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>Sensor Type</th>
<th>Range (°C)</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>-200 to 1370</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>-100 to 1300</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>-20 to 1000</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>-180 to 1300</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>-100 to 1600</td>
<td>± 0.2% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>-10 to 1760</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>-20 to 1760</td>
<td>± 0.1% of F.S. ± 0.5 °C  (plus any sensor error)</td>
<td></td>
</tr>
</tbody>
</table>

Range (mV) | -10 to 70 | ± 0.2% of full scale

4.0 INSTALLATION AND WIRING

4.1 Mechanical

The 659TC-1 transmitter has been specifically designed to fit inside a DIN standard probe head enclosure (such as the Status SCH-4 series), which provides adequate protection from moisture, dust, corrosive atmospheres 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 659TC-1 enclosure has a center hole allowing the sensor wired to enter screw terminals from the transmitter center, this is applicable when the sensor is mounted directly below the transmitter.

Figure 1

Mounting holes: two holes 5.5mm diameter, 33mm centers
Center hole sensor wire entry: 4mm

Figure 2

Load

Electrical connections to the transmitter are made to the screw terminal provided on the top face. The correct type of thermocouple wire must be used to connect sensor, this will normally be provided as part of the probe assembly. The screw terminals allow for wires to enter either inner or outer direction. Never attempt to unscrew the spare terminal which secures the factory fitted cold junction sensor. The terminal is fitted with a tamperproof screw to avoid accidental adjustment.

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 setting.

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

The transmitter conforms with EC directive BS EN 61326 : 1998 when correctly installed in a suitable enclosure.

Shielded 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 range “R” LED acts as over-range LED. The menu LED is always off.

Figure 2

4.2 Electrical

4.3 Mechanical
5.0 USER RANGING
The transmitter may be purchased pre-configured, if specified at the time of order. Ranging is provided to allow the temperature range of the transmitter to be set to a custom range. This configuration level cannot change the input type, if the input type or other parameters require change, then please refer to the advances configuration section. To confirm the present input type set on the transmitter is correct for your application, count the number of flashes of the range "R" LED at power up then refer to the chart in section 6 "Menu 1" to establish the type set.

The push button is located under the slot in the key hole label, the slot located next to the menu "M" LED. To press the button use a 3 mm screw drive (flat blade), inserted into the slot and locate resistance of button key. The button has a slight click action.

It may be worth noting at this stage the advanced user configuration provides the user with the option of selecting fixed ranges, this may be a more attractive option if a suitable range is available, as no calibration equipment will be required.

Configuration will require the following tools and equipment:

- DC Supply 12 to 10VDC @ 30 mA
- Thermocouple calibrator
- Thermocouple compensating wire
- Screw drive flat blade 3mm wide

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

Connect thermocouple calibrator to 659TC-1 input terminals using correct thermocouple compensating wire. Observe polarity.

Connect the output terminals to the DC supply, observe polarity.

Turn DC supply on.

Set calibrator to the required low scale temperature. Note Range "R" LED if an input indicates input connection error or input out of range, please check input.

Allow 1 minute warm up period.

To "enter" ranging, press and keep pressed the push button until Range "R" LED flashes at a slow rate, then release button.

The "R" LED will flash at a slow rate for a approximately one second during which period the low scale range is stored. Once the store is complete the "R" LED will flash at a medium rate indicating the transmitter is ready to store the high range setting.

Set the calibrator to the required high range temperature and allow ten seconds.

Press button to store high range setting, the "R" LED will flicker for one second before the transmitter returns to normal operation. The transmitter is now re-ranged.

The above procedure also applies to mV input, but please ensure only copper wire is used for connection to mV calibrator.

6.0 ADVANCED USER CONFIGURATION

The advanced user configuration option is based on five menus, each menu Sets a different parameter:-

Menu 1

Selects one of eight input types.

Menu 2

Selects either custom user range or one of seven fixed range.

Menu 3

Selects the output direction of sensor burnout.

Menu 4

Provide User trim 4mA and 20mA.

Menu 5

Reset to factory default setting.

The advance configuration menus are navigated using the push button, menu "M" LED and range "R" LED. The push button is located underneath the slot in the key hole label, located just below the "M" LED. To press the button use a 3 mm screw drive (flat blade) inserted into the slot. The button has a slight click action.

Three commands are used to navigate menus, performed by clicking the button as follows:-

Advance

Single button press or click

Escape or change direction

Double press or click within 0.1 seconds

Enter

Press and hold button > two seconds

When a menu is selected the "M" LED will flash a burst of 1 to 5 flashes, the number of flashes represents the menu number.

Note the range "R" LED will only operate when a selected menu has been entered, then the "R" LED uses a series of flashes or toggle flash rates to indicate the state or the open menu.

Navigating the menus (Read all of this section before attempting configuration)

To access the advanced user menus press and hold down button during 659TC-1 power up. The先进 user menus will now be enabled and remain enabled until transmitter power is removed. Note the "USER RANGING" level will not be active at this stage, the push button will now serve to navigate "advanced user menus" as follows:

- To "enter" menus press and hold button for > 2 seconds. The "M" LED will then starts to flash, rate the flash at burst period (indicating menu 1).
- To "advance" to the next menu use single button press, the "M" LED will advance to two flashes per burst, indicating menu 2 is selected. Repeated single presses will advance menu, once menu 5 is reached, the next press will return to menu 1, for a repeat cycle around the menus.
- To "escape" from menus back to normal operation use a double click of the button or remove transmitter power. Note menus have no timeout escape and therefore will remain selected indefinitely.
- To "enter" a selected menu press and hold button for two seconds, at which stage the "R" LED will start to flash between bursts of the "R" LED, indicating the state of the opened menu.

