



Emotron Encoder board 2.0

Option

For Emotron VFX/FDU 2.0 AC drive
Emotron VFXR/FDUL



Instruction manual
English

Encoder board 2.0

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Instruction Manual - English

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Safety

Instruction manual

Read this instruction manual first!

This option is a supplementary part of the “main product” and the user must be acquainted with the original instruction manual of the main product. All safety instructions, warnings, etc. as mentioned in this instruction manual must be known to the user.

Safety instructions

Read the safety instructions in the instruction manual for the main product.

Installation

Installation, commissioning, dismantling, making measurements, etc. on the main product may only be carried out by personnel who are technically qualified for the task. Installation must also be carried out in accordance with the local standards. Ensure that all necessary safety measures are taken.



WARNING!

Take all necessary safety precautions during installation and commissioning to prevent personal injuries, e.g. by an uncontrolled load.

Opening the main product



WARNING!

Always switch off the mains supply before opening the main product.
For AC drives, wait at least 7 minutes to allow the buffer capacitors to discharge.

Always take adequate precautions before opening the main product, even though the connections for the control signals and jumpers are isolated from the mains voltage.

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1. Introduction

This board is used to connect an incremental encoder for motor speed feedback to the main product. The terminal X1/X2 on the encoder board is used for the connection of the power supply and encoder inputs. The encoder board is designed to be used with differential signals, but it may also be used with non-differential signals even though this is not recommended in general. The encoder function is activated in menu [22B].

2. Connections and functions

2.1 Board layout

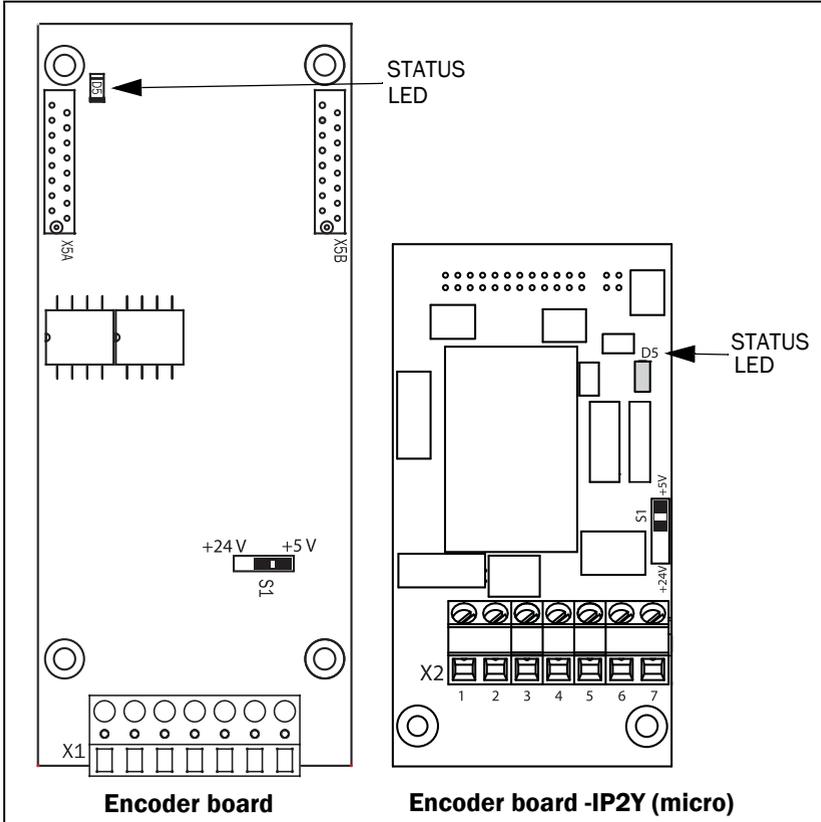


Fig. 1 Encoder option board layout

2.2 General information

2.2.1 Menus

The following menus are available when the Encoder option board is mounted in the main product.

All menus are described in the manual for the main product.

