

The B17 amplifier series is distributed with the CE mark, because they are in accordance with the European Directives on EMC and Low Voltage.



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All specifications are subject to change without prior notice.

WARNING!

***ELECTRICAL AND CONTROL EQUIPMENT CAN BE DANGEROUS IF
HANDLED IMPROPERLY***

This manual describes the mechanical and electrical characteristics of the B17 A-B-C-D series.
It is important, that the installation procedures are only performed by qualified personnel and in accordance with local safety guidelines.
Whoever installs the equipment must follow all of the technical instructions printed in this manual.
For more information, please contact AXOR'S technical department.

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2) When we're applying power supply the number 9 is lighted

Wrong Supply voltage

- Control by instruments between +- AT

3) The B17 is enabled, but the motor don't runs

There isn't ref signal

- Check input signals

4) When the B17 is enabled the number 2 lighted

Short-circuit on Motor terminals

- Remove power supply

One of the motor terminal in connected with earth.

- Check the wiring
- Controllare il motore
- Disconnect the motor and check the insulation.

5) When the B17 is enabled, the motor is not controlled and the number 5 is lighted

There isn't encoder signal

- Remove power supply
- Check the encoder connections (see the table)

The encoder connection is wrong

6) When the B17 is enabled, the number 4 is lighted

Wrong connection of hall signal

- Check the connection of the hall signal

There isn't +5V power supply on the encoder

- Check the connections of the sub din 25 ways connector.

7) During the deceleration the number 9 is lightning

The power supply voltage is over the maximum

- Check the capacitor value

8) During the working the number 7 is lighted and the motor is stopped

Motor max temperature

- The motor works over his possibility

The B 17 amplifier has protective circuits for safeguard it and the motor ,if necessary. All the protections are annunciated in front of the amplifier by the display"see the previous page about the means"

There are two types of faults:reversible and irreversible.

Reversible protections intervent:

The amplifier will be enable as soon as the current or voltage returns to on acceable operating level.

Irreversible protection intervent:

The amplifier won't able.It is necessary switch off the power supply,eliminate the fault cause and switch on the power supply.

NOTE: Before switch on a new time,pls ensure to leave the amplifier minimum amount of time till all the capacitors on board are discharged.

REVERSIBLE

- Limit current intervent
- Over-under voltage

IRREVERSIBLE

- Absence setting board
- Over Current
- Overtemperature amplifier
- Absence Hall effect signals
- Memorization I²t intervent
- Motor Thermoswitch (PTC)

Fault serching

1) During the work, the 3 number is lighted and the motor is stopped

Happened max temperature thermoswitch

- Room temperature more then 40° C
- There isn't present forced cooling where is required.

Description

- The *B 17 BOX* amplifier, is a four quadrant converter with Sinusoidal waves suitable for driving AC brushless motors.
 - The power stage is made by power mosfet (IGBT for 200v version B17C).
 - It is driven in PWM mode with 20 KHZ modulation, this allows it to drive small and medium Brushless motors, where dynamic performance and fast response are requested.

Main features:

- Complete Smt technology
- High PWM frequency "40khz"
- Sinusoidal Waves
- Feedback from encoder
- I²t motor protection
- Display with diagnostic alarm and status
- Differential input reference +/-10V
- Analogue input for drive in torque mode +/-10 V
- Monitor current motor +/-8V =I max.
- Monitor speed motor +/-10V =Speed max.
- Auxiliary voltage +/-10V max 30mA
- Encoder auxiliary voltage +5 V max 200mA
- Encoder auxiliary voltage +12 V max 200mA
- Direct net power supply for B17 Box D versions (opto-isolated) both in mono and three-phase

Adjustments:

- Detachable settings board (replaced with a new one when necessary)
- Adjustable speed offset
- Dynamic motor's adjustment
- Ramp acceleration adjustment
- The offset trimmer may be used as reference signal "S19 Closed".

Protections:

- Outputs completely protected - Above-below voltage - Above temperature amplifier and PTC motor - Polarity/absence of speed feedback- Absence of Hall Sensors - Absence of the settings board

Power supply voltage and rated current for every model

Model	Supply (Vac)
B17 BOX A	20 - 40 *
B17 BOX B	35 - 95 *
B17 BOX C	52 - 145 *
B17 BOX D	90 - 230 *

Size	Rated current	Peak current (A)RMS
4 / 8	4	8
8 / 16	8	16
10 / 20	10	20
14 / 28	14	28
20 / 40	20	40

-Sizes available for all models

* Dc power supply values are the minimum and maximum accepted.

-Working voltage B17,Motherboard and Rack system,please see chapter "Power supply and Requirements".

-The next pages explain the specifications for the connector controller and the sub D 25 poles connector.

More specifications

Altitude	1500 m.
Humidity	10% a 95% Without condensation
Shock	25 a 1500 hz @ 1,8g
Operating temperature	0 / 40° C
Storage temperature	-10 / 70° C
Drift referred to differential reference circuit	+ / -18 micro V/C°
Drift referred to differential speed circuit	+ / -18 micro V/C°
Bandwidth	2.5 Khz
Interface encoder	AM26LS33
Interface hall signal	AM26LS33
Max . encoder frequency	200 Khz

4

Signal of absence of the hall effect sensors

This situation appears when occur the absence of one or more feedback signal HA HB HC , come from hall effect sensors.

When occur this alarm,the amplifier is disabled and the alarm is memorized. Switch off the main power,eliminate the cause of the problem and switch on the main power ,again.

5

Signal of absence of the velocity feedback

-It announce the absence or inversion of the signals come from the encoder feedback .

When occur this alarm,the amplifier is disabled and the alarm is memorized. Pls,switch off the main power,eliminate the cause of the problem and switch on the main power ,again.

6

Signal of I^t alarm

It announce that the current limitation I^t is active.

When get over this limit,means that the cycle of the machine is heavy.

Max current providible from the amplifier,will be the current adjusted (as rated current)on the amplifier.

(This alarm don't cause the memorization into the amplifier).

The amplifier return automatically to normal work,when the current consumption goes to a normal value.

If the solder bridge S11 is close,the interdiction of thermal image I^{x t} , **don't cause** the opening of OK relay contact.

.

Signal of I^t intervent memorization.

When the point is on,it announces the intervent of I^t.

To restore,pls switch off the main power,wait for a few seconds,and then switch on the main power again.

7

Signal of PTC motor intervent

It announce the reachment of max motor temperature.

When occur this alarm,the amplifier is disabled and the alarm is memorized.

To restore this alarm it is necessary wait for the cooling of the motor.

Now,it is possible switch on the main power.

8

Intervention signal MAX-REC.

Shows arriving at the maximum regenerative recovery value. When this occurs the amplifier is disabled and the alarm is memorized. To restore - Shut down then restore power

9

Signal of min-max voltage intervent.

It announce the reachment of min.max voltage alarm.

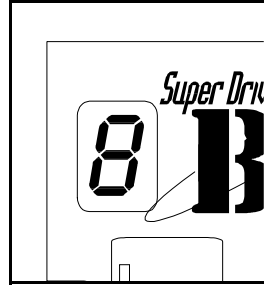
When occur this alarm,the amplifier is disabled and the alarm is memorized, the OK relay contact will be open.

Pls,switch off the main power, eliminate the cause of the problem and switch on the main power.

If the solder bridge,S7 is close,will be cause the memorization into the amplifier.

The display may announces the amplifier's status and the situation of the internal protections.

- The status appears by **fixed letters or symbols**.
- When a failure occur this is announce by a **blinking number**.



Status signals

- Amplifier in stand by situation
This situation appears when the amplifier has the correct power supply without the input REF ON and ENABLE ,and any alarms are present.

E Absence of the input enable
This situation appears when the amplifier has the correct power supply with REF ON enable,and the absence of the ENABLE signal and any alarms are present.
The motor's shaft is free.

