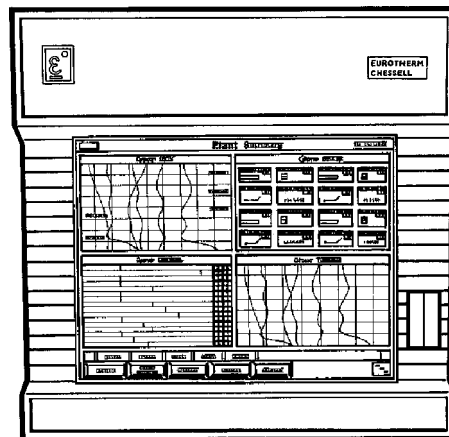


- 180mm Video Chart Recorder
- Up to 48 inputs
- Touch-sensitive colour LCD screen
- Integral six-colour, multi-point printing
- Data storage to PCMCIA memory card
- RS232/485 MODBUS communications
- Over 500 points available using remote I/O racks
(128 points displayable simultaneously)
- High speed scanning (all inputs in 1 sec)



The Eurotherm Chessell 4181G, high specification, 180 mm graphic chart recorder combines the latest technology with the proven reliability for which Chessell are renowned. Designed to meet the rigorous requirements of an industrial environment, the recorder is ideal for production and test purposes.

Display

The back-lit VGA liquid crystal display uses tough thin-film transistor (TFT) technology to give exceptionally vivid colour and clarity unmatched by conventional CRT displays. The Model 4181G provides a menu of pre-configured display pages, arranged in a hierarchical system of plant areas, groups and inputs. The display can show process values in a choice of three formats: strip chart, bar-graph and numerical.

Printing system

Up to 24 channels can be updated and printed every three seconds, using the sophisticated six-colour dot printing system. To produce the clearest, most accurate record, the 4181M employs innovative new printing methods, such as line thickening and adaptive recording. Concurrent annotation of time and date markings, channel tags, scales, alarm messages and so on produce a clear record for later reference. For a full customer record, batch details and logs may also be printed on the chart.

Input Technology

The 4181G 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. Alternatively data can be stored in a format which allows multiple copies to be produced on the chart. The recorder's configuration can also be stored on the card for transfer to another recorder or to a PC for manipulation using the PC configuration editor.

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.

Software

Continuous Emissions Monitoring (CEM) software includes maths pack and timer/ counter/ totaliser functions, allowing rolling averages, percent of time outside limits etc. to be calculated for NO_x, SO_x for example.

Serial Communications

Using the MODBUS protocol, the Model 4181G forms an ideal data acquisition unit for a central plant SCADA system. Up to 16 recorders or I/O racks can be linked on an RS422 multi-drop communications loop.

TECHNICAL SPECIFICATION (Recorder)

Board types

Input board types	8-channel universal; 16-channel dc*
Output board type	8-channel relay; 4/8 chan 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 o/p
Max number of inputs	48 dc inputs*; 24 resistance inputs; 39 contact closure.
Max number of outputs	8 x no of free slots.
	Analogue o/p 8
Maximum 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 metres
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 IEC 1010: 1990 Class 1.

Physical

Bezel size (mm)	288mm x 288mm x 45 mm deep.
Panel cutout size	281mm x 281mm (+ 1.4 - 0 mm.)
Depth behind bezel rear face	304 mm. (inc. rear cover); 275 mm. (no rear cover)
Weight (Eight-channel instrument)	12.5 kg. 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 0.6 mm.
Dot spacing (vertical)	0.25 mm. (chart speed <300 mm/hr.); 0.5 mm (600 mm/hr); 1 mm. (1200 mm/hr.); 1.25 mm (1500 mm/hr)
Dot spacing (horizontal)	0.39 mm.
Characters per line	77
Noise level	55 dBA 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 metres (z-fold - fold depth 75 mm.).
Chart width	224 mm. overall; 180 mm. calibrated.
Pen-to-paper accuracy	0.25% of calibrated chart width.
Transport accuracy	Better than 10 mm. in 22 meters.

Installation category II: The rated 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.

Recorder Specification (Cont.)