Table 1 Menus available with the Encoder option board installed

Menu	Function	Default	Range/Selection
22B	Encoder	Off	On = Encoder enabled Off = Encoder disabled
22C	Enc Pulse	1024	5-16384 pulse/rev
22D	Enc Speed		Measured motor speed
22F	Enc Puls Ctr		Counting encoder pulses

2.2.2 Status LED

Table 2 Specification of status LED

LED	Specification
D5	Flashing slow (1 Hz) = OK On = communication error Off = no power supply

2.2.3 Cable recommendations and shielding

Shielded twisted pair cables are recommended. Connect the cable shield firmly (low ohmic connection) to the earthing plate/screw (PE) according to picture below.

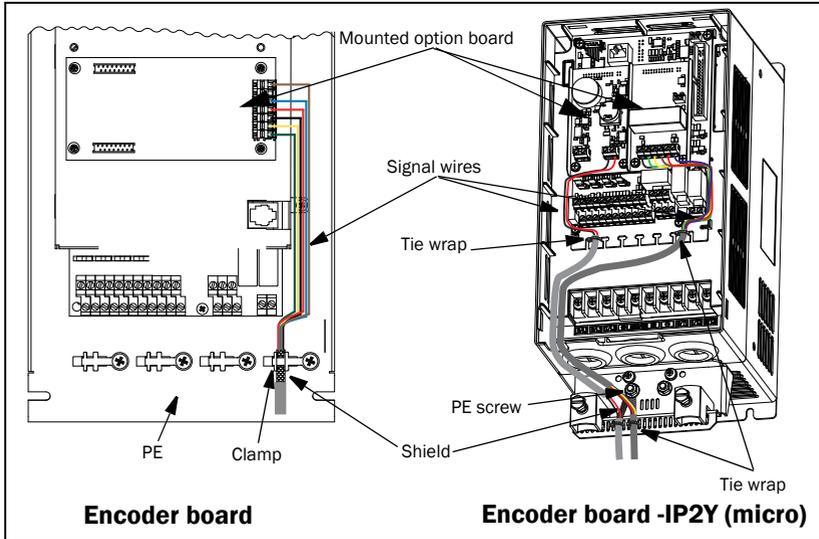


Fig. 2 General shielding principle.

The shield must end at the earthing plate/screw (PE) and be secured with the clamp/screw. Only the signal wires should continue to the terminals of the option board.

On AC drives type IP-2Y, secure the cables with tie wraps according to Fig. 2. On other AC drives, the cable is secured by the cable clamp which also serves as shield connection.

In most cases it is recommended that both ends of the shield are connected to PE. This will give a good attenuation of high frequency interference. Shield connection should be made with the largest possible area.

Make sure that you select a cable of material appropriate for your environment. Consider ambient temperature, humidity and occurrence of chemical substances such as oil. Standard copper wire with crossing area of approximately $0.14 - 1.5 \text{ mm}^2$ will be sufficient in most cases.

2.2.4 Isolation

The encoder circuit on this option board is separated from the control board SELV circuit with functional insulation only. It is therefore important that the encoder and encoder connections are separated from live parts with double or reinforced insulation for the relevant voltage.



WARNING:!

It is mandatory to use an external encoder with double or reinforced insulation towards live parts.

2.3 Encoder interface



WARNING!

Before connecting the Encoder to the Encoder option board, check the voltage rating of the encoder and make sure that the S1 switch on the Encoder option board is set to the correct position.

Terminal X1/X2 has the following terminal configuration starting from the left:

Table 3 Encoder interface, terminal X1/X2

X1/X2	Name	Function	Remarks
1	Gnd	Signal ground	
2	A	Signal A	See the specification Table 5.
3	A'	Signal A' (inverted)	
4	B	Signal B	
5	B'	Signal B' (inverted)	
6	$\frac{1}{2} V_{\text{sup}}$	Half power supply voltage	Used for non-differential encoder inputs
7	V_{sup}	Supply voltage to encoder; +24 VDC or +5 VDC.	Correct supply voltage must be set with S1 on the option board

NOTE: When the encoder is powered by an external supply (i.e. not by the Encoder option board itself) a +5V or +24V voltage source should be used.

NOTE: Only incremental encoder types can be used.

NOTE: This Encoder option board can handle both TTL and HTL type of incremental encoders by selecting the corresponding supply voltage with switch S1.

