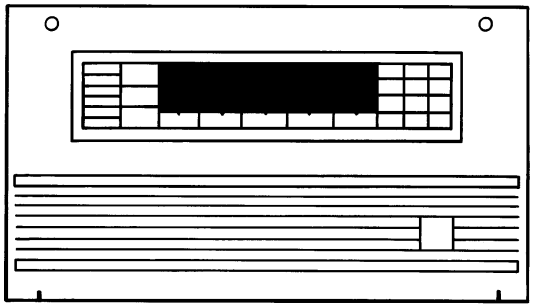
- Data acquisition system
- Up to 96 input channels
- High speed processing
- Universal 8-channel input board
- High density 16-channel input board
- Optional 80-character, 3 -colour
- vacuum fluorescent display
- Data storage to PCMCIA memory card
- RS232/485 MODBUS communications
- XIODL communications and networking software
- Panel or 19" rack mounting



The 4000R is designed for use as a stand-alone remote indicating/alarm unit, or for network use with the Chessell range of large frame video recorders. The unit is suitable for both panel and 19" rack mounting.

Input Technology

The 4000R provides inputs of very high accuracy and stability using the latest in Application Specific Integrated Circuits (ASIC) and surface mount technology. All inputs to the 8-channel and 16-channel input boards are scanned in 1 second and are isolated to 250V channel-to-channel and channel-to-ground.

Alarms

Up to four alarms are available per channel. These alarms can be configured as absolute high/low, rate of change rising/falling, deviation in/out or digital change of state. All alarm setpoints are scanned every second.

Options

Memory Card Archiving

Use of the widely accepted PCMCIA standard allows data to be stored in a format readable by commercial spreadsheet packages. The unit's configuration can also be stored on the card for transfer to another instrument or to a PC for manipulation using the PC configuration editor.

Software

Special software options include Continuous Emissions Monitoring (CEM) and Quality Monitoring.

Options (Continued)

Maths, Timers, Counters, Totalisers

These options provide the recorder with integrating and counting facilities, and with the ability to carry out calculations ranging from simple arithmetic functions such as subtracting one channel from another to complex, application specific functions such as Relative Humidity calculations.

Serial Communications

Using the MODBUS or EI bisynch protocol, the Model 4000R forms an ideal data acquisition unit for a central plant SCADA system. Up to 16 instruments can be linked on an RS422 multi-drop communications loop.

High Visibility Display

The display panel with its integral keyboard provides an excellent operator interface, permitting the Model 4000R to be used as a local process indicator and alarm monitor. The vacuum fluorescent display, which consists of two lines of 40 blue characters with red and green bargraphs, indicates process values and also provides digital readout of channel values and engineering units. The keyboard is used for configuration and for acknowledging alarms as they occur. The display panel can be integrally mounted, or remotely mounted on a wall or panel. When remotely mounted it has an IP65 rating, making it ideal for tough indusrial environments.

Model 4000R

Specification sheet

TECHNICAL SPECIFICATION (Recorder)

Board types

Input board types	8-channel universal; 16-channel dc*
Output board type	8-channel relay output, 4/8-channel analogue output (AO)
Max number of I/O boards per type	12 off 8-channel input, 12 off relay output; 6 off 16-channel input, 6 off 8-channel analogue o/p, 12 off 4-channel analogue o/p
Max number of inputs	96 dc inputs*; 96 resistance inputs; 96 contact closure.
Max number of outputs relay o/p:	8 x no of free slots.
Analogue o/p:	48 (in any combination of 4- or 8- channel boards)

*Volts, mV, mA, thermocouple, contact closure, but not resistance inputs.

Environmental Per formance

General	To BS2011: 1981
Temperature limits Operation:	0 to + 50 ˚C
Storage:	-20 to +70 ˚C
Humidity Operation/storage	5 to 85% RH; non-condensing
Maximum altitude	<2000 metres
Protection	IP54
Shock	BS EN61010 1990 (Safety); IEC873: 1986
Vibration	2g peak at 10 to 150Hz

Electr omagnetic compatibility (EMC)

Emissions	BS EN50081-2
Immunity	BS EN50082-2

Electrical Safety

To BS EN61010: 1990 Class 1.

