# 4101C, 4101M
# 4102C, 4102M

## MODELS



# Strip Chart Recorders

## Specification Sheet

The 4101/2 are low cost, 100mm strip chart recorders, providing recording for up to 4 (continuous pen) or 6 (multi-point) process variables. Designed to fit a DIN cut out (138 x 138 mm) the recorders feature an exceptionally small back panel dimension of 236mm with the cover fitted.

### Display

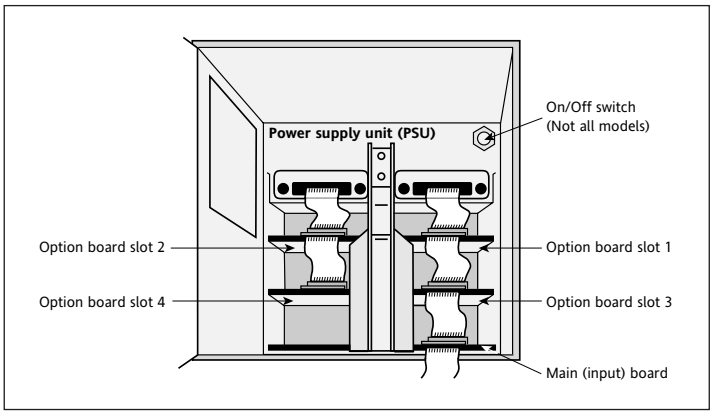
An analogue scale, specified at the time of order is supplied with all 4101 recorders. The 4102 is supplied with a high visibility seven segment display, providing clear numeric indication of the process variables, and alarm status. The display will cycle through each PV, but can be paused on a particular channel if required.

### Configuration

The 4101 is supplied pre-configured and ready for use. The addition of a keypad to the 4102 allows for configuration to be carried out on site. In order to prevent unauthorised access to the 4102, 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

### Modular Design – All

The modular design of the 4100 Series allows for upgrades to be carried out in situ thus reducing downtime.




Exploded view

- **Continuous Pen Recording**
  1, 2, 3 or 4 Pens
- **Multi-point Recording**
  Providing 6 Colour traces
- **High Visibility Display**
  **4101C, 4101M** –
  Clear Analogue Scale

  **4102C, 4102M** –
  Large 7 Segment numeric Display
- **Isolated Universal Inputs**
  Select from mA, mV, V, Thermocouples and RTD
- **Annotation**
  Clear text printing of time/date and messages

## TECHNICAL SPECIFICATION

## Input Board

### General

| | | |
|---|---|---|
| Input types: | | dc Volts, dc millivolts,dc milliamps (with shunt), Thermocouple, 2 / 3-wire RTD ***(Channel 1 can be RTD only if no other channels are thermocouple)*** |
| Input type mix: | | User configutrable |
| Max no of inputs: | 4101C, 4102C: | 4 |
| | 4101M, 4102M: | 6 |
| Input ranges: | | –30 to +150mV; –0.2 to +1 Volt; –2 to +10 Volts |
| 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: | | 180 mV at lowest range; 12 Volts peak at highest range. |
| Isolation (dc to 65 Hz; EN61010): | | Installation cat. II; Pollution deg. 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: | | >10MΩ at 500V dc |
| Input impedance: | | 150mV and 1V ranges: >10MΩ; 10V range: 68.8kΩ |
| Over voltage protection: | | 50 Volts peak (150V with attenuator) |
| Open circuit detection: | | ±57nA max. |
| Recognition time: | 4101C, 4102C: | 250 msec |
| | 4101M, 4102M: | 500 msec |
| Minimum break resistance: | | 10MΩ |

### 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 |
|---|---|---|---|---|
| –30mV | 150mV | 5.5µV | 0.084% input + 0.053% range | 80ppm of input per °C |
| –0.2V | 1V | 37µV | 0.084% input + 0.037% range | 80ppm of input per °C |
| –2V | 10V | 370µV | 0.275% input + 0.040% range | 272ppm of input per °C |

