



Hi-drive

Quick installation guide

rev. 0
November 2004
(software rel. 0)

IMPORTANT INFORMATION**WARNING**

The product Hi-drive, described in this handbook, doesn't contain accessible parts to the customer, to open it or to try to approach the inner components could cause an irreparable fault. Some internal circuits are subject to voltages that could create serious hazards for people and even be lethal. It is prohibited to approach and/or to violate whichever part of the converter; that would involve also the immediate invalidation of the warranty (of one year).

**IMPORTANT**

The user shall be responsible for ensuring that installation is done in accordance with the applicable Work Safety regulations.: the breach could cause to damages to things and/or persons.

The customer must study with attention the contents of the present manual before the installation/use. The installation, the start up and the maintenance are permitted exclusively to persons capable, trained and qualified to use of industrial electronic equipment. These persons must be acquaintance of electric/mechanical risk associates to products for control the motion connected to mains power.

**IMPORTANT**

High equipment to performance for the control like the Hi-drive, is able to produce to movements many expresses to forces high.

Unexpected or unsuspected movements could be taken place especially during the development of control programs: to preview the opportune emergencies and don't touch the parts of the machine in motion.

The Hi-drive must be installed in a protected atmosphere. Before using whichever type of drive or motor it is important to analyze to all aspects of the application verifying the characteristics on catalogues currents. The user is the only responsible for the final decision approximately the system and components to use.

Parker Hannifin –S.B.C. Division declines every responsibility deriving from an use of the product not in compliance with the instruction described in the present manual.

**WARNING**

High leakage current! Risk of electric shock!
Leakage current exceeds 3.5mA.

Before switching on power for electrical units, all housing and motor must be permanently grounded according to the connection diagram. This applies even for brief tests. Use a copper conductor with at least 10mm² cross section over its entire course for the protective connection (PE)! European countries: see EN61800-5-1, section 4.2.5.4.2. USA: see National Electrical Codes (NEC, National Electrical Manufacturers Association (NEMA), and local bulging codes. The user of this equipment must maintain the above noted instructions at all times.

**IMPORTANT**

Do not touch the surfaces of the mechanism when this is operating or afterwards, because the temperatures of some surfaces could touch 85°C (185°F).

The present user's manual refers to the version standard of the converter.

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The performance of "Hi-drive" converter is guaranteed only with synchronous motors with permanent magnets MB and SMB Series that have been manufactured by us.

Upon request, Parker Hannifin S.p.A. Divisione S.B.C.offers training courses.

THIS QUICK INSTALLATION GUIDE REFERS TO THE STANDARD PRODUCT AND DOES NOT REPLACE THE MORE COMPLETE VERSION OF THE OPERATOR'S MANUAL. BEFORE USING THE PRODUCT, ALWAYS CAREFULLY READ THE COMPLETE OPERATOR'S MANUAL, A COPY OF WHICH IS AVAILABLE ON THE CD-ROM ATTACHED TO THE SUPPLY. PARKER HANNIFIN SpA S.B.C. DIVISION DISCLAIMS ALL LIABILITY FOR ANY TYPE OF DAMAGE DERIVING FROM INAPPROPRIATE PRODUCT USE.

Conformity to EMC standards

Immunity:

EN50082-1* / EN61000-6-2
IEC1000-4-2
IEC1000-4-3
IEC1000-4-4

Basic immunity specifications

level 3 Immunity for electrostatic charge
level 3 Immunity for electromagnetic field
level 4 Immunity for fast transmission burst

Compatibility:

EN50081-1* / EN61000-6-4
EN55011 group 1, class A
EN55011 group 1, class B*

Basic specifications for radio interference
Limits of measurement for radio interference
Limits of measurement for radio interference

Safety

Safety regulation
Low voltage regulation
Applied regulation

EN50178
73/23/CEE modified by 93/68/CEE
EN60204-1

* Conformity to the residential or industrial environment depends on the installation.



This symbol is an invitation to refer to the more detailed information in the integral version of the operator's manual attached to the supply or which can be downloaded from www.sbcelettronica.com

1.1 Hardware specifications

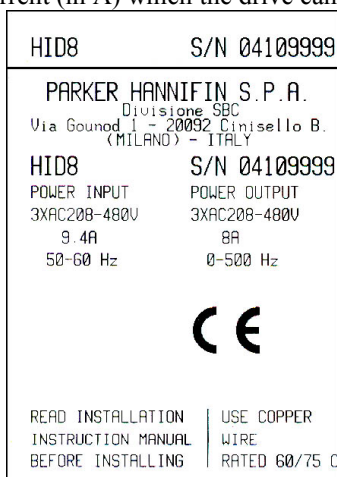
Description	Symbol	UdM	Type of drive				
Hi-Drive type			2	5	8	16	25
POWER							
Mains supply: three-phase or single-phase or D.C.							
Three-phase rated voltage	V _{mains}	V~	200 – 10% ÷ 480 +10%				
Single-phase rated voltage	V _{mains}	V~	200 – 10% ÷ 277 +10%				
D.C.	V _{dc}	V=	245 ÷ 744				
Frequency of the A.C. supply	f _{mains}	Hz	50...60 ±5%				
Load installed for continuous service	S	KVA	1,4	3,5	5,6	11,2	17,5
PWM switchover frequency (selectable)	f _{sw}	kHz	8-16		8		
PWM switchover frequency (default)	f _{def}	kHz	8				
Continuative current at output (*) ±2%	I _{cont}	Arms	2	5	8	16	25
Peak current at output 2s (*) ±2%	I _{peak}	Arms	4	10	16	32	50
Current derating in case of f _{sw} >f _{def}	Kf	p.u.	0,7		-		
Current derating @ 480V _{mains}	Kv	p.u.	0,9				
Maximum frequency at output	f _{out}	Hz	0÷500				
Power stage losses	Ploss	W	30	75	120	220	350
Volumetric capacity of internal fans	Q	m ³ /h	32	47	63	168	168
Braking resistance	Rb	Ohm	200	90	75	40	27
Continuous internal braking power	Pb _{cont}	W	75	75	120	180	180
Braking power peak 790VDC	Pb _{peak}	W s	3120 1	6935 0,7	8320 0,5	15600 0,2	23115 0,15
Continuative power	P _{out}	W	See diagrams				
Overvoltage cutout (OV)	V _{ovl}	V	870				
Undervoltage cutout (UV)	V _{und}	V	70% * √2 *V _{mains}				
CONTROL							
D.C. power supply	Vcc	V=	24 (0%...+10%)				
Maximum ripple	Vcc _{ripple}	V	Do not exceed range				
Max power input	Icc	A=	2				
Power input	Pcc	W	30				
PARKING BRAKE							
Power supply voltage	Vs	V=	24 ±10%				
Max current	Is	A=	2				

