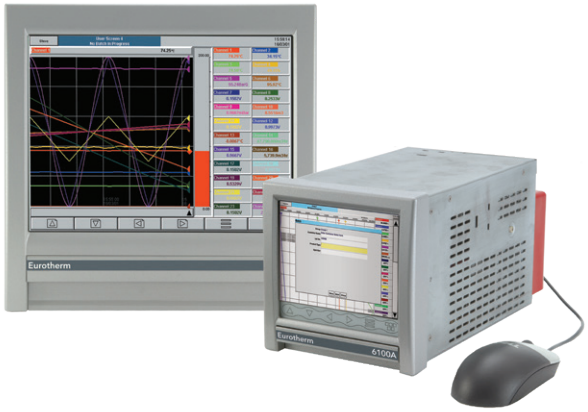
Easy to use and versatile data recording solutions

Eurotherm®



6100A & 6180A Paperless Graphic Recorders

Product at a glance

The 6000 Series offer world leading input accuracy with a 125ms total sample rate for up to 48 input channels. Input channels are freely configurable to suit your process requirements. Each instrument has an intuitive, touch screen display to enable operators to clearly view process data in varying formats. All have onboard Flash data storage capability, Ethernet communication and a choice of removable media. Data is stored in a tamper-resistant binary format that can be used for long term records of your process. The 6000 Series is truly designed for todays networked world and can be accessed via a Local Area Network, dial-up connection, Intranet or Internet.

- Color touchscreen display
- USB “plug & play”
- Up to 48 universal Inputs
- Up to 96 MB non-volatile flash memory
- 125ms parallel sampling
- Compact Flash card
- Modbus RTU
- Ethernet TCP/IP
- Web server
- EtherNet/IP server
- Multi-language support (French, Dutch, German, Italian, Japanese, Korean, Portuguese, Russian and Simplified Chinese)

Available features		
	6100A	**6180A**
Display	5.5” 1/4 VGA	12.1” XGA
Channels	18	48
Relays	12	27
Events inputs	24 (6 per option card)	
Groups	6 standard (12 options)	
Auditor features	Auditor or audit trail	
Analogue ouputs	Output 8 (2 per card)	
Virtual channels*	36, 96, 128	
Timers	Fitted as standard	
Alarms	4 per channel	
Batch	Optional	
Bridge-remote viewing software	Lite as standard (Full optional)	
Screen builder	24 (optional)	
Security	Unlimited unique user names with configurable access permissions and passwords	
Configuration software	Standard	
Reviews/Quickchart Lite software	Standard	
Standard views	Vertical and horizontal trending Vertical and horizontal bar graphs Circular trend and numeric values	

* Virtual channels can be configured as maths, totalisers, counters or comms

WATLOW®
Powered by Possibility

Data logging and archiving

The 6000 Series recorders have internal Flash memory for high integrity data storage. They are also able to accept various removable media types (Compact Flash or USB memory stick). Data stored within the internal memory can be archived to the removable media on demand or at preset intervals. The 6000 Series will give an indication of how long its internal memory and that of the removable media installed will last according to the configuration of the recorder.

The 6000 Series can be configured to archive to the removable media and/or over Ethernet. Archiving files over Ethernet effectively gives infinite archiving capacity.

Approximate duration for continuous recording of one group of six channels, high compression:

Archive media	Sample rate						
	0.125s	0.5s	1s	5s	10s	30s	60s
96Mb Internal Flash (approx. 12 million samples)	8.49 days	33.9 days	67.8 days	339 days	1.85 yrs	5.5 yrs	11.1 yrs
256Mb CF Card or USB memory stick (approx, 32 million samples)	22.6 days	90.6 days	181 days	2.4 yrs	4.9 yrs	14.8 yrs	20 yrs
8Gb CF Card or USB memory stick (approx. 1000 million samples)	1.9 yrs	7.8 ys	15.2 yrs	76.8 yrs	152 yrs	464 yrs	928 yrs
Ethernet (FTP Server)	Infinite						

Time synchronization (SNTP)

The 6000 Series support Simple Network Time Protocol which, when enabled, updates the instrument time every 15 minutes from the configured SNTP server. The unit can also act as a Unicast SNTP server on the network, allowing client instruments to synchronize with the 6000 Series to a resolution of one millisecond.

Batch recording

Up to ten user-defined fields can be used to enter batch specific data.

Field descriptor	Operator entered batch information
up to 20 characters	up to 60 characters

The user can choose to log any number of the given fields on start and/or stop of a batch. The information will appear on the chart as a message and cannot be separated from the process data to which it relates.

Auditor features

Auditor

Designed to aid compliance to FDA regulation 21 CFR Part 11 for Electronic Records and Signatures, this software option provides the 6000 Series with additional access controls such as password ageing, electronic signatures and time stamped audit trail.

