TempCal

Field Calibration Software for DTS3250 Series Modules

V1.00



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INTRODUCTION

This software is designed to re-calibrate the voltage A/D's of all DTS3250 series Thermocouple Scanners with software version 3.05 or 4.0 and newer. The software is designed to perform calibrations in either an automatic or manual mode. In the automatic mode the software will communicate with any Fluke Voltage Standard listed in the equipment requirements. In the manual mode, the user may use other secondary voltage standards. The software will prompt the user to input voltages at each point. Scanivalve recommends performing a voltage calibration (using TempCal) every six (6) months and that each of the module's RTD's be recalibrated every five (5) years. Please consult the factory for full RTD calibration procedures.



REQUIREMENTS

Hardware

Computer Pentium IV Processor or better 2 Mb RAM GPIB connection

Voltage Standard

Automatic Calibration

Fluke 5440B

Fluke 5700A

Manual Calibration

DC Voltage Standard Range:

Range: -10 mV to +131 mV.Accuracy: $\pm 1.5 \mu \text{V}$ or better

Accessories

16 Channel DTS:

Scanivalve 21079-1 DTS Field Calibration Kit consisting of:

155870-1 DTS Calibration Board Set (1)

155868-1 DTS RTD Extension Cable (2)

155869-1 RTD Excitation Measurement Cable (1)

21089-1 Calibration Insulation (2)

32 Channel DTS:

Scanivalve 21079-2 DTS Field Calibration Kit consisting of:

155870-1 DTS Calibration Board Set (2)

155868-1 DTS RTD Extension Cable (4)

155869-1 RTD Measurement Cable (1)

21089-1 Calibration Insulation (4)

64 Channel DTS:

Scanivalve 21079-3 DTS Field Calibration Kit consisting of:

155870-1 DTS Calibration Board Set (4) 155868-1 DTS RTD Extension Cable (8)

155869-1 RTD Measurement Cable (1)

21089-1 Calibration Insulation (8)

Software

Windows XP Professional SP2 or higher or Windows 7. Framework.net V2.0 or higher** Microsoft Excel 2003 or Open Office version 3

**Framework.net is available as a free download from Microsoft.

SOFTWARE INSTALLATION

The TempCal Installation disk contains the following programs and files: DTSCalsetup.msi Setup.exe

To install the software,

1. Place the Install CD in a CD or DVD drive

2.		Click S	tart, the	n Run
		Microsoft Upo	date	
	0	Set Program	Access and De	faults
		Windows Cat	alog	
	-	Windows Upo	late	
		WinZip		
		Programs		٠
	3	Documents		
nal	1	Settings		
essic	P	Search		
Prof	0	Help and Sup	port	
ЧX	77	Run	N	-
dows	P	Log Off Ryan	Pemberton	
Win	0	Turn Off Con	nputer	
	Start		0:5	0
3.		Select	Browse	
Run				<u>? x</u>
-	7 Type Intern	the name of a pro net resource, and '	gram, folder, docu Windows will open	iment, or it for you.
Open	:			•
		OK	Cancel	Browse

- 4. Open the drive where the CD is installed, highlight **Setup.exe** and Click **Open**
- 5. Click **OK** in the Run Window to start the installation process.
- 6. Follow the on screen prompts to complete the installation process.

If TempCal has been downloaded from the Scanivalve website, unzip the file and double-click on the **Setup.exe** file. Follow the on screen prompts to complete the installation process.



GETTING STARTED

Start Up Page

		and the second se
Start Sally Selly AD Test AD Test AD Test Clear Ufriets AD Test AD Tat 3 Board T 2 3 A Received RTD 7.2.3 7.2.3 4.5 A Received RTD 7.2.3 7.2.3 4.5 A St Received T/C 7.2.3 7.2.3 4.5 Validation T/C 7.2.3 7.2.3 4.5 Validation T/C 7.2.3 7.2.3 4.5 A Received Report Validation Report A Received Report Validation Report As Received Report Validation Report A Received Report Validation Report A Received Report Validation Report A Received Report Validation Fad Fad Repet A Received Report Validation Report Received Report Report Received	Temperature Cal Set Up Information: Insure that the device has been powered up for at least 3 hours prior to calibration. Consult the manual for connection of the calibration kit.	

Figure 1 - Main Window



Main Menus

File

Exit

Clicking this option will close the TempCal program.



Figure 2 - File Menu



Setup

The options listed under setup are used to define the test. The options are listed in the order in which they must be defined.



Figure 3 - Setup Menu

Device

This option is used to define the DTS3250 under test.

сор ремсе	
Module	
IP Address: 0.0.0.0	
Serial Number: 000	
Connection	
Screw Terminals O Panel Jack	
Filter	
Standard C 10 Hz	
© Standard © 10 Hz	
Close	

P

Address

Input the IP Address of the DTS being calibrated.

Serial Number

L

Input the serial number of the DTS being calibrated. **Connection Type**



Select the type of thermocouple connection.

Filter

Select the filter type.

Volt

This option is used to define the voltage standard to be used for the test.

SetUp¥olt			×
Voltage Reference Settings —			
Voltage Reference Type:	Fluke5440B Fluke5700A Manual		
Volt Dwell Time:	15	Seconds	
Table Display Dwell Time:	5	Seconds	
🗖 External Guard On			
Communication Settings		Temperature Control	
Com Port: COM4		🔲 Use Cryogenic Temps	
GPIB Address: 7			
Report Control	Error		
	Close		

Figure 5 - Volt Setup Window

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oltage Reference Type

Select the voltage standard to be used. If the standard is not one of the listed voltage standards, the test must be run in the manual mode.

Volt Dwell Time

Set the dwell time between when the voltage is applied and the voltage is read. This will be grayed out when **Manual** reference type is selected.

Table Display Dwell Time

Set the dwell time controlling how long the tables will be displayed between each voltage measurement. This will be grayed out when **Manual** reference type is selected.

External Guard On

This function is not used. This will be grayed out when **Manual** reference type is selected.

Com Port

Set the Communications Port that the voltage standard will be using. This will be grayed out when **Manual** reference type is selected.

GPIB Address

Set the GPIB Address for communications with the voltage standard. This will be



grayed out when Manual reference type is selected.

Use Cryogenic Temps

Select this option if calibrating the DTS for use in extremely cold temperature ranges. If this is selected and the DTS had not been previously calibrated for cryogenic temperatures, the first temperature point in the As Received Validation will not be correct. However, the unit will still calibrate correctly.

Sort Summary Report By Error

Selecting this option sorts the Summary Reports displaying the channels with the greatest error at the top. If this is not selected, the Summary Reports will be sorted numerically.

Directories

This option is used to define the directories where the calibration data and test reports will be stored.

etUpDirs	×
Base path for archive files and log files:	
	Browse
Base path for 16 channel certifications and list all reports:	
	Browse
Base path for 32 channel certifications and list all reports:	
	Browse
Base path for 64 channel certifications and list all reports:	
	Browse
Path for Open Office Executable:	
	Browse
Close	

Active Files

This

Figure 6 - Directories Setup Window

Base Path for

option is used to define the directory where files created in the test will be placed. The Browse button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Base Path for 16 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 16 channel units will be created. The Browse button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Base Path for 32 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 32 channel units will be created. The Browse button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Base Path for 64 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 64 channel units will be created. The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Path for Open Office Executable

This option is used if Microsoft Excel 2003 is not available and Open Office 'Calc' software is being used. In order for TempCal to reference Open Office instead of Excel 2003, the directory containing the file 'soffice.exe' must be entered here. The default installation location is: "C:\Program Files\OpenOffice.org 3\program". The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Skip Initialization

This option is used to configure the test controls to automatically remove the DTS initialization sequences from the test.

As Received Tests

This option is used to configure the test controls to generate **As Received Reports** only.

Cal and Val Tests

This option is used to configure the test controls to **Calibrate** the DTS and run a **Validation** of the test without performing an As Received test.

All Tests

The option is used to configure the test controls to perform a **complete** test.



Utilities

The options listed under utilities pertain to documenting the test.



Figure 7 - Utilities Menu

Save ListA Data to File

This option is used to save all of the current DTS configuration and calibration data to a file.

Upload ListA Data from File

This option is used to load a saved DTS configuration and calibration setup from a file.

Generate As Received Report

This option is used to generate a report on the "As Received" calibration accuracy of the module. The report will be generated in Microsoft Excel.

Generate Validation Report

This option is used to generate a report on the calibration accuracy of the module after a calibration. The report will be generated in Microsoft Excel.



Debug

The **Debug** feature allows the user to perform any error checking if problems are encountered with the operation of the test.



Figure 8 - Debug Menu

Volt

This option is used to test the communications with the Voltage Standard being used in the test.

Help



The Help feature provides information on the TempCal software.



Figure 9 - Help Menu

Abou

t

This will display specific software information including the software version number.

Test Controls

A/D Test

The A/D Test control **allows the user to perform a functional test of the module's RTD and A/D circuits** before TempCal attempts to calibrate the unit. This ensures the A/D is functioning correctly and prevents the test from being run with a non-functioning A/D. This function is optional and not required for every test.



Figure 10 - A/D Test Control

Clear Offsets

The Clear Offsets control ensures that the unit is properly configured for the test. TempCal automatically removes any offsets manually put into the unit as well as resets the gain function to one and the ARPCON function to zero. **These configurations are important in order to properly calibrate the module.** After the calibration is complete, these settings will be maintained. Any unique offsets of these values will not be valid after a calibration. If the calibration is not saved, the original settings will be restored if the 'Restore Original Settings' option is selected. See page 16 for more information on the 'Restore Original Settings' function.







