

# SERIES 33 RECORDERS & RECORDER/CONTROLLERS



- Single, two and three pen recording and controlling at low cost.
- Simple installation and maintenance requirement.
- Cases are suitable for panel or surface mounting.
- Short case for shallow compartments.
- Standard 24 hour or 7 day chart revolution options (other revolutions available).
- Electrical control options.
- Supplied with 100 charts and pack of pens.

These reliable and accurate instruments are suitable for most applications where there is a requirement for low cost recording / controlling. The case is suitable for surface or panel mounting. The Series 33 range of recorders and recorder controllers may be used with thermocouple, resistance thermometer element, strain gauge or potentiometric pressure transducer, or any transducer producing a dc current or a voltage signal. Recorders and recorder controllers can be fitted with a digital display if required.

## OPERATION

A high-quality dc servo motor is utilised for the prime mover, and this is coupled to the outlet spindle and feedback potentiometer by a precision gear train, adjusted for minimum backlash. The feedback potentiometer is a conductive plastics device, which does not require maintenance. The output spindle operates the pen/index of the mechanism.

Alarms, electrical re-transmission, electric contact control or an auxiliary power supply are available as options.

## ALARMS

The operation of alarms (if fitted) is electronic, and is independent of the pen. Either absolute or deviation alarms are available. Absolute alarms can be set to any value within the range of the instrument: deviation alarms operate with relation to the desired value, and can be set either above it (positive deviation) or below it (negative deviation).

The alarms are set by adjusting a potentiometer against the scale. A push button, which will drive the pen to the alarm trip point, is included in each circuit to enable the setting to be checked. On instruments with deviation alarms the push button will drive the pen to the set deviation from the mid chart.

Because the relays are normally energised when the measured conditioned is out-of-alarm (fail safe), it is necessary to specify, at the time of ordering,

which of the alarms is to be set high" or "low".

Whatever the setting on the scale, an alarm state that is reached on a rise in value is termed "high" and that on a fall in value "low".

## RECORDER

Available as a single pen, two pen or three pen model, this potentiometric disc chart recorder will produce a permanent record of the value of the measured variable.

With a two-pen recorder the measuring element for the second pen can be a Bourdon or diaphragm pressure measuring element.

A three-position operations pen can be supplied, provided that no pen lift is required and that no alarms are required on the second system, if fitted.

## PENS

Fitted to the pen arms are disposable fibre tipped pens which are readily replaced without mess. Single pen recorders and the first pen of two and three pen recorders trace in red ink, the second pen in blue, the third in green.

## CHARTS AND CHART DRIVE

Charts are supplied normally with the minimum measuring value at the centre, although other styles are available. Standard chart duration's are one revolution every 24 hours or 7 days with special duration's available on request. A pen lift is fitted to ease chart changing.

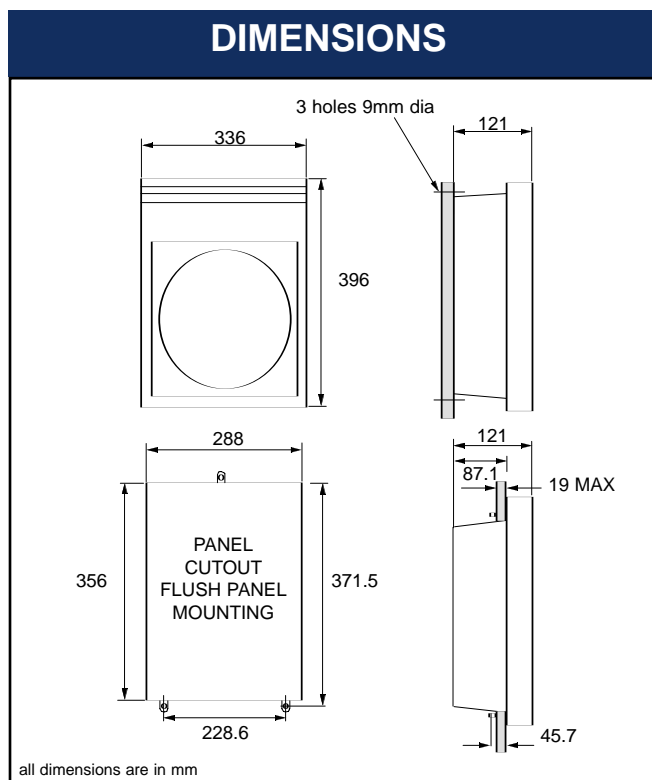
## PNEUMATIC CONTROL

Series 33 recorders may be specified with pneumatic control. Single or two pen recorders may be specified, single pen may be specified with full three term control Proportional (P) Integral (I) or Derivative (D) in combination of P, P+I, P+D or P+I+D.

