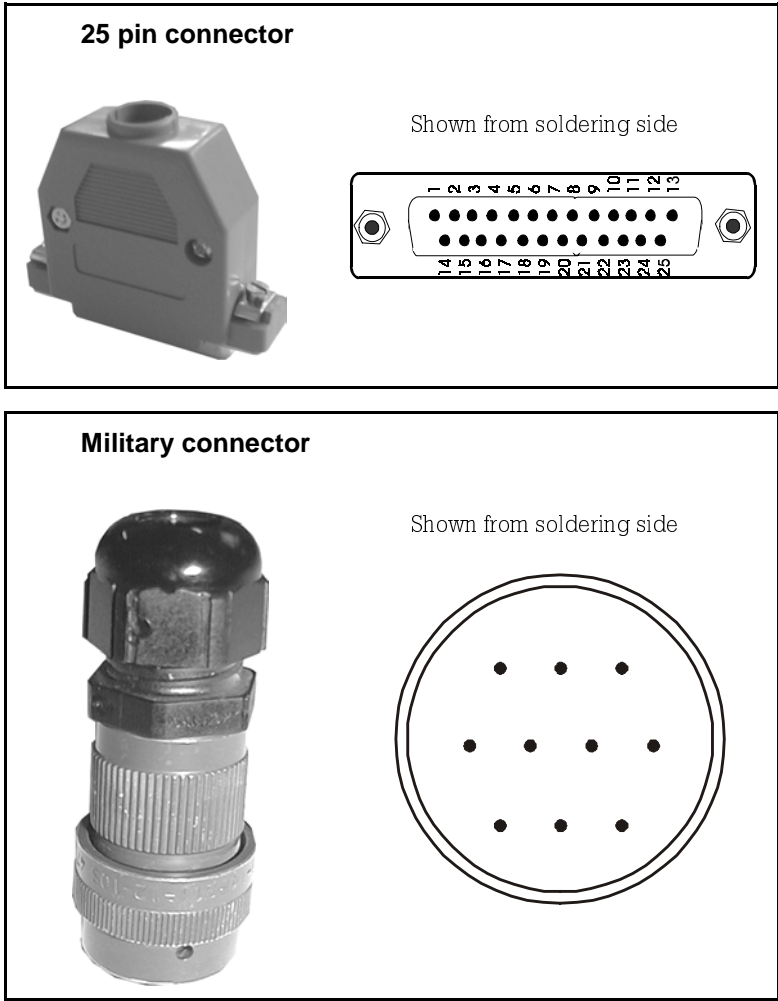
MODEL	SIZE	SECTION
B17 box Digital	2/4 - 4/8 - 8/16	1,5mm ²
B17 box Digital	10/20 - 14/28 - 20/40	2,5mm ²



If an electromechanical brake is present on motor, power the +e terminal with a continuous voltage of approx. 24 Vdc, paying attention not to invert the polarity.

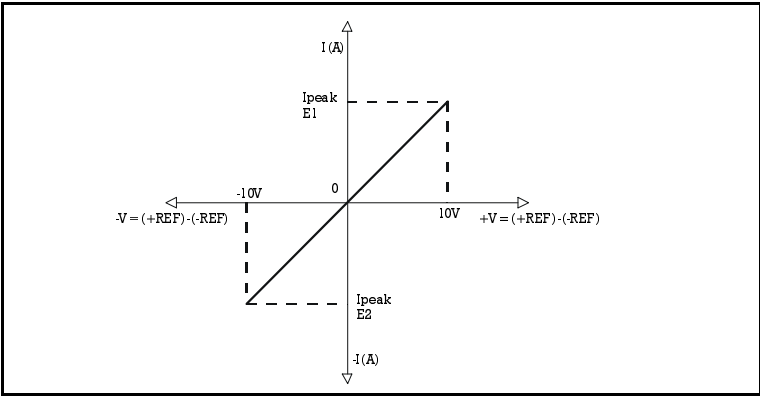
3.8. Connecting 25 pin and military connectors

On these connectors

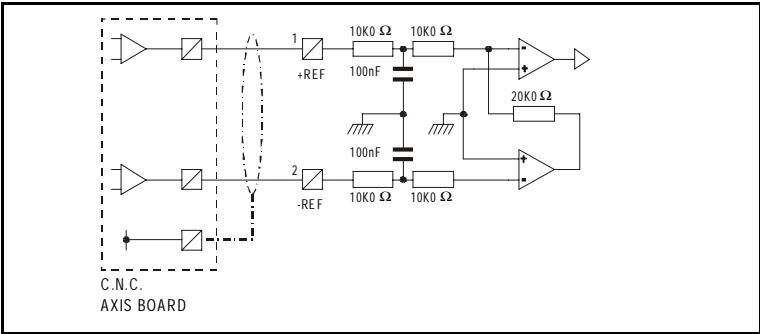


MENU' F7:

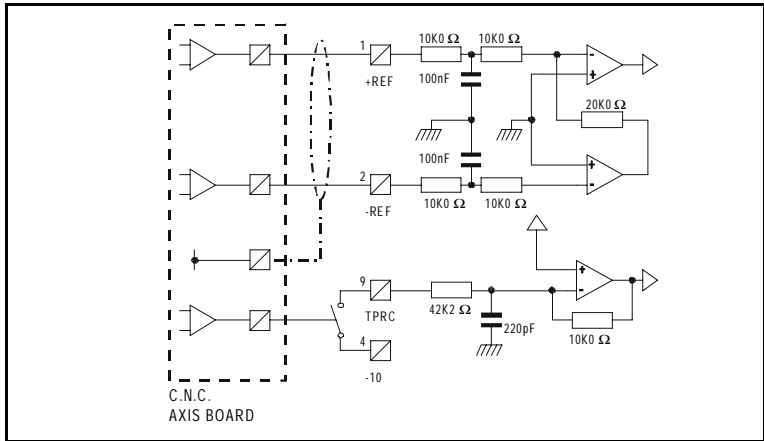
- L0: Speed or Torque control
1: torque control
L1: Analogue or digital reference
0: analogue reference
L6: Torque reference in common mode or differential
1: differential reference
L7: Clockwise speed limitation in current mode
0: 0% no speed limitation
L8: Counter-clockwise speed limitation in current mode
0: 0% no speed limitation



Example of current control with differntial input without max. rpm limitation:



Example of differential speed control with digital current limitation:



- Speed control with differential inputs without max. rpm limitation**
This configuration enables controlling drive's current with an analogic signal of +/- 10V in differential utilizing terminals 1 and 2 "+/- REF". The current value depends upon the differential voltage present between terminals 1 and 2 "+/- REF", the max. value cannot exceed the limits set with parameters E1 and E2. To utilize this tpe of control, set the parameters as follows:

MENU' F4:
E1: positive peak current
 0: 0% zero current
 99: 100% max. current
E2: negative peak current
 0: 0% zero current
 99: 100% max. current

$$\% \text{ di limit. } I_{picco} = \frac{I_{picco}}{100} \times \text{valore di limitazione tra 0 e 100}$$

TERMINAL BOARD PIN #	MILITARY PIN#	SIGNAL	DESCRIPTION
4		ST	motor thermal switch
8		SCREEN	3-pair shielded cable
13		SCREEN	global cable shield
14		-SEN	Resolver secondary winding input (connected to zero signal)
15		-COS	Resolver secondary winding input (connected to zero signal)
16		-ECC	power supply for resolver primary winding Output
17		ST	motor thermal switch
23		+SEN	Resolver secondary winding input
24		+COS	Resolver secondary winding input
25		+ECC	power supply for resolver primary winding

3.9. Control Terminal Board

The drive command inputs are present on the terminal board, the simulated encoder output and the auxiliary +/-10V power supply. We recommend using shielded cable to avoid signal disturbances when connecting terminals 1-2-9-15-16-17-18-19-20-21 and 22.

N° POLES	FUNCTION	DESCRIPTION
1	+REF	INPUT Non inverted speed differential stage input or torque with +/-10V (see ch. 3.10 iSpeed and Torque Referencei).
2	-REF	INPUT Inverted speed differential stage input or torque with +/-10V (see ch. 3.10 iSpeed and Torque Referencei).
3	GND	Comune zero segnale
4	-10V	OUTPUT Auxiliary voltage output of -10V with 2mA max.
5	+10V	OUTPUT Auxiliary voltage output of +10V with 2mA max.
6	REF ON	INPUT Using the F3 menu parameter d7, you can enable the drive for accepting input reference at terminals 1&2 i+/- REFi with positive logic signal 10/30Vdc or negative 0/5Vdc (see ch. 4.6 iParameter programming and visualizationi).
7	ENABLE	INPUT Using the F3 menu parameter d7 its possible to enable the drive to take motor stall torque with positive logic signal 10/30Vdc o r negative 0/5Vdc (see ch. 4.6 iParameter programming and visualizationi).
8	PROGRAMMABLE ANALOGIC OUTPUT	OUTPUT Using the F2 menu parameter c9 itis possible to read and select one of the following values: (see ch. 4.6 iParameter programming and visualizationi) 0: no visualization 1: motor current 2: current Iq 3: current Id 4: current reference Iq
9	TPRC	INPUT This input can be used as a torque command current limit (see ch. 3.10 iSpeed and torque referencei).

