

USERGUIDE

Infranor Variable Speed Drive

Implementation



WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

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Introduction

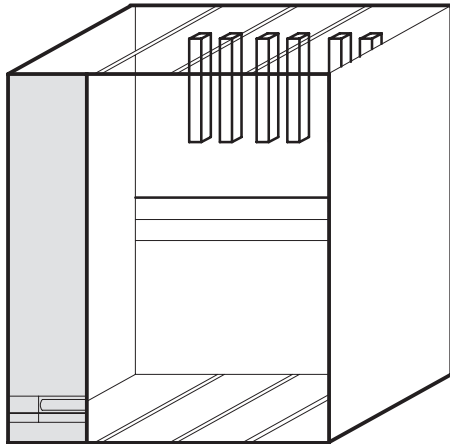
This implementation manual must be used in conjunction with manual No. 01T00084:

INFRANOR VARIABLE-SPEED DRIVE (for Sepro robots) DESCRIPTION.

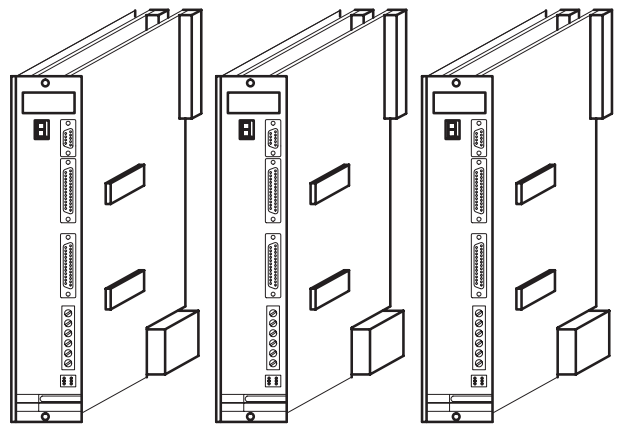
I - DESCRIPTION

The Infranor variable-speed drive is made up of the following parts:

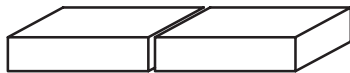
The figure shows a 3-axis configuration



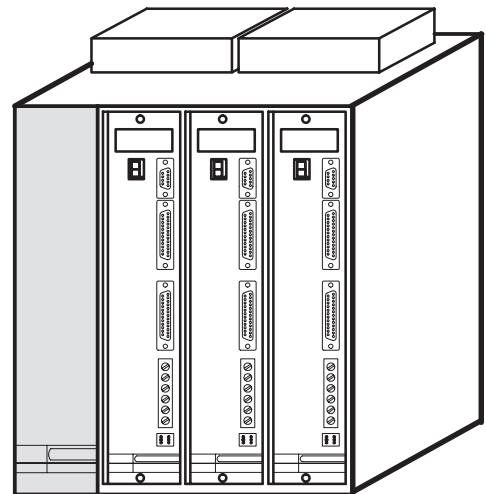
SMTR.BL Rack



SMTB.S (i) Axis Modules



Fans



Complete INFRANOR
Variable-Speed Drive

II – IMPLEMENTATION

1 – Preliminary Checks

Follow the procedure described below using the axis identification sheet and bearing in mind the maximum speed requirement:

- Enter the list of parameters.
- Check the configuration of the variable–speed drive as follows:
 - . Integral gain: strap or capacitor set to PAV–D
 - . Number of encoding points: switch A14 set to ON or OFF
 - . Vertical compensation strap: 2 directions possible if present
- Check that the fastening screws on the front panel of axis modules are tightened.
This is to ensure that the shielding required to protect the equipment against interference is uninterrupted.

2 – Power–up

- Close the main isolating switch of the cabinet
- Check the main and auxiliary power supplies: 220V AC (240V AC max)
- The power is not set,

the display on the front panel should indicate a fault as follows:



- Reset the power. The display is now:



if the display is not as shown, refer to the section entitled “Safety Devices Stored in Memory” in the Maintenance chapter in the description manual.

3 – Settings

A. Setting P6 – P5 – P4

P6 – (ramp) to min. (P–)

P5 – (I RMS) to max. * (P+)

P4 – (I MAX) to max. * (P+)

* Valid for associations:

SMTB.Si VS Drive	SMTB.S VS Drive	Motor
220 / 17	220 / 18	LD 620 EL
220 / 30	220 / 25	LD 640 EG – 825EJ
220 / 45	220 / 45	LD 825 EJ

B. Setting Gain Using P2

In Set-up mode, the gain must be preset by increasing it to noise level.

Reduce it to eliminate noise and attenuate the oscillations visible on the IDC. data item (pin 2 of X3)

C. Setting Set Point Level Using P3

Adjust the set point level for the maximum speed of the customer application in Auto mode to the following value:

Axis controlled by CAM/CAF board	Axis controlled by 3 AXES board
6 V	9 V

– **Caution:** don't measure the set point amplitude at X3 pin 3. It must be measured on X4 extension.

