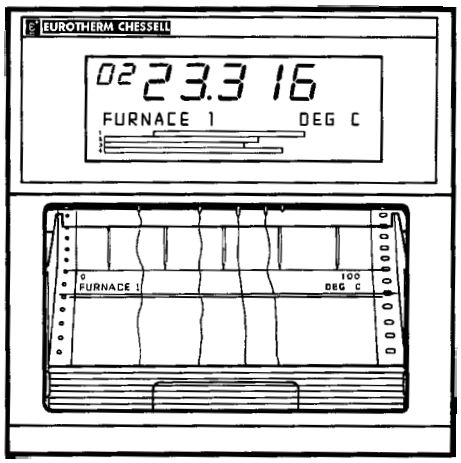
- 4-Pen Continuous trace with annotation option
- 4-Colour digital display with analogue bargraphs
- Roll or Z-fold chart
- Front panel or PC, local or remote configuration
- Universal isolated inputs
- Chart illumination
- Maths, timers, counters and totalisers
- PC card reader
- MODBUS® /Profibus communications
- 236 mm total depth behind panel
- Up to 16 relay outputs
- Up to 4 analogue outputs
- 16 contact inputs



The 4103C is a high specification continuous-trace chart recorder capable of plotting up to four signals. Enclosed in a sheet steel case designed to meet the requirements of an industrial environment, the recorder is ideal for production or test environments.

Display

The display module for the 4103C is a high resolution four-colour vacuum fluorescent display (VFD) comprising five 12-mm high characters for process value, twenty 4.7mm characters for text and four 1.5 mm. bargraphs. The display shows the measured value of each channel in turn, together with its associated descriptor or scale. It also gives bargraph indication of the channels' values.

Configuration

The recorder is fully configurable from the front panel, using push-button keys to follow a series of text prompts. This allows access both to simple operator facilities and, via a password, to the more complex input and instrument configuration.
The recorder can also be configured from a DOS based package, allowing the user to set up the configuration off-site for later downloading to the recorder.

Input technology

Use of the very latest in Application Specific Integrated Circuit (ASIC) and Surface Mount technologies, gives the 4103 input circuitry high accuracy and stability. Inputs are fully universal accepting inputs from thermocouples, resistance thermometers, potentiometers and digital signals.

Chart Illumination

This option provides a fluorescent tube above the chart, making the traces significantly more visible, even in well lighted areas.

Maths, Timers, Counters and Totalisers

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

Memory Card Reader

Using the computer industry standard SRAM PC card type 1, the recorder's configuration can be stored for transfer to another recorder or to a PC for manipulation using the PC configuration tool. Data can also be stored on the memory card in a format readable by standard spreadsheet packages

File transfer

Archive files can be transferred (using z-modem) from the recorder's memory card to a PC, either using a modem or by direct connection. In addition, configuration files can be sent to the recorder, thus allowing remote re-configuration.
Data from several recorders (on an RS485 serial link), can be imported direcly into the PC, and viewed using Eurotherm Review Software.

MODBUS® Communications

This communications option uses the MODBUS® RTU protocol to ensure compatibility with any standard SCADA software and other types of industrial equipment such as PLCs. RS232 or RS485 specification can be used in single drop (RS232) or multidrop (RS485) applications using a single communications link.

Profibus Communications

All parameters available over the Modbus protocol are available, as an alternative, over a Profibus DP interface running at up to 12Mbits/sec. allowing direct communication with PLCs etc. Profibus configuration is carried out using the Eurotherm GSD File Editor.

Relay Outputs

Up to 16 relay outputs can be fitted, driven by any internal recorder event such as channel alarm, totaliser overflow etc. Relays are available as changeover, normally closed or normally open.

Retransmission outputs

Up to four of the input or maths channels can be output as a linearised current or voltage signal.

Contact inputs

Recorder inputs can be used as digital inputs to trigger events. The Event input option adds the ability to read a further 16 (encoded) inputs.