F Absence of the enable in the input REF ON.
This situation appears when the amplifier has the correct power supply,the ENABLE is present and the REF ON is absence (Always any alarms present).
The motor's shaft is still in torque.

O Amplifier enabled in torque
This situation appears during the correct working of the amplifier.
REF ON is present , ENABLE is present and any alarms appears.

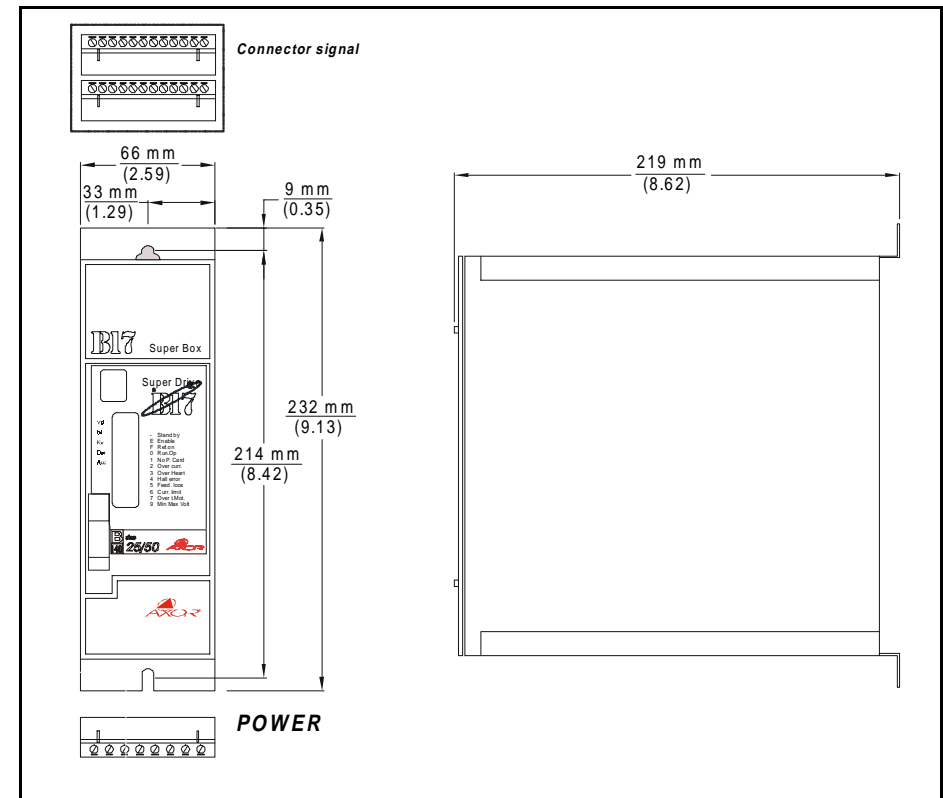
Alarms

1 Signal of absence of the detachable settings board.
This situations appears when switch on the amplifier and the detachable settings board is not present onboard . (This alarm disable tha amplifier).
Pls,switch off the main power,mount the detachable settings board and switch on again.

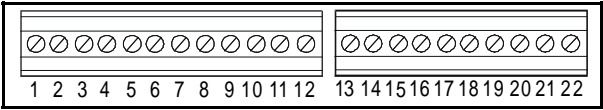
2 Over current signal
This situation may cause from a short circuit between the motor's terminals, or short circuit from the ground.
When occur this alarm,the amplifier is disabled and the alarm is memorized.
Pls,switch off the main power, eliminate the cause of the problem

3 Overtemperature amplifier
This situation when the temperature reach a too high value on the heatsink. When occur this alarm,the amplifier is disabled and the alarm is memorized.
To the alarm restore,it is necessary wait for,the temperature go down in the heatsink.
Pls,switch off the main power,wait for some seconds and then switch on again the main power.

Drive dimensions



Signal control connector



1	+ REF	(INPUT)	Non-inverting differential Input +/-10V.
2	- REF	(INPUT)	Inverting differential input +/- 10V.
3	GND		Common zero signal
4	- 10V	(OUTPUT)	Output auxiliary voltage -10Volt curr. max 20mA.
5	+ 10V	(OUTPUT)	Output auxiliary voltage +10Volt curr. max 20mA.
6	REF ON	(INPUT)	Enable amplifier signal (+10 / 30 Vdc). If the signal is lower than 10 volts the reference signal is disabled.
7	ENABLE	(INPUT)	Enable amplifier signal (+10 / 30 Vdc). If the signal is lower than 10 volt the rference signal is disabled.
8	I MOTOR	(OUTPUT)	This signal corresponds to the rea/ signal in the motor. The max level corresponds to the peak amplifier current + / - 8V . Example: B17 140 8/168V Corresponds to 16 A RMS
9	TPRC	(OUTPUT)	<p>This command can be used in two different modes:</p> <p>1 <u>Current limitation</u>:</p> <p>This function can be accomplished by connecting an external resistor to zero; linear ripartition with internal R = 47 K (Velocity loop continues with it's functions). Example: With 47 K external reistor the current limitation is 50% in respect to the peak size current.</p> <p>2 <u>Current reference</u>: (Torque input)</p> <p>Applying +/-10V max signal in this point corresponds to the peak current in the output.In this situation the velocity loop is automatically excluded,to completely eliminate this effect please open solder bridge JP 7 in the driver module (see page 22).</p> <p>Terminal 9 may be used(Alternative situation 1 and 2), as monitor signal of the amplifier's demand current .</p> <p>N.B. We reccomend to using an instrument with impedance greater t h a n 100 K.</p>
10	OK		These two contacts are normally close.They open when an internal amplifier protection occurs .
11	OK		

Max. load 48Vdc - 800mA 110Vac - 1 A

Specials costants



The amplifiers are normally supplied with the standard adjustments setted.
If necessary,it is possible,optimize the amplifier response,replacing the internal standard costants.
The replacement may be do,putting new vaalues on the detachable settings board and opening the proper solder bridge in the

C DER

This allow to increase the costant derivative of the velocity loop.(pre-setted).
It is ,also,possible increase this adjustments,mounting the capacitor **C DER** in the detachable settings board .

RKV - CKV

These values belong respectively to proportional/integral resistor and capacitor of the velocity loop.
The replacement may be do,opening the solder bridge **S15** .
(Disable standard costants)

GAIN

This,determine the static gain of the velocity loop to do it.
Mounting a new value and open the solder bridge **S16** (Disable of the standard costants).



These adjustments are usually made from the factory and consequently don't need more adjustments, it is necessary only the fine tune of the trimmer KV and DER.

In case of a particular high load inertia (report 3:1 between load inertia and motor inertia), is necessary modify the gain by "Trimmer KV" and increase the derivative effect by "Trimmer DER".

The dynamic adjustments procedures must be done with the load connect with the motor. Pls, connect in the input speed reference terminals, a square at low frequency and amplitude (0,5 Hz +/- 1V). Then, connect on the tacho signal, a probe from an oscilloscope with memory. (Channel A)

(The ground's probe must be connect to GND of the amplifier).

Turn the der trimmer, in anticlockwise sense.

Pls, ensure that the alternative load motions don't cause any dangerous situation.

Se il carico è un'asse allontanarlo dai fine corsa.

Give the power supply to the amplifier and enable it.

The load begin to move and if the machine allow, increase the amplitude until to +/- 2V.

Check the signals in the oscilloscope and compare them with the draw reported below.

The gain is too low.

