



## FACTORY SERVICE

Should service become necessary, the QuikCal 70 should be returned to the Factory for repair or replacement. Do not return any item to Transmation without first contacting us and obtaining an authorization number. This number should appear clearly on the outside of all packages sent to Transmation and on all associated paperwork.

## WARRANTY

Transmation products are warranted to be free from defects in material and workmanship (excluding fuses, batteries and leads) for a period of one year from the date of shipment. Warranty repairs can be obtained by returning the equipment prepaid to our factory. Products will be replaced, repaired, or adjusted at our option. *Transmation gives no other warranties, including any implied warranty of fitness for a particular purpose.* Also, Transmation shall not be liable for any special, indirect, incidental or consequential damages or losses arising from the sale or use of its products.

### Transmation

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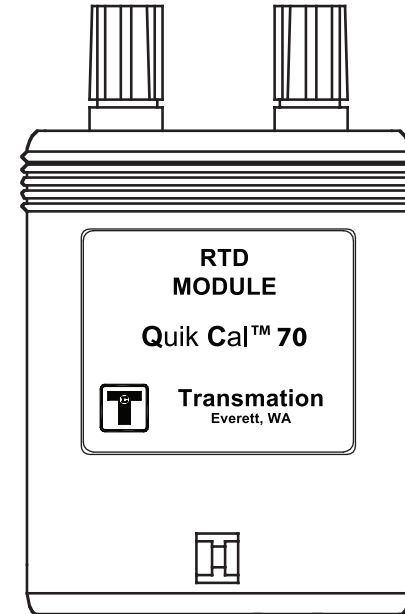
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# Transmation

## QUIKCAL™ 70 RTD MODULE USER'S GUIDE



### NOTE!

*Do not discard this user's guide. The information provided in this document is essential to safe equipment operation and maintenance. To prevent possible personal injury or equipment damage through misuse, the procedures outlined in this document should be performed by qualified service personnel.*



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## INTRODUCTION

The QuikCal™ 70 RTD Module is an input/output module designed to plug into a QuikCal™ 190 Base Unit. The QuikCal 70 is designed to measure and simulate RTD signals.

### NOTE!

*The QuikCal 190 Base Unit must be running software version 4.0 or higher to communicate with the QuikCal 70.*

## SPECIFICATIONS

Unless otherwise indicated, all specifications are for three- and four-wire connections with 1 mA fixed excitation current @ 23°C (74°F) ambient temperature.

### GENERAL

**General Accuracy:**  $\pm(0.01\%$  of Ohm reading + 0.075 Ohms)

**Two-Wire Mode Accuracy:**  $\pm(0.01\%$  of Ohm reading + 0.25 Ohms + lead resistance)

**Temperature Effect:** Included in **Accuracy** specification for ambient temperature range of 13°C to 33°C (55°F to 91°F); outside this range:  $\pm 0.01\%$  of Ohm reading per °C

**Operating Temperature Range:** -10°C to 50°C (14°F to 122°F)

**Storage Temperature Range:** -40°C to 85°C (-40°F to 185°F)

**Warm Up Time:** 30 seconds to maximum accuracy



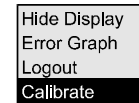
25. "Lock" user calibration as described in "Logging Out" in the QuikCal 190 User's Guide.

## RESTORING FACTORY CALIBRATION CORRECTION FACTORS

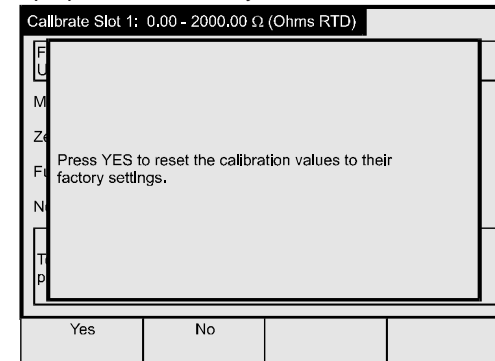
If any problems are encountered during a user calibration, the calibration data can be reset to the Factory calibration correction factors. Bear in mind this is **not** equivalent to a new calibration.

