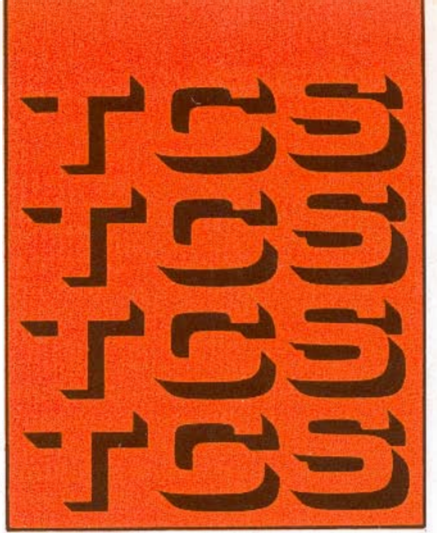
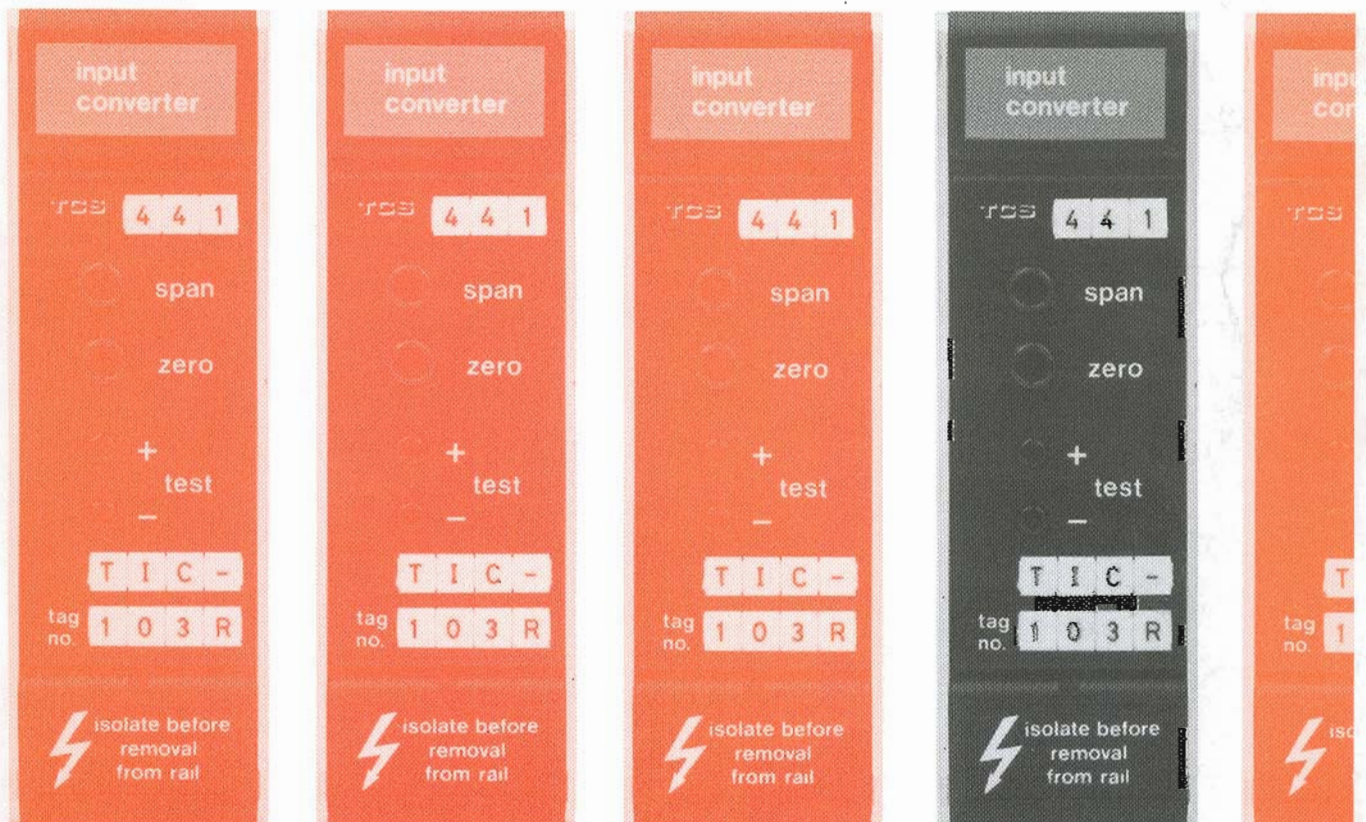




prt 100 resistance
input conditioner



system
6000
D003
D004



product
specification

Star features

- 3 and 4 wire option
- Good lead rejection
- High accuracy and stability
- 3 port galvanic isolation:
Input/power supply/output
- Standard high level outputs:
1–5V, 0–10V or 4–20mA
- Easily configured into larger
systems
- Flexible input power supply
- Direct DIN rail mounting
- Clear plant and system labelling

Functional description

The prime function of this instrument is to measure the resistance of a 100Ω platinum resistance thermometer (PRT) and produce a high level output signal which is a function of the temperature of the PRT. The current used to sense the resistance of the PRT is low (0.5mA) to minimise self heating. The current drive and voltage sense circuits are arranged to give good rejection of lead resistance when connected to 3 and 4 wire PRTs.