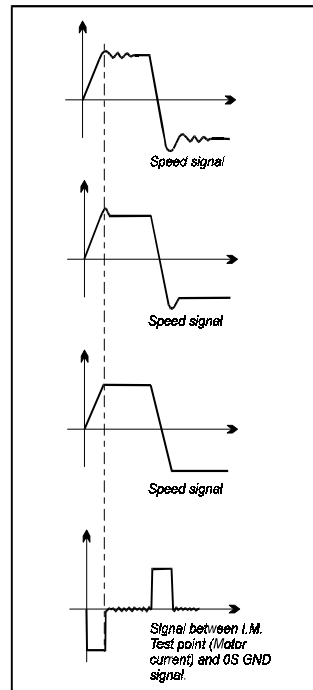
Increase the gain turning in clockwise sense **trimmer "KV"**, until appears a situation as reported on the right.

To reduce the overshoot turn in clockwise sense **trimmer "Der"**, until appears a situation as reported on the right.

(We wish remember that if S16 is close it increase the adjustment of DER.trimmer)

Warning: Don't exceed with the gain; indeed may be provoke an unuseful heating of the motor caused from the current oscillations.

A good signal is reported on the right.



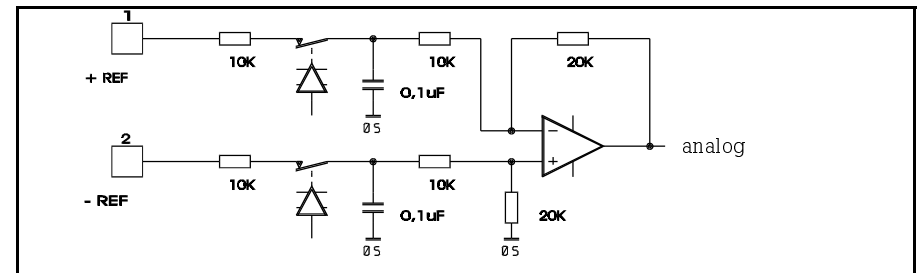
Signal controls (continued)

12	Ground	(INPUT) Terminal to connect to the common hearth
13	+LIM SW.	(INPUT) Extra switch limit dx. (Avalaible in a short time)
14	-LIM SW	(INPUT) Extra switch limit sx. (Avalaible in a short time)
15	+5V EXT.	(INPUT) Power supply from CNC to encoder supply
16	GND	Common zero signal
17	A encoder	(OUTPUT) A channel from encoder
18	/A encoder	(OUTPUT) A channel denied from encoder
19	B encoder	(OUTPUT) B channel from encoder
20	/B encoder	(OUTPUT) B channel denied from encoder
21	Z encoder	(OUTPUT) Z channel from encoder
22	/Z encoder	(OUTPUT) Z channel denied from encoder

Note: The signals available from terminals 16,17,18,19,20,21,22 come from the sub D connector.

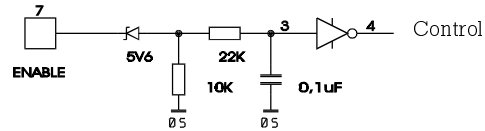
Interface circuits

Input circuit analog differential

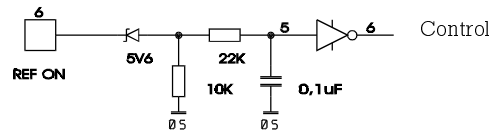


Interface circuits

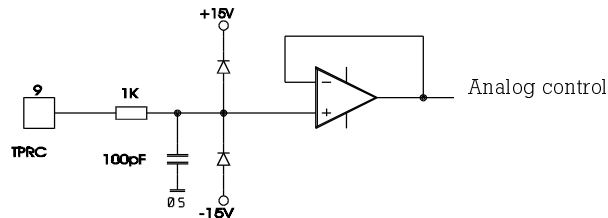
Input circuit - Enable PWM 10V - 30 Vdc max



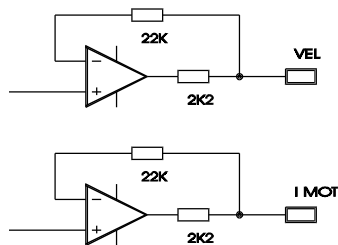
Input circuit - Enable ref. 10V - 30 Vdc max



Analog input TPRC



VEL and IMOT Output circuit on the setting card



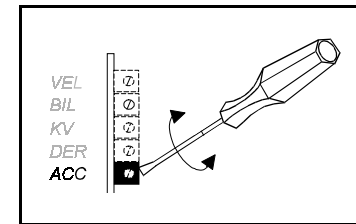
Ramp time adjustments

This function is inserted closing the solder bridge **S12**, **S13**. (see 1)

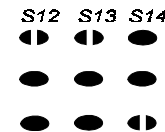
This allow to adjust the ramp slope during the acceleration and deceleration phasis.

Tuning in a clockwise sense (**cw**) by the ACC trimmer located in front of the amplifier increase the ramp time between 0,1 to 1S (corresponding to 10V reference).

It is also possible modify "the ramp range" pre-setted opening the solder bridge **S14**, and inserting in the personalization card (**Ramp**) resistor with a proper value. This value is reported in the table show below. (**SEE 2**)



①



FUNCTION	RANGE	NOTE
Ramp excluded	0 sec.	Standard solder bridges
Ramp inserted	0,1 - 1 sec.	Adjustable by Acc trimmer
Ramp inserted	by. RAMP resistor	Adjustable by Acc trimmer

②

RAMP Res.	680K	820K	1Mohm	1,5Mohm	2,2Mohm
Time	0,2 - 2,6 s.	0,3 - 3,2s.	0,4 - 3,9s.	0,6 - 5,7s.	0,8 - 8,6s.

Nominal current adjustments

The amplifier is supplied,adjusted for nominal size current.

(RIN not mounted).

To reduce this current until adjust to the motor's characteristics,insert a resistor **RIN** on the settings card.

To facilitate the comprehension,below is reported a table with all the **current value express in (A) RMS**. If the amplifier,need a current adjustment lower than rated size current , occur that the intervent time will be **less than 2 sec.**

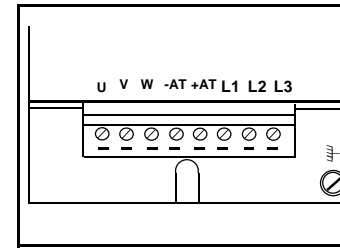
Value RIN in Kohm	*	12K	3K9	2K2	1K5	1K	560 ohm	330 ohm	180 ohm	82 ohm
B17 4/8 (A)	4	3,6	3,3	3	2,7	2,4	2,1	1,8	1,5	1,2
B17 8/16 (A)	8	7,2	6,6	6	5,4	5,1	4,2	3,6	3	2,4
B17 10/20 (A)	10	9	8	7,3	6,7	6	5,2	4,4	3,7	3
B17 14/28 (A)	14	12,8	11,5	10,2	9,5	8,7	7,4	6,2	5,2	4,2
B17 20/40 (A)	20	19,2	17,5	16	14,6	13,3	11,3	9,6	8	6,5
B17 25/50 (A)	25	22,5	20	18	16,5	15	12,5	10,5	9	7

Peak current adjustment

If,RIP is inserted in the settings board, it limit the peak current providible from the amplifier.The table reported below show,the **current values express in (A). RMS**

Value RIN in Kohm	*	120K	68K	47K	33K	22K	15K	12K	10K	8K2
B17 4/8 (A)	8	7,6	7,3	6,9	6,4	5,8	5,2	4,8	4,4	4
B17 8/16 (A)	16	15,2	14,3	13	12,2	10,7	10	9,6	8,8	8
B17 10/20 (A)	20	19	18	17,1	16	14,6	13	12	11	10
B17 14/28 (A)	28	26,7	25,3	24	22,5	20,5	18,1	16,6	15,4	14
B17 20/40 (A)	40	38	36	34	32	29	25,6	23,5	21,8	20
B17 25/50 (A)	50	47,5	45	42,5	40	36,5	32	29,3	27,2	25

Power terminals



For the proper connection between the motor and the B17 reference encoder signals, always see the Table of connections that come with the motor. It's possible that some motors (for phase reasons) show the U V W terminals inverted.