To restore the Factory calibration settings, do the following:

1. As required, "unlock" user calibration as described in "Logging In" in the QuikCal 190 User's Guide.
2. Insert the QuikCal 70 into Slot 1 (or Slot 2) of the Base Unit.
3. Select the appropriate data window.
4. Press the **Commands** key to call up the Commands list.
5. Select "Calibrate", then press **Enter**.



6. Press the **Factory Settings** key.
7. At the prompt, press the **Yes** key.



8. Press the **Done** key.  
The calibration settings are reset to the Factory calibration correction factors.
9. "Lock" user calibration as described in "Logging Out" in the QuikCal 190 User's Guide.



- Hide Display
- Error Graph
- Logout
- Calibrate

12. Press **Enter** to call up the Setpoint Zero data entry window.
13. For output low range calibration, enter the Setpoint Zero value that the low range is to be calibrated to (between 0.00 and 100.00 Ohms), then press **Enter**.  
  
For output high range calibration, enter the Setpoint Zero value that the high range is to be calibrated to (between 506.00 and 800.00 Ohms), then press **Enter**.
14. Press the **Continue** key to highlight the Zero field, then press **Enter** to call up the data entry window.
15. Enter the resistance reading of the precision meter in the New Value field, then press **Enter**.
16. Press the **Continue** key to highlight the Full Scale field, then press **Enter** to call up the Setpoint Full Scale data entry window.
17. For output low range calibration, enter the Setpoint Full Scale value that the low range is to be calibrated to (between 100.00 and 505.00 Ohms), then press **Enter**.  
  
For output high range calibration, enter the Setpoint Full Scale value that the high range is to be calibrated to (between 1000.00 and 2000.00 Ohms), then press **Enter**.
18. Press the **Continue** key to highlight the Full Scale field, then press **Enter** to call up the data entry window.
19. Enter the resistance reading of the precision meter in the New Value field, then press **Enter**.
20. Press the **Continue** key to highlight the Next Cal. Due field, then press **Enter** to call up the Next Cal. Due data entry window.
21. Enter the calibration interval in months in the New Value field, then press **Enter**.
22. Press the **Continue** key.
23. Press the **Done** key.
24. When the verification screen is displayed, press **Ok** to accept the calibration values or press **Factory Settings** to reset to the default factory calibration settings.

All data collection and computation is performed automatically. When the display returns to normal, the QuikCal 70 is ready for use.



**Power:** 5 VDC  $\pm$  4% @ 100 mA DC nominal

**Isolation:** 250V RMS from I/O terminals to Base Unit power supply

**Input/Output Protection:** 40V RMS for 30 seconds from Terminals 1-2 and 3-4

**Input/Output Terminals:** Four standard 5-way binding posts

**Housing:** Black ABS/Polycarbonate (UL 94 V-O)

**Case Size (HWD):** 92 mm x 64 mm x 51 mm (3.6" x 2.5" x 2")

**Weight:** ~0.154kg (5.5 oz.)

### SOURCE MODE (SIMULATION OF RESISTANCE)

**Output Resistance Ranges:** 0.00 to 2000.00 Ohms

**Accuracy From 1.0 to 10.0 mA of External Excitation Current:**  
 $\pm(0.01\%$  of reading + 0.075 Ohms)

**Accuracy Below 1 mA of External Excitation Current:**  
 $\pm(0.01\%$  of reading + (0.025mV / mA Excitation Current) + 0.05 Ohms)

**Maximum Allowable External Excitation Current Level:**  
4V/resistance setpoint, 10 mA absolute maximum

**Minimum Allowable External Excitation Current Level:** 0.1 mA

#### Intermittent Excitation Currents:

Open loop resistance simulation accepts intermittent excitation currents  
Output resistance settling time is less than 4 milliseconds with no capacitive load

