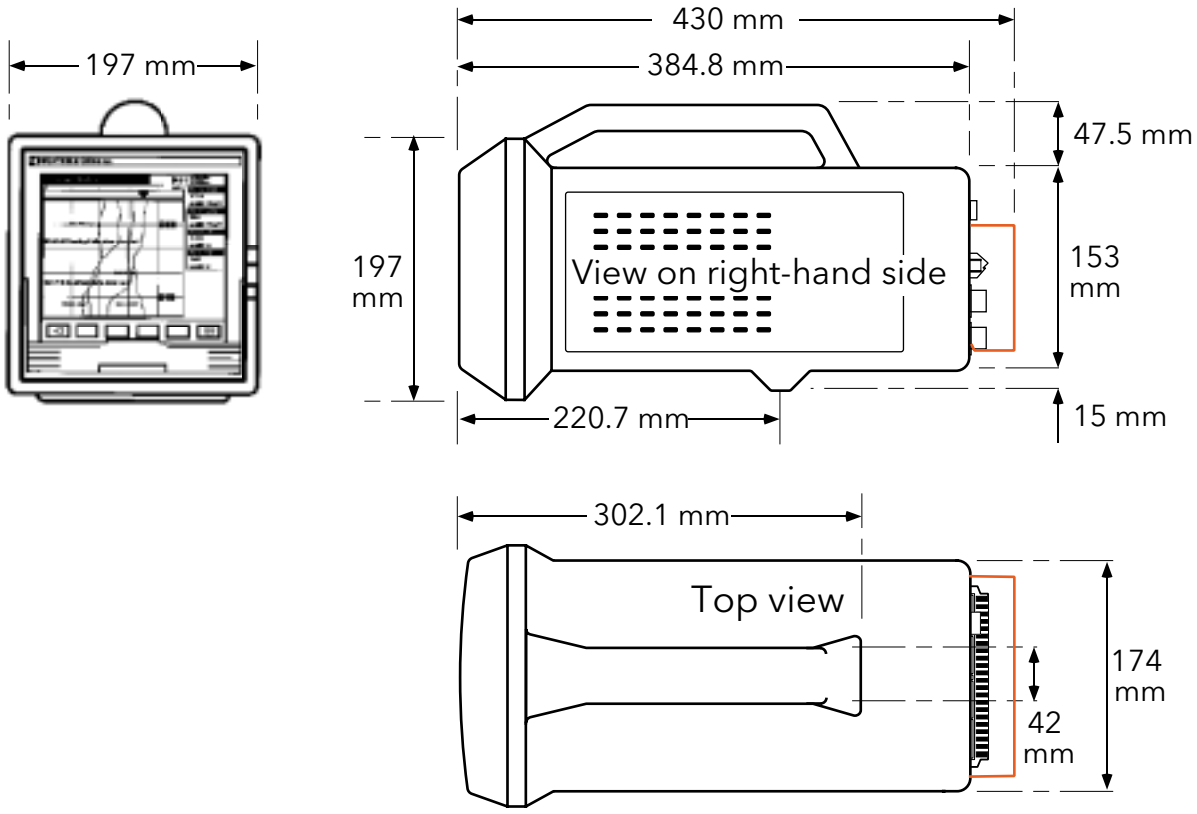
invensys
Eurotherm

# Portability Options

## 100mm Chart Recorders

Portable Case
Options Manual

## Dimensions




**Notes:**

1. Video graphics recorder shown; other models similar
2. Terminal cover supplied only if standard input connectors are fitted.

# Portable case options manual

## Contents list

# Safety Notes

1. Before any other connection is made, the protective earth terminal  shall be connected to a protective conductor. The Mains (supply voltage) wiring must be terminated in such a way that, should it slip in the cable clamp, the Earth wire would be the last wire to become disconnected.
2. In the case of portable equipment, the protective earth terminal must remain connected (even if the recorder is isolated from the mains supply), if any of the I/O circuits are connected to hazardous voltages*.

WARNING!

Any interruption of the protective conductor inside or outside the apparatus, or disconnection of the protective earth terminal is likely to make the apparatus dangerous under some fault conditions. Intentional interruption is prohibited.

3. The mains supply fuse within the power supply unit is not replaceable. If it is suspected that the fuse is faulty, the manufacturer's local service centre should be contacted for advice.
4. Whenever it is likely that protection has been impaired, the unit shall be made inoperative and secured against unintended operation. The nearest manufacturer's service centre should be consulted for advice.
5. Any adjustment, maintenance and repair of the opened apparatus under voltage, should be avoided as far as possible and, if inevitable, shall be carried out only by a skilled person who is aware of the hazard involved.
6. This unit is not recommended for use where conductive pollution (e.g. condensation, carbon dust) is likely.
7 Signal and supply voltage wiring should be kept separate from one another. Where this is impractical, shielded cables should be used for the signal wiring.
8. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.
9. The battery is not replaceable. Only the manufacturer's battery PCB assembly may be used for replacement.

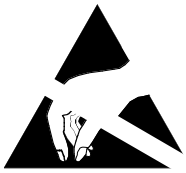
* A full definition of "Hazardous' voltages appears under 'Hazardous Live' in BS EN61010. Briefly, under normal operating conditions, hazardous voltages are defined as > 30V RMS (42.2V peak) or > 60V dc.

## INSTALLATION CATEGORY AND POLLUTION DEGREE

This product has been designed to conform to BS EN61010 installation category II and pollution degree 2. These are defined as follows:

INSTALLATION CATEGORY II
The rated impulse voltage for equipment on nominal 230V ac mains is 2500V.

POLLUTION DEGREE 2
Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.



## Static electricity

All circuit boards associated with the recorder contain components which are susceptible to damage caused by static electrical discharge of voltages as low as 60 Volts.

Should it be necessary to handle such circuit boards, appropriate precautions must first be taken to ensure that the recorder, the circuit board, the operator and the work area are all at the same electrical potential.

## Recorder labelling

One or more of the symbols below may appear in the recorder labelling.

| | |
|---|---|
|  | Refer to the Manual for instructions |
|  | Protective Earth |
|  | This recorder for ac supply only |
|  | This recorder for dc supply only. |
|  | This recorder for either ac or dc supply |
|  | Risk of electric shock |
|  | Supply voltage on /off switch.<br>I = on; O = off |

# 1. BASIC OPTION

This basic portability option provides a rugged carrying case for use with 100mm recorders fitted with

a) Four or Six input channels and up to four option boards

b) 12 input channels and up to two option boards (graphics recorders only)

See section 2 below, for:

c) Four or six input channels, upto one option board (relays, or retransmission) and transmitter power supply.

## 1.1 WIRING

The details of input channel wiring depend on the recorder model and type fitted in the case. for definitive details refer to the user guide or installation and operation manual supplied with the recorder. Figures 1.1below give some typical examples

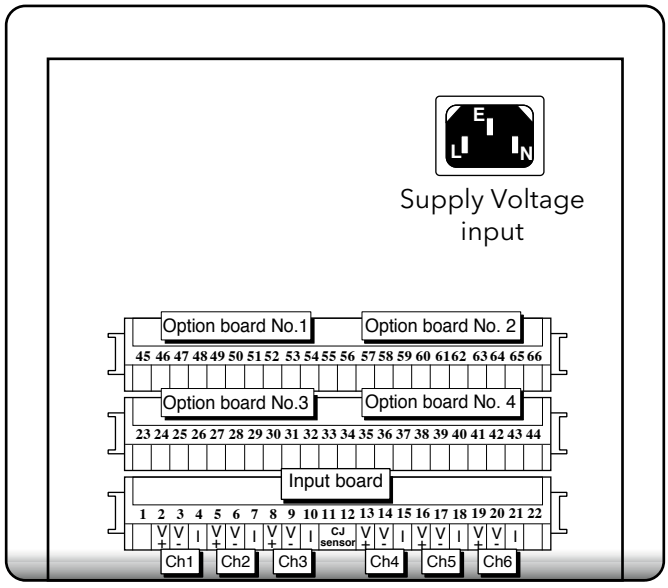



Figure 1.1a

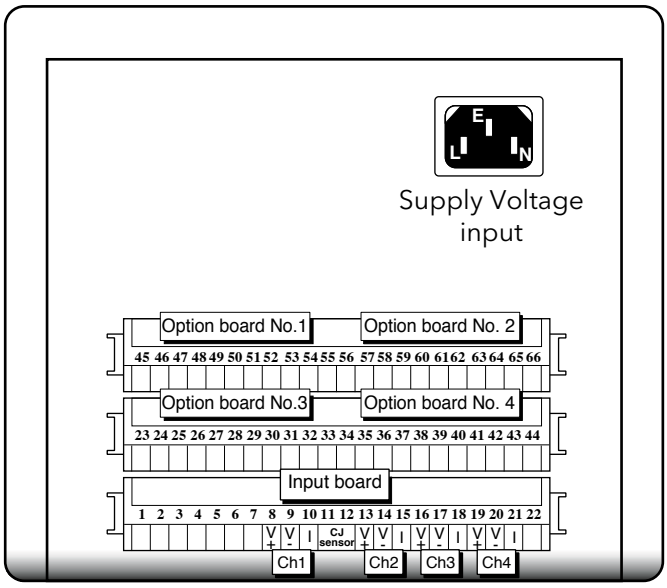



Figure 1.1b

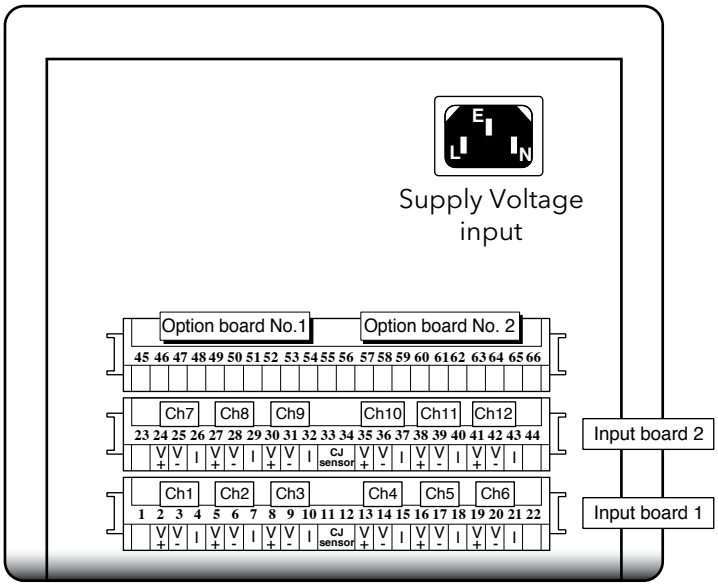



Figure 1.1c Two input / two option boards (graphics recorders only)

