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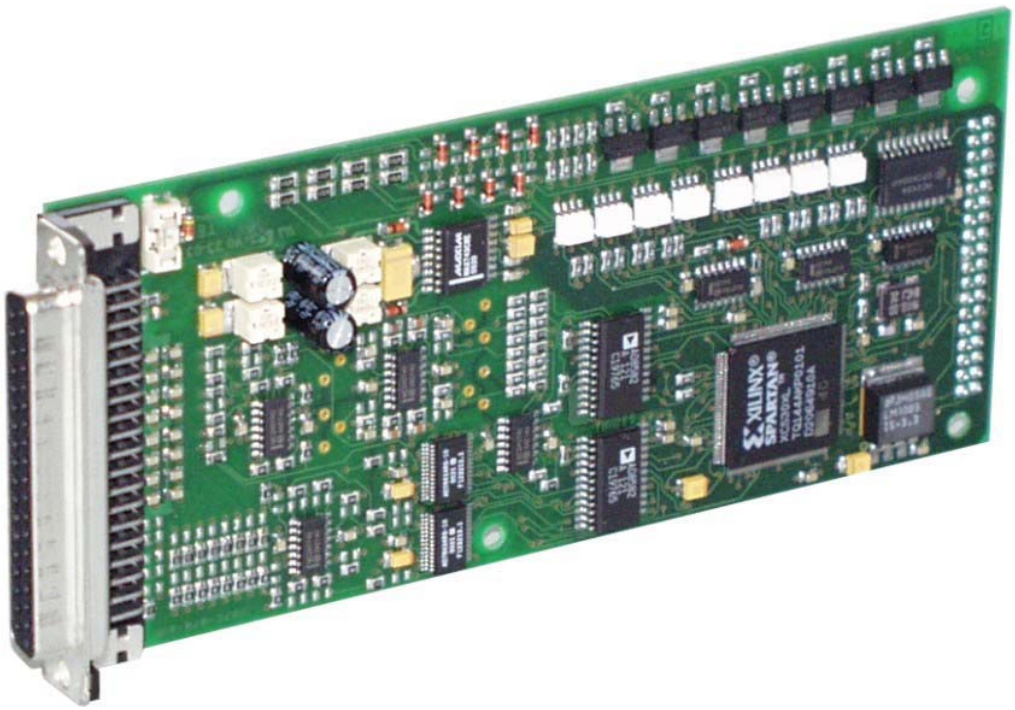
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I/O board for DSC family



DSO-HIO

User's Manual

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Record of revisions concerning the DSO-HIO manual:

Document revisions		
Issue (x)	**Date**	**Modified**
Ver A	11.09.03	First version
Ver B	03.04.07	Updated version: - Maximum current on the analog outputs added (refer to §2.3.4)
Ver C	05.01.11	**Updated version:** **- New UL certification laboratory (TUV)**

Documentation concerning the DSO-HIO:

- **DSO-HIO User's Manual (DSO-HIO principle) # DSOHIO 902 C**

Refer to the **'Operation & Software Manual'** corresponding to the controller in order to set the DSO-HIO.

Refer to the **'Hardware Manual'** corresponding to the controller in order to install the DSO-HIO in the controller.

The DSO-HIO optional board has been successfully tested and evaluated to meet the UL 508C for US market and CSA-C22.2 N°14-05 for canadian market.

This standard describes the fulfillment by design of minimum requirements for electrically operated power conversion equipment which is intended to eliminate the risk of fire, electrical shock, or injury to persons being caused by such equipment.

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1. Introduction

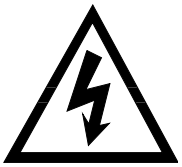
This document concerns the **DSO-HIO** optional board used with the position controller of ETEL's DSCxx family. The purpose of this manual is to give details regarding the specifications, installation and interfacing. The DSO-HIO allows the user to add 8 opto-coupled digital inputs, 8 opto-coupled digital outputs, 4 differential analog inputs and 4 differential analog outputs (depending on the DSO-HIO models) to the position controller.

Remark: The updates between two successive versions are highlighted with a modification stroke in the margin of the manual.