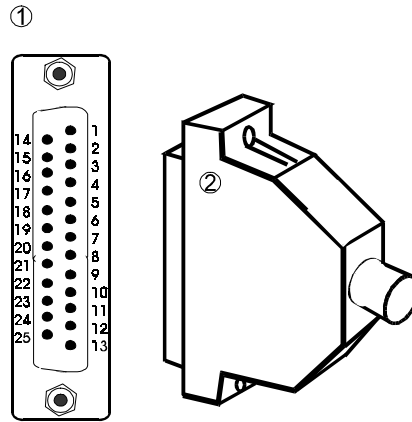
<i>m</i>	(INPUT)	Ground motor connection
<i>L3</i>	(INPUT)	Supply phase
<i>L2</i>	(INPUT)	Supply phase
<i>L1</i>	(INPUT)	Supply phase
<i>+AT</i>	(INPUT)	Positive current coming from the power supply
<i>-AT</i>	(INPUT)	Negative current coming from the power supply
<i>W</i>	(OUTPUT)	Motor output voltage
<i>V</i>	(OUTPUT)	Motor output voltage
<i>U</i>	(OUTPUT)	Motor output voltage

25 pole sub D connector (motor's signal) for Encoder

On this 25 pole "male" sub D connector arrive the signal to and from the brushless motor.(see 1)

It is provided with the female connector with plastic cover (see 2) where must soldered the wires in according with the numeration reported on it.

It is also available, upon requests, an adapter(sub D-Terminals) where is possible do the wiring without the use of welder.



4	PTH	(INPUT) Thermoswitch, PTC, or PTH coming from the motor.
17	PTH	(INPUT) Thermoswitch, PTC, or PTH coming from the motor.
5	A	(INPUT) A channel coming from the encoder
18	/A	(INPUT) A Denied channel coming from the encoder
6	B	(INPUT) B channel coming from the encoder
19	/B	(INPUT) B Denied channel coming from the encoder
7	Z	(INPUT) Z channel coming from the encoder
20	/Z	(INPUT) Z Denied channel coming from the encoder
21	+5V	(OUTPUT) Encoder supply , max. load 200mA Short-circuit Protected
22	+12V	(OUTPUT) Encoder supply , max. load 200mA Short-circuit Protected
9	+5Vext.	(INPUT) External Power supply coming from terminal 15

-The amplifier can accept signal from LINEDRIVER. When LINEDRIVER encoder is used, the CHZ and /CHZ signal aren't used from the amplifier; they are only transferred on the control connector.

--See the following connections examples about their proper use.

Continue

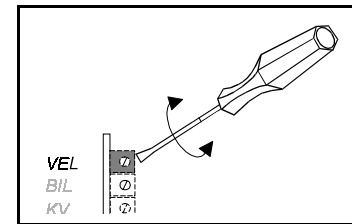
Examples:

Max velocity needed: 4000 RPM with encoder 2000 Imp / RPM:

Close the follow Dip switch

5	6	7	8
ON	-	-	ON

After, with the trimmer Vel set the velocity, in anticlockwise sense, from 4150 to 4000 RPM.

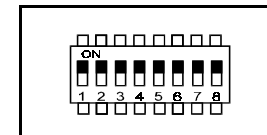


Clockwise senseIncrease speed.
Anticlockwise sense.....Decrease speed.
The adjustment range is +/- 20%

NOTE:

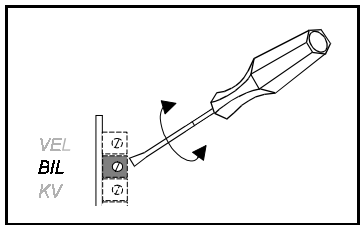
If your encoder has 2048-1024-512 Imp/RPM the code will be the same.
You can to combine the encoder and the motor with the table on page 45.

Anticipation Phase Setup



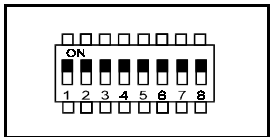
With the Dip switch 1,2,3,4 you can choose the value of the anticipation phase. This setting is made from our laboratory.

Balance speed adjustment



The amplifier is provided with the balance speed setted,for the **Encoder feedback.** Retune,where requested,by the **Bil trimmer**, to adjust the offset. (It can adjust +/- 200mV respect the input reference). With the input reference adjust to zero , turn the trimmer till the motor is still.

Speed adjustments



With the Dip switch 5,6,7,8 you may setup the maximum velocity. (void = OFF). To know the corresponding codes. see the table below:

Code				Speed motor in RPM		
5	6	7	8	2000 Imp/rpm	1000 Imp/rpm	500 Imp/rpm
-	-	-	-	290	580	1160
-	-	-	ON	750	1500	3000
-	-	ON	-	1050	2100	4200
-	-	ON	ON	1500	3000	6000
-	ON	-	-	2100	4200	8200
-	ON	-	ON	2400	4800	9600
-	ON	ON	-	2800	5600	11200
-	ON	ON	ON	3200	6400	12800
ON	-	-	-	3800	7600	15400
ON	-	-	ON	4150	8300	16600
ON	-	ON	-	4500	9000	18000
ON	-	ON	ON	4800	9600	19400
ON	ON	-	-	5300	10600	21200
ON	ON	-	ON	5600	11200	22400
ON	ON	ON	-	5850	11700	23400
ON	ON	ON	ON	6100	12200	24400

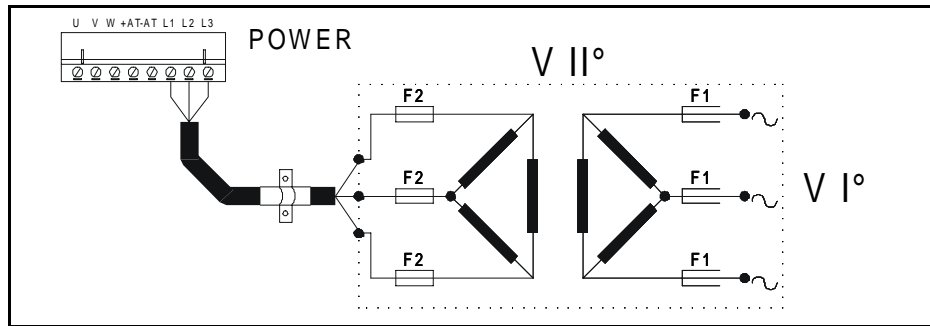
Continue 25 poles sub D connector (motor’s signal)

8	GND	Common zero signal
10	Hall U	(INPUT) Angular position signal from the motor
11	Hall V	(INPUT) Angular position signal from the motor
12	Hall W	(INPUT) Angular position signal from the motor
1	Hall /U	(INPUT) Angular position signal denied from the motor
2	Hall /V	(INPUT) Angular position signal denied from the motor
3	Hall /W	(INPUT) Angular position signal denied from the motor

Note:
-The pins not cosidererd are reserved for other configurations.(They **must not be connected**)

Three phase power supply dimensioning

- **WARNING:** Pls, follow the scheme and the formulas reported below to calculate correctly the power supply dimensioning. The amplifier doesn't need auxiliary voltages, all the voltage requested are inside of the amplifier.



Transformer



The amplifier has the zero signals connected to the power negative, consequently **don't use autotransformers**. We also recommend to use a net transformer with the secondary winding connected in triangle mode. **If the secondary winding has star connection, absolutely don't connect to the ground the neutral or star centre transformer.**

- **VOLTAGE:** The secondary voltage value is the voltage compared with the primary voltage. This value must be calculated according with the motor's parameters and however respecting the voltage amplifier

V II°

44 Vac	B17 BOX A
95 Vac	B17 BOX B
145 Vac	B17 BOX C
220 Vac	B17 BOX D

The voltage power supply range (respectively minimum and maximum) nominal with load, accepted from the B 17 (60-140-200-300) are respectively Min and Max values declared are referred to the transformer voltage with load. (Max difference accepted without load +5%). These values accept also a +/-10% difference net voltage.

