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DEDICATED DRIVE

PTC/PT100 board 2.0 Option

Instruction Manual - English

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Document number: 01-3873-01
Edition: r1
Date of release: 2006-10-30

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 motor thermistors (PTC) acc. to DIN44081/ 44082 and/or PT100 sensors acc. to IEC 60 751 to the main product. Note that both the PTC and the PT100 sensors needs to be isolated from live voltage, see § 3.2.4, page 16 for further details.

There are three terminals on the option board, X1 - X3. X1 and X2 for PT100 input and X3 for PTC input.

Both PTC and PT100 functions can be used for thermal motor protection. When the monitored temperature e.g. motor temperature becomes too high, the VSD will trip. The PTC and PT100 thermal motor protection function is activated in menu [234].

The PT100 function can also be used as a process temperature feedback to optimise the control. This function can be activated in menu [321]. The PT100 function can also be used for monitoring measured temperatures by the analogue comparators and the programmable levels. This function can be activated in menu [611] or [614].

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.

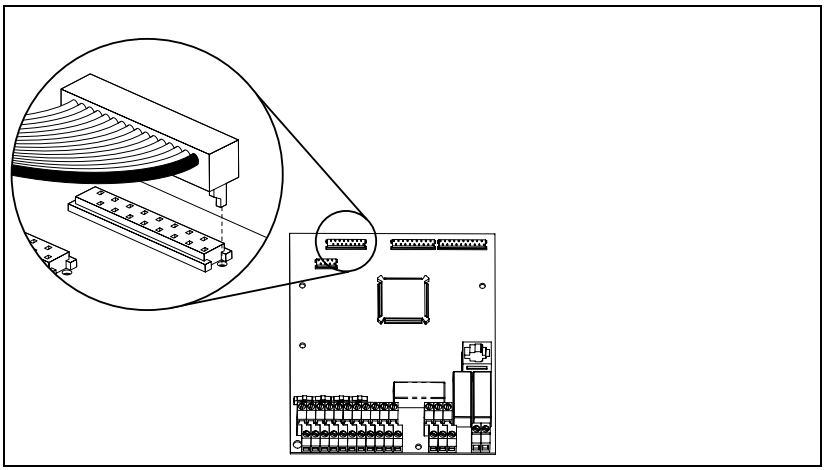

Fig. 1 Polarisation of flat cable

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:

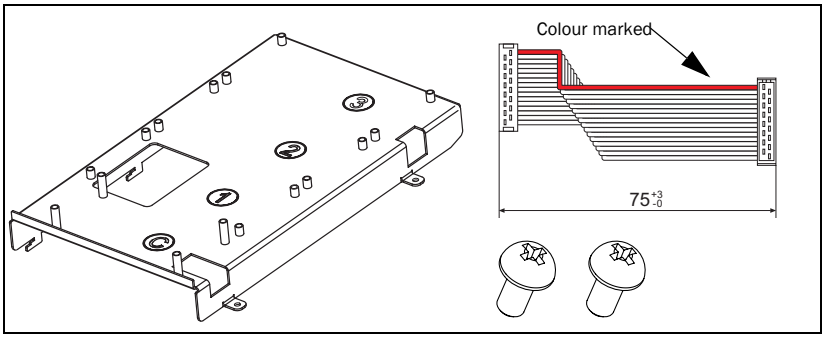

Fig. 2 Option mounting kit

- 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.