D. Setting Offset Using P1

Set the offset in Set-up Mode function [Offset]

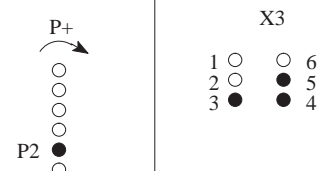
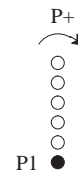
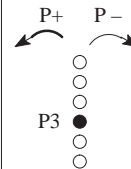
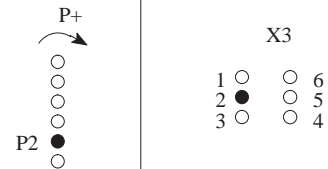
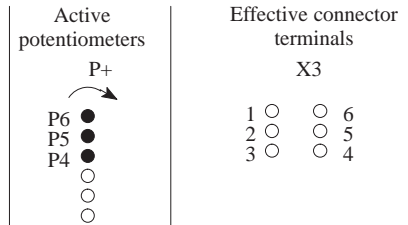
The value of the position of the axis displayed on terminal musn't change.

E. Check settings one axis at a time (with different movements)

readjusting the gain setting if necessary.

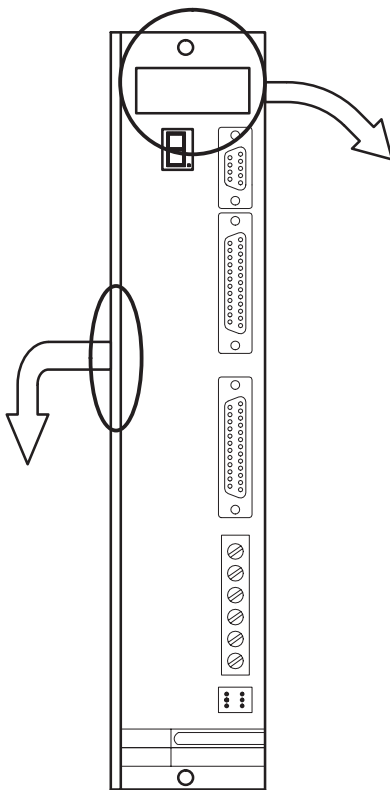
– On the oscilloscope, check the set point (pin 3 of X3), tachometer feedback (pin 4 of X3) and the current (pin 5 of X3)

Caution : Pin 3 of X3 is only used to display the speed of the set point and not the amplitude.



III – CONFIGURATION FOR SEPRO ROBOTS

1 – Personalization Label



☞ For standard configuration:

Robot serial no.

Robot N° :
 SMTB. Si 220/
 Axis Balancing
 standard configuration

Module reference.
 Imax of board:
 17A, 30A, 45A

Presence of vertical load compensation strap

Type of axis:
 X,Y,Z,B,C.

☞ For specific configuration:

Robot serial no.

Robot N° :
 SMTB. Si 220/
 Axis Balancing
 specific configuration

Module reference.
 Imax of board :
 17A, 30A, 45A

Presence of vertical load compensation strap

Type of axis:
 X,Y,Z,B,C.

IGBT Variable-Speed Drive

Current loop configuration strap
 B1 B2 B3

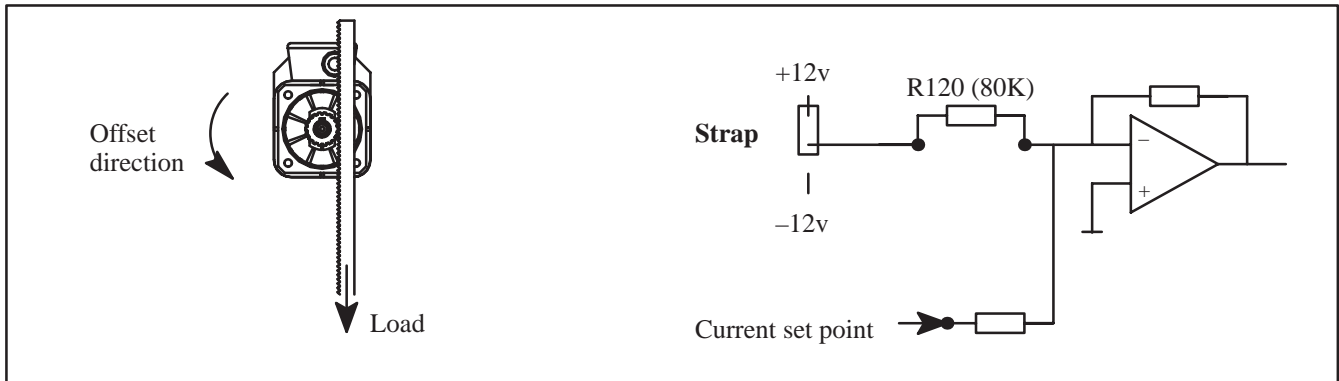
Current limitation:
 . Set value
 . Number of potentiometer turns

Speed loop:
 . Standard
 . Specific B(ra2) =
 C(ca1) =
 D(ca2) =
 L =

2 – Vertical Load Configuration

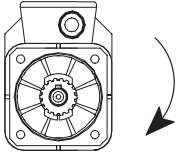
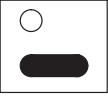
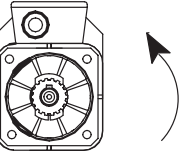