The solder bridges S1-S2-S3-S4-S5-S6 are to set the amplifier map for the expected motor.

Motor 2 poles	Imp-rev encoder	S1	S2	S3	S4	S5	S6
	500/512	●	◀▶				
	1000/1024	●	●	◀▶	●	◀▶	◀▶
Motor 4 poles	Imp-rev encoder	S1	S2	S3	S4	S5	S6
	500/512	◀▶	◀▶				
	1000/1024	●	◀▶	◀▶	●	◀▶	◀▶
Motor 6 poles	Imp-rev encoder	S1	S2	S3	S4	S5	S6
	500/512	◀▶	◀▶				
	1000/1024	●	◀▶	◀▶	◀▶	●	◀▶
Motor 8 poles	Imp-rev encoder	S1	S2	S3	S4	S5	S6
	1000/1024	◀▶	◀▶				
	2000/2048	●	◀▶	◀▶	●	◀▶	◀▶

- the bridges S1 - S2 allow the adaptation between the encoder n° impulses/round and the motor n° poles. See the impulses number available.
Remember, more higher will be the number of impulse, better performance you will have.

Mean of the functions obtainable by the solder bridges

There are 20 solder bridges in the adjustment area.

By these solder bridges it is possible enable or disable particular functions of the B17.

Pls, check that the solder bridges are close in according with the functions requested from the amplifier.

Below is reported the proper position of the solder bridges.

The amplifier, in standard configuration, is provided with the solder bridges close as follow:

S1 Normally closed:	See chapter adjustment pag. 45
S2 Normally open:	See chapter adjustment pag. 45
S3 Normally open:	See chapter adjustment pag. 45
S4 Normally open:	See chapter adjustment pag. 45
S5 Normally closed:	See chapter adjustment pag. 45
S6 Normally open:	See chapter adjustment pag. 45
S7 Normally open:	Don't touch
S8 Normally closed:	If open Missing or Inverted encoder channels will not disable drive functions.
S9 Normally open:	If closed Min-max voltage is memorized by the drive.
S10 Normally closed:	If open the dispositive alarm for missing hall effect signals doesn't disable the drive.
S11 Normally open:	If closed i2t allarm intervention doesn't cause drive contact opening OK.
S12 Normally open:	(See Ramp Time Adjustment)
S13 Normally open:	(See Ramp Time Adjustment)
S14 Normally closed:	(See Ramp Time Adjustment)
S15 Normally closed:	If open disables the CKV and RKV standard constants from the velocity loop.
S16 Normally closed:	If open disables the internal static gain from the velocity loop.
S17-S18 Normally open:	Don't touch

Continue Three phase power supply dimensioning

Fuses

- **POWER** : By a three phasis tranformer is possible supply one or more amplifiers .
If different voltages are requested, use a transformer with different windings.
The secondaries transformers windings must be connected in triangle mode, while the main winding may be connected or in star mode or in a triangular mode
The power transformer must be calculated

$$P(VA) = (P_1 + P_2 + \dots + P_n)$$

Where ($P_1 + P_2 + \dots + P_n$) is the rated power sum of the motors supplied from the transformers.
In case of multiaxis application, the power of the transformer can be reduced about of 30/40% in according with the cycles use.

The rated power motor is:

$$\frac{P_n \text{ Motor}}{x \text{ Cn}} = \frac{\quad}{9,55} \quad n$$

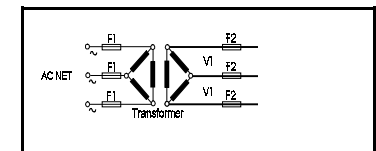
Where **n** is the max motor speed in RPM
Cn is the rated motor torque in (Nm)

- It is important foresse fuses in the main and secondary transformer windings, these fuses are F1 and F2. These fuses may be replaced **with magnetothermic interruptor (same value)**.

The F1 fuse in the primary protect the tranformer against overload caused in the secondary. This fuse must be "**slow**" type.

The F2 fuse in the secondary protect the transformer against short circuit caused on the load or on the power rectifier bridge.

This fuses must be "**rapid**" type.



$$F 1^\circ = \frac{P(VA) \text{ trasfo.}}{x} \times 1,1$$

$$F 2^\circ = \frac{P(VA) \text{ trasfo.}}{1,1} \times$$

Each B17 mother board module has on board the fuse FDC. (See fig. in previous page).

However, below are reported all the

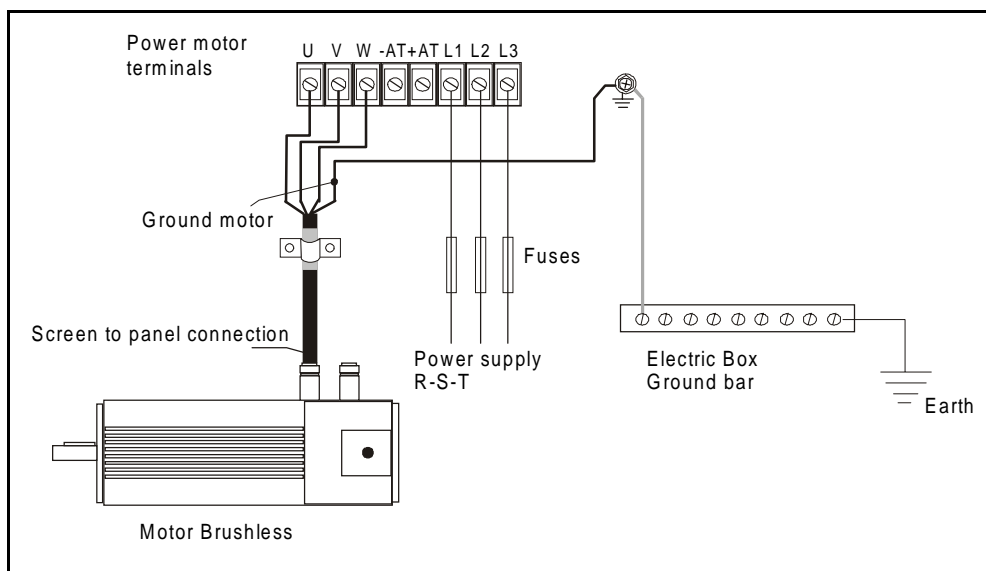
FDC x B17	4/8 = 10A rapid
xB17	8/16 = 10A rapid
xB17	10/20 = 10A rapid
xB17	14/28 = 16A rapid
xB17	20/40 = 20A rapid

Power connections

The connections explained are for one axis. Each motor will be connect to the rack (By shielded cables) on the terminals U V W more the ground connection.

Always in the same terminal, pls connect also the screen. (See the draw in the last page).

The use of shielded cables allow to reduce a lot, the noise propagation.



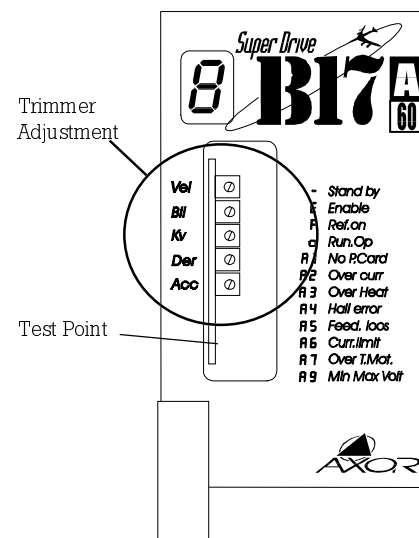
Each rack is also provided with the screw to connect it directly to the electrical box ground bar.

Advertisement

The factory suggest to use good quality cables, in according with the section and the local safety rules.