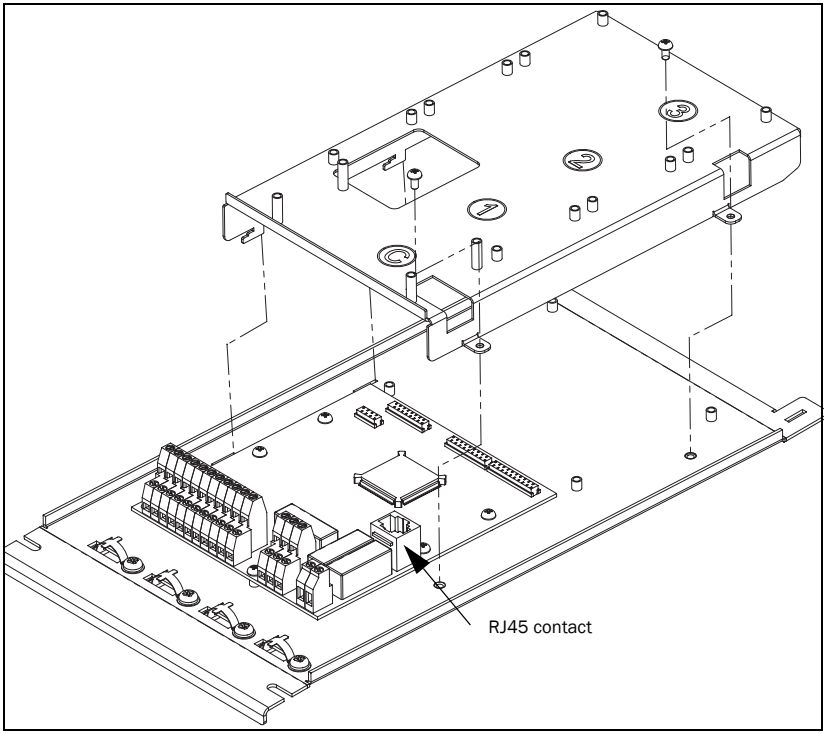

Fig. 3 Mounting the option mounting plate on the control board

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.

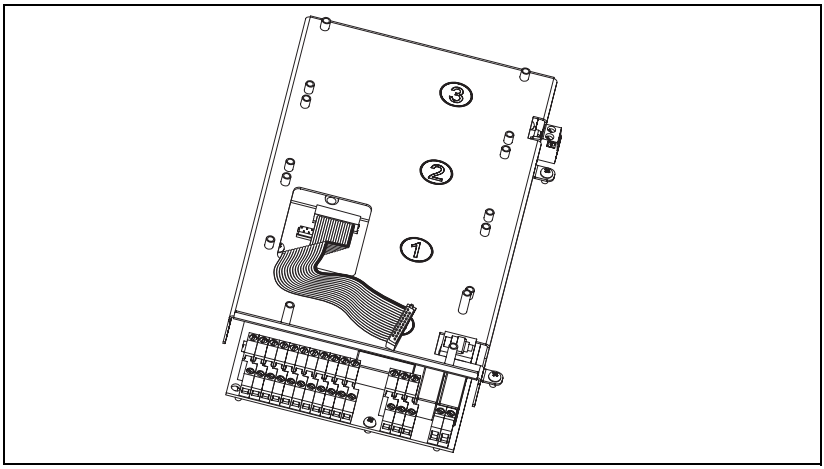

Fig. 4 Flat cable connected to the control board

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.

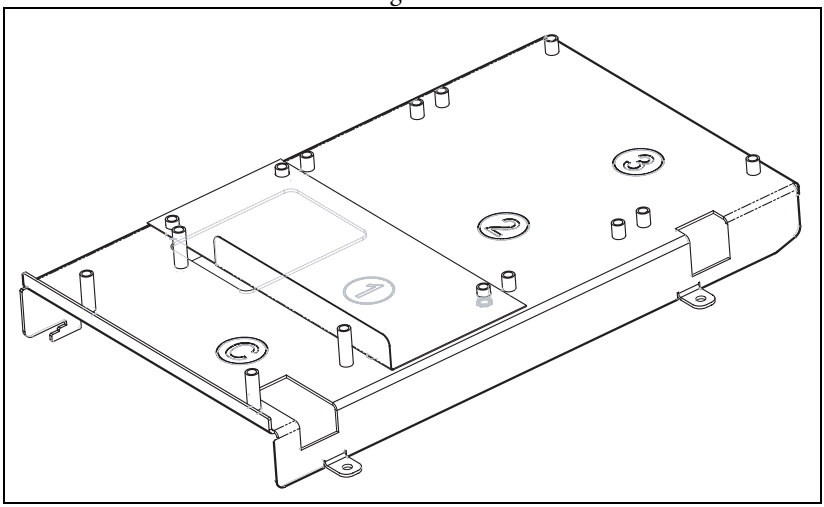

Fig. 5 Mounted insulating sheet

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.