Model 4103C

Specification sheet

TECHNICAL SPECIFICATION (Input board)

General

Input types	dc Volts, dc millivolts, dc milliamps (with shunt), Thermocouple, 2 / 3-wire RTD Contact closure (not chan. 1) >60ms
Input type mix	Freely configurable.
Maximum number of inputs	4
Input ranges	-8 to + 38 mV; - 30 to +150 mV; -0.2V to + 1 V; -2 to + 10 V
Termination	Edge connector / terminal block
Noise rejection (48 to 62 Hz)	Common mode: >140dB (channel to channel and channel to ground). Series mode: >60dB.
Maximum common mode voltage	250 Volts continuous
Maximum series mode voltage	45 mV at lowest range; 12 Volts peak at highest range.
Isolation (dc to 65 Hz; BS EN61010)	Installation cat. II; Pollution degree 2
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	2300 Vac
Channel to ground	1350 Vac
Insulation resistance	>10 MΩ at 500 V dc
Input impedance	38mV, 150 mV, 1 V ranges: >10 MΩ; 10 V range: 68.8 kΩ
Over voltage protection	50 Volts peak (150V with attenuator)
Open circuit detection	± 57 nA max.
Recognition time	125 msec
Minimum break resistance	10 MΩ

DC Input ranges

Shunt / Attenuator	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

Low Range	High Range	Resolution	Maximum error (Instrument at 20˚C)	Worst case temperature performance
-8 mV	38mV	1.4µV	0.085% input + 0.073% range	80ppm of input per deg C
-30 mV	150mV	5.5µV	0.084% input + 0.053% range	80ppm of input per deg C
-0.2 Volt	1 Volt	37µV	0.084% input + 0.037% range	80ppm of input per deg C
-2 Volts	10 Volts	370µV	0.275% input + 0.040% range	272ppm of input per deg C

Table 1 DC performance

Input board specification (Cont.)

Thermocouple data

Temperature scale	ITS 90
Bias current	0.05 nA
Cold junction types	Off, internal, external, remote
CJ error	1˚C max; instrument at 25˚C
CJ rejection ratio	50:1 minimum
Remote CJ	Via any user defined channel
Upscale / downscale drive	High, low or none selectable for each thermocouple channel
Types and ranges	See table 2

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	DIN43700:1985 (To IPTS68)	0.20˚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	DIN 43710:1985	0.08˚C
Ni/NiMo	0 to + 1406	Ipsen	0.14˚C
Platinel	0 to + 1370	Engelhard	0.02˚C

Table 2 Thermocouple types and ranges

Resistance inputs

Ranges (including lead resistance)		0 to 150Ω, 0 to 600 Ω, 0 to 6k Ω
Influence of lead resistance	Error:	Negligible;
	Mismatch:	1 Ω/Ω
Resolution and accuracy		See table 3
RTD types and ranges		See table 4

Low Range	High Range	Resolution	Maximum error (Instrument at 20˚C)	Worst case temperature performance
0Ω	150Ω	5mΩ	0.045% input + 0.110% range	35ppm of input per deg C
0Ω	600Ω	22mΩ	0.045% input + 0.065% range	35ppm of input per deg C
0Ω	6kΩ	148mΩ	0.049% input + 0.035% range	35ppm of input per deg C

Table 3 Resistance ranges resolution and accuracy

RTD Type	Overall range (˚C)	Standard	Max linearisation error
Cu10	-20 to + 400	General Electric Co.	0.02 ˚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, ranges and accuracies

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.

TECHNICAL SPECIFICATION (Recorder)

Board types and hardware options

Standard:	Universal input / control board
Options:	3- Change-over relay output board
	4 Normally open relay o/p board
	4 Normally closed relay o/p board
	Analogue output board (2 channel)
	Event input board
	Communications board
	Transmitter Power Supply

Environmental Performance

Temperature limits	Operation: 0 to 50˚C.
	Storage: –20 to + 70˚C
Humidity limits (non-condensing)	Operation: 5% to 80% RH
	Storage: 5% to 90% RH
Protection	Door and Bezel: IP54. Sleeve: IP20
	Transmitter PSU rear cover: IP10
Shock	BS EN61010
Vibration	2g peak at 10 Hz to 150Hz
Altitude (max.)	<2000 metres

Electromagnetic compatibility (EMC)

Emissions:	BS EN50081-2
Immunity:	BS EN50082-2
Electrical safety (BS EN61010)	Installation cat. II; Pollution degree 2