1.1 Safety

Please, read all the safety precautions listed in this manual before handling the DSO-HIO:

- Never use the DSO-HIO for purposes other than those described in this manual.
- A competent and trained technician must install and operate the DSO-HIO (and the position controller), in accordance with all specific regulations of the respective country concerning both safety and EMC aspects.
- Troubleshooting and servicing are permitted only for ETEL's technicians and agreed distributors.
- Operating the DSO-HIO (and the position controller) will make the motor move. **Keep away from all moving parts to avoid injuries!**
- The safety symbols placed on the corresponding position controller or written in the manuals must be respected.
- If the DSO-HIO, associated with a position controller, is integrated into a machine, the manufacturer of this machine must establish that it fulfils the 89/336/EEC directive on EMC before operating the position controller.



Warning:Signals a danger of electrical shock to the operator.
Can be fatal for a person.



Caution: Signals a danger for the DSO-HIO (and the position controller). Can be destructivefor the material.
A **danger** for the operator can result from this.



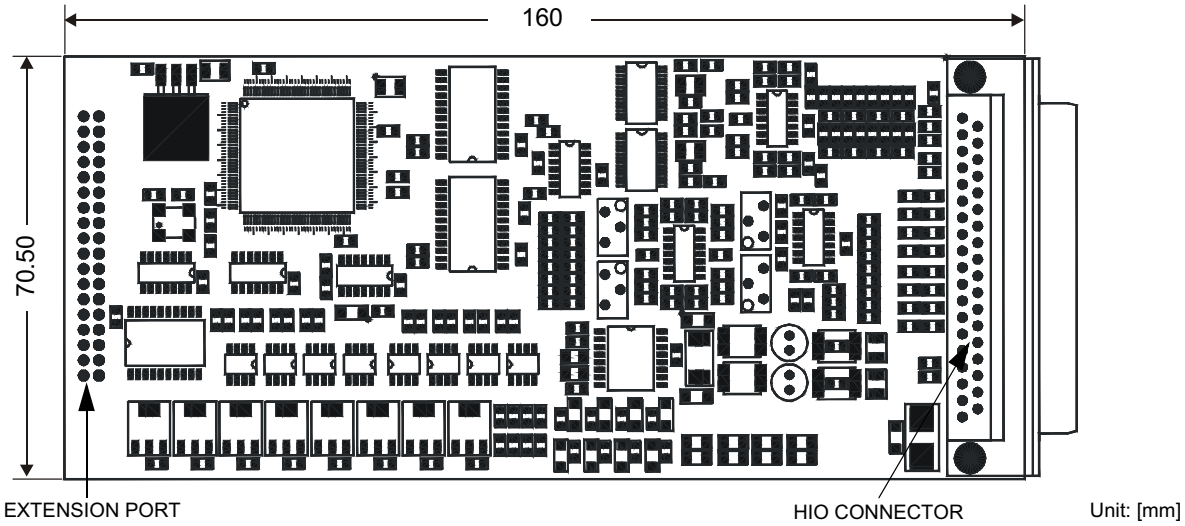
Caution: Indicates electrostatic discharges (ESD), dangerous for the DSO-HIO and the position controller.
The components must be handled in an ESD protected environment only.

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2. Hardware

2.1 Outline and dimensions

The DSO-HIO board has two connectors. The D-SUB (37 poles, female connector) allows the user to connect additional inputs/outputs to the position controller front panel. This connector is called **HIO connector** (refert to §2.3.5 for more information about the pin assignment). The **extension port** connects the board to the position controller (it is not described in this manual because this connection is ETEL's property).



2.2 DSO-HIO models

There are three different DSO-HIO models available:

- DSO-HIO111 which includes 8 DINs (digital inputs), 8 DOUTs (digital outputs), 4 AOUTs (analog outputs) and 4 AINs (analog inputs).
- DSO-HIO211 which includes 8 DINs (digital inputs), 8 DOUTs (digital outputs) and 4 AOUTs (analog outputs).
- DSO-HIO311 which includes 8 DINs (digital inputs) and 8 DOUTs (digital outputs).

2.3 DSO-HIO connector

Caution: The inputs/outputs cable must be insulated (no contact) from the power and mains lines.
The inputs and outputs must be connected to an Extra Low Voltage circuit only (SELV).
The analog outputs are not galvanically insulated from the GND.