A/D Init

The A/D Initialization function commands TempCal to perform and A/D Cal. This corrects for the internal temperature of the unit and ensures a successful calibration. It is important that this is done before the test and as such, **it is recommended that this option is enabled for every test**.



Figure 12 - A/D Initialization Control

Board 1 2

3 4

This portion of the test controls the actual calibration and validation of the unit. You can individually select each of the boards (1-2 with 32 channel units, 1-4 with 64 channel units) to perform the applicable validations and calibrations. This is useful when you only needed to validate or calibrate a select board.

As Received RTD

Selecting this option commands TempCal to perform a validation of the RTD(s) before altering any of the settings or existing calibration(s). In order to get a complete As Received Report at the end of the test, this must be enabled.

Calibration RTD

Selecting this option commands TempCal to perform a calibration of the RTD(s). If this is not selected, a calibration of the RTD will be completed.

Validation RTD

Selecting this option commands TempCal to perform a validation of the RTD(s) after calibration. If this is not selected, a complete validation report cannot be generated at the conclusion of the calibration.

As Received T/C

Selecting this option commands TempCal to perform a validation of the T/C's before altering any of the settings or existing calibration(s). In order to get a complete As Received Report at the end of the test, this must be enabled.

Calibration T/C

Selecting this option commands TempCal to perform a calibration of the T/C's. If this is not selected, a calibration of the T/C's will be completed.



Validation T/C

Selecting this option commands TempCal to perform a validation of the T/C's after any calibration is done. If this is not selected, a complete validation report cannot be generated at the conclusion of the calibration.



Figure 13 - Board Validation and Calibration Controls

Report As Received

This option determines whether or not a report will be generated showing the pre-calibration status of the unit. The As Received report is useful for determining the effects of the calibration. In order to get a complete As Received report, both 'As Received A/D' and 'As Received T/C' need to be selected (see above section 'Boards 1 2 3 4').



Figure 14 - Report As Received Control

Reference **Appendix B - Sample As Received Certificate of Calibration** to see an example of an As Received report.



Report Validation

This option determines whether or not TempCal will generate a report showing the post-test status of the unit. The Validation report is useful for determining the effect of the calibration and indicates whether or not the calibration is acceptable. In order for TempCal to generate a complete Validation report, Calibrate RTD, Validate RTD, Calibrate T/C and Validate T/C all need to be enabled (see above section 'Boards 1 2 3 4')



Figure 15 - Report Validation Control

R e f e r e n c e **Certificate of Calibration** to see an example of a Validation Report. Appendix C - Sample

Replace Original Settings

This option determines whether or not TempCal reconfigures the DTS back to the configuration before the calibration/validation. At the beginning of the test, TempCal configures many of the DTS parameters such as period and average. If is desired that the original settings be restored after the test is complete, enable this option. It should be noted, that after a complete calibration and validation, if the configuration parameters are not reset, the DTS may not scan properly until several parameters are manually reconfigured. It is recommended that this option is enabled.



Figure 16 - Replace Original Settings Control



Save Cal to DTS

This option determines whether or not TempCal will give the user an option to save the calibration to the DTS. If this is not selected, the calibration will not be saved. If this option is enabled, TempCal will give the user the option to save the calibration to the DTS or not.



Figure 17 - Save Calibration to DTS Control

Reset

Clicking the **Reset** button enables all of the test controls. This configures the test controls to perform a **complete** test including initialization and configuration of the DTS, As Received, Calibration and Validation, and all associated reports.



Figure 18 - Reset



INSTALLING THE CALIBRATION HARNESS

16 Channel Unit



1) Remove side covers





2) Disconnect RTD #1



3) Install calibration harness connector #1



4) Install calibration harness connector #2



5) Install calibration harness connector #3 (Where the RTD was disconnected.)



6) Close and latch the lid



7) After powering the unit up, let the DTS thermally stabilize for a minimum of 3 hours before beginning the calibration.



32 Channel Unit



1) Remove cover





2) Remove side covers



3) Disconnect RTD 1 and 3



4) Install calibration harness connector #1 (2x)





6) Install calibration harness connector #3 (Where the RTD was disconnected. 2x)



7) Place insulation over the exposed connectors







8) Install the cover. After powering the unit up, let the DTS thermally stabilize for a minimum of 3 hours before beginning the calibration.



64 Channel Unit



1) Remove cover





2) Remove side covers



3) Disconnect RTD 1, 3, 5 and 7



4) Install calibration harness connector #1 (4x)



5) Install calibration harness connector #2 (4x)







6) Install calibration harness connector #3 (Where the RTD was disconnected. 4x)





8) Install the cover. After powering the unit up, let the DTS thermally stabilize for a minimum of 3 hours before beginning the calibration.



MANUAL TEST OPERATION

This section will cover the setup and operation of a manual test.

Defining a Test

Device Setup

Click **Setup**, **Device** to open the Device Set Up Window.

Set Up Device	×
Module	
IP Address: 0.0.0.0	
Serial Number: 000	
Connection	
Screw Terminals O Panel Jack	
Filter	
Standard C 10 Hz	
Close	

Enter the module configuration.

- 1. Enter the IP Address of the module.
- 2. Enter the serial number this will be used in the reports.
- 3. Click on the thermocouple connection type.
- 4. Click the Standard Filter unless the module has the special 10 Hz filter option

Click Close when all of the information has been entered.


Volt

Click Setup, Volt to open the Voltage Reference Settings Window.

Voltage Reference Type:	Fluke5440B Fluke5700A Manual	
Volt Dwell Time:	15	Seconds
Table Display Dwell Time:	5	Seconds
🗖 External Guard On		
ommunication Settings		Temperature Control
Com Port: COM4		🔲 Use Cryogenic Temps
GPIB Address: 7		
eport Control		

Enter the Voltmeter configuration.

- 1. Select the Voltmeter type. For manual tests, select **Manual**. If one of the voltage standards listed is available then the test can be run in the automatic mode by selecting the appropriate voltage standard. See the 'Automatic Test Setup' section for more details.
- 2. If the test is calibrating a DTS unit used for extreme cold temperatures, select the 'Use Cryogenic Temps' option. Otherwise, leave it unselected.
- 3. Selecting 'Sort Summary Report By Error' will float the channels with the greatest errors to the top of the report making it easier to review the Summary Report. If this is not selected, the channels will be arranged in numerical order.

Click	Close	when all of the information has been entered.
-------	-------	---

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Directories

Click Setup, Directories to open the Directory definition window.

SetUpDirs	×
Base path for archive files and log files:	
Browse	
Base path for 16 channel certifications and list all reports:	
Browse	
Base path for 32 channel certifications and list all reports: Browse	
Base path for 64 channel certifications and list all reports:	
Browse	
Path for Open Office Executable:	
Browse	
Close	

Base Path for Active Files

This option is used to define the directory where files created in the test will be placed. The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Base Path for 16 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 16 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Base Path for 32 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 32 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Base Path for 64 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 64 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Path for Open Office Executable

This option is used if Microsoft Excel 2003 is not available and Open Office 'Calc' software is being used. In order for TempCal to reference Open Office instead of Excel 2003, the directory containing the file 'soffice.exe' must be entered here. The default installation location is: "C:\Program Files\OpenOffice.org 3\program". The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.



Test Controls

The test controls can be configured by two means. The first method is by selecting and deselecting specific portions of the test in the **Test Controls** portion of the main screen.



Alternately, the test controls can be configured by selecting on of the pre-configured test setups found in the **Setup Menu**. See the section devoted to the **Setup Menu** in the **Getting Started** section of this manual.





Running a Test

Once the test has been defined and configured, the test can be commenced.

This is done by simply clicking **Start Calibration** found at the bottom of the window.

To proceed through the test, click the **Next** button at the bottom right corner of the window.

Additionally, the test can be advanced using the 'Enter' key on the keyboard

At any point in the test, the test can be canceled by clicking **Cancel** or by pressing the **'Escape**' key on the keyboard.

When a test is canceled, TempCal will automatically reset the DTS to the settings in place before the test was commenced.

When running the test in manual mode simply follow the on screen prompts.



A/D Test

The A/D Test page provides an interactive screen that enables the user to check the DTS' response to input voltages. Including this test in the calibration is only recommended if it is suspected that either an RTD or an individual T/C channel has failed. Otherwise, this test is generally not necessary. **Assuming a compatible voltage standard is not available to run the test automatically and the test is being run manually, the 'Voltage Control' buttons will not function.** However, the user can manually apply the appropriate voltages and verify the DTS' response. In order for any voltages to be applied to the DTS, either the RTD connections of the Calibration Kit or the T/C connections of the Calibration Kit must be connected to the voltage standard for each respective test. **It is recommended that there is zero input voltage when making or breaking any connections.** See sections 'Connect RTD Cables' and 'Connect T/C Cables' for the relevant connection.

rature Cal					Scanivalve Corp
	Chan	Data	Chan	Data	Voltage Control
sets	2	2007152	10	2007152	RTD 0.10 Volt
2	3	,2097152	19	2097151	RTD 0.11 Volt
eived RTD	4	2097151	20	2097151	
345578 ion BTD	5	-2097152	21	-2097152	RTD 0.12 Volt
345578	6	-2097152	22	2097151	
on RTD 345678	7	2097151	23	2097151	T/C-0.01 Volt
eived T/C	8	-2096852	24	-2097152	
345578 ionT/C	9	2097151	25	2097151	T/C 0.0 Volt
345678	10	-2097152	26	2097151	T/C 0.02 Volt
345678	11	2097151	27	2097151	
Received	12	-2097152	28	2097151	1/C 0.06 Volt
Inginal Settings	13	-2097152	29	-2097152	
oration To DTS	14	-2097152	30	2097151	
	15	-2097152	31	2097151	
	16	-2097152	32	2097151	
	BTD.	1483057	RTD	1480363	
			_	Obert California	

Note that the display updates at approximately 1 Hz.