Physical

Panel mounting	DIN43700
Bezel size	144 x 144 mm.
Panel cutout dimensions	138 x 138 (both – 0 + 1 mm)
Depth behind bezel rear face	220 mm (No terminal cover);
	236 mm (standard terminal cover)
	275 mm (long terminal cover closed)
	390mm (long terminal cover open)
Weight	< 3.5kg
Panel mounting	Vertical ± 30˚

Printing system

Pen type		Disposable fibre-tipped pens
Pen resolution		0.15 mm
Trace colours		See table 5
Pen life	Channel:	1.2km
	Annotator option:	7.5 x 10^5 dots
Update rate		8 Hz
Response time (max)		1 second
Characters per line		42

Channel	Colour	Channel	Colour
1 (top)	blue	4 (bottom)	violet
2	red	Annotator	black
3	green		

Table 5 Trace colours

Paper transport

Type		Stepper motor driving sprocket tube
Chart speeds		0 to 36,000 mm/hr; 0 to 1417 in/hr
Chart type	Standard:	16- metre z-fold
	Option:	32- metre roll.
Transport accuracy		0.5 cm in 16 metres (approx 0.03%)

Power requirements

Line voltage	Standard:	90 to 264V at 45 to 65 Hz.
	Enhanced interrupt protection:	90 to 132V at 45 to 65 Hz.
	Low voltage option	20 to 53 V ac/dc
		(ac frequency range: 45 to 400 Hz)
Power (Max)		< 100 VA
Fuse type		None
Interrupt protection	Standard:	40 ms at 75% max. instrument load
	Enhanced:	120 ms at 75% max. instrument load

TECHNICAL SPECIFICATION (Options)

MODBUS (RS232/RS422/RS485) Communications

Isolation†	Terminals to ground	100V RMS/dc (basic insulation)

Profibus (RS485) Communications

Isolation†	Terminals to ground	50V RMS/dc (basic insulation)

Maths pack

Number of derived channels	16
Level 1 functions	Off, constant, add, subtract, multiply, divide, modulus.
Level 2 functions (additional to level 1)	See table 6

Square root	Rate of change	DV group continuous max.	Switch
Channel average	Sample and hold	Third order polynomial	High select
DV group average	Channel minimum	Relative humidity	Low select
Rolling average	DV group latching minimum	Fvalue	Stopwatch
e^x	DV group continuous min.	Linear mass flow	Time stamp
$\log_n$	Channel maximum	Square root mass flow	O_2 correction
10^x	DV group latching max.	Zirconia probe	Percentile
$\log_{10}$			

Table 6 Level two maths functions

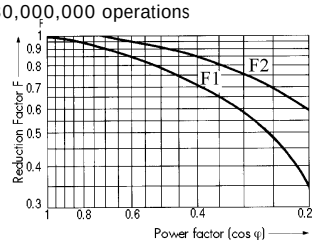
Customer linearisation tables

Nº of tables available	One
Nº of point pairs	32

Relay outputs

Maximum switching power*		500VA or 60W
Maximum breaking current*		2 Amps within above power ratings
Maximum contact voltage*		250V within above power ratings
Isolation†	Contact to contact:	300V RMS or dc (double insulation)
	Contact to ground:	300V RMS or dc (basic insulation)
Estimated life*		30,000,000 operations

* With resistive loads. With inductive loads, derate according to the graph, in which:
contact life = resistive life x F1 or F2
where F1 = measured on representative examples and F2 = typical values according to experience.



Analogue (retransmission) outputs

Output ranges (user configurable)		
	Voltage:	0 to 10 V (Source 5 mA max.)
	Current:	0 to 20mA (max. load resistance: 1kΩ)
Update rate		8 Hz.
Step response (10% to 90%)		250msec
Linearity		0.024% of hardware range
Performance		See table 7
Isolation†	Channel to channel:	300V RMS or dc (double insulation)
	Channel to ground:	300V RMS or dc (basic insulation)

Performance in instrument at 20 deg. C		
Range	Accuracy	Temperature drift
0 to 10 V	0.1% of range	±0.12mV +0.022% of reading per deg. C
0 to 20mA	0.1% of range	± 1 µA +0.03% of reading per deg. C