### READ MODE (MEASUREMENT OF RTD SENSORS)

**Input Resistance Ranges:** 0.00 to 2000.00 Ohms

**Accuracy:**  $\pm(0.01\%$  of reading + 0.075 Ohms)

**Excitation Current Supplied:** 0.3 mA nominal

**Normal Mode Rejection:** 50/60 Hz, 80 dB minimum

**Common Mode Rejection:** 50/60 Hz, 60 dB minimum

**Temperature Accuracies Converted from Resistance:**



RTD Type	Alpha	Range	Accuracy	Range	Accuracy
Pt 50 / 100 / 200 / 500 / 1000* DIN 43760 / IEC 751 Based on ITS-90	1.3850	-200.0 to 200.0°C 200.0 to 600.0°C 600.0 to 850.0°C	±0.2°C ±0.3°C ±0.4°C	-328.0 to 392.0°F 392.0 to 1112.0°F 1112.0 to 1562.0°F	±0.4°F ±0.6°F ±0.7°F
Pt 100 / 200 / 500 / 1000* (Burns)	1.3902	-195.6 to 200.0°C 200.0 to 648.9°C	±0.2°C ±0.3°C	-320.0 to 392.0°F 392.0 to 1200.0°F	±0.4°F ±0.6°F
Pt 50 / 100 / 200 / 500 / 1000* (JIS C 1604)	1.3916	-200.0 to 200.0°C 200.0 to 648.9°C	±0.2°C ±0.3°C	-328.0 to 392.0°F 392.0 to 1200.0°F	±0.4°F ±0.6°F
Cu 10 (Minco)	1.4274	-200 to 260°C	±2°C	-328 to 500°F	±4°F
Cu 50 (China)	1.4280	-50 to 150°C	±1°C	-58 to 302°F	±2°F
Ni 120 (Minco)	1.6720	-80.0 to 315.6°C	±0.2°C	-112.0 to 600.0°F	±0.4°F
Ni 110 (Bristol 7 NA)	1.5801	-105 to 310°C	±0.2°C	-157.0 to 590.0°F	±0.4°F
Ohms	0.00 to 2000.00 Ω ± (0.01% of Reading + 0.075 Ω)				

\*1000 Ohm Curve range: -200°C to 260°C (-328°F to 500°F)

## OPERATION

### NOTE!

The screen illustrations are representative of the screens a user will see during normal QuikCal operation. As new features and enhancements are incorporated, the actual screens may be visually different from the illustrations; however, they will continue to function as described.

## INSERTING/REMOVING A MODULE

The QuikCal 70 can be installed into either of the two slots in a QuikCal 190 Base Unit. A module may be installed or removed while power is applied to the Base Unit. The Base Unit will indicate a successful connection as soon as communication has been established.

To insert a QuikCal 70 module into a Base Unit, do the following:

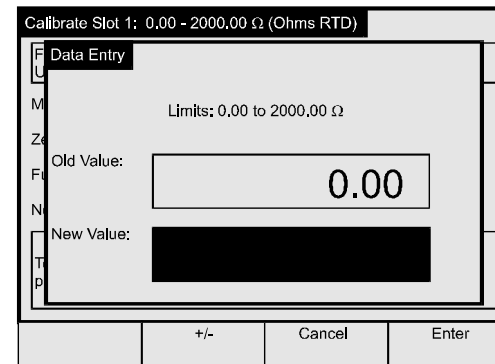
1. Orient the module so the data label is facing forward (towards the keypad).



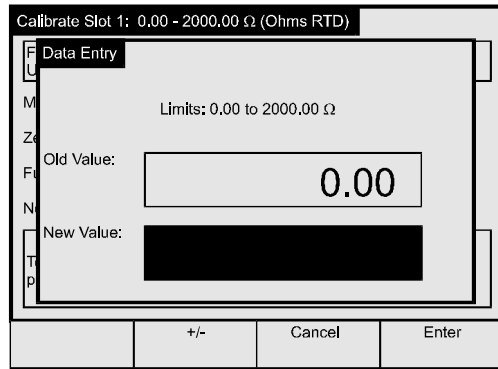
1. Insert the QuikCal 70 into Slot 1 (or Slot 2) of the Base Unit.
2. Select the appropriate data window.
3. Press **Setup** to set Service: to *Source* as instructed in “Using the Setup Feature” on page 5.
4. Select Ω from the Type: selection list, then press **Enter**.

Pt DIN 43760  
Pt JIS C 1604  
PT BURNS 3902  
Ni BRISTOL 7NA  
Ni MINCO  
Cu MINCO  
Cu CHINA 428  
Ω

5. Press the **Save Changes** key to exit the Setup screen.
6. Press **Enter** to call up the Setpoint data entry window.



