4181G, 4181M

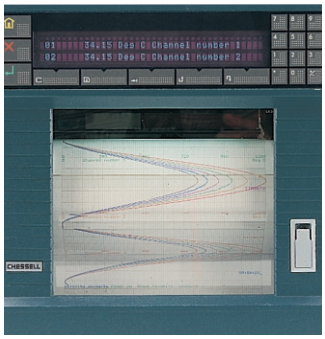
MODELS

- **Multi-point Recording**
  48 Channels
  Providing 6 Colour traces
- **Paperless Recording**
  Trend up to 24 channels
- **High Visibility Display**

4181G– 10.4" LCD Display, providing horizontal, vertical, bargraph and numeric indication.

4181M – Alphanumeric Display

- **Isolated Universal Inputs**
  Select from mA, mV, V, Thermocouples and RTD
- **Annotation**
  Clear text printing of time/ date and custom messages
- **Data Archiving Facility**
  Store data on a PCMCIA card
- **Powerful Maths Pack**
  Calculate relative humidity, Fo value and more
- **Communications**
  Modbus,RS232 or RS485



180mm Recorders
Specification Sheet

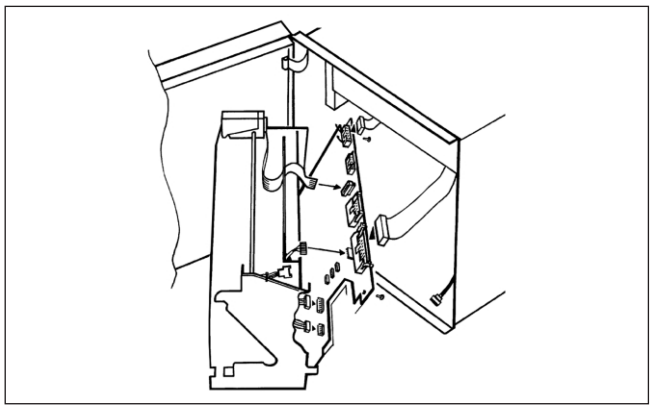
The 4181M/G are high specification, 180mm strip chart recorders, providing multi-point recording for up to 48 Process Variables. Information such as Channel descriptor, alarm status and scale information can be viewed on a high-resolution VFD (4181M) or LCD (4181G) display. Advanced maths functions allow for complex calculations to be carried out and the results annotated using custom messages to print along side the raw data. Process variables including messages can be archived to an optional integral card reader. The units can be programmed on site via the user interface or a configuration file can be transferred using a PCMCIA card.

Display
As well as displaying the process variables as a numeric value the 4181M provides bargraph indication. The 4181G is also capable of displaying the data in Horizontal and Vertical trend modes. The display will cycle through PV's configured to appear in the Display group.

Configuration
In order to prevent unauthorised access the configuration is password protected. Entry of the password provides access to the instrument configuration pages. It is possible to provide the operator access to certain parameters, for example you may require the operator to be able to change the chart speed (4181M) or archiving interval (4181G) These fields can be enabled in the operator access menu.

Adaptive Recording
At slow chart speeds it is possible that the input circuit, between chart increments will pick up a spike or other brief disturbance in the measured signal, but that this disturbance will not appear on the chart, even though they may trigger an alarm. With adaptive recording enabled, if a sudden change in the input signal is detected, the recorder will place an additional dot on the chart without the chart being moved. This means that even at the lowest chart speed, unexpected signal changes can still be traced.

Modular Design - All
The modular design of the 4180 Series allows for upgrades to be carried out in situ thus reducing downtime.



Exploded view

Data Archiving
Two log groups are available for sending tabular data to the chart or PCMCIA card. Both log groups can be initiated to print on a chart. However Log group 2 can also be archived to a PC Card automatically at predetermined intervals. Data can be archived as either ASCII for use in spreadsheet, or Packed for viewing using Eurotherm Review software.

