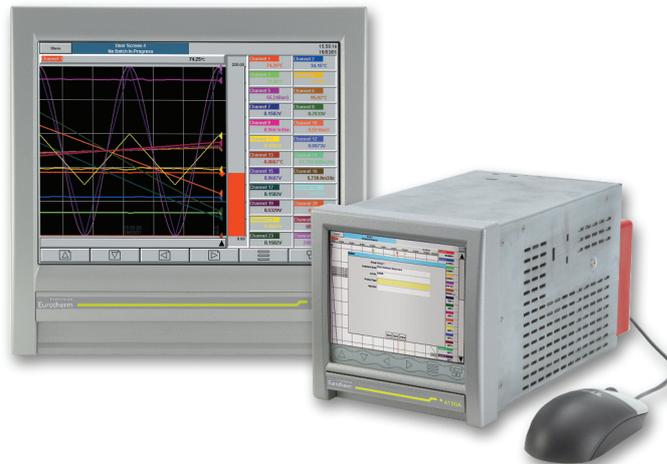


# 6100A 6180A

MODEL

invenys  
Eurotherm



## Paperless Graphic Recorders Specification Sheet

- Colour touchscreen display
- USB 'plug & play'
- Up to 48 universal Inputs
- Up to 96MB non-volatile flash memory
- 125ms parallel sampling
- Compact Flash or Secure Digital 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)

The 6000 Series offer unrivalled 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 choice of Compact Flash or SD card. Data is stored in a tamper-resistant binary format that can be used for secure, long term records of your process. The 6000 Series is truly designed for today's networked world and can be accessed via a Local Area Network, dial-up connection, Intranet or Internet.

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 optional)	
Auditor features	Auditor or audit trail	
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	
Review/Quickchart Lite software	Standard	
Standard views	Vertical and horizontal trending, Vertical and horizontal bargraphs, Circular trend and numeric values	

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

imagine absolute data records forever

## Data logging and archiving

The 6000 Series recorders have internal Flash memory for secure data storage. They are also able to accept various removable media types (Compact Flash, SD card 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 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.

All 6000s have Ethernet capability. The 6000 can be configured to archive to the removable media and/or over Ethernet. Archiving files over Ethernet effectively gives a secure, 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
32Mb Internal Flash (approx. 4 million samples)	2.83 days	11.3 days	22.6 days	113 days	226 days	1.86 yrs	3.7 yrs
64Mb CF Card or USB memory stick (approx. 8 million samples)	5.66 days	22.6 days	45.3 days	226 days	1.2 yrs	3.7 yrs	7.4 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
1Gb CF Card or USB memory stick (approx. 125 million samples)	88 days	354 days	1.9 yrs	9.6 yrs	19 yrs	58 yrs	116 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
16Gb CF Card or USB memory stick (approx. 2000 million samples)	3.8 yrs	15.6 yrs	30.4 yrs	153.6 yrs	304 yrs	928 yrs	1856 yrs
Ethernet (FTP Server)	Infinite						

## Time synchronisation (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 synchronise 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 meet the requirements of the FDA Regulation 21 CFR Part 11 for Electronic Records and Signatures, this software option provides the 6000 Series with additional security such as password ageing, electronic signatures and time stamped audit trail.

### Audit trail

A sub-set of the Auditor which provides the 6000XIO 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.

## 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 metres

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

#### Operator interface

Type:	Colour TFT LCD with cold cathode backlight, fitted with resistive, analogue, 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 370V dc
Power (Max):	60VA (Inrush current 36A)
Fuse type:	None
Interrupt protectionStandard:	Holdup >200msec, 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, SNMP, Modbus, ICMP, EtherNet/IP server  
 Cable Type: CAT5  
 Maximum length: 100 metres  
 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: >60dB.  
 Max. common mode voltage: 250 Volts continuous  
 Max. series mode voltage: 45mV 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: >10MΩ at 500 V dc  
 Input impedance: 38mV, 150 mV, 1 V ranges: >10MΩ; 20V range: 65.3kΩ  
 Over voltage protection: 50 Volts peak (150V with attenuator)  
 Open circuit detection: ± 57nA max.  
 Recognition time: 500msec  
 Minimum break resistance: 10MΩ