Refer to **Appendix A - Standard Voltage Response Limits** to determine if the results of the test are within the recommended limits.

Connect RTD Cables

Before the As Received test, Calibration or Validation of the RTD(s) can be completed, the voltage standard must be connected to the RTD connections on the calibration harness.





For each calibration harness, there is one RTD connection and one T/C connection. **The RTD connection for the voltage standard is labeled 'RTD.'** Connect the RTD connection to the voltage standard and click '**Next**.'



As Received RTD

Before TempCal begins to perform an As Received test of the DTS, a front screen will be displayed with a table representing each validation point for the RTD. Nothing needs to be done on this screen. To proceed and begin the test, click '**Next**.'

		P1	P2	P3	P4	P5	P6	P7	P8	
st ffsets	Completed		F.	Г	F.		<u> </u>		F	
91 <u>.</u>	Applied mv	97.500	102.500	107.500	112.500	117.500	122.500	127.500	130.000	
eceived BTD	RTD Volts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
leceived T/C 2345678 vation T/C 2345678 lation T/C 2345678										
As Received Validation e Driginal Settings alibration To DTS t										

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the voltage to be applied ('**Apply - - - -:**') as well as a reading of the currently applied voltage. Once the voltage has been applied and is stable, click '**Next**.'

Temperature Cal			Scanivalve Co	rp
Star Sata Sata Sata AD Test Clear Offsets AAD Int 2 3 4 5 6 7 8 Calarators RTD 7 2 3 4 5 6 7 8 Calarators RTD 7 2 3 4 5 6 7 8 Validation RTD 7 2 3 4 5 6 7 8 Validation RTD 7 2 3 4 5 6 7 8 Calarators RTD 7 2 3 4 5 6 7 8 Validation RTD 7 2 3 4 5 6 7 8 Repart As Received Report Validation Report Validation Report Validation Save Calibration To DTS End Repart	RTD As Received Applying point #: Apply: Current Reading is:	Validation 1 97.500 109.569	n millivolts millivolts	
Cancel	Start C	alibration		Next

TempCal will return to the front screen and indicate that the point has been validated with a check mark in the box below the point. Continue through each point until all points have been validated.

Calibration RTD

Once the As Received validation has been completed (if applicable) TempCal will display a front screen for the Calibration of the RTD's. Nothing needs to be done on this screen. To proceed and begin the test, click '**Next**.'

erature Cal	-		_					_	Scanivalve Corp
		P1	P2	P3	P4	P5	P6	P7	P8
st Ifsets	Completed	07.000	F	F	F	F	F	F	F
2	BTD Counts	35,000	0	0	0	0	120.000	125.000	0
2345678 eceived T/C 2345678 ration T/C 2345678									
ation T/C 2 3 4 5 6 7 8 8 Received Validation 0 Driginal Settings alibration To DTS									

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the voltage to be applied ('**Apply - - - :**') as well as a reading of the currently applied voltage (displayed in raw counts). Once the voltage has been applied and is stable, click '**Next**.'

air air bi D Teist ar Offactes D That ar Offactes D That ar Offactes D That ar Offactes 12345878 Calibration RTD 12345878 72345878 Ar Received TI/C 12345878 72345878 Calibration T/C 12345878 Calibration T/C 1234587878 Calibration T/C 123458787878 Calibration T/C 1234
gan as necewal pace Diginal Settings we Calibration To DTS of Reset Cancel ration RTD

TempCal will return to the front screen and indicate that the point has been calibrated with a check mark in the box below the point. Continue through each point until all points have been calibrated.



Validation RTD

After performing the As Received test and the Calibration (if applicable) TempCal will display a front screen for the Validation of the RTD's. Nothing needs to be done on this screen. To proceed and begin with Validation, click '**Next**.'

11	1								2	
/p T-st		P1	P2	P3	P4	P5	P6	P7	P8	
Offsets	Completed		E		0			0		
Init	Applied mv	97,500	102.500	107.500	112.500	117.500	122.500	127.500	130.000	
d 1 2	RTD Volts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
alibration T/C 12345678 alidation T/C 12345678 ort As Received										

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the voltage to be applied ('**Apply - - - :**') as well as a reading of the currently applied voltage. Once the voltage has been applied and is stable, click '**Next**.'

perature Cal				Scanivalve Corp	- 411-
i Up	Point Numb	er: 2 Apply	0.000	millivolts to the T/C's	
Test r Olfsets		Point	1		
Init	Applied mv	0.000			
d 1 2	Chan1 millivolts	9999.999			
12345678	Chan2 millivolts	9999.999			
alibration RTD	Chan3 millivolts	9999.999			
12345678	Chan4 millivolts	9999.999			
12345678	Chan5 millivolts	9999.999			
s Received T/C	Chan6 millivolts	9999.999			
12345578 alibration 1/C	Chan7 millivolts	9999.999			
12345678	Chan8 millivolts	9999.999			
alidation T/C	Chan9 millivolts	9999,999			
ort As Received	Chan10 millivolts	9999.999			
ort Validation	Chan11 millivolts	9999.999			
e Calibration To DTS	Chan12 millivolts	9999.999			
	Chan13 millivolts	9999.999			
eset	Chan14 millivolts	9999.999			
	Chan15 millivolts	9999.999			
	Chan16 millivolts	9999.999			
	Chan15 millivolts Chan16 millivolts	9999.999 9999.999			

TempCal will return to the front screen and indicate that the point has been validated with a check mark in the box below the point. Continue through each point until all points have been validated.

Scanivalve Corp.__

Connect T/C Cables

Before the As Received test, Calibration or Validation of the T/C(s) can be completed, the voltage standard must be connected to the T/C connections on the calibration harness.





For each calibration harness, there is one RTD connection and one T/C connection. **The T/C connection for the voltage standard is labeled 'T/C.'** Connect the T/C connection to the voltage standard and click '**Next**.'



As Received T/C

Before TempCal begins to perform an As Received test of the DTS, a front screen will be displayed representing each validation point for the T/C's. Nothing needs to be done on this screen. To proceed and begin the test, click '**Next**.'

Temperature Cal								Scani	valve Corp	
Start Call In		P1	P2	P3	P4	P5	P6	P7	P8	
v/D Test	Completed									
Clear Offsets A/D Init	Applied mv	-5.000	0.000	6.000	18.000	30.000	42.000	54.000	65.000	
vuinit Ioard 1 2	Chan1 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
As Received RTD	Chan2 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12345678 Calibration BTD	Chan3 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12345678	Chan4 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Validation RTD	Chan5 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
As Received T/C	Chan6 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12345678	Chan7 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12345678	Chan8 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Validation T/C	Chan9 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Report As Received	Chan10 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Report Validation	Chan11 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Seve Calibration To DTS	Chan12 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
End	Chan13 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Reset	Chan14 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Chan15 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Chan16 mv	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the point number and the voltage to be applied as well as a reading of the currently applied voltage. Once the voltage has been applied and is stable, click '**Next**.'

oerature Cal				Scanivalve Co	Pr
p	Point Numb	per: 1 Apply	-5.000	millivolts to the T/C's	
Test Offsets		Point	1		
Init	Applied mv	-5.000			
1 2	Chan1 millivolts	-9999.999			
12345678	Chan2 millivolts	-9999.999			
libration RTD	Chan3 millivolts	-9999.999			
<i>12345678</i> Idelion BTD	Chan4 millivolts	9999.999			
12345678	Chan5 millivolts	-9999.999			
12345578 As Received T/C 12345679	Chan6 millivolts	-9999.999			
Ilbration T/C	Chan7 millivolts	9999.999			
12345878	Chan8 millivolts	-9999.999	1		
lidation T/C 12345578	Chan9 millivolts	9999.999			
rt As Received	Chan10 millivolts	-9999.999			
rt Validation	Chan11 millivolts	9999.999			
Calibration To DTS	Chan12 millivolts	-9999.999	1		
-1	Chan13 millivolts	-9999.999			
iet.	Chan14 millivolts	-9999.999			
	Chan15 millivolts	-9999.999			
	Chan16 millivolts	-9999.999			
	-				

TempCal will return to the front screen and indicate that the point has been validated with a check mark in the box below the point. Continue through each point until all points have been validated.



Calibration T/C

Once the As Received validation has been completed (if applicable) TempCal will display a front screen for the Calibration of the T/C's. Nothing needs to be done on this screen. To proceed and begin the test, click '**Next**.'