Audit trail

A sub-set of the Auditor which provides the 6000 series with a time stamped audit trail. It does not include password ageing and electronic signatures.

Mircosoft® Active Directory® Directory Service

A utility intended for User Access Administration of PCs. It is a tool used by the IT administrators to manage user access across the company wide network. It allows users to be given access according to their functions by allocating them to a group with defined privileges. It also includes the necessary features such as password expiry, auto-logout, minimum length password, etc. It allows the users to manage their password from any node on the system.

Modbus master

Allows users to view data from multiple instruments connected either by a local Network connection using Modbus TCP, or a Serial connection using Modbus RTU.

The 6000 Series Recorders

ASCII printer output (reports)Fitted as standard the ASCII text printer option provides the 6000 Series with the ability to generate up to 10 simple reports that can be directed to a Serial ASCII text printer. Reports, triggered by an event/job can be configured to contain parameters such as time and date, batch names, process values and user defined messages.

Dynamic host configuration protocol (DHCP)

Dynamic Host Configuration Protocol, the successor to BootP, allows a 6000 Series host to obtain Network parameters, such as IP address, Subnet Mask, default gateway and DNS server address dynamically. The implementation of DHCP on the 6000 Series significantly reduces the overhead for maintaining a network of instrumentation.

Specification

Recorder

Environmental performance

Temperature limits	Operation:	0 to +50° C
Storage:		–20 to 60° C
Humidity limits	Operation:	5% to 80% RH
	Storage:	5% to 90% RH
Protection Bezel and display:		IP66
Sleeve:		IP20
6100A Portable case option:		IP21
Shock:		BS EN61010
Vibration (10 to 150Hz):		BSEN60873, Section 9,18
Altitude:		<2000 meters

Approvals

Electromagnetic compatibility:	CE, cUL (EMC)
UL file number:	e57766
Emissions and immunity:	BS EN61326

Electrical safety

(BS EN61010):	Installation cat. II; Pollution degree 2

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.

Physical

Panel mounting:		DIN43700
Panel mounting angle:		±45°
6100A	Bezel size:	144 x 144 mm
	Panel cutout dimensions:	138 x 138 mm (both –0/+1 mm)
	Depth behind bezel rear face:	246.5 mm (284 LTC)
	Weight:	3 kg max. (5 kg if fitted in portable case)
6180A	Bezel size:	292 x 292 mm
	Panel cutout dimensions:	281 x 281 mm (both –0/+1 mm)
	Depth behind bezel rear face:	261 mm
	Weight:	7 kg max.

Operator interface

Type:		Color TFT LCD with cold cathode backlight, fitted with resistive, analog, Touch-Panel
Size and resolution		
	Model 6100A:	1/4VGA (320 x 240 pixels) 5.5”
	Model 6180A:	XGA (1024 x 768 pixels) 12.1”

Power requirements

Supply voltage	Standard:	100 to 230V ac ±15%; 47 to 63Hz or 110 to 370 V dc
Power (Max):		60 VA (Inrush current 36 A)
Fuse type:		None
Interrupt protection	Standard:	Holdup >200 msec, at 240V ac, with full load

Back-up battery

Type:	Poly-carbonmonofluoride/lithium (BR2330) Part No. PA261095
Support time (RTC):	1 year min. with recorder unpowered
Replacement period:	3 years
Stored data:	Time; date; values for totalisers, counters and timers; batch data; Fvalue, Rolling average, Stopwatch etc.

Ethernet communications

Type:	10/100baseT Ethernet. (IEEE802.3)
Protocols:	TCP/IP, FTP, DHCP, BOOTP, SNTP, Modbus, SMTP, ICMP, EtherNet/IP server
Cable Type:	CAT5
Maximum length:	100 meters
Termination:	RJ45

Serial communications option

No of ports:	2
Protocol:	ASCII (typical applications: Input of ASCII string inputs from Barcode readers, Credit card readers etc.) ASCII printer support Modbus RTU Master and Slave Isolation (dc to 65Hz)
BS EN61010):	Installation category II; Pollution degree 2
Terminals to ground:	50V RMS or dc (basic insulation)
Transmission standard:	EIA232 or EIA485 (software selectable)