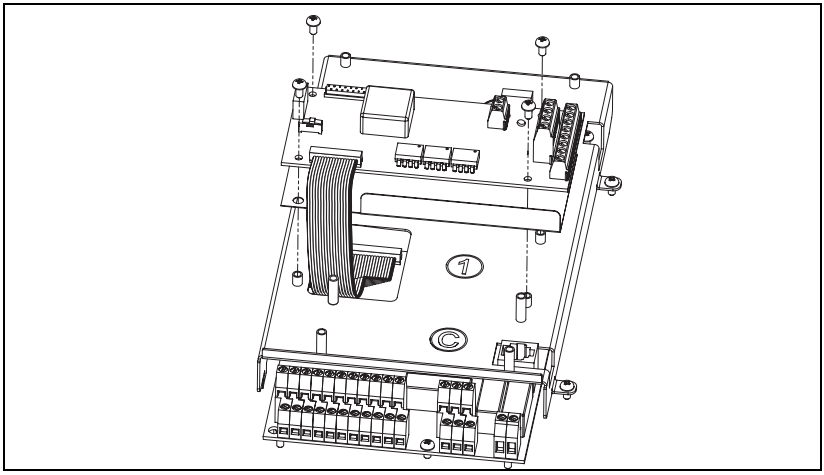

Fig. 6 Flat cable connected to the option board

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

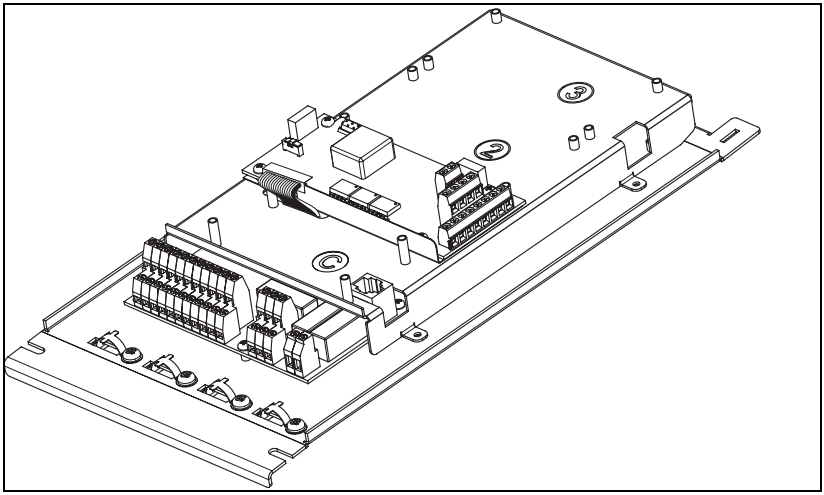

Fig. 7 Mounted option board

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.