Physical (main unit)

Door	483mm wide x 265.2 mm high
Chassis	19" x 6U
Panel cutout size (mm)	434 wide x 263 high (both +1.5 - 0)
Depth behind panel front face	309 mm
Weight (Eight-channel instrument)	20kg max

Physical (panel mounting display unit)

Bezel	365 mm wide x 85 mm high
Body	359 mm wide x 75 mm high
Panel cutout size (mm)	360 wide x 80 high (both +0.5 - 0)
Depth behind panel front face	41 mm

Physical (wall mounting display unit)

Mounting plate	365 mm wide x 128 mm high
Unit	365 mm wide x 85 mm high
Fixing centres (fixings 6mm. max.)	259 mm, 20 mm from lower edge of mounting plate
Height in front of panel front face	49.5 mm mm

Performance

Maximum scan and update rate	All parameters in 1 second
Maximum print rate (trending)	45 channels per second
Maximum chart speed	1500 mm/hr.
Clock accuracy	Better than 50 ppm

Power requirements:

Line voltage (45 to 65 Hertz)	90 to 132 Volts or 180 to 264 Volts (User selectable).
Maximum power	120 W
Fuse type	Ceramic 20 mm. 3.15 Amp. Fast blow.
Interrupt protection	100 ms at 60% load.

Memory pr otection

Type	EEPROM (for configuration) Battery-backed RAM for clock, etc.
RAM / clock-support battery type	Nickel-Cadmium (rechargeable)
Support period (no power to recorder)	3 months min. at 25 ˚C; 1 month min. at 50 ˚C.

8-CHANNEL UNIVERSAL I/P BOARD SPECIFICATION

General specification

Number of inputs	8
Termination	Edge connector / terminal block
Input types	DC Volts, dc millivolts, dc milliamps (with shunt). Thermocouple, RTD (2- or 3-wire), Ohms, Contact closure
Input type mix	User selectable during configuration.
Measurement frequency	All channels in 1 second
Step response to within resolution	2 seconds
Noise rejection Common mode:	150dB above 45 Hz. (channel-channel and channel-ground.)
Series mode:	67dB above 45 Hz.
Maximum common mode voltage	250 Volts
Maximum series mode voltage	10 mV at lowest range; 500 mV peak at highest range.
Isolation (dc to 65 Hz; BS EN61010)	Installation cat.2 Pollution degree 2
channel-to channel	300 V (double isolation)
channel-to-ground	300V (basic isolation)
Dielectric strength channel-to-channel	2350 V ac (1 minute type test)
channel-to-ground	1350V ac (1 minute type test)
Insulation resistance	50 MΩ at 500V dc.
Input impedance	>10 MΩ (68.8kΩ for 10V ranges)
Over-voltage protection	60 Volts peak; 500 Volts through 50 kΩ resistor
Open cct detection (to 200 mV range)	65 nA current max. 8 seconds recognition time (max.) 40 MΩ minimum break resistance.

DC input ranges

Ranges available	See table 1
Temperature performance (worst case)	
-10 to +40mV	(80ppm reading + 27.9ppm range)/˚C
-50 to +200mV	(80ppm reading + 12.4ppm range)/˚C
-0.5 to +1.0V	(80ppm reading + 2.1ppm range)/˚C
-5 to +10V (100V with attenuator)	(272ppm reading + 4.7ppm range)/˚C
Shunt/Attenuator	Externally mounted resistor modules
Additional error due to above	0.1% (shunt); 0.2% (attenuator)
Typical performance	See table 1

Range	Resolution	Performance (worst case) in instrument at 20 ˚C
–10 mV to + 40 mV	1.4 µV	0.083 % reading + 0.056 % range
– 50 mV to + 200 mV	14 µV	0.072% reading + 0.073% range
– 0.5 V to + 1 V	37 µV	0.070% reading + 0.032% range
– 5 to + 10 V	370 µV.	0.223% reading + 0.034% range

Table 1 DC performance - 8-channel board

Thermocouple data

Linearisation errors	0.15 ˚C or better
Bias current	<2 nA (<10 nA at 70 ˚C)
Cold Junction (CJ) types (selectable)	Off, internal, external, remote.
CJ error	1 ˚C or better
CJ rejection ratio	25:1 minimum
Remote CJ	Via any user-selected input channel.
Upscale/downscale drive	Configurable for each channel
Types and ranges	See table 2

Installation category II: The rated impulse voltage for equipment on nominal 230V mains is 2500V.