2 – 1. *Operating Principle*

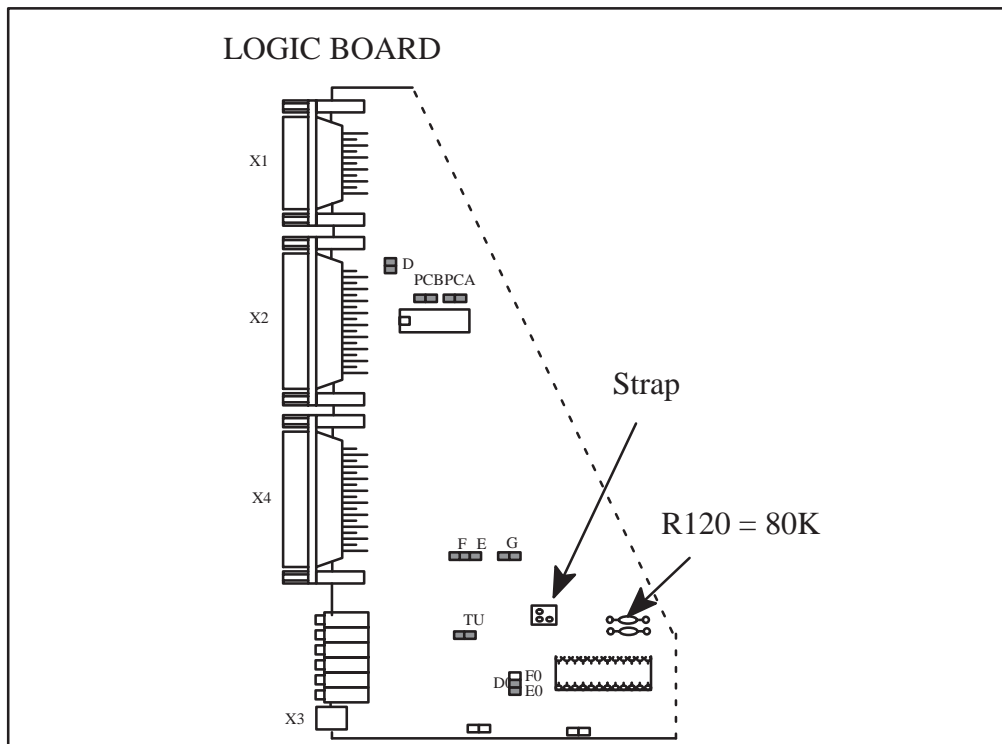
- . In order to offset the downward movement of the arm before it is raised, a vertical load compensation must be implemented.
- . This compensation adds a current offset which may be positive or negative depending on mechanical configuration.
- . The required option is selected using a strap.
- . The offset value is defined by resistor R120 = 80K



2 - 2.Strap Position

- . The position of the vertical load compensation strap is determined through the mechanical configuration of the arm.

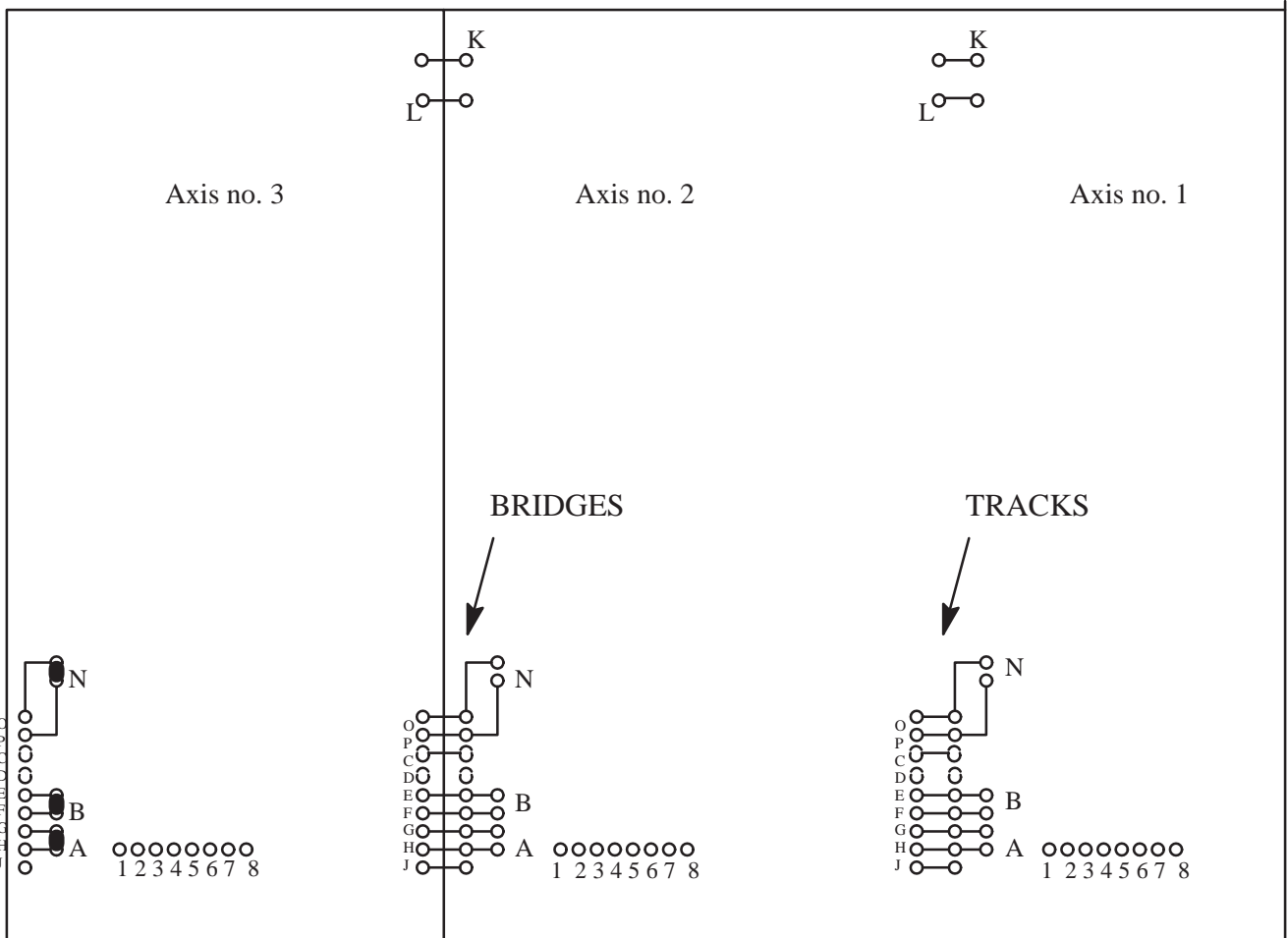
Direction of the shaft's rotary movement under the influence of a load	Strap
	
