

# **EPAC 3100 EPAC 3500**

**Numerical distance relay with integrated  
automatic and control equipment**

06/97

Installer's Guide

GI 1.6882

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**PREFACE**

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INTRODUCTION

The documentation covering the EPAC 3100/3500 Distance Protection is subdivided into 3 documents. Each document provides its recipient with the information needed for the performance of his or her tasks. The following table summarizes the titles of the documents, their recipients and the supply date.

Document Title	Recipient	Supply date
Installer's Guide	Installer of Equipment	Delivered with each equipment
User's Guide	Expert in charge of equipment	On order
Commissioning and Maintenance Guide	Agent specializing in commissioning equipment and in preventive maintenance	On order

## REASON FOR UP-DATES

<div>GI 1.6882</div> <div>First edition: 06/97</div> <div>INSTALLER'S GUIDE</div> <div>EPAC 3100/3500</div>		
Indice	Updating date	Updating subject

## EPAC 3100/3500

## INSTALLER'S GUIDE

GI 1.6882

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# **CHAPTER 1**

# **TRANSPORTATION AND STORAGE CONDITIONS**

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The EPAC is delivered in a cardboard box. The following equipment is contained inside the box:

- the EPAC 3100/3500,
- a plastic bag containing the installer's guide,
- the assembly kit screw-in or Faston connectors,
- two floppy disk with the man machine interface software.



*The EPAC 3100 is the frame mounted "L Case" EPAC.*

*The EPAC 3500 is the cabinet mounted "L Case" EPAC.*

## 1.1. TRANSPORTATION

The gross weight of the equipment in its packing is 12 kg. It can easily be moved by one person. The precautions to be taken when transporting the package are those used for the transportation of electronic equipment.

The cardboard box can withstand a weight of 100 kg without being deformed. You should therefore avoid stacking more than 5 boxes of the same equipment or any other package weighting more than 80 kg on top of it.

When handling the box, avoid dropping or knocking it. If the box falls more than 0.80 metres on one of its surfaces, the equipment components (modules, connectors, board-guides, etc.) may be damaged or distorted. If the box falls on its corner, the equipment may be damaged in the same way. Great care must therefore be taken when handling the box.

The packing guarantees that the equipment will remain in good condition when submitted to accelerations of less than 3 g ( $g = 9.81 \text{ m/s}^2$ ) for all modes of transport (overland, railway, sea and air).

The vibration resistance of the EPAC 3100/3500 is in conformance with the response curve defined by the IEEE Seismic Testing of Relays standard.

## **1.2. STORAGE ON SITE OR IN A WAREHOUSE**

### **1.2.1 Normal Storage Conditions**

While the equipment is stored on site, it must be kept in its original packing.

The cardboard box must be put on a pallet so that it does not absorb any humidity from the ground.

### **1.2.2 Long-Term Storage Conditions**

For long-term storage in a warehouse and for certain types of transport (overland, sea and tropical), we recommend the use of moisture barriers in order to keep the level of humidity inside the envelope at a level lower than 5 g of water per m<sup>3</sup>.

These packages contain dessicant pouches that must be renewed every 6, 12 or 24 months depending on whether the packing is provided for overland, sea or tropical conditions. The dessicant pouches are put inside the envelope but do not touch the equipment. Therefore the equipment may be stored for 3 years in the following storage conditions (no tests are needed during this period to check that the relay operates correctly):

- stored in a sheltered area without air-conditioning,
- temperature: - 40°C to 70°C,
- relative humidity: less than 95% with no condensation.

# **CHAPTER 2**

# **UNPACKING**

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## 2.1. UNPACKING

### Procedure:

1. Place the box on the ground or on a pallet, with the pictogram the right way up.
2. Cut the adhesive tape width-wise using the blade of a sharp instrument, on the upper right and left edges.
3. Remove the tape to get access to the staples holding flaps.
4. Remove the staples.
5. Open the flaps by folding them back, as shown on the packing diagram.
6. Remove the various elements from the cardboard box, and check that the contents correspond to the list given in chapter 1.
7. Remove the packing blocks and put the EPAC on a table with the assembly kit and documents.
8. Put the packing blocks back into the box.



*If the EPAC 3100/3500 is to be temporarily used on site, keep the packing and re-use it to repack the equipment. However, if the EPAC 3100/3500 is installed definitively, the packing can be destroyed.*

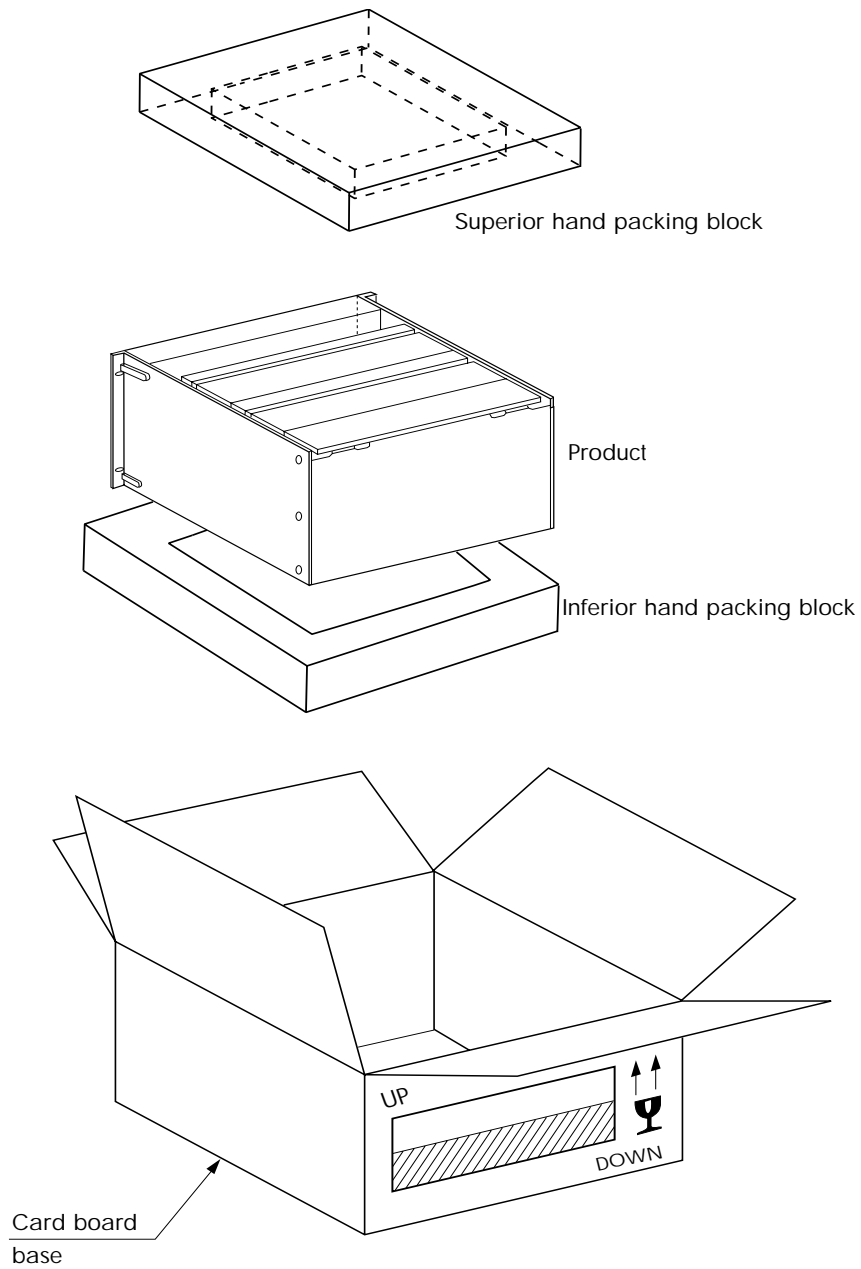


Figure 2.1a: Packing / Unpacking the EPAC 3100/3500

## 2.2. REPACKING

### Procedure:

1. Repeat the unpacking procedures in reverse order.
2. Put installer guide in a plastic bag.
3. Install the superior-hand and inferior-hand packing blocks on the rack.
4. Put the assembly in the cardboard box.
5. Put the plastic bags containing the documents and connection kit connectors on the packed rack.
6. Fold down the four flaps.
7. Staple flaps.
8. Use adhesive tape to close the box.
9. Clearly indicate the following information on the box:
  - the equipment version,
  - the serial number,
  - the purchase order and contract number,
  - the delivery address (workstation designation, person to be contacted, etc.).
10. Put the advice of dispatch in a plastic bag and stick the bag to the box.

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## **CHAPTER 3**

# **MECHANICAL CHARACTERISTICS AND INSTALLATION CONDITIONS**

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### 3.1. OVERALL DIMENSION

The overall dimensions of the EPAC 3100/3500 depend on whether it is frame- or cabinet-mounted.