Pollution degree 2: Normally, only non-conductive pollution occurs. Ocassionally, however, a temporary conductivity caused by condensation shall be expected.

T/C type	Range (˚C)	Standard
B	+ 200 to + 1800	IEC584.1:1977
C	0 to + 2300	Hoskins
E	- 200 to + 1000	IEC584.1:1977
J	- 200 to + 1200	IEC584.1:1977
K	- 200 to + 1370	IEC584.1:1977
L	-200 to + 900	DIN 43710
N	- 200 to + 1300	IEC584.1:1977
R	- 200 to + 1760	IEC584.1:1977
S	- 50 to + 1760	IEC584.1:1977
T	- 250 to + 400	IEC584.1:1977
U	- 100 to + 600	DIN 43710-85
NiNiMo	0 to + 1300	Eurotherm Recorders
Platinel II	-100 to + 1300	Engelhard R83

Table 2 Thermocouple types and ranges

3-wire RTD data

RTD linearisations		Pt100, Pt1000, Cu10, Ni100, Ni120
Linearisation errors		0.012 ˚C or better
Influence of lead resistance	error:	0.15 % of lead resistance
	mismatch:	1 ohm per ohm.
Types and ranges		See table 3
Pt100 performance (worst case)		See table 4

RTD type	Range (˚C)	Standard
Pt 100	- 200 to + 850	IEC751: 1981
Pt1000	- 200 to + 850	Based on IEC751: 1981
Cu 10	-20 to + 250	General Electric
Ni 100	- 50 to + 170	DIN43760
Ni 120	- 50 to + 170	Based on DIN 43760

Table 3 RTD types and ranges

Range ˚C	Resolution	Performance (worst case) in instrument at 20 ˚C
- 200 to + 200	0.02 ˚C	0.033% reading + 0.32 ˚C
- 200 to + 1000	0.14 ˚C	0.033% reading + 1.85 ˚C

Table 4 Typical Pt100 performance

Ohms ranges

Ranges	See table 5
Temperature performance (worst case)	
0 to 180Ω	(35ppm reading + 34.3ppm range)/˚C
0 to 1.8kΩ	(35ppm reading + 14.6ppm range)/˚C
0 to 10kΩ	(35ppm reading + 1.9 ppm range)/˚C

Range	Lead resistance	Resolution	Performance (worst case) in instrument at 20 ˚C
0 to 180 Ω	10 Ω	5 mΩ	0.033% reading +0.070% range
0 to 1.8 kΩ	10 Ω	55 mΩ	0.033 % reading + 0.041 % range
0 to 10 kΩ	10 Ω	148 mΩ	0.037 % reading + 0.020 % range

Table 5 Ohms ranges

Other linearisations

Tables available	√ value; (value)$^{3/2}$; (value)$^{5/2}$; User defined tables (up to 3 off)

Contact closure (switch) inputs

Type	Volt-free contact
Wetting voltage	2.5 Volts nominal
Minimum latched pulse width	125 ms.
De-bounce	Inherent 1 second.