	



3 – Configurations Set by Infranor

3 – 1. *Backplane*

a. Layout:

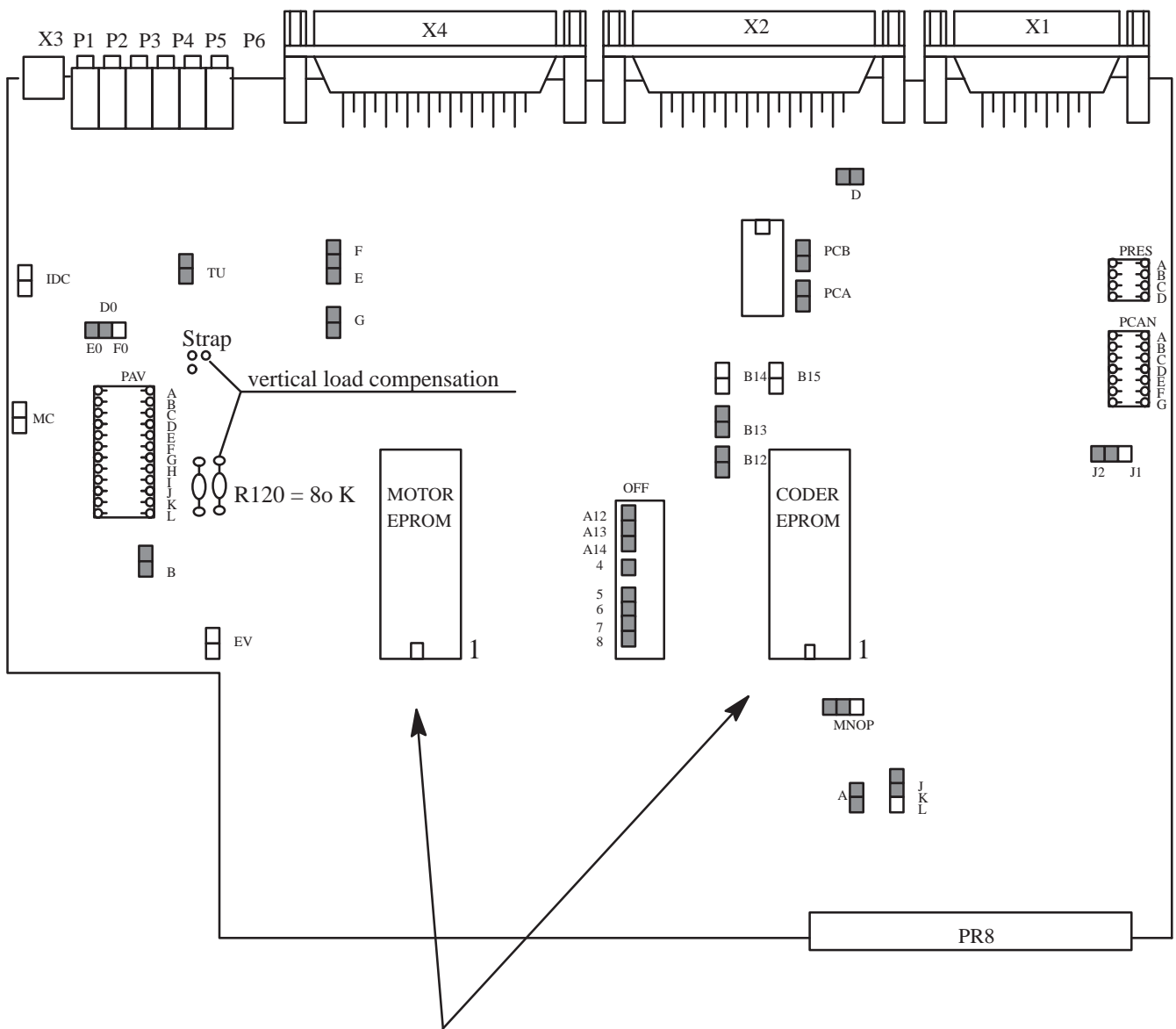


b. Bridges and Straps:

Bridges	Designation	Installed	Remark
K L	OV Aux. power supply. + Aux power supply	YES YES	Auxiliary power supply distribution
O P	Idyn Idyn	YES YES	I2t fault anticipation output (not used)
C D	Servo-control mode (M. Ass) Servo-control mode (M.Ass)	YES NO	Var validation inputs mounted in series through X5 connector (n.u.)
E F	Pu. Ready Pu. Ready	YES YES	Power OK outputs mounted in series (n.u.)
G H	Var. Ready Var. Ready	YES YES	Variable-speed drive OK outputs in series (used)
J	0V Numerical Ctrl	YES	Var. logic 0 V
A B N	Var. Ready Pu. Ready Idyn	Installed after last axis only for connecting signals in series	

3 - 2.Axis Module: Logic Board

a. Layout:



CAUTION ! CHECK THAT MOTOR AND CODER EPROMs ARE IN THE RIGHT DIRECTION

b. Bridges:

Bridges	Designation	Installation	Remark
D G E F	input logic (positive or negative)	YES YES YES	positive logic
M N	Motor temperature sensor (PTC or NTC)	YES	Type PTC
Ev B	I ² t safety device management (locked or limited)	NO YES	Locked on <i>i²t</i>
TU	SMTP 21 option	YES	No SMTP 21 option
IDC	Not connected	NO	
DO–EO	Current image on X4 and X3 (= I _{dc} or = I meas.)	YES	Current image = I meas.
KJ	Fault 3 management	YES	Var ready = no fault and power ready (Pu ready)
MC	Set point limitation (+/- 5V ou +/- 10V)	NO	+/- 10V set point
A PCA PCB	Type of board (TZ / AE)	YES YES YES	TZ logic board
J1 J2 B12 B13 B14 B15	Configuration converter resolver signals (resolution 12, 14 or 16 bits)	NO YES YES YES NO NO	Resolution = 14 bits
OSC LA + –	Reserved for Infranor		

c. Switches:

Switch	Designation	State	Remark
A12 A13 A14	Number of coder points	1000pts 2000pts OFF OFF OFF OFF OFF ON	Refer to motorization identification sheet
4	Used for AE version board	OFF	Not used
5 6 7 8	Zero pulse shift	OFF OFF OFF OFF	No shift

d. P.RES module for resolver matching:

Order	Turns ratio 0.5
A	12.7 k Ω
B	12.7 k Ω
C	12.7 k Ω
D	12.7 k Ω

e. P.CAN. module for matching the converter speed rating:

Order	RESOLUTION 14 BITS Max. speed 3600 rpm
A	220 pF
B	470 k Ω
C	1.5 nF
D	62 k Ω
E	NC
F	33 k Ω
G	NC

f. PAV. module for adapting the speed loop:

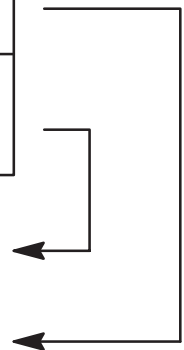
Speed rating: 3600 rpm		Current Rating			
		8/10/12A	17/18A	25/30A	45A
	Order				
	A	NC	NC	NC	NC
	B (RA2)	10 kΩ	22 kΩ	47 kΩ	100 kΩ
	C (CA1)	22 nF	10 nF	4.7 nF	2.2 nF
Refer to motorization identification sheet	D (CA2)	470 nF	220 nF	100 nF	47 nF
	E	NC	NC	NC	NC
	F	NC	NC	NC	NC
	G	NC	NC	NC	NC
	H	NC	NC	NC	NC
	I	NC	NC	NC	NC
	J	NC	NC	NC	NC
	K	NC	NC	NC	NC
	L	0 Ω	0 Ω	0 Ω	0 Ω

g. EPROMS:

	Reference / Check sum	
	8 A – 10 A – 12 A	17 A – 18 A – 25 A 30 A – 45 A
Coder EPROM	PC 14 – 1000 / 2000 FFCE	PC 14 – 1000 / 2000 FFCE
Motor EPROM	ALS / 4 / 4 – 8 C00C	ALS / 10 / 4 – 8 C000