### 1.1.1 Supply voltage

Caution

Before powering the recorder, check that the supply voltage to be applied lies within the range specified on the serial number label at the rear of the recorder.

As shown above, the line supply is terminated using an IEC plug and socket at the rear of the recorder. Minimum recommended conductor size is 16/0.2 (0.5mm) $^2$

**Note:** These versions of the portable option are available for use with low voltage (nom 24V ac/dc) supplies. See section 6 for further details.

### 1.1.2 Signal wiring

Input and option board terminations are located as shown in figure 1.1. Internal wiring is shown in figure 1.1.3 below.

For full wiring details see Annex A to this manual.

**Note:** With some recorder models, there are constraints regarding the wiring of Resistance Temperature Detectors (RTDs) to channel 1, if any other channel's transducer is a thermocouple. See the input board specification in the manual supplied with the recorder.

### 1.1.3 Internal wiring

Figures 1.1.3a and b show wiring details between the recorder and the back panel. There is no diffence in this wiring between continuous trace and multi-point recorders.

### 1.1.4 Specification

This is a general specification for the portable case options, showing only those areas which differ from the specification which appears in the user guide or installation and operation manual supplied with the recorder.

Individual option sections include any modifications to this general specification.

| Environmental Performance (chart recorders) | |
|---|---|
| Temperature limits | Operation: 0 to 50˚C; Storage: -20 to +70 ˚C |
| Humidity limits | Operation: 5 to 80% RH (non-condensing). Storage: 5 to 90% RH (non-condensing |
| Protection | IP21 |
| Shock | BS EN61010 |

| Environmental Performance (graphics recorders) | |
|---|---|
| Temperature limits | Operation: 0 to 40˚C; Storage: -20 to +70 ˚C |
| Humidity limits | Operation: 5 to 80% RH (non-condensing). Storage: 5 to 90% RH (non-condensing |
| Protection | IP21 |
| Shock | BS EN61010 |

| Physical | |
|---|---|
| Weight | <5.5 kg |
| Mounting angle | Panel vertical ± 30˚ S |

### 1.1.3 INTERNAL WIRING (Cont.)

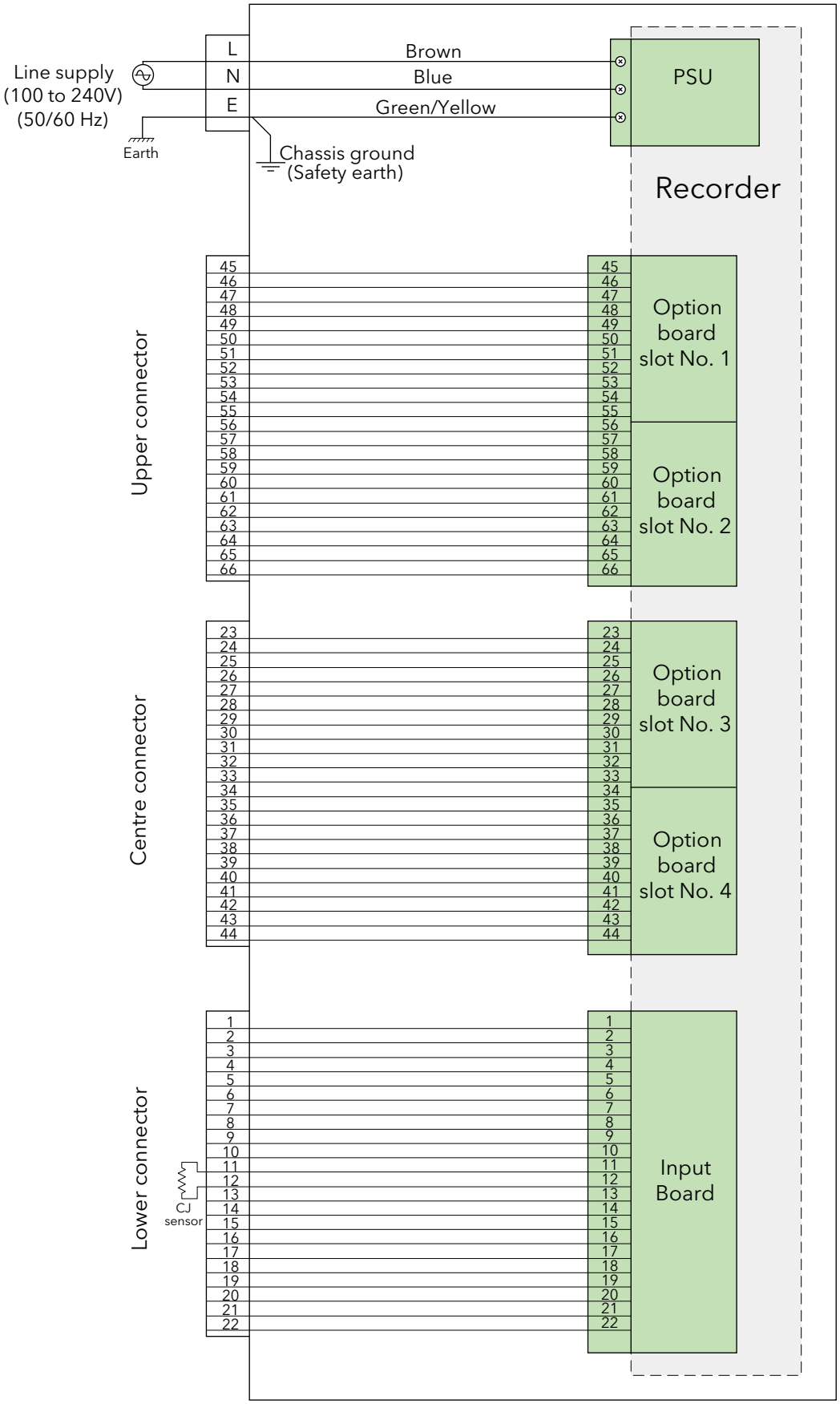



Figure 1.1.3a Internal wiring (one input board)