Maths Pack
The addition of the advanced maths pack option provides the 24 channels and the ability to carry out complex calculations such as relative humidity and mass flow. Derived channels can be added to the log and display groups for trending and archiving as required.

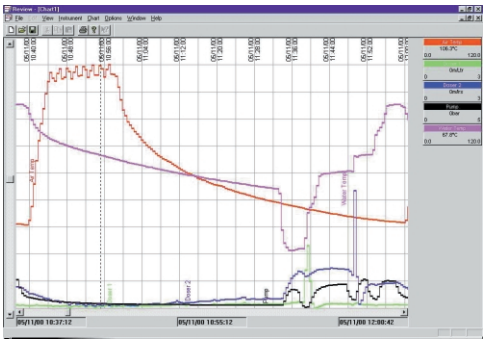
Communications
Supporting either RS232 or RS485 the Serial Communications board provides the means of establishing a link between a recorder and a host computer (using the Gould Modicon MODBUS protocol).

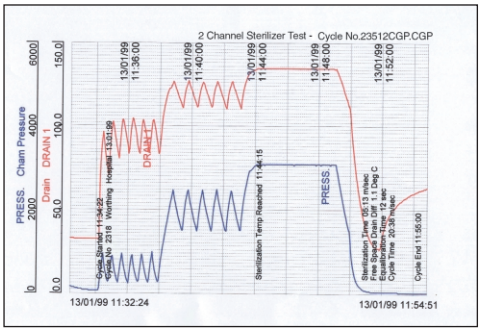
Analogue Output
If required, an input signal or the resulting calculation of a maths channel can be retransmitted to another device. The 4181 provides up to eight analogue outputs per board, each capable of generating a voltage or current output.

Events
As standard, there are 12 internal events, which can be triggered by two configurable input sources. Input sources can be logically ANDed or ORed allowing the use of multiple inputs. An example of the event input would be to provide external chart or logging control.

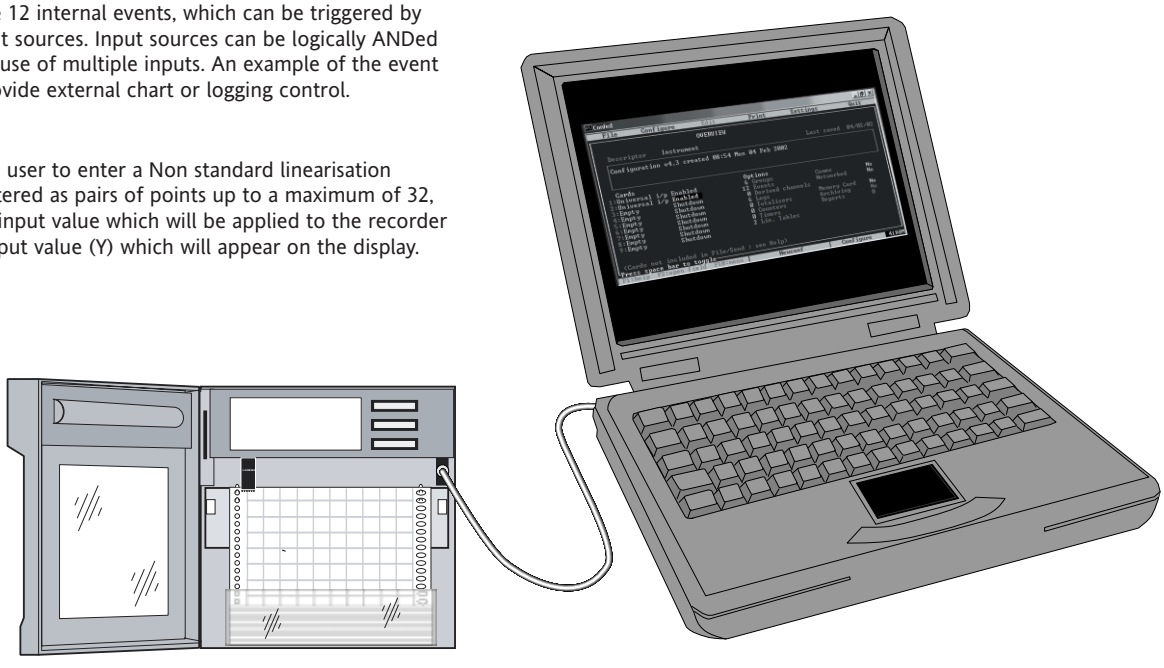
Custom Curve
This option allows the user to enter a Non standard linearisation table. The curve is entered as pairs of points up to a maximum of 32, one representing the input value which will be applied to the recorder (X), the other the output value (Y) which will appear on the display.

