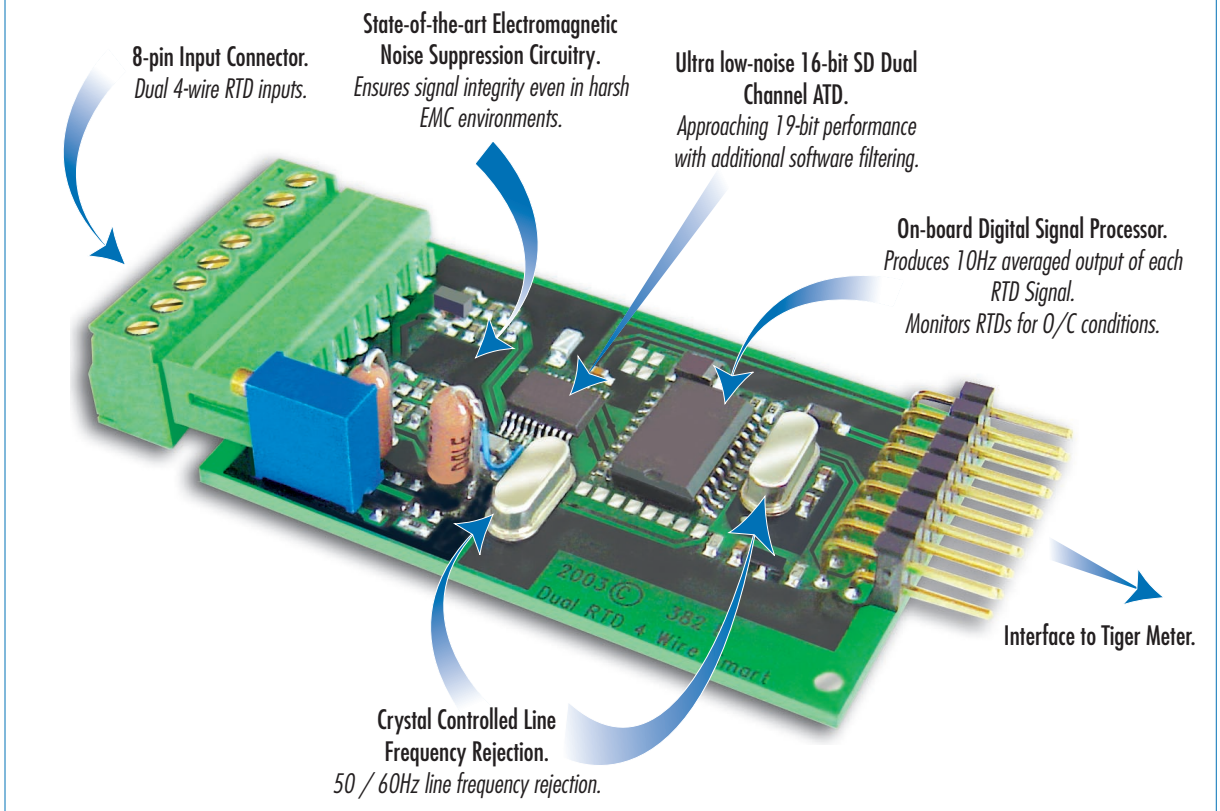
TEXMATE INC

Fits Tiger 320 Series

DUAL RTD INPUT



Unprecedented 0.01° accuracy on two channels.

Designed for applications in precision temperature measurement and calibration systems, the dual channel RTD input module interfaces directly with all Tiger 320 Series controllers. Using 4-wire RTDs, 0.01° resolution and repeatability is possible on each channel

Input Module Order Code Suffix

IST5 (50 Hz Rejection)

IST6 (60 Hz Rejection)

Hardware Module Specifications	
Dual Inputs	4-wire RTD, choice of Pt 385 or Pt 392.
	800/960 sample rate per channel.
	10 Hz average output per channel.
Excitation Current	200 µA constant current source.
	Ratiometric referenced to ATD.
	Current sense for open circuit RTD.
Resolution	0.01° on each channel.
Analog-to-Digital	Dual channel ΣΔ ATD convertor approaching
	19-bit resolution operating ratiometric
	with respect to excitation current.

Software Module Specifications	
Line Frequency Rejection	50/60 Hz selectable.
Input Type Selection	Select from either Pt 385 or Pt 392
	for both channels.
Calibration	Easy calibration with wide operating
	temperatures through Tiger 320 Series software.