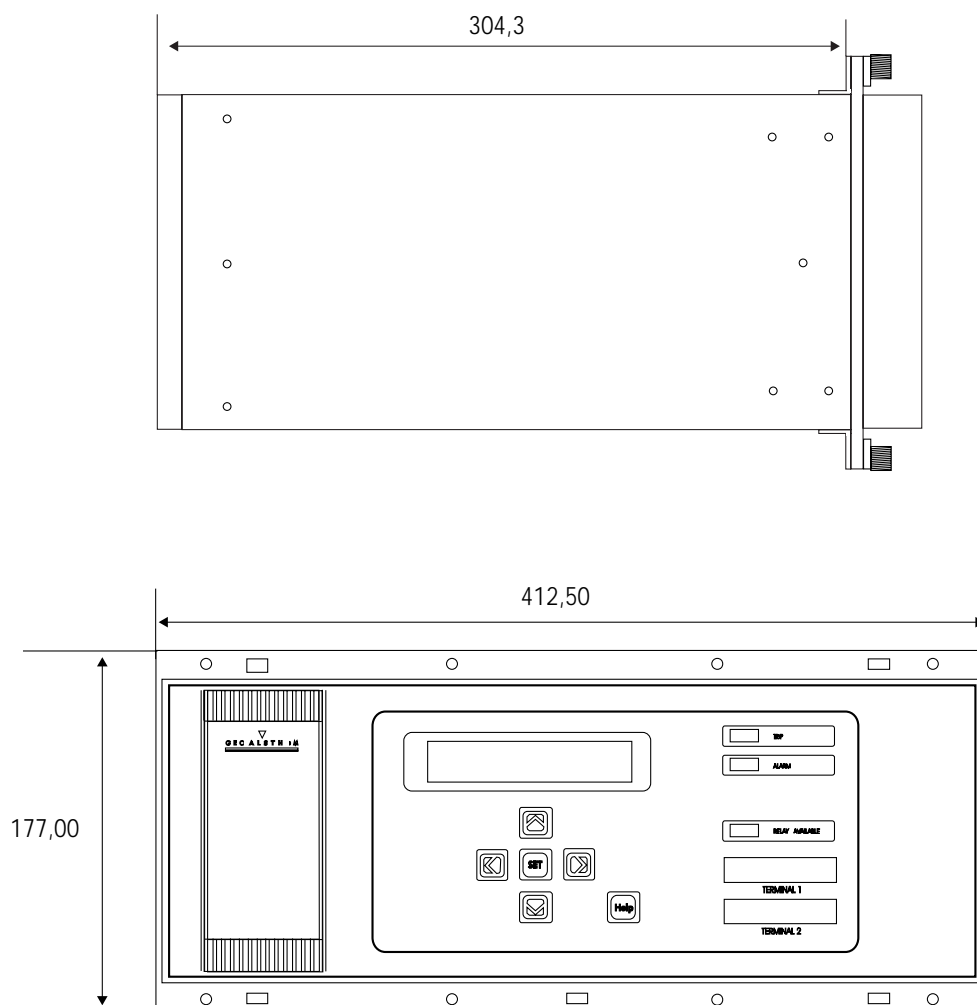


Figure 3.1a: Rack dimensions when frame-mounted (EPAC 3100)

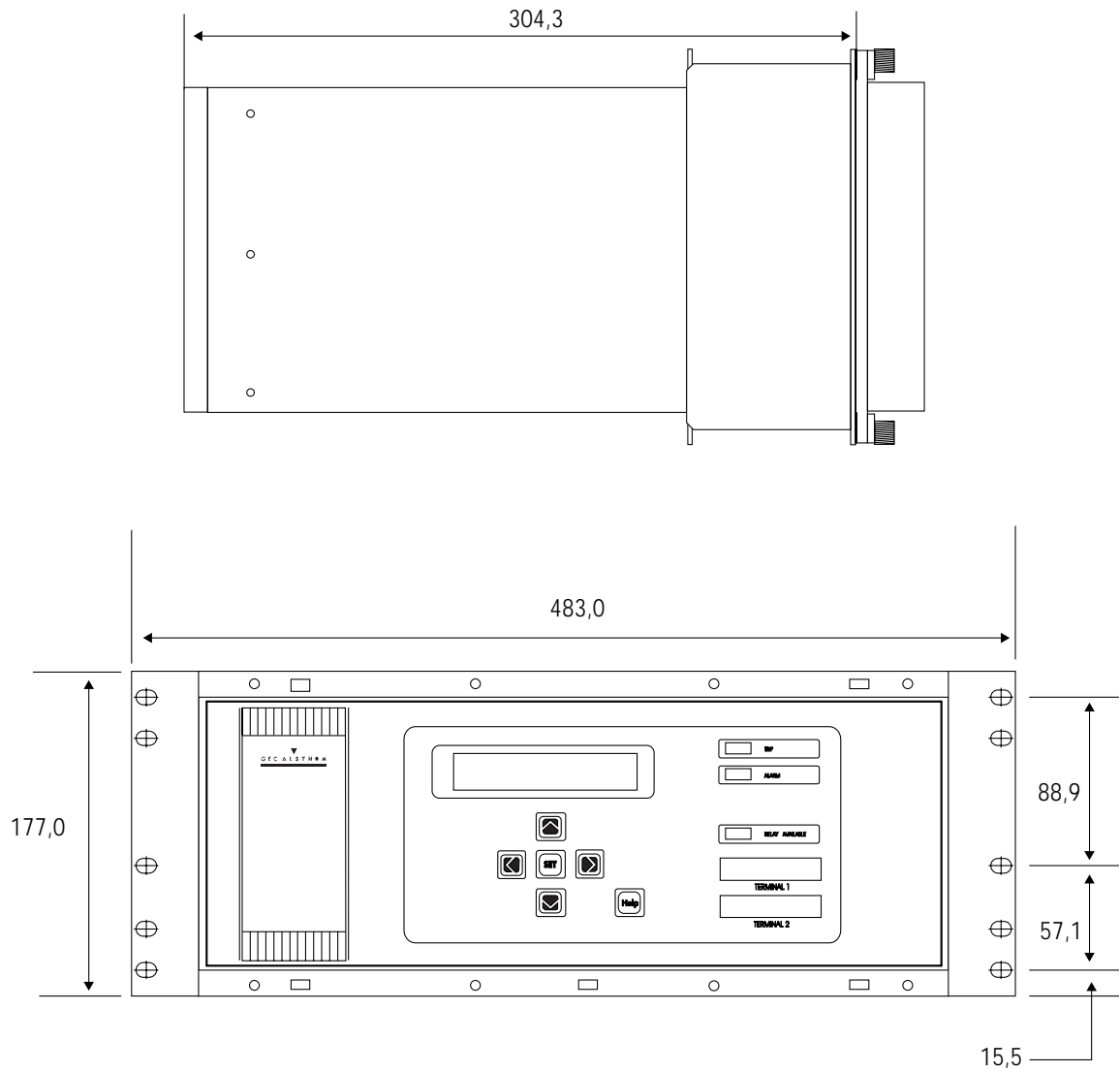


Figure 3.1b: Rack dimensions when cabinet-mounted (EPAC 3500)

### 3.2. WEIGHT

- <12 kg.

### 3.3. ASSEMBLY

The frame-mounted EPAC 3100 is attached with 8 screws at the top and bottom of the front panel, as shown in Figure 3.1c. The cabinet-mounted EPAC 3500 is attached with 4 screws on the left and right of the front panel.

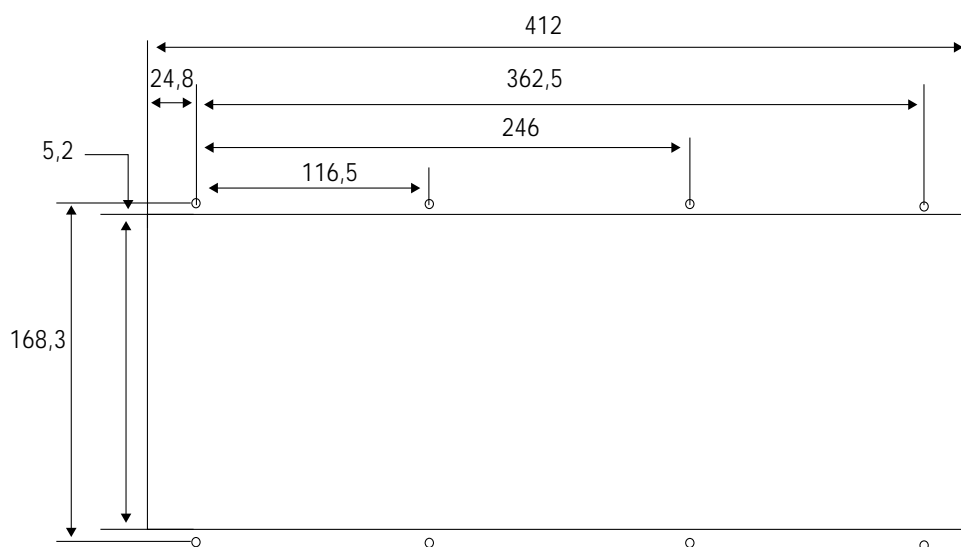


Figure 3.1c: Location of attachment points for frame mounting (EPAC 3100)