Review Package
Offline printing and viewing is made possible by the use of the Review Software package.
It uses the packed data files from the recorders local storage media and imports them into a PC database. Data from one or more archive files can easily be viewed. This data can then be printed or exported as a CSV file.





Configuration Editor
An offline configuration package that allows a recorder configuration to be set up on a PC and transferred either by the standard integral 9-way D-type connector or if fitted the Communications board. Alternatively a configuration file can be transferred using the optional PC card.



TECHNICAL SPECIFICATION

Recorder

Board types

Input board types	8-channel universal; 16-channel dc*
Output board type	8-channel relay; 4/8 channel analogue
Max number of I/O boards per type	3 x 8-channel input, 3 x relay output; 3 x 16-channel input, 3 x analogue output
Max number of inputs	48 dc inputs*; 24 resistance inputs; 39 contact closure.
Max number of outputs Relay o/p	8 x no of free slots.
Analogue o/p	8
Max number of traced channels	24 total input/derived.

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

Environmental Performance

General		To BS2011: 1981
Temperature limits	Operation:	0 to + 50°C
	Storage:	–20 to +70°C
Humidity	Operation:	5 to 80% RH; non-condensing
	Storage	5 to 90% RH; non-condensing
Max. altitude		2000 meters
Protection		IP54 (door and bezel); IP31 (sleeve).
Shock		BS EN61010 1990 (safety); IEC 873: 1986
Vibration		BS EN61010 1990 (safety); IEC 873: 1986.

Electromagnetic compatibility (EMC)

Emissions	BS EN50081-2
Immunity	BS EN50082-2

Electrical Safety

To BS EN61010 1990 Class 1.

Physical

Bezel size (mm)	288mm x 288mm x 45mm deep.
Panel cutout size	281mm x 281mm (+ 1.4 – 0mm.)
Depth behind bezel rear face	304mm. (including rear cover); 275mm. (no rear cover)
Weight (8-channel instrument	12.5kg. max.
Panel mounting angle	Up to ± 30° from vertical.

Printing system

Method		Printhead with black, brown, red, green, blue and violet dotting nibs
Printhead life		> 1.5 million dots per colour (recorder continuously powered)
Dot diameter		0.35 to 0.6mm.
Dot spacing	(vertical)	0.25mm (chart speed <300mm/hr); 0.5mm (600mm/hr); 1mm (1200mm/hr); 1.25mm (1500mm/hr)
	(horizontal)	0.39mm
Characters per line		77
Noise level		55dBA max (door closed)
Maximum trending rate		24 channels per pass (3 seconds)

Paper transport

Type	Tractor feed with selectable chart speed from 1 to 1500 mm/hr. (0.4 to 60 inches/hour)
Chart length	22 meters (z-fold - fold depth 75mm)
Chart width	224mm. overall; 180mm. calibrated
Pen-to-paper accuracy	0.25% of calibrated chart width
Transport accuracy	Better than 10mm in 22 meters

Performance

Maximum scan and update rate	All parameters in 1 second
Maximum print rate (trending)	24 channels in 3 seconds
Maximum chart speed	1500mm/hr
Clock accuracy better than	60ppm

Power requirements

Line voltage (45 to 65 Hertz)	90 to 132 Volts or 180 to 264 Volts (User selectable).
Maximum power	70W
Fuse type	Ceramic 20mm. 3.15 Amp. Fast blow.
Interrupt protection	100ms at 50% load.