The instrument does not attempt to compensate for the non-linear nature of the PRT. It provides linear amplification of the PRT signal over the temperature range specified.

Another important function is the galvanic isolation of the incoming signal from the power supply and the high

level output. This allows normal operation if the PRT becomes live (up to 250V AC r.m.s.) or if the PRT is grounded. It also ensures inherently good common mode rejection.

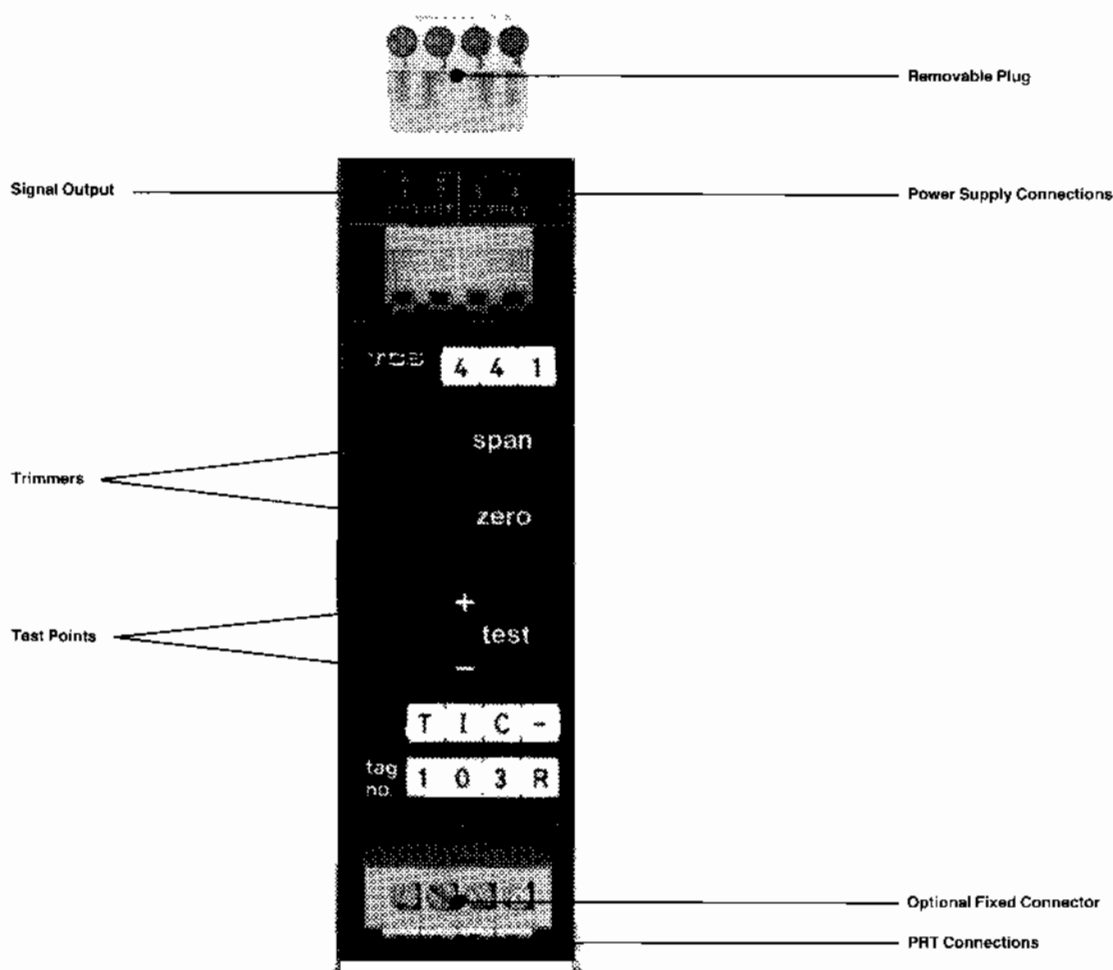
Galvanic isolation is included to simplify system design, so that the power supply and the instrumentation may be grounded independently, without causing earth loop or supply currents to flow in conductors used for reference voltage levels. The functional block diagram shows the isolation structure.

The output options are 1–5V, 0–10V for use with local instrumentation and 4–20mA for use where the signal needs to be transmitted, giving good rejection to line impedance and pick-up.