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
-38mV	38mV	1.4µV	0.013% I/P + 0.031%	0.030% I/P + 0.052%	25ppm
-150mV	150mV	5.5µV	0.013% I/P + 0.028%	0.029% I/P + 0.039%	25ppm
-1V	1V	37µV	0.013% I/P + 0.024%	0.029% I/P + 0.029%	25ppm
-20V	20V	720µV	0.075% I/P + 0.027%	0.393% I/P + 0.033%	388ppm

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
0Ω	150Ω	5mΩ	0.027% I/P + 0.034%	0.037% I/P + 0.077%	30ppm
0Ω	600Ω	22mΩ	0.027% I/P + 0.035%	0.037% I/P + 0.057%	30ppm
0Ω	5KΩ	148mΩ	0.030% I/P + 0.034%	0.040% I/P + 0.041%	30ppm

Table 2 Resistance ranges - accuracy and resolution

### 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 (8Hz)

### 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

T/C Type	Overall range (°C)	Standard	Max linearisation error
B	0 to +1820	IEC 584.1	0 to 400°C = 1.7°C 400 to 1820°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

Table 3 Thermocouple types and ranges

### Resistance inputs

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

RTD Type	Overall range (°C)	Standard	Max linearisation 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

Table 4 RTD types and ranges

## Transmitter PSU

Isolated, 6100A recorder only  
 Number of outputs: Three  
 Output voltage: 25V nominal  
 Maximum current: 20mA 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: 100mA  
 220/240V ac: 63mA

## 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:

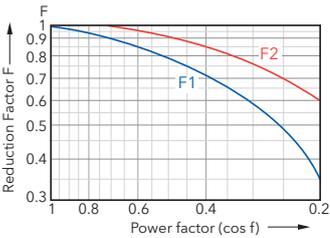
F1 = Actually measured results on representative samples  
 F2 = Typical values according to experience  
 Contact life = Resistive contact life x reduction factor  
 Max. switching power: 500VA  
 Max. contact voltage: 250V providing this does not cause the maximum switching power (above) to be exceeded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

## DC load ratings

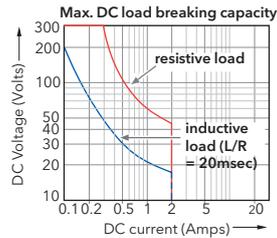
Max. switching power: See Graph 2 for operating volt/amp envelope  
 Max. contact voltage/current: See Graph 2 for examples

## 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: 8Hz  
 Minimum pulse width: 62.5ms  
 Contact resistance Event: Active if resistance <35K $\Omega$   
 Inactive if resistance >200K $\Omega$   
 Status not defined if 35K $\Omega$  < resistance <200K $\Omega$  between input terminal and 'C' terminal  
 Current sink (voltage I/P): 10mA

## Portable

### Portable option



6100A is available as a portable unit with either Thermocouple (TC), General or HTM2010 connections

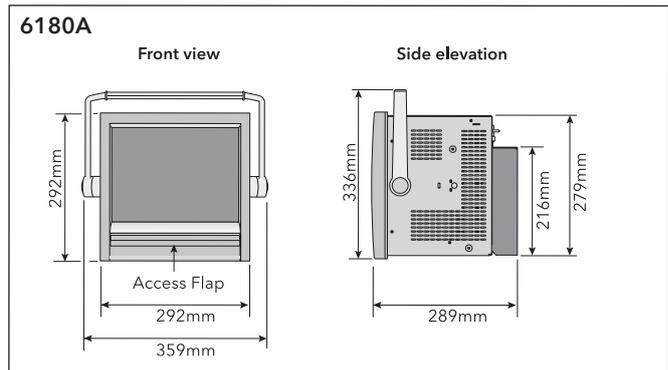
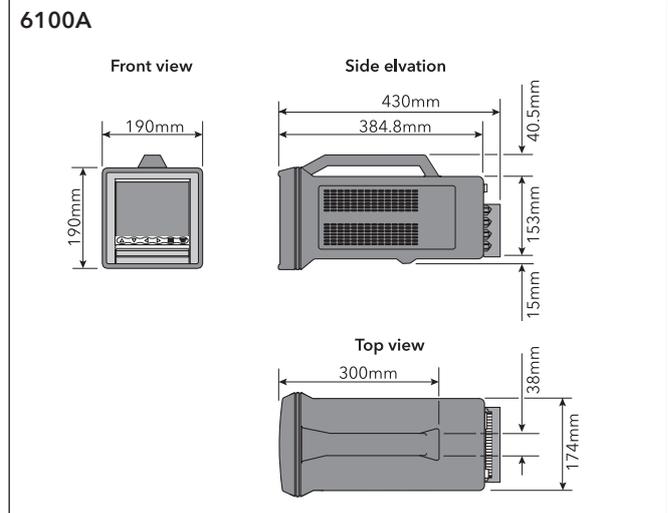