Input board

General

Input types:	dc Volts, dc millivolts, dc milliamps (with shunt), Thermocouple, 2/3-wire RTD Contact closure (not Channels 1, 7, 13, 19, 25, 31, 37, 43) >60 ms
Input type mix:	Freely configurable
Maximum number of inputs:	6 per board
A/D conversion method:	>16 bits, 2nd order delta sigma
Input ranges:	See Table1 and Table 2 below
Termination:	Edge connector / terminal block
Noise rejection (48 to 62Hz):	Common mode: >140dB (channel to channel and channel to ground)
Series mode:	>60 dB
Max. common mode voltage:	250 Volts continuous
Max. series mode voltage:	45 mV at lowest range; 23.74 Volts peak at highest range
Isolation	
Channel to channel:	300V RMS or dc (double insulation)
Channel to common electronics:	300V RMS or dc (double insulation)
Channel to ground:	300V RMS or dc (basic insulation)
Dielectric strength (BS EN61010)	(1 minute type tests)
Channel to channel:	2500V ac
Channel to ground:	1500V ac
Insulation resistance:	>10 MΩ at 500V dc
Input impedance:	38 mV, 150 mV, 1V ranges: >10 MΩ; 20V range: 65.3 kΩ
Over voltage protection:	50 Volts peak (150V with attenuator)
Open circuit detection:	± 57 nA max.
Recognition time:	500 msec
Minimum break resistance:	10 MΩ

Table 1 Voltage ranges — accuracy and resolution

Low range	High range	Resolution	Typical error (instrument at 20° C) range	Maximum error (instrument at 20° C) range	Worst case temp performance Input per °C
-38 mV	38 mV	1.4 µV	0.013% I/P + 0.031%	0.030% I/P + 0.052%	25 ppm
-150 mV	150 mV	5.5 µV	0.013% I/P + 0.028%	0.029% I/P + 0.039%	25 ppm
-1 V	1 V	37 µV	0.013% I/P + 0.024%	0.029% I/P + 0.029%	25 ppm
-20 V	20 V	720 µV	0.075% I/P + 0.027%	0.393% I/P + 0.033%	388 ppm

Table 2 Resistance ranges — accuracy and resolution

Low range	High range	Resolution	Typical error (instrument at 20° C) range	Maximum error (instrument at 20° C) range	Worst case temp performance Input per °C
0 Ω	150 Ω	5 mΩ	0.027% I/P + 0.034%	0.037% I/P + 0.077%	30 ppm
0 Ω	600 Ω	22 mΩ	0.027% I/P + 0.035%	0.037% I/P + 0.057%	30 ppm
0 Ω	5 KΩ	148 mΩ	0.030% I/P + 0.034%	0.040% I/P + 0.041%	30 ppm

Update/archive rates

Input/Relay-output sample rate:	8Hz
Trend update:	8Hz maximum
Archive sample-value:	Latest value at archive time
Display value:	Latest value at display update time (1Hz)

DC Input ranges

Shunt:	Externally mounted resistor modules
Additional error due to shunt:	0.1% of input
Additional error due to attenuator:	0.2% of input
Performance:	See Table 1

Thermocouple data

Temperature scale:	ITS 90
Bias current:	0.05 nA
Cold junction types:	Off, internal, external, remote
CJ error:	1°C max with inst. at 25°C
CJ rejection ratio:	50:1 minimum
Upscale/downscale drive	High, low or none selectable for each thermocouple channel
Additional error:	0.01°C (typ.) if high or low selected
Types and ranges:	See Table 3

Table 3 Thermocouple types and ranges

T/C Type	Overall range (° C)	Standard	Max linearization error
B	0 to +1820	IEC 584.1	0 to 400° C=1.7° C 400 to1820° C=0.03° C
C	0 to +2300	Hoskins	0.12° C
D	0 to +2495	Hoskins	0.08° C
E	–270 to +1000	IEC 584.1	0.03° C
G2	0 to +2315	Hoskins	0.07° C
J	–210 to +1200	IEC 584.1	0.02° C
K	–270 to +1372	IEC 584.1	0.04° C
L	–200 to +900	DIN43710:1985 (To IPTS68)	0.02° C
N	–270 to +1300	IEC 584.1	0.04° C
R	–50 to +1768	IEC 584.1	0.04° C
S	–50 to +1768	IEC 584.1	0.04° C
T	–270 to +400	IEC 584.1	0.02° C
U	–200 to +600	DIN43710:1985	0.08° C
NiMo/NiCo	–50 to +1410	ASTM E1751-95	0.06° C
Ni/NiMo	0 to +1406	Ipsen	0.14° C
Platinel	0 to +1370	Engelhard	0.02° C
Pt20%Rh/ Pt40%Rh	0 to +1888	ASTM E1751-95	0.07° C

Resistance inputs

Ranges (including lead resistance):	0 to 150 Ω, 0 to 600 Ω, 0 to 5 kΩ
Influence of lead resistance Error:	Negligible
Mismatch:	1 Ω/Ω
Temperature scale:	ITS90
Accuracy and resolution:	See Table 2
RTD types and ranges:	See Table 4

Table 4 RTD types and ranges

RDT Type	Overall range (° C)	Standard	Max linearization error
Cu10	–20 to +400	General Electric Co.	0.02° C
Cu53	–70 to ± 200	RC21-4-1966	<0.01° C
JPT100	–220 to +630	JIS C1604:1989	0.01° C
Ni100	–60 to +250	DIN43760:1987	0.01° C
Ni120	–50 to +170	DIN43760:1987	0.01° C
Pt100	–200 to +850	IEC 751	0.01° C
Pt100A	–200 to +600	Eurotherm Recorders SA	0.09° C
Pt1000	–200 to +850	IEC 751	0.01° C