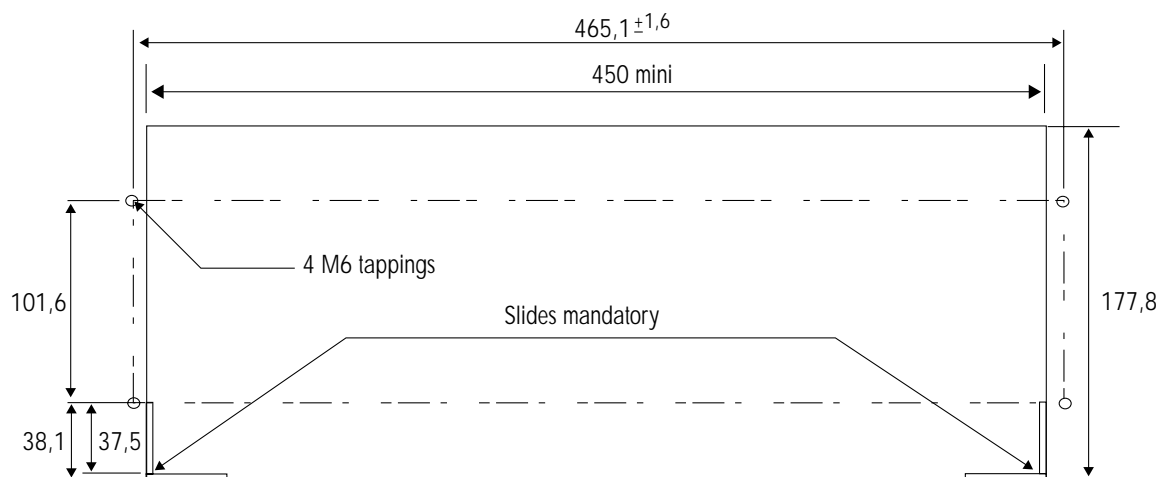


Figure 3.1d: Location of attachment points for cabinet mounting (EPAC 3500)

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# **CHAPTER 4**

## **ELECTRICAL CONDITIONS**

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**4.1. ELECTRIC POWER SUPPLY**

Rated Auxiliary Power Supply:	48, 60, 110, 125, 220 and 250 VDC
Permitted Variations:	-20% to + 20%, -20% to + 15% for 250 V
Power consumption in the basic version:	25 W
Temperature Range in operation:	-20°C to + 55°C
Maximum permitted ripple:	< 12%
Relative Humidity:	less than 95% with no condensation



*The rated value of the auxiliary supply must correspond to the value given on the EPAC 3100/3500 front panel.*

## 4.2. GROUNDING

The equipment is to be grounded to an earth network with a resistance that is always less than 3 ohms. Therefore, the distance between the equipment and the real grounding point must be minimized.

The grounding braid is connected to the terminal at the rear of the EPAC 3100/3500 rack. It is identified by the ground symbol. The following diagrams show the grounding braid connections for the different EPAC 3100/3500 options.

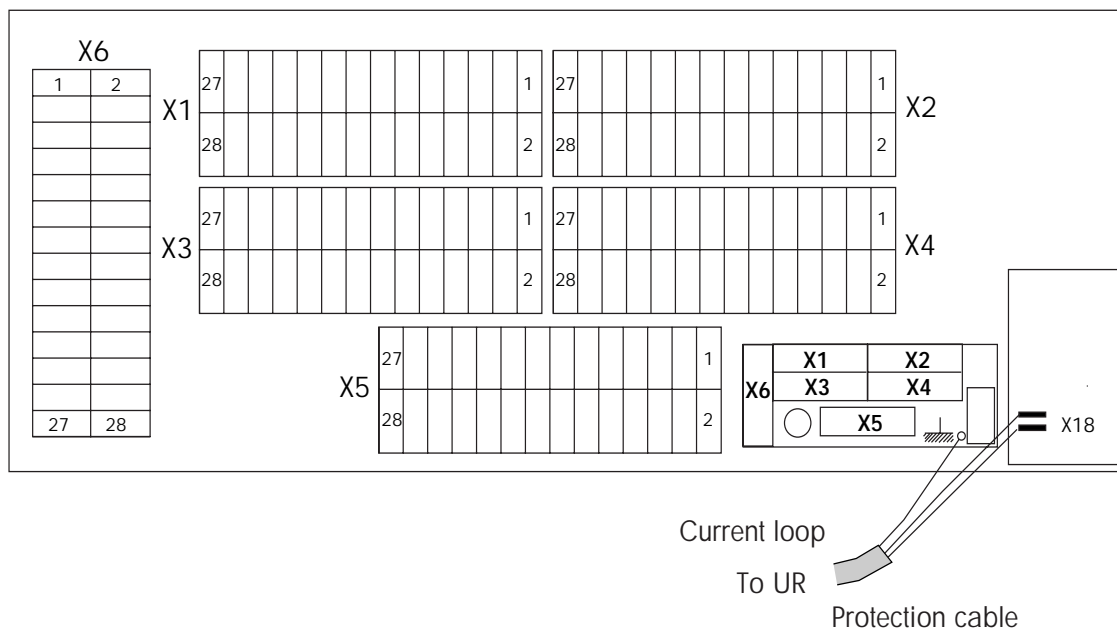


Figure 4.2a: Grounding for current loop

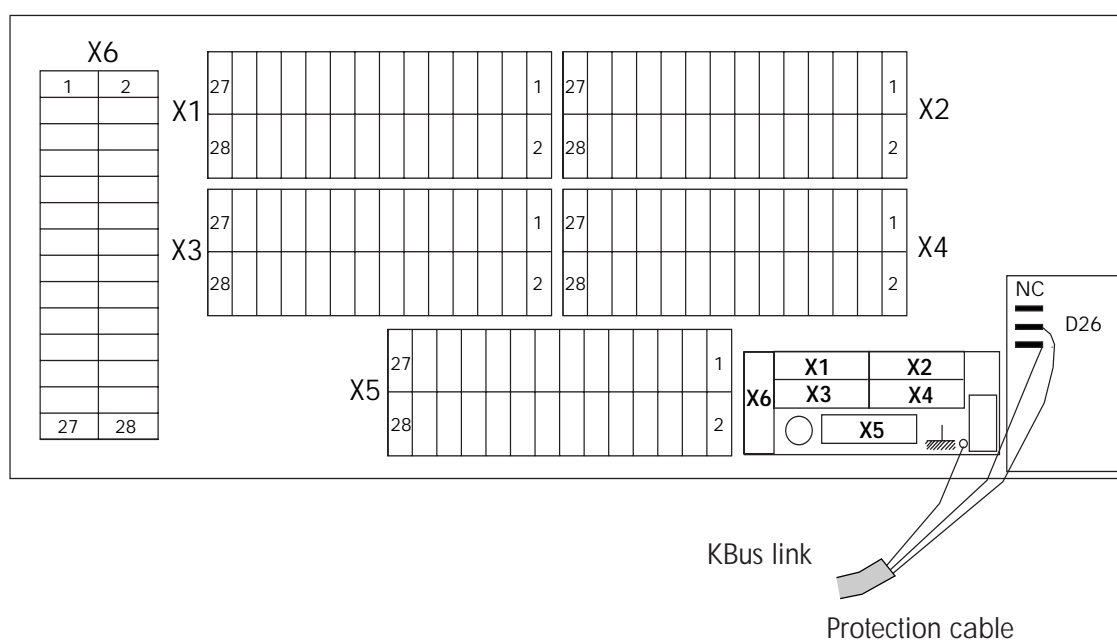


Figure 4.2b: Grounding for KBUS link

# **CHAPTER 5**

## **EXTERNAL CONNECTIONS**

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### 5.1. ANALOG INPUT CONNECTIONS

The current and voltage inputs are wired to pins 1 to 28 of the X5 connector on the EPAC rear panel as indicated in figure 5.1a.

To maintain suitable EMC Electro-Magnetic-Compatibility margins provided with this product, a state-of-art wiring and grounding is required.

We recommend the use of one multiwire (4 to 8 depending on the number of inputs used and external neutral connection) cable of 4 mm<sup>2</sup> for the voltage circuit and one multiwire (4 to 8 depending on external neutral connection) cable of 4 mm<sup>2</sup> for 1 A current circuit or 6 mm<sup>2</sup> for 5A current.

The external diameter of the cables is recommended as less than 15 mm. If the cables are connected to cubicle terminals no shielding is required. If the cables are going out, cubicle shielding of low HF impedance copper is to be provided with short strip large cross section connections to ground at both ends. Unused wires are to be grounded at both ends.

As far as possible avoid mixing the voltage and current wires and other groups of wires.

The following diagrams show the analog input connections for the different types of zero sequence current acquisition.