	-								
9	The second second	P1	P2	P3	P4	P5	PG	P7	P8
est	Completed	N.	10	1	1	1.	1.000	1.	1.1
ullisets W	Applied my	-10.000	0.000	12.000	24.000	36.000	48.000	60.000	70.000
1 2	Chan1 counts	-2097152	-2097152	0	0	0	0	0	0
Received RTD	Chan2 counts	-2097152	-2097152	0	0	0	0	0	0
ibration RTD	Chan3 counts	-2097152	-2097152	0	0	8	0	0	0
12345678	Chan4 counts	2097151	2097151	0	0	0	0	0	0
idation RTD オココメをとての	Chan5 counts	-2097152	-2097152	0	0	0	0	0	0
Received T/C	Chan6 counts	-2097152	-2097152	0	0	0	0	0	0
12345678	Chan7 counts	2097151	2097151	0	0	8	0	8	0
12345578	Chan8 counts	-2097152	-2097152	0	0	0	0	0	0
idation T/C	Chan9 counts	2097151	2097151	0	0	0	0	0	0
12345678 Las Beneived	Chan10 counts	-2097152	-2097152	0	0	0	0	0	0
t Validation	Chan11 counts	2097151	2097151	0	0	0	0	0	0
ce Original Settings Calibration To DTS	Chan12 counts	-2097152	-2097152	0	0	0	0	0	0
Constantin to pro	Chan13 counts	-2097152	-2097152	0	0	0	0	0	0
st	Chan14 counts	-2097152	-2097152	0	0	0	0	0	0
	Chan15 counts	-2097152	-2097152	0	0	0	0	0	0
	Chan16 counts	-2097152	-2097152	0	0	0	0	0	0

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the point number and the voltage to be applied as well as a reading of the currently applied voltage (in raw counts). Once the voltage has been applied and is stable, click '**Next**.'

vt Up	Point Num	per: 2 Apply	0.000	millivolts to the T/C's	
) Test ar Offsets		Point	1		
Init	Applied my	0.000			
d 1 2	Chan1 counts	-2097151			
12345678	Chan2 counts	-2097151			
alibration RTD	Chan3 counts	-2097151			
12345678 alidation BTD	Chan4 counts	2097152			
12345878	Chan5 counts	-2097151			
As Received T/C 12345678 Calibration T/C	Chan6 counts	-2097151			
	Chan7 counts	2097152			
12345878	Chan8 counts	-2097151			
alidation T/C	Chan9 counts	2097152			
ort As Received	Chan10 counts	-2097151			
ort Validation	Chan11 counts	2097152			
e Calibration To DTS	Chan12 counts	-2097151			
	Chan13 counts	-2097151			
set	Chan14 counts	-2097151			
	Chan15 counts	-2097151			
	Chan16 counts	-2097151			

TempCal will return to the front screen and indicate that the point has been calibrated with a check mark in the box below the point. Continue through each point until all points have been calibrated.

Validation T/C

After performing the As Received test and the Calibration (if applicable) TempCal will display a front screen for the Validation of the T/C's. Nothing needs to be done on this screen. To proceed and begin with Validation, click '**Next**.'

							Scani	valve Corp	
	P1	P2	P3	P4	P5	P6	P7	P8	
Completed	V								
Applied mv	-5.000	0.000	6.000	18.000	30.000	42.000	54.000	65.000	
Chan1 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan2 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan3 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan4 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan5 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan6 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan7 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan8 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan9 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan10 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan11 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan12 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan13 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan14 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan15 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chan16 mv	9999.999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	Completed Applied mv Chan1 mv Chan2 mv Chan3 mv Chan6 mv Chan6 mv Chan6 mv Chan6 mv Chan6 mv Chan10 mv Chan10 mv Chan11 mv Chan13 mv Chan13 mv Chan13 mv	P1 Completed ✓ Appled mv -5.000 Charl mv 9993.939 Char2 mv 9993.939 Char3 mv 9993.939 Char3 mv 9993.939 Char6 mv 9993.939 Char10 mv 9993.939 Char11 mv 9993.939 Char13 mv 9993.939 Char14 mv 9993.939 Char15 mv 9993.939 Char16 mv 9993.939	P1 P2 Completed ✓ □ Applied mv -5.000 0.000 Charl mv 9999.999 0.000 Charl mv 9999.999 0.000 Charl mv 9999.999 0.000 Charl mv 999.999 0.000 Charl mv 999.999 0.000 Charls mv 999.999 0.000 Charls mv 9999.999 0.000 Charl mv 9999.999 0.000 Charl 1 mv 9999.999 0.000	P1 P2 P3 Completed I* I I* Applied mv 5 000 0.000 6 000 Chan1 mv 9393 939 0.000 0.000 Chan2 mv 9396 999 0.000 0.000 Chan3 mv 9393 939 0.000 0.000 Chan4 mv 9393 939 0.000 0.000 Chan5 mv 9393 939 0.000 0.000 Chan6 mv 9393 939 0.000 0.000 Chan7 mv 9393 939 0.000 0.000 Chan7 mv 9393 939 0.000 0.000 Chan7 mv 9393 939 0.000 0.000 Chan8 mv 9393 939 0.000 0.000 Chan1 mv 9393 939 0.000 0.000 Chan1 mv 9393 939 0.000 0.000 Chan13 mv 9393 939 0.000 0.000 Chan13 mv 9393 939 0.000 0.000 Chan14 mv 9393 939 0.000 0.000 </th <th>P1 P2 P3 P4 Completed IF IF IF IF Applied mv 5.000 0.000 6.000 18.000 Charl mv 9993.999 0.000 0.000 0.000 Charl mv 9993.993 0.000 0.000 0.000 <th>P1 P2 P3 P4 P5 Completed V <th>P1 P2 P3 P4 P5 P6 Completed I I I I I I Applied mv 5:000 0.000 6:000 18:000 30:000 42:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993</th><th>P1 P2 P3 P4 P5 P6 P7 Applied mv 5.000 0.000 6.000 18.000 30.000 42.000 54.000 Charl mv 9939.393 0.000 0.000 0.000 0.000 0.000 0.000 Charl mv 9939.393 0.000</th><th>P1 P2 P3 P4 P5 P6 P7 P8 Completed V <t< th=""></t<></th></th></th>	P1 P2 P3 P4 Completed IF IF IF IF Applied mv 5.000 0.000 6.000 18.000 Charl mv 9993.999 0.000 0.000 0.000 Charl mv 9993.993 0.000 0.000 0.000 <th>P1 P2 P3 P4 P5 Completed V <th>P1 P2 P3 P4 P5 P6 Completed I I I I I I Applied mv 5:000 0.000 6:000 18:000 30:000 42:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993</th><th>P1 P2 P3 P4 P5 P6 P7 Applied mv 5.000 0.000 6.000 18.000 30.000 42.000 54.000 Charl mv 9939.393 0.000 0.000 0.000 0.000 0.000 0.000 Charl mv 9939.393 0.000</th><th>P1 P2 P3 P4 P5 P6 P7 P8 Completed V <t< th=""></t<></th></th>	P1 P2 P3 P4 P5 Completed V <th>P1 P2 P3 P4 P5 P6 Completed I I I I I I Applied mv 5:000 0.000 6:000 18:000 30:000 42:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993</th> <th>P1 P2 P3 P4 P5 P6 P7 Applied mv 5.000 0.000 6.000 18.000 30.000 42.000 54.000 Charl mv 9939.393 0.000 0.000 0.000 0.000 0.000 0.000 Charl mv 9939.393 0.000</th> <th>P1 P2 P3 P4 P5 P6 P7 P8 Completed V <t< th=""></t<></th>	P1 P2 P3 P4 P5 P6 Completed I I I I I I Applied mv 5:000 0.000 6:000 18:000 30:000 42:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 999 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993 0:000 0:000 0:000 0:000 0:000 Charl mv 9993 993	P1 P2 P3 P4 P5 P6 P7 Applied mv 5.000 0.000 6.000 18.000 30.000 42.000 54.000 Charl mv 9939.393 0.000 0.000 0.000 0.000 0.000 0.000 Charl mv 9939.393 0.000	P1 P2 P3 P4 P5 P6 P7 P8 Completed V <t< th=""></t<>

The next screen will prompt the user to input a known voltage using a voltage standard. This screen displays the point number and the voltage to be applied as well as a reading of the currently applied voltage. Once the voltage has been applied and is stable, click '**Next**.'

	Point Numb	er: 2 Apply	0.000	millivolts to the T/C's
est Tifcato	1	Point	I	
it.	Applied mv	0.000		
1 2	Chan1 millivolts	9999,999		
Hecerved HID	Chan2 millivolts	9999.999		
bration RTD	Chan3 millivolts	9999,999	-	
12345678	Chan4 millivolts	9999.999		
lidation RTD 72345678 Received T/C 72345678 libration T/C	Chan5 millivolts	9999.999		
	Chan6 millivolts	9999.999		
	Chan7 millivolts	9999.999		
12345678	Chan8 millivolts	9999.999		
dation T/C	Chan9 millivolts	9999,999		
As Received	Chan10 millivolts	9999.999		
Validation	Chan11 millivolts	9999.999		
ce Original Settings Calibration To DTS	Chan12 millivolts	9999.999	1	
	Chan13 millivolts	9999,999		
et	Chan14 millivolts	9999.999		
	Chan15 millivolts	9999.999		
	Chan16 millivolts	9999.999	1	
	-			

TempCal will return to the front screen and indicate that the point has been validated with a check mark in the box below the point. Continue through each point until all points have been validated.

Report As Received

If the '**Report As Received**' function has been enabled for the test, TempCal will automatically generate an As Received report for the DTS. The files will be generated in the location specified in the '**Directories**' setup under '**Base path for XX channel certifications and list all reports**.' Reference **Appendix B - Sample As Received Certificate of Calibration** to see an example of an As Received report.

Report Validation

If the '**Report Validation**' function has been enabled for the test, TempCal will automatically generate a Validation report for the DTS' new calibration. The files will be generated in the location specified in the '**Directories**' setup under '**Base path for XX channel certifications and list all reports**.' Reference **Appendix C - Sample Certificate of Validation** to see an example of an As Received report.

Replace Original Settings

If the '**Replace Original Settings**' function has been enabled for the test, TempCal will ask to replace the original DTS settings. Selecting '**Yes**' will command TempCal to reconfigure the DTS to the configuration before the test was conducted. **This is highly recommended.** Selecting '**No**' will not reconfigure the DTS and will leave the DTS configured for calibration. **In this state, the unit will not scan until several variables have been reconfigured.**



Save Calibration To DTS

If the 'Save Calibration To DTS' function has been enabled for the test, TempCal will ask if the calibration should be saved to the DTS or not. It is recommended that the user first review the As **Received Report** and the Validation Report to determine if the calibration should be saved or not. Select 'Yes' to save the calibration or 'No' to ignore the most recent calibration and leave the DTS with the original pre-test calibration.