(*) data applied according to the default switchover frequency and 400 V power voltage; higher values derate the output current.

2 INSTALLATION

2.1 Identification

Five available models: HID2, HID5, HID8, HID16 and HID25, where the number corresponds to the rated current (in A) which the drive can dispense.



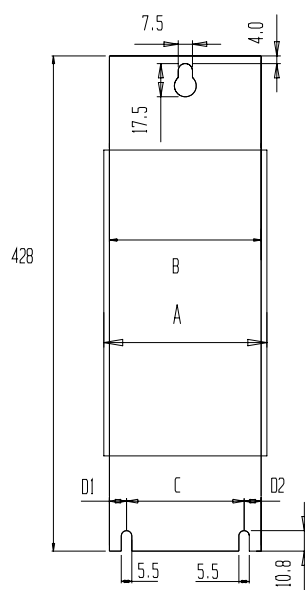
The installation and cabling operations must be done when there is absolutely no voltage in the entire electric cabinet. Make sure that the power switch on the converter is cut off from the emergency circuit. The first time the cabinet is powered up, qualified technical personnel must be present.

This is a product of the restricted sales distribution class according to EN61800-3. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

2.2 Assembly

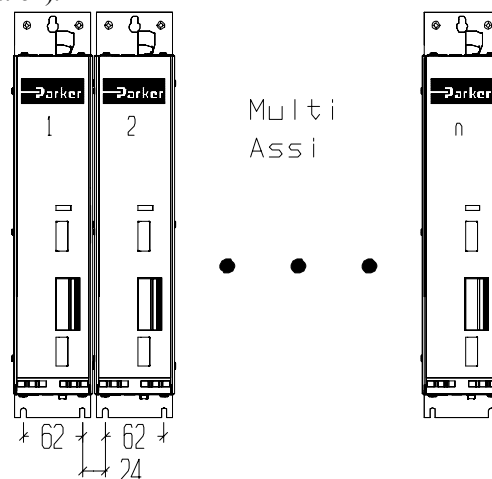
IMPORTANT Do not install in hazardous environments.

The rear supporting plate features special reamed holes (see illustration).

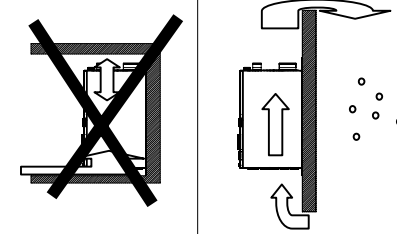
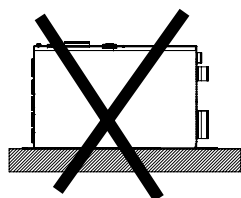


Type of drive	HID2 HID5 HID8	HID16 HID25
A (width frame)	87	122
B (width plate)	80	115
C	62	79,5
D1	9	26,5
D2	9	9

Measurements expressed in mm.
Tolerance ± 1.5 mm.

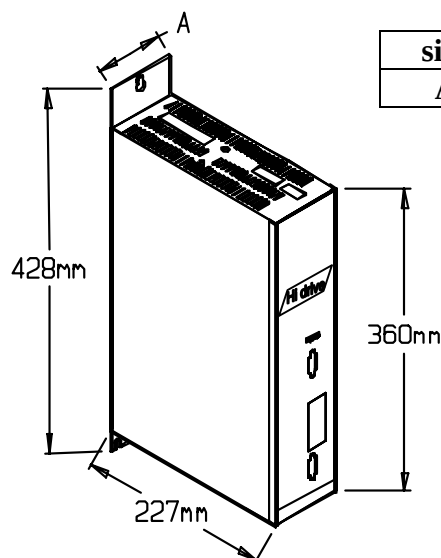


Characteristics	Description
Storage temperature	$-20^{\circ}\text{C} \div +65^{\circ}\text{C}$ ($-4^{\circ}\text{F} \div 149^{\circ}\text{F}$)
Room temperature	$0^{\circ}\text{C} \div 45^{\circ}\text{C}$ ($32^{\circ}\text{F} \div 113^{\circ}\text{F}$)
Room humidity	$< 85\%$
Max installation altitude	1000 m asl
Degree of protection	IP20
Degree of pollution	2 or below



- IMPORTANT** • FIT IN VERTICAL POSITION (power terminal board at top).
- IMPORTANT** • To ensure drive cooling, leave a free space above, below and in front of at least 100 mm. The illustration shows how hot air cooling must be done in an external environment, to avoid damage caused by the formation of condensation.
- IMPORTANT** • The flow of air entering the converter must not come from or pass through other heat source parts.
- IMPORTANT** • Fit a suitable ventilation filter inside the switchboard.