7. For output low range calibration, enter 0.00, then press **Enter**.  
For output high range calibration, enter 1000.00, then press **Enter**.
8. As required, “unlock” user calibration as described in “Logging In” in the QuikCal 190 User’s Guide.
9. Connect a resistance meter using a four-wire RTD configuration as illustrated in the diagram on page 11.
10. Press the **Commands** key to call up the Commands list.
11. Select “Calibrate”, then press **Enter**.



12. Enter the Zero value corresponding to the setting of the resistance source in the New Value field, then press **Enter**.
13. Press the **Continue** key to highlight the Full Scale field.
14. Set the resistance source to 2000Ω (or any value greater than 200Ω).
15. Press **Enter** to call up the Full Scale data entry window.
16. Enter the Full Scale value corresponding to the setting of the resistance source in the New Value field, then press **Enter**.
17. Press the **Continue** key to highlight the Next Cal. Due field, then press **Enter** to call up the Next Cal. Due data entry window.
18. Enter the calibration interval in months in the New Value field, then press **Enter**.
19. Press the **Continue** key.
20. Press the **Done** key.
21. When the verification screen is displayed, press **Ok** to accept the calibration values or press **Factory Settings** to reset to the default factory calibration settings.  
  
All data collection and computation is performed automatically. When the display returns to normal, the QuikCal 70 is ready for use.
22. "Lock" user calibration as described in "Logging Out" in the QuikCal 190 User's Guide.

## OUTPUT CALIBRATION

To perform an output low range or output high range calibration, do the following:



2. Insert the module into one of the slots and firmly press down until the module seats.

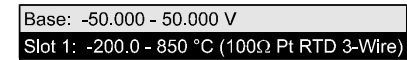
To remove a QuikCal 70 module from a Base Unit, do the following:

1. Push inward on the locking tab on the rear of the module while pulling upward on the module.

## USING THE SETUP FEATURE

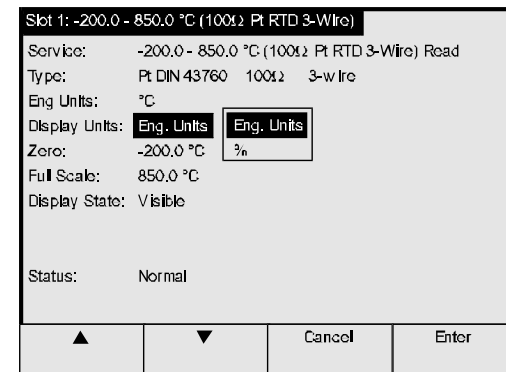
The Setup key allows the configuration of the QuikCal 70 or the Base Unit. To review and/or modify a setup parameter, do the following:

1. Press **Setup** to call up the Setup list.
2. Select the desired item, then press **Enter**.



The Setup screen will be displayed. Each Setup screen displays parameters and information pertinent to the combination of module and slot in use.

3. Use the **▲** and **▼** keys to select a parameter, then press **Enter** to call up the selection list or data entry window associated with the selected item.
4. Select an item from the selection list or enter a value, then press **Enter**.



5. When finished, press the **Save Changes** key to save the changes and exit the Setup screen.

## PERFORMING A QUICK TEST

The Quick Test feature allows a pre-configured test to be performed and recorded with just a few keystrokes.



The following test parameters can be configured:

- 1 Source/Read The configured ranges and service (Source or Read) for the QuikCal 70 and the Base Unit. These values must be configured via the Setup feature as described in "Using the Setup Feature".
- 2 Test Direction The direction of the test (Ascending, Descending, or Both).
- 3 Recording Delay The delay (in seconds) before data recording begins.
- 4 Fail Limit - % Full Scale The fail limit as a percentage of full scale.
- 5 Fail Limit - % Reading The fail limit as a percentage of reading.
- 6 Steps/Scan The number of steps during the test.
- 7 Repeat Count The number of times the test is performed.
- 8 Alert Limit - % Full Scale The alert limit as a percentage of full scale.
- 9 Alert Limit - % Reading The alert limit as a percentage of reading.