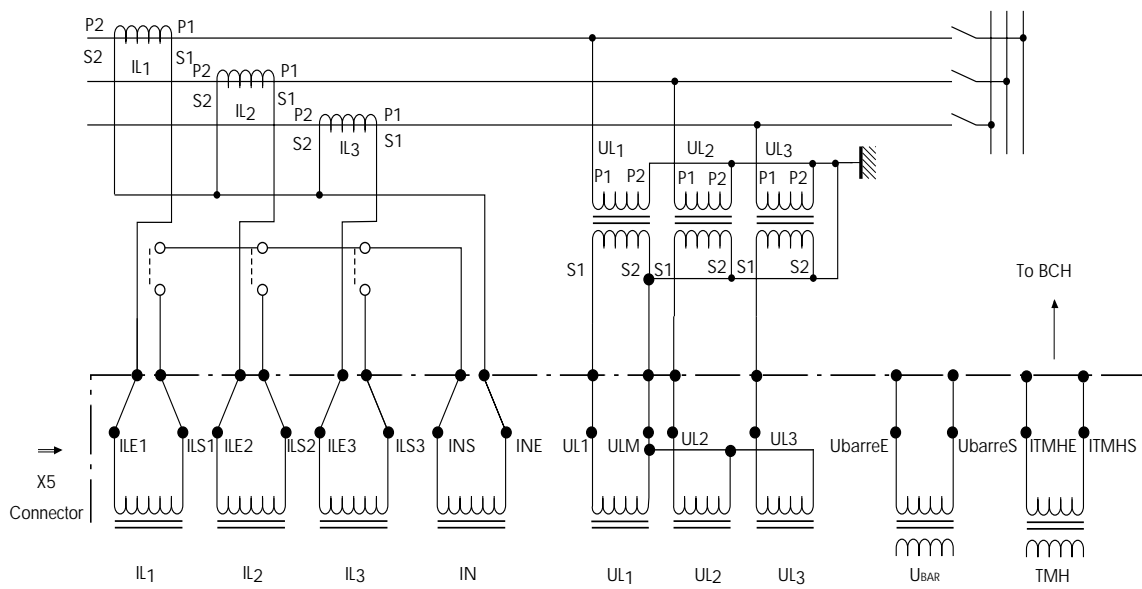


Figure 5.1a: Analog input connections without zero sequence current transformer

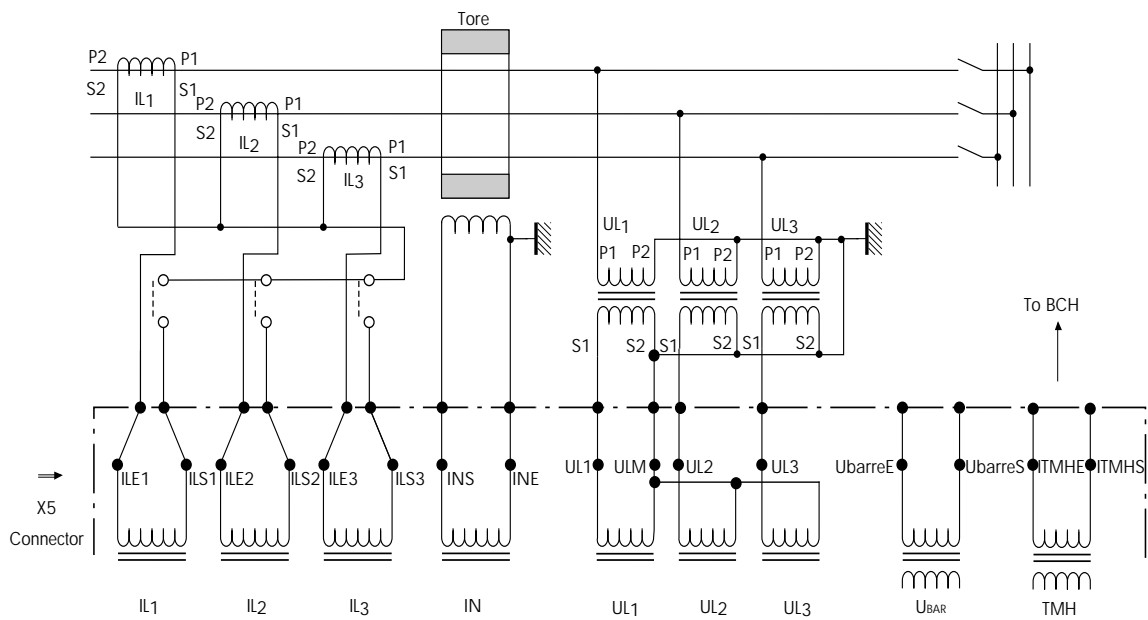


Figure 5.1b: Analog input connections with zero sequence current transformer

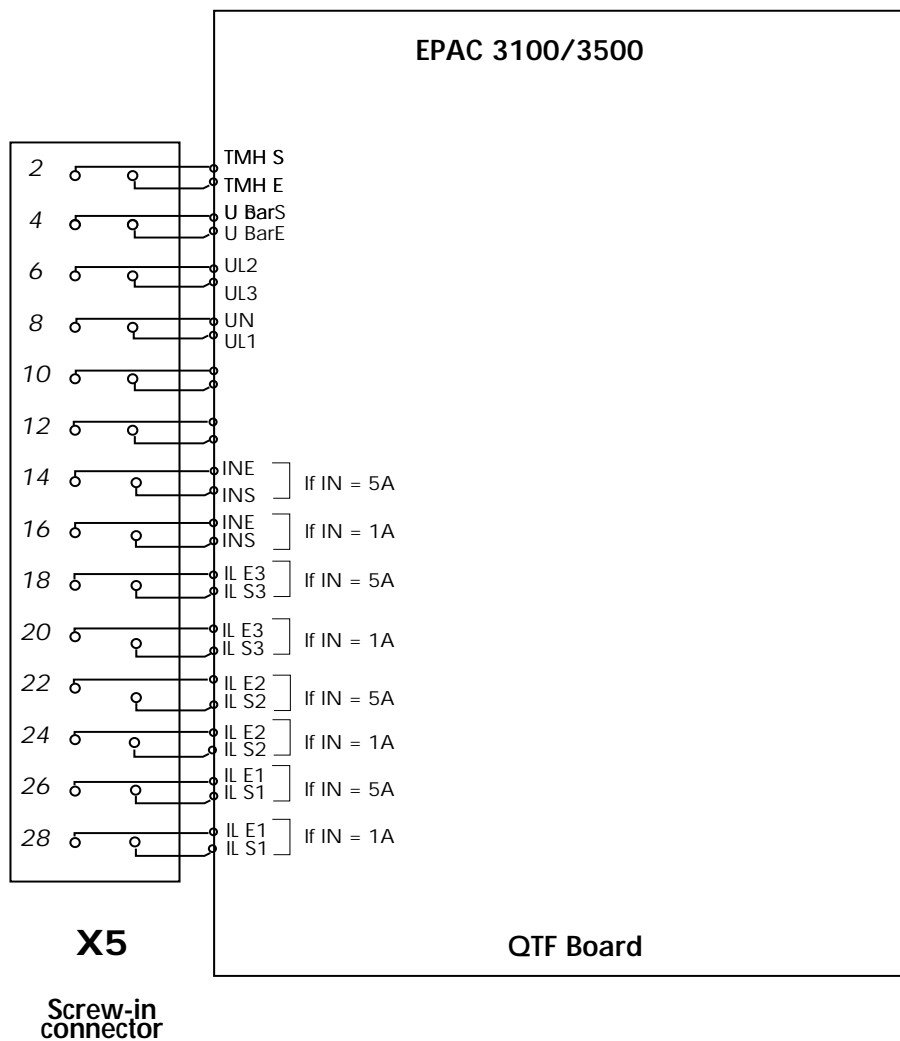


Figure 5.1c: Analog input connections to the X5 connector

## 5.2. INPUT AND OUTPUT CONTACTS CONNECTIONS

Inputs and outputs contacts are connected to the screw-in LMI or ENTRELEC connectors at the EPAC rear panel. The X1 and X2 connectors are used to connect the inputs/outputs of the IO-1 board. The X3 and X4 connectors are used to connect the inputs/outputs of the additional IO-1 or additional IO-2 board. To maintain suitable EMC margins provided with this product, a state-of-art wiring and grounding is required.

The wire used must have a cross-section less than 2.5 mm<sup>2</sup>.

We recommend to use flexible multiwire (5 to 8 depending on number of groups common) cable of 1.5 or 2.5 mm<sup>2</sup> for tripping contacts.

We recommend to use flexible multiwire (9 to 16 depending on number of groups common) cable of 0.6 to 1.5 mm<sup>2</sup> wire section for input contacts (for all pins of the X2 and X4 connectors and pins 1 to 4 of the X1 and X3 connectors).

We recommend to use 1 or 2 multiwire (22 to 32 for 1 or 11 to 16 for 2 cables depending on number of groups common) cable of 0.6 to 1.5 mm<sup>2</sup> wire section for signalling contacts (for pins 13 to 28 of the X1 and X3 connectors).

The external diameter of cables is recommended as less than 15 mm.

If the cables are connected to cubicle terminals no shielding is required.

If the cables are going out cubicle shielding of low HF impedance copper is to be provide with short strip large cross section connections to ground at both ends. Not used wires are to be grounded at both ends.