Analogue output board

General

Max number. of OP boards	Four
Number of OPs per board	Two
Output ranges	
Voltage:	0 to 10V (source 5mA max.)
Current:	0 to 20mA (max. load 1K Ω
Update rate:	8Hz
Step response:	250msec (10% to 90%)
Linearity:	0.024% of hardware range
Performance:	See table

Performance		
Range	Accuracy	Temperature drift
0 to 10V	0.2% of range	± 0.12mV +0.022% of reading per °C
0 to 20mA	0.1% of range	± 1µA + 0.03% of reading per °C

Transmitter PSU

Isolated, 6100A recorder only

Number of outputs:	Three
Output voltage:	25V nominal
Maximum current:	20 mA per output
Isolation	Installation category II;
(dc to 65Hz; BS61010):	Pollution degree 2
Channel to channel:	100V RMS or dc (double insulation)
Channel to ground:	100V RMS or dc (basic insulation)
Fuse (20mm Type T)	
Supply voltage:	110/120V ac: 100 mA 220/240V ac: 63 mA

Relay output board

General

Max. number of relay boards	
6100A:	4 (max. no of relay outputs = 12)
6180A:	9 (max. no of relay outputs = 27)
No. of relays per board:	3 per C/O
Estimated mechanical life:	30,000,000 operations
Update rate:	See “Update rates” in “Recorder Specification” above

AC load ratings

Derating
The figures give below are for resistive loads. for reactive or inductive loads, de-rate in accordance with Graph 1, in which:

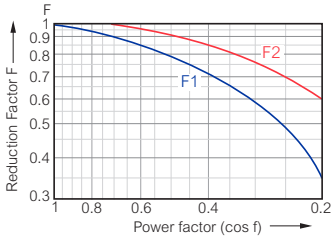
F1 =	Actually measured results on representative samples
F2 =	Typical values according to experience
Contact life =	Resistive contact life x reduction factor
Max. switching power:	500VA
Max. contact voltage:	250V providing this does not cause the maximum switching power (above) to be exceeded
Max. contact current:	2 Amps providing this does not cause the maximum switching power (above) to be exceeded

DC load ratings

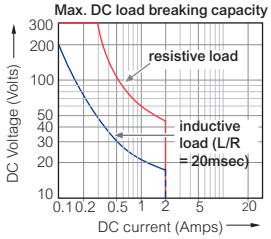
Max. switching power:	See Graph 2 for operating volt/amp envelope
Max. contact voltage/current:	See Graph 2 for examples

Safety isolation

Isolation	Installation category II;
(dc to 65Hz; BS EN61010):	Pollution degree 2
Relay to relay:	300V RMS or dc (double insulation)
Relay to ground:	300V RMS or dc (basic insulation)



Graph 1
Derating curves for ac loads



Graph 2
DC load switching curves

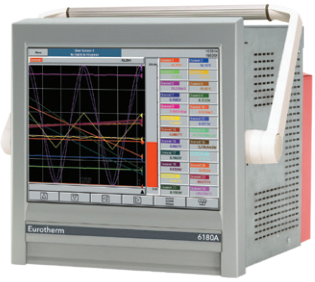
Event input

Number of inputs:	6 discrete inputs
Max. number of boards	
6100A:	4
6180A:	4
Isolation	
Event input to ground:	50V RMS or dc (double insulation)
Event input to Event input:	0V
Recognition levels “Active”:	–30V to +0.8V
“Inactive”:	+2 to +30V
Maximum frequency:	8 Hz
Minimum pulse width:	62.5 ms
Contact resistance Event:	Active if resistance <35 KΩ Inactive if resistance >200 KΩ Status not defined if 35K Ω < resistance <200 KΩ between input terminal and ‘C’ terminal
Current sink (voltage I/P):	10 mA

Portable

Portable option

6100A is available as a General(PORTGEN) or Thermocouple (PORTUTC) portable



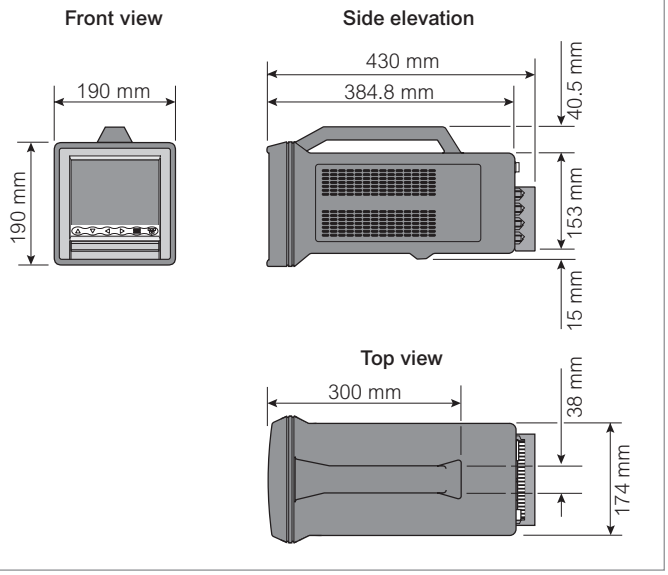
6180A is available with optional carry handle and feet for portability