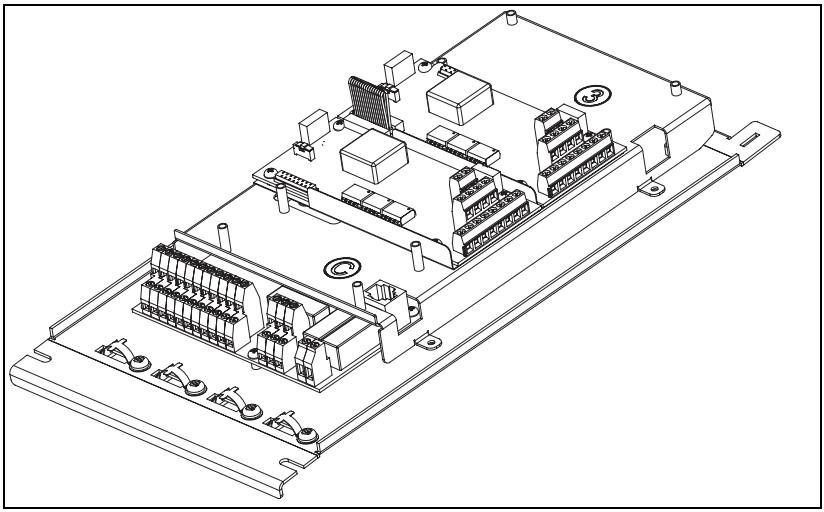

Fig. 8 Two option boards mounted on the option mounting plate

3. Connections and functions

3.1 Board layout

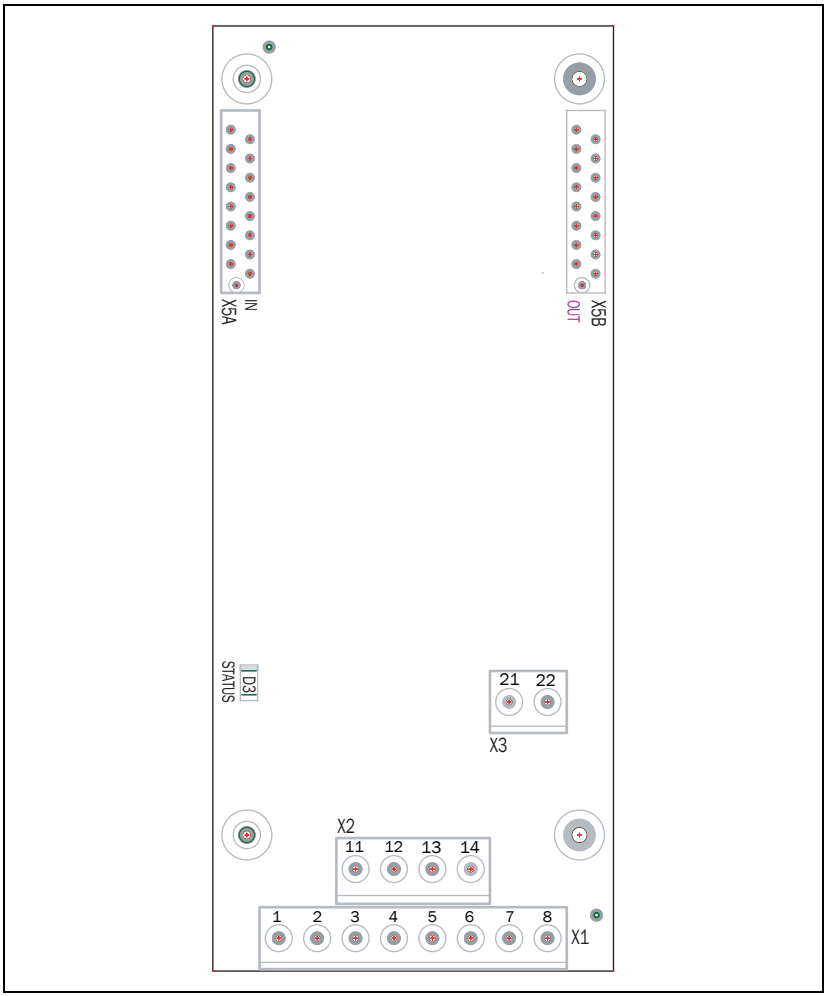

Fig. 9 PTC/PT100 option board layout

3.2 General information

3.2.1 Menus

The following menus are available when the PTC/PT100 option board is installed in the main product.

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

Table 1 Menus available with the PTC/PT100 option board

Menu	Function	Default	Range/Selection
234	Thermal protection	Off	Off = No thermal protection PTC = PTC protection enabled PT100 = PT100 protection enabled PTC+PT100 = Both protections enabled
235	Motor Class	F140	A 100°C, E 115°C, B 120°C, F 140°C, F Nema 145°C, H 165°C
71B	PT100 1,2,3	-	Shows the measured temperature with a resolution of 1 degree, for all PT100 inputs.

3.2.2 Status LED

For location of status LED, see Fig. 9.

Table 2 Specification of status LED

LED	Specification
D3	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.