Performance

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

Power requirements:

Line voltage (45 to 65 Hertz)	90 to 132 Volts or 180 to 264 Volts (User selectable).
Maximum power	70 W
Fuse type	Ceramic 20 mm. 3.15 Amp. Fast blow.
Interrupt protection	100 ms at 50% load.
Memory protection	EEPROM (for configuration) Battery-backed RAM for volatile data
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	300 V (basic isolation)
Dielectric strength	channel-to-channel 2350 V ac for 1 minute channel-to-ground 1350V ac for 1 minute
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 (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)
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	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
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 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 (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 300 V (double isolation)
 Channel-to-ground 300 V (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 2 off)

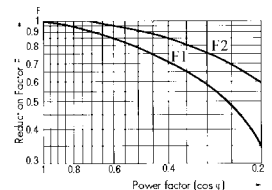
Contact closure inputs (not channels 1, 8 or 16)

Type Volt-free contact
 Wetting voltage 2.5 Volts nominal
 Minimum latched pulse width 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)

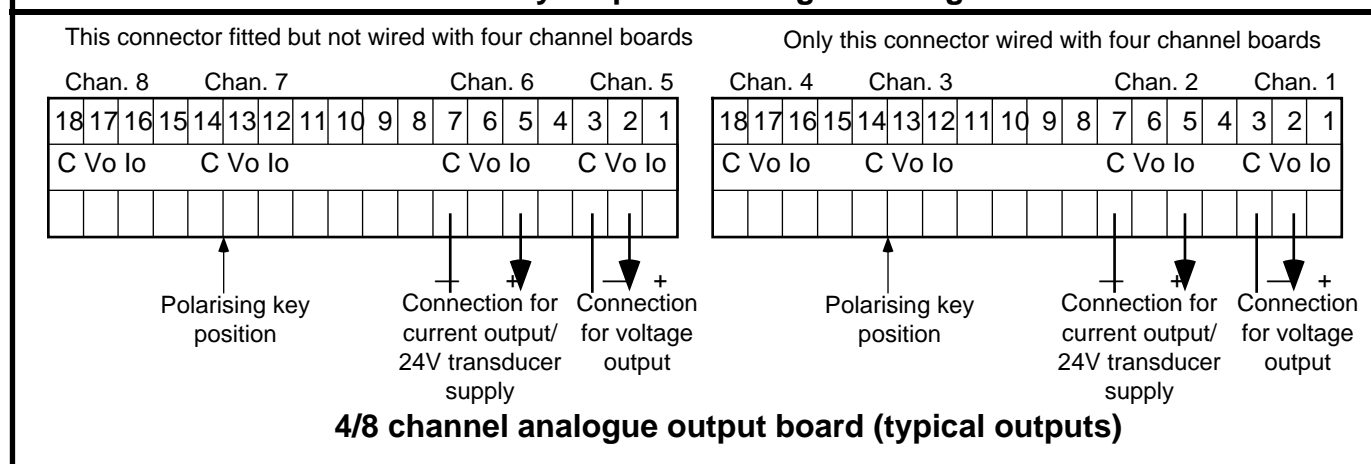
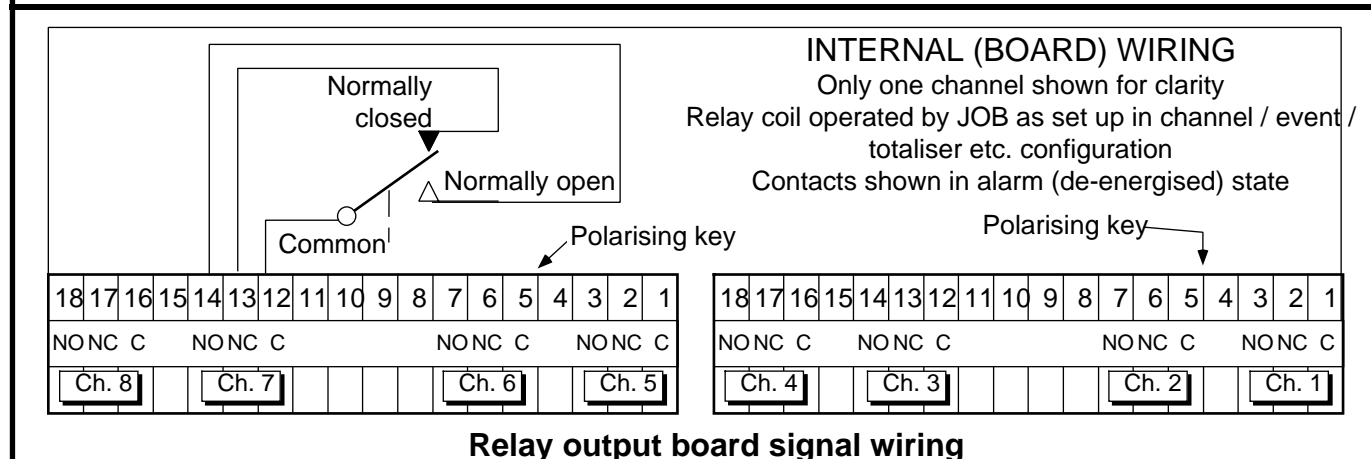