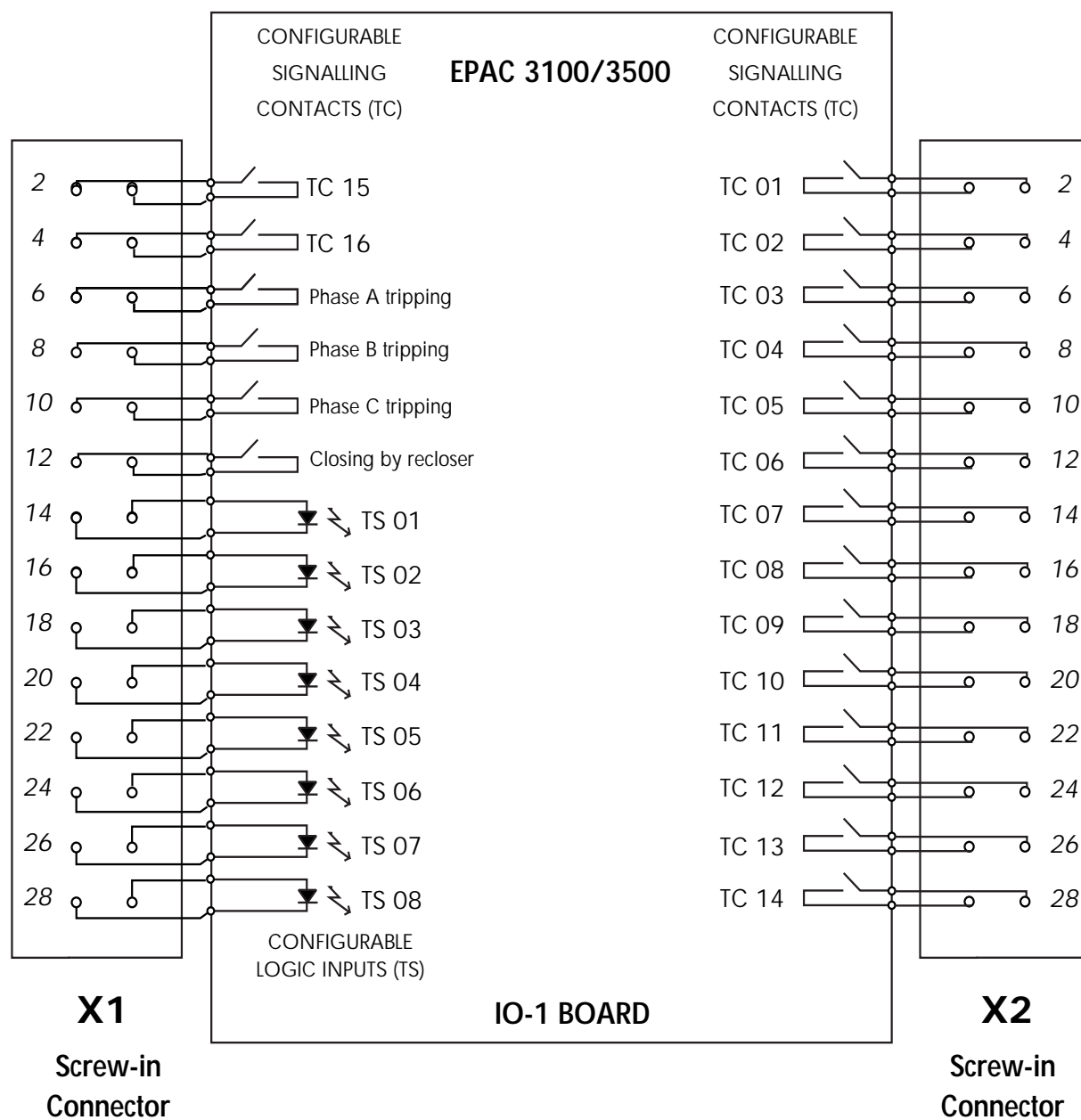


Figure 5.2a: Connections on the IO-1 Board

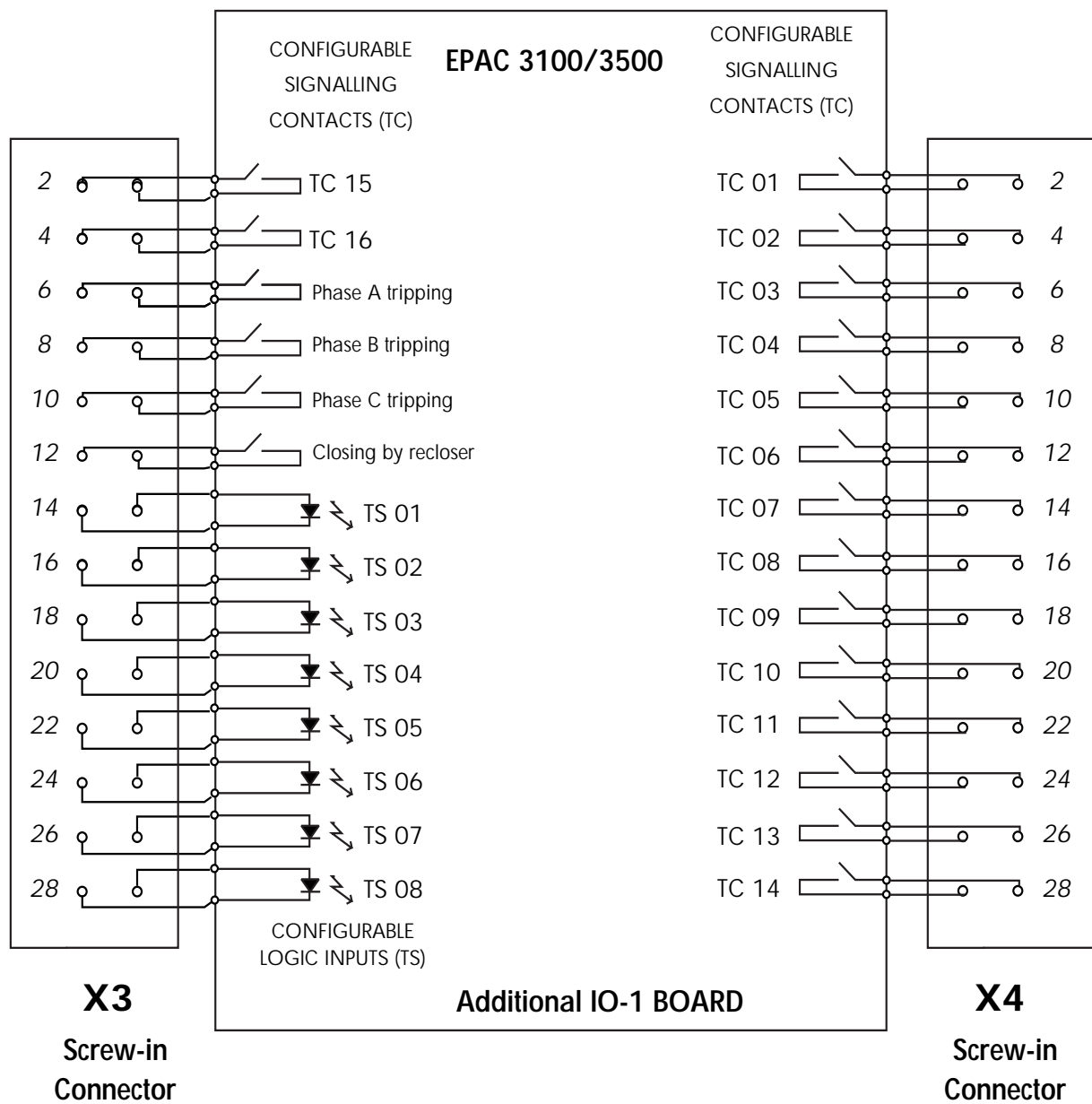


Figure 5.2b: Connections on the Additional IO-1 Board

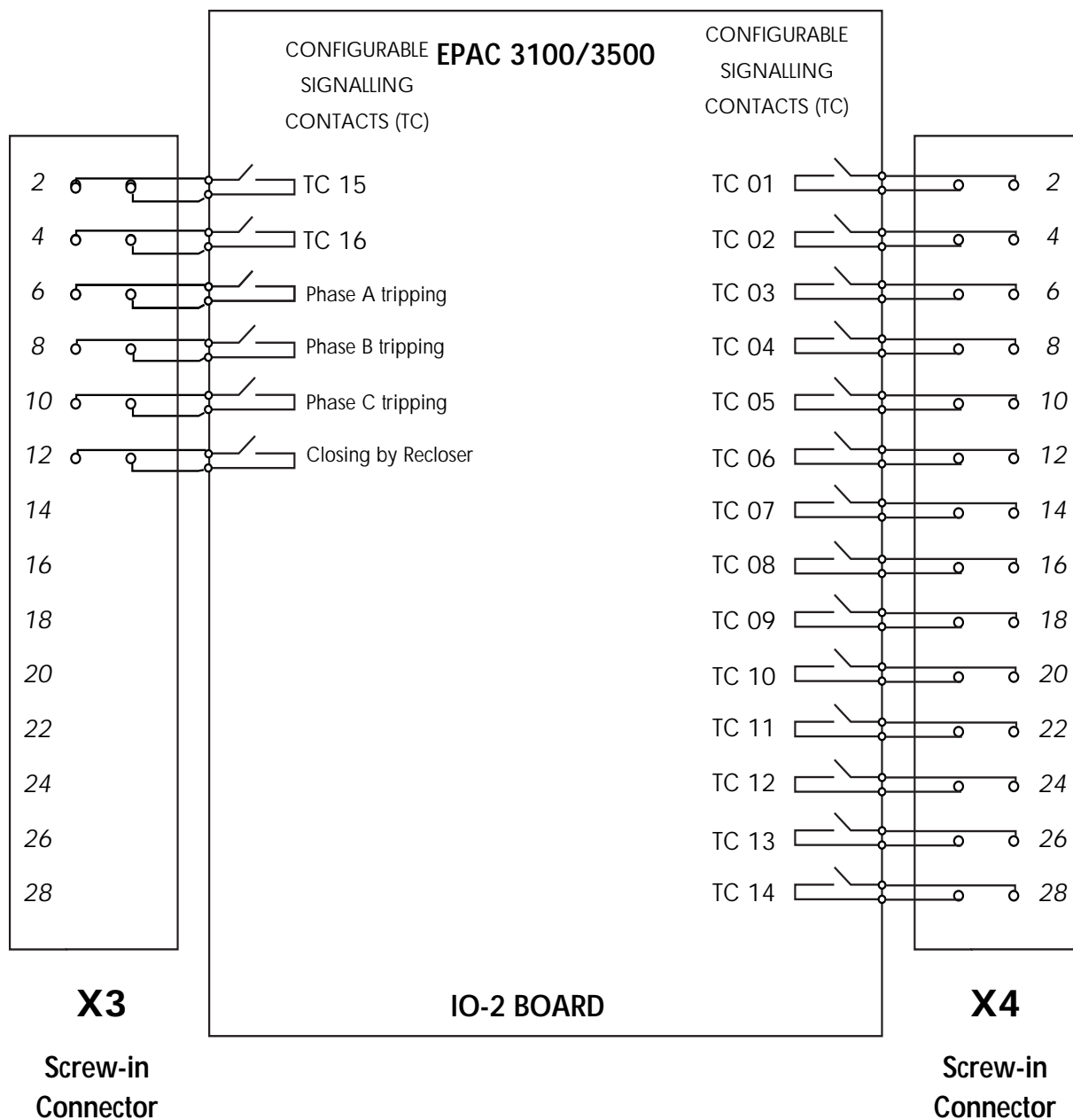


Figure 5.2c: Connections on the additional IO-2 Board

### 5.3. POWER SUPPLY CONNECTIONS

The power supply PS is connected to the X6 screw-in connector on the rear panel. The wire used must have a section less than 5 mm<sup>2</sup>. See 5.1. and 5.2. for wiring recommendations. Avoid long distance wirings to DC source (less than 20-30 m) without special care.

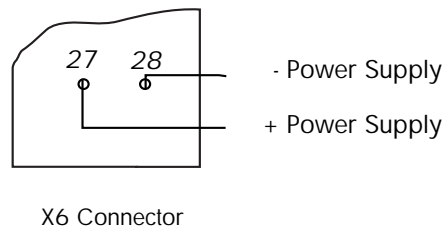


Figure 5.3a: Power Supply Connections

### 5.4. EQUIPMENT FAULT SIGNALLING CONNECTIONS

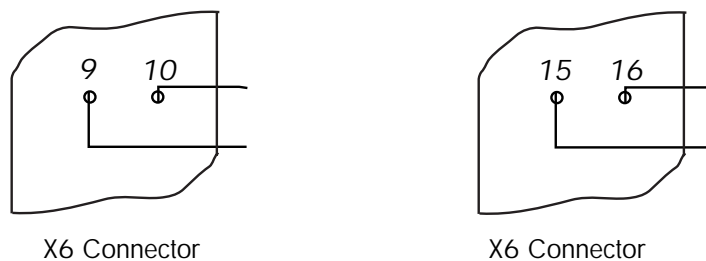


Figure 5.4a: Fault Signalling Connections