Reference : ALSTHOM / num. of pairs of poles / resolver shift

Reference: Resolution 14 bits – num of coder points

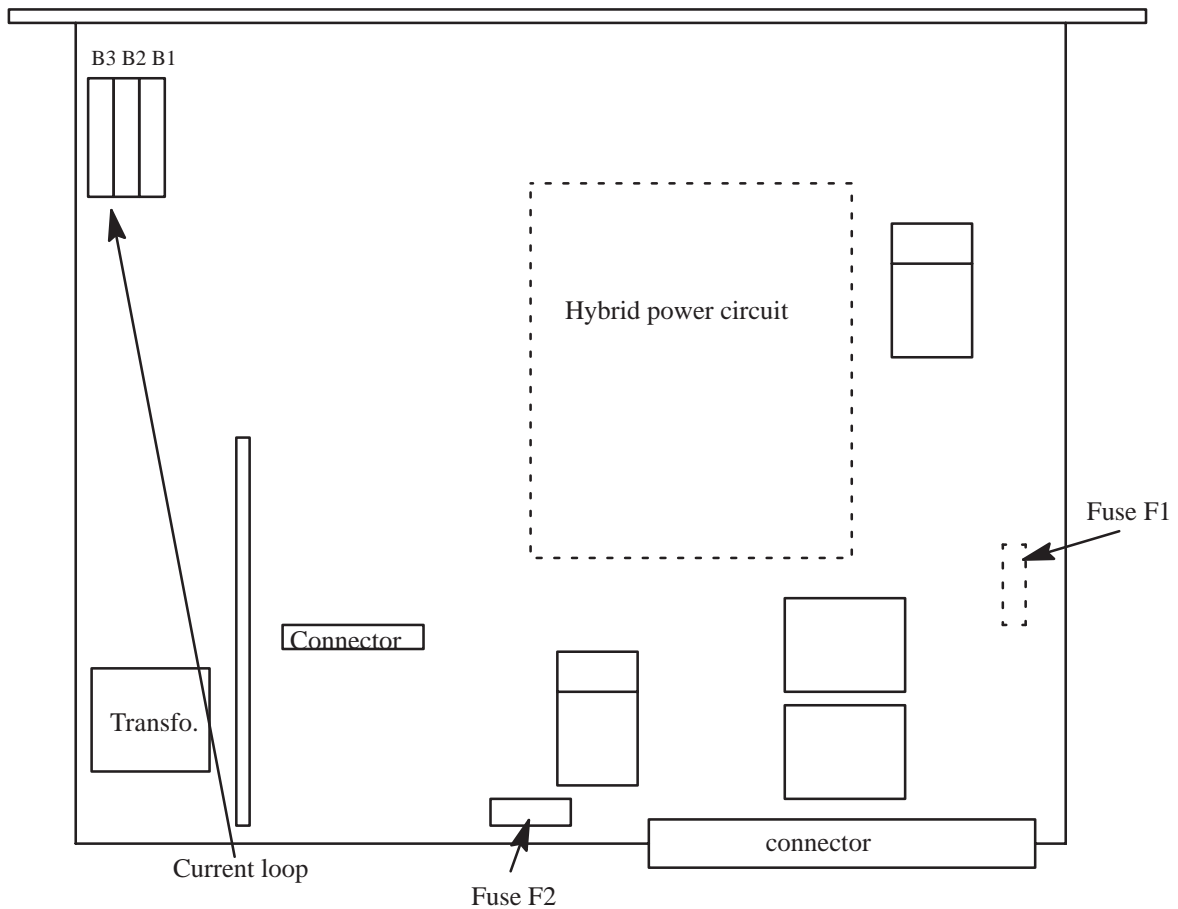


3 - 3.Axis Module: Power Board

There are two types of power board:

- boards with an IGBT power stage (1 hybrid power circuit, small transformer) of varying design according to type: SMTB.Si or SMTB.S.
- boards with a bipolar stage (3 groups of 2 power transistors, large transformer),

a. Power board with IGBT POWER STAGE for SMTB.Si:



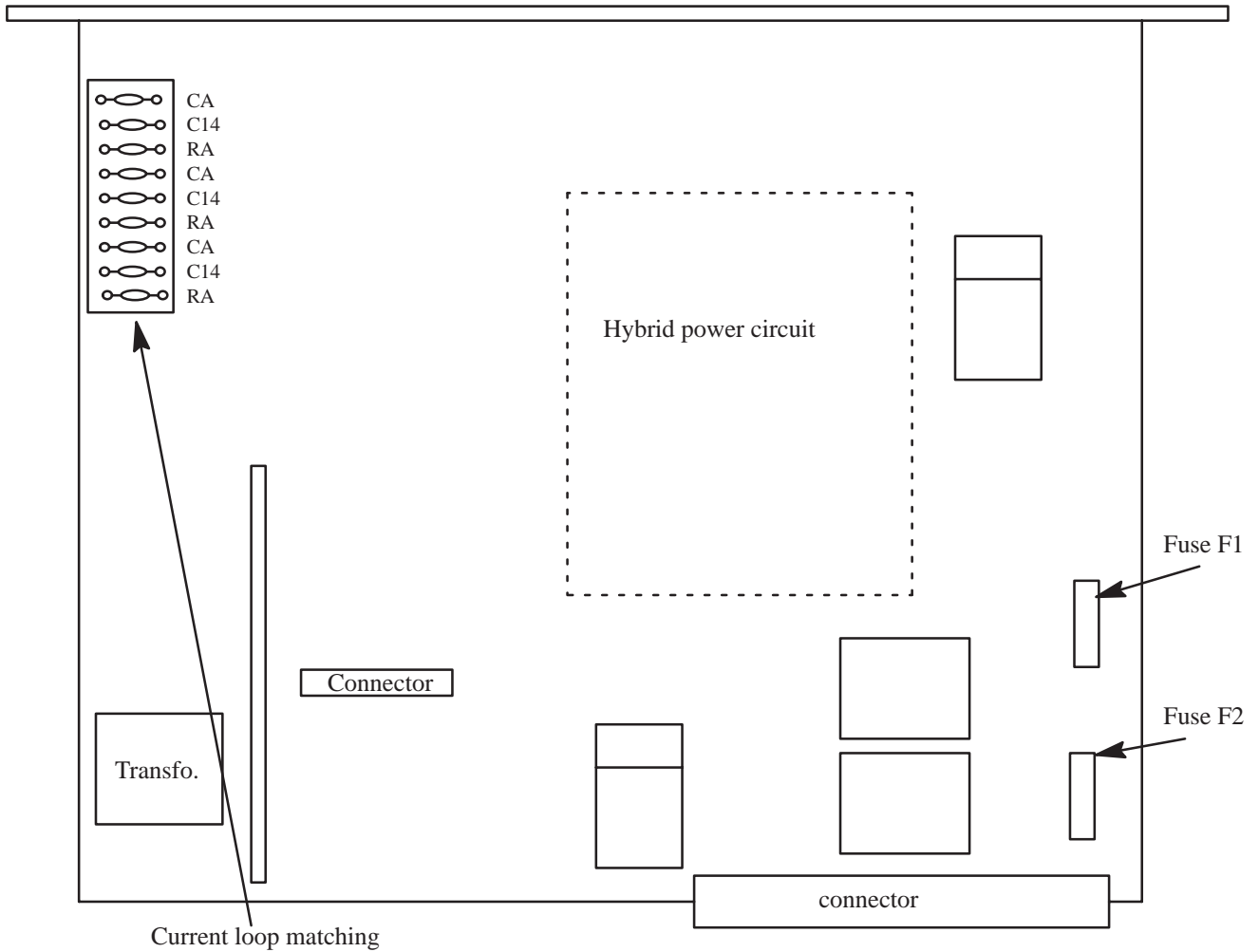
Position	Current Rating				
	8A $L > 8.93 \text{ mH}$	12A $L > 5.95 \text{ mH}$	17A $L > 4.2 \text{ mH}$	30A $2.38 < L < 5.95$	45A $L > 3.97 \text{ mH}$
B1	B1	B1	B1	B2	B1
B2					
B3					