2.3 DIMENSION



size	HID2-5-8	HID16-25
A	87mm	122mm

3 WIRING CONNECTIONS

- Wire up the panel/drive/motor in accordance with the instructions in the operator's manual and applicable safety regulations. In case of any doubts, contact our After-Sales Service.
- Check the correct dimensioning of the drive/motor. Compare the rated voltages and currents.
- Make sure the maximum power voltage to terminals L1, L2, L3 does not exceed the specifications (see EN60204-1, section 4.3.1) to avoid damaging the drive.
- Make sure the system is properly earthed.
- The user is responsible for the cutout fuses on the AC or DC supply of the converter.
- Be careful of the cable cross sections; refer to the "connections" table and ensure conformity with IEC227-2.
- The cables connected to the drive by means of the terminal board should not be strengthened by soldering Sn-Pb (EN60065, art.15.3.5).
- **DO NOT** remove the power connections from the drive when this is energised.
- After interrupting the power supply and after the converter has been switched off, allow at least 5 minutes to pass before disconnecting the motor leads from the drive, as hazardous voltages could persist.
- **DO NOT** open the converter. This could be hazardous and immediately invalidate the warranty.

3.1 Protection devices

The drive can be connected to an A.C. mains having at most 5kA of short-circuit current and maximum voltage of 480V. The drive is without integrated overload protection.

Table for dimensioning the fuses:

Mechanism size	Type of Hi-drive				
	2	5	8	16	25
Fuse size (delayed) on AC mains	6A rit	10A rit	16A rit	20A rit	50A rit
Fuse sizes on control supply VDC	3.15A				

Instead of the fuses, a thermal magnetic circuit breaker can be used with the same effectiveness as the fuses.

Table for using ultra fast fuses to UL standards:

Drive type	fuse type				
	HID2	HID5	HID8	HID16	HID25
AC mains (three fuses)	Bussmann FWP10A14F Ferraz-Shawmut A70P10-1	Bussmann FWP20A14F Ferraz-Shawmut A70P20-1	Bussmann FWP30A14F Ferraz-Shawmut A70P30-1	Bussmann FWP-50B Ferraz-Shawmut A70P50-4	Bussmann FWP-60B Ferraz-Shawmut A70P60-4
Braking (two fuses)	Bussmann FWP10A14F Ferraz-Shawmut A70P10-1	Bussmann FWP20A14F Ferraz-Shawmut A70P20-1	Bussmann FWP20A14F Ferraz-Shawmut A70P30-1	Bussmann FWP30A14F Ferraz-Shawmut A70P30-1	Bussmann FWP-35B Ferraz-Shawmut A70P35-1
DC Bus (two fuses)	Bussmann FWP10A14F Ferraz-Shawmut A70P10-1	Bussmann FWP20A14F Ferraz-Shawmut A70P20-1	Bussmann FWP30A14F Ferraz-Shawmut A70P30-1	Bussmann FWP-50B Ferraz-Shawmut A70P50-4	Bussmann FWP-60B Ferraz-Shawmut A70P60-4

3.2 Wiring harness

The motor cable must be shielded. The mains power cables must not necessarily be shielded. In the case of cable chains, cables for mobile installation will have to be chosen.

Sections table:

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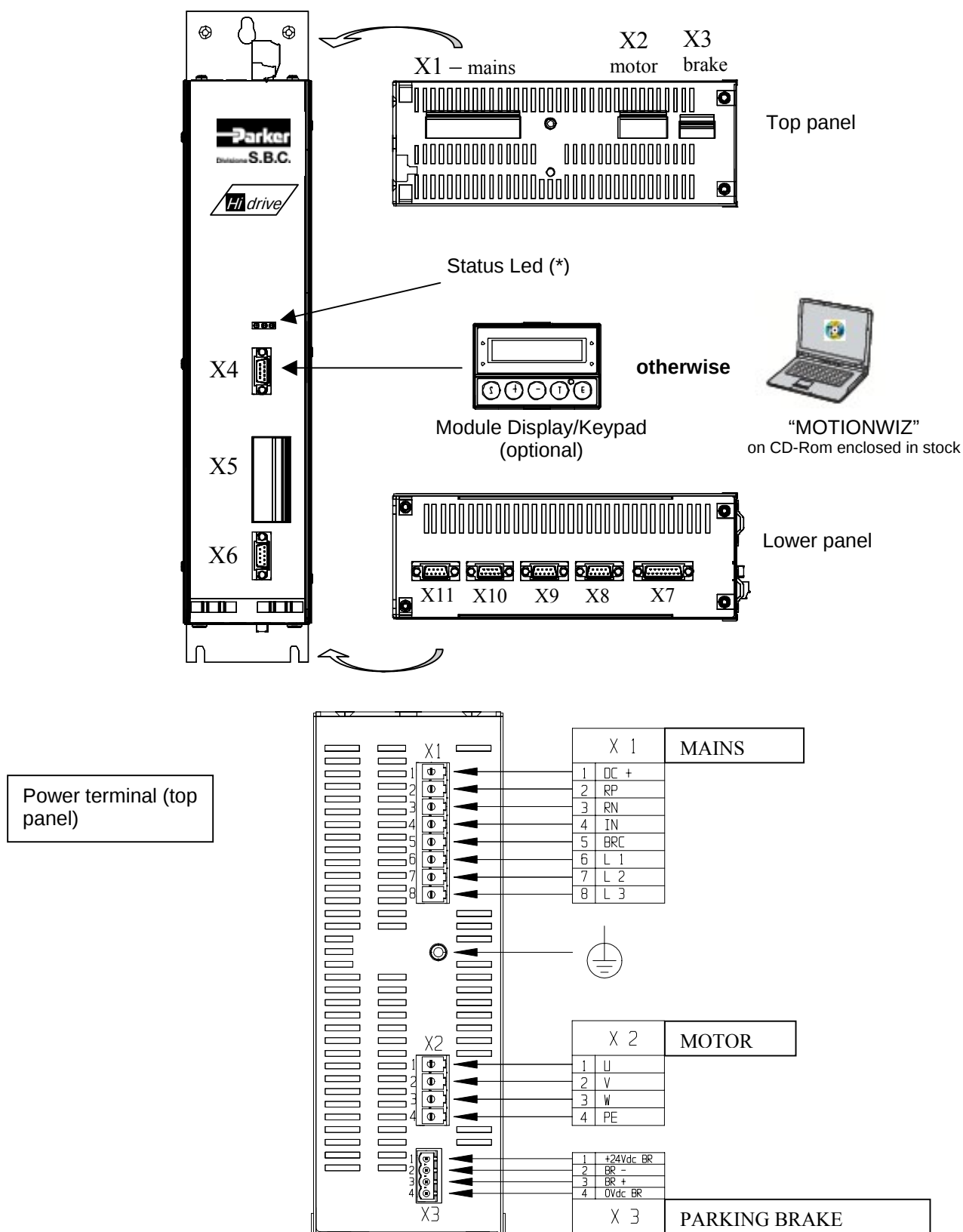
CABLE		Type of Hi-drive				
Mechanism size		HID2	HID5	HID8	HID16	HID25
MOTOR (X2 terminal)	Section	1.5 mm ² (AWG14)	1.5 mm ² (AWG14)	2.5 mm ² (AWG12)	4 mm ² (AWG8)	6 mm ² (AWG8)
	Tightening torque	0.5 – 0.6 Nm (M3)			1.2 Nm (M4)	
MAINS (X1 terminal)	Section	2 mm ² (AWG14)	2 mm ² (AWG14)	2.5 mm ² (AWG12)	4 mm ² (AWG8)	6 mm ² (AWG8)
	Tightening torque	0.5 – 0.6 Nm (M3)			1.2 Nm (M4)	
Signal (X5 terminal)	Section	0.22 ÷ 1 mm ² (AWG16)				
	Tightening torque	0.22 – 0.25 Nm (M2)				
Parking brake	Section	1 mm ² (AWG16)				
	Tightening torque	0.5 – 0.6 Nm (M3)				
Maximum length of motor cables		60 m				
Max cable capacity		< 150 pF/m				

