

Sentinel Programmable Microprocessor Based Recorder Controllers

The Sentinel range of microprocessor-based circular chart recorders is available in 1, 2 or 3 channel variants.

Sentinel combines the simplicity and clarity of pen drawn traces together with the versatility of microprocessor control.

Each channel is equipped with a universal signal input which is compatible with all industry standard sensors and signals including thermocouple types J, K, T, E, N, R, S and B, Pt100 platinum resistance temperature detectors and 4/20mA current loops.

Low and high measurement ranges are provided for each input type, separate range cards are not required. Multi input versions include optoelectronic isolation of the input stages to eliminate troublesome installation ground loops.

Thermocouple and RTD characteristics are fully linearised by means of software. In addition thermocouple measurements benefit from automatic cold junction compensation which uses software correction in conjunction with a stable platinum resistance detector for cold-junction temperature sensing.

Alarm relay facilities are comprehensive. Single pen recorders are equipped with three failsafe single-pole changeover relays, six relays are standard on the two and three pen versions. Colour-coded light-emitting diodes show the status of each relay at a glance. All relay functions are under software control: set point values and hysteresis levels are entered directly via the keypad, relay action and channel assignment are selected from user friendly menus. Relays may be freely assigned to any recording channel.

The rotation speed of the 240mm diameter chart is microprocessor controlled and user programmable. Linear Sentinel charts are compatible with other recorders in the Rototherm range.

All Sentinel recorders are housed in a strong steel case with a moulded door that can be panel or surface mounted. A gasketed lockable door protects internal components from harsh industrial environments and offers protection generally to IP55. A tough acrylic window allows the chart trace, digital channel readings and alarm status to be viewed with the recorder's door closed.

Simple to setup, simple to operate

Ease-of-operation is an important feature of all Sentinel recorders. The operator's panel includes a five position tactile keypad and a two-line backlit liquid crystal display with large easy-to-read characters. Using this straightforward interface the Sentinel is quickly configured to suit each application.

Clear prompts and menus presented on the large character display guide the operator through the setup procedure with confidence.

The input type, chart range, display units, chart speed and relay configurations are selected from logically- ordered option menus.

At each stage of the setup procedure the display recalls the value or setting currently stored in memory and data entries are checked automatically. The keypad allows direct entry of numerical values such as relay set points and measurement ranges.

The time for a chart revolution may be set between 1 hour and 31 days in steps of 1 hour or 1 day. To ease chart changing a motorised pen lifter parks the pens at the edge of the paper.



Sentinel's high speed chart advance / reverse facility allows the chart to be set quickly to the correct time mark.

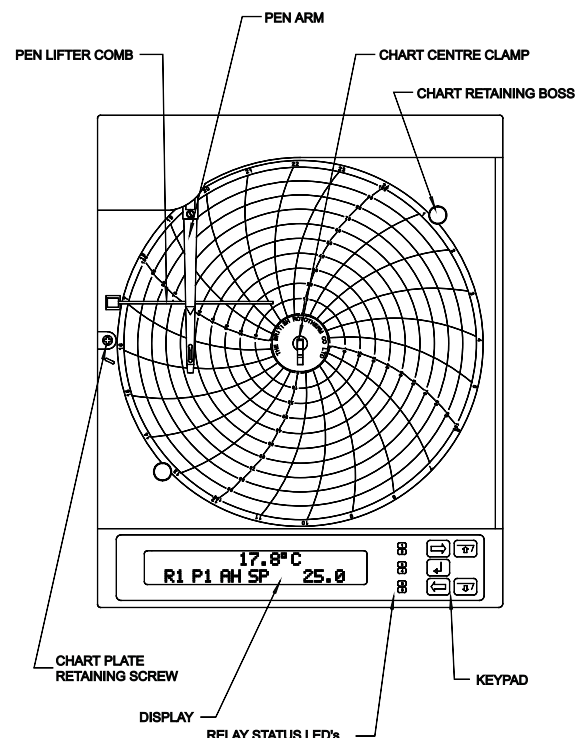
Three levels of security, including password and hardware protection are available to stop unauthorised access and alteration of the recorder's configuration. All configured data (type of input, chart range, chart speed, display units, set points, etc.) are stored in non-volatile memory for security in the event of power failure.