In order to restore the original calibration coefficients the DTS must be rebooted. After the '**No**' button is pushed deciding not to save the new calibration coefficients, TempCal automatically reboots the DTS. A message window appears noting this. Pressing the '**OK**' button is required to complete the test and restore the original calibration. As prompted in the message window, it may take several minutes for the DTS to reboot allowing a connection to be established again.





Validation

Validation Reports

If the '**Report As Received**' and '**Report Validation**' functions were enabled for the test, TempCal will have generated As Received and post-calibration Validation reports. These two reports can be used to evaluate the status of the unit before and after the calibration. In order for these reports to accurately represent the percentage of error of the unit, the error of the RTD's needs to be included in the report's calculations. The DTS was provided with a Certificate of Calibration new from the factory. This will be required as the RTD's errors are included in this document.

The second page of the Certificate of Calibration should look like Figure19 below. Along the top of the table the RTD readings are listed. Each set of RTD readings are unique to each DTS and each calibration of the RTD's. Ensure that you reference the Certificate of Calibration from the same unit and the most recent calibration.

		え ふうし ふうし ふうし ふうし ふうし ふうし ふうし しんし ふうし ふうし ふうし ふうし ふうし ふうし ふうし ふうし ふうし ふう		E: DTS	\$3250	ید مح		BER: 1	1037		
		λ		STC			TEST				
		V	V			·V·					
		<u> </u>				- V					
		RTD1	RTD2	Cold J	unction	Ref Point	old June	tion Erro			
		42.030	42.030	42.	030	42.037	-0.	007			
	-										
Channel	Va	itage in M	illivolts	Er	ror of Th	ermocoup	le Type (l	n degrees	C) See N	otes 1 and	12
	Applied	Reading	Delta Offset	E	J	K	N 0.007	R	S	B	T
	0 54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
2	54.000	54.000	0.001	0.003	0.012	0.007	0.007	0.007	0.007	0.033	0.017
4	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
5	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
6	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
7	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
8	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
9	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
10	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
11	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
12	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
13	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
14	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
15	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
16	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
RTD	127.500	127.504	0.004								
		RTD1	RTD2	Cold J	unction	Ref Point	Cold Juna	tion Erro			
		42.030	42.030	42.	030	42.037	-0.	007			
	-										
Channel	۷a	itage in M	illivolts	Er	ror of Th	ermocoup	le Type (l	n degrees	C) See N	otes 1 and	12
	Applied	Reading	Delta Offset	E	J	к	N	B	S	В	Т
1	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
2	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
3	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
4	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
0	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
7	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
· ·	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
9	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
10	65,000	65.000	0.000	0.007	0.007	0.007	0.031	0.160	0.007	0.093	0.007
11	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
12	65.000	65.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
13	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
14	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
15	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
16	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
RTD	130.000	130.004	0.004								
NIE	100.000	1 100.004	0.004								

Figure 19 - Original Certificate of Calibration



The new Certificate of Calibration TempCal generates will be formatted exactly the same as the Certificate of Calibration provided with the DTS. To include the RTD errors from the original calibration in the new Certificate of Calibration simply input the values from **RTD 1**, **RTD 2** and **Ref Point** into the respective inputs. These values only need to be entered into the first positions on the first page (titled SN_###_Pts 1 & 2). Reference Figure 20 below.

		Ŷ		E: DTS STC4	3250 ALIBR		L NUM TEST	BER:	1037		
		V .	<u> </u>			<u> </u>					
		DTDI	DTD2	Cold I		Def Deire		Nine Free	1		
		0.000	B102			ner Point	ola Junc	CON EITO			
		0.000	0.000	0.0	00	0.000	0.0	00			
Channel											
Channel	¥o	itage in Mi	Illivolts	Er	ror of Th	ermocoup	le Type (li	n degrees	C) See N	otes 1 and	12
	Applied	Feading	Delta Uffset	E 0.000	J 0.000	K	N 0.000	B	5	B 0.000	0.000
- 1	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
3	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
9	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
11	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
13	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
14	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RTD	127.500	127.504	0.004								
		BTD1	RTD2	Cold J	unction	Ref Point	Cold June	tion Erro			
		0.000	0.000	0.0	000	0.000	0.0	000			
									,		
	Yo	ltago in Mi	illiuolte	E,		armonoun	lo Teno (li	o dograos	C) See M	otor 1 and	12
Channel	Applied	Reading	Dalta Offcat				N N	D	cj see n		т т
1	65.000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	65,000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	65,000	65,000	0.001	0.016	0.013	0.024	0.030	0.167	0.000	0.000	0.024
12	65,000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	65,000	65,000	0.001	0.010	0.013	0.027	0.000	0.000	0.000	0.000	0.024
10	65.000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	60.000 CE 000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	65.000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	60.000	60.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure 20 - New Certificate of Calibration

Once the values are entered into the Certificate of Calibration any RTD errors can be accounted for and included in the calibration reports. Scanivalve recommends that the RTD's be recalibrated every 5 years. This procedure is only applicable when the RTD's are within the 5 year calibration period.

Functional Validation

As an option, a functional validation can be performed on the DTS after a new calibration using a Thermocouple Simulator or an Ice Point Calibrator. This ensures an acceptable calibration.

To perform a functional validation, connect to the DTS with a Telnet client, such as HyperTerminal or Telnet. Configure the DTS as follows:

SET PERIOD 7812 SET AVG 4 SET FPS 0 SET XCSCANTRIG 0 SET FORMAT 0 SET EU 1

Type 'Scan' to begin scanning.

Using a Thermocouple Simulator or an Ice Point Calibrator, introduce a known voltage to each channel of the DTS individually. The published DTS accuracy is ± 0.5 Degrees C. Every channel should be within this range.

Thermocouple leads or panel jack connectors may introduce errors into the readings. If it is suspected that this is the case, contact Scanivalve for support.



AUTOMATIC TEST OPERATION

This section will cover the setup and operation of an automatic test

Defining a Test

Device Setup

Click Setup, Device to open the Device Set Up Window.

Set Up Device	×
Module	
IP Address: 0.0.0.0	
Serial Number: 000	
Connection	
Connection	
Screw Terminals O Panel Jack	
Filter	
• Standard © 10 Hz	
Close	

Enter the module configuration.

- 1. Enter the IP Address of the module.
- 2. Enter the serial number this will be used in the reports.
- 3. Click on the thermocouple connection type.
- 4. Click the Standard Filter unless the module has the special 10 Hz filter option



Volt

Click Setup, Volt to open the Voltage Standard Set Up Window.

SetUpVolt		×
Voltage Reference Settings		
Voltage Reference Type:	Tuke54408 Tuke5700A Manual	
Volt Dwell Time:	15 Seconds	
Table Display Dwell Time:	5 Seconds	
🗖 External Guard On		
Communication Settings	Temperature Control	
Com Port: COM4	Use Cryogenic Temps	
GPIB Address: 7		
Report Control		
Sort Summary Report By Erro	и	
	Close	

Enter the Voltmeter configuration.

- 1. Select the Voltmeter type. For automatic tests, select one of the Fluke voltage standards listed.
- 2. Set the **Volt Dwell Time**. 15 seconds is suggested.
- 3. Set the **Table Display Dwell Time**. This is personal preference.
- 4. The **External Guard On** box should be left unchecked.
- 5. Set the **Com Port** that the voltage standard will be using.
- 6. Set the **GPIB Address** that the voltage standard will be using.
 - The Fluke Voltmeters operate over a GPIB interface when in the automatic calibration mode. Scanivalve Corp recommends an ICS Electronics 4895 Serial to GPIB interface be used.
- If the test is calibrating a DTS unit used for extreme cold temperatures, select the 'Use Cryogenic Temps' option. Otherwise, leave it unselected. Reference the Voltage Setup section for more information.
- 8. Selecting 'Sort Summary Report By Error' will float the worst channels to the top of the report making it easier to review the Summary Report. If this is not selected, the channels will be arranged in numerical order.



Directories

Click Setup, Directories to open the Directory definition window.

JpDirs	
Base path for archive files and log files:	
	Browse
Base path for 16 channel certifications and list all reports:	
	Browse
Base path for 32 channel certifications and list all reports:	
	Browse
Base path for 64 channel certifications and list all reports:	
	Browse
Path for Open Office Executable:	
	Browse
Close	

Base Path for Active Files

This option is used to define the directory where files created in the test will be placed. The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.

Base Path for 16 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 16 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Base Path for 32 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 32 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Base Path for 64 Channel Certifications and List All Reports

The option is used to define the directory where all Validation Reports and ListA Reports generated for 64 channel units will be created. The **Browse** button can be used to select the directory, or the full path can be directly entered in the window.

Path for Open Office Executable

This option is used if Microsoft Excel 2003 is not available and Open Office 'Calc' software is being used. In order for TempCal to reference Open Office instead of Excel 2003, the directory containing the file 'soffice.exe' must be entered here. The default installation location is: "C:\Program Files\OpenOffice.org 3\program". The **Browse** button can be used to navigate to and select the directory, or the full path can be directly entered in the window.



Test Controls

The test controls can be configured by two means. The first method is by selecting and deselecting specific portions of the test in the **Test Controls** portion of the main screen.



Alternately, the test controls can be configured by selecting on of the pre-configured test setups found in the **Setup Menu**. See the section devoted to the **Setup Menu** in the **Getting Started** section of this manual.





Running a Test

Once the test has been defined and configured, the test can be commenced.