Connector Pinouts

Note:
The trimpot is used during factory calibrated to optimize internal RTD calibration algorithms.

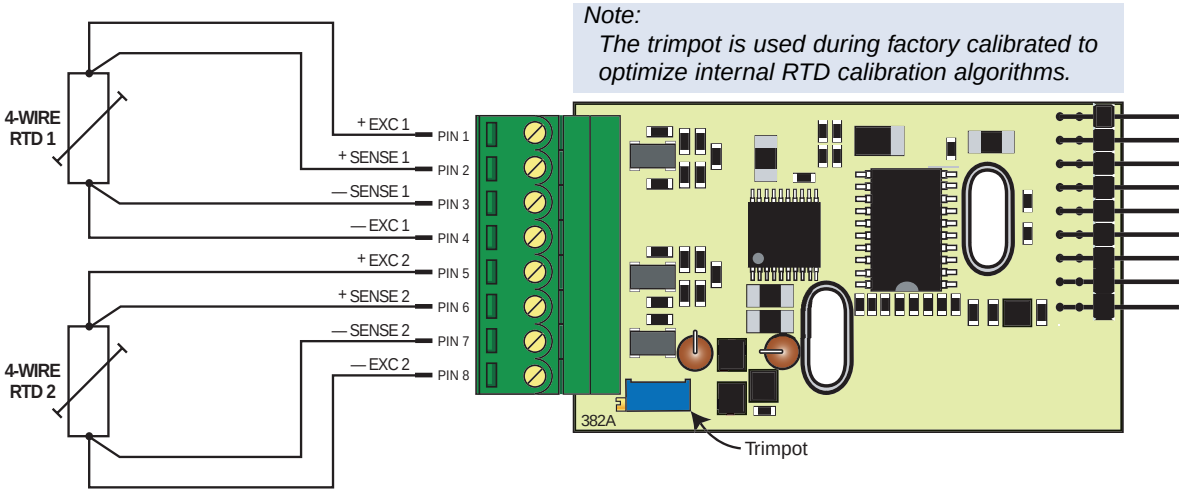


Figure 1 – IST5 Input Module Configured for Two 4-wire RTD Sensors

Note:
To complete the current pathway use links between pins 5 and 6, pins 6 and 7, and pins 7 and 8 to replace the missing RTD.

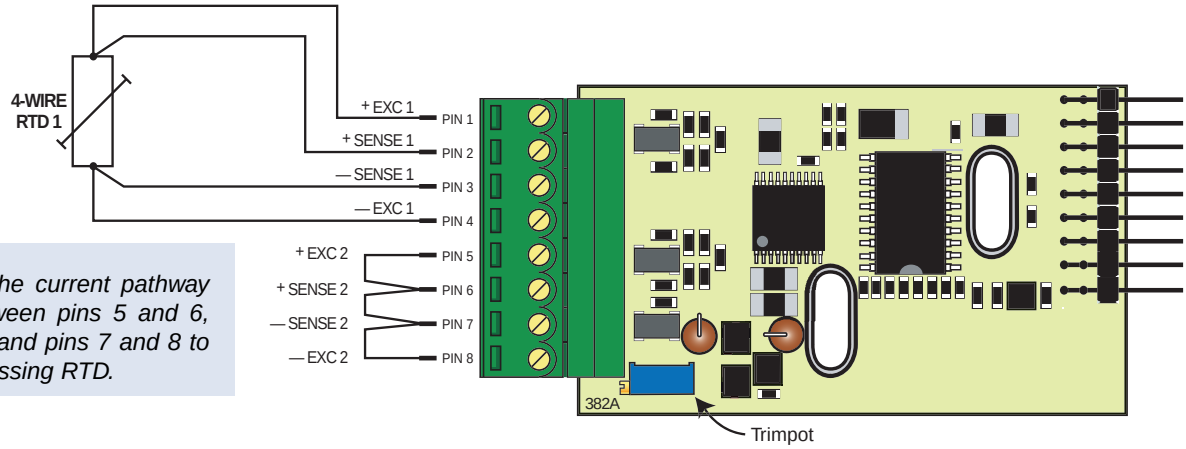


Figure 2 – IST5 Input Module Configured for a Single 4-wire RTD Sensor

Smart Setup Registers

The Tiger meter uses three smart setup registers to configure all smart input modules. The IST5 input module requires only **smart register 1** (SMT1) to be configured. See Figure 3.