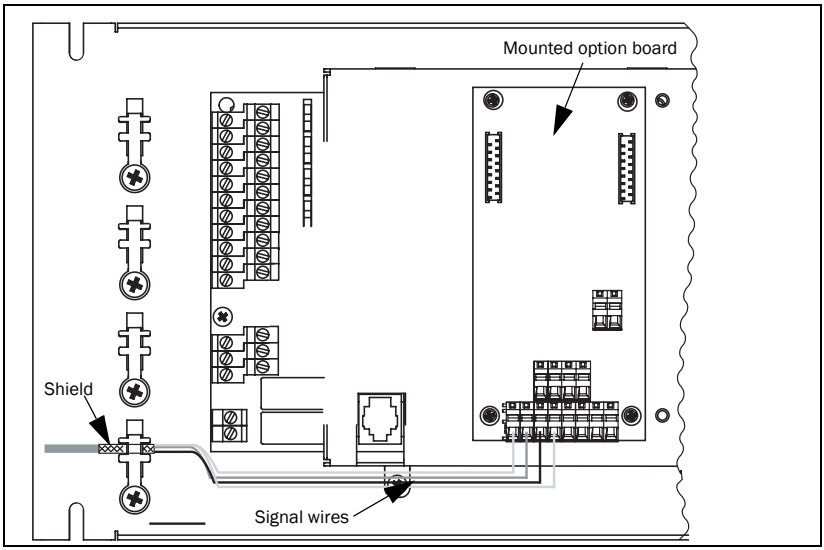

Fig. 10 General shielding

The shield must end at the clamp. Only the signal wires should continue to the terminals of the PTC/PT100 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 control board in the main product is a Separated Extra Low Voltage (SELV) circuit. This means that this board is safely separated from other circuits that carry higher voltages and is isolated from earth and protective eart conductors of other circuits. The PTC/PT100 circuit on this option board is separated from the control board SELV circuit with separation rated for:

1. Double insulation when used in drives rated up to 480 VAC.
2. Basic insulation when used in drives rated up to 690 VAC.

It is recommended that the PTC/PT100 sensors are always separated from live parts with at least basic insulation for the relevant voltage.

WARNING: For drives rated higher than 480 VAC it is mandatory to have at least basic insulation from the temperature sensor towards live voltage.

3.3 PTC input

This PTC input is for safety reasons isolated from internal supplies and electronics, see § 3.2.4, page 16 for detailed information. The PTC sensor should be connected to terminal X3. No polarisation is needed. Up to six PTC may be connected in series according to DIN44081/44082.

Table 3 Terminal configuration for PTC connection

X3	Name	Function
21	T1	PTC input
22	T2	PTC input

3.3.1 Electrical specification

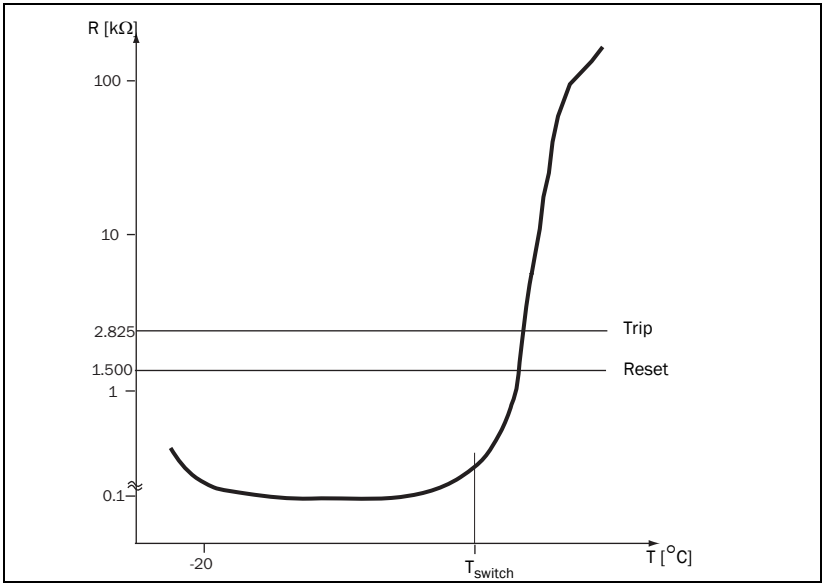

Fig. 11 Typical PTC-curve

The figure above shows a typical PTC-curve. The resistance increases drastically with the temperature after a certain switch temperature, T_{switch}, which is typically 60 - 120 °C (depending on PTC type).