Test - Quick Test			
1	Source:	Slot 1: 0.00 - 2000.00 Ω (Ohms RTD)	
	Read:	Base: 4.000 - 20.000 mA	
2	Test Direction:	Desc.	Steps / Scan: 6
3	Recording Delay:	5	Repeat Count: 1
4	Fail Limit - % FS:	0.50	Alert Limit - % FS: 0.40
5	Fail Limit - % Rdng:	0.00	Alert Limit - % Rdng: 0.00
	Start Test		Done

To perform a Quick Test, do the following:

1. Insert the QuikCal 70 into Slot 1 (or Slot 2) of a Base Unit.
2. Select the appropriate data window.
3. As required, press **Setup** to configure the Source and Read parameters as described in "Using the Setup Feature" on page 5.
4. Perform the applicable connections from the QuikCal 70 to the device under test.
5. Press the **Commands** key to call up the Commands list.
6. Select "Quick Test", then press **Enter**.



5. Select the number of wires that corresponds to the sensor being calibrated (3-Wire or 4-Wire), then press **Enter**.

3-wire	2-wire
	3-wire
	4-wire

6. Press the **Save Changes** key to exit the Setup screen.
7. As required, "unlock" user calibration as described in "Logging In" in the QuikCal 190 User's Guide.
8. Press the **Commands** key to call up the Commands list.
9. Select "Calibrate", then press **Enter**.

Hide Display
Error Graph
Logout
Calibrate

The Calibration screen will be displayed.

Calibrate Slot 1: 0.000 - 2000.00 Ω (Ohms RTD)	
Factory Cal. Date: 19 Nov 1999	Due: Nov 2000
User Cal. Date:	Due:
Meas. Value:	0.00 Ω
Zero:	0.00 Ω
Full Scale:	2000.00 Ω
Next Cal. Due:	12 months
To set the sensor to be calibrated to the Zero value, press CONTINUE.	
Factory Settings	Continue
	Done

10. Connect the resistance source using the appropriate wire configuration (as specified in Step 5) and set the resistance source to 0Ω (or any value less than 100Ω).
11. Press **Enter** to call up the Zero data entry window.



## CALIBRATION EQUIPMENT

The electrical I/O calibration requires a precision resistance source and meter capable of generating/reading resistance values of 0-2000Ω. The accuracy of the reference instrument at the listed values and at the ambient temperature should be better than ±50 ppm (0.005% of resistance reading).

## USER CALIBRATION PROCEDURE

A complete user calibration for the QuikCal 70 requires four calibrations:

- Input three-wire calibration
- Input four-wire calibration
- Output low range calibration (0-505Ω)
- Output high range calibration (506-2000Ω)

A partial user calibration may be accomplished by performing only a portion of the above calibrations. For example, if the QuikCal 70 is being used for 0 to 500Ω out only, the user may choose to calibrate just the low range output. The date of user calibration is automatically updated when **any** of the calibrations is performed.

### NOTE!

To perform any of the user calibrations, the Type: must be set to Ω. If an RTD curve is selected, the user calibration will be ignored.

## INPUT CALIBRATION

To perform an input three-wire or input four-wire calibration, do the following:

1. Insert the QuikCal 70 into Slot 1 (or Slot 2) of the Base Unit.
2. Select the appropriate data window.
3. Press **Setup** to set Service: to *Read* as instructed in "Using the Setup Feature" on page 5.
4. Select Ω from the Type: selection list, then press **Enter**.

- Pt DIN 43760
- Pt JIS C 1604
- PT BURNS 3902
- Ni BRISTOL 7NA
- Ni MINCO
- Cu MINCO
- Cu CHINA 428
- Ω



- Quick Test
- Switch Test
- Hide Display
- Error Graph
- Login

7. Verify that the test parameters are correct. If not, do the following:
  - a. Press **Setup**.
  - b. Use the ▲ and ▼ keys to select a parameter, then press **Enter** to call up the selection list or data entry window associated with the selected item.
  - c. Select an item from the selection list or enter a value, then press **Enter**.
8. Press the **Start Test** key to start the Quick Test.