**1.1.3 INTERNAL WIRING (Cont.)**

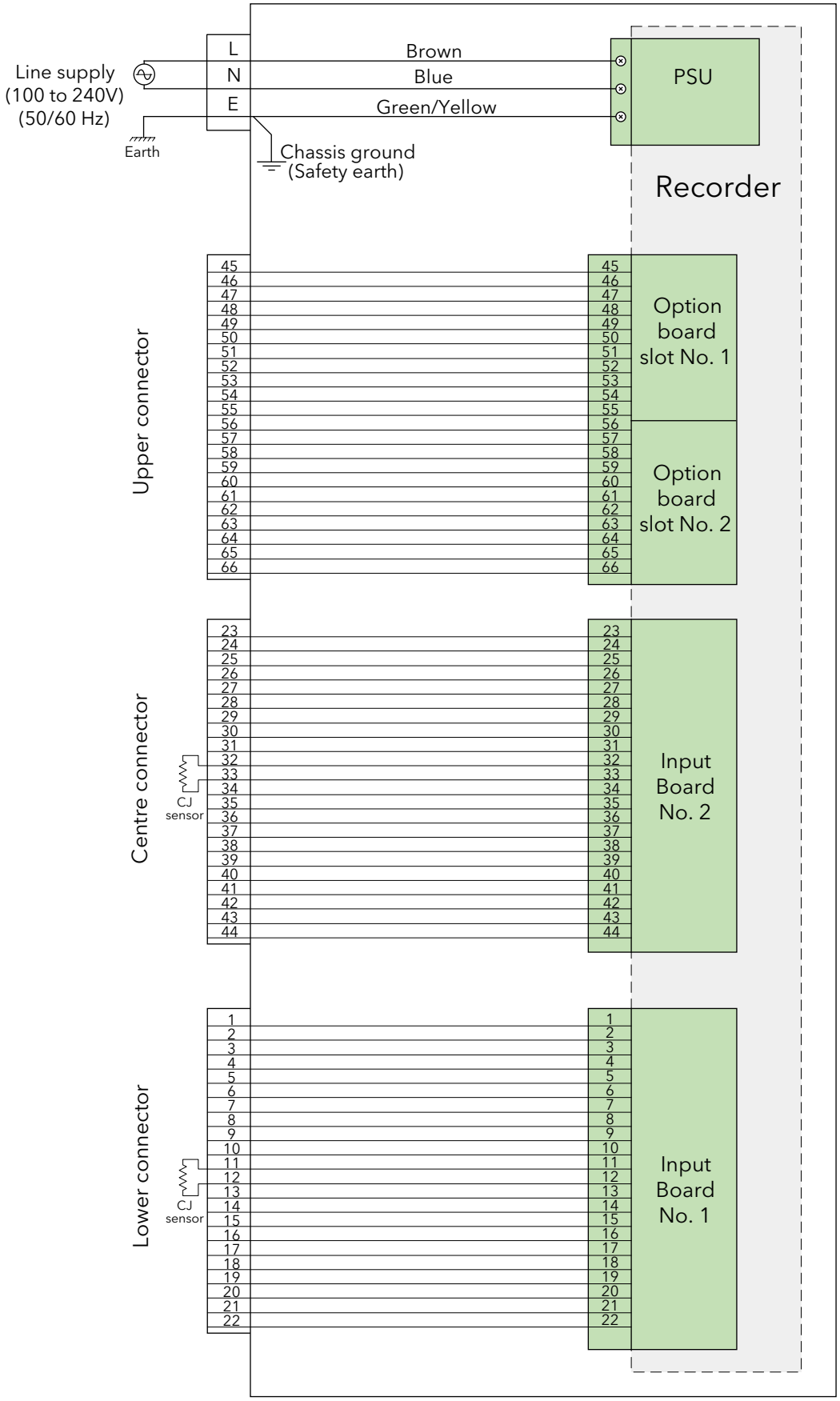



Figure 1.1.3b Two input boards (graphics recorders only)

# 2. BASIC OPTION WITH TRANSMITTER POWER SUPPLY

This basic portability option provides a rugged carrying case for use with 100mm recorders fitted with up to one hardware option (relays or re-transmission) and (if required) a transmitter power supply.

## 2.1 WIRING

The details of input channel wiring depend on the recorder model and type fitted in the case. for definitive details refer to the user guide or installation and operation manual supplied with the recorder. Figure 1.1 below shows terminations for a six-channel recorder.

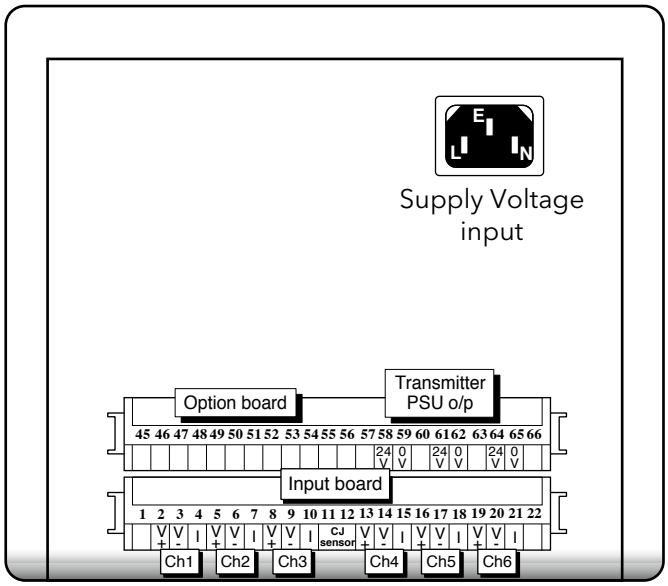



Figure 2.1 Wiring connector location (six input channel version)s

### 2.1.1 Supply voltage

Caution

Before powering the recorder, check that the supply voltage to be applied lies within the range specified on the serial number label at the rear of the recorder.

As shown above, the line supply is terminated using an IEC plug and socket at the rear of the recorder. Minimum recommended conductor size is 16/0.2 (0.5mm$^2$). Low voltage (24 v nom ac/dc) versions of this option are not available.

### 2.1.2 Signal wiring

Input and option board terminations are located as shown in figure 2.1. As can be seen, the input channels are wired to the lower connector (terminals 1 to 22). The option board (if fitted) is wired to the upper connector using terminals 45 to 55 and the transmitter power supply is terminated as the upper terminal block using terminals 56 to 66. Internal wiring is shown in figure 2.1.3 below. For full wiring details see Annex A of this manual

**Note:** With some recorder models, there are constraints regarding the wiring of Resistance Temperature Detectors (RTDs) to channel 1, if any other channel's transducer is a thermocouple. See the input board specification in the manual supplied with the recorder.

## 2.1.3 Internal wiring

Figure 2.1.3 shows wiring details between the recorder and the back panel connectors. Internal wiring is as shown for both continuous-trace and multipoint recorders.

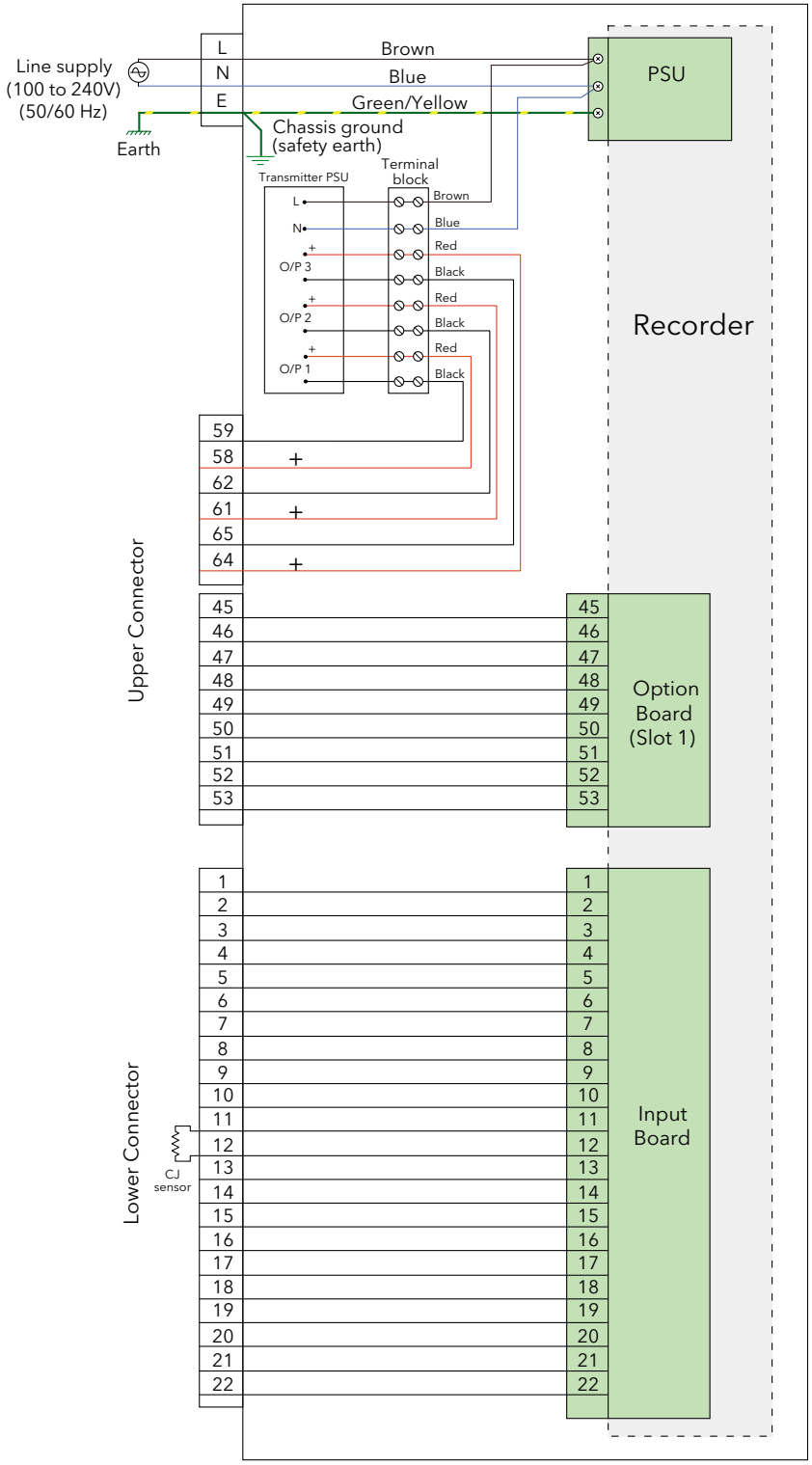



Figure 2.1.3 Internal wiring

# 3 HTM2010 Quarterly Test Kit

## 3.1 INTRODUCTION

This section describes the use of 100 mm chart recorders specified for use as HTM 2010 test recorders. The details supercede the relevant parts of the Installation and Operation Manual supplied with the recorder.

The option is supplied as a four-channel or six-channel, 100 mm, configurable recorder in a rugged portable case, configured for three type-T thermocouples and one pressure transducer. The option comes complete with pressure transducer, insertion tubes and miniature plugs for type T thermocouples. As supplied, the recorder is configured for use with small, unwrapped utensil sterilisers.

## 3.2 WIRING

### 3.2.1 Supply voltage

The supply voltage is applied to the recorder using an IEC socket.

