emotron®

DEDICATED DRIVE

Encoder board 2.0 Option

Instruction Manual - English

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Safety

Instruction manual

Read this instruction manual first!

Since this option is a supplementary part of the variable speed drive, 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 are to be known to the user.

Safety instructions

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

Installation

Installation, commissioning, dismounting, 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 variable speed drive

WARNING: Always switch off the mains supply before opening the variable speed drive and wait at least 5 minutes to allow the buffer capacitors to discharge.

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

Contents

1. Introduction

This board is used to connect an incremental encoder for motor speed feedback to the main product. The terminal X1 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. Installation

This chapter describes how to mount the option mounting plate and an option board in the main product. Up to three different option boards and one communication board can be mounted.

2.1 Polarisation of flat cables

The flat cable is marked with colour on one side and has a tap 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.

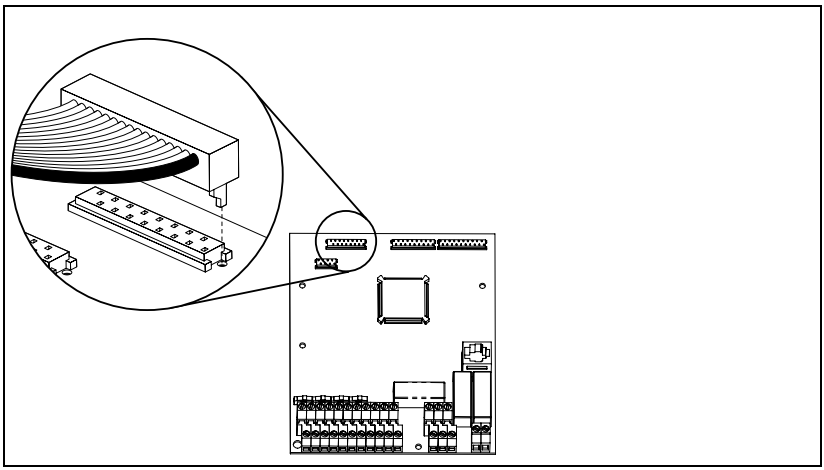

Fig. 1 Polarisation of flat cable

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

2.2 Mechanical mounting

Make sure that the main product has been switched off for at least five 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 switched on.

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

2.2.1 Option mounting plate

Delivered with the option mounting kit

The option mounting plate must be mounted before any option can be installed. The mounting plate may already be installed in the main product. In that case go directly to section 2.3 on page 8 for further mounting instructions. The option mounting kit consists of the following:

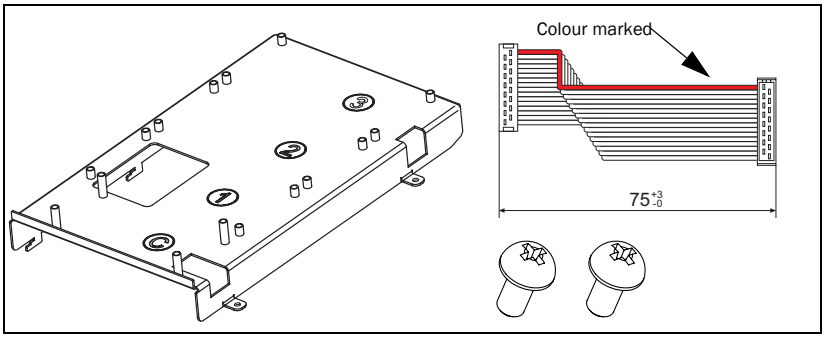

Fig. 2 Option mounting kit

- One mounting plate with the slots marked C, 1, 2 and 3. C = communication option.
- 2 screws
- One 16-pole flat cable for connection to the control board when mounting option boards on position 1.

Mounting

1. Make sure that the power supply is switched off for at least 5 minutes before opening the variable speed drive.
2. Open the door to the variable speed drive.
3. Jack the option mounting plate on to the control board mounting plate as shown in Fig. 3. It can only be turned in one direction.
4. Drag the option mounting plate towards the control board until the screw holes match. Keep the side with the screw holes tilted up slightly until the RJ45 contact fits into its hole.

NOTE: Be careful not to damage the RJ45 contact (connection for the control panel), see picture below.