Table 4 Electrical specifications for the PTC input

Number of PTCs	1 to 6 in series acc. to DIN44081/44082
Trip at	2825 Ω ±10%
Reset at	1500 Ω ±10%
Measurement voltage $U_{T1\text{-}T2}$ at $\leq T_{switch}$	<1 VDC

3.3.2 PTC connection example

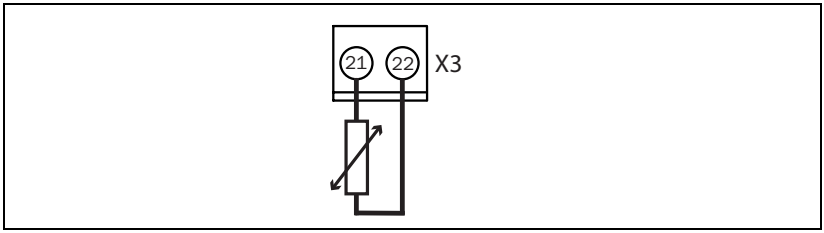

Fig. 12 Connecting PTC

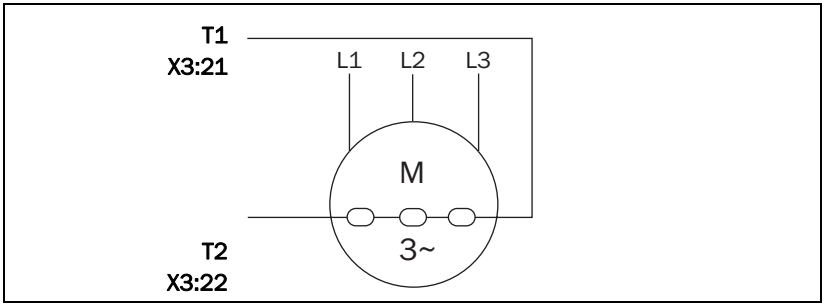

Fig. 13 Example of an application with three PTC in series.

3.4 PT100 input

The PT100 input is according to EN60751. Connector X1 and X2 on the PTC/PT100 option board have the following terminal configuration:

Table 5 Terminal configuration for PT100 input

X1	Name	Function
1	Feed_1+	Constant current feed channel 1
2	PT100_1+	Positive input for PT100 channel 1
3	PT100_1-	Negative input for PT100 channel 1
4	Feed_1-	Constant current feed channel 1
5	Feed_2+	Constant current feed channel 2
6	PT100_2+	Positive input for PT100 channel 2
7	PT100_2-	Negative input for PT100 channel 2
8	Feed_2-	Constant current feed channel 2

X2	Name	Function
11	Feed_3+	Constant current feed channel 3
12	PT100_3+	Positive input for PT100 channel 3
13	PT100_3-	Negative input for PT100 channel 3
14	Feed_3-	Constant current feed channel 3

NOTE: PT100 inputs which are are left unconnected will indicate a temperature of approximately -99 degrees.

3.4.1 Electrical specifications

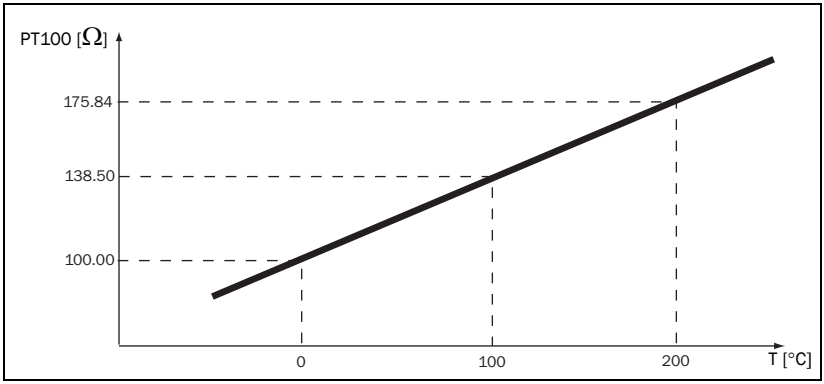

Fig. 14 Sketch of the PT100 resistance/Temperature relationship.