### 3.2.2 Signal wiring

Signal wiring is simply a matter of wiring the thermocouples to the relevant plugs and plugging them and the (pre-wired) pressure transducer in. Figure 3.2.2a shows the arrangement of the sockets at the rear of a six-channel recorder, and figure 3.2.2b shows the wiring of the thermocouple plugs.

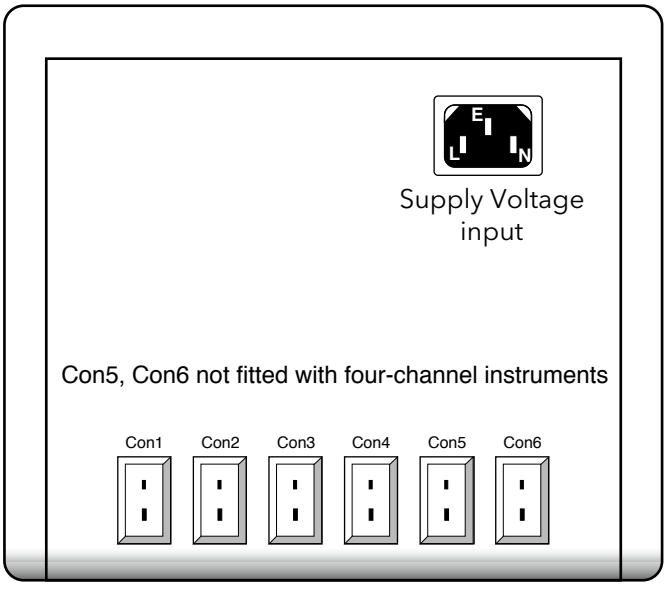
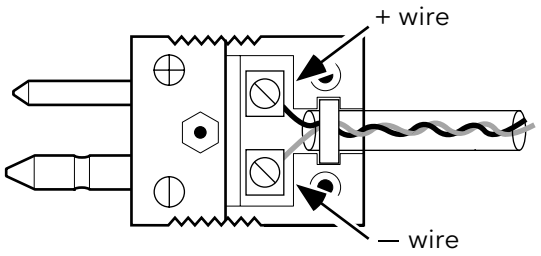



Figure 3.2.2a transducer socket locations




| | T/C type T colours | |
|---|---|---|
| | BS1843:1952 | BS4937:1993 IEC584-3:1989 |
| + | White | Brown |
| — | Blue | White |
| Sheath | Blue | Brown |

Figure 3.2.2b Thermocouple plug wiring (cover removed for clarity)

### 3.2.3 Internal wiring

Figure 3.2.3 shows the internal wiring from the connectors on the rear panel to the input circuits and transmitter power supply of a four channel recorder.

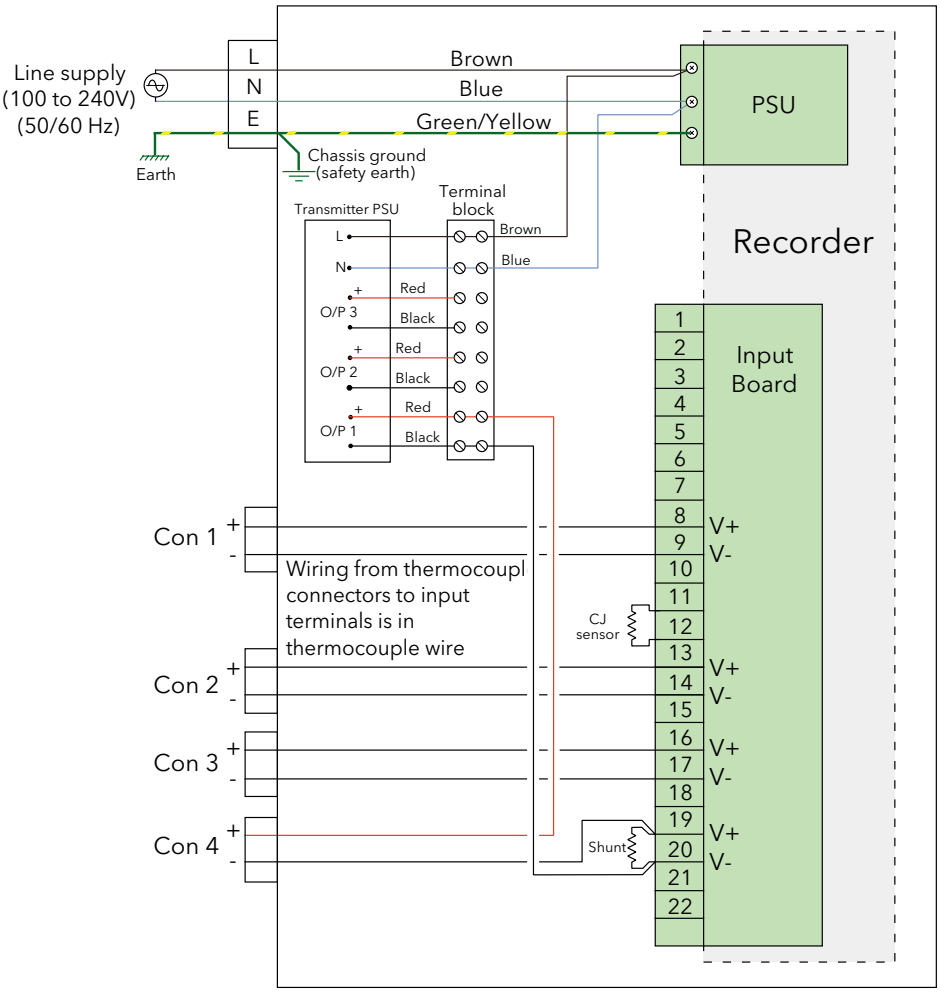



Figure 3.2.3 Internal wiring details

## 3.3 SPECIFICATION

| | | |
|---|---|---|
| **Recorder** | | |
| Temperature limits | Operation: | 0 to 50˚C |
| | Storage: | -20 to +70˚C |
| **Safety isolation** | | |
| | | DC to 65 Hz: BS EN61010 (Installation category II; Pollution degree 2 (see 'safety Notes on page 2 for definitions) |
| | Channel to channel: | S.E.L.V. (i.e. 30V dc or RMS) to earth |
| | Channel to ground: | S.E.L.V. (i.e. 30V dc or RMS) to earth |
| **Pressure transducer** | | |
| Input range | | -1 to 3 Bar G |
| Output range | | 4 to 20 mA |
| Supply voltage range | | 12 to 32v dc |
| Non linearity/hysteresis | | <+0.25% span |
| Long term stability | | 0.1% in 12 months |

# 4 POWER MONITORING OPTION

## 4.1 INTRODUCTION

The recorder is mounted in a portable case with connector receptacles provided at the rear to allow the simultaneous monitoring of ac voltage and current inputs. This option is available in several versions (as shown in table 4.1) for measuring ac current (using a current clamp) and/or ac line voltage via voltage transducers.

| Number of inputs | |
|---|---|
| Volts | Amps |
| 0 | 3 |
| 1 | 0 |
| 1 | 1 |
| 1 | 3 |
| 3 | 0 |
| 3 | 3 |

**Table 4.1 Available current/ voltage combinations**

The unit comes supplied with current clamps and sets of safety leads appropriate to the version ordered. Each current clamp gives a dc output signal of 0 to 1V for ac currents of 0 to 25 or 0 to 100 Amperes (as ordered), or for 250, 500 or 1000Amps (switchable). The maximum output of 1 Volt means that the current clamp remains safe, even under open circuit conditions. Voltage transducers are available for ac voltages (45 to 65 Hz) of 0 to 300 V and 0 to 500V RMS (sinusoidal) or average (non-sinusoidal).

WARNING!

Conformance with the safety and performance specifications in section 4.4 cannot be guaranteed with current clamps other than those supplied with the recorder. In particular, clamps which are not limited to a maximum output of 1V dc MUST NOT be connected to the recorder or permanent damage will result.

If a maths pack option is fitted (availability depends on recorder model), power (VA) per phase can be calculated by the 'Multiply' function, and the resulting 'Derived Variable' (DV) can be traced or it can be logged to the chart (not graphics recorders), or if the relevant archiving option is fitted, to a bulk storage medium (e.g. SRAM memory card).

## 4.2 CONFIGURATION

Recorders are preconfigured for the version ordered, but the following configuration example shows how a configurable recorder is set up to measure one ac phase current of up to 100Amps (channel 1) and one voltage uo to 300 Vac (channel 2) and trace the instantaneous VA on the chart (Derived Variable 1).

### 4.2.1 Input configuration

#### Channel 1

Channel 1 is configured as follows for a 100A clamp:

| | |
|---|---|
| Input type: | V |
| Input range: | 0 to 1 |
| Linearisation type: | Linear |
| Scaled | 0 to 100 |
| Scale units | A |
| Value format: | XXX.XX |
| Damping: | None |
| Break response: | None |
| Offset | 0.0000 |
| Tag: | Current |

#### Channel 2

Channel 2 is configured as follows for a 300V transducer:

| | |
|---|---|
| Input type: | V |
| Input range: | 0 to 1 |
| Linearisation type: | Linear |
| Scaled | 0 to 300 |
| Scale units: | Vac |
| Value format: | XXX.XX |
| Damping: | None |
| Break response: | None |
| Offset | 0.0000 |
| Tag: | Voltage |

### 4.2.2 Derived channel configuration (Options Manual Section 3)

**Note:** Not all recorders support derived channels

DERIVED CHANNEL 1

For the above example using a 100 Amp clamp and a 300V voltage transducer, Derived channel 1 is configured as follows:

| | | | |
|---|---|---|---|
| Function | Multiple | Trace | On |
| Equation | Mult Ch1 by Ch 2 | Pen | Green |
| Val format | XXXXX. | Span | Unspanned |
| Scaled | 0 to 30000 | | |
| Scale units | VA | | |
| Tag | Phase 1 power | | |

### 4.2.3 Alarm/Relay configuration

Alarms are not preconfigured. See the Installation and Operation manual, or Options Manual (depending on recorder model) for configuration details.