2.3.1 Using differential signals

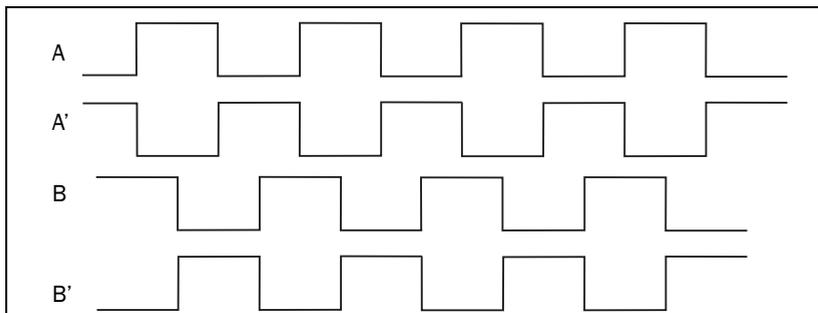


Fig. 3 Example of two differential channels which are 90 degrees out of phase.

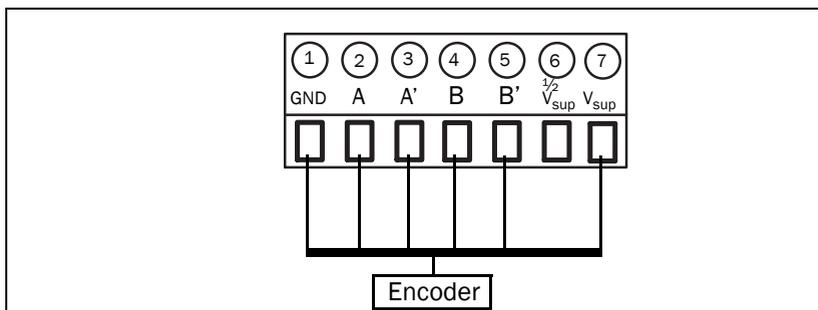


Fig. 4 Connection on terminal.

2.3.2 Using non-differential signals

In this case the two inverted input terminals A' and B' should be connected to half of the power supply (Terminal 6).

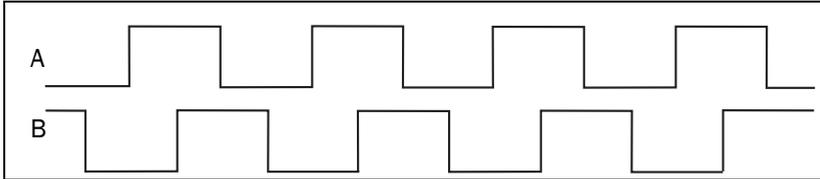


Fig. 5 Example of two non-differential channels which are 90 degrees out of phase.

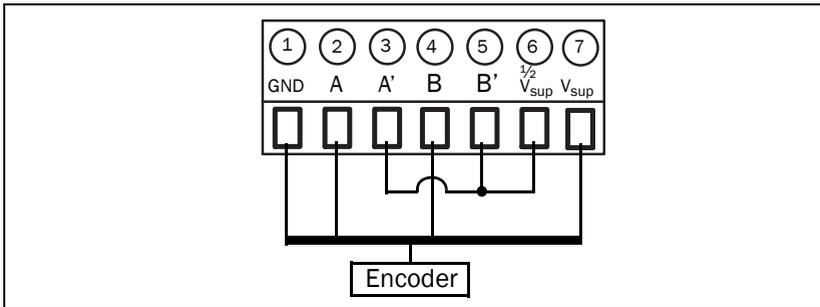


Fig. 6 Connection on terminal

2.3.3 Electrical specification encoder power output interface

Table 4 Setting of switch S1

Position	Description
+24	Power supply on terminal 7 is +24 VDC
+5	Power supply on terminal 7 is +5 VDC

Table 5

Allowed voltage amplitude input	+5 - 24 VDC
Input impedance	min 9 k Ω
Supply to encoder	+5/24 VDC - 100 mA max selected by switch S1
Pulse range (adjustable in inverter)	5 - 16384 pulse/rev
Max input frequency	100 kHz
Differential input sensitivity	\pm 200 mV

3. Installation

3.1 Installation in type IP54, IP20/21 and IP23



This chapter describes how to mount option boards in the AC drive.

