2.0 RECEIVING AND UNPACKING

Please inspect the packaging and instrument thoroughly for any signs of transit damage. If the instrument has been damaged, please notify your supplier immediately.

3.0 SPECIFICATION @ 20 °C

<table>
<thead>
<tr>
<th>INPUT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Type</td>
<td>PT100 100 R @ 0°C 2 or 3 Wire</td>
<td></td>
</tr>
<tr>
<td>Sensor Range</td>
<td>(-200 to +850) °C (18 to 390) D</td>
<td></td>
</tr>
<tr>
<td>Sensor Connection</td>
<td>Screw terminal</td>
<td></td>
</tr>
<tr>
<td>Minimum span (see note 1)</td>
<td>25 °C</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>BS EN 60751 (IEC 751) standard / JISC1604</td>
<td></td>
</tr>
<tr>
<td>Accuracy (see note 2)</td>
<td>±0.1 °C at 0.05% of Reading</td>
<td></td>
</tr>
<tr>
<td>Thermal Drift</td>
<td>0.002 % / °C</td>
<td></td>
</tr>
<tr>
<td>Excitation current</td>
<td>≤ 200 uA</td>
<td></td>
</tr>
<tr>
<td>Lead Resistance effect</td>
<td>0.002 °C / D</td>
<td></td>
</tr>
<tr>
<td>Maximum lead Resistance</td>
<td>20.0 Ω per leg</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Any span may be selected, full accuracy is only guaranteed for spans greater than the minimum recommended span.

Note 2: Basic measurement accuracy includes the effects of calibration, linearisation and repeatability.

<table>
<thead>
<tr>
<th>OUTPUT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Two wire 4 to 20 mA sink</td>
<td></td>
</tr>
<tr>
<td>Limits</td>
<td>Low +3.9 mA, high 21.5 mA</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(mA out / 2000) or ±50 uA which ever greater</td>
<td></td>
</tr>
<tr>
<td>Loop Effect</td>
<td>±(0.2 uA / V measured @ 50 Hz 1 V (peak to peak))</td>
<td></td>
</tr>
<tr>
<td>Thermal Drift</td>
<td>±1 uA / °C typical; ±1.5 uA Max</td>
<td></td>
</tr>
<tr>
<td>Max Load</td>
<td>(Vsupply – 10)/21 KΩ</td>
<td></td>
</tr>
</tbody>
</table>

4.0 INSTALLATION AND WIRING

4.1 Mechanical

The transmitter has been specifically designed to fit inside a DIN standard probe head enclosure, which provides adequate protection from moisture, dust, corrosive atmosphere etc. All cable entries must be sealed using the correct size gland. Likewise any probe assembly fitted must be sealed.

Care must be taken when locating the transmitter to ensure the working ambient temperature range of (-40 to 85) °C is not exceeded. The enclosure has a hole allowing the sensor wire to enter through the transmitter. This is applicable when the sensor is mounted directly below the transmitter.

4.2 Electrical

Electrical connections to the transmitter are made to the screw terminal provided on the top face. The sensor wires must be equal length and type for the load compensation to work correctly. The screw terminals allow for wires to enter either inner or outer direction.

The transmitter is protected against reverse connection and over voltage. If no sensor (input) connection is made the transmitter will go into either up or down scale output current, depending on configuration.

Figure 2 gives connection details, the output is shown connected to a 24 V supply. The load symbol represent any other device connected in the loop, such as monitoring equipment, panel indicators and loop isolators. The load value can range from 0 ohms to the max loop load for given supply, refer to section 3 “Max load” for more information.

The transmitter conforms with EC directive BS EN 61326 : 1998 when correctly installed in a termination head providing at least IP20 protection and with sensor wires less than 3 metres. Screened or twisted pair wires are recommended for output wires. Always ensure the 4 to 20 mA loop is grounded at one point, this would normally be at the monitoring equipment or loop power supply.

In normal operation the program LED acts as over-range LED.

Figure 2

1.0 DESCRIPTION

The head mounted 659RTD-1 connects to any standard Pt100 resistance sensor and converts the linearised temperature to a 4 to 20 mA signal. The transmitter is a two wire device, and is fully configurable by the user, over a wide temperature range, with the aid of a simple push button. This new design incorporates additional configuration menus, allowing the user to push button trim the transmitter output at both zero and span, ideal for trimming out sensor errors. The transmitters advanced circuitry guarantees high stability over the wide operating ambient temperature ranges experienced by head mounted devices.