## 4.3 WIRING

### 4.3.1 Connector locations

Figure 4.3.1 is a representation of the rear panel of both mains (line) powered and 24 Volt recorders, giving locations for the various connectors. Figure 4.3.2 shows typical internal wiring between the rear panelconnectors and the recorder's input channels. In all cases, if current transducers are fitted, they are wired to the lowest channel numbers. E.G for one voltage input and three current inputs, the current inputs are wired to channels 1, 2 and 3 and the voltage input to channel 4.

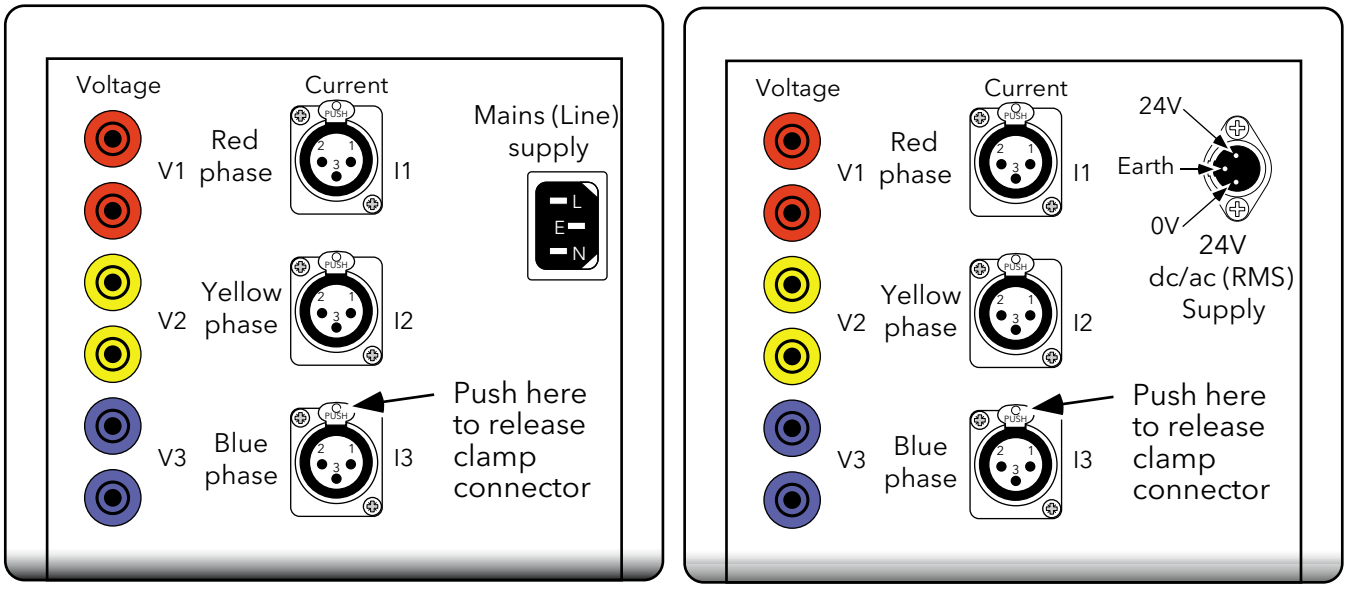



Figure 4.3.1 View on rear panel

### 4.3 WIRING (Cont.)

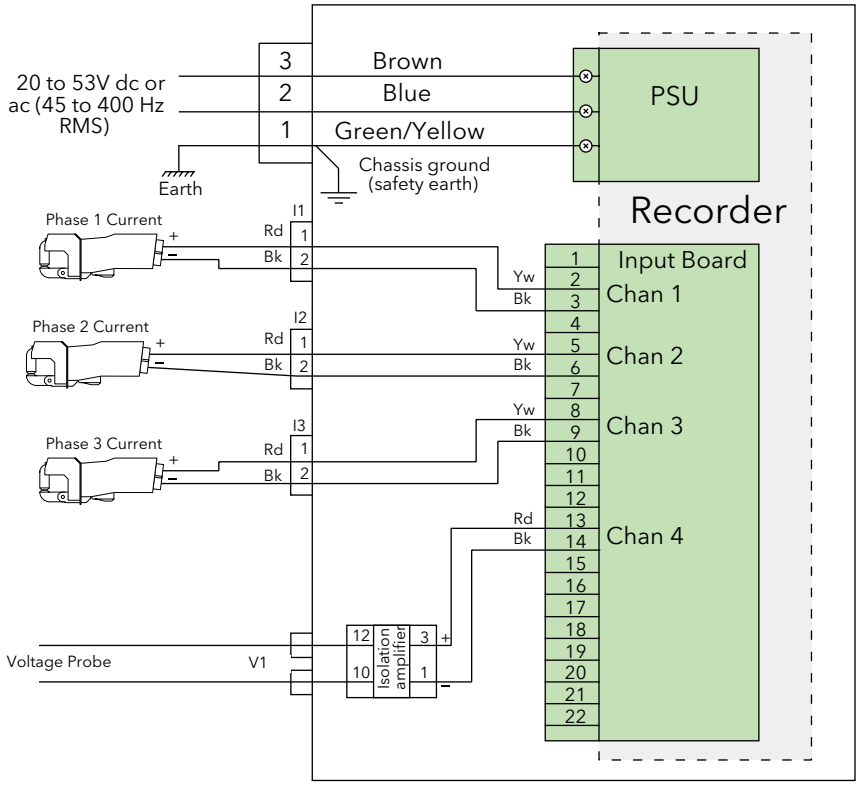



Figure 4.3.2a Internal wiring for three current inputs and one voltage input (low supply voltage option)

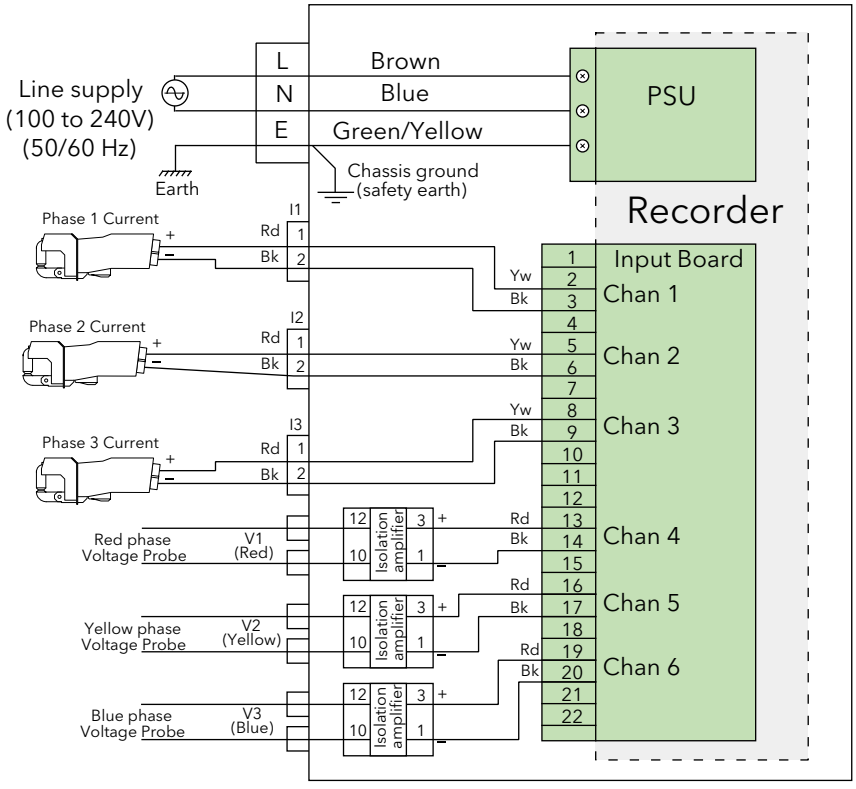



Figure 4.3.2b Internal wiring for three current inputs and three voltage inputs

## 4.4 SPECIFICATION

The recorder specification as given in annex A of the Installation and Operation Manual is modified as follows:

| | |
|---|---|
| **Safety Isolation** | |
| | DC to 65Hz: BS EN61010 (Installation category II; Pollution degree 2 (see 'Safety Notes' on page 2 for definitions) |
| Current clamp connections: | S.E.L.V. (i.e. 30V dc or RMS) to earth. |
| Input voltage connections: | 600V dc or RMS to each other (basic insulation), and 600V dc or RMS to earth (double insulation). |
| **Protection** | |
| | IP21 |
| **Voltage transducer** | |
| Input accuracy | 1.1% reading + 2.05% full scale (Note 1) |
| Temperature coefficient | 0.04% of reading per ˚C |
| Frequency range | 45 to 65 Hertz |
| Temperature range | 0 to 50 ˚C (operating); -10 to +70˚C (storage) |
| **Current clamp (0 to 25A, 0 to 100A)** | |
| Input accuracy | 0.35% reading + 0.3% full scale |
| Frequency range | 45 to 65 Hertz |
| Temperature range | 0 to 50 ˚C (operating); -10 to +70˚C (storage) |
| **Current clamp (Switchable, 250, 500, 1000 Amps)** | |
| Input accuracy | 2.1% reading + 0.55% full scale |
| Frequency range | 45 to 65 Hertz |
| Temperature range | 0 to 50 ˚C (operating); -10 to +70˚C (storage) |

**Notes**

1. Input accuracy specification is with the unit at 20˚C, and includes recorder figures

# 5 Environmental monitor and data logger

## 5.1 INTRODUCTION

This document assumes a 12-channel recorder with six probes - other recorders are similar, except where stated.