Caution: This connector must be handled in an ESD protected environment, only.

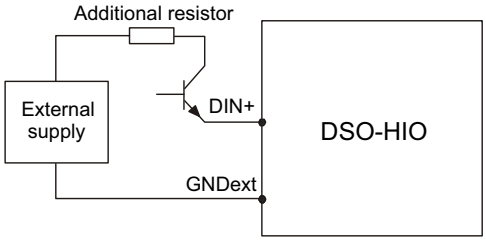
Remark: The inputs/outputs cable connected to the DSO-HIO must be shielded (refer to §2.4).

2.3.1 Digital inputs

There are 8 opto-coupled digital inputs on the DSO-HIO. The M55 monitoring of the corresponding position controller allows the user to monitor the state of the 8 digital inputs (refer to the corresponding **'Operation and Software Manual'** for more information about the monitorings).

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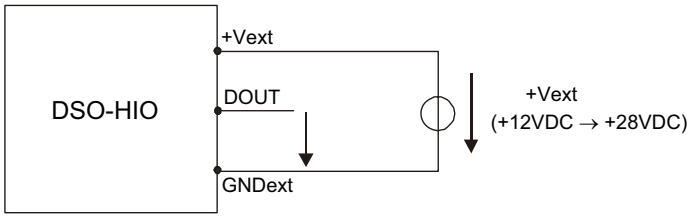
The digital inputs switch to '1' when a voltage ranging between +12VDC and +28VDC is applied between pins DIN+ of the corresponding input and GNDext.
The digital inputs switch to '0' when a zero voltage is applied between pins DIN+ of the corresponding input and GNDext.



2.3.2 Digital outputs

There are 8 opto-coupled digital outputs on the DSO-HIO. A fuse (F1) protects the digital outputs circuit. All the digital outputs together can deliver maximum 500mA. The K172 parameter of the corresponding position controller allows the user to change the state of the 8 digital outputs (refer to the corresponding **'Operation and Software Manual'** for more information about the parameters).

To use a digital output, a voltage should previously be supplied to the external auxiliary supply (+Vext). This voltage should range between +12VDC and +28VDC.



2.3.3 Analog inputs

There are 4 differential analog inputs on the DSO-HIO. To use the analog input, a voltage ranging from +10VDC to -10VDC must be applied between the corresponding AIN+ and AIN-. M56, M57, M58 and M59 monitorings of the corresponding position controller allows the user to monitor the state of AIN1, AIN2, AIN3 and AIN4 respectively (refer to the corresponding **'Operation and Software Manual'** for more information about the monitorings).

+10VDC ⇔ -8192 increments
–10VDC ⇔ +8191 increments

Remark: The analog inputs are available only on the DSO-HIO111 model.

2.3.4 Analog outputs

There are 4 differential analog outputs on the DSO-HIO. The maximum amplitude of the output signal between AOUT+ and AOUT- is ±20VDC (±10VDC between AOUT and GND). Each analog output can sink or source maximum 4mA.

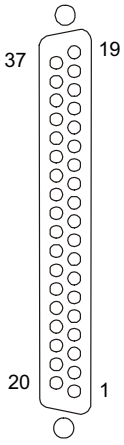
-8192 ⇔ +20VDC between AOUT+ and AOUT-
+8191 ⇔ -20VDC between AOUT+ and AOUT-
-8192 ⇔ +10VDC between AOUT+ and GND
+8191 ⇔ -10VDC between AOUT+ and GND
+8191 ⇔ +10VDC between AOUT- and GND
-8192 ⇔ -10VDC between AOUT- and GND

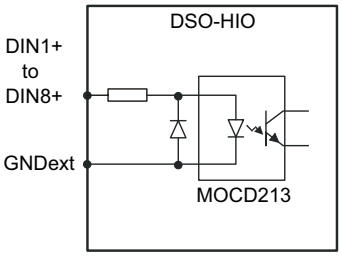
The four depths of the parameter K173 of the position controller allows the user to change the value of the 4 analog outputs. K150, K151, K154 to K158 parameters allow the user to select the source monitoring and to modify the outputs signals (refer to the corresponding **'Operation and Software Manual'** for more information).