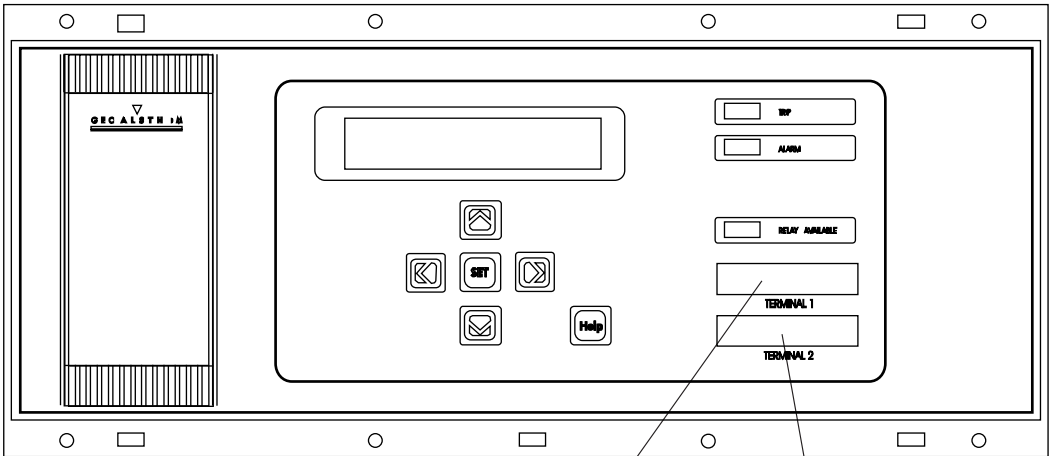
The equipment fault signal wires are connected to pins 9 and 10 of the X6 terminal block on the IO-1 Board and to pins 15 and 16 of the X6 terminal block on the additional IO-1 Board or the IO-2 Board.

### 5.5. COMMUNICATION OPTION CONNECTIONS

The EPAC can be connected to three types of communication system:

- Communication with an remote control system, either VDEW or KBUS-COURIER.
- Reception of an external time synchronisation signal via an IRIG-B board.
- Communication with the TPE system for disturbance event management. Communication is by means of:
  - . a current loop for a link to a UR 2000 restitution unit,
  - . a Modem for a link to the TPE via the PSTN,
  - . RS232 for a direct link to the EPAC via the RS232 serial port on the EPAC front panel.