This is done by simply clicking **Start Calibration** found at the bottom of the window.

To proceed through the test, click the **Next** button at the bottom right corner of the window.

Additionally, the test can be advanced using the 'Enter' key on the keyboard

At any point in the test, the test can be canceled by clicking the or **Cancel** by pressing the **'Escape'** key on the keyboard.

When a test is canceled, TempCal will automatically reset the DTS to the settings in place before the test was commenced.

When running the test in an automatic mode you will only be prompted to hook the RTD portion of the calibration kit to the voltage source at the beginning of the test and then disconnect the RTD connections and hook up the T/C portion of the calibration kit midway through the test.



A/D Test

The A/D Test page provides an interactive screen that enables the user to check the DTS response to input voltages. Including this test in the calibration is only recommended if it is suspected that either an RTD or an individual T/C channel has failed. Otherwise, this test is generally not necessary.

When running an automatic test with a compatible voltage source, the user can simply click the 'Voltage Control' buttons to verify the DTS' response. In order for any voltages to be applied to the DTS, either the RTD connections of the Calibration Kit or the T/C connections of the Calibration Kit must be connected to the voltage standard for each respective test. It is recommended that the user click the 'T/C 0.0 Volt' button before making or breaking any connection with the calibration harness. See sections 'Connect RTD Cables' and 'Connect T/C Cables' for the relevant connection.

iure Cal					Scanivalve Corp
	Chan	Data	Chan	Data	Voltage Control
8	1	-2097152	17	2097151	RTD 0.10 Volt
	2	-2097152	18	-2097152	
ed BTD	3	-2097152	19	2097151	HIDUITVOR
5 6 7 8	4	2097151	20	2097151	RTD 0.12 Volt
RTD	5	-2097152	21	-2097152	
RTD	6	-2097152	22	2097151	
5678	7	2097151	23	2097151	T /C -0.01 Volt
5678	8	-2096852	24	-2097152	7/00000
T/C	9	2097151	25	2097151	175.0.0 904
5578 MC	10	-2097152	26	2097151	T/C 0.02 Volt
5678	11	2097151	27	2097151	Ticancy h
ceived	12	-2097152	28	2097151	
nal Settings	13	-2097152	29	-2097152	
on To DTS	14	-2097152	30	2097151	
	15	-2097152	31	2097151	
	16	-2097152	32	2097151	
	BTD	1483057	RTD	1480363	
cel				Start Callibration	a l

Note that the display updates at approximately 1 Hz.

Refer to **Appendix A - Standard Voltage Response Limits** to determine if the results of the test are within the recommended limits.

Connect RTD Cables

Before the As Received test, Calibration or Validation of the RTD(s) can be completed, the voltage standard must be connected to the RTD connections on the calibration harness.





For each calibration harness, there is one RTD connection and one T/C connection. **The RTD** connection for the voltage standard is labeled 'RTD.' Connect the RTD connection, and click 'Next.'

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Connect T/C Cables

Before the As Received test, Calibration or Validation of the T/C(s) can be completed, the voltage standard must be connected to the T/C connections on the calibration harness.





For each calibration harness, there is one RTD connection and one T/C connection. **The T/C connection for the voltage standard is labeled 'T/C.'** Connect the T/C connection, and click 'Next.'



Report As Received

If the '**Report As Received**' function has been enabled for the test, TempCal will automatically generate an As Received report for the DTS. The files will be generated in the location specified in the '**Directories**' setup under '**Base path for XX channel certifications and list all reports**.' Reference **Appendix B - Sample As Received Certificate of Calibration** to see an example of an As Received report.

Report Validation

If the '**Report Validation**' function has been enabled for the test, TempCal will automatically generate a Validation report for the DTS' new calibration. The files will be generated in the location specified in the '**Directories**' setup under '**Base path for XX channel certifications and list all reports**.' Reference **Appendix C - Sample Certificate of Validation** to see an example of an As Received report.

Replace Original Settings

If the '**Replace Original Settings**' function has been enabled for the test, TempCal will ask to replace the original DTS settings. Selecting '**Yes**' will command TempCal to reconfigure the DTS to the configuration before the test was conducted. **This is highly recommended.** Selecting '**No**' will not reconfigure the DTS and will leave the DTS configured for calibration. **In this state, the unit will not scan until several variables have been reconfigured.**



Save Calibration To DTS

If the 'Save Calibration To DTS' function has been enabled for the test, TempCal will ask if the calibration should be saved to the DTS or not. It is recommended that the user first review the As **Received Report** and the Validation Report to determine if the calibration should be saved or not. Select 'Yes' to save the calibration or 'No' to ignore the most recent calibration and leave the DTS with the original pre-test calibration.





coefficients the DTS must be rebooted. After the '**No**' button is pushed deciding not to save the new calibration coefficients, TempCal automatically reboots the DTS. A message window appears noting this. Pressing the '**OK**' button is required to complete the test and restore the original calibration. As prompted in the message window, it may take several minutes for the DTS to reboot allowing a connection to be established again.





Validation

Validation Reports

If the '**Report As Received**' and '**Report Validation**' functions were enabled for the test, TempCal will have generated As Received and post-calibration Validation reports. These two reports can be used to evaluate the status of the unit before and after the calibration. In order for these reports to accurately represent the percentage of error of the unit, the error of the RTD's needs to be included in the report's calculations. The DTS was provided with a Certificate of Calibration new from the factory. This will be required as the RTD's errors are included in this document.

The second page of the Certificate of Calibration should look like Figure 21 below. Along the top of the table the RTD readings are listed. Each set of RTD readings are unique to each DTS and each calibration of the RTD's. **Ensure that you reference the Certificate of Calibration from the same unit and the most recent calibration.**

		ぷ		E: DT	3250	ید مح		BER: 1	1037		
		λ		STC		A FA	TEST				
		V	V			·V·					
		<u> </u>				Y.					
		BTD1	RTD2	Cold J	unction	Ref Point	old Junc	tion Erro			
		42.030	42.030	42.	030	42.037	-0.	007			
	•										
Channel	¥o	itage in M	illivolts	Er	ror of Th	ermocoup	le Type (l	n degrees	C) See N	otes 1 and	12
	Applied	Reading	Delta Offset	E	J	K	N	R	S	B	T
	<u>54.000</u>	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
2	54.000	54.000	0.001	0.003	0.012	0.017	0.007	0.007	0.007	0.033	0.017
4	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
5	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
6	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
7	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
8	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
9	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
10	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
11	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
12	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
13	54.000	54.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
14	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
15	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
16	54.000	54.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
RTD	127.500	127.504	0.004								
		RTD1	RTD2	Cold J	unction	Ref Point	Cold Juna	tion Erro			
		42.030	42.030	42.	030	42.037	-0.	007			
Channel	¥o	itage in M	illivolts	Er	ror of Th	ermocoup	le Type (l	n degrees	C) See N	otes 1 and	12
	Applied	Reading	Delta Offset	E	J	K	N	R	S	В	T
	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
2	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
3	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
- 4 Б	65.000	65.000	0.000	-0.007	-0.007	0.007	-0.007	-0.007	-0.007	-0.007	-0.007
6	65,000	65,000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
7	65,000	65,000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
8	65,000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
9	65,000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
10	65.000	65.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
11	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
12	65.000	65.001	0.001	0.009	0.012	0.017	0.031	0.160	0.160	0.093	0.017
13	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
14	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
15	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
16	65.000	65.000	0.000	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
RTD	130.000	130.004	0.004								

Figure 21 - Original Certificate of Calibration



The new Certificate of Calibration TempCal generates will be formatted exactly the same as the Certificate of Calibration provided with the DTS. To include the RTD errors from the original calibration in the new Certificate of Calibration simply input the values from **RTD 1**, **RTD 2** and **Ref Point** into the respective inputs. These values only need to be entered into the first positions on the first page (titled SN_###_Pts 1 & 2). Reference Figure 22 below.

		₹ √		E: DTS ST CA	S3250 ALIBR		LNUM TEST	BER:	1037		
		<u> </u>	Y			<u> </u>					
		BTD1	BTD2	Cold J	unction	Bef Point	old June	tion Erro	1		
		0.000	0.000	00100	000	0.000	0.0	00			
	L								9		
Channel	Va	ltago la bili	illinalta	E.	res of Th		la Tana (k		C) Can M		1.2
Channer	Applied	Reading	Dolta Officat	E E1		iermocoup v	ie igpe (i M	D	CJ See N		12 T
1	54.000	54 000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	54,000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	54.000	54.000	0.001	0.016	0.013	0.024	0.030	0.167	0.000	0.000	0.024
4	54,000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- 4 E	54.000	54.000 E4.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	54.000	54.000	0.001	0.016	0.019	0.024	0.038	0.167	0.000	0.000	0.024
1	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
9	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
11	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
13	54.000	54.001	0.001	0.016	0.019	0.024	0.038	0.167	0.167	0.100	0.024
14	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	54.000	54.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RTD	127.500	127.504	0.004								
		BTD1	RTD2	Cold J	unction	Ref Point	Cold June	tion Erro			
		0.000	0.000	0.0	000	0.000	0.0	000			
	Yo	ltage in Mi	illiuolts	Fr	ror of Th	ermocoup	la Tena (li	n dearees	C) See N	otes 1 and	12
Channel	Applied	Reading	Delta Offset	F		ĸ	N	B	s	B	Т
1	65.000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
, ,	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	65,000	65,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	65,000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	65,000	65,000	0.001	0.016	0.013	0.024	0.030	0.167	0.000	0.000	0.024
12	65,000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	65,000	65.001	0.001	0.016	0.013	0.024	0.038	0.000	0.000	0.000	0.024
10	60.000 CE 000	60.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	60.000 CE 000	65.000 65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	65.000	65.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
01	60.000	60.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure 22 - New Certificate of Calibration

Once the values are entered into the Certificate of Calibration any RTD errors can be accounted for and included in the calibration reports. Scanivalve recommends that the RTD's be recalibrated every 5 years. This procedure is only applicable when the RTD's are within the 5 year calibration period.