5. Secure the plate with the two screws.

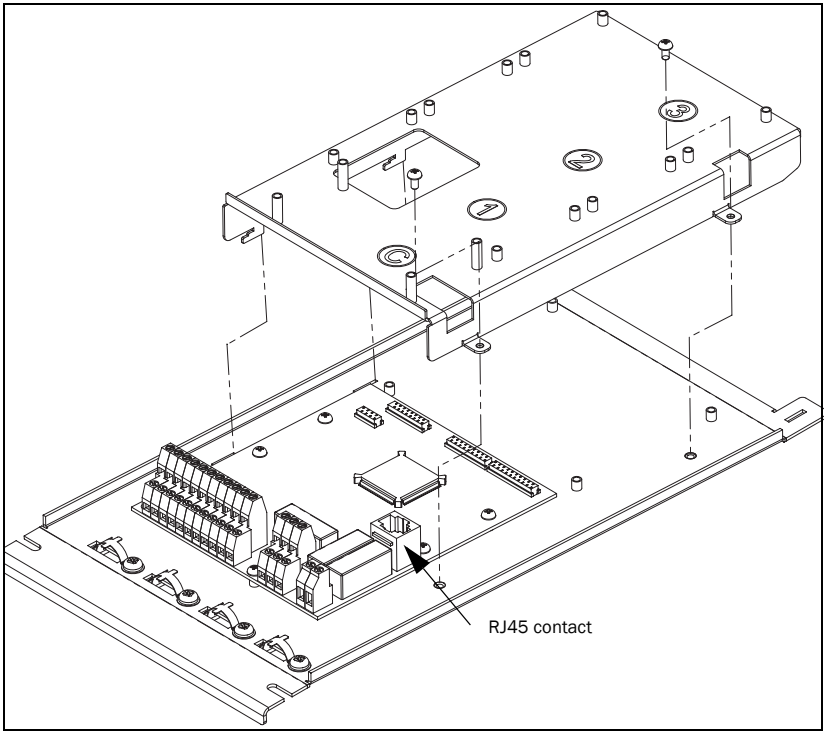

Fig. 3 Mounting the option mounting plate on the control board

2.3 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.

Delivered with the option board kit

- Option board and four screws.
- 16-pole flat cable for connection between two option boards.
- Insulating sheet.

Mounting

1. Connect the 16-pole flat cable to the X5 connector on the control board with the cable downwards as in Fig. 4.

NOTE: The polarisation of the flat cable, see section 2.1 on page 5.

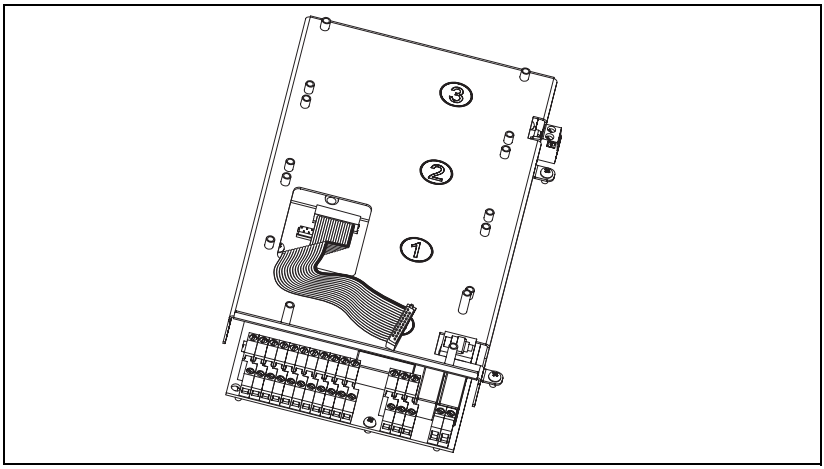

Fig. 4 Flat cable connected to the control board

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

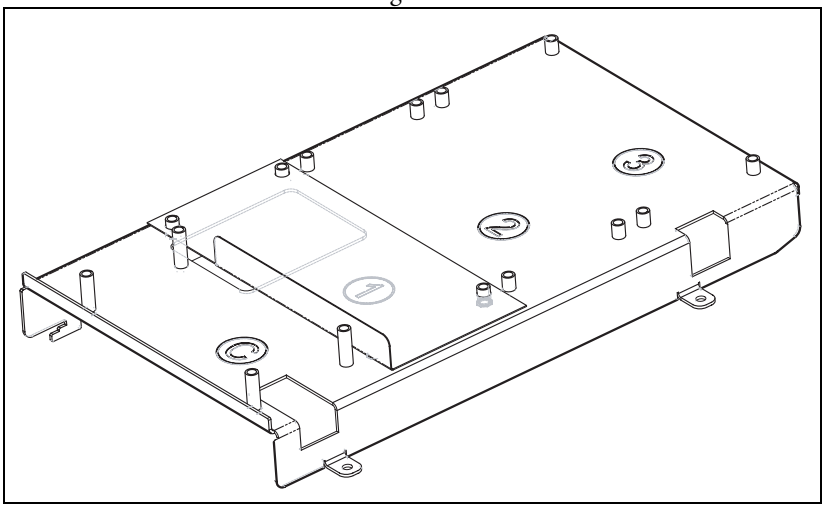

Fig. 5 Mounted insulating sheet

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 2.1 on page 5.