Memory Protection

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

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

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

8-Channel Universal Input 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 45Hz. (Channel-to-channel and Channel-to-ground.)
	Series mode:	67dB above 45Hz.
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	300V (double insulation)
	Channel-to-ground	300V (basic insulation)
Dielectric strength		
	Channel-to-channel	2350V ac for 1 minute
	Channel-to-ground	1350V ac for 1 minute
Insulation resistance		50MΩ at 500V dc.
Input impedance		>10MΩ (68.8kΩ for 10V ranges)
Over-voltage protection		60 Volts peak; 500 Volts through 50kΩ resistor
Open cct detection		65nA current max.
(to 200mV range)		8 seconds recognition time (max.) 40MΩ minimum break resistance.

DC input ranges

Ranges available	See table 1 (max 100V with attenuator)
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)
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	<2nA (<10nA at 70°C)
Cold Junction (CJ) types (selectable)	Off, internal, external, remote.
CJ error	0.5°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

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
NiMoNiCo	–50 to + 1410	ASTM E 1751-95
Platinel II	-100 to + 1300	Engelhard R83

Table 2 Thermocouple types and ranges

TECHNICAL SPECIFICATION (continued)

8-Channel Universal Input Board Specification (cont)

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 DIN43760

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 Pt 100 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) instrument at 20 °C
0 to 180W	10Ω	5mΩ	0.033% reading + 0.070% range
0 to 1.8kW	10Ω	55mΩ	0.033% reading + 0.041% range
0 to 10kW	10Ω	148mΩ	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 2 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 (including 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. (channel-to-channel) and channel-to-ground.)
Series mode:	> 60dB between 10 to 100Hz.
Maximum series mode voltage	Hardware range +50 mV
Safety isolation (BS EN61010)	Installation cat.II; Pollution degree 2
Channel-to-channel	300V (double insulation)
Channel-to-ground	300V (basic insulation)
Dielectric strength	
Channel-to-channel	2350V ac continuous
Channel-to-ground	1350V ac
Input impedance	> 10MΩ (68.8kΩ for 5V range)
Over-voltage protection	60 Volts peak, 500V through 50kΩ resistor.
Open cct detection (85 mV range only)	65nA current max. 8 seconds recognition time (max.) 40MΩ minimum break resistance.
Damping	2, 4, 8, 16, 32, 64, 128 or 256 secs. time constant, as configured

DC input ranges

Ranges available	–15mV to +85mV; –1.0V to +5V
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
–15mV to + 85mV	± 5.5µV	0.072% reading + 0.071% range
– 1.0V to + 5V	± 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	< 2nA (< 10nA 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 2 off)

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

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

Relay Output Board Specification

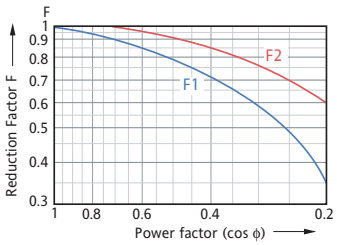
No of relays per board	8
Contact format	Single pole change-over (single set of common, normally open and normally closed contacts)
Estimated life at 60VA load	1,000,000 operations
Max contact voltage*	250 Volts ac
Max contact current* Make:	8 Amp
Continuous:	3 Amps
Break:	2 Amps
Maximum switchable power*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

* With resistive loads. Derate with reactive or inductive loads according to the graph in which:

F1 = measured on representative samples

F2 = typical values (according to experience)