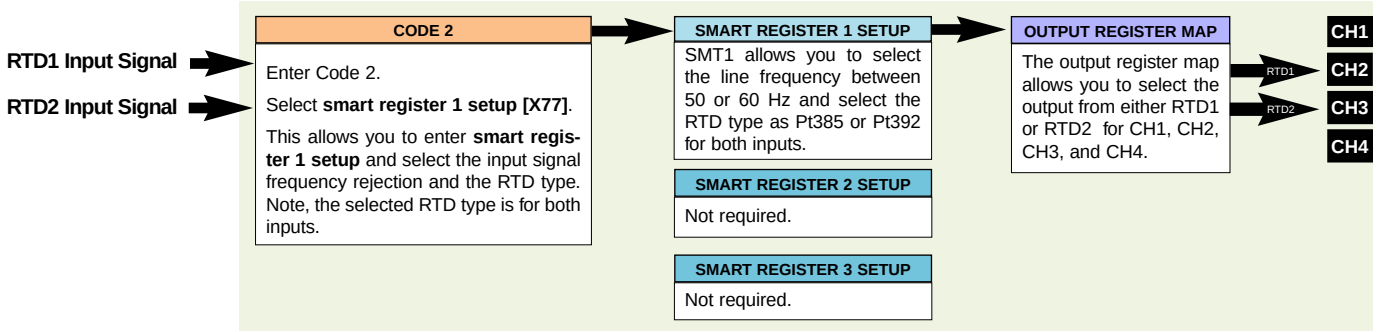


Figure 3 – IST5 Smart Setup Registers Operational Flow Diagram

Input module IST5 has two RTD inputs: RTD1 and RTD2. RTD1 is physically connected to input 1 and RTD2 is physically connected to input 2 of IST5's dual channel, 16-bit A to D convertor. See Figure 4.

SMT1 resides in IST5's microcontroller and allows you to select the RTD type to suit your input. SMT1 applies a Pt 385 or Pt 392 linearization table to both input 1 and input 2.

The IST5 input module produces **two output registers**, one for the averaged signal output from each RTD. The data from one of these registers can be transferred to a channel in the Tiger meter. All four channels can be selected for either RTD1 or RTD2, or a combination of both inputs can be selected, for example:

- RTD1 to CH1.
- RTD2 to CH2 .
- CH3 not used.
- CH4 not used.

The channels are selected through the codes in the Tiger meter's main programming mode:

- RTD1 or RTD2 to CH1 via Code 2.
- RTD1 or RTD2 to CH2 via Code 4.
- RTD1 or RTD2 to CH3 via Code 5.
- RTD1 or RTD2 to CH4 via Code 6.

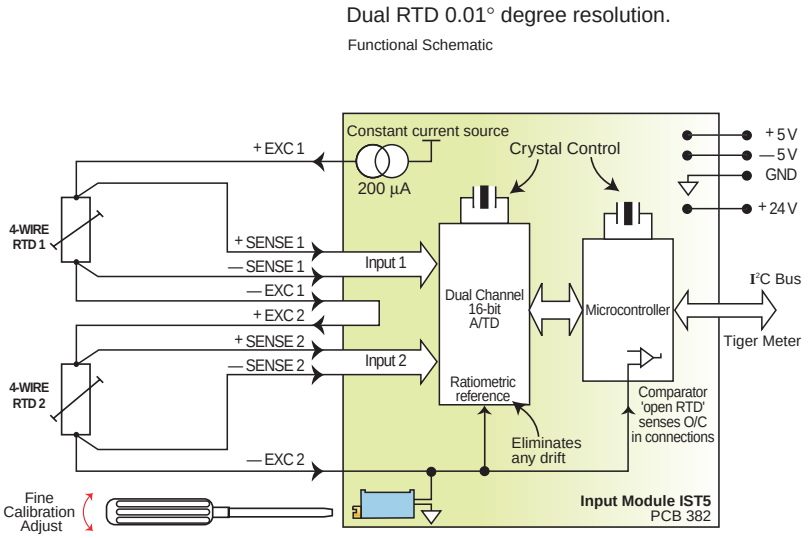


Figure 4 – IDT5 Dual RTD Smart Input Module Functional Schematic

Programming Procedures

The following programming procedures cover all the steps required to configure smart input module IST5. Steps **1** to **7** describe how to select the **line frequency** and the **RTD type** through SMT1.