The factory suggest for the motor wires to use the shielded cables or, if this is impossible, use single links twisted together. About the cables section, below it is suggested the section:

B17 2/4 - 4/8 - 8/16	LINKS 1,5mm ²
B17 10/20-14/28	LINKS 2,5mm ²
B17 20/40	LINKS 4 mm ²



VEL

This trimmer allow to adjust the speed. It provides a range of +/- 20% to fine tune velocity adjustments; to increase the speed turn the potentiometer in clockwise sense (cw) to reduce the speed turn in anticlockwise sense (ccw).

BIL

Offset calibration. This potentiometer allows offset calibration on the input reference.

(Max reference correction. +/- 200mV).

KV

Gain. This function allow to optimise the dynamic motor behaviour. Turning in clockwise sense (cw) increase the gain in the speed stage PI, improving the performance (response).

DER

Derivative adjustments.

Turning it in clockwise sense (cw) increase the derivative effect allowing to reduce the overshoot in the machine.

ACC

This function allow to insert the ACC/DEC function (ramp) by the solder bridge (closing) S12 - S13 - S14.

This allow to adjust the slope of the ramp. Turning it in anticlockwise sense (ccw) increase the ramp time (between 0,1 - 1 sec) (correspond to 10V reference).

It is also possible increase or reduce the max acc/dec setting time opening the solder bridge S14 and inserting on the settings board the RAMP resistor. (See chapter ADJUSTMENTS)

N.B. Usually the amplifier is provided with the ACC/DEC function (ramp) disabled.

Personalizations and adjustments

WARNING : If the amplifier is under load, before keep off the detachable settings card to do all the adjustments, switch off the main power and wait for at least 30 seconds.

If the amplifier isn't adjusted in according with the motor, pls follow carefully the advertisement.

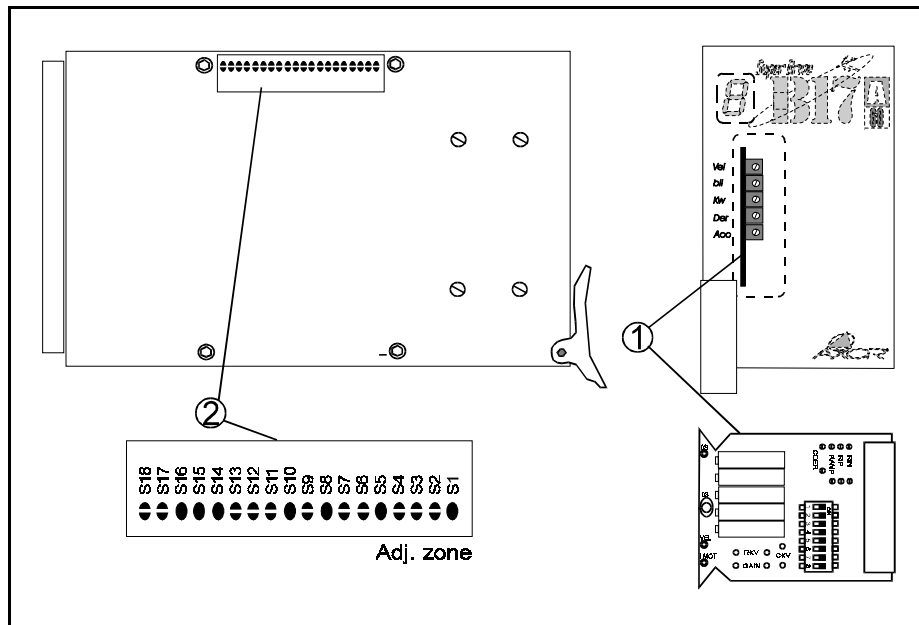
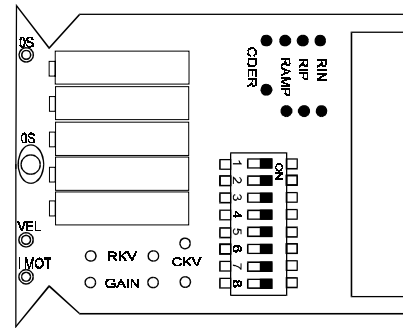
All the personalizations are located in two different areas on board.

1 -The first is on a detachable settings board.

To approach on the adjustments components keep off this setting board carefully to avoid ruin it.

2 -The second area is located onboard and is called (ADJUSTEMENT). It consists in some solder bridges.

If is necessary to replace an amplifier with a new one, is enough move the detachable settings board in the new amplifier checking that the solder bridge are closed like in previous amplifier.



European directive about EMC

The Power Drive System (PDS) are now submit to a specific technical rule in Italy, the rule CEI EN 61800. This technical rule assures that the european directive about electromagnetic compatibility is observed.

For the B17, as all the motor drivers or amplifiers, will be assured only if the installation will be made in the right way. That involve some wiring characteristic, as follows:

- 1) Adjust net filter between the power supply net and the amplifier
- 2) Adjust shielded wires for all the connections
- 3) Separation of power wires from signal wires
- 4) Adjust heart connections.

Net filters

About the mentioned methods, the use of the filters to suppress the noise, is fundamental, also if is more expensive.

Axor, after tests, has recognized some good solutions, about his products.

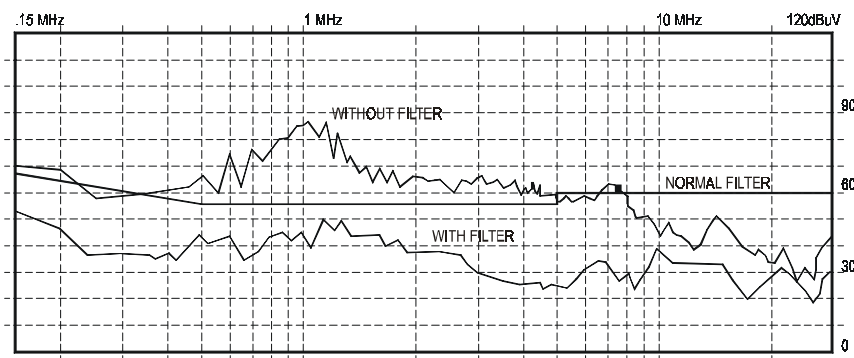
Concerning equipment where is mounted other sources, Axor can't evaluate the global equipment. In the follow page, are reported, some fundamental configurations, with the suggested filters.

We did an agreement with Schaffner

products. The market offer other product with, the same characteristics, but still not checked from Axor.

When other products will be checked and approved, will be notified.

Follow reported an example about the noise level with filter and without filter as explained previous page.



Note: This diagram is only demonstrative.

Application note: usually, you can note that using a choke connected in series of the motor (see also the service manual products) and improving the form factor of the motor current, improve the efficacy of the filter.

In some specific application, this, allow to use a cheaper filter.

In the followin tables are reported the net filter advised, for every series of product in some typical configuration.

These filters are made by Shaffner

Company (european leader in the filter field). Another products may be the same for your application (if the characteristic are the same) but Axor still hasn't tested another kind of net filter. When do it with a positive result, the new kind will be notified.

Starting procedures

-The motor's shaft must be free from the load and a person must be ready to stop the main supply net if necessary.

(Keep carefully to keep the motor fasten well)

-Insert the fuses in series to the alternative power supply or insert the proper magnetotermic.

-Switch on the main power.

In normal conditions, after 1 second, the amplifier annunciate the proper symbol. (see signal display means).

In this condition the motor must stays still.

If this situation don't occur, pls see the power supply value and check if it is correct by a multimeter.

Then, check the voltage reference, it must be zero volt; now give the enable to the amplifier.

WARNING: If the amplifier is driven by C. N.C. foresee to give the reference in manual system with the servo error excluded.

-Enable the PWM ON input.

(It is a good rule gives the enable, after the power supply of the amplifier).

If the motor is still in torque or turn slowly means that the encoder signals and the hall effect signals are correct.