The **RESOLVER** cable features 4 x 0.22 mm² pairs of minimum section, twisted and shielded individually plus general shielding. The lead-lead capacity for the length used must not exceed 10nF. The max acceptable length is **60 m**.

The 24V= power supply must be **dedicated to the drive only**, and not shared with other devices (contactors, brake relays, solenoid valves, etc.). Prefer a shielded cable.

The cables used for analogue signals (**minimum section 0.22 mm²**) must feature twisted and shielded pairs. Also use shielded cables for the digital inputs and outputs.

3.3 Connector layout



(*) The yellow and green LEDs are active if, when the drive supply is connected (24Vdc), the drive electronics is operating.

The red LED, called “STATUS” provides a series of information on the state of the converter:

- **off** the converter is disabled without active alarms.
- **on** the converter is enabled: the drive is in RUN mode
- **flashing with interval between the 2 series of flashes**, the converter is disabled and an alarm has tripped; the tripped alarm can be identified by counting the number of flashes between two intervals.
- **Continuous fast flashing** indicates the command I^2t is active, the converter remains enabled.

IMPORTANT

IMPORTANT

X5 : terminal connection		
0VQ drive supply	15	1 – SR drive enabling
+24V drive supply	16	2 + SR drive enabling
	17	3 SC B
	18	4 SC A
	19	5 N.C.
GND (DIGITAL)	20	6 0VA
OUT 1	21	7 MON 2
OUT 0	22	8 MON 1
VCC (DIGITAL)	23	9 0VA
GND IN	24	10 – AX
IN 3 (ENCODER IN)	25	11 + AX
IN 2 (ENCODER IN)	26	12 0VA
IN 1	27	13 – REF
IN 0	28	14 + REF

X6 : “resolver” (DB9 female)		
1	PTC -	
2	A GND	
3	ECC -	
4	SIN -	
5	COS -	
6	PTC +	
7	ECC +	
8	SIN +	
9	COS +	

X7 : “sincos” (DB15 female)			
1	PTC -	10	Ve
2	SHIELD	11	SENSE -
3	A GND	12	CLK -
4	SENSE +	13	DATA -
5	CLK +	14	B -
6	DATA +	15	A -
7	B +		
8	A +		
9	PTC +		

X8 : “RS422/485” (DB9 female)		
1	TX422 +	
2	RX422 +	
3	TX422 -	
4	RX422 -	
5	SHIELD	
6	Termination	
7	N.C.	
8	N.C.	
9	0V F	

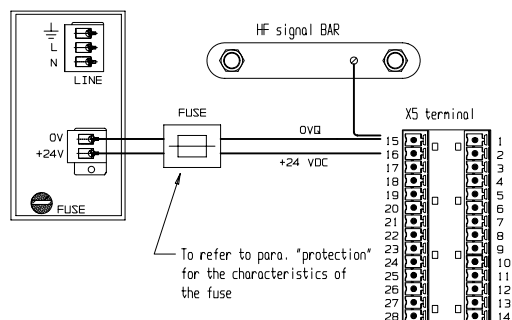
X9 : “encoder input” (DB9 female)		
1	EIN A +	
2	EIN A -	
3	EIN B +	
4	EIN B -	
5	EIN C +	
6	EIN C -	
7	0VF	
8	SHIELD	
9	+5V F	

X10 : “encoder output” (DB9 male)		
1	EOUT A +	
2	EOUT A -	
3	EOUT B +	
4	EOUT B -	
5	EOUT C +	
6	EOUT C -	
7	0VF	
8	Reserved	
9	Reserved	

X11 : “CAN” (DB9 male)		
1	N.C.	
2	CANL	
3	GND CAN	
4	Reserved	
5	SHIELD	
6	Reserved	
7	CANH	
8	N.C.	
9	Reserved	

4 24V= SUPPLY

SUPPLY 24V



The 24 V powers the drive electronics and therefore controls drive switch on and off.