On these AC drives up to three different option boards and one communication board can be mounted.

The option kit includes

- option board.
- Four screws, M3 x 6.
- One 16-pole flat cable, approx. 75 mm long. This cable is used to connect the first option board.

One 16-pole flat cable approx. 32 mm long, for connection between two option boards.

- Insulating sheet.

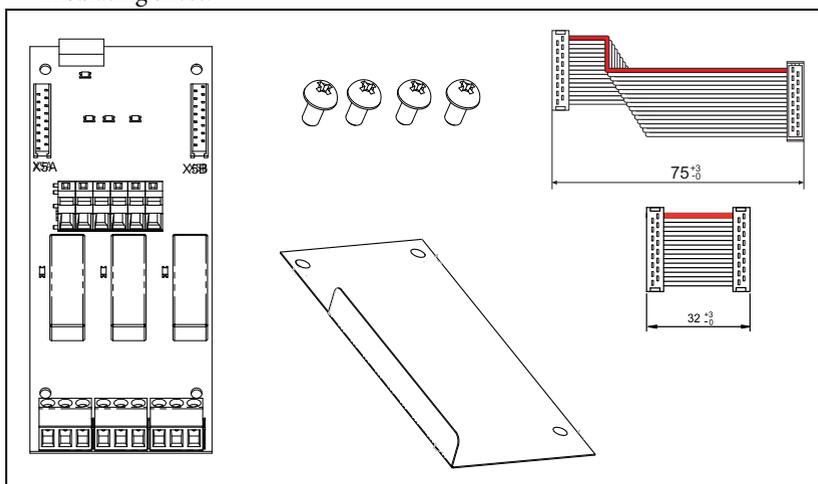


Fig. 7 Option kit contents

3.1.1 Polarisation of flat cables

The flat cable is marked with a colour on one side and has a pin on the micromatch male contact. This side must be matched to the female micromatch contact on the control board and option board respectively, where a small hole in the board is located.

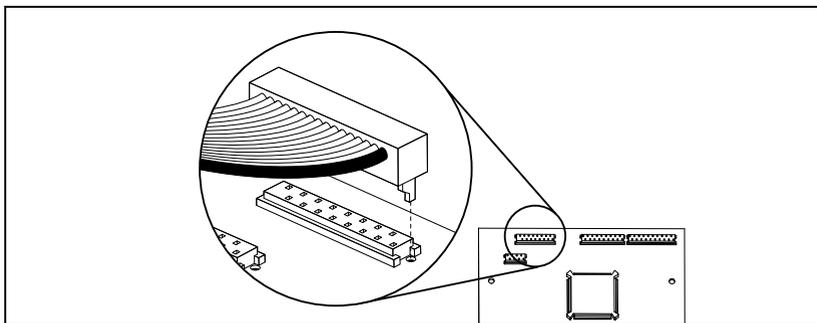


Fig. 8 Polarisation of flat cables.



CAUTION!

Incorrect connection might cause damage to both the option and to the control board/external equipment.

3.1.2 Mechanical mounting

Make sure that the AC drive has been switched off for at least seven minutes to ensure that the capacitor bank is discharged before continuing with installation! Also make sure that no external equipment connected to the drive's interface is powered on.

NOTE: Correct installation is essential for fulfilling the EMC requirements and for proper operation of the module.

3.1.2.1 Mounting the first option board

The first option board is always mounted on the slot marked 1 on the mounting plate. In this example we assume that no other option board is installed.