Table 6 Electrical specifications for PT100 input

Standard	EN60751
Temperature range	-100°C to +300°C
Accuracy	≤1% off full scale

Menu [71B] in the main product shows the by the PT100 element measured temperature, with a resolution of 1 degree, for all PT100 inputs.

3.4.2 PT100 connection example

Three PT100 channels are available for temperature measurement. All three PT 100 channels (X1, pin 1-8 and X2, pin 11-14) can be used as a 4-wire input which can be used for precision measurement to avoid errors due to resistance in connecting wires.

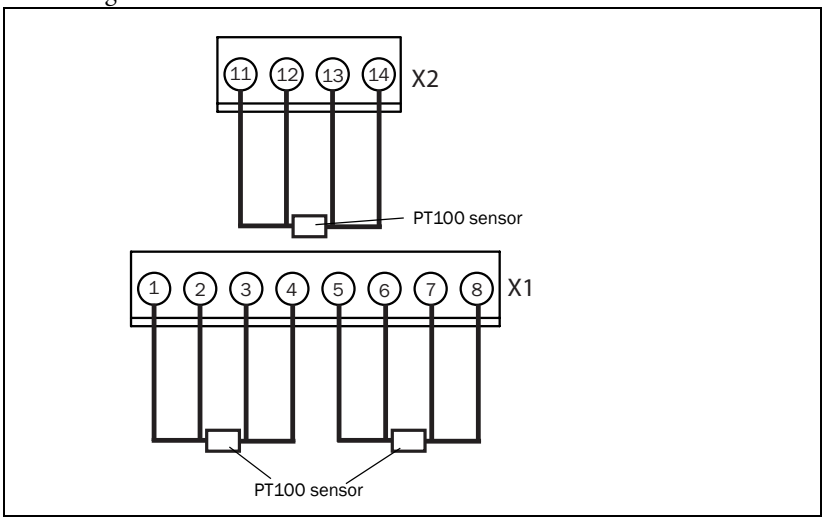

Fig. 15 Connecting PT100 sensors for 4-wire temperature measurement

NOTE: To achieve proper 4-wire temperature measurement it is important that Feed_x+ is connected to PT100_x+ and Feed_x- is connected to PT100_x-.

It is also possible to use these 4-wire inputs as a 2-wire input. Then put a jumper between Feed_x+ and PT100_x+ and one between Feed_x- and PT100_x-. See figure below.

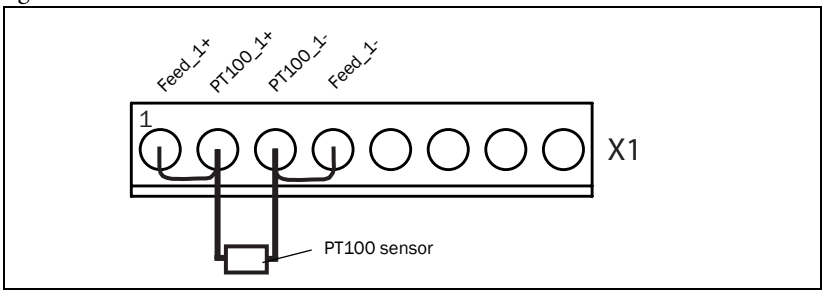

Fig. 16 Using 4-wire input as 2-wire input.

Motor thermal protection

When the PT100 function is enabled by selecting function PT100 or PTC+PT100 in menu [234] and the correct motor class is selected in menu [235] this PT100 function will automatically protect the connected motor against overheating.

Process value

When PT 100 is selected in menu [321], the PT100 element is used for feedback of the actual process temperature to establish an optimised temperature control.

Monitoring

When PT100_1, PT100_2 or PT100_3 is selected as a Comparator Value in menu [611] or [614] the measured temperature by the concerning PT100 can be used to monitor the temperature level. This analogue comparison can activate a (alarm) signal via Digital Output or Relay. It also can be used to start an action in combination with the comparator and the Virtual Connections. See the main product instruction manual for more information.

Emotron AB, Mörsaregatan 12, SE-250 24 Helsingborg, Sweden
Tel: +46 42 16 99 00, Fax: +46 42 16 99 49
E-mail: info@emotron.se
Internet: www.emotron.com

Emotron AB 01-3873-01r1 2006-10-30