6180A is available with optional carry handle and feet for portability

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**

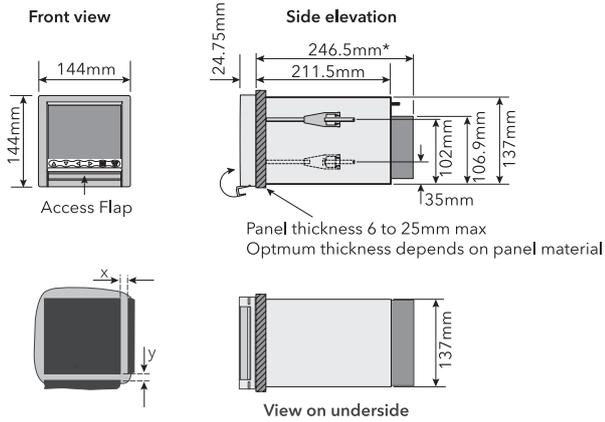
\*\* Mutually exclusive  
 \* Requires one option slot

## Portable mechanical details



## Mechanical details

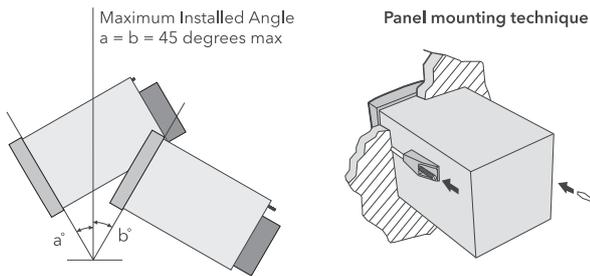
### 6100A



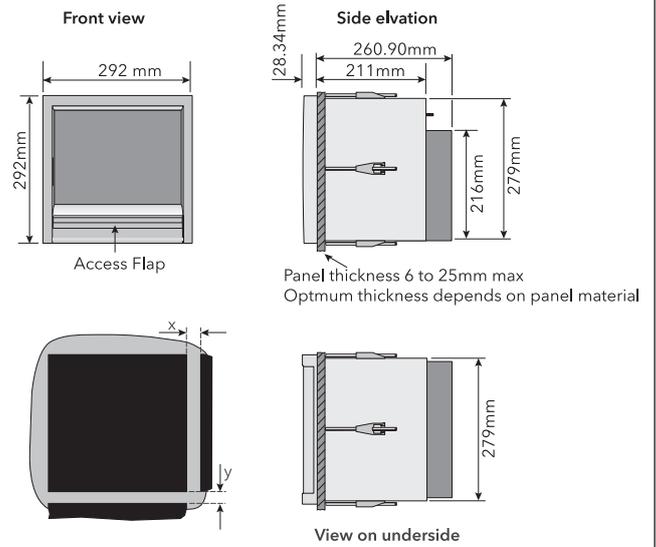
\* Standard Terminal Cover: 246.5mm  
 Long Terminal Cover: Closed: 288mm  
 Open: 415mm