5 CONNECTION TO POWER MAINS

Two modes that can be selected with Pr39.0:

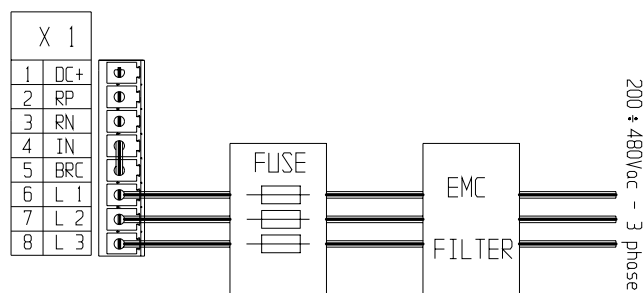
- programme **0** for three-phase mains supply 180V~ MIN to 528V~ MAX or single-phase at 305V~ MAX.
- programme **1** for D.C. supply - 254V= MIN to 744V= MAX. Enter value in Pr21, save, switch off and then back on.

→ A third possibility exists - low-voltage supply (see Operator's Manual).

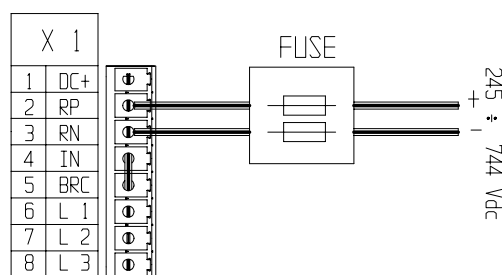
With both the D.C. and the A.C. supply, the **undervoltage** threshold is set not below 70% of VMIN (254V= or 180V~). If the bit b39.8 is set at one, upon the return of the mains voltage, the undervoltage alarm is automatically reset.

In the case of D.C. current supply, the maximum voltage must be 744V=. The connection terminals are in terminal board X1 between the terminals RP (positive) and RN (negative).

Direct connection to D.C. mains (three-phase)

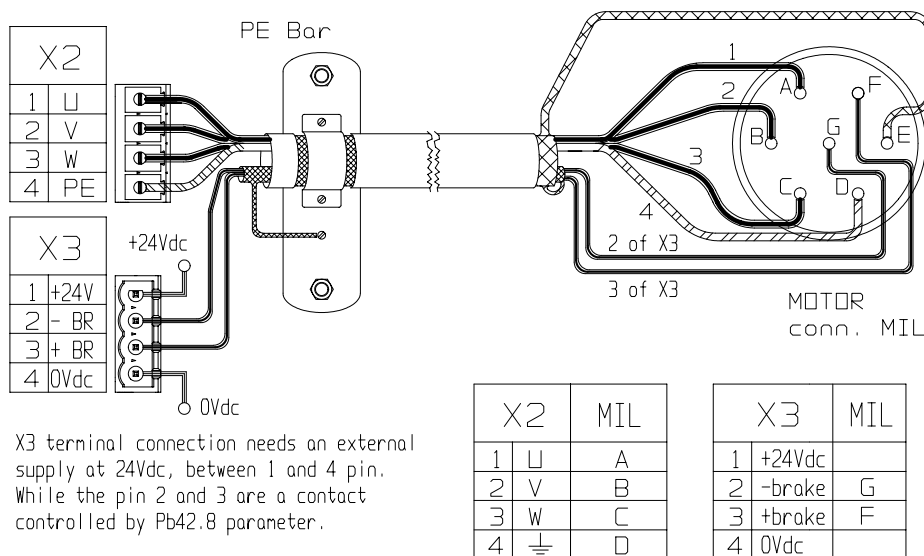


Connection for D.C. current



6 MOTOR

Before entering the motor data parameter **Pr31** must be defined: write “0” for brushless motor (default) or “1” for asynchronous motor.



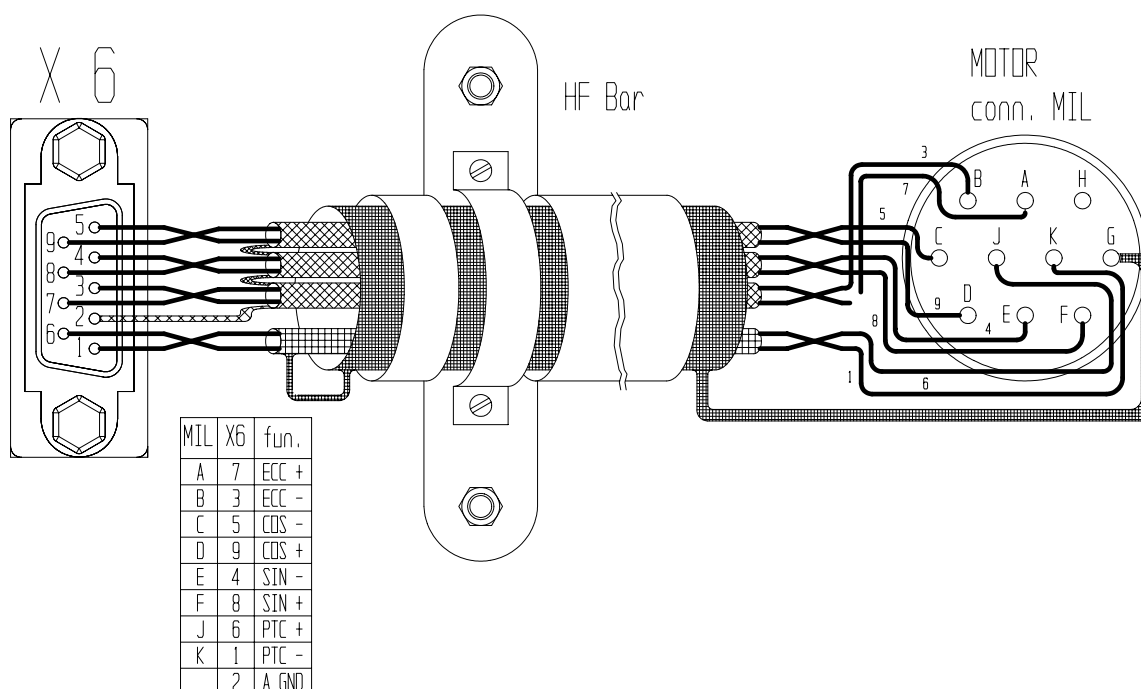
X3 terminal connection needs an external supply at 24Vdc, between 1 and 4 pin. While the pin 2 and 3 are a contact controlled by Pb42.8 parameter.

