1 Input ranges

1.1 Input type RTD Pt100

1. Range -200 ... 500 °C

Zero calibration (Max = 220 °C)				
°C	SW3-5	SW3-6	SW3-7	SW3-8
-190	ON	OFF	OFF	OFF
-165	OFF	ON	OFF	OFF
-135	ON	ON	OFF	OFF
-105	OFF	OFF	ON	OFF
-75	ON	OFF	ON	OFF
-45	OFF	ON	ON	OFF
-20	ON	ON	ON	OFF
10	OFF	OFF	OFF	ON
40	ON	OFF	OFF	ON
70	OFF	ON	OFF	ON
100	ON	ON	OFF	ON
130	OFF	OFF	ON	ON
160	ON	OFF	ON	ON
190	OFF	ON	ON	ON
220	ON	ON	ON	ON

Span calibration (Min = 40 °C, Max = 450 °C)				
°C	SW3-1	SW3-2	SW3-3	SW3-4
45	ON	ON	OFF	ON
60	ON	ON	OFF	OFF
80	ON	ON	ON	ON
110	ON	ON	ON	OFF
155	ON	OFF	OFF	ON
210	ON	OFF	OFF	OFF
290	ON	OFF	ON	ON
390	ON	OFF	ON	OFF

2. Range -200 ... 850 °C

Zero calibration (Max = 220 °C)				
°C	SW3-5	SW3-6	SW3-7	SW3-8
-190	ON	OFF	OFF	OFF
-130	OFF	ON	OFF	OFF
-70	ON	ON	OFF	OFF
-10	OFF	OFF	ON	OFF
50	ON	OFF	ON	OFF
110	OFF	ON	ON	OFF
170	ON	ON	ON	OFF
230	OFF	OFF	OFF	ON
290	ON	OFF	OFF	ON
350	OFF	ON	OFF	ON
410	ON	ON	OFF	ON
470	OFF	OFF	ON	ON
530	ON	OFF	ON	ON
590	OFF	ON	ON	ON
650	ON	ON	ON	ON

Span calibration (Min = 40 °C, Max = 450 °C)				
°C	SW3-1	SW3-2	SW3-3	SW3-4
85	OFF	ON	OFF	ON
110	OFF	ON	OFF	OFF
150	OFF	ON	ON	ON
210	OFF	ON	ON	OFF
300	OFF	OFF	OFF	ON
420	OFF	OFF	OFF	OFF
580	OFF	OFF	ON	ON
780	OFF	OFF	ON	OFF

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1.2 Input type potentiometer

Fixed setting

SW2

SW2-1	SW2-2
OFF	ON

SW3

SW3-5	SW3-6	SW3-7	SW3-8
OFF	OFF	OFF	OFF

Input setting

Potentiometer Ω	SW3-1	SW3-2	SW3-3	SW3-4
100	OFF	ON	ON	OFF
200	OFF	OFF	ON	ON
300	OFF	OFF	ON	OFF

When using a potentiometer with more than 300 Ω value a shunt resistor R_s must be mounted in parallel to the potentiometer on the terminal block. The parallel value R_p must be equal to 100, 200 or 300 Ω as the table above.

$$R_p = \frac{PV \times R_s}{PV + R_s} \quad \text{or} \quad R_s = \frac{PV \times R_p}{PV - R_p}$$

PV = Potentiometer value (> 300 Ω).

R_p = Parallel resistor

Output behaviour for wires interruption

- Downscale: wire on terminal 7 interrupted
- Upscale: wire on terminal 4 interrupted
- Undefined: wire on terminal 1 interrupted

Example:

Potentiometer value PV = 10 kΩ

- R_p should be 100 Ω:

$$R_s = \frac{10\ k\Omega \times 100\ \Omega}{10\ k\Omega - 100\ \Omega} = 101\ \Omega$$

- R_p should be 200 Ω:

$$R_s = \frac{10\ k\Omega \times 200\ \Omega}{10\ k\Omega - 200\ \Omega} = 204\ \Omega$$

- R_p should be 300 Ω:

$$R_s = \frac{10\ k\Omega \times 300\ \Omega}{10\ k\Omega - 300\ \Omega} = 310\ \Omega$$

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2 Calibration

These isolated barriers are designed for long term stable and trouble free operation. They have been factory calibrated with high accuracy, periodically certified, traceable standard calibrators operating under computer control to perform an automated final testing procedure and test data recording. Therefore they should not require, under normal operating circumstances, any calibration check or readjustment.

For input type or range modification, however it is necessary to re-calibrate the output scale to adjust to the new input values.