Test - Quick Test				
Source:	Slot 1:	0.00 - 2000.00 Ω (Ohms RTD)		
Read:	Base:	-50.000 - 50.000 V		
Test Direction:	Desc.	Steps / Scan:	6	
Recording Delay:	5	Repeat Count:	1	
Fail Limit - % FS:	0.50	Alert Limit - % FS:	0.40	
Fail Limit - % Rdng:	0.00	Alert Limit - % Rdng:	0.00	
Start Test				Done

9. When the test sequence is complete, press the **Show Results** key to view the test results.

Test - Quick Test				
Source (°C)	Read (mA)	Expected (mA)	Error (mA)	Tolerance (mA)
200.00	0.000	20.000	-20.000	0.080 F
1600.00	0.000	16.800	-16.800	0.080 F
1200.00	0.000	13.600	-13.600	0.080 F
800.00	0.000	10.400	-10.400	0.080 F
400.00	0.000	7.200	-7.200	0.080 F
0.00	0.000	4.000	-4.000	0.080 F
				Done

10. When the test results have been noted, press the **Done** key.



Test - Quick Test			
Source:	Slot 1:	0.00 - 2000.00 $\Omega$ (Ohms RTD)	
Read:	Base:	4.000 - 20,000 mA	
Test Direction:	Desc.	Steps / Scan:	6
Source:	0.00		0.00
Read:	0.000		
Start Test	Show Results		Done

11. Press the **Done** key to exit the Quick Test screen.

## INPUT/OUTPUT TERMINALS

The input/output terminals on the QuikCal 70 consist of four standard 5-way binding posts.

## ERROR CONDITIONS

The display will flash if a value falls outside the measurement range of the QuikCal 70 or the Base Unit. Five exclamation points ("!!!!") will be displayed if a measured value is significantly beyond the measurement range of the module or Base Unit. An asterisk next to the displayed value indicates that an error condition has been detected. The Status field in the data window will indicate the cause of the error.

## READ MODE ERRORS

Not Calibrated: Factory calibration data error; unit requires Factory service.  
 A/D Overrange: Input resistance is too high to be read correctly.  
 A/D Underrange: Input resistance is too low to be read correctly.  
 Open Input: Absence of bulb current has been detected; check for proper connections.

## SOURCE MODE ERRORS

Setpoint Overrange: The setpoint is over the calibrated range.  
 Setpoint Underrange: The setpoint is under the calibrated range.  
 RTD Leads Reversed: Bulb current is flowing in the wrong direction. Swap leads 1 and 2 and leads 3 and 4 (refer to the diagrams in "Using the QuikCal 70" for proper connection configurations).



- b. Connect the negative IN lead from the RTD transmitter to terminal #2 on the QuikCal 70.
  - c. Connect the negative Sense lead from the RTD transmitter to terminal #3 on the QuikCal 70.
  - d. Connect the positive Sense lead from the RTD transmitter to terminal #4 on the QuikCal 70.
8. Enter the output to be simulated via the numeric keypad, then press **Enter**. Press the **0%**, **▲**, **▼**, or **100%** keys to generate other outputs.

## MAINTENANCE

Since the QuikCal 70 was designed as a low maintenance unit, field service procedures are limited to cleaning the case exterior. Use a damp, soft cloth with mild non-abrasive detergent; solvents or abrasives should not be used since they can damage the case finish.

## CALIBRATION

Due to the QuikCal 70's sophisticated electronics and software, calibration beyond the zero and span adjustment procedures described in "User Calibration" below requires equipment and procedures available only at Transmation. We recommend that the QuikCal 70 be returned to Transmation or calibration annually to ensure optimum operation. Our service department can also inform the customer of any recent product upgrades, retrofits, modifications, or enhancements.

## USER CALIBRATION

The QuikCal 70 actually stores two sets of correction factors. The first set of factors is determined during factory calibration. Factory calibration numbers can only be accessed by factory authorized service personnel.

The second set of correction factors used by the QuikCal 70 can be calibrated by users that have suitable calibration standards. This allows the user's qualified service personnel to calibrate the QuikCal 70 using suitably accurate equipment without returning the unit to the Factory. This set of factors does not replace the factory calibration, but is used in conjunction with the factory values.





1. Insert the QuikCal 70 into Slot 1 (or Slot 2) of a Base Unit.
2. Select the appropriate data window.
3. Press **Setup** to set Service: to *Source* as instructed in "Using the Setup Feature" on page 5.
4. Select the Type: of RTD curve that corresponds to the sensor being measured, then press **Enter**.