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

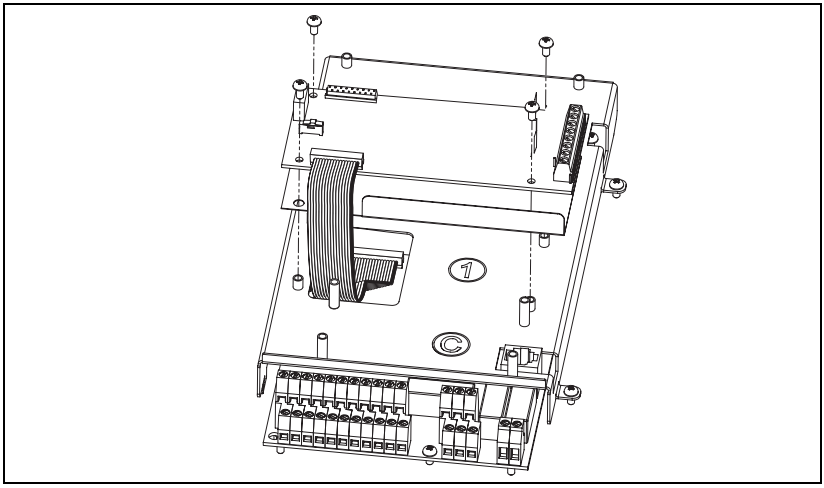

Fig. 6 Flat cable connected to the option board

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

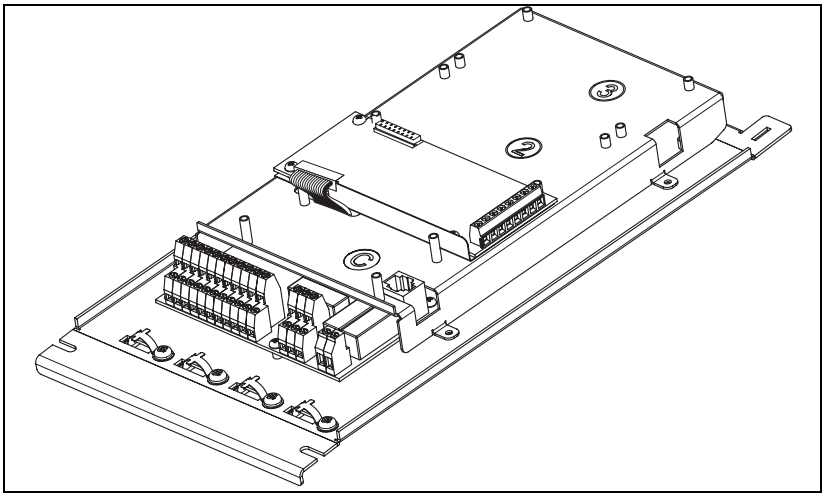

Fig. 7 Mounted option board

2.4 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 edge 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.