## ELECTRIC CONTROL OPTIONS

For further details about electric control options please contact Rototherm.

## DIMENSIONS



# SPECIFICATION

## GENERAL

<b>ACCURACY</b>	±1% FSD.
<b>AMBIENT TEMPERATURE ERROR DUE TO SUPPLY VARIATIONS</b>	-10°C to +55°C
<b>DEAD BANDS</b>	Less than 0.25% fsd fOr -20% t0 +10% variation
<b>RESPONSE TIME</b>	0.5% fsd max
<b>SPURIOUS SIGNAL REJECTION - SERIES MODE:</b>	1.5 seconds typical (0-100%)
<b>THERMOCOUPLE, mV AND RESISTANCE</b>	Less than 0.25% fsd error for 50/100Hz signal up to 20mV rms max
<b>CURRENT &amp; VOLTAGE</b>	Less than 0.25% fsd error for 50/100Hz signal up to 20% span max
<b>SPURIOUS SIGNAL REJECTION - COMMON MODE</b>	Less than 0.25% fsd error for 50/100Hz signal up to 100V rms max
<b>ALARM RELAY CONTACTS</b>	Rated at 5A @ 30Vdc or 250Vac
<b>PLANT NOISE REJECTION</b>	Variable filter having a 3dB point variation, from 2.5Hz to 0.125Hz with 20dB/decade roll off rate, giving an effective response time variation of 1.5s to 15s
<b>ELECTRICAL CONNECTIONS</b>	Cable gland (access to terminal blocks)
<b>CHART DRIVE</b>	Synchronous electric.
<b>CHARTS</b>	Disc 240mm (9.5 inches) diameter. standard dividing 40, 50, 60, 70 or 80 linear divisions.
<b>INKING SYSTEM</b>	Disposable fibre tipped pen. Single pen: red. 2 pen: red and blue 3 pen: red, blue and green.
<b>CASE</b>	Glass filled polyester resin. Protection to IP55.
<b>WINDOW</b>	Acrylic.
<b>POWER SUPPLY</b>	200 to 250 volts, 50Hz (60Hz available). 100 to 120 volts, 50 Hz (60Hz available).
<b>MOUNTING</b>	Suitable for surface or flush panel in vertical position.
<b>WEIGHT</b>	Single pen recording instrument: 7kg (15.51b) Two pen recording instrument: 8kg (17.5 lb) Three pen recording instrument: 9kg (19.51b)

## THERMOCOUPLE INPUT

<b>SENSITIVITY</b>	5mV to 60mV fsd
<b>MAX LINE RESISTANCE</b>	100ohms
<b>AUTOMATIC COLD JUNCTION COMPENSATION</b>	Max error ±0.08°C over ambient temperature ranges of +15°C to +30°C

## BROKEN THERMOCOUPLE FACILITY

Fail up or down scale

**AMBIENT TEMPERATURE DRIFT** 3uV/°C typical, 6uV°C max  
**INPUT OVERLOAD** 4 Vdc max  
**STANDARD INPUTS** Type R, J, K and T (8S4937)  
**VOLTAGE INPUT (dc only)**

**SENSITIVITY** 5mV to 50V fsd  
**INPUT CURRENT** 150nA Max (5mV to 100mV ranges)  
**INPUT RESISTANCE** 100mV to 10V ranges:  
span (V) x 105ohms  
10V to 50V ranges = 1m ohm

**AMBIENT TEMPERATURE DRIFT** 0.03%/°C max  
**INPUT OVERLOAD** 5mV to 100mV ranges: 4 Vdc max 100mV to 50V ranges:  
80 x span up to 200 Vdc 100mV to 50V ranges:  
4 x span (max top scale 200V)

## RESISTANCE THERMOMETER INPUT

**DETECTING ELEMENT** Standard platinum to 8S1904 (1984) r0 = 100 ohms,  
FI = 38.5 ohms (PT100)  
10 ohms to 200 ohms.fsd  
**MAX LEAD RESISTANCE** 10 ohms total (3.33 ohms/lead for 3 wire systems)