The power supply has been designed so that the instrument may be powered from a wide range of low voltage supplies. The supply, nominally 24V, may be either AC or DC.

The front panel has two test points to aid commissioning and servicing. For voltage outputs the test points carry the signal directly but are protected by a 1kΩ series resistor. For current outputs the test points are across a 10Ω resistor in series with the current loop giving 40–200mV.

Also on the front panel there are two adjustments for trimming the gain and offset. The gain control gives about $\pm 10\%$ of span and the offset about $\pm 1.5\%$ span.



External features

The power supply and high level signal connections are made with the plug-in terminal block at the top to simplify access to the instrument and to simplify system maintenance. The PRT

connection is made at the bottom of the instrument, either through a plug-in terminal block (option PS) or a fixed terminal block (option TB) as shown in the diagram above.

For routine maintenance access is given to the gain and offset adjustments. Test points are also provided so that the instrument output may be monitored without disconnecting any wiring.

Connection and installation

The pin numbering is 1 to 4, left to right, on the top connector, and 5 to 8, left to right on the bottom

PIN	FUNCTION	
1	Output + ve	
2	Output - ve	
3	Supply	
4	Supply	
5	Current sink	
6	Voltage - ve	
7	Voltage + ve	PRT
8	Current source	

The instrument may be powered from either an AC or DC source. The DC supply voltage is nominally 24V (20–35V). The AC supply voltage range is 18–26V AC r.m.s. Internally the power supply circuit is galvanically isolated from the other circuits. This means that power source may float, but it is recommended that the power circuit is earthed at a suitable point in the system, where this is possible.

The voltage outputs can drive up to 20mA. These outputs are designed to work with local instrumentation and have the advantages of lower power consumption than the D003/I. It may also be connected directly to the signal processing instruments without burden resistors.

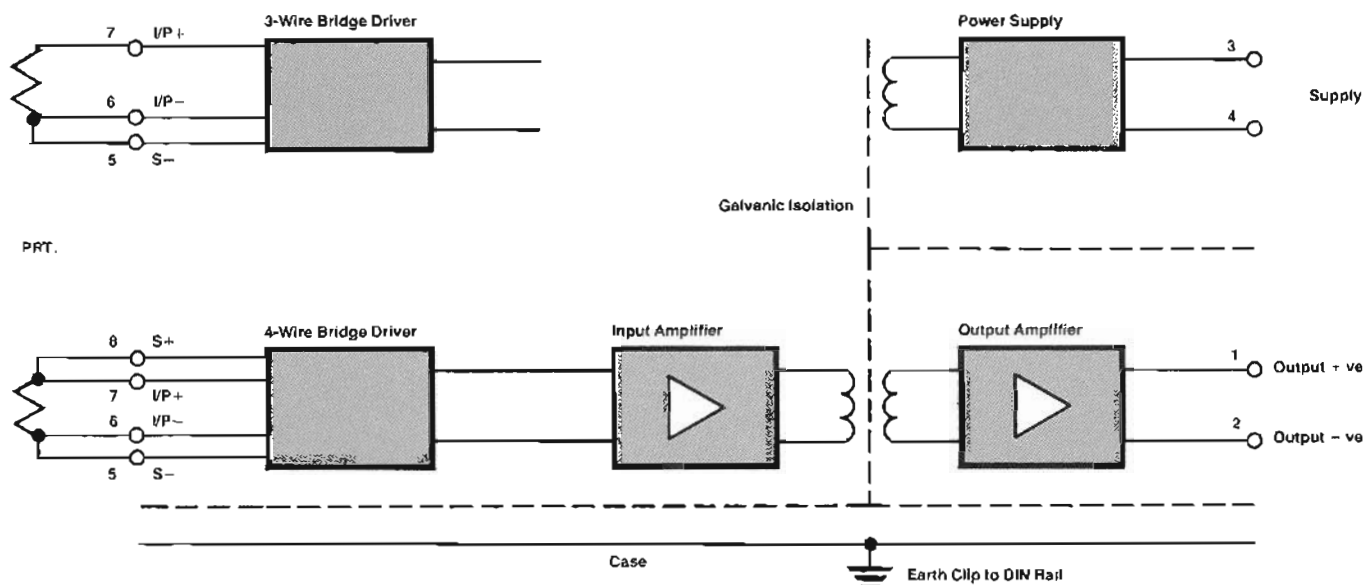
The 4–20mA output can drive up to 15V (i.e. 750Ω). This is an active signal as the power is supplied locally. This unit may be used to transmit the signal over some distance because of the inherent rejection of the cabling resistance and picked up noise that the current loop offers. This signal conforms with the increasingly popular 4–20mA standard and is therefore also useful with local instrumentation that uses this.