The recorder is a four, six or 12 input-channel recorder, suitable for use with two, three or six environmental probes respectively. The instrument is mounted in a portable case and can be powered either by mains (line) supply or by 24V dc as specified at time of order  Relay outputs are fitted so the user can be alerted to unusual or unacceptable conditions

The unit can be supplied with probes with integral push-fit connectors, which mate with receptacles at the rear of the recorder. The probes each contain a Pt100 Resistance temperature detector (RTD) and a humidity detector. Alternatively, if the user supplies the probes, only the push-fit connectors will be supplied.

For 12-channel graphics recorders, the RTDs in probes one to six are connected to channels 1, 3, 5, 7, 9 and 11 respectively, and display group 1 is preconfigured to to contain these channels. The Humidity detectors in probes one to six are connected to channels 2, 4, 6, 8, 10 and 12 respectively, and display group 2 is preconfigured to contain these channels. Section 5.4 of the manual describes group configuration. For six channel graphics, only channels 1, 3 and 5, and 2, 4 and 6 are used and all these are contained in display group 1.

For multipoint recorders, channels 1, 3 and 5 are used for RTDs in probes 1 to 3 respectively and channels 2, 4 and 6 are used for the humidity detectors.

For continuous-trace recorders, channels 1 and 3 are used for RTDs in probes 1 and 2 respectively, and channels 2 and 4 are used for the humidity detectors.

## 5.2 CONFIGURATION

### 5.2.1 Input channels

Odd numbered channels

Odd numbered channels are pre-configured as follows:

| | |
|---|---|
| Input type: | RTD |
| Input range: | 0 to 50.00 |
| Input units: | ˚C |
| Linearisation type: | Pt100 |
| Unscaled | |
| Value format: | XX.XXX |
| Damping: | None |
| Break response: | None |
| Tag: | Chan 1 (3) (5) (7) (9) (11) |

### 5.2.2 Alarm/Relay configuration

Alarms are not preconfigured. See the relevant section of the Installation and Operation Manual supplied with the recorder for details.

## 5.3 WIRING (12-channel recorder)

Figure 5.3a below is a representation of the rear panel showing connector locations and a pinout for the relay option board. Figures 5.3b and 5.3c show the internal wiring between the rear panel connectors and the recorder.

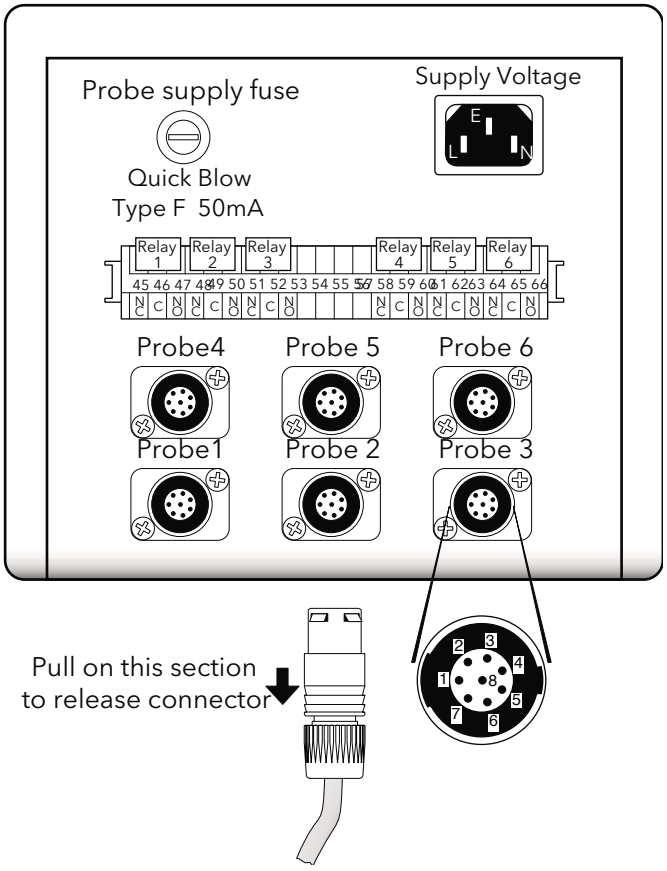



Figure 5.3a Connector location and pin-out

## 5.4 SPECIFICATION

The recorder specification as given in Annex A of the manual is modified as follows:

| | |
|---|---|
| Safety Isolation | |
| | DC to 65Hz: BS EN61010 (Installation category II; Pollution degree 2 (see 'Safety Notes' on page 2 for definitions) |
| Current clamp connections: | S.E.L.V. (i.e. 30V dc or RMS) to earth. |
| Input voltage connections: | 600V dc or RMS to each other (basic insulation), and 600V dc or RMS to earth (double insulation). |
| Protection | |
| | IP21 (IP20 if relays fitted) |
| Fuse specification | |
| | 20 x 5 mm; 50mA type F |

**PORTABLE ENVIRONMENT MONITOR (Cont.)**

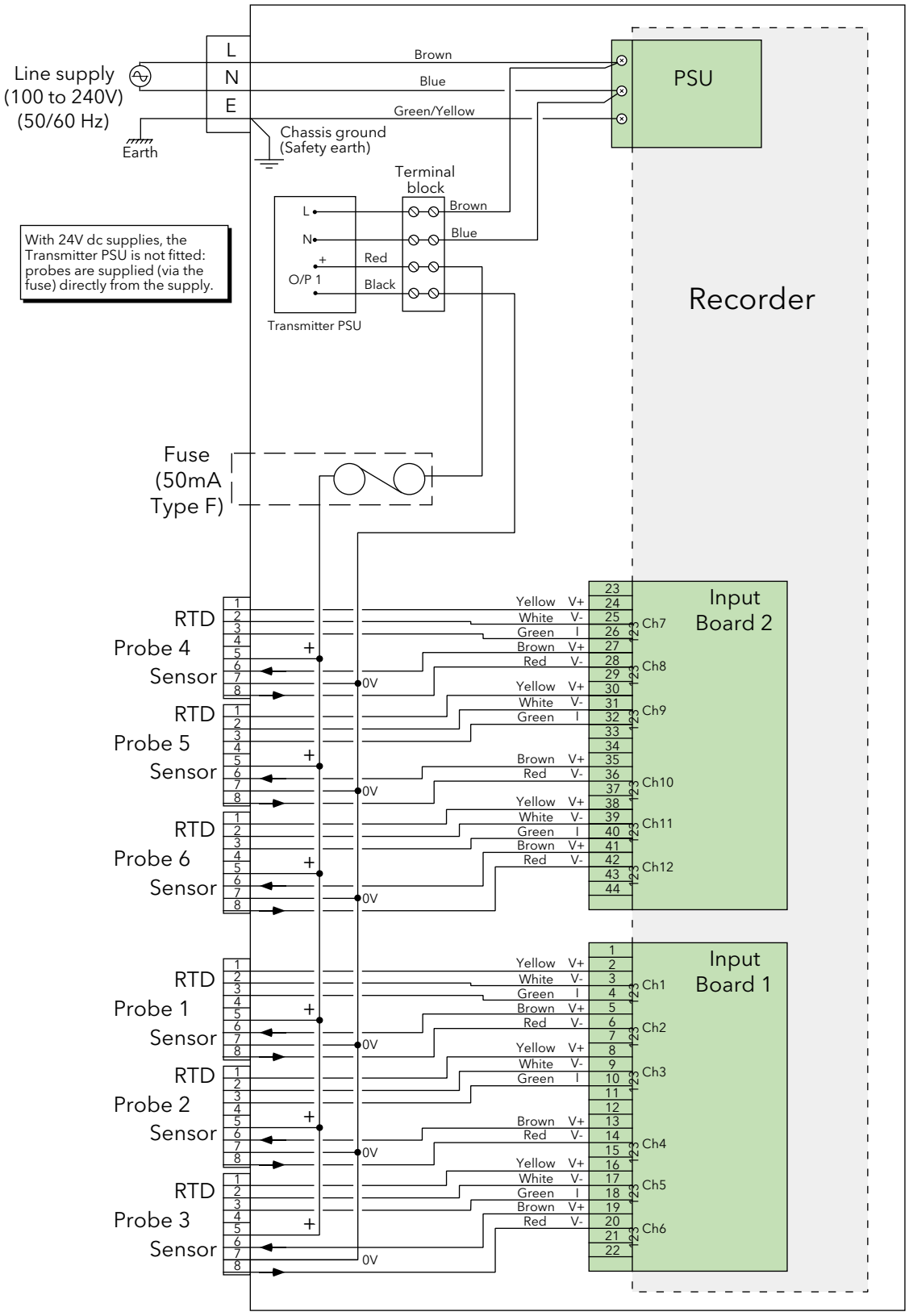



Figure 5.3b Internal wiring (input connectors and power supplies)