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

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

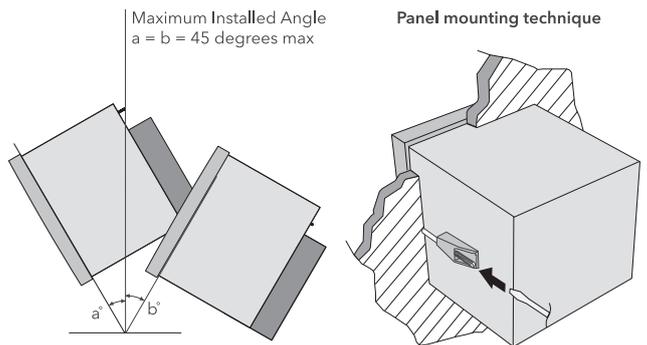


### 6180A

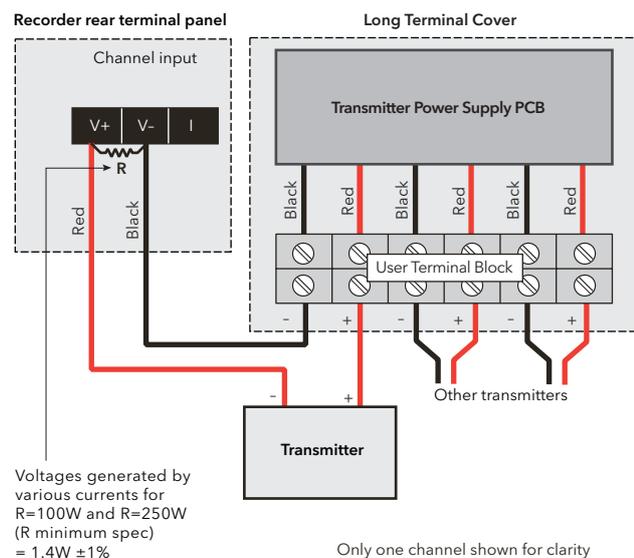


**Panel cut-out**  
 281mm (+1 -0) x 281mm (+1 -0)

Minimum recommended inter-unit spacing	
Side clamps	Top/bottom clamps
x = 15mm (1 inch) y = 10 mm (0.5 inch)	x = 10mm (0.5 inch) y = 15mm (1 inch)



## Isolated transmitter power supply wiring (6100A only)



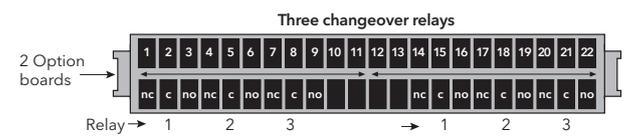
Voltages generated by various currents for R=100W and R=250W (R minimum spec) = 1.4W ±1%