L = Inductance between phases of motor

Example of configuration for variable-speed drive with 8 A rating :

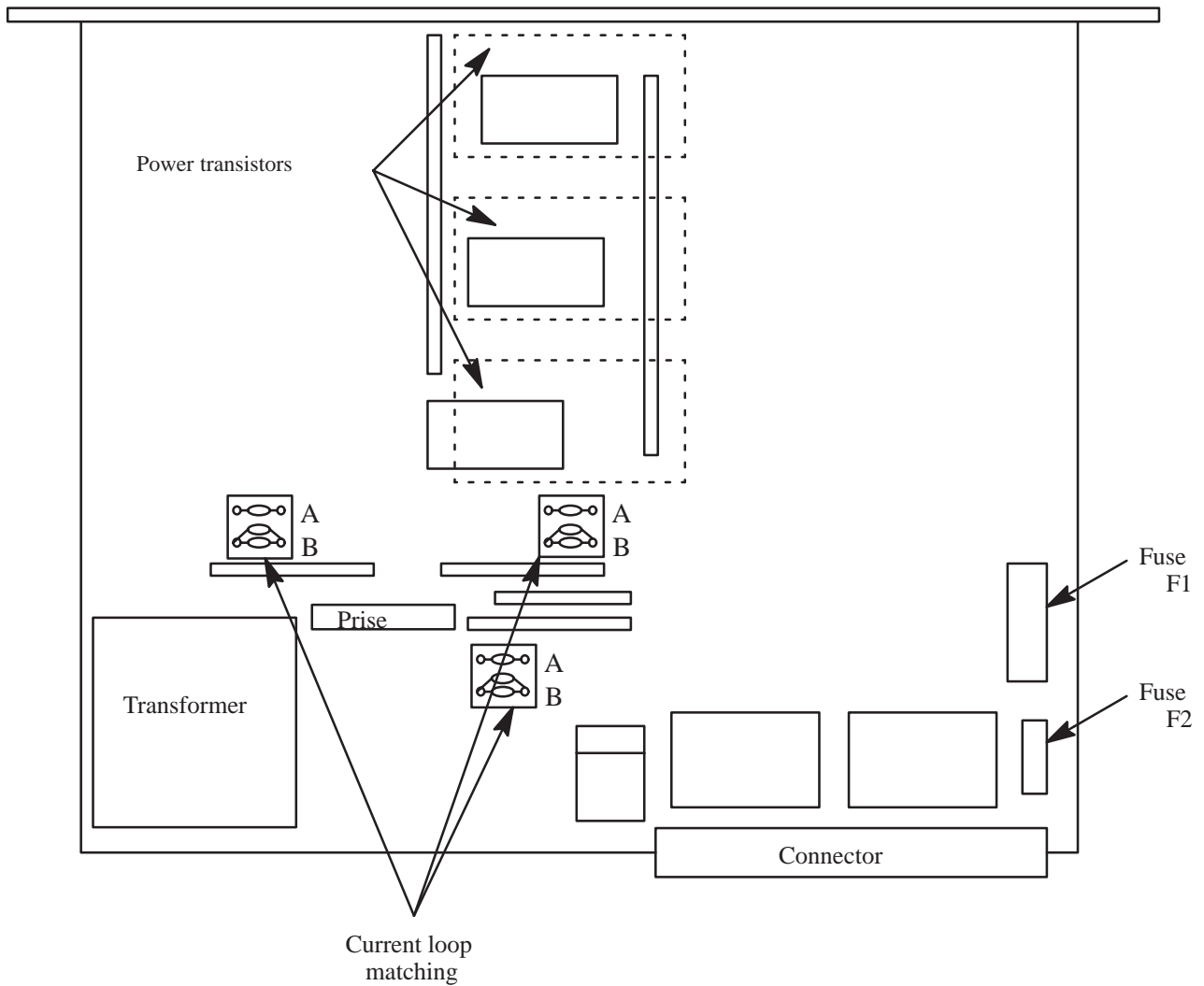


b. Power board with IGBT POWER STAGE for SMTB.S :



Order	Current rating / Type of motor			
	10A / L x 310	18A / LD 620	25A / LD 640 LD 825	45A / LD 825
CA	470 pF	1 nF	1.2 nF	560 pF
RA	330 kΩ	150 kΩ	110 kΩ	220 kΩ
C14	100 pF	220 pF	220 pF	100 pF

c. Power board with BIPOLAR STAGE :



Order	Current rating / Type of motor			
	10A / L x 310	18A / LD 620	25A / LD 640 LD 825	45A / LD 825
A	470 pF	1 nF	1.2 nF	560 pF
B	330 kΩ	150 kΩ	110 kΩ	220 kΩ
B	100 pF	220 pF	220 pF	100 pF

IV – TROUBLESHOOTING HELP

* NO RESPONSE FROM MOTOR

- No power supply voltage (if auxiliary supply).
- No main power supply voltage.
- Motor wire cut or fuse.
- Power supply fuse.
- Servo-control mode (M.ASS) input not activated.
- Limit switch input not activated.
- No personalization board (PAV module).

* MOTOR CONTROL BUT NO TORQUE

- Potentiometer P4 set to minimum (Imax).
- Wiring fault on personalization board (PAV module).
- Potentiometer P5 set to minimum (Ieff).

* PREFERENTIAL POSITIONS HELD WITH ALTERNATING OSCILLATIONS

- Motor wires are badly connected or coupled or even reversed.
- Resolver wrongly positioned with respect to motor or misconnected.
- Number of resolver poles does not comply.
- EPROM does not comply with number of motor poles.

* DISCONTINUOUS OPERATION

- Wire cut on one phase.

* TORQUE WITH POSSIBLE SPEED DRIFT

- No set point.
- Both limit switches are activated.

* THE MOTOR ONLY RUNS AT HIGH SPEED

- Resolver adjustment or connection fault.

- * LOUD NOISE AND CRACKLING EVEN WHEN OFF
 - Shielding fault on resolver wires.
 - Motor ground connection fault.
 - Ground link fault on logic 0V potential.

- * IRREGULAR BUZZING SOUND
 - Same causes as above.
 - Shielding fault on set point link.

- * MOTOR DRIFT ON LOAD IN ONE DIRECTION
 - Incorrect logic 0V potential reference.

- * IRREGULAR OPERATION, ESPECIALLY AT HIGH SPEED
 - Resolver impedance too low.
 - Resolver interface faulty.
 - Speed dynamic adjustment fault.
 - Resolver wiring fault.

- * LOUD NOISE IN THE MOTOR WHEN RUNNING AT HIGH SPEED IN ONE DIRECTION