Steps **8** to **12** describe how to select the output registers for channels 1, 2, 3, or 4 as required.

1 Press the P and ⬆ buttons at the same time to enter the main programming mode.

2 Press the P button three times to enter Code 2. Set Code 2 to [X77].

This setting enters the **smart register 1** code setup menu.

FIRST DIGIT
TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100 Hz

SECOND DIGIT	
MEASUREMENT TASK	
0	**Voltage, Current**
1	TC (3rd digit selects type of TC)
2	RTD 3-wire (3rd digit selects type of RTD)
3	RTD 2- or 4-wire (3rd digit selects type of RTD)
4	Frequency
5	Period
6	Counter
7	Smart Input Module

THIRD DIGIT	
OUTPUT REGISTER MAP	
0	**RTD1 Average Output**
1	RTD2 Average Output
2	-
3	-
4	-
5	-
6	-
7	Smart input module register 1 code setup

Note the output registers in the 3rd digit are specific to the dual RTD input module. These registers vary for each different smart input module.

3 Press the P button.

SMt1 000

This menu provides settings unique to **smart register 1** of input module IST5.

FIRST DIGIT
FREQUENCY SELECT
0 -
1 60 Hz rejection
2 -
3 50 Hz rejection

SECOND DIGIT
NOT USED
0 -
1 -
2 -
3 -
4 -
5 -
6 -
7 -

THIRD DIGIT
RTD TYPE
0 Pt 385
1 Pt 392
2 -
3 -
4 -
5 -
6 -
7 -

4 Using the ⇧⇩ buttons, select either **50 or 60 Hz line frequency rejection** in the 1st digit and either Pt 385 or Pt 392 the **RTD type** in the 3rd digit.

2nd digit settings are not relevant.

5 Press the P button. The display returns to [Cod_2] [X77]. Cod_2 X77

6 Using the ⇩ button, reset the 3rd digit to zero [X70] to leave the smart register 1 menu.

Note, leaving the 3rd digit as 7 means the display constantly cycles between [Cod_2] and [SMt1]. Cod_2 X7X

7 Press the P and ⇧ buttons at the same time to return to the operational display.

Select a Channel

Select the output register for the required channels

8 Press the P and ⇧ buttons at the same time again to re-enter the main programming mode, then press the P button three times to enter Code 2.

Channel 1

9 Set Code 2 to [X7X]. Select the required processing rate for **CH1** in the 1st digit and the required register map settings in the 3rd digit.

CH1 Cod_2 X7X

FIRST DIGIT
TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100 Hz

Note the output register map is different for each smart input module type.

THIRD DIGIT
OUTPUT REGISTER MAP
0 RTD1 Average Output
1 RTD2 Average Output
2 -
3 -
4 -
5 -
6 -
7 Smart input module register 1 code setup

Channel 2

10 Set Code 4 to [0X0]. Select the required register map settings for **CH2** in the 2nd digit.

CH2 Cod_4 0X0

FIRST DIGIT	
MEASUREMENT TASK	
0 Voltage, Current	
1	TC (type as per 2nd digit)
2	RTD (type as per 2nd digit)
3	Second Digital Input Channel (type as per 2nd digit)

SECOND DIGIT		
FOR VOLTAGE & CURRENT		
0 Channel 2 Disabled		
1 Direct (no post processing)		
2 Square Root of Channel 2		
3 Inverse of Channel 2		
4 Output Register 1 (smart module)*		
5 Output Register 2 (smart module)*		
6 Output Register 3 (smart module)*		
7 Output Register 4 (smart module)*		
	2nd Digit	**Output Register Map**
	4 selects	**0 RTD1 Averaged signal**
	5 selects	1 RTD2 Averaged signal*

*****Note:*
The logic for CH2 is not the same as CH1, CH3, or CH4. The 1st and 3rd digits must both be set to 0. Selecting 040 or 050 in the 2nd digit of Code 4 directly selects one of the following settings in the output register map (3rd digit):

Channel 3

11 If required enter Code 5 and select the required register map settings for **CH3** in the 3rd digit.

CH3 Cod_5 X7X

FIRST DIGIT
CH3 POST PROCESSING
0 Direct Display of Input (no processing)
1 Square Root of Channel 3
2 Inverse of Channel 3
3 **Meters with 4 kB memory** NO Linearization
Meters with 32 kB memory 32-point Linearization of CH3 using Table 3
Note: All linearization tables are set up in the Calibration Mode [24X].