Contact life = resistive life x Reduction factor



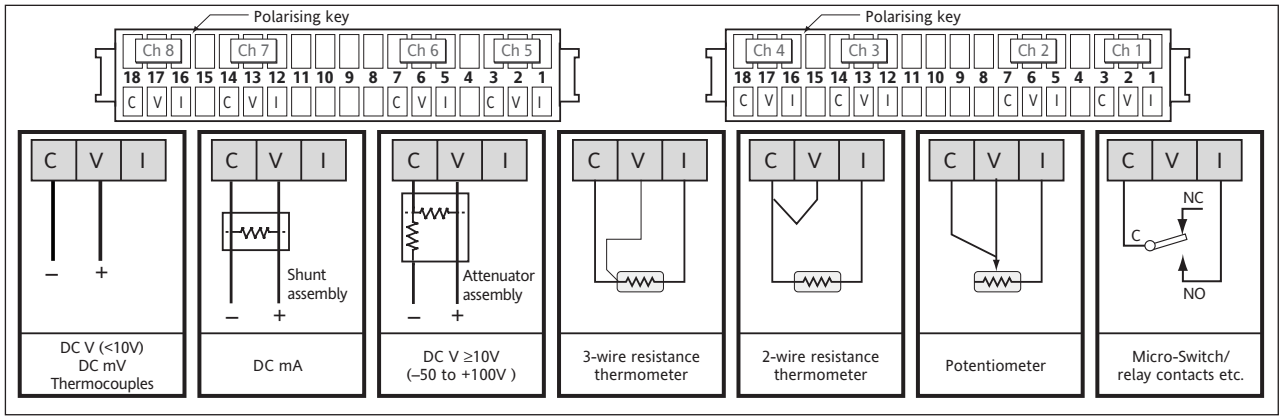
Analogue Output Board Specification

General specification

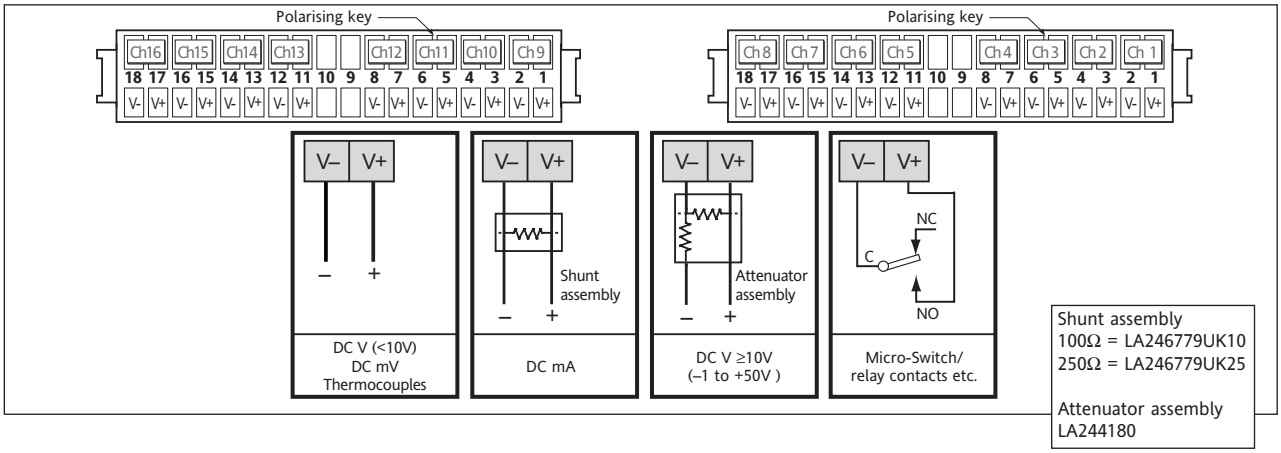
Number of outputs	Four or eight as ordered
Termination	Edge connector / terminal block
Output types	Current or Voltage as configured for each channel
Current:	0 to 25mA max. at up to 24V
Voltage:	–1 to 11V at up to 5mA
Output frequency	All channels in 1 second
Output damping	250msec rise time (10% to 90%)
Resolution	0.025% full scale, monotonic.
Isolation (dc to 65 Hz; BS EN61010)	Installation cat. II; Pollution degree 2
Channel-to-channel:	30V RMS or dc (double insulation)
Channel-to-ground:	30V RMS or dc (basic insulation)
Dielectric strength (BS EN61010)	(1 minute type tests)
Channel-to-channel:	2350V ac
Channel-to-ground:	1350V ac
Insulation resistance	50MΩ at 500V dc