6100A	Max. no of I/Ps**	Option slots**	Relays	Serial comms	Transmitter PSU	Event I/P
General	18	4	Yes*	Yes	Yes*	Yes*
PORTUTC	15	0	No	Yes	No	No**

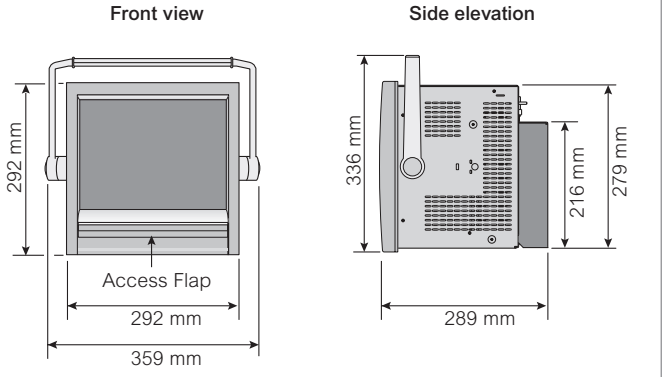
** Mutually exclusive
* Requires one option slot

Portable mechanical details

6100A

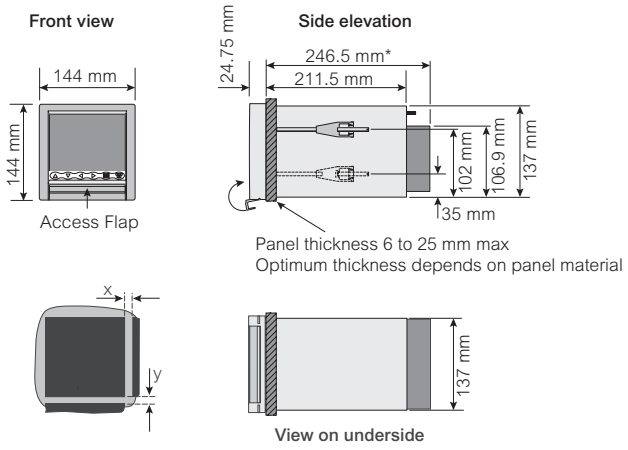


6180A



Mechanical details

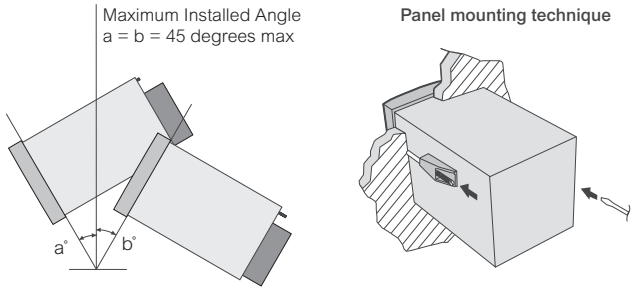
6100A



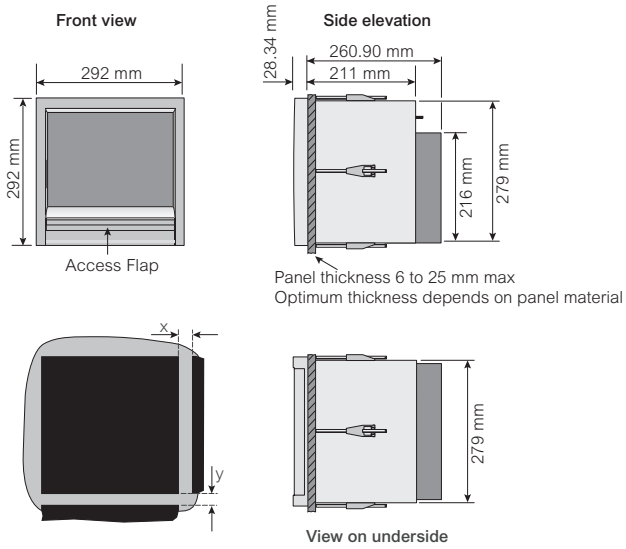
* Standard Terminal Cover: 246.5 mm
Long Terminal Cover: Closed: 288 mm
Open: 415 mm

Panel cut-out
138 mm (+1 –0) x 138 mm (+1 –0)