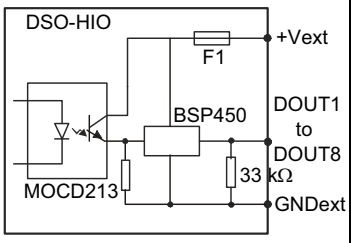
Remark: The analog outputs are available only on the DSO-HIO111 and DSO-HIO211 models.

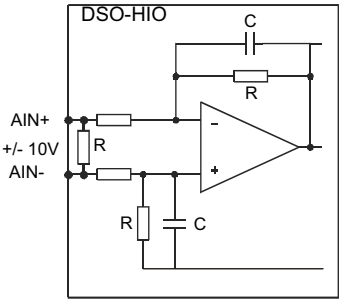
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2.3.5 Pin assignment

D-SUB, 37 pins, female				
HIO CONNECTOR	Pin #	Signal	Function	Interface
	1	GNDext	External supply input (0V) for the digital outputs	
	2	GND	Position controller internal supply output (0V)	
	3	AIN1-	Differential analog input 1 -	
	4	AIN2-	Differential analog input 2 -	
	5	AIN3-	Differential analog input 3 -	
	6	AIN4-	Differential analog input 4 -	
	7	AOUT1-	Differential analog output 1 -	
	8	AOUT2-	Differential analog output 2 -	
	9	AOUT3-	Differential analog output 3 -	
	10	AOUT4-	Differential analog output 4 -	
	11	DOUT1	Digital output 1	
	12	DOUT2	Digital output 2	
	13	DOUT3	Digital output 3	
	14	DOUT4	Digital output 4	
	15	DOUT5	Digital output 5	
	16	DOUT6	Digital output 6	
	17	DOUT7	Digital output 7	
	18	DOUT8	Digital output 8	
	19	+Vext	External supply input for digital outputs +12VDC to +28VDC (fuse F1 of 500 mA, limits input current)	
	20	GNDext	External supply input (0V) for the digital outputs	
	21	AIN1+	Differential analog input 1 +	
	22	AIN2+	Differential analog input 2 +	
	23	AIN3+	Differential analog input 3 +	
	24	AIN4+	Differential analog input 4 +	
	25	AOUT1+	Differential analog output 1 +	
	26	AOUT2+	Differential analog output 2 +	
	27	AOUT3+	Differential analog output 3 +	
	28	AOUT4+	Differential analog output 4 +	
	29	DIN1+	Digital input 1 +	
	30	DIN2+	Digital input 2 +	
	31	DIN3+	Digital input 3 +	
	32	DIN4+	Digital input 4 +	
	33	DIN5+	Digital input 5 +	
	34	DIN6+	Digital input 6 +	
	35	DIN7+	Digital input 7 +	
	36	DIN8+	Digital input 8 +	
	37	+Vext	External supply input for digital outputs +12VDC to +28VDC (fuse F1 of 500 mA, limits input current)	







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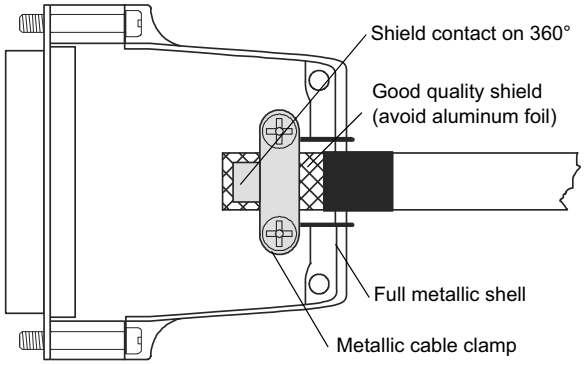
2.4 Cable shielding

The following shield recommendations must be respected to use the DSO-HIO optional board. Simple shielded cable must be linked to the connector shells on both cable ends. Only full metallic conductive shells connector must be used. Shield with only aluminum foil (metallized plastic film) is forbidden!. Use only copper braid (85% covering shield). The shield must entirely cover all wires. 'Pig tails' connections are forbidden! The shield contact on 360° and a metallic cable clamp is necessary.

Remark: All the cables connected to the position controller must have copper conductors only and an insulation standing at least 75°C.