If any signals are inverted, after a slow turn, the display will annunciates the alarm 9

" Absence of encoder signals or reverse channels " and the amplifier will be disable.

(The alarm will be annunciates inaccording with the number the appears in the display.

This protection is an irreversible protection pls see to page

If the hall effect signals are wrong or absence the number 4 will be annunciate.

Pls ,switch off the main power and checks the wiring.

WARNING : When is necessary switch off the amplifier, pls wait for few seconds to give power again.

-Enable the REF ON input.

Increase the velocity reference signal untill a minimum value (about 1 Volt) and check the motr's sense.

(If the motor run in opposite sense respect the selected switch off the main power and invert the links + REF and - REF).

-Now, connect the load to the shaft and eventual insert the C.N.C. servo error.

If the behaviour is correct and the C.N. C. work correctly, the system is OK.

-In this situation, begin some standard cycles checking that any alarm occur.

How you will receive the amplifier.

The standard amplifier has the following adjustments:

The rated and peak current provided from the amplifier corresponding to the amplifier's size; " The resistor RIN and RIP aren't mounted."

Ex. B17 10/20 = 20A peak current for 2
Sec.10A rated current .

It is adjusted for 3000 rpm with 1000 imp/
rev encoder at 10V reference.

What you must check?

Pls check carefully that al the terminals (power and signal) are close and to do a check vision about the amplifier's wiring. In according with the polarity,show in the previous examples,about the motor and the encoder ,the system will turn in clockwise sense with refernce positive.

How to proceed

Now,there are two different cases to install the B 17

1 If the amplifier was previous adjusted in according with the motor proceed to chapter " *Starting procedure* ".

2 If the amplifier isn't adjusted,pls before see the chapters "Personalizations and Adjustment" and then go on .

ATTENTION

The choose of the net filter is made in consideration of the current needed to the user device. As you can see at the point 2.3, Axor advises to connect the net filter before the power supply transformer. This method is suitable for noises suppression, and allows the use of net filters be able to support lower current. This method is also the cheapest one.

The function of the net filter, is to deviate toward heart the undesidered frequency. In consequence of this, the current toward earth (leakage current) may be as well mAmpere.

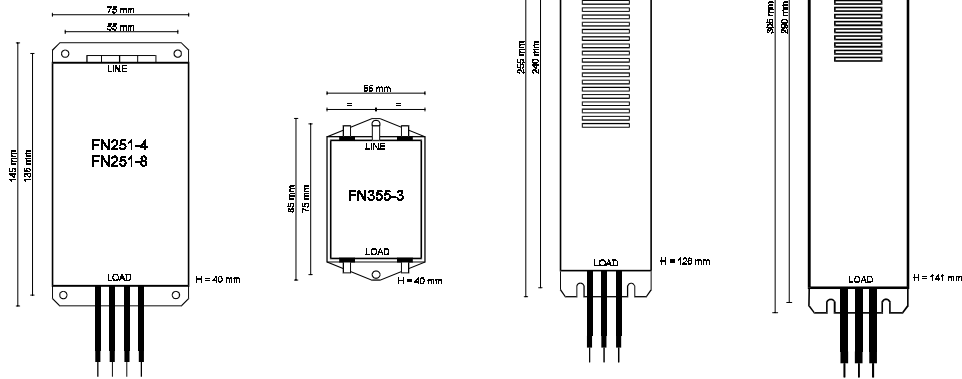
Therefore, is necessary, for the safety of global device, to connect to earth the net filter before apply the power supply. Moreover a wrong wiring will produce an ineffective function of the filtre.

About the leakage current, we remember you that it must be considered when you set up your electric safety device, like differential switch or another device who compare the electric line. This for avoid not necessary intervention.

For detail about the value of leakage current see the nexts paragraph.

Mechanical and electrical features

In this section are described the mechanical and electrical features of the quoted filters.



Supplied standard with input on terminal-screw, and output on isolated wire.
Max. work voltage : 440Vac
Max current : 8A @ 40°C
Work temperature: -25° +85°C

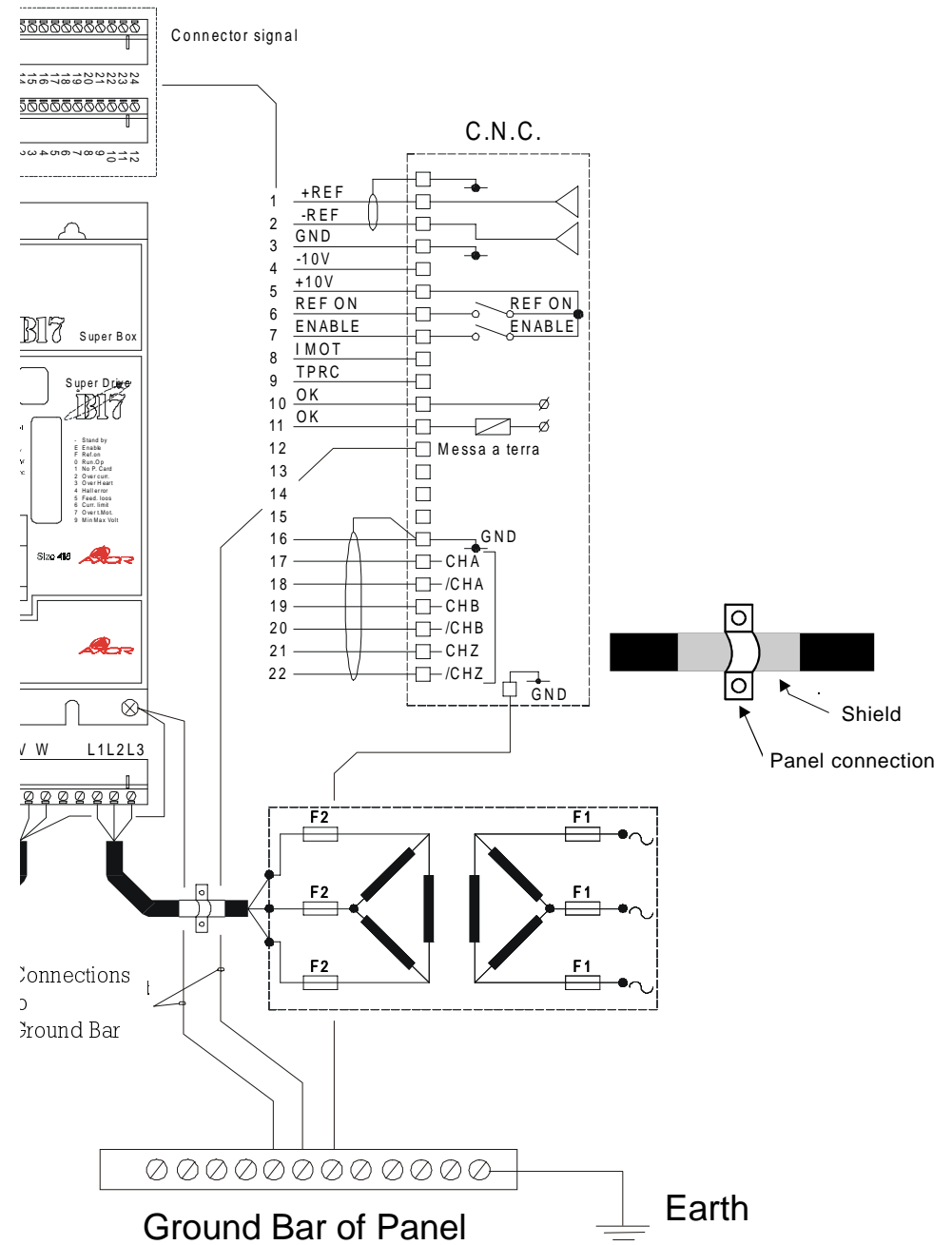
Supplied standard with input and output on faston terminal.
Max. work voltage : 420Vac
Max. current : 3A @ 40°C
Work temperature: -25° +85°C