Functional Validation

As an option, a functional validation can be performed on the DTS after a new calibration using a Thermocouple Simulator or an Ice Point Calibrator. This ensures an acceptable calibration.

To perform a functional validation, connect to the DTS with a Telnet client, such as HyperTerminal or Telnet. Configure the DTS as follows:

SET PERIOD 7812 SET AVG 4 SET FPS 0 SET XCSCANTRIG 0 SET FORMAT 0 SET EU 1

Type 'Scan' to begin scanning.

Using a Thermocouple Simulator or an Ice Point Calibrator, introduce a known voltage to each channel of the DTS individually. The published DTS accuracy is ± 0.5 Degrees C. Every channel should be within this range.

Thermocouple leads or panel jack connectors may introduce errors into the readings. If it is suspected that this is the case, contact Scanivalve for support.



Appendix A - Standard Voltage Response Limits

Table 1 - RTD Voltage	Response Limits
-----------------------	------------------------

APPLIED VOLTAGE	IDEAL COUNTS	LOW LIMIT	HIGH LIMIT		
100 mV	1354760	1339760	1369760		
110 mV	1490236	1475236	1505236		
120 mV	1625712	1610712	1640712		

 Table 2 - Thermocouple Voltage Response Limits

APPLIED VOLTAGE	IDEAL COUNTS	LOW LIMIT	HIGH LIMIT	
-10 mV	-275985	-290985	-260985	
0 mV	0	-15000	15000	
20 mV	551970	536970	566970	
60 mV	1655911	1640911	1670911	



Appendix B - Sample As Received Certificate of Calibration

 Table 3 - Sample As Received Summary Sheet

MODULE TYPE: DTS3250 SERIAL NUMBER: 1037 AS RECEIVED

T/C Points								
Channel	Applied	Reading	Delta Offset	Abs Offset				
8	65.000	64.953	-0.047	0.047				
8	54.000	53.961	-0.039	0.039				
10	65.000	64.965	-0.035	0.035				
2	65.000	64.967	-0.033	0.033				
8	42.000	41.968	-0.032	0.032				
11	65.000	64.968	-0.032	0.032				
13	65.000	64.970	-0.030	0.030				
10	54.000	53.971	-0.029	0.029				
14	65.000	64.971	-0.029	0.029				
2	54.000	53.973	-0.027	0.027				
3	65.000	64.973	-0.027	0.027				
12	65.000	64.973	-0.027	0.027				
11	54.000	53.974	-0.026	0.026				
13	54.000	53.975	-0.025	0.025				
8	30.000	29.976	-0.024	0.024				
14	54.000	53.976	-0.024	0.024				
6	65.000	64.976	-0.024	0.024				
15	65.000	64.976	-0.024	0.024				
10	42.000	41.977	-0.023	0.023				
1	65.000	64.978	-0.022	0.022				
7	65.000	64.978	-0.022	0.022				
3	54.000	53.978	-0.022	0.022				
2	42.000	41.979	-0.021	0.021				
12	54.000	53.979	-0.021	0.021				
5	65.000	64.979	-0.021	0.021				
11	42.000	41.980	-0.020	0.020				
13	42.000	41.980	-0.020	0.020				
6	54.000	53.980	-0.020	0.020				
15	54.000	53.981	-0.019	0.019				
14	42.000	41.982	-0.018	0.018				
1	54.000	53.982	-0.018	0.018				
3	42.000	41.983	-0.017	0.017				
12	42.000	41.983	-0.017	0.017				
5	54.000	53.983	-0.017	0.017				
7	54.000	53.983	-0.017	0.017				
10	30.000	29.983	-0.017	0.017				
9	65.000	64.983	-0.017	0.017				

RTD Points									
Channel	Applied	Reading	Delta Offset	Abs Offset					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					
1	0.000	0.000	0.000	0.000					



16	65.000	64.983	-0.017	0.017			
4	65.000	64.984	-0.016	0.016			
8	18.000	17.984	-0.016	0.016			
6	42.000	41.984	-0.016	0.016			
2	30.000	29.985	-0.015	0.015			
15	42.000	41.985	-0.015	0.015			
1	42.000	41.986	-0.014	0.014			
7	42.000	41.986	-0.014	0.014			
16	54.000	53.986	-0.014	0.014			
11	30.000	29.986	-0.014	0.014			
13	30.000	29.986	-0.014	0.014			
14	30.000	29.987	-0.013	0.013			
5	42.000	41.987	-0.013	0.013			
4	54.000	53.987	-0.013	0.013			
9	54.000	53.987	-0.013	0.013			
3	30.000	29.988	-0.012	0.012			
6	30.000	29.988	-0.012	0.012			
12	30.000	29.988	-0.012	0.012			
15	30.000	29.989	-0.011	0.011			
10	18.000	17.990	-0.010	0.010			
1	30.000	29.990	-0.010	0.010			
7	30.000	29.990	-0.010	0.010			
4	42.000	41.990	-0.010	0.010			
9	42.000	41.990	-0.010	0.010			
16	42.000	41.990	-0.010	0.010			
5	30.000	29.991	-0.009	0.009			
2	18.000	17.992	-0.008	0.008			
11	18.000	17.992	-0.008	0.008			
13	18.000	17.992	-0.008	0.008			
6	18.000	17.993	-0.007	0.007			
12	18.000	17.993	-0.007	0.007			
14	18.000	17.993	-0.007	0.007			
4	30.000	29.993	-0.007	0.007			
9	30.000	29.993	-0.007	0.007			
16	30.000	29.993	-0.007	0.007			
8	6.000	5.993	-0.007	0.007			
3	18.000	17.994	-0.006	0.006			
7	18.000	17.994	-0.006	0.006			
15	18.000	17.994	-0.006	0.006			
2	-5.000	-4.995	0.005	0.005			
3	-5.000	-4.995	0.005	0.005			
1	18.000	17.995	-0.005	0.005			
5	18.000	17.995	-0.005	0.005			
4	18.000	17.996	-0.004	0.004			
16	18.000	17.996	-0.004	0.004			
8	0.000	-0.004	-0.004	0.004			
9	-5.000	-4.996	0.004	0.004			
11	-5.000	-4.996	0.004	0.004			

14	-5.000	-4.996	0.004	0.004	
1	-5.000	-4.997	0.003	0.003	
5	-5.000	-4.997	0.003	0.003	
7	-5.000	-4.997	0.003	0.003	
10	-5.000	-4.997	0.003	0.003	
12	-5.000	-4.997	0.003	0.003	
13	-5.000	-4.997	0.003	0.003	
15	-5.000	-4.997	0.003	0.003	
16	-5.000	-4.997	0.003	0.003	
6	6.000	5.997	-0.003	0.003	
10	6.000	5.997	-0.003	0.003	
9	18.000	17.997	-0.003	0.003	
1	0.000	0.003	0.003	0.003	
3	0.000	0.002	0.002	0.002	
4	0.000	0.002	0.002	0.002	
4	-5.000	-4.998	0.002	0.002	
11	6.000	5.998	-0.002	0.002	
13	6.000	5.998	-0.002	0.002	
6	-5.000	-4.999	0.001	0.001	
2	6.000	5.999	-0.001	0.001	
7	6.000	5.999	-0.001	0.001	
9	6.000	6.001	0.001	0.001	
12	6.000	5.999	-0.001	0.001	
14	6.000	5.999	-0.001	0.001	
15	6.000	5.999	-0.001	0.001	
6	0.000	-0.001	-0.001	0.001	
7	0.000	0.001	0.001	0.001	
9	0.000	0.001	0.001	0.001	
10	0.000	-0.001	-0.001	0.001	
15	0.000	0.001	0.001	0.001	
16	0.000	0.001	0.001	0.001	
8	-5.000	-5.000	0.000	0.000	
2	0.000	0.000	0.000	0.000	
5	0.000	0.000	0.000	0.000	
11	0.000	0.000	0.000	0.000	
12	0.000	0.000	0.000	0.000	
13	0.000	0.000	0.000	0.000	
14	0.000	0.000	0.000	0.000	
1	6.000	6.000	0.000	0.000	
3	6.000	6.000	0.000	0.000	
4	6.000	6.000	0.000	0.000	
5	6.000	6.000	0.000	0.000	
16	6.000	6.000	0.000	0.000	

Table 4 - Sample As Received Channel Error Report

MODULE TYPE: DTS3250 SERIAL NUMBER: 1037 AS RECEIVED

RTD1	RTD2	Cold Junction	Ref Point	Cold Junction Error
40.130	40.190	40.160	40.109	0.051

Channel	nel Voltage In Millivolts			Channel Voltage In Millivolts Error of Thermocouple Type (In degrees C) See Notes 1 and					and 2		
	Applied	Reading	Delta Offset	E	J	К	Ν	R	S	В	Т
1	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
2	-5.000	-4.995	0.005	0.132	0.147	0.173	0.243	0.884	0.884	0.551	0.173
3	-5.000	-4.995	0.005	0.132	0.147	0.173	0.243	0.884	0.884	0.551	0.173
4	-5.000	-4.998	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
5	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
6	-5.000	-4.999	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
7	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
8	-5.000	-5.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
9	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
10	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
11	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
12	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
13	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
14	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
15	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
16	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
RTD	0.000	0.000	0.000								