To store new setting allow 10 seconds with no button action, the burn out selection menu will then timeout, store new setting, indicated by a flicker of the "R" LED, before returning back to normal operation.

Menu 1 Input type

On Entry "M" LED single flash every burst (menu 1), followed by a burst of 1 to 8 "R" LED flashes, flash count represents the input type as listed below. Timeout is 10 seconds so be sure to act quickly if the type needs changing.

<table>
<thead>
<tr>
<th>Number</th>
<th>Input Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type 8</td>
</tr>
<tr>
<td>2</td>
<td>Type 2</td>
</tr>
<tr>
<td>3</td>
<td>Type 6</td>
</tr>
<tr>
<td>4</td>
<td>Type 4</td>
</tr>
<tr>
<td>5</td>
<td>Type 5</td>
</tr>
<tr>
<td>6</td>
<td>Type 1</td>
</tr>
<tr>
<td>7</td>
<td>Type 7</td>
</tr>
<tr>
<td>8</td>
<td>Type 8</td>
</tr>
</tbody>
</table>

To avoid any action, allow 10 seconds with no button action, Set factory default menu will then timeout, without storing any default configuration. The transmitter will then return to normal operation.

Menu 2 Fixed ranges

On Entry the "M" LED flashes twice every burst (menu2), followed by a "R" LED flash cycle back to type 1. To ensure valid indication of menu allow one to two burst cycle after "advance", before counting the "R" LED flashes.

On the desired type is selected, allow 10 seconds with no button action, the transmitter will then store the selected input type, (indicated by flicker of "R" LED) before return back to normal operation.

Menu 3 Burnout Selection

On Entry "M" LED, three flashes every burst (menu 3), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate. Be quick to act as timeout is 10 seconds.

Slow rate indicates low scale burnout, fast rate indicates upscale burnout.

To "advance" to the other burnout selection press button.

To store new setting allow 10 seconds with no button action, the burn out selection menu will then timeout, store new setting, (indicated by a flicker of the "R" LED), before returning back to normal operation.

Menu 4 User trim

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

The input of the transmitter must be connected to either a calibrator or a temperature sensor held at a known temperature. The 4 to 20mA loop current will also need to be monitored with a current meter. This menu has extended timeout of 20 seconds.

The trim action will only operate within certain output current bands, the zero will be trimmed when the out current is between (3.8 to 6.0) mA, and the span will be trimmed when the output current is between (18.0 to 21.5) mA.

On Entry "M" LED, four flashes every burst (menu 4), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate.

Slow rate indicates trim direct down, while fast rate indicate trim direction up.

To "change trim direction" double click button.

To trim, single press button to "advance" current by 2 uA, or press and hold button to auto advance, after two seconds the trim will adjust automatically at a rate of 3 uA per second until the button is released. Note after approximately 20 seconds of continuous press button, the auto trim rate will speed up to a rate of 10 uA per second.

To store new setting allow 20 seconds with no button action, the User Trim menu will then timeout and store any new setting(s), (indicated by a flicker of the "R" LED), before returning back to normal operation.

Menu 5 Set factory default

On Entry "M" LED, five flashes every burst (menu 5), followed by "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate.

To set factory default and zero any user trim, press button. Default setting will then be loaded and stored into the transmitter, indicated by a flicker of the "R" LED. The transmitter will then return to normal operation.

To avoid any action, allow 10 seconds with no button action, Set factory default menu will then timeout, without storing any default configuration. The transmitter will then return to normal operation.

Range R LED flashes | Input U.J.E. & N | Input T | Input U.S. & I | Input mV
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0 to 1000</td>
<td>0.0 to 400</td>
<td>0.0 to 1500</td>
<td>0.0 to 70</td>
</tr>
<tr>
<td>1</td>
<td>0.2 to 200</td>
<td>0.2 to 200</td>
<td>0.2 to 1500</td>
<td>0.2 to 70</td>
</tr>
<tr>
<td>2</td>
<td>2.5 to 500</td>
<td>2.5 to 500</td>
<td>2.5 to 1500</td>
<td>2.5 to 70</td>
</tr>
<tr>
<td>3</td>
<td>5.0 to 1000</td>
<td>5.0 to 1000</td>
<td>5.0 to 1500</td>
<td>5.0 to 70</td>
</tr>
<tr>
<td>4</td>
<td>10.0 to 100</td>
<td>10.0 to 100</td>
<td>10.0 to 1500</td>
<td>10.0 to 70</td>
</tr>
<tr>
<td>5</td>
<td>20.0 to 100</td>
<td>20.0 to 100</td>
<td>20.0 to 1500</td>
<td>20.0 to 70</td>
</tr>
<tr>
<td>6</td>
<td>40.0 to 100</td>
<td>40.0 to 100</td>
<td>40.0 to 1500</td>
<td>40.0 to 70</td>
</tr>
<tr>
<td>7</td>
<td>80.0 to 100</td>
<td>80.0 to 100</td>
<td>80.0 to 1500</td>
<td>80.0 to 70</td>
</tr>
</tbody>
</table>

User Range

On the desired range selected, allow 10 seconds with no button action, the transmitter will then store new range (indicated by flicker of "R" LED) before returning back to normal operation.