Table 1 DC performance

### Thermocouple data

| | |
|---|---|
| Temperature scale: | ITS 90 |
| Bias current: | 0.05 nA |
| Cold junction types: | Off, internal, external |
| CJ error: | 1°C; instrument at 25°C |
| CJ rejection ratio: | 50:1 minimum |
| Upscale / downscale drive: | High, low or none |
| Types and ranges: | See table 2 |

| T/C Type | Overall range (°C) | Standard | Max linearisation error (4102C, 4102M only) |
|---|---|---|---|
| B | 0 to +1820 | IEC 584.1 | 0 to 400°C: 1.7°C<br>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 | DIN43700:1985 | 0.08°C |
| Ni/NiMo | 0 to +1406 | Ipsen | 0.14°C |
| Platinel | 0 to +1370 | Englehard | 0.02°C |

Table 2 Thermocouple types and ranges

### Resistance inputs

| | |
|---|---|
| Ranges (including lead resistance): | 0 to 600Ω, 0 to 6kΩ |
| Influence of lead resistance: | Error: negligible; Mismatch: 1 Ω/Ω |
| Temperature scale: | ITS90 |
| Resolution and performance: | 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 | 600Ω | 22mΩ | 0.045% input + 0.065% range | 35ppm of input per °C |
| 0Ω | 6000Ω | 148mΩ | 0.049% input + 0.035% range | 35ppm of input per °C |

Table 3 Resolution and performance for resistance inputs

| RTD Type | Overall range (°C) | Standard | Max linearisation error (4102C, 4102M only) |
|---|---|---|---|
| JPT100 | –220 to +630 | JIS C 1604:1989 | 0 01°C |
| Ni1000 | –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

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

## Recorder

### Board types

| | | |
|---|---|---|
| | Standard: | Universal input / control board |
| | Options: | 3- Change-over relay output board |
| | | Transmitter power supply |
| | | Event input board, Annotator board |

### Environmental Performance

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

### 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: | 20 to 54V dc or |
| | | 20 to 35V ac (45 to 400 Hz) |
| Power (Max): | | 100 VA |
| Fuse type: | | Not user accessible |
| Interrupt protection: | Standard: | 40ms at 75% max. instrument load |
| | Enhanced: | 120ms at 75% max. instrument load |

### Electromagnetic compatibility (EMC)

| | | |
|---|---|---|
| | Emissions: | BS EN50081-2 |
| | Immunity: | BS EN50082-2 |
| Electrical safety: | | To EN61010: Installation category II; Pollution degree 2 |

### Physical

| | |
|---|---|
| Panel mounting: | DIN43700 |
| Bezel size: | 144 x 144mm |
| Panel cutout dimensions: | 138 x 138mm (both - 0 + 1 mm) |
| Depth behind bezel rear face: | 220mm (no terminal cover);<br>236mm (standard terminal cover)<br>275mm (long terminal cover closed)<br>390mm (long terminal cover open) |
| Weight: | < 3.5kg |
| Panel mounting: | Vertical ±30°C |

## TECHNICAL SPECIFICATION (continued)

### Recorder (continued)

**Printing System 4101C, 4102C**

| | |
|---|---|
| Pen type: | Disposable fibre-tipped pens |
| Pen resolution: | 0.15 mm |
| Trace colours: | See Table 5 |
| Pen life: | 1.2km (channel);<br>7.5 x $10^5$ dots (annotator) |
| Update rate: | 4 Hz |
| Response time (max): | 2 seconds |
| Characters per line: | 38 |

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

Table 5 4101C, 4102C Trace colours

**Printing System 4101M, 4102M**

| | |
|---|---|
| Pen type: | Six nib cartridge |
| Pen resolution: | 0.2 mm |
| Trace colours: | See Table 6 |
| Pen life: | 1.5 x $10^6$ dots per colour |
| Update rate: | 2 Hz |
| Response time (max): | 1 pass every 5 seconds |
| Characters per line: | 42 |

| Channel | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Colour | violet | red | black | green | blue | brown |

Table 6 4101M, 4102M Trace colours

**Paper transport**

| | | |
|---|---|---|
| Type: | | Stepper motor driving sprocket tube |
| Chart speeds: | | |
| 4101C, 4102C with annotation: | | Off 5, 10, 10, 20, 30, 60, 120, 300 mm/hr |
| 4101C, 4102C annotation inhibited: | | 600, 1200, 3600, 18000, 36000 mm/hr |
| | 4101M, 4102M: | Off, 5, 10, 20, 30, 60, 120 mm/hr |
| Chart type: | Standard: | 16 metre z-fold |
| | Option: | 32 metre roll |