SIGNAL WIRING DETAILS

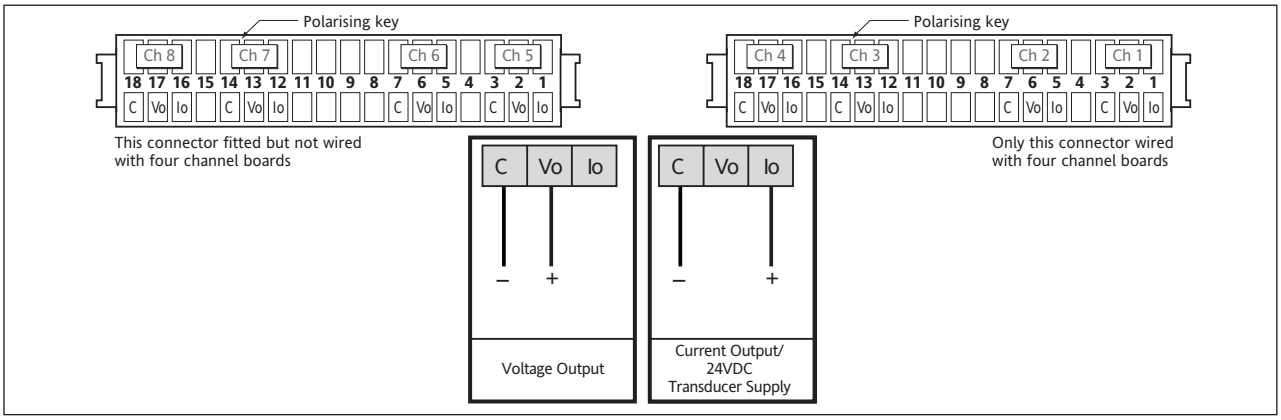
8-channel dc input board (typical inputs)



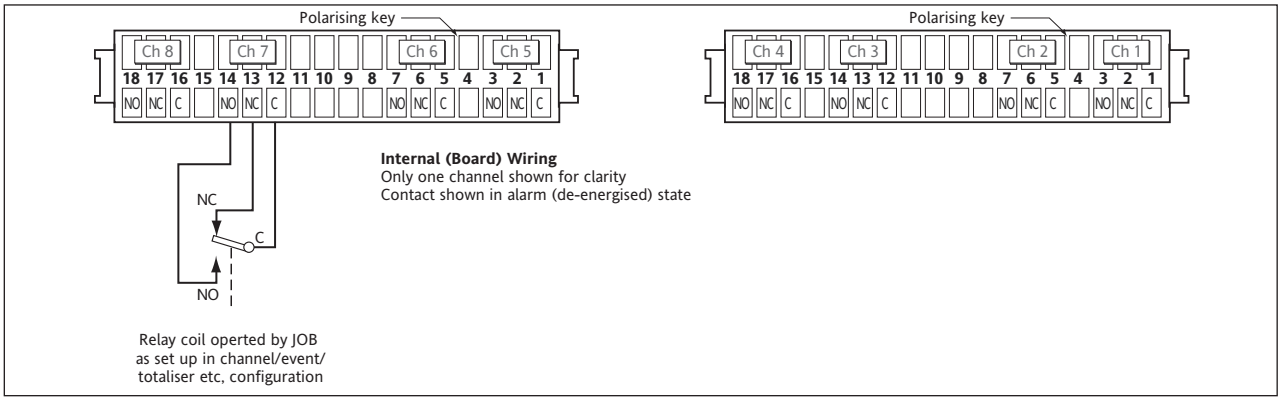
16-channel dc input board (typical inputs)