2.1 Equipment required

In case of calibration check or readjustment the following equipment is required:

- 4½ digit digital multimeter
  - range 20 V, resolution 1 mV, accuracy ±0.1 % or better
  - range 20 mA resolution 10 mA, accuracy ±0.1 % or better
- RTD: precision decade resistance box
  - range 0 ... 400 Ω, resolution 0.01 Ω, accuracy ±0.03 % or better
- Potentiometer: two precision decade resistance boxes
  - Range and resolution depending on potentiometer value, accuracy ±0.03 % or better

2.2 RTD or potentiometer input range modification

In case of input type changing you must configure the instrument according to the procedure given in data sheet. In case of input range changing, the input range setting dip-switches position must be changed following the procedure:

1. Find the required input type in the section input ranges (for example Pt 100).
2. Select the zero and span tables that better satisfy the required range extension (i. e. -200 ... 500 °C).
3. In the zero table take the closest value to the one to be calibrated (i. e. 0 for a range 0 ... 300 °C) and set the switches SW3 accordingly.
4. In the span table take the closest value to the one to be calibrated (i. e. 290 °C for a range 0 ... 300 °C) and set the switches SW3 accordingly.
5. Then proceed in calibrating the front accessible trimmers for fine adjustment of the output value based on input signal range.
6. If the calibration is to difficult, select in the Zero and Span tables a new range close to the previous one and repeat the calibration procedure.

2.3 Pt100 input range calibration

Connect the decade resistance box to the input terminals of the unit and the multimeter at the output terminals (current or voltage mode dependent to the output type). Allow five minutes for warm up the unit, then set the decade box at low end of scale signal and check the output value. It should also be at the low end of scale. Adjust the zero trimmer of the relevant channel, if necessary.

Set the decade box for full scale value, check the output value. It must also be at full scale otherwise adjust, if necessary, the span trimmer of the relevant channel.

Return to the low end of scale and check the shifting of calibrated value. If necessary re-adjust the output value until it comply with the specified accuracy.

If a burnout feature is specified, open any of the 3 input wires (or any combination) and check the Upscale or Downscale values.

2.4 Other types of RTD (to be specified when ordering)

On specific request, different type of RTD sensor can be configured, for linear temperature output in the converter (i. e. Pt100 ANSI or Ni100 or Cu10).

Differences from Pt100 DIN mainly stems from some component value on the base board bridge circuit and/or some values on the input preamplifier circuit.

The calibration procedure is very similar described above.

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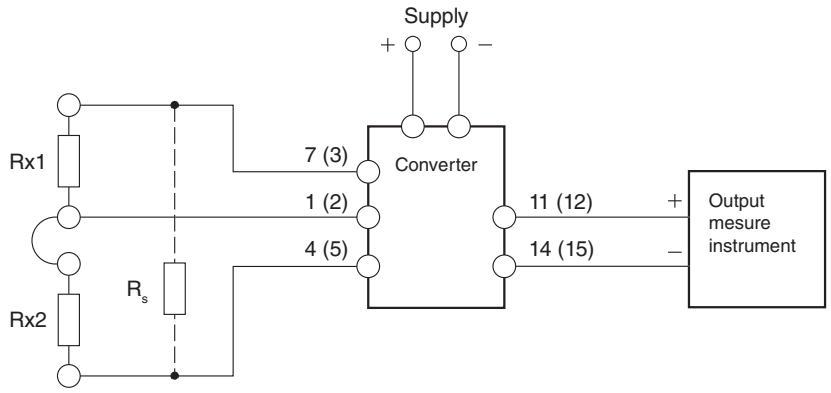
2.5 Potentiometer input range calibration



Connect the two decade resistor boxes at the input terminals of the unit and connect the multimeter at the output terminals (current or voltage mode dependent to the output type) as shown in figure. Allow five minutes for warm-up of the unit, then set 0 Ω on the decade box Rx2 and the potentiometer value on decade box Rx1 (i. e. 200 Ω) and check the output value. It should be at low end of scale. Adjust if necessary, zero trimmer of the relevant channel. Set decade box Rx1 to the potentiometer value (i. e. 200 Ω) and Rx2 to 0 Ω, check the output value that must be at full scale. Adjust, if necessary, the span trimmer of the relevant channel.

Return to the low end of scale and check the shifting of the calibrated value. If necessary re-adjust the output value until it comply with the specified accuracy.

Potentiometer ranges from 100 ... 300 Ω are implemented without an input shunt resistor R_s on the terminal block by adjusting coarse span and zero as required.

Potentiometer values from 300 Ω ... 100 kΩ can be accommodated by inserting a shunt resistor R_s (accuracy ±0.5 %, stability 25 ppm/°C, power rating ¼ Ω, see section 1.2) to obtain a parallel value R_p near to 100 Ω, 200 Ω or 300 Ω. The calibrating of zero and span can be done as shown above.

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