1. Connect the 16-pole flat cable (75 mm) to the X5 connector on the control board with the cable downwards as in Fig. 9

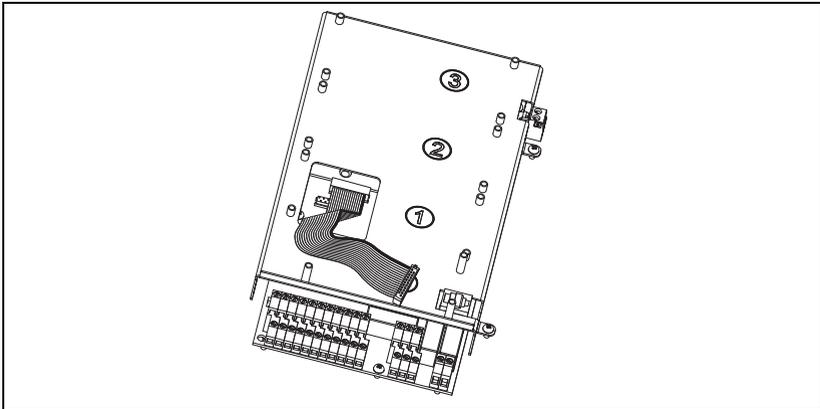


Fig. 9 Flat cable connected to the control board.

NOTE: For polarisation of the flat cable, see section 3.1.1 on page 17.

2. Place the insulating sheet over the short spacers on the slot marked 1 on the mounting plate. Make sure the flap bent upwards is mounted towards the control board interface as in the figure below.

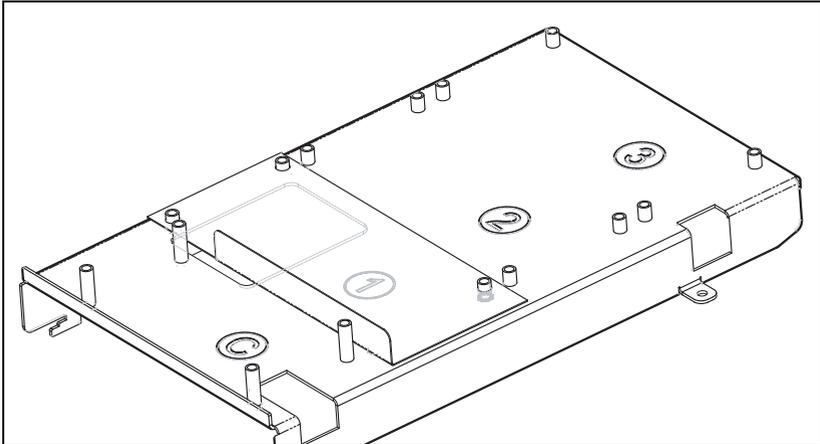


Fig. 10 Mounted insulating sheet

3. Connect the other end of the 16-pole flat cable to the X5A connector on the option board. Make sure that the polarisation is correct as in section 3.1.1 on page 17.

NOTE: Connect the micro match male contact to the option in the same manner as on the control board, i.e. the pin on the micro match contact must be fitted into the hole in the PCB.