Table 7 Analogue output performance

Event inputs

Nº of inputs		6 discrete or 16 binary coded inputs as configured + chart synch.
Isolation†	Event input to ground:	100V RMS or dc (double insulation),
	Chart drive to ground:	100V RMS or dc (double insulation)
	Event input to chart drive:	100V RMS or dc (double insulation)
	Event input to Event input:	0V.
Recognition levels	Low:	-30 V to + 0.8V
	High:	2 to 30 V
Maximum frequency		Events: 1Hz; Pulse counting: 6Hz
Minimum pulse width		62.5 ms.
Chart synchronization	Chart speed:	Selected speed at 200 pulses/sec.
	Maximum pulse rate:	220 pulses per second
	Duty cycle:	20 to 80%

Transmitter Power Supply

Output voltage		3 or 6 x 25V (nom) outputs
Isolation†	Channel to channel:	100V RMS or dc (double insulation)
	Channel to ground:	100V RMS or dc (basic isolation)

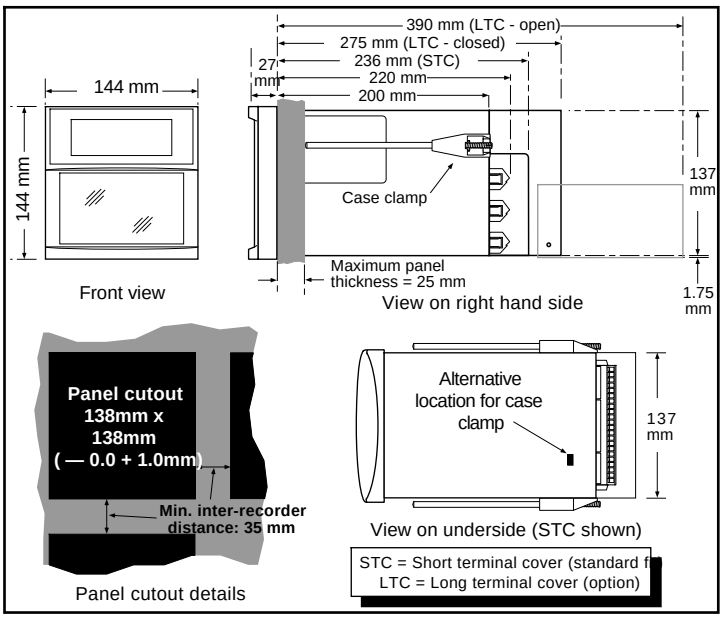
Seismic

Tested to IEEE344 - 1987 'IEEE recommended practice for Seismic qualification of class 1E equipment for Nuclear Power Generating Stations'

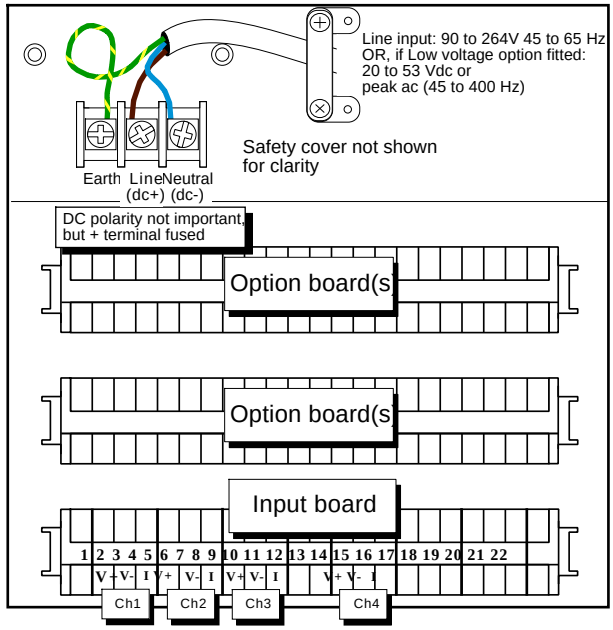
†All isolation figures are: DC to 65Hz; BS EN61010 Installation category II; Pollution degree 2