IMPORTANT

On the terminal board X3, the output that powers the parking brake (pin 2 and 3) is controlled through the internal bit of the drive as a type ON/OFF command.

Important: in all operating conditions, the user shall be responsible for controlling the brake release-on control.

7 Resolver



When the resolver is connected, do not use the Less Wiring enc. or the incremental encoder in X7.

8 FEEDBACK (FBK)

Types:

-**FBK A**, resolver only (only read if also selected as speed loop feedback).

-**FBK B**, with the Pr62, the following systems can be selected:

FBK B	Pr62	INPUT ON
Encoder Sincos + EnDat interface	0	X7
Encoder Sincos	1	X7
Encoder Less Wiring (**)	2	X7
5V Line Driver 422 quadrature signals (incremental encoder) (**)	3	X7
5V Line Driver 422 frequency/direction signals (*)	4	X7
24V Push-Pull quadrature signals (IN2 and IN3) (*)	5	X5
24V Push-Pull frequency/direction signals (IN2 and IN3) (*)	6	X5

-**FBK C**, can support through selection of parameter Pr63

FBK C	Pr63	INPUT ON
5V Line Driver 422 quadrature signals (incremental encoder)	3	X9
5V Line Driver 422 frequency/direction signals (*)	4	X9
24V Push-Pull quadrature signals (IN2 and IN3) (*)	5	X5
24V Push-Pull frequency/direction signals (IN2 and IN3) (*)	6	X5

(*) these signals cannot be used as feedback on the position loop, but can be used as encoder input counters.

(**) when the resolver is connected to X6, do not connect the Less Wiring encoder and the incremental encoder to X7.

To the connector, a variable supply is available with voltage that can be set at 5, 8 or 12V=, by means of a parametric switch. In the case of 5 and 8 V voltages, these can be regulated with a feedback by means of a sensing pair to offset any voltage drops of the cables. In the case of 12V, the feedback is internal and any voltage drop cannot be offset. Bit Pb64.0 indicates whether the sensing function is on, otherwise the voltage set in open loop is regulated.

To the in encoder connector, a fixed isolated voltage of 5V is available.

8.1 Encoder connection

Refer to the diagrams in the Operator's Manual at website www.sbcelettronica.com.



9 INPUT AND OUTPUT : X5 TERMINAL CONNECTIONS

PIN	DESCRIPTION	
1	GND: for hardware enabling.	0V DC
2	Input: hardware enabling. Safety relay supply (optional).	Voltage: 24V DC
3	Output: safety relay (when fitted).	Contact
4		
5	N.C.	
6	Common: programmable output	0V
7	Output: two programmable outputs are available to display the parameters (see “programmable outputs” paragraph).	MON 2: 0 ÷ 10V DC
8		MON 1: 0 ÷ 10V DC
9	Common: anal. input. Aux. Ref.	0 V
10	- AX: analogue signal dedicated to auxiliary reference – input	0 ÷ 10V DC
11	+ AX: analogue signal dedicated to auxiliary reference – input	0 ÷ 10V DC
12	Common: anal. input Main Ref.	0 V
13	- REF: main reference analogue signal – input	0 ÷ 10V DC
14	+ REF: main reference analogue signal – input	0 ÷ 10V DC
15	Drive supply (see chap. “converter supply”)	0V DC
16		24V DC
17	Relay outputs: the internal relay controls two outputs for the external and is associated with the parameter bin. Pb91.2 18: N.O. contact - 19: N.C. contact	Common 0V DC
18		N.O.: 24V DC
19		N.C.: 24V DC
20	Digital output supply (together with VDC – term. 23)	0V DC
21	Digital output: the output voltage is determined by the connected supply. Associated binary parameters Pb91.0 e .1	Pb91.1 OUT 1: 5 ÷ 24V DC
22		Pb91.0 OUT 0: 5 ÷ 24V DC
23	Digital output supply: the output voltage can be determined according to the given supply (together with GND term. 20)	5 ÷ 24V DC
24	Input common	0V dc
25	Inputs: four different inputs are available and are matched with binary parameters Pb90.0 ÷ Pb90.3	Pb90.3 IN 3: 24V DC
26		Pb90.2 IN 2: 24V DC
27		Pb90.1 IN 1: 24V DC
28		Pb90.0 IN 0: 24V DC

10 FIRST CONVERTER START-UP

The drive is supplied from the factory with default programming.

Remember that the Hi-drive can control brushless synchronous or asynchronous motors. Before entering the motor data, programme **Pr31**: write “0” for brushless motor (default condition), “1” for asynchronous motor.