16-CHANNEL DC INPUT BOARD SPECIFICATION

General specification

Number of inputs		16
Termination		Edge connector/terminal block
Input types		DC volts, dc mV, dc mA (with shunt), thermocouple, contact closure (not channels 1, 8 or 16)
Input mix		Software selected on configuration for each channel. (Max. eight different linearisations (inc. linear) per board
Measurement frequency		All channels in 1 second
Step response to within resolution		1.5 seconds
Noise rejection	Common mode:	150dB above 45 Hz. (chan-chan and channel-ground.)
	Series mode:	> 60dB between 10 to 100 Hz.
Maximum series mode voltage		Hardware range +50 mV.
Safety isolation (BS EN61010)		Installation cat.ii; Pollution degree 2
	Channel-to-channel	300V (double isolation)
	Channel-to-ground	300V (basic isolation)
Dielectric strength	Channel-to-channel	2350 V ac continuous
	Channel-to-ground	1350V ac
Input impedance		> 10 MΩ (68.8kΩ for 5V range)
Over-voltage protection		60 Volts peak, 500 V through 50 kΩ resistor.
Open cct detection (85 mV range only)		65 nA current max. 8 seconds recognition time (max.) 40 MΩ minimum break resistance.
Damping		2, 4, 8, 16, 32, 64, 128 or 256 secs. time constant, as configured.

16- channel i/p board specification (Cont.)

DC input ranges

Ranges available	-15mV to +85 mV; -1.0 V to +5 V
Temperature performance (worst case)	
-15mV to +85mV	(80ppm reading +12.9ppm range)/˚C
-1V to +5V	(272ppm reading +7.8ppm range)/˚C
Shunt	Externally mounted resistor modules
Additional error due to shunt	0.1%.
Performance (worst case)	See table 6

Range	Resolution	Performance (worst case) in instrument at 20˚C
–15 mV to + 85 mV	± 5.5 µV	0.072% reading + 0.071% range
– 1.0V to + 5 V	± 280µV	0.223% reading + 0.055 range

Table 6 DC performance (16-channel board)

Thermocouple data (in addition to the above)

Linearisation errors	0.15 ˚C or better
Bias current	< 2 nA (< 10 nA at 70 ˚C)
Cold Junction (CJ) types (selectable)	Off, internal, external, remote.
CJ error	1 ˚C or better
CJ rejection ratio	25:1 minimum
Remote CJ	Via any user-selected input channel.
Upscale drive	Configurable for each channel
Types and ranges	See table 2

Other linearisations

Tables available	√ value; (value)$^{3/2}$; (value)$^{5/2}$; User defined tables (up to 3 off)

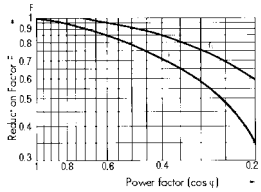
Contact closure inputs (not channels 1, 8 or 16)

Type	Volt-free contact
Wetting voltage	2.5 Volts nominal
Minimum latched pulse width	250 ms.
De-bounce	Inherent 1 second.

RELAY OUTPUT BOARD SPECIFICATION

No of relays per board		Eight
Contact format		Single pole change-over (single set of common, normally open and normally closed contacts)
Estimated life at 60VA load*		1,000,000 operations
Max contact voltage*		250 Volts ac.
Max contact current*	Make:	8 Amp
	Continuous:	3 Amps
	Break:	2 Amps
Maximum switchable power*		60 watts or 500 VA
Isolation (BS EN61010)		Installation cat.. II, Pollution degree 2
	Channel-to-channel	300V ac (double isolation)
	Channel-to-ground	300V ac (basic isolation)
Dielectric strength		1350V ac for 1 min. (contact to contact) 2350V ac for 1 min. (channel to channel) 1350V ac for 1 min. (channel to ground)

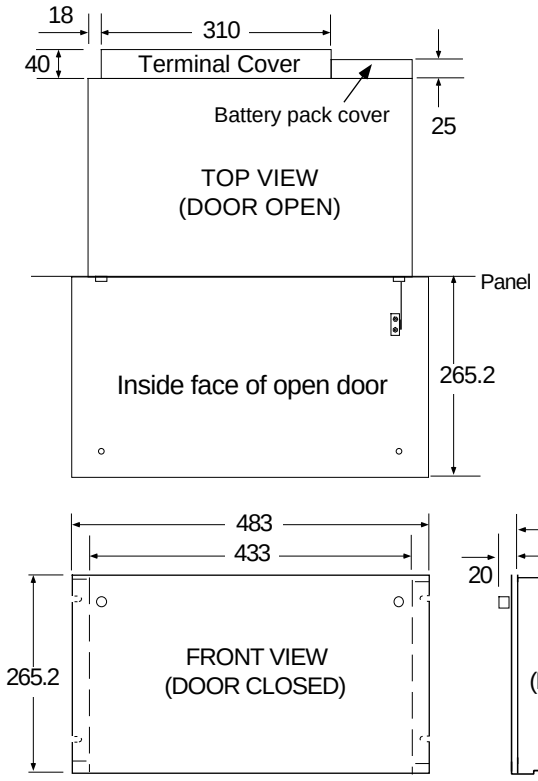
* With resistive loads. Derate with reactive or inductive loads according to the graph in which:
F1 = measured on representitive samples
F2 = typical values (according to experience)
Contact life = resistive life x Reduction factor