Minimum recommended inter-unit spacing	
Side clamps	Top/bottom clamps
x = 15 mm (0.6 inch) y = 10 mm (0.4 inch)	x = 10 mm (0.4 inch) y = 15 mm (0.6 inch)

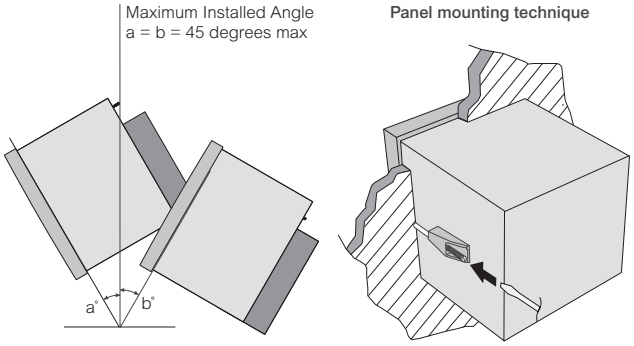


6180A

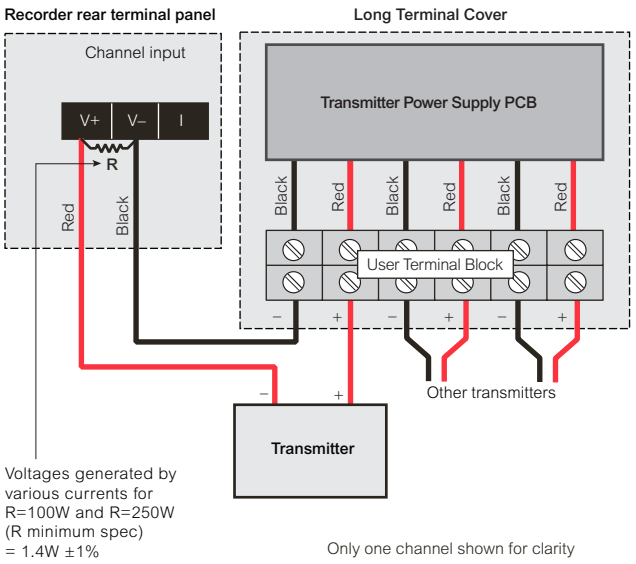


Panel cut-out
281 mm (+1 –0) x 281 mm (+1 –0)

Minimum recommended inter-unit spacing	
Side clamps	Top/bottom clamps
x = 25 mm (1 inch) y = 12.5 mm (0.5 inch)	x = 12.5 mm (0.5 inch) y = 25 mm (1 inch)

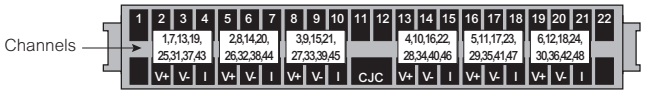


Isolated transmitter power supply wiring (6100A only)