THIRD DIGIT
OUTPUT REGISTER MAP
0 RTD1 Average Output
1 RTD2 Average Output
2 -
3 -
4 -
5 -
6 -
7 Smart input module register 1 code setup

Note the output register map is different for each smart input module type.

Channel 4

11 If required enter Code 6 and select the required register map settings for **CH4** in the 3rd digit.

CH4 Cod_6 X7X

FIRST DIGIT
CH4 POST PROCESSING
0 Direct Display of Input (no processing)
1 Square Root of Channel 4
2 Inverse of Channel 4
3 **Meters with 4 kB memory** NO Linearization
Meters with 32 kB memory 32-point Linearization of CH4 using Table 4
Note: All linearization tables are set up in the Calibration Mode [24X].

Press the P button to save the settings.

12 Press the P and ⬆ buttons at the same time to return to the operational display.

Calibration Procedures

Calibrating the IST5 dual RTD smart input module is done in the following two steps:

- Perform a simulated RTD input calibration procedure.
- Perform a full scale calibration procedure.

Simulated RTD Input Calibration Procedure

To gain the best performance from and linearization of RTD signals, the input module should be initially calibrated using a simulated RTD input signal of 32 °F (0 °C). Fine calibration is a means of initially calibrating the input module using two 100 Ω precision resistors to simulate an RTD input signal of 32 °F. This is normally done before the input module leaves the factory. But, if recalibration is required, connect two 100 Ω precision resistors to the input module according to the connection diagram shown in Figure 6 and carry out the following steps.

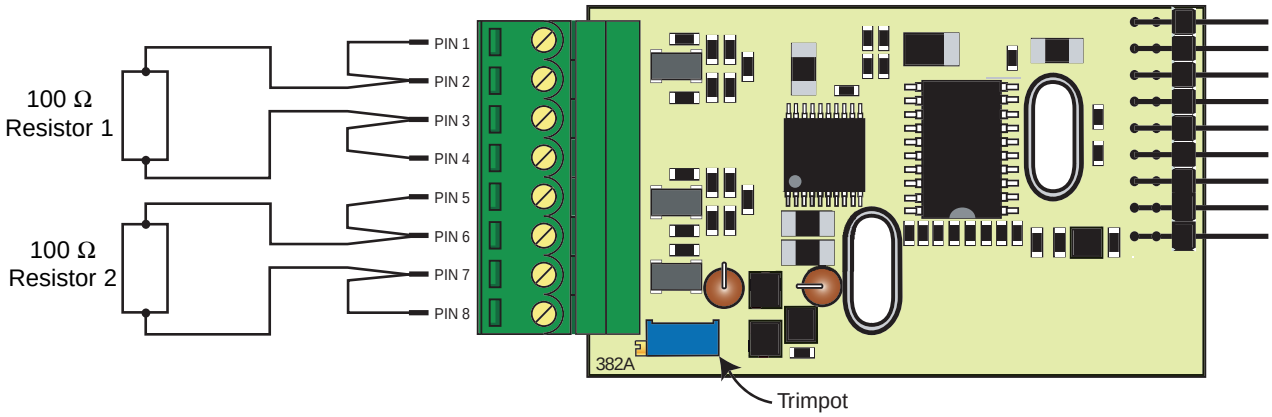


Figure 6 – IST5 Fine Calibration Connection Diagram

1) Ensure that the line frequency rejection and RTD type settings for SMT1 have been set. See Steps 2 and 3 of the Programming procedures.

2) Enter the main programming mode in your Tiger meter and set the offset setting to 0 (zero) and the span setting to 1 (one) for CH1 and CH2 using the following codes:

In [CAL] [000] for **CH1** select [101] then press the [P] button.

Display toggles between [OFF_1] [0]

Leave the offset setting [OFF_1] at [0] and press the [P] button.

Display toggles between [SCA_1] [00000]

Adjust the full scale setting [SCA_1] to [1] and press the [P] button.