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

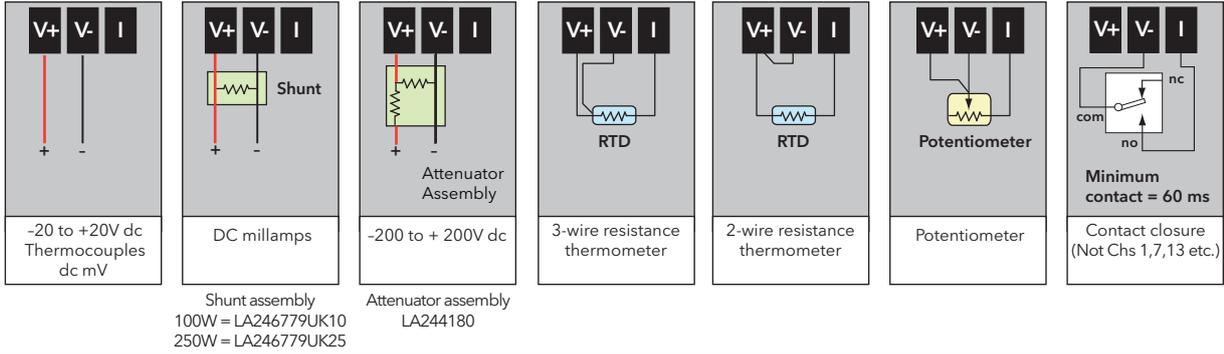
## Input board wiring



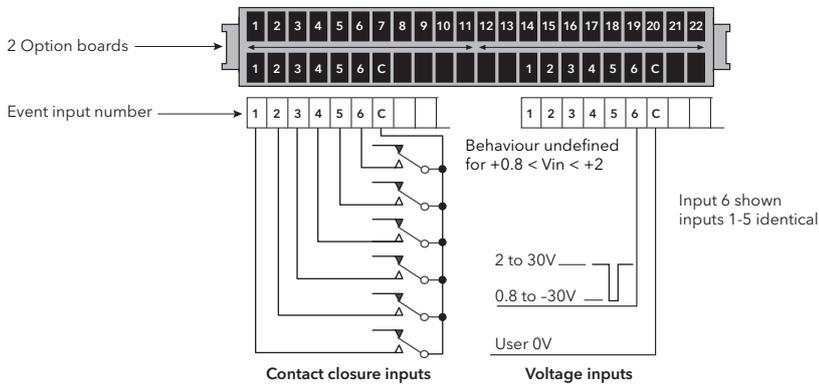
## Relay board wiring



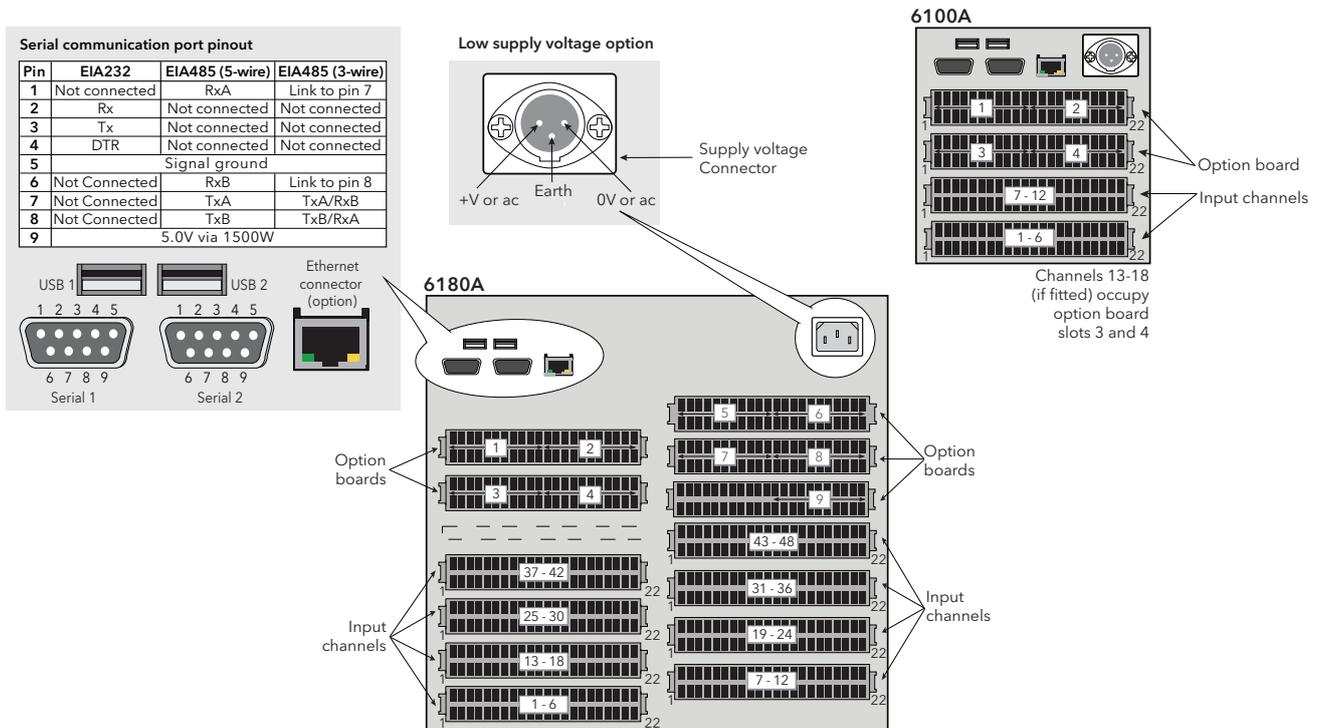
## Input board signal wiring



## Event input board wiring



## Rear terminal connections



## Order codes

	1	2	3	4	5	6	7	8	9	10	11	12	13
						VH							
14	15	16	17	18	19	20	21	22	23	24	25	26	27
				00	00		00						
28	29	30	31	32	33	34							

### Basic Product

<b>6100A</b>	100mm TFT 1/4 VGA Display Paperless Graphic Recorder
<b>6180A</b>	180mm TFT XGA Display Paperless Graphic Recorder

### 1 Number of Channels

<b>U00</b>	0 Input channels
<b>U06</b>	6 Input channels
<b>U12</b>	12 Input channels
<b>U18</b>	18 Input channels
<b>U24</b>	24 Input channels (6180A only)
<b>U30</b>	30 Input channels (6180A only)
<b>U36</b>	36 Input channels (6180A only)
<b>U42</b>	42 Input channels (6180A only)
<b>U48</b>	48 Input channels (6180A only)

### 2

<b>XXX</b>	
------------	--

### 3 Case Options

<b>PANEL</b>	Panel mounting
<b>PORTGEN</b>	General Portable (6100A only)
<b>PORTUTC</b>	Universal Thermocouple Portable (6100A only)
<b>PORTVTC</b>	Voltage Input only Portable (6100A only)
<b>CH</b>	Carry handle (Bezel Colour Silver)
<b>PMHD</b>	Panel mounting with Heavy Duty Case Clamps
<b>PMTN</b>	Panel mounting with Thin panel mounting kit