MENU' F4:

E1: Peak positive current

0: 0% zero current

99: 100% max. current

E2: Peak negative current

0: 0% zero current

99: 100% max. current

E6: Peak current limitation percentage

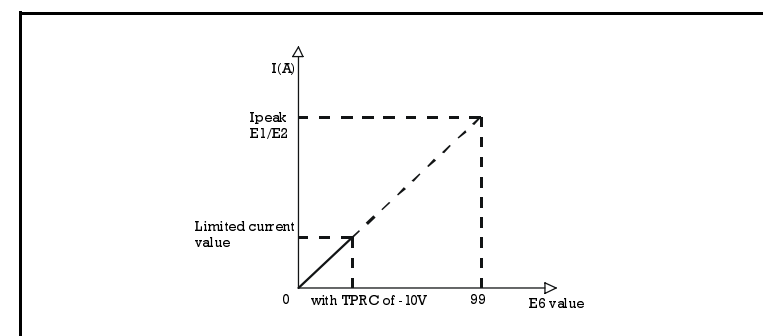
0: 0% of peak current

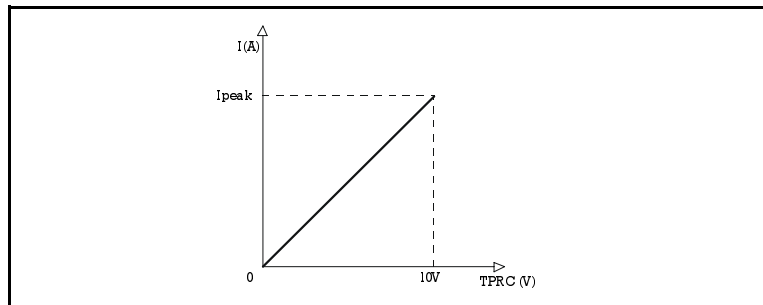
99: 100% of peak current

$$\% \text{ di limit. } I_{picco} = \frac{I_{picco}}{100} \times \text{valore di limitazione tra 0 e 100}$$

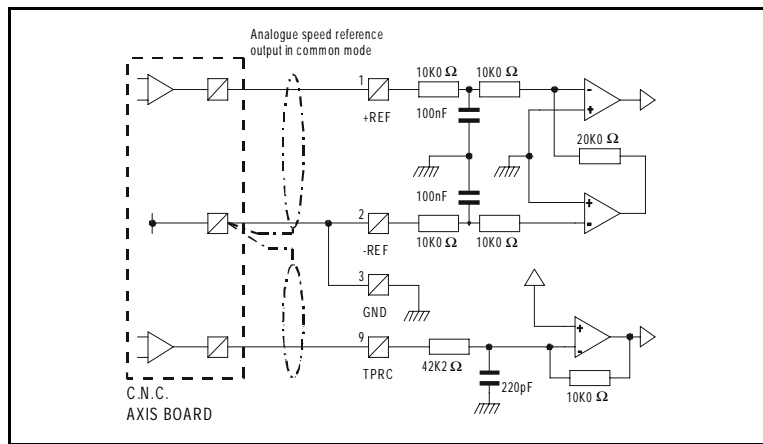
MENU' F7:

L0: Speed or Torque mode






Example of speed control with common mode reference and analogic current limitation:



Speed control with differential analogue reference or in common mode and digital current limitation.

This configuration allows motor speed control with an analogue differential reference or in common mode using inputs 1-2 "+/- Ref" and limit the current size setting parameter E6 with a value between 0 and 99.

The contact input 9 "TPRC" if open, the current value is determined by parameters E1 and E2, while if closed with terminal 4 "-10" the current value is limited by parameter E6. to obtain this type of control, set the parameters as follows:

PIN#	FUNCTION	DESCRIPTION	
10	OK		This contact is normally closed. It is opened for intervention of one of the internal drive protections and when enabled the external signal of nominal motor protection (I _{st}) comes on. Max. carrying capacity 48Vdc - 800mA 110Vac - 1A
11	OK		
12	EARTH	INPUT	Common zero GND terminal . <i>Said terminal must be connected to the Isolated Ground Bar.</i>
13	+LIMSW	INPUT	Right limit overshoot or alternately can be programmed with other functions (see ch. 3.11. iLimitswitch+/- i)
14	-LIMSW	INPUT	Left limit overshoot or alternately can be programmed with other functions (see ch. 3.11. iLimitswitch+/- i)
15	V EXT.	INPUT	External voltage to supply the logic board and resolver (see ch. 3.12. iResolver and Logic board external power supply i)
16	GND	Common zero signal	
17	A	OUTPUT	Simulated Positive A channel (see ch. 3.13. iSimulated encoder channel i)
18	A	OUTPUT	Simulated Negative A channel (see ch. 3.13. iSimulated encoder channel i)
19	B	OUTPUT	Simulated Positive B channel (see ch. 3.13. iSimulated encoder channel i)
20	B	OUTPUT	Simulated Negative B channel (see ch. 3.13. iSimulated encoder channel i)
21	Z	OUTPUT	Simulated Positive Z channel (see ch. 3.13. iSimulated encoder channel i)
22	Z	OUTPUT	Simulated Negative Z channel (see ch. 3.13. iSimulated encoder channel i)