 - Resolver wiring fault.

- * THE VARIABLE-SPEED DRIVE CUTS OUT AFTER AN ACCELERATION OR BRAKING WITH OVERVOLTAGE
 - Discharge on a resistor ineffective (threshold setting fault or fuse blown on discharge system) – Fault no. 6 displayed on the variable-speed drive.

- * MOTOR WHISTLES AFTER HIGH ACCELERATION AND NOMINAL SPEED NOT REACHED
 - DC voltage too low during accelerations.

- * WHISTLING WHEN OFF
 - The resolver used has an unsuitable turns ratio.

* UNSTABLE SETTINGS (DAMPED SPEED OSCILLATIONS)

- Gain too low (increase by turning P2 to the right).

* FLUTTERING BETWEEN PLUS OR MINUS INCREMENT POSITION

- Static gain K_0 too high: decrease gain using P2.

* OVERRUN IN POSITIONING PHASES

- Speed loop gain too low (turn P2 to the right).
- Position loop gain to be corrected, dragging errors in the position measuring system.
- Position loop gain too high.

REMARK:

One error does not rule out another.

Have you remembered to retighten all connections ?
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Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

WE'RE HERE TO HELP

To contact Customer Service personnel, call:



HOW TO CONTACT CUSTOMER SERVICE

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

If you do have a problem, please complete the following checklist before calling Conair:

- Make sure you have all model, serial and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- Make sure power is supplied to the equipment.
- Make sure that all connectors and wires within and between loading control and related components have been installed correctly.
- Check the troubleshooting guide of this manual for a solution.
- Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- Check that the equipment has been operated as described in this manual.
- Check accompanying schematic drawings for information on special considerations.

BEFORE YOU CALL ...

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Departments for a nominal fee.

EQUIPMENT GUARANTEE

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

WARRANTY LIMITATIONS

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.