Display returns to [CAL] [000]

for **CH2** select [102] then press the [P] button.

Carry out the same steps as for CH1 to to set the offset and full scale settings for CH2.

3) While still in the main programming mode set CH1 to display RTD1 and CH2 to display RTD2 using the following codes:

for **CH1** enter Code 2 and select RTD1 in the 3rd digit. See Step 9 on Page 4.

for **CH2** enter Code 4 and select RTD2 in the 2nd digit. See Step 10 on Page 5.

4) While viewing CH1, adjust the trimpot until the display reads 3200 counts. This represents 32.00 °F.

Both CH1 and CH2 are now calibrated.

Full Scale Calibration Procedure

The RTDs can be calibrated in °F or °C. A calibration source is the easiest method to calibrate a zero and full scale setting, otherwise, the known resistance values for the temperatures must be used:

RTD Pt 385: 0 °C is equivalent to 100 Ω.

100 °C is equivalent to 138.5 Ω.

For example:

Offset (low setting) is zero (0 °C).

Full scale setting is 100 °C.

Enter the calibration mode and carry out the procedure on Page 7 for both CH1 and CH2.

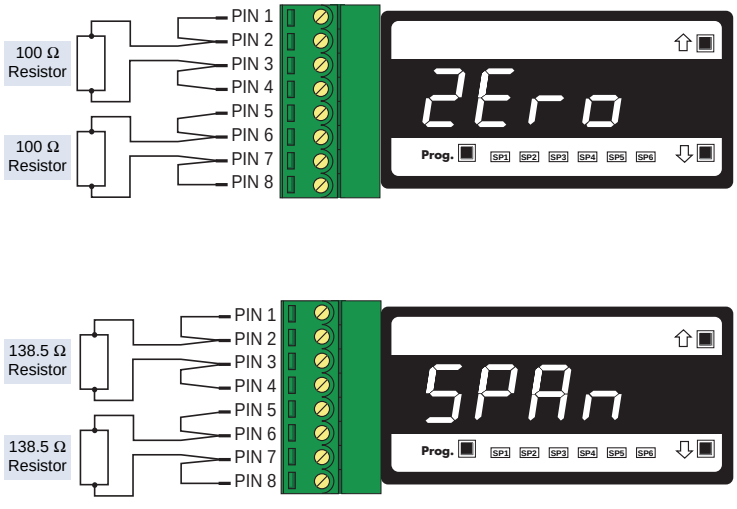
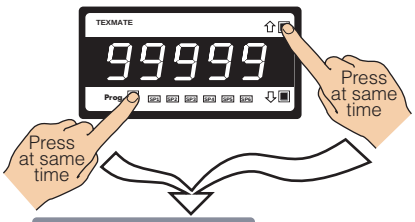


Figure 7 – IST5 2-point Calibration Diagram

START HERE

Operational Display

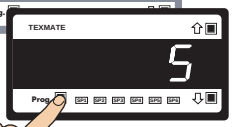


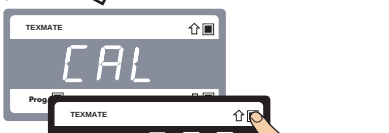
Step 1

Enter the brightness mode

Step 2

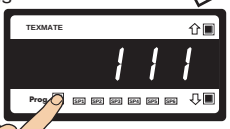
Pass brightness mode and the enter calibration mode





Step 3

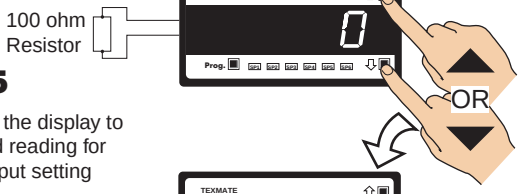
Set calibration mode to [111]:
1st Digit = **1**
Selects calibration procedures
2nd Digit = **1**
Selects 2-point calibration
3rd Digit = **1**
Selects CH1 for calibration



[111] for CH1
[112] for CH2
[113] for CH3
[114] for CH4

Step 4

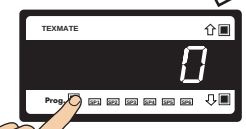
Enter calibration mode [111] for 2-point calibration of CH1