4- / 8-channel analogue output board (typical outputs)

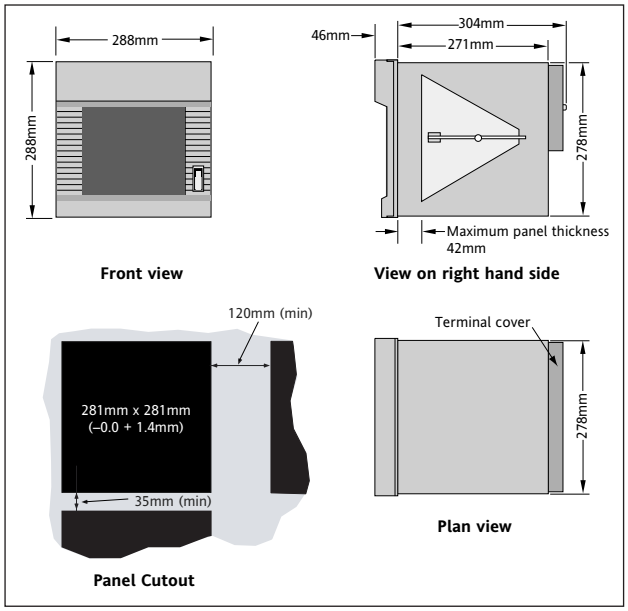


Relay output board signal wiring

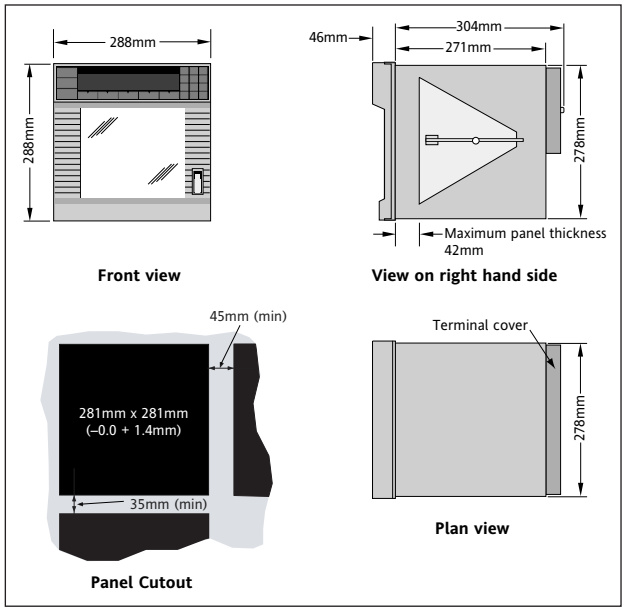


MECHANICAL INSTALLATION

4181G

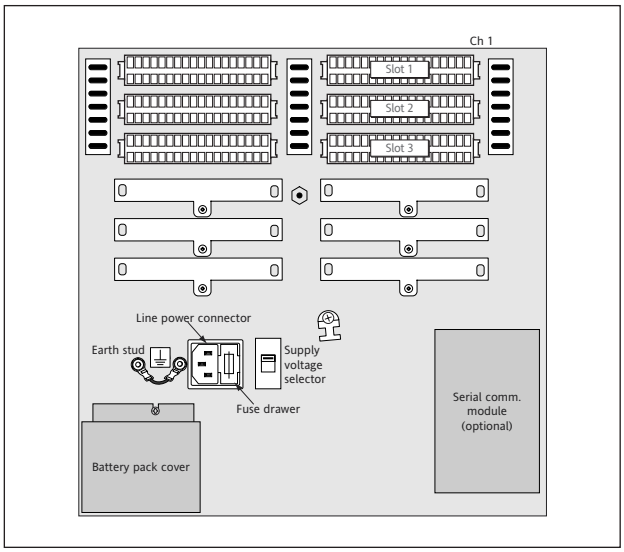


4181M



ELECTRICAL INSTALLATION COMPONENT LOCATIONS

4181G/4181M



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