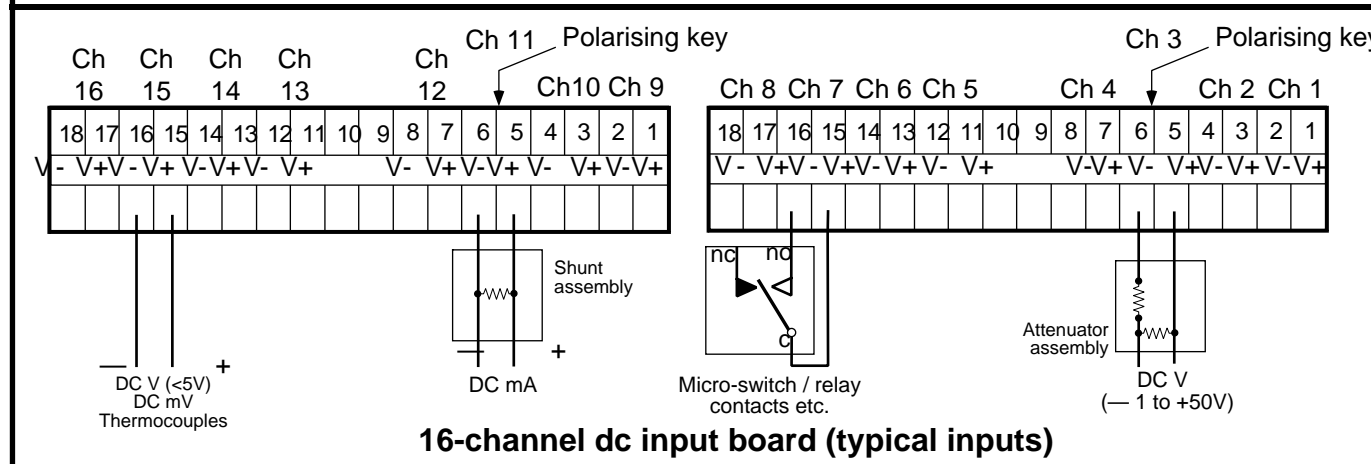
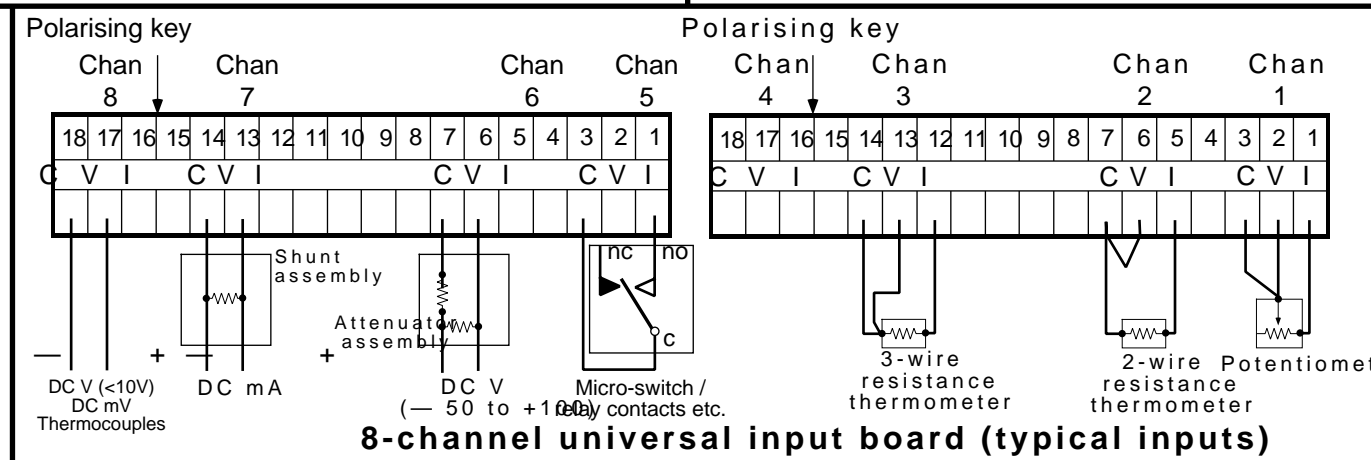
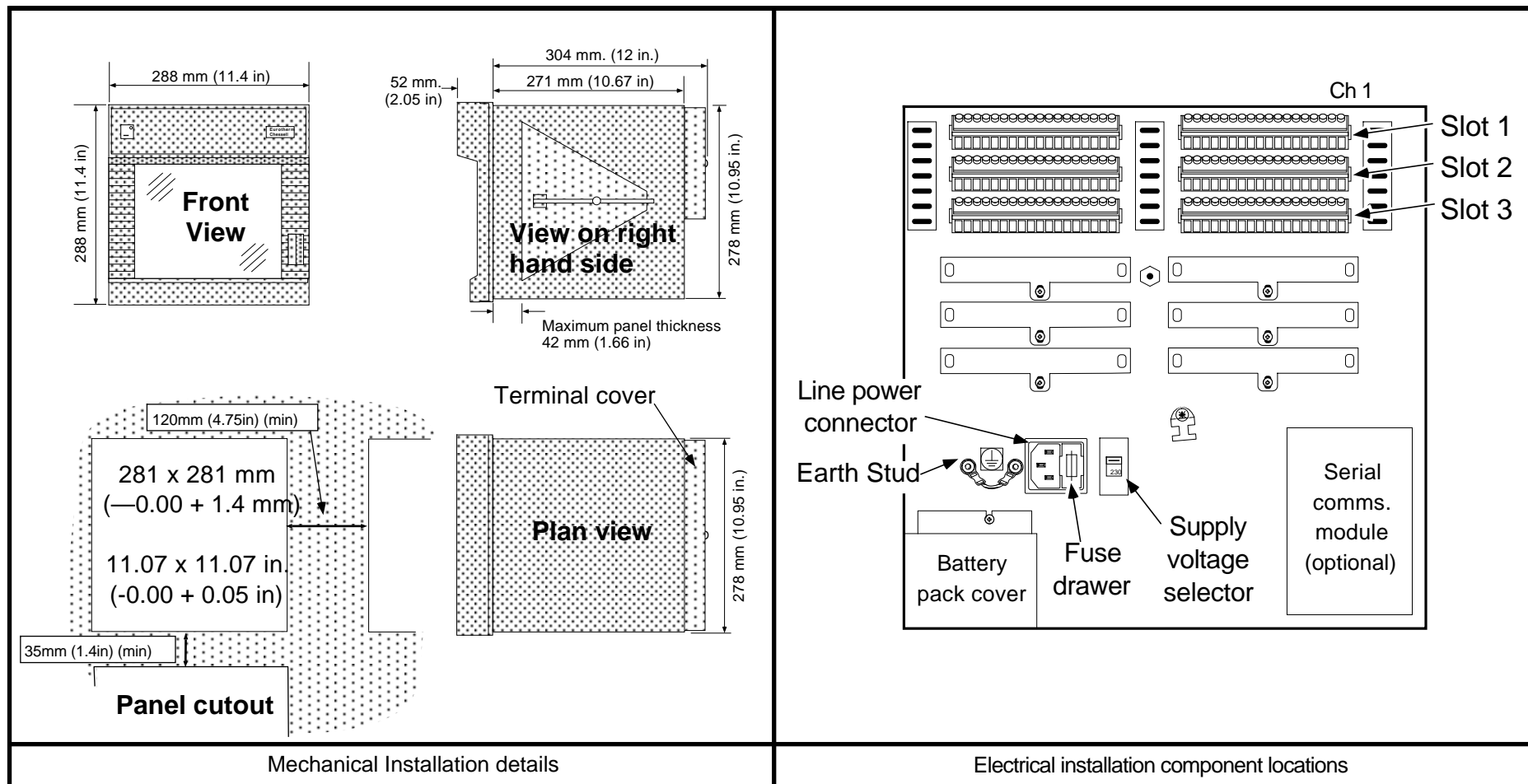
* With resistive loads. Derate with reactive or inductive loads according to the graph in which:
 F1 = measured on representative samples
 F2 = typical values (according to experience)
 Contact life = resistive life x Reduction factor



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 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: 30V RMS or dc (double isolation)
 Channel-to-ground: 30V 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.



Signal Wiring Details

Shunt part n...s: 100% = LA246779UK10; 250% = LA246779UK25. Attenuator part n...: LA244180