**PORTABLE ENVIRONMENT MONITOR (Cont.)**

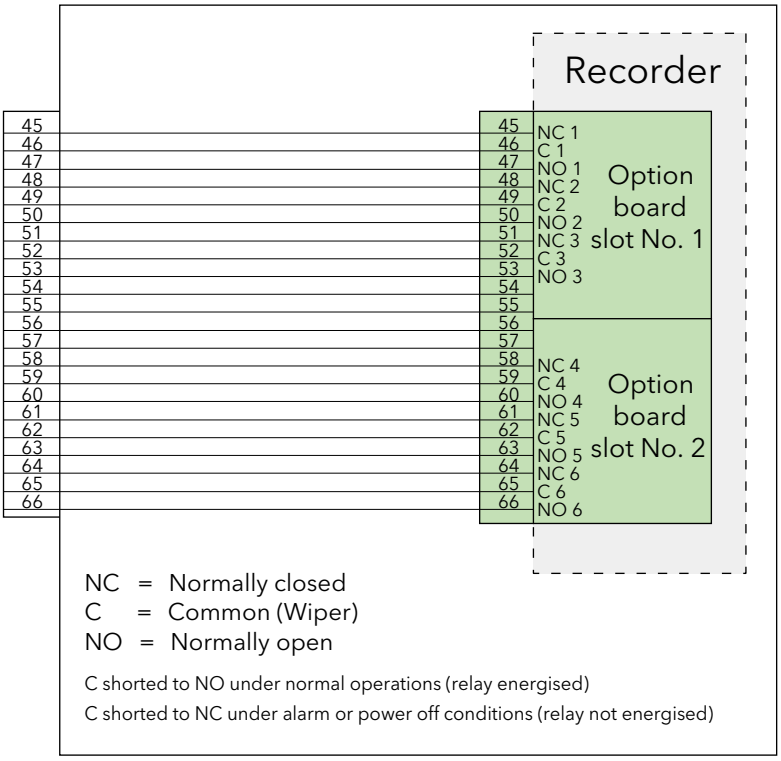



Figure 5.3c Internal wiring (relay board)

## 5.5 24 VOLT DC SUPPLY OPTION

Where the dc supply option is ordered, the relevant part of the internal wiring diagram is replaced by figure 5.3d. Note that the probes are supplied by the 24V power supply and the transmitter power supply is not fitted.

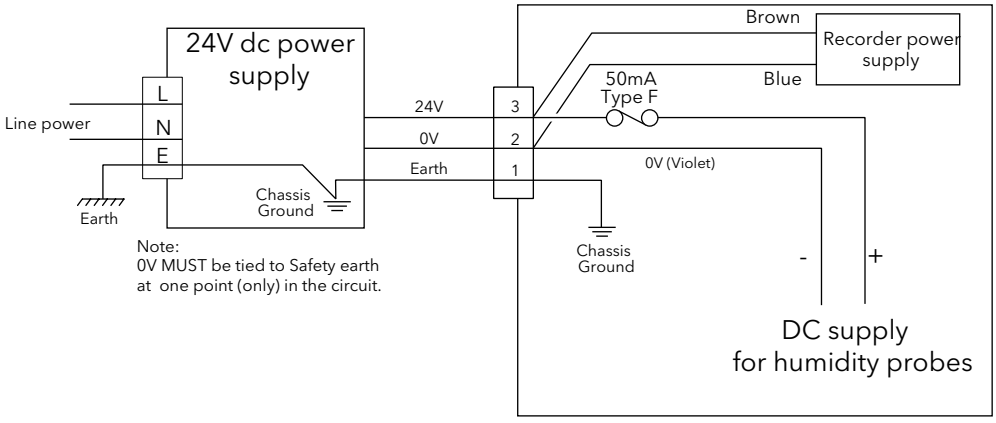



Figure 5.5 DC supply option internal wiring

# 6 Low supply voltage options

Many of the portable case options described in this manual can be ordered for use with 24V (nom.) supply voltages. In such cases, the supply voltage part of the wiring diagrams is replaced with that shown in figure 6a unless otherwise stated. The low voltage supply is terminated by a three pin plug, as shown in figure 6b.

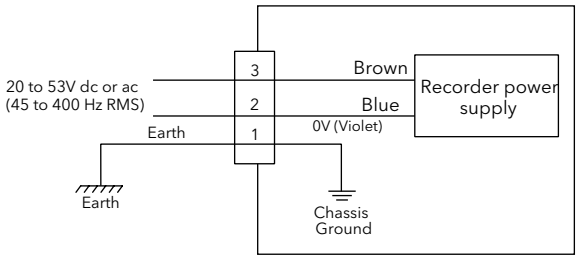



Figure 6a Internal wiring for low voltage options

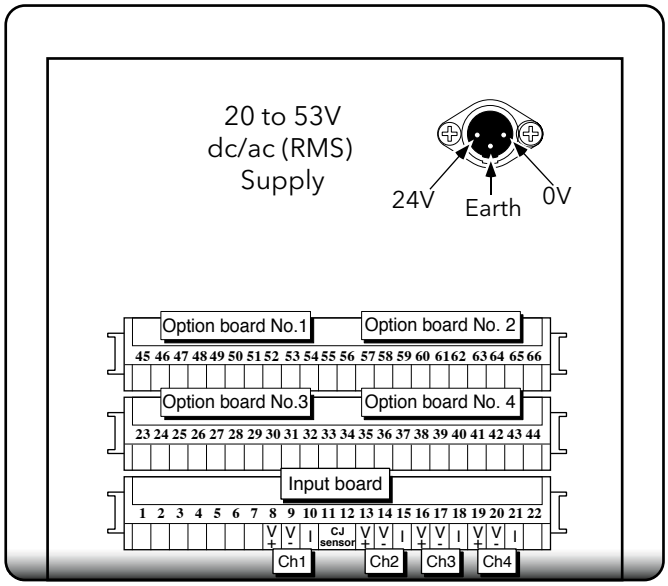



Figure 6b Low supply voltage connector details

## 6.1 SPECIFICATION

| Supply voltage | |
|---|---|
| Voltage | 20 to 53V dc or ac* (RMS) (ac frequency range 45 to 400 Hz) |
| Current (max) | 5A |

* The standard low voltage option input is suitable for ac or dc. Some of the portable case options, however, are not available for use with low voltage ac supply.

| Safety | |
|---|---|
| safety Isolation | All input and output connections are S.E.L.V. (i.e. 30V dc or RMS) to earth |