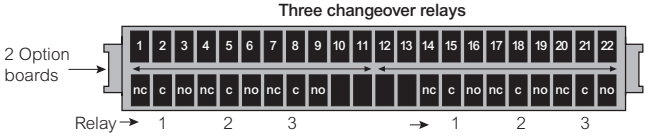


	100W	250W
0mA	0V	0V
4mA	0.4V	1.0V
20mA	2.0V	5.0V

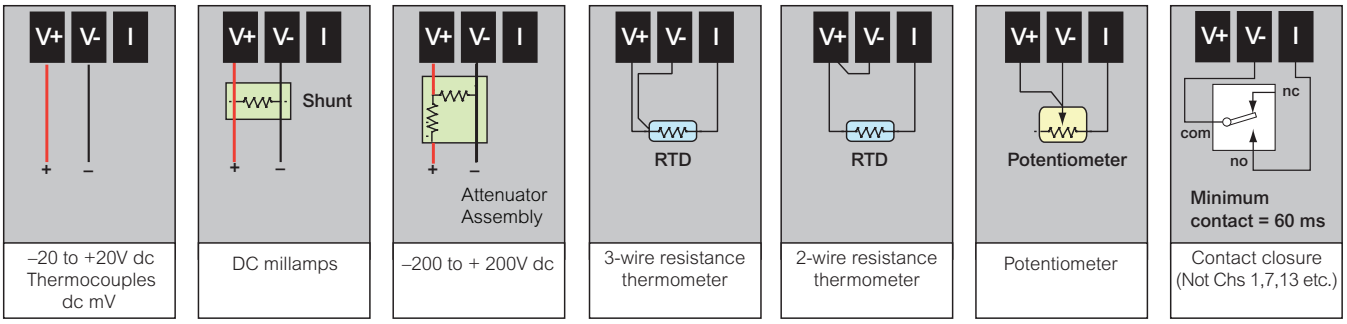
Input board wiring



Relay board wiring



Input board signal wiring

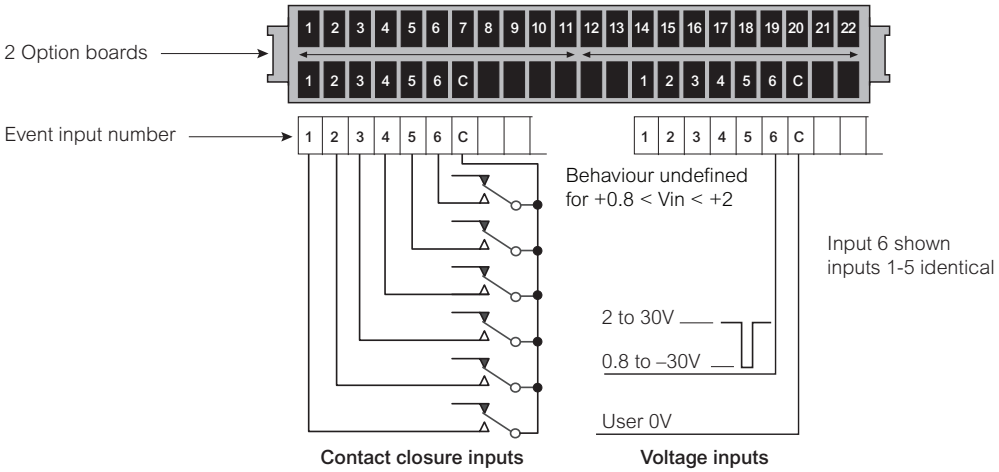


–20 to +20V dc Thermocouples dc mV	DC millamps	–200 to + 200V dc	3-wire resistance thermometer	2-wire resistance thermometer	Potentiometer	Contact closure (Not Chs 1,7,13 etc.)

Shunt assembly
100W = LA246779UK10
250W = LA246779UK25

Attenuator assembly
LA244180

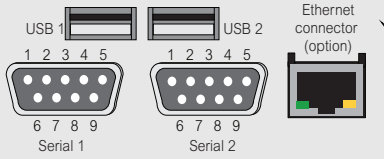
Event input board wiring

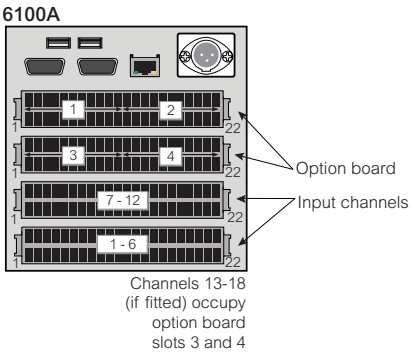


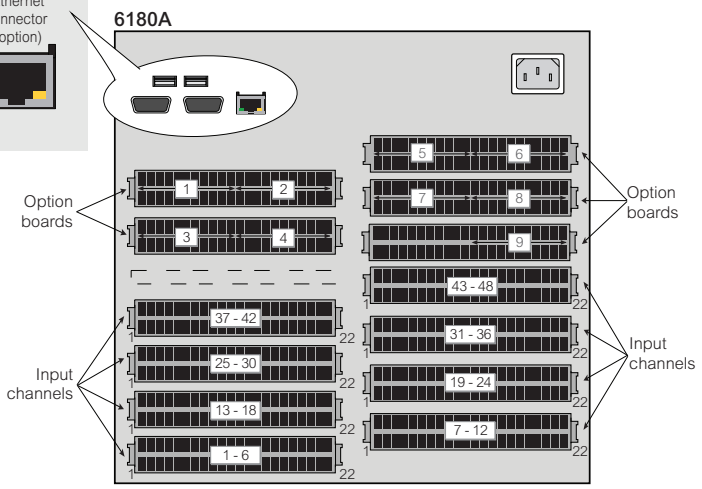
Rear Terminal Connections

Serial communication port pinout

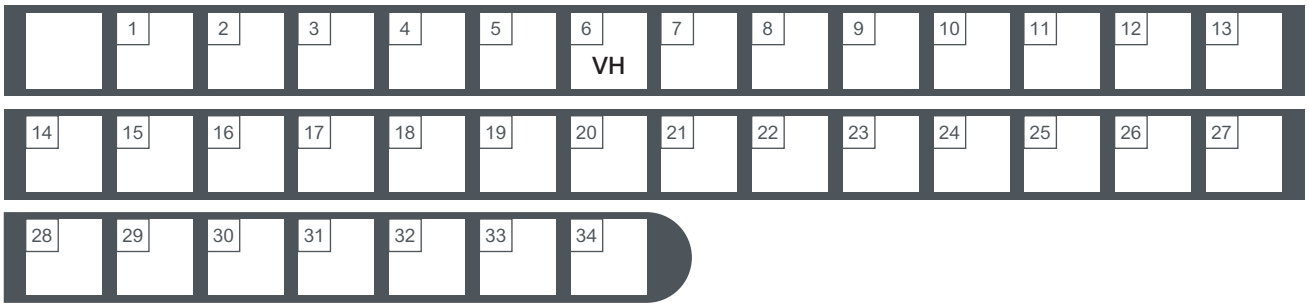
Pin	EIA232	EIA485 (5-wire)	EIA485 (3-wire)
1	Not connected	RxA	Link to pin 7
2	Rx	Not connected	Not connected
3	Tx	Not connected	Not connected
4	DTR	Not connected	Not connected
5	Signal ground		
6	Not Connected	RxB	Link to pin 8
7	Not Connected	TxA	TxA/RxB
8	Not Connected	TxB	TxB/RxA
9	5.0V via 1500W		