**Vacuum flurescent display (4102C, 4102M)**

| | |
|---|---|
| Process value: | Four, blue 15mm high characters with minus sign as required |
| Channel number: | Single, green 8mm high character |
| Alarm indication: | Pair of red arrows for high and low alarms |
| Channel hold indication: | Red 'H' below channel number when channel hold inoperation |
| Keypad: | 5-key keypad for operator/ configuration access |

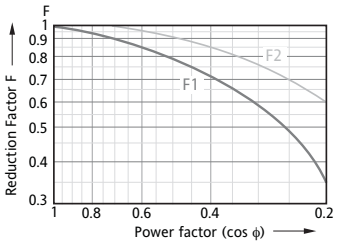
### Options

All isolation figures are Installation category II and Polution degree 2

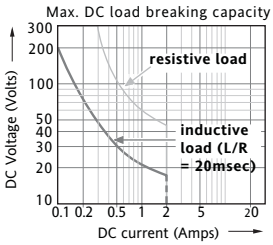
**Relay outputs**

| | |
|---|---|
| Maximum switching power: | 500VA |
| Maximum breaking current: | 2 Amps within above power ratings |
| Maximum contact voltage: | 250V within above power ratings |
| Maximum dc ratings: | See Graph 2 |
| Isolation (dc to 65Hz; BS EN61010): | |
| Contact-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 Graph 1, in which:
Contact life = resistive life x F1 or F2 where
F1 = measured on representative examples and
F2 = typical values according to experience




Graph 1 Derating curves




Graph 2 DC ratings

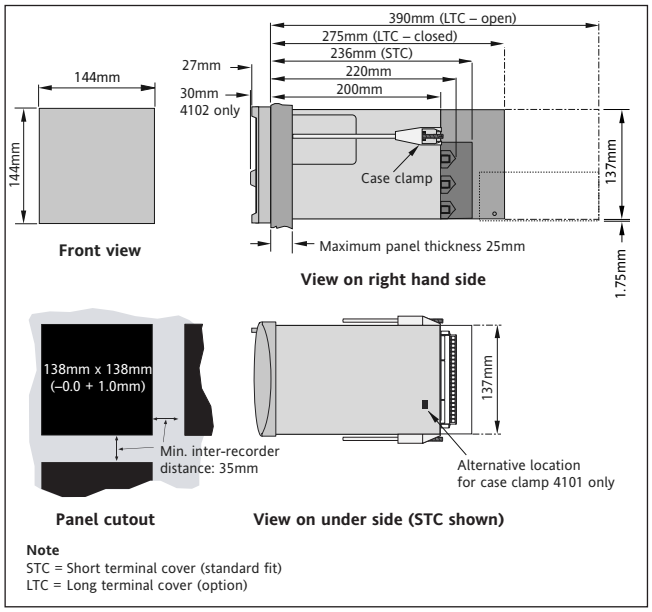
**Event inputs**

| | | |
|---|---|---|
| Isolation (dc to 65Hz; BS EN61010:) | | |
| Event input to ground: | | 100V RMS or dc (double insulation) |
| Event input to Event input: | | 0V |
| Recognition levels: | Low: | –30V to +0.8V |
| | High: | 2 to 30V |

**Transmitter Power Supply**

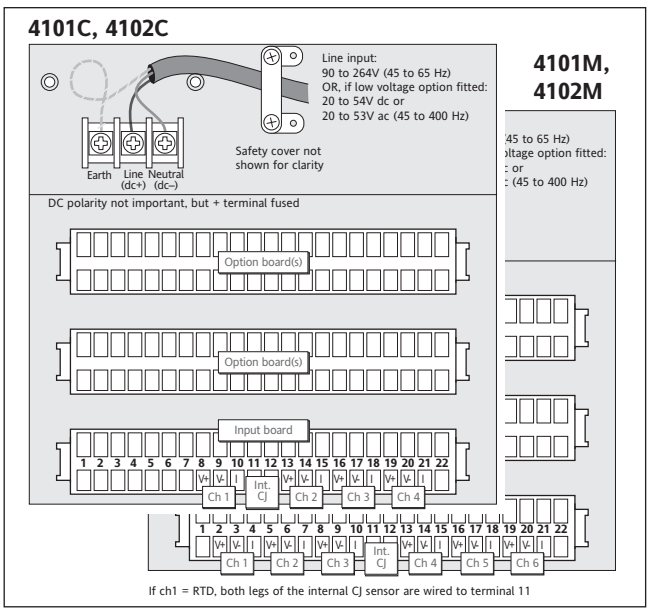
| | |
|---|---|
| Output voltage: | 3 or 6 x 25V dc (nom) outputs |
| Isolation (dc to 65Hz; BS EN61010) | |
| Channel to channel: | 100V RMS or dc (double insulation) |
| Channel to ground: | 100V RMS or dc (basic insulation) |
| Cover rating: | IP10 |