The 659RTD-1 features an LED which provides visual indication of sensor fault when in normal operation and is also used to guide the operator through the simple menus during configuration.
5.0 USER CONFIGURATION

READ COMPLETE SECTION BEFORE ATTEMPTING CONFIGURATION
PARTICULAR CARE SHOULD BE TAKEN REGARDING TIMEOUTS IN MENU 2 & 3

IMPORTANT

Reset to factory default setting, this procedure also removes any user trim adjustment. Factory default settings are:

- **Range** (0 to 100) °C
- **User trim**
- **All user adjustment cleared**

To reset to factory setting, hold the button down whilst the 659RTD-1 is powered up.

**User Configuration**

User configuration uses three menus, each menu sets a different parameter:

- **Menu 1** Range configuration (No Timeout)
- **Menu 2** Set direction of output on sensor burnout
- **Menu 3** User trim at 4 mA and 20 mA.

The configuration menus are navigated using the push button and program LED. The push button is located under the hole in the keyhole shaped wiring label. To press the button use a 3 mm screw driver (flat blade) inserted into the hole. The button has a slight click action.

Three types of button press are used:

- Single button press = Advance
- Double press within 0.5 seconds = Escape or change direction
- Press and hold button > two seconds = Enter

When a menu is selected the Program LED will flash in bursts of one to three flashes, the number of flashes represents the menu number.

Navigating the menus

- To access menus, press and hold button > 2 seconds, then program LED will start to flash, one flash every burst. This indicates “menu 1” is selected.
- Use single button press to advance selection to “menu 2”, the program LED will now show two flashes per burst. The Next single presses will advance the selected menu to menu 3 and the next single press will advance selected menu back to menu 1. Repeated single presses will cycle the selected menu back around menus 1 to 3, in the above sequence.
- Double press button to escape from menus, and return to normal. Normal operation can also be selected by turning transmitter power off and on. Note the transmitter will not time out and automatically escape from menus.

Using Menus

**Menu 1 Range configuration (No Timeout)**

Configuration will require the following tools and equipment:

- DC Supply (12 to 30) V @ 30 mA
- Precision resistance decade box to simulate PT100 sensor. (Do not use electronic calibrator)
- Screwdriver flat blade 3mm wide
- Current meter (user trim)

**To re-range the temperature scale follow the instructions:**

- Refer to figure 3, connect resistance box to the input terminals using three wire connection. Connect output to a DC supply, observe polarity. Turn power on and allow 1 minute warm up period.
- Set calibrator to the equivalent resistance of the PT100 sensor, at required low range temperature. If the program LED is on at this stage the input is out of range, check resistance and connection.
- Press and hold button > 2 seconds to enter menus, menu 1 will then be selected, indicated by one flash every burst.

**Menu 2 Burnout Selection (Timeout is 3 Seconds)**

- Whilst menu 1 is selected, press and hold button > 2 seconds to enter menu 1, at which stage the program LED will flash on and off at a slow rate.
- Set calibrator to the equivalent resistance of the PT100 sensor, at required high range temperature and allow twenty seconds.
- Press button to store high range setting, the program LED will flicker for one second before the transmitter returns to normal operation. The transmitter is now re-ranged.

**Menu 3 User trim (Timeout is 20 Seconds)**

This menu allows the user to trim the output current at 4 mA and 20 mA points, (similar function to trim potentiometers) and is very useful for trimming out sensor errors.

To trim output current, single press button to advance current 2 uA in selected menu. Menu 3 is powered up.

- Press and hold button > 2 seconds to enter menu 3, indicated by three flashes of the program LED every burst.
- Press button to advance selection to menu 2, single press again to select menu 3 indicated by three flashes of the program LED every burst.
- Press and hold button > 2 seconds to enter menu 3, at which stage the program LED will flash on and off at a slow rate indicating down trim direction or fast rate indicating up trim direction.
- To change trim direction double press button. The Program LED will toggle to the opposite direction. Repeated double presses will toggle between up and down trim direction.
- To trim output current, single press button to advance current 2 uA in selected menu, or press and hold button to auto advance in set direction release button to stop advance. Note after approximately 20 seconds of continuous button press, the auto trim rate will speed up. Monitor the current change on the current meter.
- To store new setting allow 20 seconds with no button action, the program will then timeout, store new setting then return to normal operation.

**Aid to User trim**

1) **Trim** the 4 mA end first. The 4 mA trim is an offset adjustment and will affect both low and high ends, they will trim by the same amount (Fig 4).
2) **Trimming** the 20 mA end will not affect the 4 mA end. It will stretch or contract the ‘span’ between them. (Fig 5)

**Reset to factory default settings**

If required the unit can be reset to factory default setting, this procedure also removes any user trim adjustment. Factory default settings are:

- **Range** (0 to 100) °C
- **User trim**
- **All user adjustment cleared**

To reset to factory setting, hold the button down whilst the 659RTD-1 is powered up.