Simple to install and maintain

A choice of mounting options enables simple installation in a panel or surface mounting on a wall. The Sentinel recorder case is compatible with the standard Rototherm recorder panel cut-out.

Sentinel's circuits with excellent long term stability maintain performance and keep recalibration to a minimum, cutting the costs of maintenance.

Internal Layout of Sentinel - Chart Plate



Sentinel Models

SEN10	Single pen recorder controller
SEN20	Two pen recorder controller
SEN30	Three pen recorder controller
SEN10F	Single pen recorder controller - Flow version
SEN20F	Two pen recorder controller - Flow version
SEN30F	Three pen recorder controller - Flow version
SEN30P	Three pen recorder controller - Dairy version
SEN20KD	Two pen recorder controller - Timber Kiln version

Specifications

INPUTS

Number: 1, 2 or 3
Input Signals: (Standard) Thermocouples K, T, J, N, E, B, R & S
 Platinum RTD (Pt100) 3-wire
 DC voltage $\pm 2V$, +20V
 DC current $\pm 2mA$, $\pm 20mA$

Temperature Ranges:

Thermocouples to BS4937 (type B minimum temp 200°C) RTD to BS1904:1984
 High and low measurement ranges for each input

Cold-Junction Compensation:

Automatic, using Pt1000 temperature detector and software correction

Linearisation: Automatic software linearisation to BS4937 (thermocouples) and BS1904: 1984 (RTD)

Input Resistance: T/C: 10 Mohms
 $\pm 2mA$: 200 ohms
 $\pm 20mA$: 20 ohms
 $\pm 2V$, +20V: >1 Mohms

Minimum Span: 5°C (Thermocouples K, J, T, E, N & RTD)

Thermocouple Burn-out:

Pull-up or pull-down, link selectable

RTD Current: 1mA approximately

RTD Lead Resistance: 3-lead connection, compensated up to 10 ohms maximum per lead

Input Protection: $\pm 50Vdc$ on signal inputs

Input Isolation: Optoelectronic on 2 and 3 input versions
 500Vrms channel-to-channel, 500Vrms channel-to-earth

PERFORMANCE

Accuracy: RTD: Low range (<200°C) $\pm 0.2^\circ C$,
 High range (>200°C) $\pm 0.8^\circ C$ (Ambient 20°C)
 T/C: $\pm 0.25\%$ FS
 Linear: $\pm 0.2\%$ FS

Temperature Stability: $\pm 0.02\%$ FS/ $^\circ C$

Cold Junction Compensation Stability: $\pm 0.02^\circ C/^\circ C$

Linearisation Accuracy:

Thermocouple Types J, K, T, N, E : $\pm 0.1^\circ C$ - 50/200°C, $\pm 1^\circ C$ max
 Thermocouple Types R & S : $\pm 0.2^\circ C$ -50/200°C, $\pm 1^\circ C$ max
 Thermocouple Type B : $\pm 1^\circ C$ max.
 RTD :Pt100 Better than $\pm 0.1^\circ C$ - 200/850°C

Calibration Shift: $\pm 10^\circ C$ user programmable to eliminate sensor errors (T/C & RTD)

A to D Converter: Integrating, 16-bit resolution with 50/60Hz noise rejection
Conversion Rate: 2 per second
Noise Rejection: >120dB common-mode, 60dB normal mode 50/60Hz

CHART & DISPLAY

Chart Size: 240mm (9.5") circular paper chart
Chart Divisions: 40, 50, 60, 70 or 80 linear divisions
Chart Drive: DC stepper motor
Chart Speeds: 1 to 24 hours in steps of one hour, 2 to 31 days in steps of 1 day

Writing Method: Disposable ink cartridges. Pen 1 Red, Pen 2 Green, Pen 3 Blue

Pen Positioner: DC stepper motor

Positioning Resolution: Better than 0.1% of full-scale

Pen Response Time: Zero to full-scale in 4.5 seconds

Pen Lift: Motorised, activated from front panel. Chart fast time advance possible with pens raised.

Display Type: 2 line x 20 character dot matrix liquid crystal with backlight and automatic temperature compensation. Character height 9.6mm.