At this point the mechanism must be set with the fundamental parameters to characterise the connected motor (motor plate data). The fundamental parameters are:

Pr29	Number of motor poles	N
Pr32	nominal motor speed	r.p.m.
Pr33	rated motor current (eg. 2.5A, write 2.5)	A
Pr46	motor phase-phase resistance (eg. 1.8Ω, write 1.8)	ohm
Pr47	motor phase-phase inductance (eg. 2.6mH, write 2.6)	mH
Pr60	number of resolver poles	N

In the case of an asynchronous motor, the previous data must be completed with the following parameters:

Pr45	basic speed	r.p.m.	} <u>Asynchronous motor</u>
Pr48	sliding	r.p.m.	
Pr49	magnetisation current	A	
Pr32	limit speed of motor	r.p.m.	

After setting the parameters for motor characterisation, the operator must give the data saving command, **Pb42.15** (with drive disabled) and start the mechanism again. The drive will calculate the correct values of Pr2, Pr3, Pr16, Pr17, Pr18 and Pr19. The gain calculation is done if the drive is in default condition.

To change the entered parameters, put bit **Pb42.1**=1. The drive, at this point, again asks for the default parameters (alarm 15). After data entering, save and start the drive again. The parameters Pr2, Pr3, Pr16, Pr17, Pr18 and Pr19 will be recalculated according to the entered values.

10.1 First Hi-drive start-up

Below, the steps are shown to be carefully followed during first converter start-up.

- 1) Connect the motor to the converter, carefully following the manual diagrams.
- 2) Make sure the converter is disabled.
- 3) Start the converter.
- 4) Make sure no alarm has tripped.
- 5) Set the analogue reference at 0 V (pin 13, 14 of terminal board X5), and enable the converter (24V at the pin that enables the drive).
- 6) Now the motor shaft must be stopped; when the analogue reference voltage changes, the motor speed must change proportionately. If it does not, check the wiring harness.

The converter is made with default values already set.

10.2 Setting the default parameters

To set the default parameters (which change all previously set parameters) proceed as follows:

- start the converter
- disable the converter by means of software command (**Pb40.9=0**) or via hardware (before starting the converter)
- set **Pb39.13=0**
- give the command **Pb42.12=1**, which enables drive default parameter loading
- enter the fundamental parameters (motor plate data, see para. 3.2)
- save the setting with commands **Pb42.14** e **Pb42.15** (the drive must be disabled)
- stop and start the drive again.

11 USE OF KEYBOARD (OPTIONAL)

S, SHIFT, is used in combination with the other keys to enable the cursor to move inside the fields:

- o Together with key T, movement inside the fields is made in the opposite direction (anticlockwise).
- o Together with key + o – to move the cursor inside the field on a figure with greater or less "weight".

+, increases the datum shown by the cursor; if PLC instructions.

–, decreases the datum shown by the cursor; if PLC instructions.

T, the purpose of this key is to change the field shown by the cursor.

E, ENTER, confirms datum entering or change. The changed or entered datum or instruction must be saved before changing the display page, otherwise the change made will be lost. **IMPORTANT**: the instructions can also be changed when the Pico-PLC is running (Pr39.13=1), and so before changing anything, it is best to stop the Pico-PLC.



12 Alarms

Pr23	Alarm	Remedies
0	No alarm	
1	Overvoltage	Check the three-phase power line. Check the braking line and braking resistance Check the application
2	Undervoltage	Check the three-phase power line.
3	Overcurrent	Check any mechanical impediments and correct motor size for required use. Check motor connections and any short-circuits between phase-phase and phase-earth. Check the length and type of motor cable used. Make sure a mains filter is not connected on the motor!
4	FBK speed loop error	Check the speed loop connections and the connectors from both sides (drive-motor).
5	Motor PTC alarm	-Check the PTC connection cable. -If the alarm persists, disable the drive, interrupt power to the motor, disconnect the power supply to the drive (24VDC). Disconnect the PTC connector from the drive, and make a connection short-circuiting the PTC (between PTC+ and PTC-) on the terminal board of the drive itself. Power the drive (24VDC). If the alarm continues, the drive is faulty, otherwise the PTC on board the motor is faulty (after completing the test, remove the connection short-circuiting the PTC)
6	Power module overheating	Check the cooling fans and any blockages/restrictions in air flow. Check the braking cycle. Check the room temperature of the switchboard where the drive is fitted and outside room temperature.
7	External alarm	Depends on application (see PicoPLC program)
8	Auxiliary alarm	Depends on application (see PicoPLC program)
10(*)	Check sum PLC	Set the default parameters, save, switch back on and reprogramme the drive
11(*)	Check sum param.	Set the default parameters, save, switch back on and reprogramme the drive
15	Default parameters	Set the default parameters, save and switch back on
21	24VDC undervoltage	The drive power voltage is below minimum threshold: voltage too low.
22	Environment overheating	Check the cooling fans and any blockages/restrictions in air flow. Check the room temperature of the switchboard where the drive is fitted and outside room temperature.
24	Braking transistor cutout	Braking resistance in short circuit. If an external braking resistance is connected to the drive, check its condition and wiring harness.
25(**)	Wrong FBK speed loop initialisation	Check the FBK speed settings. Check the FBK speed connection.
26(**)	Wrong FBK position loop initialisation	Check the settings of the position FBK. Check the connection of the position FBK.
28	FBK position loop error	Check the connections of the position loop and the connectors on both sides (drive-motor).
I ² T	Current restriction (I ² T) - "the red LED flashes continuously"	The drives goes in I ² T due to an overload (more power is required than that being supplied). Check: -The wiring between the drive and the motor (there must be no switched-over phases). Above all mind the motors with terminal board rather than connector: it is easy to make a mistake. Make sure you keep to the wiring diagrams. - Mechanical sizing

(*) only reset after default loading and new saving.

(**) cannot be reset until next switch-on.



Divisione S.B.C.