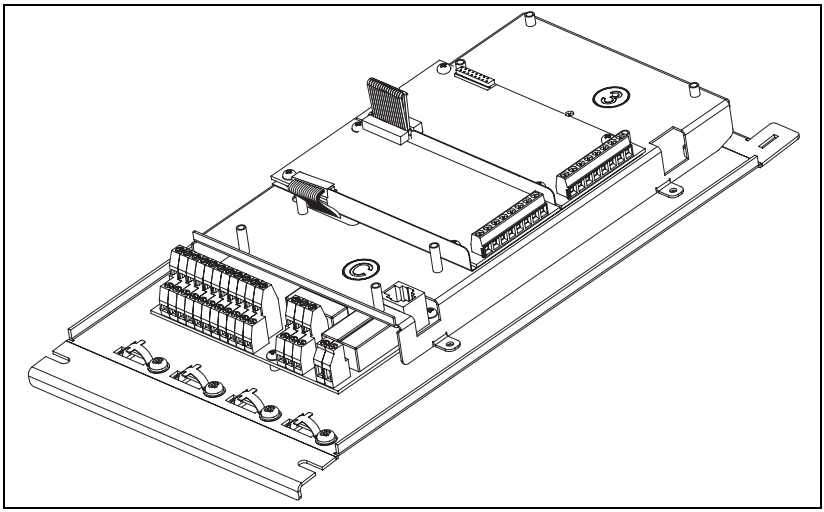

Fig. 8 Two option boards mounted on the option mounting plate

3. Connections and functions

3.1 Board layout

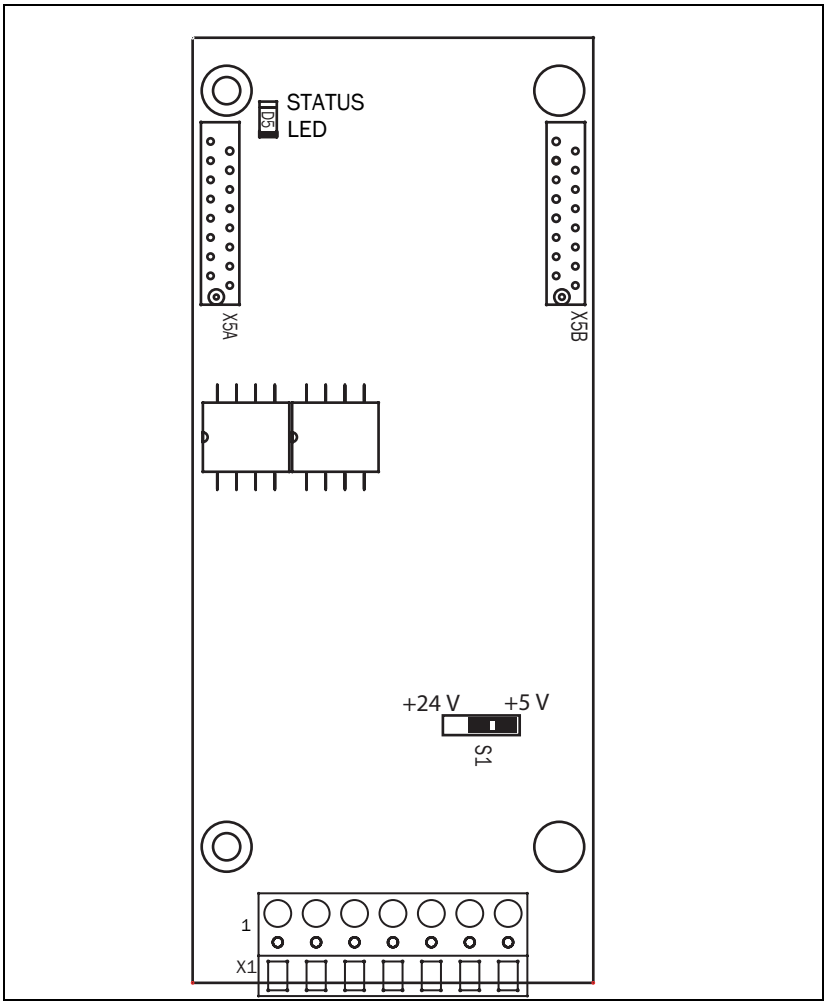

Fig. 9 Encoder option board layout

3.2 General information

3.2.1 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		Speed control value

3.2.2 Status LED

Table 2 Specification of status LED

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

3.2.3 Cable recommendations and shielding

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

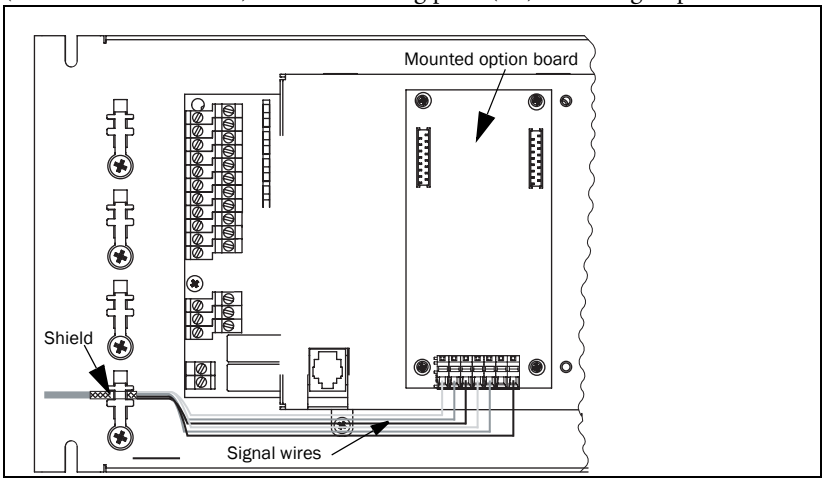

Fig. 10 General shielding

The shield must end at the clamp. Only the signal wires should continue to the terminals of the Encoder option board.