The PRT is connected to the lower connector pins 5–8. The function of the terminations is shown in the block diagram below. Pin 8 is not used in the 3-wire system.

In installations where the PRT might become live (any potentially hazardous voltage), particular attention must be paid to earthing the case and to proper termination of the PRT connections.

The mounting of the instrument is directly to the 'top hat' cross section DIN rail (type T35). To install, the unit is rolled down until it clips into position. To remove, a screwdriver is used to release the spring catch.

The internal operating voltages constitute no electric shock hazard. However, if the PRT is allowed to become live, care must be taken to earth the case. To facilitate this an earth spring is provided at the back of the box connecting onto the DIN rail. There are available parts which are specifically designed to provide an earth for the rail.



Labelling

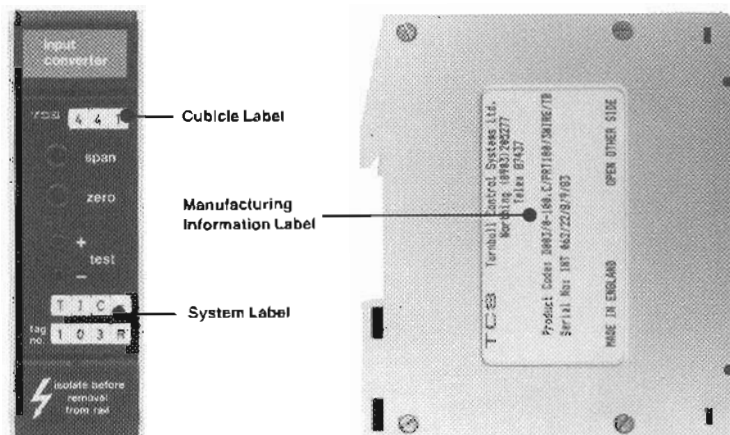
Two labelling areas are provided on the fascia. These labels are made up with Dekafix* markers. The use of this labelling system ensures that the label is legible and may be transferred if the instrument is replaced or the system reconfigured.

The upper label, three markers, is provided for system identification and will normally indicate the position of the instrument within the housing.

The lower label, eight markers, is provided for functional identification or tag number.

These positions will normally be supplied with blank markers but particular labelling may be specified within a system order.

There is a printed label on the side of the box with manufacturing information and the order code.



* Dekafix is a registered trade name of Klippon Electricals Ltd.

Performance

Power supply

Range	20–35V DC 18–26V AC r.m.s.
Current drain excluding O/P	
D003	32mA
D004	40mA
Output loading on supply	1.7mA/mA

Bridge drive

Current source	0.5mA (nominal)
Drive capability	0–1000Ω

Input

Input offset drift	4μV/°C
Other sources of drift	90 ppm of span/°C
Gain stability	240 ppm of span/°C
Linearity	0.05% of span
Calibration accuracy	0.05% of span
Common mode rejection (50Hz–5kHz)	120dB
Series mode rejection (50Hz–5kHz at 10xspan)	100dB
Frequency response	2Hz
Lead rejection	
Lead resistance 20Ω/lead	0.18°C max. offset error
10Ω/lead	0.06°C max. offset error

(For 3-wire configurations lead resistances are assumed to be matched)

Output

Span D003/V	1–5V
D004/V	0–10V
Drive capability	–0.3–20mA
Span D003/I	4–20mA
Drive capability	0–15V

Isolation

INPUT to OUTPUT and POWER SUPPLY	250V DC/250V AC r.m.s. (2kV TEST)
OUTPUT to POWER SUPPLY	60V DC/60V AC r.m.s. (500V TEST)

RFI susceptibility

Conforms with IEC 801 3 and CEEB DN5

Test points

D003/I	40–200MV (10Ω)
D004/V D003/V	10V (1kΩ) 5V (1kΩ)
Operation range for specification	0–50°C

Front adjustments

Span	20% of span
Offset	3% of span

Accuracy example: A 0–100°C instrument has a nominal accuracy of 0.1°C with a worst case ambient rejection of 24 : 1 at mid range.

Ordering information

Description	Order code
OUTPUT 1–5V 0–10V 4–20mA	D003/V D004/V D003/I
IDENTITY	PRT100
*TEMPERATURE RANGE AND UNITS	XXXX–XXXX
NUMBER OF CONNECTIONS	3-WIRE 4-WIRE
PLANT CONNECTOR Plug and socket Terminal block	PS TB

Example: D003/I/PRT100/0–100°C/3-WIRE/TB

*In 4-wire instruments the PRT resistance at the high range temperature must not exceed 5 times the PRT resistance at the low range temperature.

Details

Overall dimensions in mm of housings.	Width	:	35
	Height	:	110
	Depth	:	97



Interface Products

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