Square root	Rate of change	DV group continuous max.	Switch
Channel average	Sample and hold	Third order polynomial	High select
DV group average	Channel minimum	Relative humidity	Low select
Rolling average	DV group latching minimum	Fvalue	Stopwatch
e^x	DV group continuous min.	Linear mass flow	Time stamp
$\log_n$	Channel maximum	Square root mass flow	O_2 correction
10^x	DV group latching max.	Zirconia probe	Percentile
$\log_{10}$			

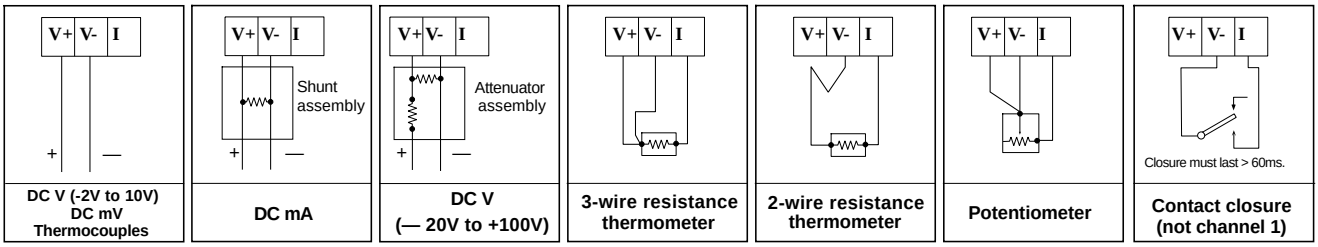
Mechanical installation



Supply voltage and input board termination



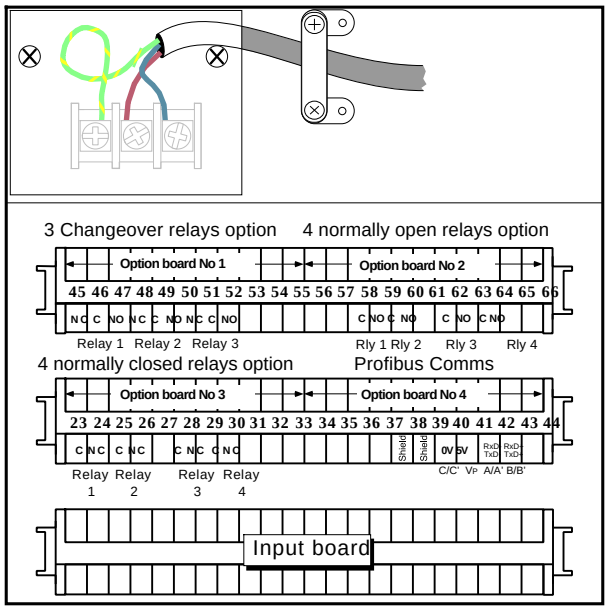
Input board signal wiring



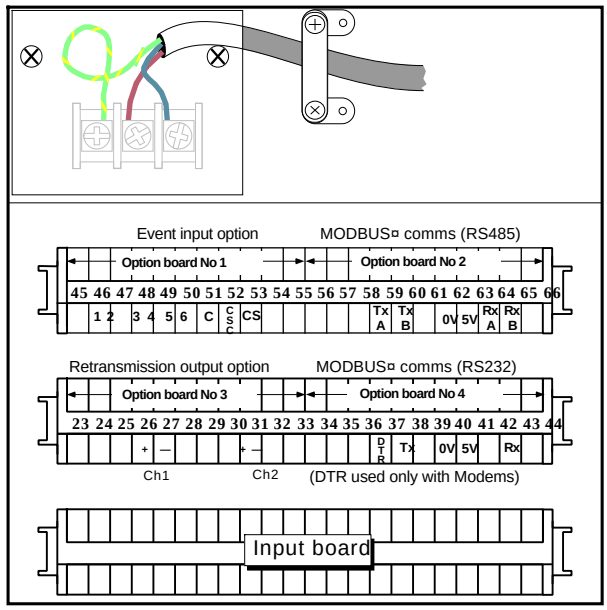
Shunt assembly:
100Ω = LA249885UK10
250Ω = LA249885UK25

Attenuator assembly:
LA244180

Option wiring



Relay output and
Profibus communications termination



Event input, Retransmission and
Modbus communications termination

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