Display Resolution: Temperature ranges 0.1°C, linear ranges software programmable

Alarm Display: Relay status shown by red and green front panel LEDs

RELAYS

Number: 3 on single pen, 6 on two and three-pen versions.

Relay Actions: Software selectable from:- High alarm/Low alarm/Deviation alarm/Control relay (high)/Control relay (low). Relays de-energise in alarm state

Assignment: Relays freely assignable to any channel

Hysteresis Level: User programmable 0.0% to 10% of span

Relay Contacts: SPCO silver alloy

Switched Load: 150W dc, 1660VA ac non-inductive

Switched Current: 6A max

Switched Voltage: 30Vdc, 250Vac

Snubber Network: 22nF +100R

GENERAL

Security: 3-level software lock including password protection, internal hardware jumper lock, lockable door.

Power Supply: 115V or 230Vac $\pm 10\%$, switch selectable, 50/60Hz.

Power Requirements: <25W

Operating Temperature: 0 to 55°C

Operating Humidity: 0 to 90% RH (non condensing)

Case: Steel case with acrylic door window

Protection: IP55

Mounting: Panel or surface

Weight: 7kg (single pen) 7.7kg (three pen)

Dimensions (overall): 336 x 396 x 171 mm (w x h x d)

Panel Cut-out: 288 x 356 mm (w x h)

Specifications continued

OPTIONS

Retransmission

Output Current: 0 to 20mA or 4 to 20mA.

Resolution: 12 bits (0.024%)

Output Compliance:

20V approx.

Isolation: Optoelectronic

Assignment: Card assignable to any channel. Retransmission range software selectable anywhere within chart range

Action: Direct or reverse

Event pen

Number of Inputs: Two

Pen Positions: Four, 0, 33, 66, 100% of pen sweep

Sweep: Position on chart user configured, forward or reverse.

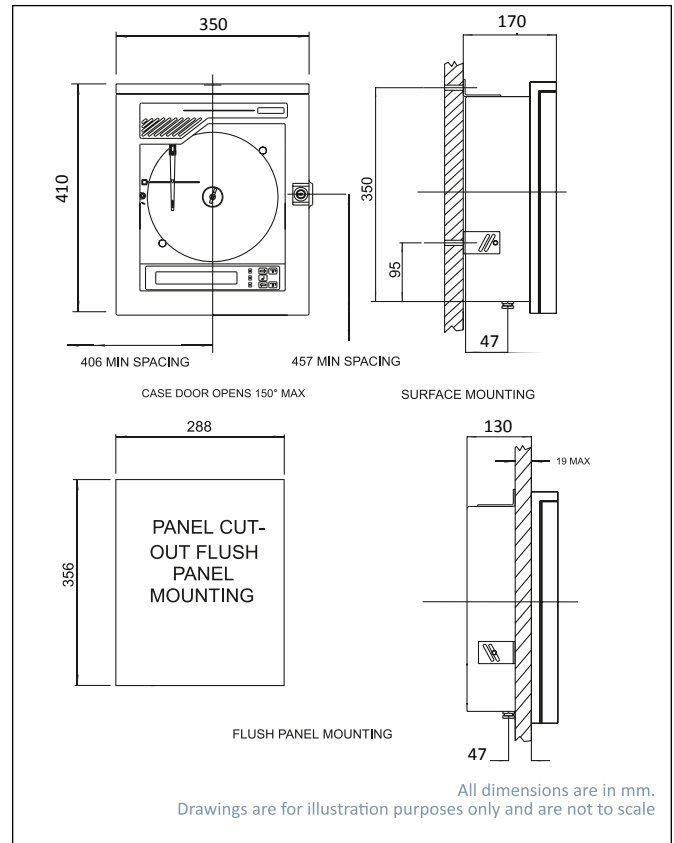
Input Voltage: 48-250Vac (card CR0027-E)

5-24Vdc (card CR0031-E)

Transmitter PSU

Input: Isolated output, voltage 12/24V link selectable

Dimensions & Fixing



Order Codes

Sentinel Recorder Controller - single pen

Sentinel Recorder Controller - two pen

Sentinel Recorder Controller - three pen

Sentinel Recorder Controller - single pen - flow version

Sentinel Recorder Controller - two pen - flow version

Sentinel Recorder Controller - three pen - flow version

Sentinel Recorder Controller - three pen - dairy version

Sentinel Recorder Controller - two pen - timber kiln version

Alarms (user configurable)