Step 5

5.1. Adjust the display to the desired reading for the zero input setting

5.2. Connect the 100 ohm resistor to simulate the LOW (zero) input signal

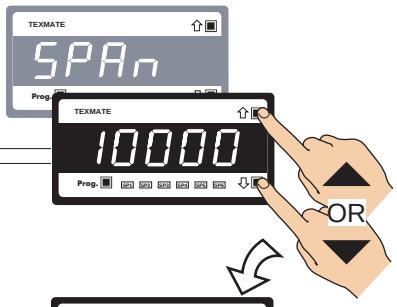


Example

Step 6

Set the reading for zero load into the meter and enter the span mode

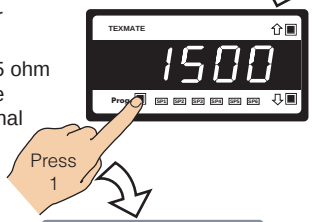
From Step 6



Step 7

7.1. Adjust the display to the desired reading for the span input setting

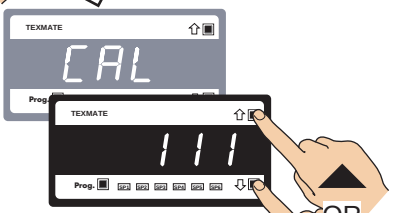
7.2. Connect the 138.5 ohm resistor to simulate the HIGH (span) input signal



Example

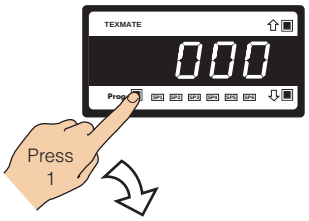
Step 8

Save the zero and the span settings and re-enter the calibration mode



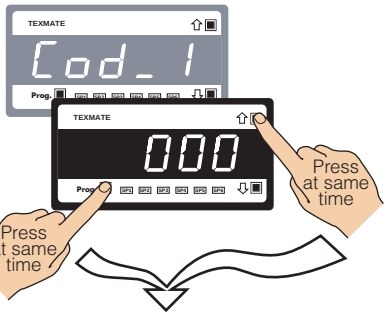
Step 9

Select the **no function** calibration mode [000]



Step 10

Save calibration mode [000] setting and enter Code 1



Step 11

Exit code 1 and return to operational display

Operational Display

The meter is now fully calibrated across the range: 0 to 100 °C

To Step 7

Customer Configuration Settings:

		1st Digit	2nd Digit	3rd Digit
	SMt 1			
CH1	Cod_2			
CH2	Cod_4	0		0
CH3	Cod_5		7	
CH4	Cod_6		7	

WARRANTY

Texmate warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. Texmate's obligations under this warranty are limited to replacement or repair, at its option, at its factory, of any of the products which shall, within the applicable period after shipment, be returned to Texmate's facility, transportation charges pre-paid, and which are, after examination, disclosed to the satisfaction of Texmate to be thus defective. The warranty shall not apply to any equipment which shall have been repaired or altered, except by Texmate, or which shall have been subjected to misuse, negligence, or accident. In no case shall Texmate's liability exceed the original purchase price. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by Texmate.

USER'S RESPONSIBILITY

We are pleased to offer suggestions on the use of our various products either by way of printed matter or through direct contact with our sales/application engineering staff. However, since we have no control over the use of our products once they are shipped, NO WARRANTY WHETHER OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHERWISE is made beyond the repair, replacement, or refund of purchase price at the sole discretion of Texmate. Users shall determine the suitability of the product for the intended application before using, and the users assume all risk and liability whatsoever in connection therewith, regardless of any of our suggestions or statements as to application or construction. In no event shall Texmate's liability, in law or otherwise, be in excess of the purchase price of the product.

Texmate cannot assume responsibility for any circuitry described. No circuit patent or software licenses are implied. Texmate reserves the right to change circuitry, operating software, specifications, and prices without notice at any time.

TEXMATE INC
995 Park Center Drive • Vista, CA 92081-8397
Tel: 1-760-598-9899 • USA 1-800-839-6283 • That's 1-800-TEXMATE
Fax: 1-760-598-9828 • Email: sales@texmate.com • Web: www.texmate.com

Texmate has facilities in Japan, New Zealand, Taiwan, and Thailand. We also have authorized distributors throughout the USA and in 28 other countries.

For product details visit www.texmate.com

Local Distributor Address