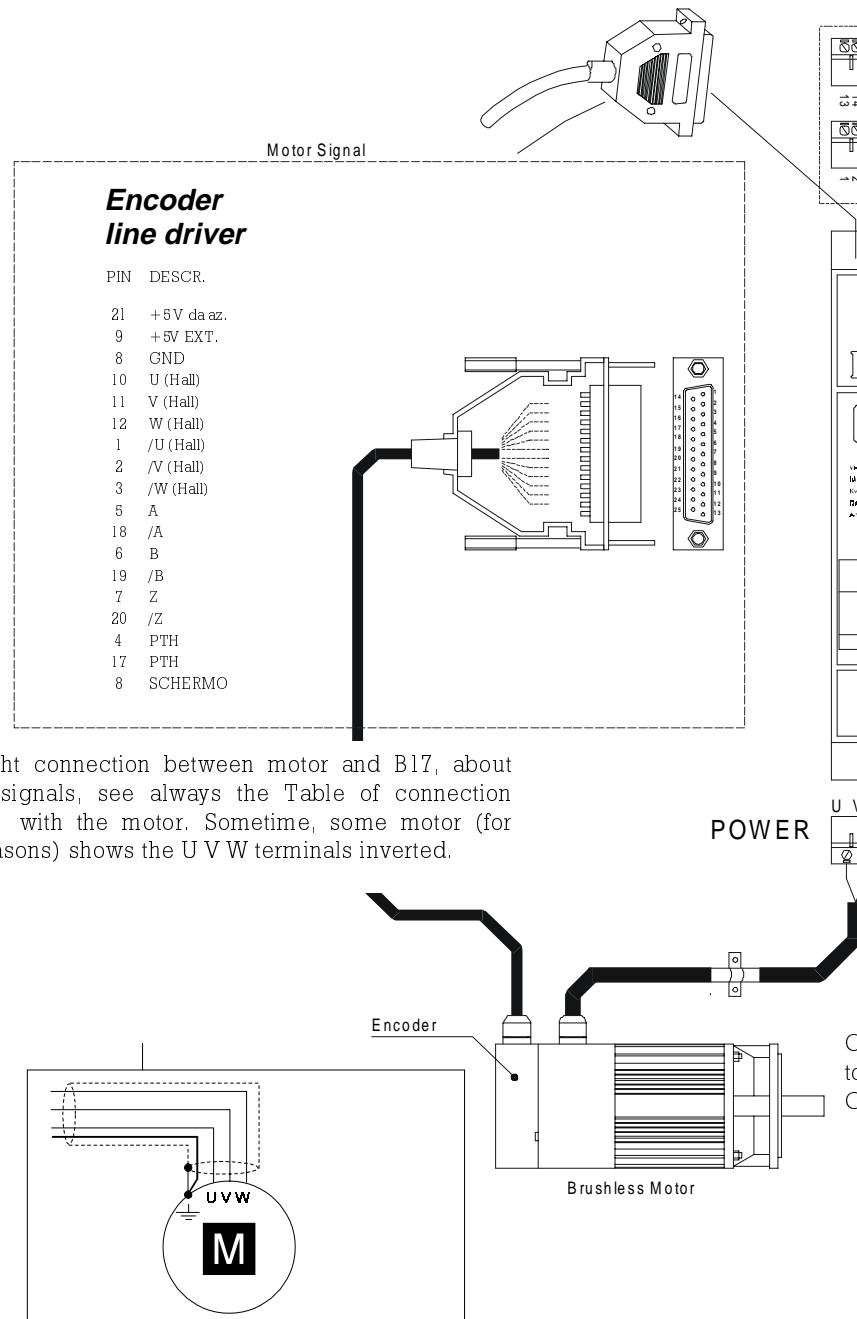
Supplied standard with input on terminal-screw, and output on isolated wire.
Max. work voltage : 480Vac
Max. current : 7A @ 50°C
Work temperature: -25° +85°C

Supplied standard with input on terminal-screw, and output on isolated wire.
Max. work voltage: 480Vac
Max. current : 16A @ 50°C
Work temperature: -25° +85°C

In the following table are reported the electric features of the quoted filters. You must see particularly the leakage current, for the set up of your differential switch, and the nominal current, that can change if the enviroment temperature changes.

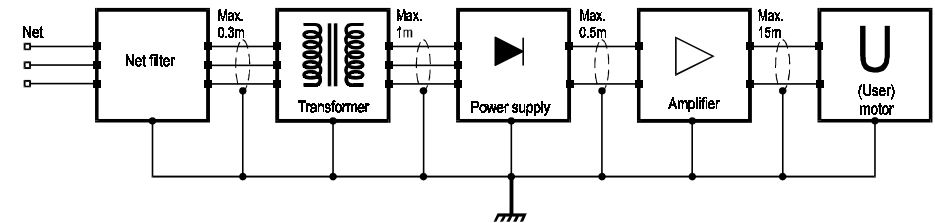
MODEL	CURRENT RATING A	LEAKAGE CURRENT mA	POWER LOSS W	WEIGHT Kg
FN251 - 4	4 (40°) / 4.6 (25°)	1.31 (400V 50Hz)	5.5	0.75
FN251 - 8	8 (40°) / 9.2 (25°)	1.31 (400V 50Hz)	7	0.75
FN258 - 7	7 (50°) / 8.4 (40°)	71 (250V 60Hz)	4.5	0.75
FN258 - 16	16A (50°) / 19.2 (40°)	84 (250V 60Hz)	9	1.2
FN355 - 3	20 (40°) / 23 (25°)	0.41 (400V 50Hz)	1.5	0.25





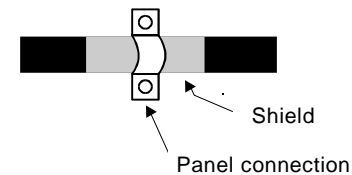
Connections and wiring system

The wiring project and managing technics can be decisive for a good working of the equipment and for the noise suppression. In the following table we show you a connection diagram with necessary



In some amplifiers, the power supply can be integrated into the amplifiers. As you can see, the net filter quoted on point 2.1, must be connected before the transformer. All the wiring after the net filter must be screened and they mustn't be much longer than the lenght express in the diagram. The wiring toward earth of the chassises must be direct to the heart (mount panel or heart bar). The screens of the cables must cover the conductor wire for all its lenght, more complitely as possible, also near the connectors and terminals. At last, these screens may be connected with heart like the following picture.

The panel where the cable is fixed must be connected with heart. This thing is very important. As just wrote, when you do the wiring, you must separate the power cables from the signal cables. Is very important avoid to cross one's and twist two type of cables. If is not possible, look for cross them by 90 degrees. Where is possible, use a metallic tubes or channels, connected with earth.



This type of screening by presscable is better if executed on the cable near the net filters and near the amplifiers.

Note

Follows this note some examples about connections of B17 (in a rack system or in single mode), for CNC controls and Brushless motors.

Diagrams meaning

This note are valid for the motherboard and for racks system.

The diagram shows the connection of a B17, with encoder Line driver (5Vdc) feedback.

(The B17 has also available the power supply +12Vdc on terminal n. 22, for encoder who are this power supply voltage).

ATTENTION: This power supply source are only for encoder. Don't connect other circuit or, in any way , charge over 200mA Max.

The signals that come from the chosen encoder are available on the terminal box (22 ways) , for the control interface.

The signals available on the terminal box will be only the signals previously connected to the sub din connectors (25 ways).

External encoder power supply

You can supply your encoder with +5V power supply from the B17 or, if you prefer, with +5V power supply from your CNC control.

In the second way, you will find all the signals on your encoder even if the B17 is off.

In this case it is necessary that the power supply is connected with the terminal n.9 on the sub din connector 25 ways (and not with terminal 21).