Order codes



Basic product	
6100A	100mm TFT 1/4 VGA Display Paperless Graphic Recorder
6180A	180mm TFT XGA Display Paperless Graphic Recorder

1 Number of channels	
U00	0 Input channels
U06	6 Input channels
U12	12 Input channels
U18	18 Input channels
U24	24 Input channels (6180A only)
U30	30 Input channels (6180A only)
U36	36 Input channels (6180A only)
U42	42 Input channels (6180A only)
U48	48 Input channels (6180A only)

2 Industry variant	
NONE	None
TUS	AMS2750F Heat Treatment specific variant

3 Number of channels	
PANEL	Panel mounting
PORTGEN	General Portable (6100A only)
PORTUTC	Universal Thermocouple Portable (6100A only)
CH	Carry handle (Bezel Colour Silver)
PMHD	Panel mounting with Heavy Duty Case Clamps
PMTN	Panel mounting with Thin panel mounting kit

4 Lock	
NOLCK	Media lock not fitted
LOCK	Electronic lock fitted

5 Bezel color	
SLV	Silver including portable options
BLK	Black

6 Power supply	
VH	90-264V ac (110-370 V dc) 47-63 Hz

7 24V Isolated tansmitter power supply	
NONE	Not fitted
115TPS	110-120V 3 channel TPS (6100A only)
230TPS	220-240V 3 channel TPS (6100A only)

8 Non standard	
XXXXXX	Non standard option

9 Internal memory	
096M	96 MB for history – approx. 12 million samples

10 Removable media	
CF	Compact Flash and Front USB port

11 Memory card	
NOMC	Not fitted
008G	8 GB Card CF only*

12 USB memory stick size	
NOMC	Not fitted
008GMS	8 GB*

13 Rear USB	
0RUSB	No rear USB ports
2RUSB	2 USB ports at rear

14 Serial communications ports	
0SRL	Not fitted
2SRL	EIA 232/422/485

15 EtherNet communications protocol	
NONE	Not fitted
ESERV	EtherNet/IP server

16 Calibration certificates	
NOCAL	Not required
CAL	Calibration certificate

17 Changeover relays	
00	Not fitted
03	3 (1 option brd)
06	6 (2 option brds)
09	9 (3 option brds)
12	12 (4 option brds)
15	15 (5 option brds) †
18	18 (6 option brds) †
21	21 (7 option brds) †
24	24 (8 option brds) †
27	27 (9 option brds) †
	† (6180A only)

18 Normally closed relays	
00	Not fitted

19 Normally open relays	
00	Not fitted

20 Event inputs	
00	Not fitted
06	06 (1 brd)
12	12 (2 brds)
18	18 (3 brds)
24	24 (4 brds)

21 Analog outputs	
00	None
02	2 (1 option brd)
04	4 (2 option brd)
06	6 (3 option brd)
08	8 (4 option brd)

22 Quantity of shunts	
_ _	Enter quantity required

23 Shunt value	
NOS	Not required
100	100 ohm shunts
250	250 ohm shunts

24 Quantity of 100:1 attenuators	
_ _	Enter quantity required

25 Warranty	
XXXXX	Standard warranty
WL005	Extended warranty

26 Bridge	
BLITE	Lite (supplied as standard)
BFULL	Full

27 Review & quickchart	
XXXXX	Not required

28 Auditor	
NOADT	Not required
ALITE	Audit Trail
AFULL	Auditor Full

29 Security manager	
NOSM	Not required
SECMAN	Security Manager (inc. Active Directory)

30 Groups	
06GROUP	6 (supplied as standard)
12GROUP	12

31 Math, totalizers & counters	
MTC00	Not required
MTC36	36 Virtual Channels
MTC96	96 Virtual Channels
MTC128	128 Virtual Channels

32 Batch	
NOBTCH	Not required
BATCH	Batch

33 Screen builder	
NOSB	Not required
ADSB	Advanced

34 Master communications	
NOMSTR	Not required
MSTR16	16 Slaves
MSTR32	32 Slaves

* Please consult Eurotherm for this option

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Contact your local sales representative

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