3 alarms (standard on single pen)

6 alarms (standard on 2 and 3 pens, option for single pen recorder)

Retransmission

Required

Not required

Events Pen

Required (1 pen only)

Not required

Transmitter Power Supply

Required

Not required

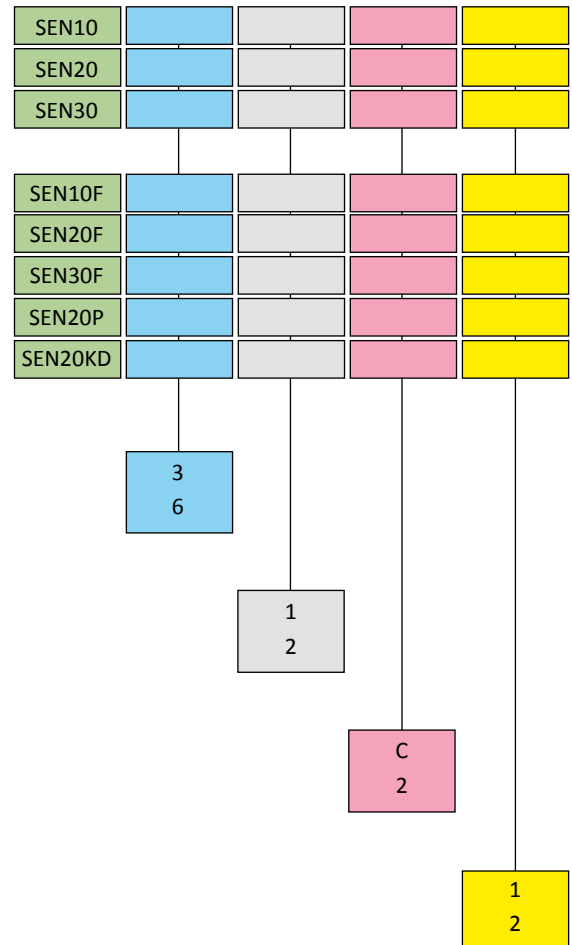


Chart Recorders & Recorder Controllers Overview

- Temperature, Pressure, Flow & Humidity
- Rugged design & construction
- Accurate & reliable measuring systems
- Up to 3 recording pens
- Simple installation & maintenance required
- Fully mechanical versions available
- Choice of mounting options - wall / panel / portable / 2" pipe
- Electrical and pneumatic control options
- Spares and consumables widely available

An extensive range of chart recorders and controllers which includes programmable microprocessor electric-input recorder controllers and a wide range of mechanical recorders for temperature, pressure, humidity and flow with options for electrical or pneumatic control.

Rototherm chart recorders can be used to record and control:

- Temperature
- Pressure
- Humidity
- Flow

Each recorder is supplied with a packet of 100 charts and 1 spare packet of pens for each pen specified. Consumable items and spare parts are readily available from British Rototherm

Clearscan Chart Recorders

The Clearscan range of recorders is suitable for most industrial applications and can be fitted with up to 3 pens for recording temperature, pressure and flow.

Sentinel Micro-processor based chart recorders

The Sentinel range of micro-processor based circular chart recorders is available in 1, 2 and 3 channel versions. Sentinel combines the simplicity and clarity of pen drawn traces together with the versatility of microprocessor control.

RPO and RTO Series Chart Recorders

The RPO series of pressure circular chart recorders uses the well proven and reliable Rototherm non ferrous or stainless steel pressure system.

The RTO range of temperature circular chart recorders uses the well



(from left to right) Model RPO Pressure Recorder, Sentinel Chart Recorder & Clearscan Chart Recorder



RTH Recorders

C105 Recorder

RPO / RTO Recorder

proven and reliable Rototherm stainless steel thermal system. Up to three pens can be fitted with three temperature systems or a combination of temperature and pressure systems.

Clearscan C105 Chart Recorders

Developed from the ex Kent Industrial Measurement and Cambridge range of circular chart recorders, C105 continues to be available and still offers the same reliability and versatility that has been manufactured for the past 30 years.