# Annex A: Wiring details

## A1 STANDARD INPUT WIRING

Figure A1 shows wiring details for standard input circuits

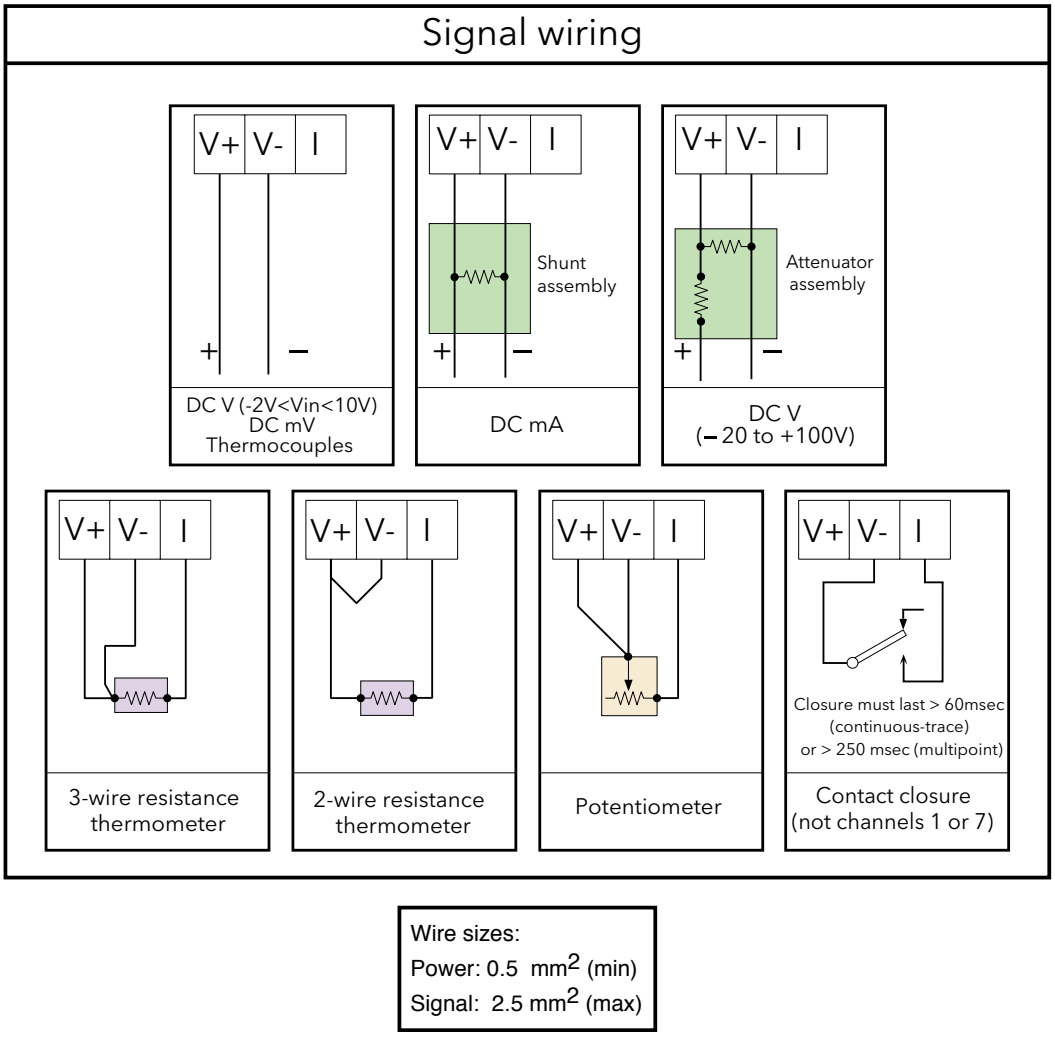



Figure A1 Standard input wiring

**Notes:**

1. Contact closure inputs not available on all recorder models
2. See the user guide/installation and operation manual supplied with the recorder for contraints on connecting RTDs to channel 1.

## A2 OPTION BOARD PINOUTS

This section shows the pinouts for the three types of relay board and the re-transmission board. For details of other option board pinouts, refer to the Options Manual or the options section of the User guide, whichever is supplied with the recorder. The drawings below assume a four/six input channel recorder. For 12-channel recorders, the second input board occupies Option board slots 2 and 4, thus reducing the number of options available.

### A2.1 RELAY OUTPUT BOARDS

Safety isolation All input and output terminals are S.E.L.V. (i.e. 30V dc or RMS) to earth.

#### A2.1.1 Three change-over relays board

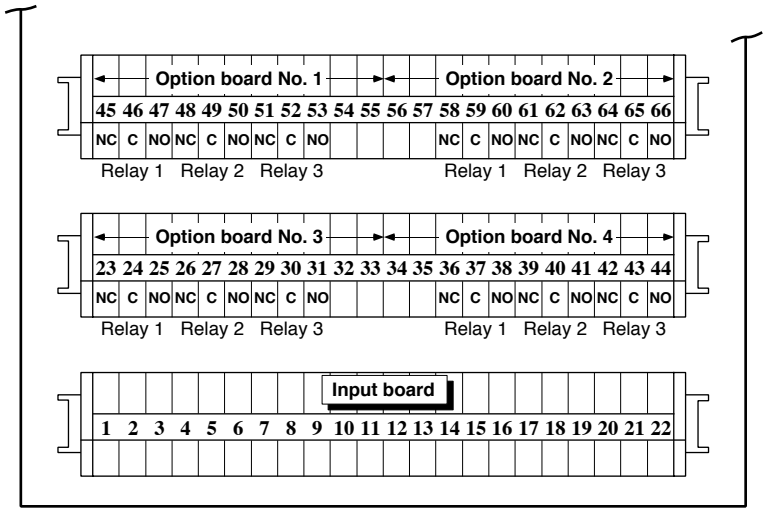



Figure A2.1.1 Three change-over relay board pinout

#### A2.1.2 Four normally open relays board

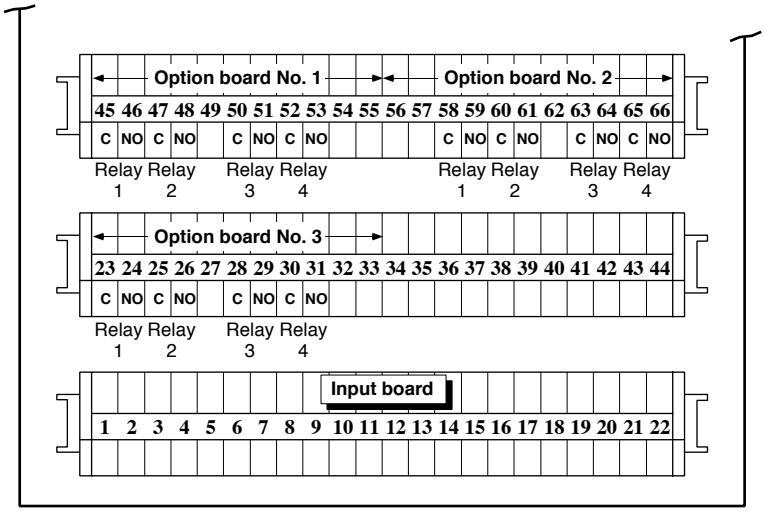



Figure A2.1.2 Four normally-open relay board pinout

### A2.1.3 Four normally closed relays board

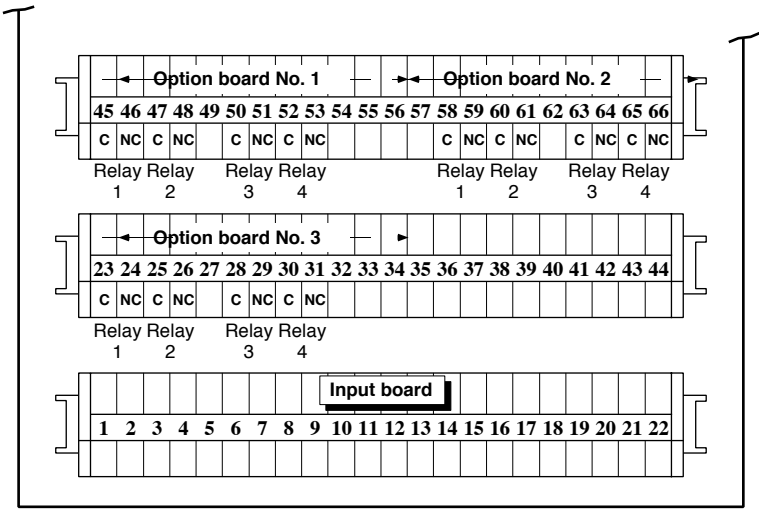



Figure A2.1.3 Four normally-closed relay board pinout

## A2.2 RETRANSMISSION (ANALOGUE OUTPUT) BOARD

Safety Isolation Channel to channel: 30V RMS or dc
Channel to ground: 30V RMS or dc.

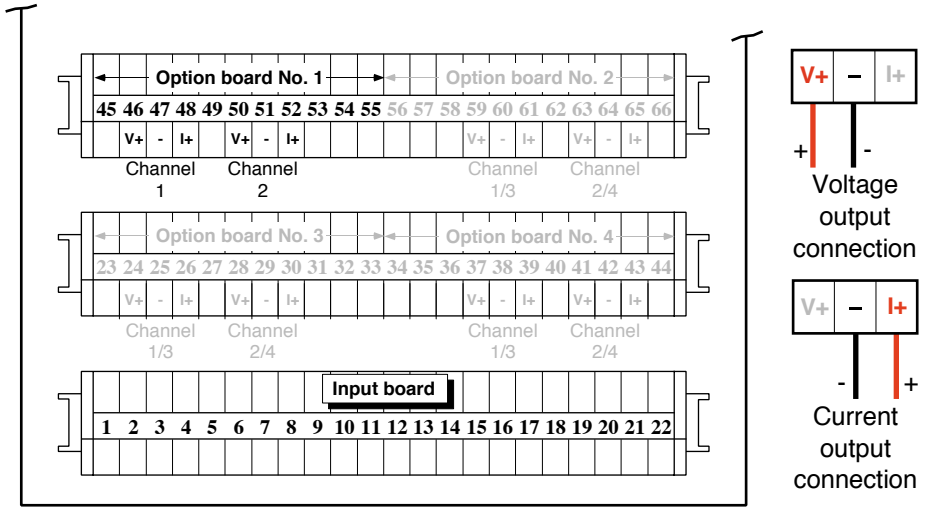



Figure A2.2 Retransmission output board

**Notes:**

1. Up to two retransmission output boards may be fitted. Figure 2.2 gives the pinout for each of the four positions in which they may be fitted.
2. Where relay boards are fitted as well as retransmission boards, the relay boards have the lower slot numbers.

# Annex B GENERAL SPECIFICATION

This is a general specification for the portable case options, showing only those areas which differ from the specification which appears in the user guide or installation and operation manual supplied with the recorder.

Individual option sections show any modifications to this Annex B specification.

| Environmental Performance (chart recorders) | |
|---|---|
| Temperature limits | Operation: 0 to 50°C; Storage: –20 to +70 °C |
| Humidity limits | Operation: 5 to 80% RH (non-condensing). Storage: 5 to 90% RH (non-condensing |
| Protection | IP21 |
| Shock | BS EN61010 |

| Environmental Performance (graphics recorders) | |
|---|---|
| Temperature limits | Operation: 0 to 40°C; Storage: –20 to +70 °C |
| Humidity limits | Operation: 5 to 80% RH (non-condensing). Storage: 5 to 90% RH (non-condensing |
| Protection | IP21 |
| Shock | BS EN61010 |

| Physical | |
|---|---|
| Weight | <5.5 kg |
| Mounting angle | Panel vertical ± 30° |

# LIST OF EFFECTIVE PAGES

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