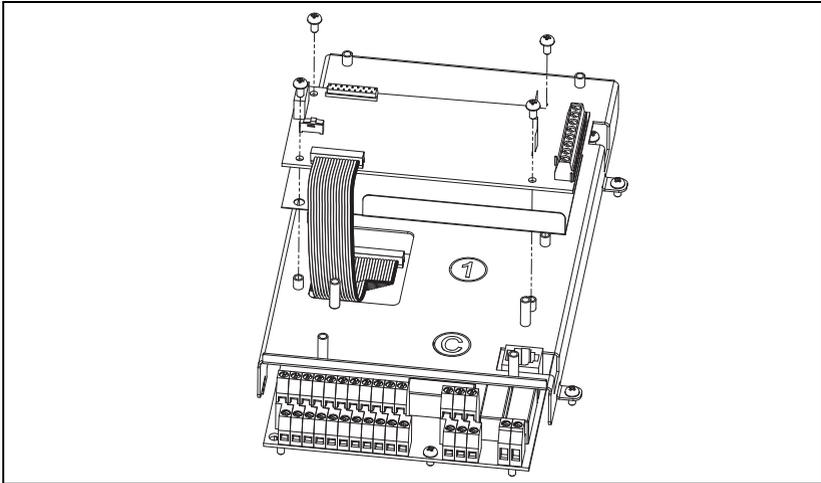


Fig. 11 Flat cable connected to the option board

4. Put the option board on the spacers.
5. Fasten the board using the four screws.

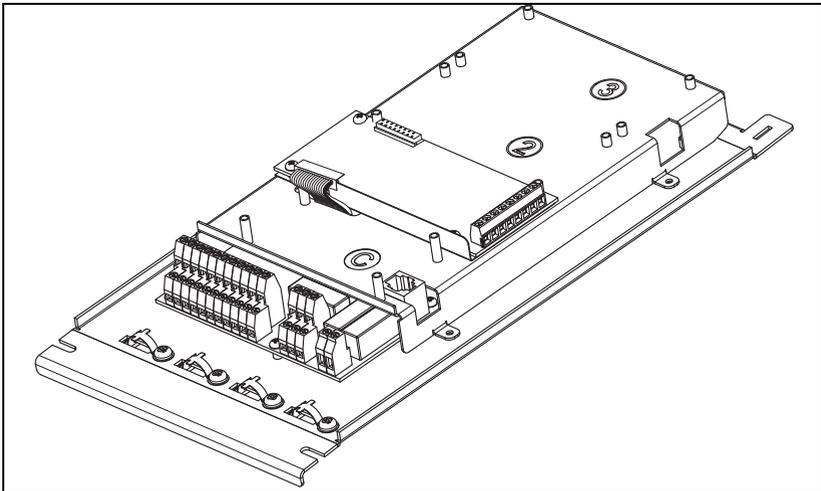


Fig. 12 Mounted option board

3.1.3 Mounting another option board

1. Place the insulating sheet on the spacers on the option board slot marked 2 or 3. It is necessary to select the slot closest to the already mounted option board.

NOTE: Place the insulating sheet with the turned up flap facing the interface of the control board to achieve proper insulation between the option boards.

2. Put the option board on the spacers.
3. Fasten the option board on the spacers using the four screws.
4. Connect the short flat cable between the X5B connector on the first option board and the X5A connector on the option board you have just mounted.

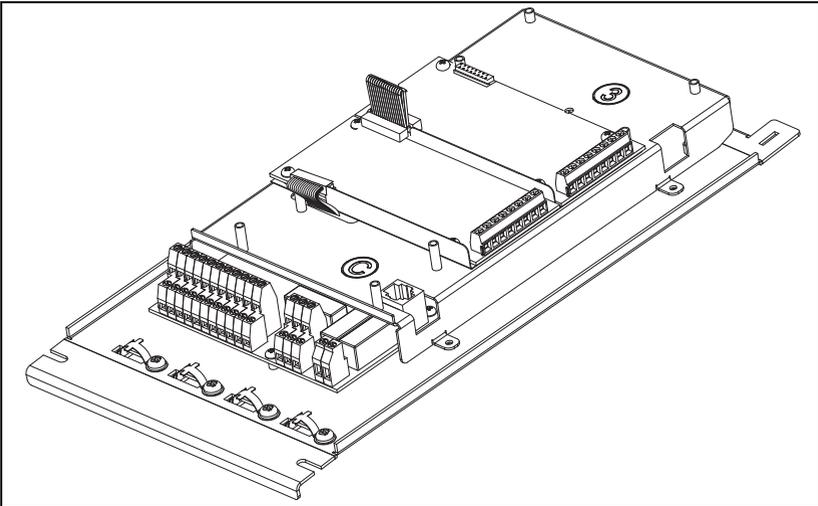


Fig. 13 Two option boards mounted on the mounting plate

3.2 Installation in type IP2Y frame sizes A3, B3 and C3



This chapter describes how to mount the option board in the AC drive.
Two different option boards and one communication board can be mounted.

Table 6 Emotron FDU/VFX-IP2Y frame size explanation

Model	Frame size
VFX/FDU48-2P5-2Y	A3
VFX/FDU48-3P4-2Y	
VFX/FDU48-4P1-2Y	
VFX/FDU48-5P6-2Y	
VFX/FDU48-7P2-2Y	
VFX/FDU48-9P5-2Y	
VFX/FDU48-012-2Y	B3
VFX/FDU48-016-2Y	
VFX/FDU48-023-2Y	C3
VFX/FDU48-032-2Y	
VFX/FDU48-038-2Y	

3.2.1 Option boards type -2Y

The option kit includes

- option board (micro).
- Two screws, M3 x 6.
- Insulating sheet.