Pt DIN 43760
Pt JIS C 1604
PT BURNS 3902
Ni BRISTOL 7NA
Ni MINCO
Cu MINCO
Cu CHINA 428
Ω

5. Select the base resistance of the RTD curve, then press **Enter**.

100 Ω	50 Ω
100 Ω	
200 Ω	
500 Ω	
1000 Ω	

6. Configure other Setup parameters (as required), then press the **Save Changes** key to exit the Setup screen.
7. For a two-wire RTD, do the following:

- a. Connect the positive IN lead from the RTD transmitter to terminal #1 on the QuikCal 70.
- b. Connect the negative IN lead from the RTD transmitter to terminal #2 on the QuikCal 70.

For a three-wire RTD, do the following:

- a. Connect the positive IN lead from the RTD transmitter to terminal #1 on the QuikCal 70.
- b. Connect the negative IN lead from the RTD transmitter to terminal #2 on the QuikCal 70.
- c. If using a negative Sense lead, connect the lead to terminal #3 on the QuikCal 70. If using a positive Sense lead, connect the lead to terminal #4 on the QuikCal 70.

For a four-wire RTD, do the following:

- a. Connect the positive IN lead from the RTD transmitter to terminal #1 on the QuikCal 70.

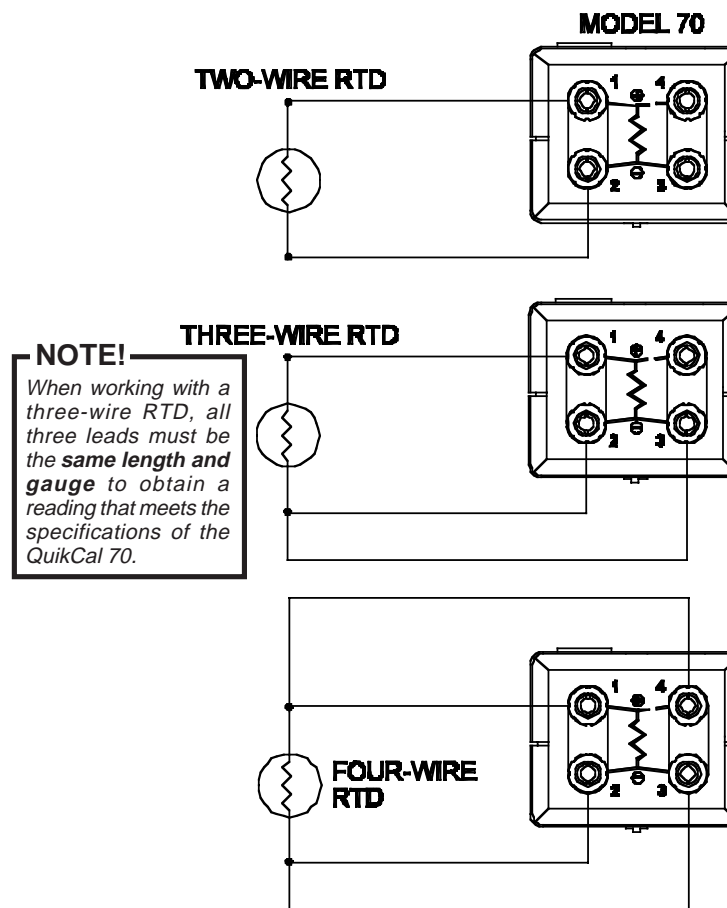


## USING THE QUIKCAL 70

### WARNING!

The QuikCal 70 is protected from misconnections up to 40V between leads 1 and 2 and between leads 3 and 4 **ONLY**. Do not apply a voltage between leads 1 and 4 or between leads 2 and 3. Such connections could cause a high current to flow and could result in damage to the module.

## MEASURING RTD TEMPERATURE OR RESISTANCE





1. Insert the QuikCal 70 into Slot 1 (or Slot 2) of a Base Unit.
2. Select the appropriate data window.
3. Press **Setup** to set Service: to *Read* as instructed in “Using the Setup Feature” on page 5.
4. Select the Type: of RTD curve that corresponds to the sensor being measured, then press **Enter**.