## RESISTANCE ELEMENT CURRENT

**AMBIENT TEMPERATURE DRIFT** 0.02%/°C typical 0.06%/°C max  
**INPUT OVERLOAD** Short or open circuit

## 2-WIRE TRANSMITTER SUPPLY

**OUTPUT VOLTAGE** 20V nominal  
**OUTPUT CURRENT** 20mA max (short circuit protected)  
**SUPPLY VARIATION REG.** 2mV for +10% -20% supply variation  
**LOAD REGULATION** 20mV for 0 to 20mA  
OTHER POWER SUPPLIES ARE AVAILABLE

## CURRENT INPUT (dc only)

**SENSITIVITY** 50nA to 50mA fsd  
**INPUT RESISTANCE** 50 ohms mA span  
**AMBIENT TEMPERATURE DRIFT** 0.03%/°C max  
**INPUT OVERLOAD** 80 x span up to 200mA max

**SIGNAL RE-TRANSMISSION ACCURACY** ±0.5% of instrument fsd input signal  
**OUTPUT SPANS** 0-10mA and 4-20mA standard: others on request  
**MAX LINE VOLTAGE DROP** 6V i.e. 4-20mA into 300ohms, 0-10mA into 600ohms

Note: Re-transmission signal is not isolated from the instrument input terminals

# ORDERING CODES

1 pen Series 33 Recorder  
2 pen Series 33 Recorder  
3 pen Series 33 Recorder

### POWER SUPPLY

Electric 240V 50Hz

Electric 110V 50Hz

Electric 110V 60Hz

### CHART ROTATION

24 hour

7 day

Other\*

### INPUT TYPE

#### Current

0-1 mA

4-20 mA

0-20 mA

#### Thermocouple

Copper v Constantan Thermocouple Type T

Iron v Constantan Thermocouple Type J

Chromel v Alumel Thermocouple Type K

PT/13% Rh v Pt Thermocouple Type R

#### RTD

Pt100

#### Other Input

#### BROKEN THERMOCOUPLE FAILURE

Not thermocouple input

Fail Upscale

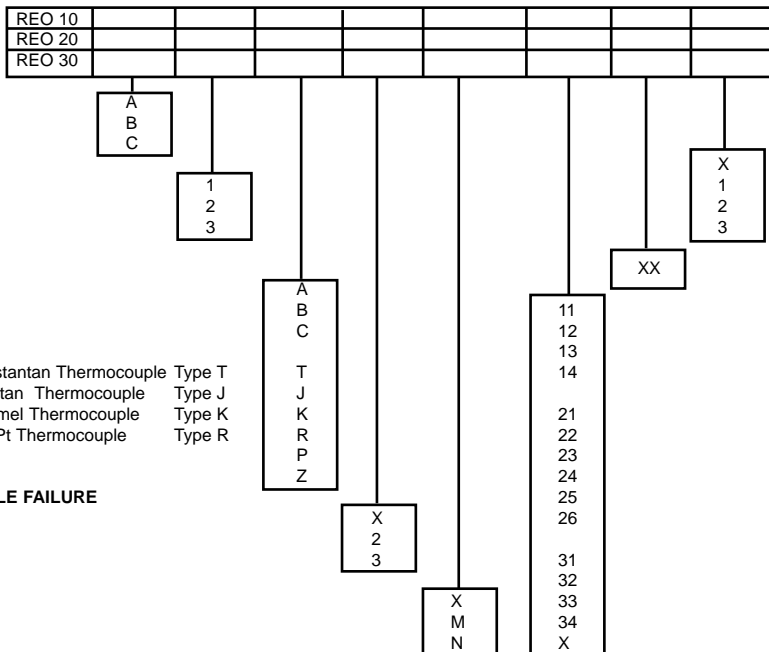
Fail Downscale

#### RETRANSMISSION

Not Required

4-20mA

0-10mA



### 2 WIRE TRANSMITTER SUPPLY

Not required

Required on first pen

Required on second pen

Required on both pens

#### RANGE

Specify chart scale and unit

#### ALARMS (per pen)

Abs high

Abs low

Dev high

Dev low

2 Abs high

2 Abs low

1 Abs high 1 Abs low

2 Dev high

2 Dev low

1 Dev high 1 Dev low

1 Abs high 2 Abs low

1 Abs high 1 Abs low

3 Abs high

3 Abs low

None

# Rototherm

instrumentation and control

British Rototherm Co. Ltd.,  
Kenfig Industrial Estate, Margam,  
Port Talbot, West Glamorgan,  
SA13 2PW, United Kingdom  
Tel: 01656 740551 Fax: 01656 745915  
E-mail: rototherm@rototherm.co.uk  
Web site: www.rototherm.co.uk



BS EN  
ISO 9001  
Registration  
no: FM11958