3.10. Speed and Torque reference

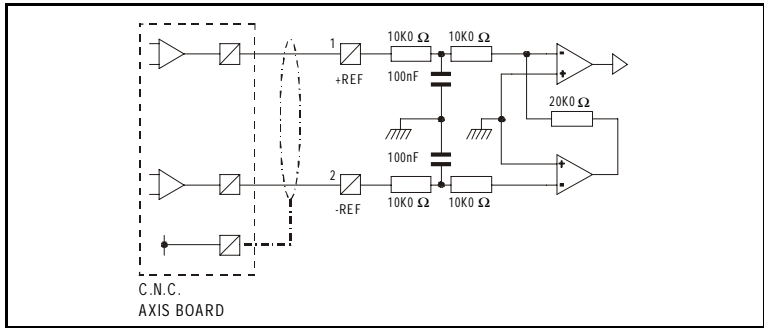
Terminals 1-2 "+/- Ref" and the "TPRC" terminal may be used for speed control or torque and both. If needed, if necessary, limiting motor rpm in current control it's sufficient to set parameters L7 and L8 with the following values:

MENU' F7:

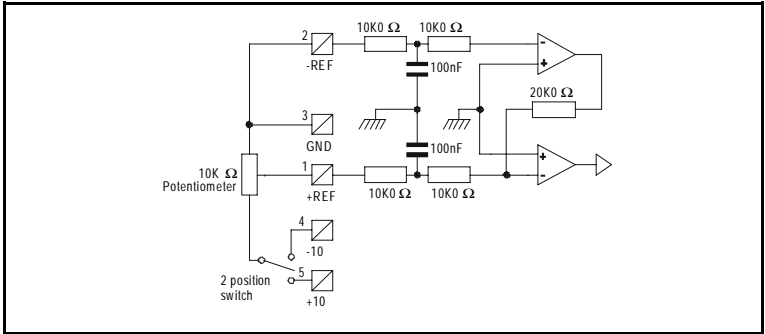
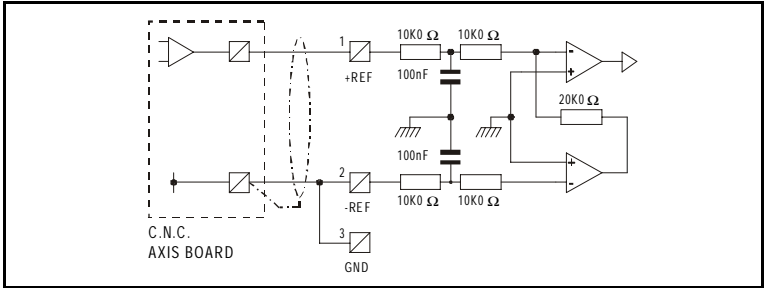
- L7: Clockwise Speed limitation in current control
allows limiting the speed in regards to lowscale setting
0: 0% zero speed limitation
50: 50% lowscale speed set
99: 100% lowscale speed set
- L8: Counter-Clockwise Speed limitation in current control
allows limiting the speed in regards to lowscale setting
0: 0% zero speed limitation
50: 50% lowscale speed set
99: 100% lowscale speed set

The possible applications of these 3 inputs are the following:

speed control with analogue differential reference +/-10V or less.



- speed control with analogue reference in common mode with +/-10V or less.
In this configuration with +10V signal input at "+Ref" the motor shaft as seen from the front turns clockwise, with a +10V signal input at "-Ref" the motor shaft turns counter-clockwise.



Do not use a potentiometer with a value less than 10KΩ

speed control with analogic differential reference or in common mode and analogue current limitation

This configuration allows controlling motor speed with an analogic differential reference or in common mode by inputs 1-2 "+/- Ref" and auxiliary input 9 "TPRC" it's possible giving a voltage of +10V, limiting the drive current from 0 to peak aized value. To obtain this type of control, set the parameters as follows:

MENU' F7:

- L0: Speed or Torque Mode
0: speed control
- L5: Internal or External current limit
1: external current limit