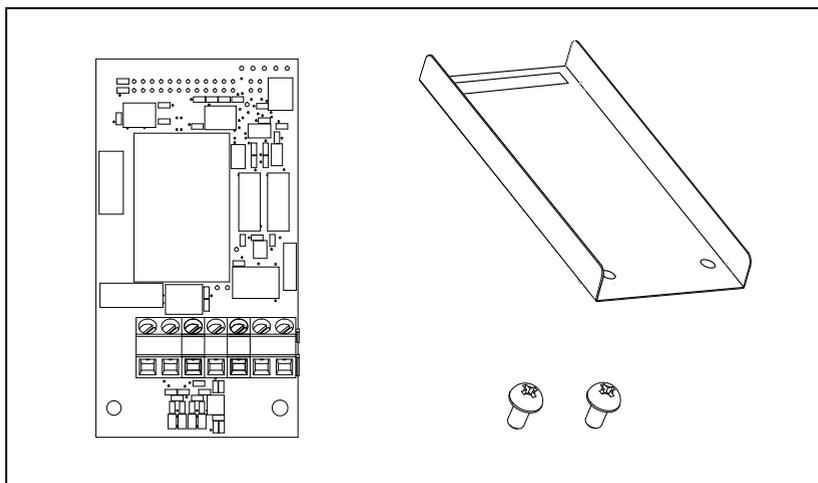


Fig. 14 The IP2Y option kit includes.



CAUTION!

Incorrect connection might cause damage to both the option and to the control board/external equipment.

3.2.2 Mounting the option board

Make sure that the AC drive has been switched off for at least ten minutes to ensure that the capacitor bank is discharged before continuing with installation! Also make sure that no external equipment connected to the drive's interface is powered on.

NOTE: Correct installation is essential for fulfilling the EMC requirements and for proper operation of the module.

It is possible to mount two option boards on the control board connectors X7A and X7B. It does not matter if you mount the option board on place X7A or X7B you are free to choose.

NOTE: The option board RS/485-2Y always needs to be mounted on connector X7B. Otherwise there is not enough room for the D-Sub connector.

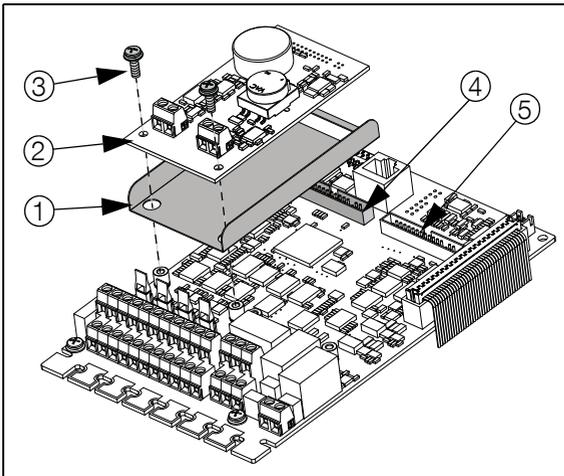


Fig. 15 How to mount the option board on connector X7A.

1. Place the insulating sheet over the short spacers and make sure the slot fits around the X7 connector on the control board. Make sure the flaps are bent upwards.

- Put the option board into position by pressing the connector on the option board into connector X7 on the control board. Make sure it rests on the spacers.
- Secure the option card with the two screws.

3.2.2.1 Mount another option board

A second option board is mounted in the same way as the first, see Fig. 16 where the second board in this case is mounted to connector X7B

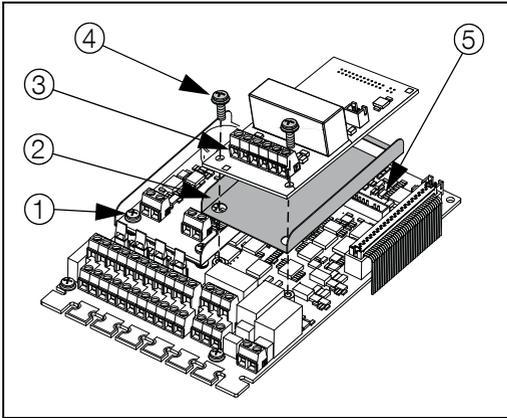


Fig. 16 Mount the second option board, in this case on to connector X7B.

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