Serial port for WinEPAC PC

Serial port for:  
- WinV24  
- or a local printer

Figure 5.5a: EPAC Front Panel Option Connections

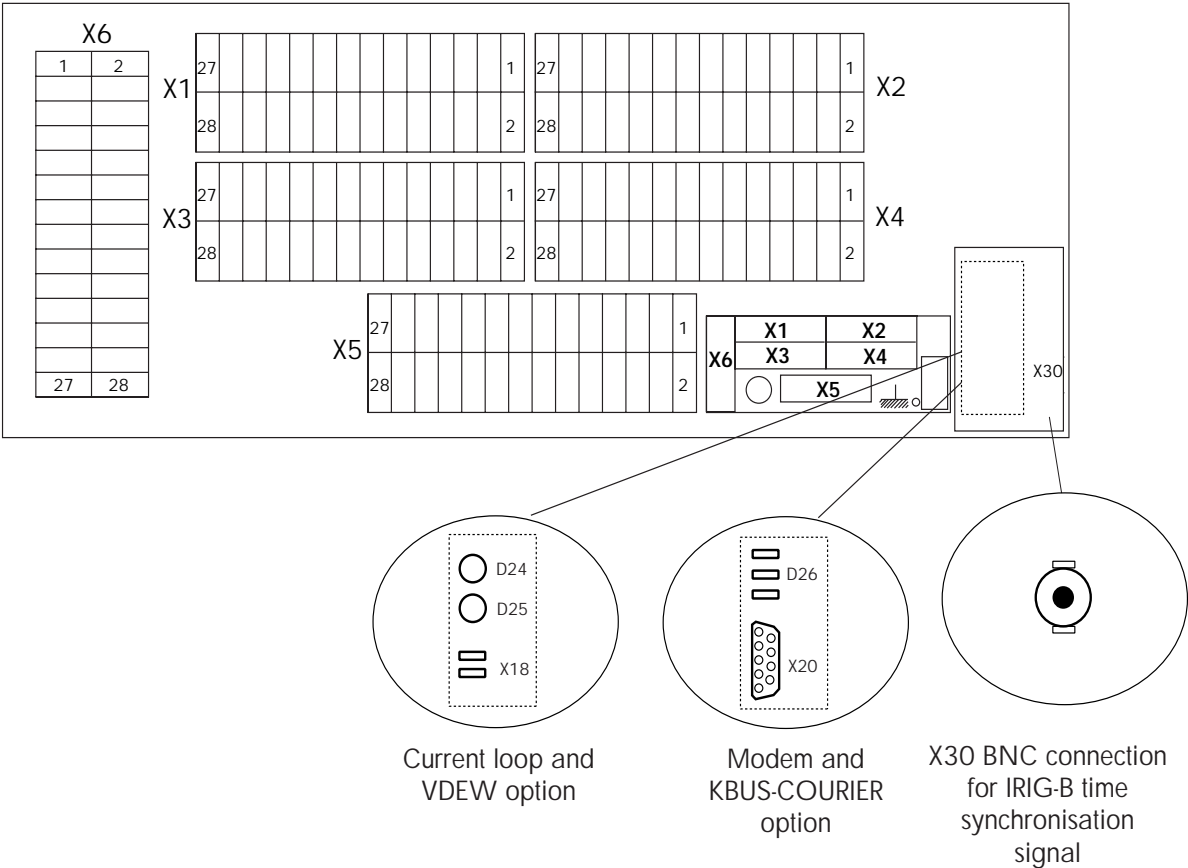


Figure 5.5b: EPAC Rear Panel Option Connections


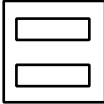
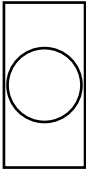
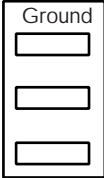
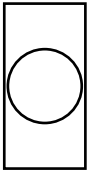
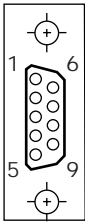
Terminal	Description	Terminal	Description
	<div>X30 connector</div> <div></div> <div>BNC connector for IRIG-B time synchronisation signal</div>		<div>X18 connector</div> <div></div> <div>Current loop</div>
	<div>D24 connector</div> <div></div> <div>VDEW receiver</div>		<div>D26 connector</div> <div></div> <div>KBUS</div>
	<div>D25 connector</div> <div></div> <div>VDEW transmitter</div>	<div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> <div>8</div>	<div>X20 connector</div> <div><div>CD</div><div>RD</div><div>ED</div><div>DTR</div><div>OV</div><div>DSR</div><div>RTS</div><div>CTS</div></div> <div></div> <div>Modem</div>

Figure 5.5c: Option Connector Connections

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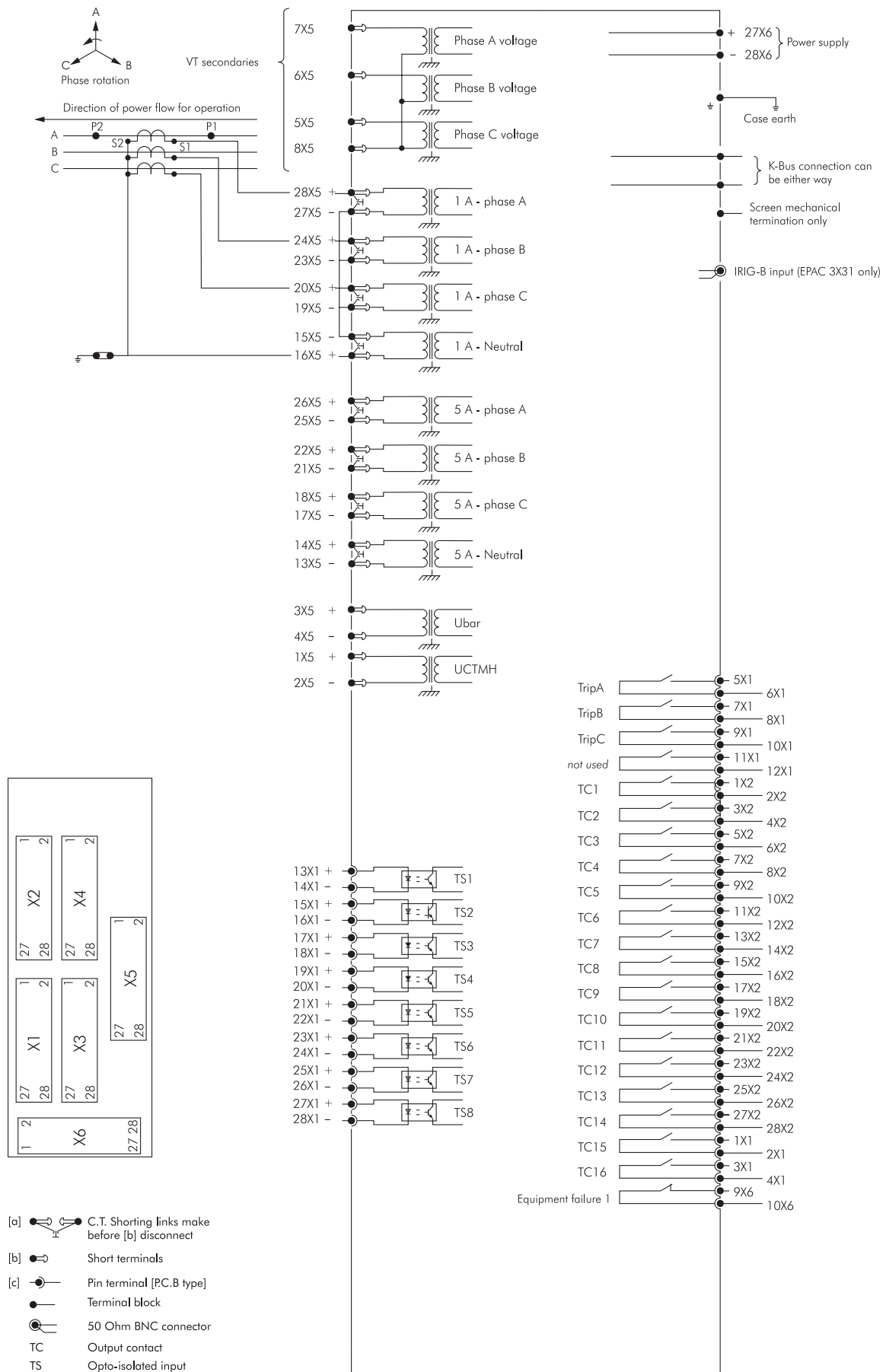