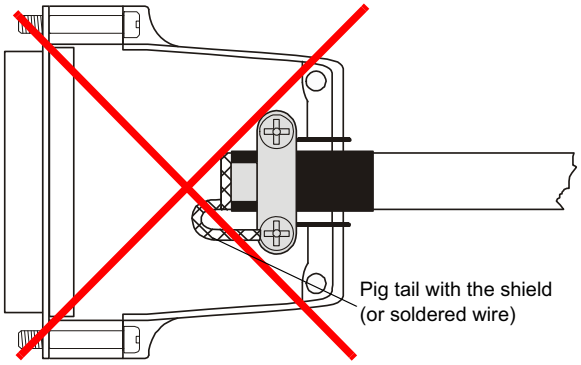
Here is an example of good shielding connection:

Good shielding connection

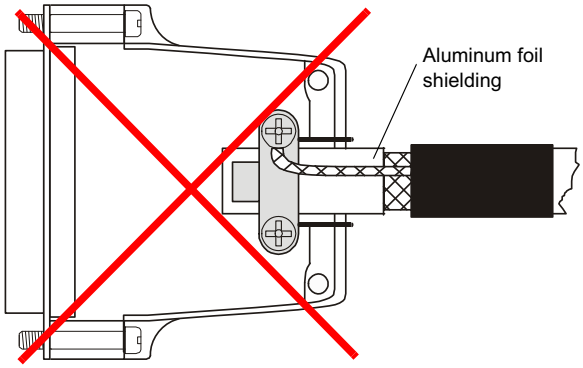


Here are two examples of bad shielding connections:

Bad shielding connection



Bad shielding connection



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3. General instruction for installation

3.1 Board installation in a rack module

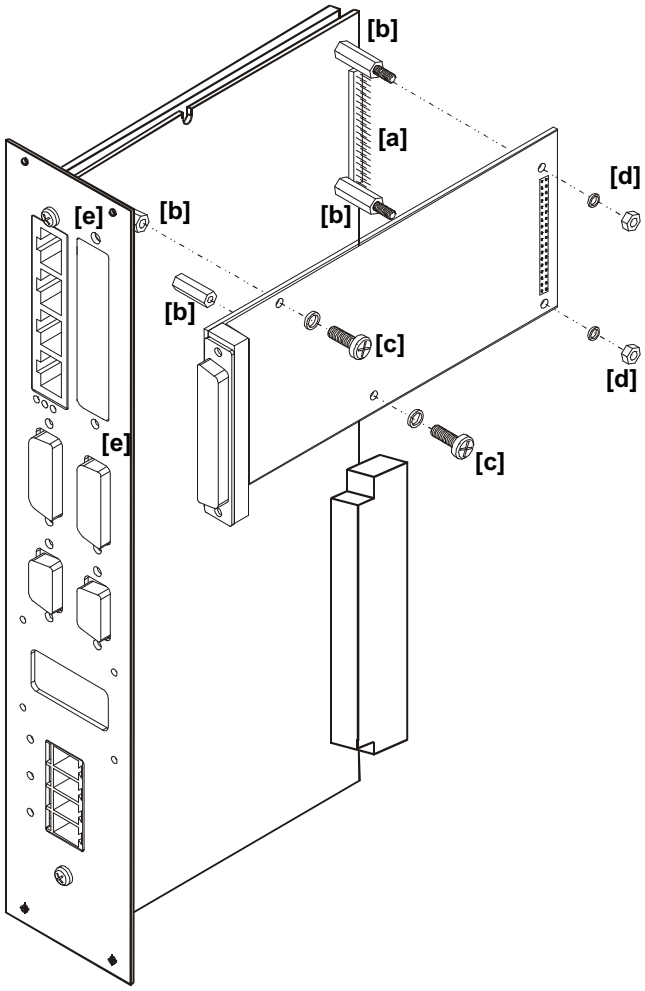
To install the board in a rack module, the user must follow the following steps:



- Work in an ESD protected environment, ground connected yourself.
- Turn off all the power supplies (main and auxiliary) and wait 10 minutes to allow the internal DC bus capacitors to discharge.
- Unplug all the cables connected to the position controller.
- Unscrew the four front panel flat head screws on the position controller.
- Slide carefully the position controller out of the rack case.