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 mm^2 will be sufficient in most cases.

3.2.4 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.

3.3 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 has the following terminal configuration starting from the left:

Table 3 Encoder interface, terminal X1

X1	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	½ V_{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.

3.3.1 Using differential signals

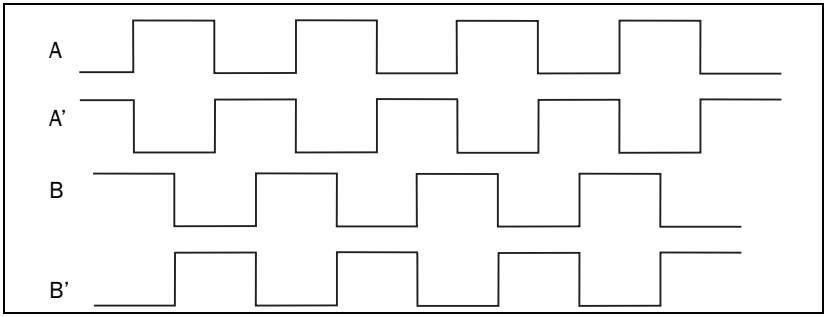

Fig. 11 Example of two differential channels which are 90 degrees out of phase.

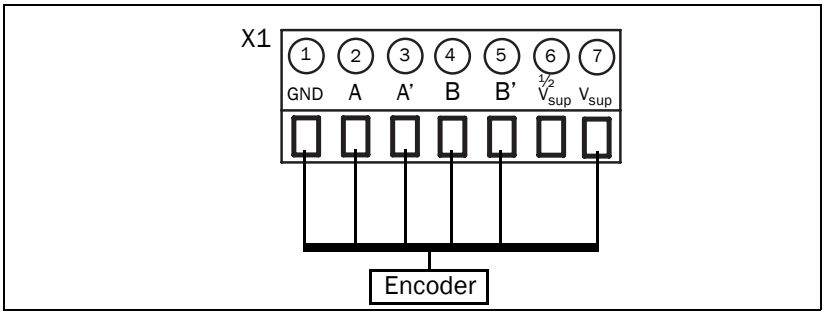

Fig. 12 Connection on terminal.

3.3.2 Using non-differential signals

In this case the two inverted input terminals A' and B' should be connected to half of the power supply (X1:6).

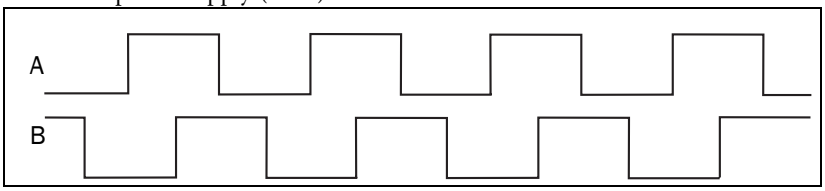

Fig. 13 Example of two non-differential channels which are 90 degrees out of phase.

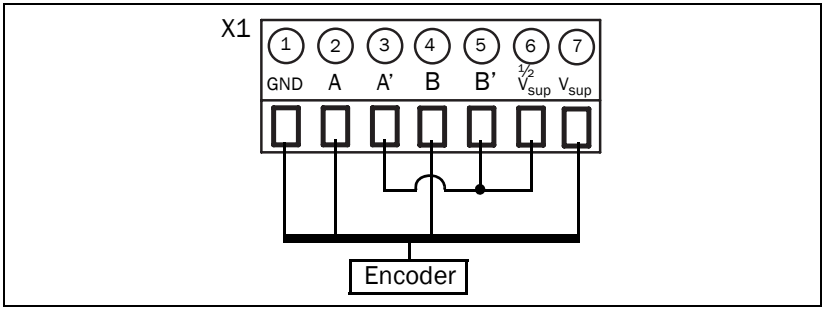

Fig. 14 Connection on terminal

3.3.3 Electrical specification encoder power output interface

Table 4 Setting of switch S1

Position	Description
+24	Power supply on terminal X1:7 is +24 VDC
+5	Power supply on terminal X1:7 is +5 VDC

Table 5

Allowed voltage amplitude input	+5 - 24 VDC
Input impedance	min 9 kΩ
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	±200 mV

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