RTD1	RTD2	Cold Junction	Ref Point	Cold Junction Error
40.130	40.190	40.160	40.109	0.051

Channel	Voltage In Millivolts			Error	of Therm	ocouple	Type (I	n degre	es C) S	ee Notes	1 and 2
	Applied	Reading	Delta Offset	E	J	К	Ν	R	S	В	Т
1	0.000	0.003	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
2	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
3	0.000	0.002	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
4	0.000	0.002	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
5	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
6	0.000	-0.001	-0.001	0.035	0.032	0.027	0.013	-0.116	-0.116	-0.049	0.027
7	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
8	0.000	-0.004	-0.004	-0.014	-0.026	-0.047	-0.103	-0.616	-0.616	-0.349	-0.047
9	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
10	0.000	-0.001	-0.001	0.035	0.032	0.027	0.013	-0.116	-0.116	-0.049	0.027
11	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
12	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
13	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
14	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
15	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
16	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
RTD	0.000	0.000	0.000								
Appendix C - Sample Certificate of Calibration

Table 5 - Sample Post Calibration Summary Sheet

T/C Points								
Channel	Applied	Reading	Delta Offset	Abs Offset				
8	65.000	64.953	-0.047	0.047				
8	54.000	53.961	-0.039	0.039				
10	65.000	64.965	-0.035	0.035				
2	65.000	64.967	-0.033	0.033				
8	42.000	41.968	-0.032	0.032				
11	65.000	64.968	-0.032	0.032				
13	65.000	64.970	-0.030	0.030				
10	54.000	53.971	-0.029	0.029				
14	65.000	64.971	-0.029	0.029				
2	54.000	53.973	-0.027	0.027				
3	65.000	64.973	-0.027	0.027				
12	65.000	64.973	-0.027	0.027				
11	54.000	53.974	-0.026	0.026				
13	54.000	53.975	-0.025	0.025				
8	30.000	29.976	-0.024	0.024				
14	54.000	53.976	-0.024	0.024				
6	65.000	64.976	-0.024	0.024				
15	65.000	64.976	-0.024	0.024				
10	42.000	41.977	-0.023	0.023				
1	65.000	64.978	-0.022	0.022				
7	65.000	64.978	-0.022	0.022				
3	54.000	53.978	-0.022	0.022				
2	42.000	41.979	-0.021	0.021				
12	54.000	53.979	-0.021	0.021				
5	65.000	64.979	-0.021	0.021				
11	42.000	41.980	-0.020	0.020				
13	42.000	41.980	-0.020	0.020				
6	54.000	53.980	-0.020	0.020				
15	54.000	53.981	-0.019	0.019				
14	42.000	41.982	-0.018	0.018				
1	54.000	53.982	-0.018	0.018				
3	42.000	41.983	-0.017	0.017				
12	42.000	41.983	-0.017	0.017				
5	54.000	53.983	-0.017	0.017				
7	54.000	53.983	-0.017	0.017				
10	30.000	29.983	-0.017	0.017				

MODULE TYPE: DTS3250 SERIAL NUMBER: 1037
POST CALIBRATION TEST

	RTD Points										
Channel	Applied	Reading	Delta Offset	Abs Offset							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							
1	0.000	0.000	0.000	0.000							



9	65.000	64.983	-0.017	0.017
16	65.000	64.983	-0.017	0.017
4	65.000	64.984	-0.016	0.016
8	18.000	17.984	-0.016	0.016
6	42.000	41.984	-0.016	0.016
2	30.000	29.985	-0.015	0.015
15	42.000	41.985	-0.015	0.015
1	42.000	41.986	-0.014	0.014
7	42.000	41.986	-0.014	0.014
16	54.000	53.986	-0.014	0.014
11	30.000	29.986	-0.014	0.014
13	30.000	29.986	-0.014	0.014
14	30.000	29.987	-0.013	0.013
5	42.000	41.987	-0.013	0.013
4	54.000	53.987	-0.013	0.013
9	54.000	53.987	-0.013	0.013
3	30.000	29.988	-0.012	0.012
6	30.000	29.988	-0.012	0.012
12	30.000	29.988	-0.012	0.012
15	30.000	29.989	-0.011	0.011
10	18.000	17.990	-0.010	0.010
1	30.000	29.990	-0.010	0.010
7	30.000	29.990	-0.010	0.010
4	42.000	41.990	-0.010	0.010
9	42.000	41.990	-0.010	0.010
16	42.000	41.990	-0.010	0.010
5	30.000	29.991	-0.009	0.009
2	18.000	17.992	-0.008	0.008
11	18.000	17.992	-0.008	0.008
13	18.000	17.992	-0.008	0.008
6	18.000	17.993	-0.007	0.007
12	18.000	17.993	-0.007	0.007
14	18.000	17.993	-0.007	0.007
4	30.000	29.993	-0.007	0.007
9	30.000	29.993	-0.007	0.007
16	30.000	29.993	-0.007	0.007
8	6.000	5.993	-0.007	0.007
3	18.000	17.994	-0.006	0.006
7	18.000	17.994	-0.006	0.006
15	18.000	17.994	-0.006	0.006
2	-5.000	-4.995	0.005	0.005
3	-5.000	-4.995	0.005	0.005
1	18.000	17.995	-0.005	0.005
5	18.000	17.995	-0.005	0.005
4	18.000	17.996	-0.004	0.004
16	18.000	17.996	-0.004	0.004
8	0.000	-0.004	-0.004	0.004
9	-5.000	-4.996	0.004	0.004

11	-5.000	-4.996	0.004	0.004
14	-5.000	-4.996	0.004	0.004
1	-5.000	-4.997	0.003	0.003
5	-5.000	-4.997	0.003	0.003
7	-5.000	-4.997	0.003	0.003
10	-5.000	-4.997	0.003	0.003
12	-5.000	-4.997	0.003	0.003
13	-5.000	-4.997	0.003	0.003
15	-5.000	-4.997	0.003	0.003
16	-5.000	-4.997	0.003	0.003
6	6.000	5.997	-0.003	0.003
10	6.000	5.997	-0.003	0.003
9	18.000	17.997	-0.003	0.003
1	0.000	0.003	0.003	0.003
3	0.000	0.002	0.002	0.002
4	0.000	0.002	0.002	0.002
4	-5.000	-4.998	0.002	0.002
11	6.000	5.998	-0.002	0.002
13	6.000	5.998	-0.002	0.002
6	-5.000	-4.999	0.001	0.001
2	6.000	5.999	-0.001	0.001
7	6.000	5.999	-0.001	0.001
9	6.000	6.001	0.001	0.001
12	6.000	5.999	-0.001	0.001
14	6.000	5.999	-0.001	0.001
15	6.000	5.999	-0.001	0.001
6	0.000	-0.001	-0.001	0.001
7	0.000	0.001	0.001	0.001
9	0.000	0.001	0.001	0.001
10	0.000	-0.001	-0.001	0.001
15	0.000	0.001	0.001	0.001
16	0.000	0.001	0.001	0.001
8	-5.000	-5.000	0.000	0.000
2	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
1	6.000	6.000	0.000	0.000
3	6.000	6.000	0.000	0.000
4	6.000	6.000	0.000	0.000
5	6.000	6.000	0.000	0.000
16	6.000	6.000	0.000	0.000

Table 6 - Sample Post Calibration Channel Error Report

MODULE TYPE: DTS3250 SERIAL NUMBER: 1037 POST CALIBRATION TEST

		RTD1	RTD2	Cold Ju	unction	Ref Point	Cold	Junctio	n Error		
		40.130	40.190	40.1	160	40.109		0.051			
Channel Voltage In Millivolts				Error of Thermocouple Type (In degrees C) See Notes 1 and 2							
	Applied	Reading	Delta Offset	E	J	К	Ν	R	S	В	Т
1	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
2	-5.000	-4.995	0.005	0.132	0.147	0.173	0.243	0.884	0.884	0.551	0.173
3	-5.000	-4.995	0.005	0.132	0.147	0.173	0.243	0.884	0.884	0.551	0.173
4	-5.000	-4.998	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
5	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
6	-5.000	-4.999	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
7	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
8	-5.000	-5.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
9	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
10	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
11	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
12	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
13	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
14	-5.000	-4.996	0.004	0.116	0.128	0.149	0.205	0.718	0.718	0.451	0.149
15	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
16	-5.000	-4.997	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
RTD	0.000	0.000	0.000								

RTD1	RTD2	Cold Junction	Ref Point	Cold Junction Error
40.130	40.190	40.160	40.109	0.051

Channel	Voltage In Millivolts			Error of Thermocouple Type (In degrees C) See Notes 1						1 and 2	
	Applied	Reading	Delta Offset	Е	J	К	Ν	R	S	В	Т
1	0.000	0.003	0.003	0.099	0.109	0.124	0.166	0.551	0.551	0.351	0.124
2	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
3	0.000	0.002	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
4	0.000	0.002	0.002	0.083	0.089	0.100	0.128	0.384	0.384	0.251	0.100
5	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
6	0.000	-0.001	-0.001	0.035	0.032	0.027	0.013	-0.116	-0.116	-0.049	0.027
7	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
8	0.000	-0.004	-0.004	-0.014	-0.026	-0.047	-0.103	-0.616	-0.616	-0.349	-0.047
9	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
10	0.000	-0.001	-0.001	0.035	0.032	0.027	0.013	-0.116	-0.116	-0.049	0.027
11	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
12	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
13	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
14	0.000	0.000	0.000	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
15	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
16	0.000	0.001	0.001	0.067	0.070	0.075	0.089	0.218	0.218	0.151	0.075
RTD	0.000	0.000	0.000								

Appendix D - Software Change Log

Version 1.00 - First release August 2010