- Set out the opened position controller module in an ESD protected environment.
- Plug the DSO-HIO board on the position controller extension port [a].
- Fix the DSO-HIO board on the 4 long spacers [b] with the 2 M3 nuts [c], 2 M3 screws [d] and 4 rings.
- Fix the DSO-HIO to the front plate, with the two NC4-40 short spacers [e].



Remark: Follow the above-mentioned disassembling steps in the reverse order to put the position controller back into the rack case.

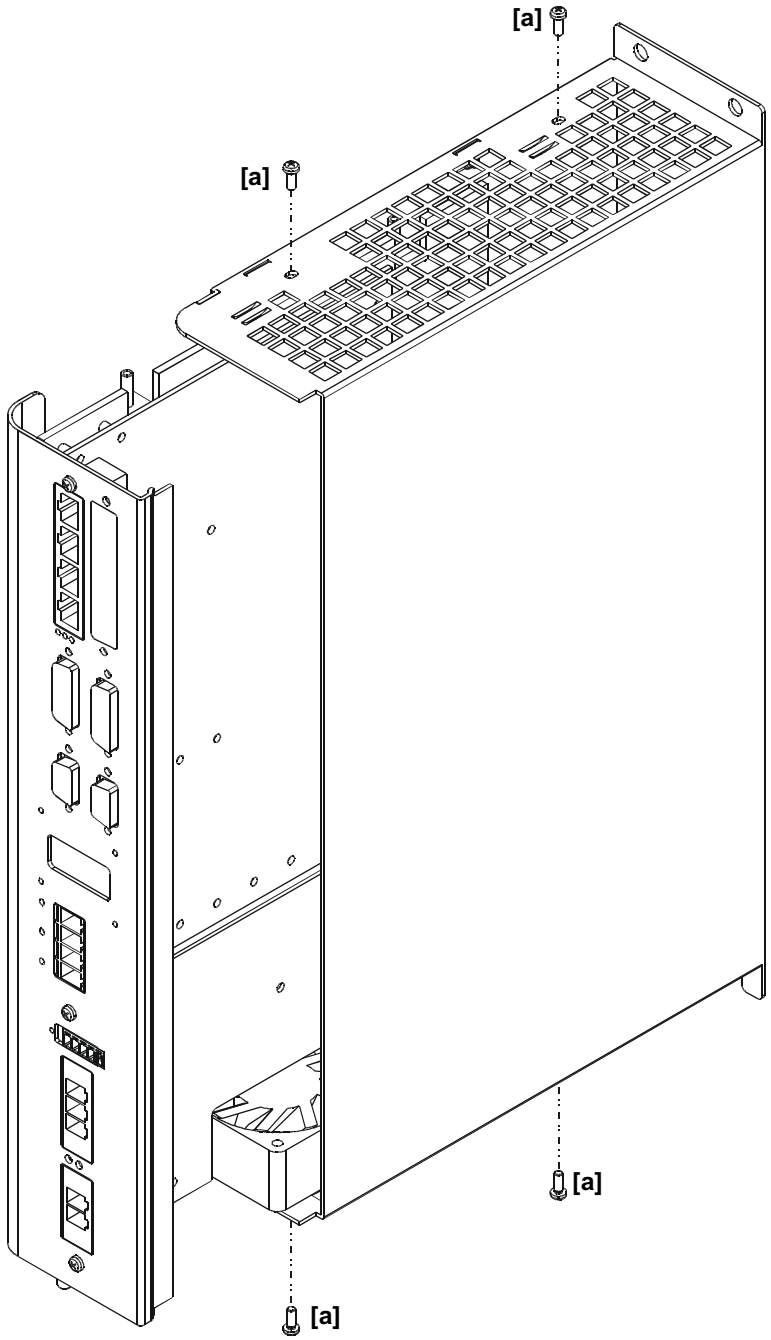
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3.2 Board installation in a housed module

To install the board in a housed module, the user must follow the following steps:

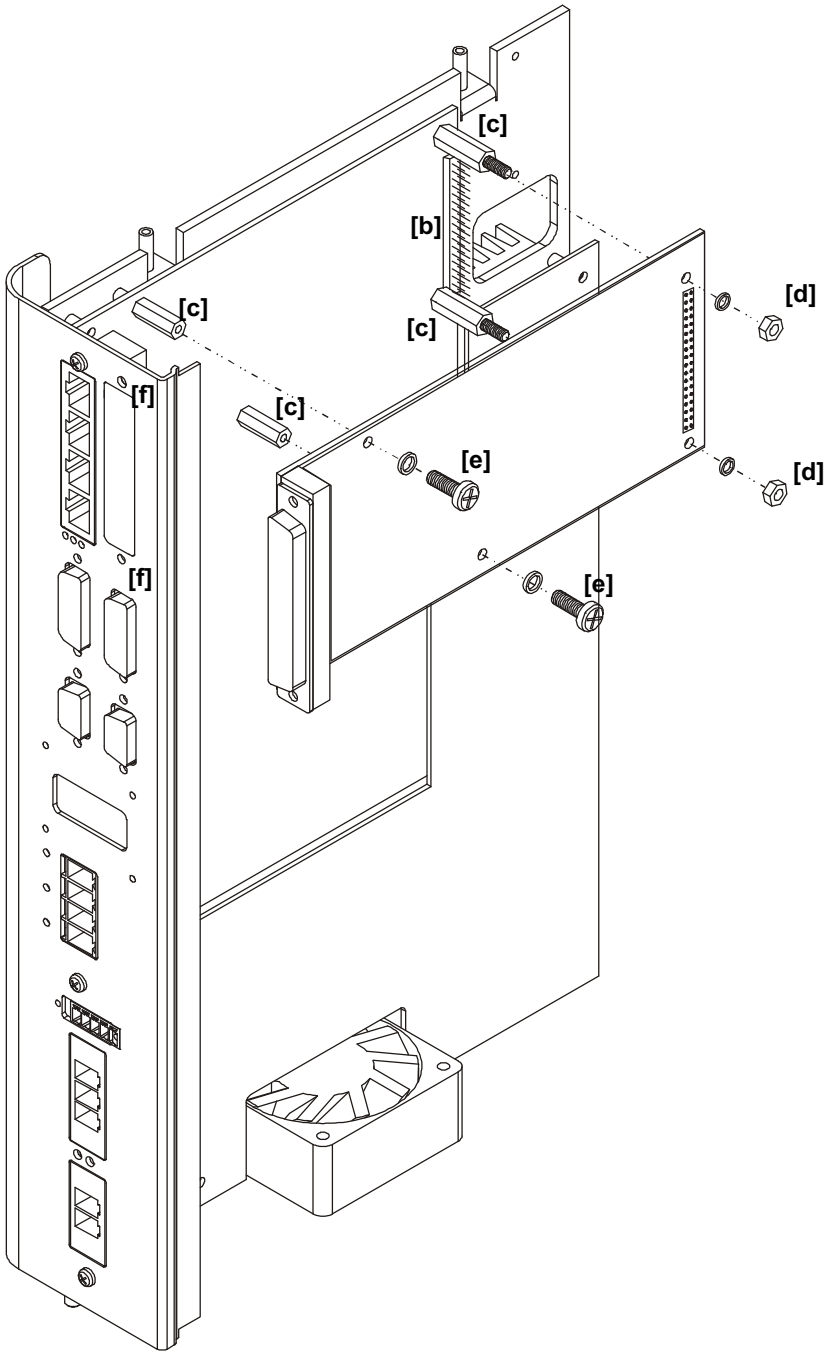


- Work in an ESD protected environment, ground connected yourself.
- Turn off all the power supplies (main and auxiliary) and wait 10 minutes to allow the internal DC bus capacitors to discharge.
- Unplug all the cables connected to the position controller.
- Unscrew the four flat head screws [a] on the position controller (2 on the top and 2 under).
- Slide carefully the position controller out of the position controller's case.



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- Set out the opened position controller module in an ESD protected environment.
- Plug the DSO-HIO board on the position controller extension port [b] (be careful not to bend the pins).
- Fix the DSO-HIO board on the 4 long spacers [c] with the 2 M3 nuts [d], 2 M3 screws [e] and 4 rings.
- Fix the DSO-HIO to the front plate, with the two NC4-40 short spacers [f].



Remark: Follow the above-mentioned disassembling steps in the reverse order to put the position controller back into its case.

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