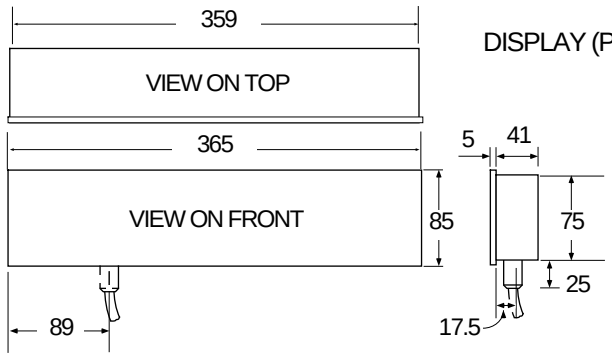
ANALOGUE OUTPUT BOARD SPECIFICATION

General specification

Number of outputs		Four or eight as ordered
Termination		Edge connector / terminal block
Output types		Current or Voltage as configured for each channel
	Current:	0 to 25mA max. at up to 24 V
	Voltage:	-1 to 11V at up to 5 mA
Output frequency		All channels in 1 second
Output damping		250 msec rise time (10% to 90%)
Resolution		0.025% full scale, monotonic.
Isolation (dc to 65 Hz; BS EN61010)		Installation cat. II; Pollution degree 2
	Channel to channel:	300V RMS or dc (double isolation)
	Channel-to-ground:	300V RMS or dc (basic isolation)
Dielectric strength (BS EN61010)		(1 minute type tests)
	Channel to channel:	2350 V ac
	Channel to ground:	1350V ac
Insulation resistance		50 MΩ at 500V dc.

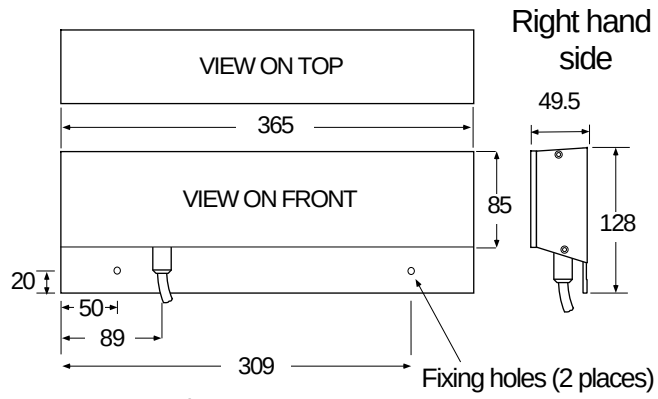


All dimensions in mm.
(Drawings not to same scale)