Pt DIN 43760
Pt JIS C 1604
PT BURNS 3902
Ni BRISTOL 7NA
Ni MINCO
Cu MINCO
Cu CHINA 428
Ω

5. Select the base resistance of the RTD curve, then press **Enter**.

100 Ω	50 Ω
100 Ω	
200 Ω	
500 Ω	
1000 Ω	

6. Select the number of wires that corresponds to the sensor being measured, then press **Enter**.

3-wire	2-wire
3-wire	
4-wire	

7. Configure other Setup parameters (as required), then press the **Save Changes** key to exit the Setup screen.
8. For a two-wire RTD, do the following:
  - a. Connect one leg of the RTD to terminal #1 on the QuikCal 70.
  - b. Connect the other leg of the RTD to terminal #2 on the QuikCal 70.
 For a three-wire RTD, do the following:
  - a. Connect one leg of the RTD to terminal #1 on the QuikCal 70.
  - b. Connect one of the paired RTD legs to terminal #2 on the QuikCal 70.
  - c. Connect the other paired RTD leg to terminal #3 on the QuikCal 70.
 For a four-wire RTD, do the following:
  - a. Connect one leg of paired RTD A to terminal #1 on the QuikCal 70.
  - a. Connect the other leg of paired RTD A to terminal #4 on the QuikCal 70.
  - b. Connect one leg of paired RTD B to terminal #2 on the QuikCal 70.

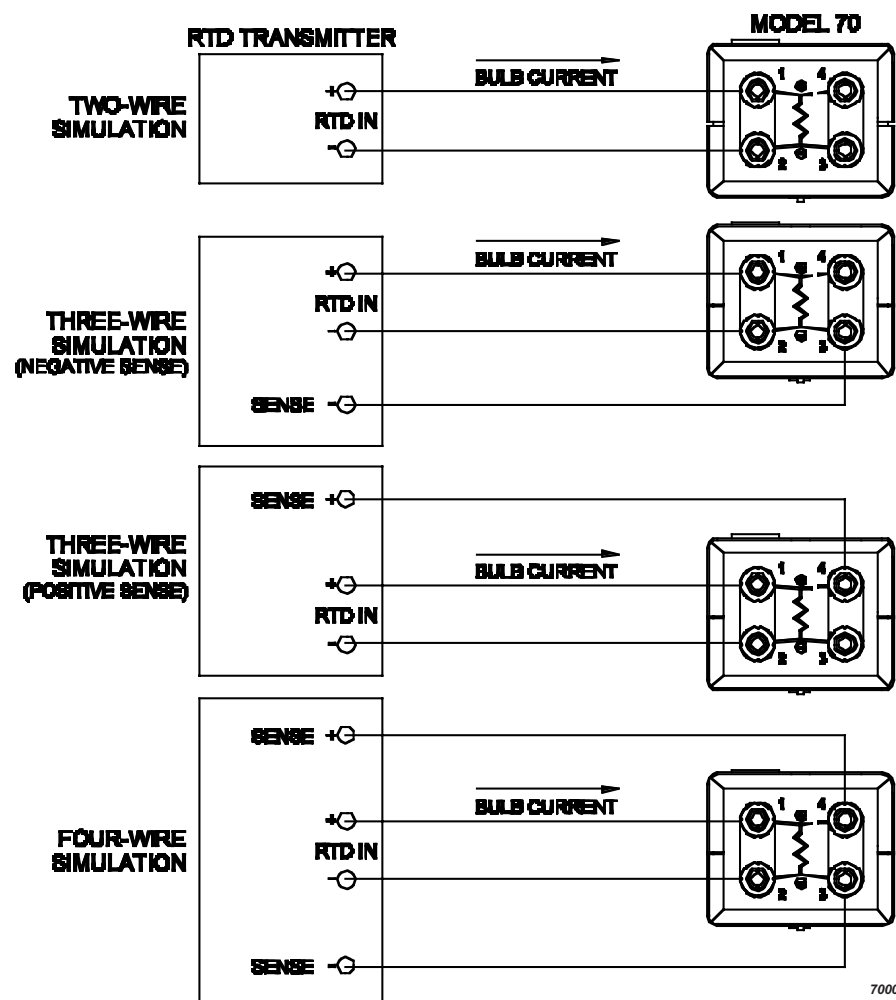


- c. Connect the other leg of paired RTD B to terminal #3 on the QuikCal 70.
9. The measured value will be displayed.

## SIMULATING AN RTD OR RESISTANCE

### NOTE!

When working with a three-wire RTD, all three leads must be the **same length and gauge** to obtain a simulation that meets the specifications of the QuikCal 70.



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