## MECHANICAL INSTALLATION

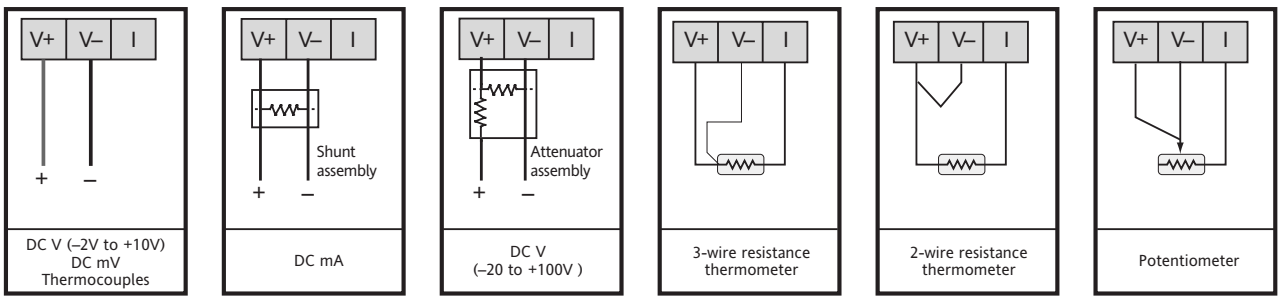



**Note**
STC = Short terminal cover (standard fit)
LTC = Long terminal cover (option)

## SUPPLY VOLTAGE AND INPUT BOARD TERMINATION



**INPUT BOARD SIGNAL WIRING**




Shunt assembly
100Ω = LA246779UK10
250Ω = LA246779UK25

Attenuator assembly
LA244180

## Steriliser Option 4101/2

This option offers four inputs to control chart on/off and annotation of events.

Contact 1, when closed the chart runs normally. When open the pens are parked at Zero and the chart winds on 80mm.

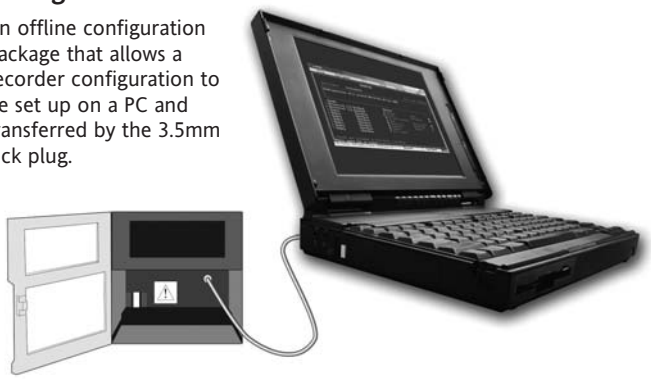
Contact 2, applies to annotating recorders only. When closed the current time and date is printed, and as long as the contact remains closed the chart will run at its selected speed, with annotation inhibited. Once the contact goes open the pens are zeroed; the time date, scales and chart speed are printed and the chart is advanced by 80mm and stopped.

Contact 3, applies to annotating recorders only. On closure the message "EVENT START HH:MM:SS" is printed, where HH:MM:SS show the time of closure in hours, minutes and seconds. On the contact opening, the message "DURATION HH:MM:SS" is printed, where HH:MM:SS shows how long the contact was closed, therefore providing Sterilisation time.

Contact 4, If either contact 1 or 2 is closed then pen 4 (continuous) or pen 6 (multipoint ) is used to show the status of Contact 4. Whilst contact 4 is open the trace is at 100%, whilst closed the trace is at 96%.

## Configuration Editor

An offline configuration package that allows a recorder configuration to be set up on a PC and transferred by the 3.5mm jack plug.



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