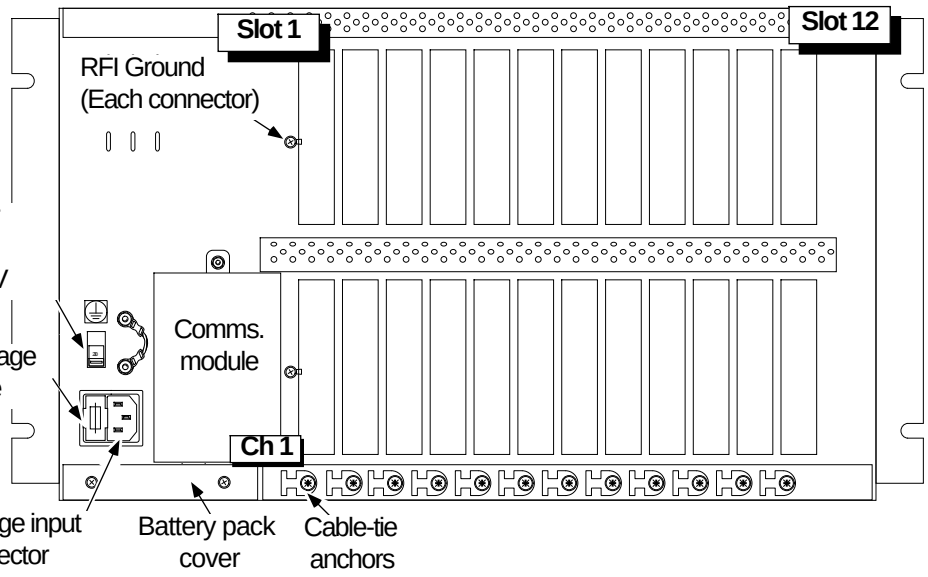
DISPLAY (PANEL MOUNTING)

Right hand side



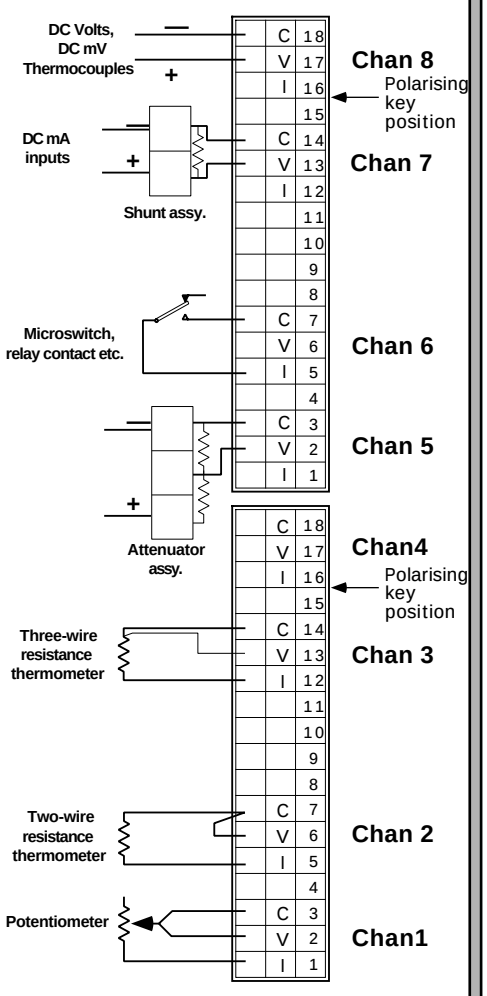
Right hand side

DISPLAY (WALL MOUNTING)



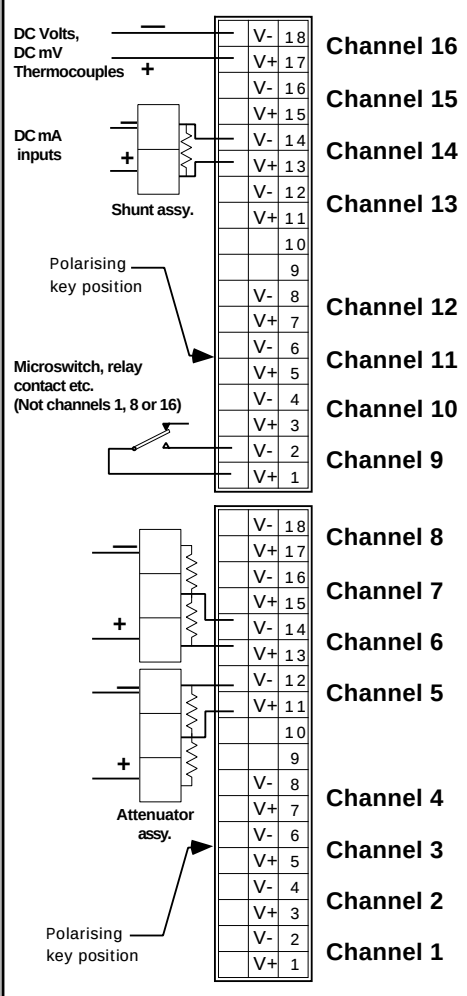
Rear view with terminal cover removed

8 - Channel dc input board (typical input signal wiring)