## CASE CONNECTION DIAGRAM

EPAC 3111 / 3111 / 3121 / 3131

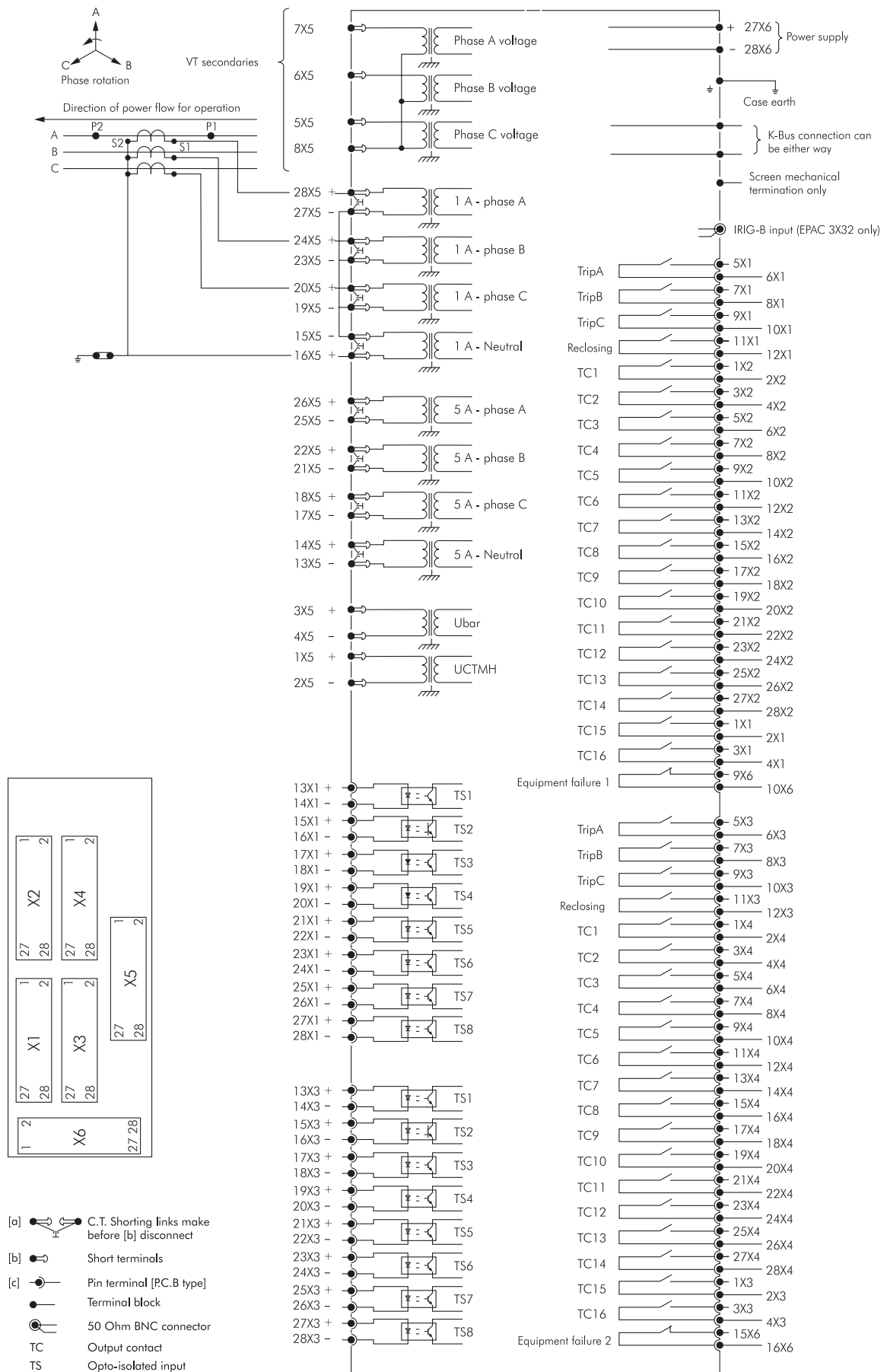
EPAC 3511 / 3511 / 3521 / 3531





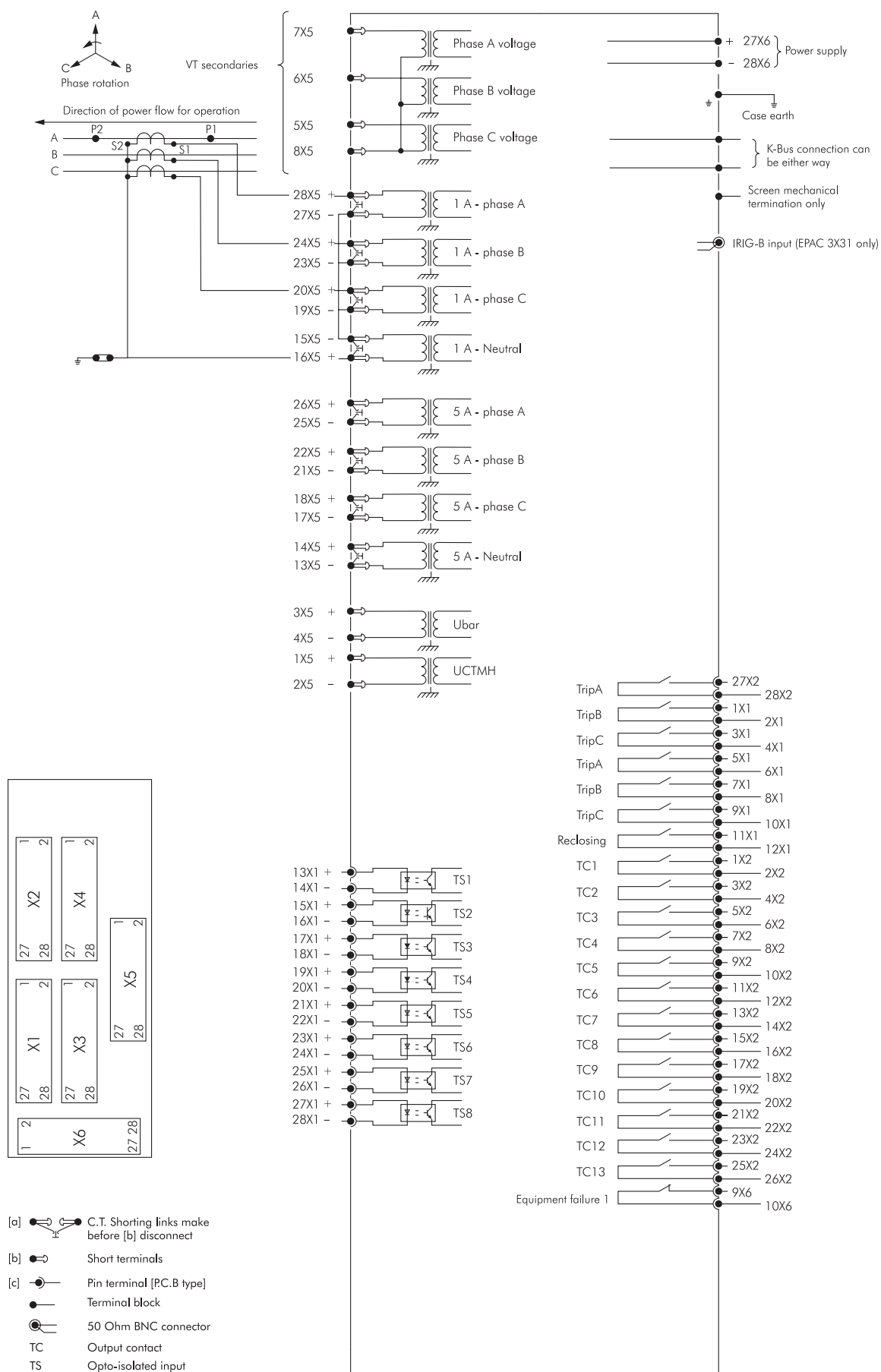
# CASE CONNECTION DIAGRAM

EPAC 3112 / 3112 / 3122 / 3132 EPAC 3512 / 3512 / 3522 / 3532



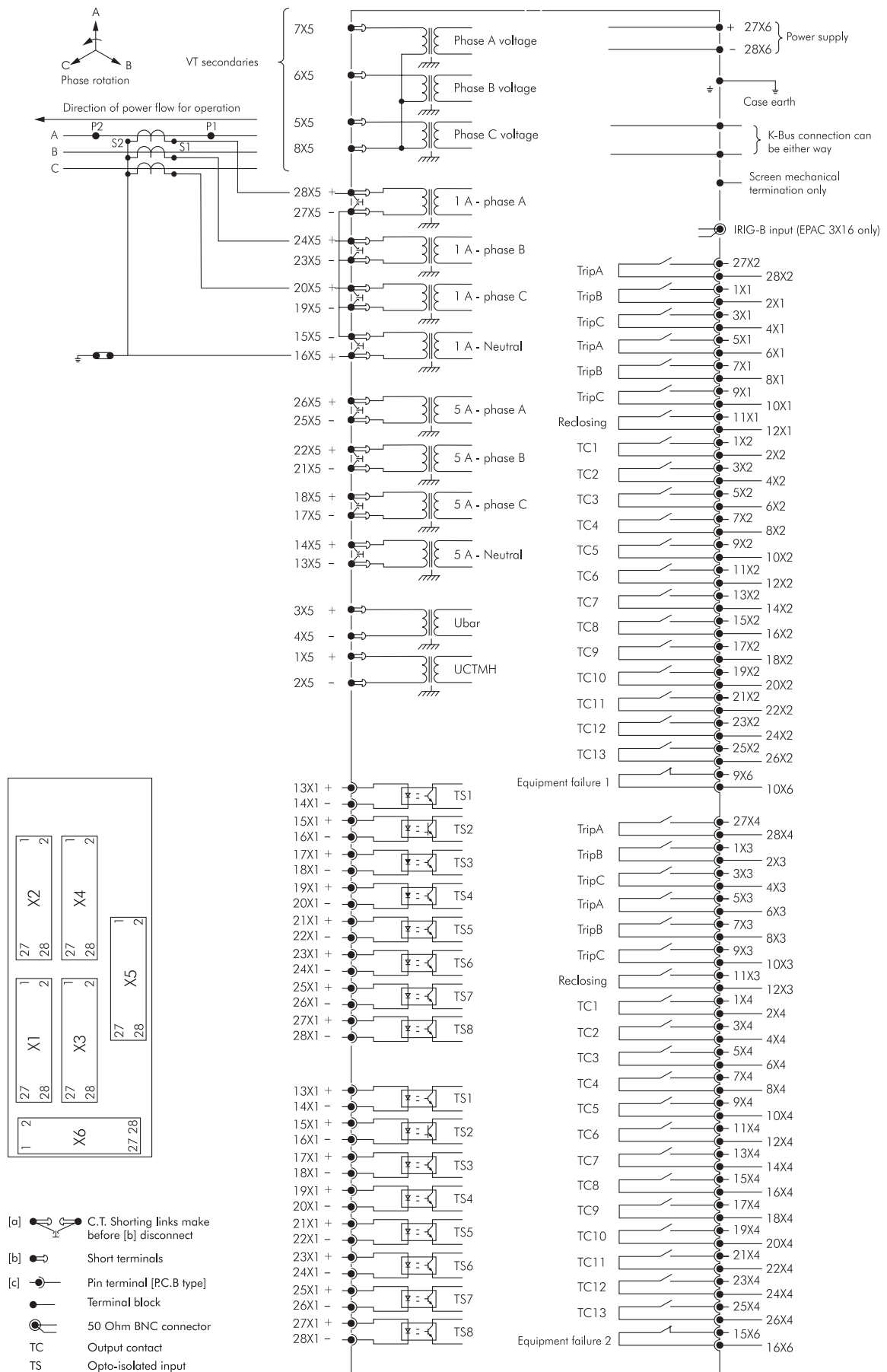
## CASE CONNECTION DIAGRAM

EPAC 3113 / 3113 / 3123 / 3133 EPAC 3513 / 3513 / 3523 / 3533



# CASE CONNECTION DIAGRAM

EPAC 3116 / 3116 / 3126 / 3136 EPAC 3516 / 3516 / 3526 / 3536



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