### 4 Lock

<b>NOLCK</b>	Media lock not fitted
<b>LOCK</b>	Electronic lock fitted

### 5 Bezel Colour

<b>SLV</b>	Silver including portable options
<b>GRN</b>	Eurotherm Green
<b>BLK</b>	Black

### 6 Power Supply

<b>VH</b>	90-264V ac (110-370V dc) 47-63Hz
-----------	----------------------------------

### 7 24V Isolated Transmitter Power Supply

<b>NONE</b>	Not fitted
<b>115TPS</b>	110-120V 3 channel TPS (6100A only)
<b>230TPS</b>	220-240V 3 channel TPS (6100A only)

### 8 Non Standard

<b>XXXXXX</b>	Non standard option
---------------	---------------------

### 9 Internal Memory

<b>096M</b>	96MB for history - approx. 12 million samples
-------------	---

### 10 Removable Media

<b>CF</b>	Compact Flash and Front USB port
<b>SD</b>	Secure Digital and Front USB port

### 11 Memory Card

<b>NOMC</b>	Not fitted
<b>002G</b>	2GB Card CF only*
<b>004G</b>	4GB Card CF only*
<b>008G</b>	8GB Card CF only*

### 12 USB Memory Stick Size

<b>NOMS</b>	Not fitted
<b>002GMS</b>	2GB*
<b>004GMS</b>	4GB*
<b>008GMS</b>	8GB*

### 13 Rear USB

<b>0RUSB</b>	No rear USB ports
<b>2RUSB</b>	2 USB ports at rear

### 14 Serial Communications Ports

<b>0SRL</b>	Not fitted
<b>2SRL</b>	2EIA 232/422/485

### 15 EtherNet Communications Protocol

<b>NONE</b>	Not fitted
<b>ESERV</b>	EtherNet/IP server

### 16 Calibration Certificates

<b>NOCAL</b>	Not required
<b>CAL</b>	Calibration certificate

### 17 Changeover Relays

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

### 18 Normally Closed Relays

<b>00</b>	Not fitted
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### 19 Normally Open Relays

<b>00</b>	Not fitted
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### 20 Event Inputs

<b>00</b>	Not fitted
<b>06</b>	06 (1 brd)
<b>12</b>	12 (2 brds)
<b>18</b>	18 (3 brds)
<b>24</b>	24 (4 brds)

### 21 Analogue Outputs

<b>00</b>	None
-----------	------

### 22 Quantity of Shunts

<b>--</b>	Enter qty required
-----------	--------------------

### 23 Shunt Value

<b>NOS</b>	Not required
<b>100</b>	100 ohm shunts
<b>250</b>	250 ohm shunts

### 24 Qty of 100:1 Attenuators

<b>--</b>	Enter qty required
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### 25 Warranty

<b>XXXXX</b>	Standard warranty
<b>WL005</b>	Extended warranty

### 26 Bridge

<b>BLITE</b>	Lite (supplied as standard)
<b>BFULL</b>	Full

### 27 Review & Quickchart

<b>RLITE</b>	Lite (supplied as standard)
<b>RFULL</b>	Full

### 28 Auditor

<b>NOADT</b>	Not required
<b>ALITE</b>	Audit Trail
<b>AFULL</b>	Auditor Full

### 29 Security Manager

<b>NOSM</b>	Not required
<b>SECMAN</b>	Security Manager (inc. Active Directory)

### 30 Groups

<b>06GROUP</b>	6 (supplied as standard)
<b>12GROUP</b>	12

### 31 Maths, Totalisers & Counters

<b>MTC00</b>	Not required
<b>MTC36</b>	36 Virtual Channels
<b>MTC96</b>	96 Virtual Channels
<b>MTC128</b>	128 Virtual Channels

### 32 Batch

<b>NOBTCH</b>	Not required
<b>BATCH</b>	Batch

### 33 Screen Builder

<b>NOSB</b>	Not required
<b>ADSB</b>	Advanced

### 34 Master Communications

<b>NOMSTR</b>	Not required
<b>MSTR16</b>	16 Slaves
<b>MSTR32</b>	32 Slaves

\* Please consult Eurotherm for this option

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**i n v e n s y s**  
 Operations Management