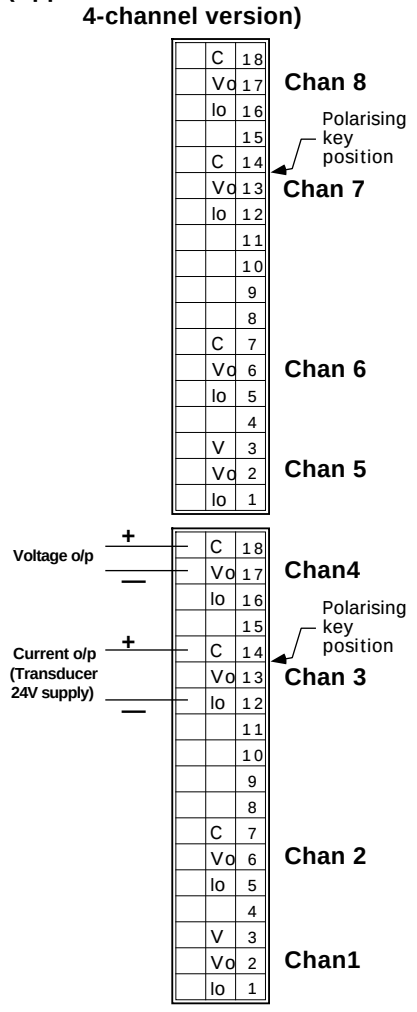
In order to prevent mis-mating, a polarising key can be located between contacts 15 and 16.

16 - Channel dc input board (typical input signal wiring)



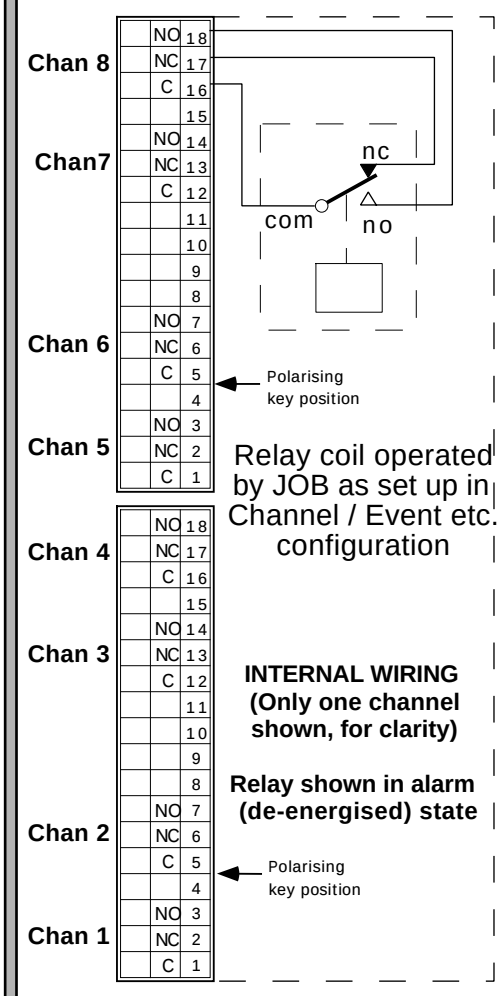
In order to prevent mis-mating, a polarising key can be located between contacts 5 and 6.

4/8 channel analogue output board (Upper connector not wired for 4-channel version)



In order to prevent mis-mating, a polarising key can be located between contacts 13 and 14.

Relay output board



In order to prevent mis-mating, a polarising key can be located between contacts 4 and 5

Accessory part numbers : 100Ω shunt = LA246779UK10; 250Ω shunt = LA246779UK25; Attenuator = LA244180

Slot 1 is the left-most slot when viewed from the back of the recorder.

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