Worldwide distribution

EUROPE

BELGIUM, LUXEMBURG PROCOTEC BVBA

Lieven Bauwensstraat 25A
8200 Brugge (Industriezone Waggelwater)
Tel. +32-50-320611 - Fax +32-50-320688
www.procotec.be - info@procotec.be

DENMARK SERVOTECH AS

Ulvhavevej 42-46 - 7100 VEJLE
Tel. +45-7942-8080 - Fax. +45-7942-8081
www.servotech.dk - servotech@servotech.dk

FRANCE TRANSTECHNIK SERVOMECHANISMES S.A.

Z.A. Ahuy Suzon
17 Rue Des Grandes Varennes - 21121 Ahuy
Tel. +33-380-550000 - Fax +33-380-539363
www.transtechnik.fr - infos@transtechnik.fr

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Amir House, Maxted Road - Hemel Hempstead
Hertfordshire - HP2 7DX
Tel. +44-1442-212671 - Fax +44-1442-246640
www.amirpower.co.uk - apt@amirpower.co.uk

QUIN SYSTEMS LIMITED

Oakland Business Centre
Oakland Park - Wokingham
Berkshire - RG41 2FD - U.K.
Tel. +44-118-9771077 - Fax +44-118-9776728
www.quin.co.uk - sales@quin.co.uk

HOLLAND VARIODRIVE AANDRIJF-EN BESTURINGSTECHNIEK B.V.

A. van Leeuwenhoekstraat 22
3261 LT Oud-Beijerland
Tel. +31-186-622301 - Fax +31-186-615228
www.variodrive.nl - sales@variodrive.nl

PORTUGAL

SIEPI LDA
Parque Industrial do Arneiro, Lote 46
São Julião do Tojal - 2660-456 Loures
Tel. +351-21-9737330 - Fax +351-21-9737339
www.gruposiepi.com - Siepi@mail.Telepac.Pt

SPAIN

INTRA AUTOMATION SL
C/ALABAU, 20 Horno Alcedo
E-46026 Valencia
Tel. +34-96-3961008 - Fax +34-96-3961018
www.intraautomationsl.com
info@intraautomationsl.com

SWITZERLAND INDUR ANTRIEBSTECHNIK AG

Margarethenstrasse 87
CH - 4008 Basel
Tel. +41-61-2792900 - Fax +41-61-2792910
www.indur.ch - info@indur.ch

TURKEY

SANPA LTD STI
Plaj Yolu, Ersoy Apt. No. 14 D, 4
34740 Suadiye - Istanbul
Tel. +90-216-4632520 - Fax +90-216-3622727
www.sanpaltd.com.tr - sanpa@turk.net

NORTH AMERICA

**CANADA
PARS ROBOTICS GROUP INC.**
441 Esna Park Drive, units 11-12
Markham, Ontario, L3R 1H7
Tel. +1-905-4772886 - Fax +1-905-4770980
www.parsrobotics.com - pars@parsrobotics.com

UNITED STATES PARKER HANNIFIN CORPORATION COMPUMOTOR DIVISION

5500 Business Park Drive
Rohnert Park, CA 94928
Tel. +1-707-5847558 - Fax +1-707-5842446
www.compumotor.com
CMR_Customer_Service@parker.com

CENTRAL AMERICA

**MEXICO
PARKER HANNIFIN DE MÉXICO**
Eje 1 Norte No. 100
Parque Ind. Toluca 2000 - Toluca 50100
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www.parker.com

SOUTH AMERICA

**ARGENTINA, CILE, PARAGUAY, URUGUAY
R.A. INGENIERIA ELECTRONIC IND. Y COM.**
Arregui 5382 - 1408 Buenos Aires
Tel. +54-11-45675543 - Fax +54-11-45662870
www.raing.com.ar - ra@raing.com.ar

BRAZIL

AUTOMOTION LTDA.
Acesso Jose Sartorelli Km2,1
Parque das Arvores, 18550-000 Boituva - SP
Tel. +55 15 33639900 - Fax +55 15 33639911
www.automotion.com.br - coml@automotion.com.br

VENEZUELA TEKNOMAQ C.A.

Avenida Manuel Diaz Rodriguez
Edif. Milano Local C
Santa Monica - Caracas
Tel. +58-212-6335657 - Fax +58-212-6330466
teknomaq@cantv.net

ASIA

**ISRAEL
AF ELECTRONICS MOTOR CONTROL**
PO BOX 741
52322 Ramat-Gan Israel
Tel. +972-3-6745457 - Fax +972-3-6776342
afmotor@zahav.net.il

MALAYSIA PRESTIGE MACHINERY

No. 46, Jalan Bateria 34/5
Bukit Kemuning Light Industrial Area
42450 Shah Alam - Sengalor D.E.
Tel. +60-3-5880-9851 - Fax +60-3-5880-8364
presmach@maxis.net.my

TAIWAN AUTO ACCURACY CO. LTD

No. 18, 35RD, Taichung Industrial Park
Taichung City
Tel. +886-42-3594847 - Fax +886-42-3591083
www.autoaccuracy.com.tw - autoauto@ms2.hinet.net

OCEANIA

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Huntingdale, 3166
Melbourne, Victoria
Tel. +613-9563-0115 - Fax +613-9568-4667
www.motion-solutions.com.au
sales@motion-solutions.com.au



Parker Hannifin S.p.A.
Electromechanical Automation
Via Gounod 1
20092 Cinisello Balsamo (MI), Italia
Tel: +39 0266012459
Fax: +39 0266012808
www.sbcelettronica.com
sales.sbc@parker.com

Parker Hannifin GmbH
Electromechanical Automation
Robert-Bosch-Str. 22
D-77656 Offenburg, Germania
Tel: +49 (0)781 509-0
Fax: +49 (0)781 509-98-258
www.parker-emd.com
sales.hauser@parker.com

Parker Hannifin plc
Electromechanical Automation
21 Balena Close
Poole, Dorset. BH17 7DX UK
Tel: +44 (0)1202 50 6200
Fax: +44 (0)1202 69 5750
www.parker-emd.com
sales.digiplan@parker.com