



SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510
Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: DURO-SENSE TYPE K

Description: THERMOCOUPLE

Serial No: 333

Asset No: 008427

Procedure: CUSTOMER LETTER DATED NOV 16, 2001

Work Order: 444050129

Date Issued: Sep 11, 2002

Calibration Date: Sep 6, 2002

****Calibration Due:** Mar 6, 2003

Calibration Location: N/A

Environment: Temp. 75.0°F Hum. 51 %RH

***As Found:** SEE ATTACHED DATA

***As Left:** SEE ATTACHED DATA

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCCL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of $k=2$ to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Dec 10, 02

Approved by: Walt Hill
Metrology Group Leader
m:\Nona21a1.rpt Rev date 15, August 02

Measurements by: Vince Morales
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Calibration Data Sheet Z 540

Workorder 444050129 Asset #. 8427 Serial #. 333	Mfr. DURO-SENSE Model J-00 Type Thermocouple	Technician V Morales Procedure Customer Cal Date 9/6/02
Remarks: Customer wants readings per letter dated Nov 16, 2001 The reported uncertainty is based upon a standard uncertainty multiplied by a coverage factor of k=2 which provides a level of confidence of approximately 95%.		

Parameter	Degree C	mVolts As Found	mVolts	
	Standard Reading	TI Reading	Uncertainty	Results
	0.00	0.002mV	0.002	
	150.00	6.615mV	0.002	



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Certificate #

0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: DURO-SENSE TYPE K

Description: THERMOCOUPLE

Serial No: 333

Asset No: 008427

Procedure: CUSTOMER LETTER DATED NOV 16, 2000

Work Order: 444055695

Date Issued: Oct 8, 2003

Calibration Date: Oct 8, 2003

****Calibration Due:** Apr 8, 2004

Calibration Location: Bldg. 64

Environment: Temp. 70.0°F Hum. 40 %RH

***As Found:** IN TOLERANCE

***As Left:** IN TOLERANCE

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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Feb 05, 04
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Feb 07, 04
005325	XITRON TECHNOLOGIES	2000M	V/A/T CALIBRATOR	Oct 30, 03

Approved by: Walt Hill

Metrology Group Leader

m:\a2la1.rpt Rev date 15, August 02

Measurements by: Vince Morales

Metrology Technician

Southwest Research Institute
Calibration Laboratory
Calibration Report

Work Order:	444055695	Mfr.	Duro-Sense	Technician	Vmorales
Asset No:	8427	Model	Type K		
Serial No:	333	Type	Thermocouple	Cal Date	8-Oct-03
Remarks: Accuracy taken from IEC 584-2 (1982) Test points and procedure comply with custodian memo dated Nov. 16, 2000					

Function/Range	Test Point	TI Read	Difference	+/-Limit	+/-Uncertainty	Found/Left
mV	Deg C	Deg C	Deg C	Deg C	Deg C	Result
0.00	0.09	0.17	-0.08	1.5	0.03	Pass
6.12	150.0	149.8	0.2	1.5	0.03	Pass
END OF REPORT						



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Certificate #

0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: DURO-SENSE TYPE K

Description: THERMOCOUPLE

Serial No: 333

Asset No: 008427

Procedure: CUSTOMER LETTER DATED NOV 16, 2000

Work Order: 444059858

Date Issued: Jul 20, 2004

Calibration Date: Jul 20, 2004

****Calibration Due:** Jan 20, 2005

Calibration Location: Bldg. 64

Environment: Temp. 77.0°F Hum. 44 %RH

***As Found:** IN TOLERANCE

***As Left:** IN TOLERANCE

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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC	1575	THERMOMETER	Sep 05, 04
008920	HART SCIENTIFIC	5614-17660-A-12	PLATINUM RTD	Sep 09, 04
005325	XITRON TECHNOLOGIES	2000M	V/A/T CALIBRATOR	Nov 13, 04

Approved by: Walt Hill
Metrology Group Leader
m:\a2la1.rpt Rev date 11, May 04

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	444059858	Mfr.	Duro-Sense	Technician	Mark Romero
Asset No:	008427	Model	Type K		
Serial No:	333	Type	Thermocouple	Cal Date	20-Jul-04
Remarks: Limits taken from ASTM E230-02 and are based on brand new unused thermocouples. Verification complies with customer memo dated Nov. 16, 2000.					

Function/Range	Test Point	TI Read	Difference	+/-Limit	+/-Uncertainty	Found/Left
mV	Deg C	Deg C	Deg C	Deg C	Deg C	Result
0.01	0.10	0.13	-0.03	2.20	0.028	Pass
6.13	150.05	149.69	0.36	2.20	0.028	Pass
END OF REPORT						



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Certificate #

0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: DURO-SENSE TYPE K

Description: THERMOCOUPLE

Serial No: 333

Asset No: 008427

Procedure: THERMOCOUPLE-GENERAL, JAN/03

Work Order: 303062797

Date Issued: Feb 7, 2005

Calibration Date: Feb 7, 2005

**Calibration Due: Aug 5, 2005

Calibration Location: Bldg. 64

Environment: Temp. 73.0°F Hum. 40 %RH

*As Found: IN TOLERANCE

*As Left: IN TOLERANCE

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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC	1575	THERMOMETER	Mar 20, 05
010281	HART SCIENTIFIC	5628	SPRT	Jun 24, 08
010814	HART SCIENTIFIC	1529	THERMOCOUPLE THERMOMETER	Apr 16, 05

Approved by: Walt Hill
Metrology Group Leader

m:\a2la1.rpt Rev date 11, May 04

Measurements by: Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303062797	Mfr.	Duro-Sense	Technician	blt
Asset No:	008427	Model	Type K		
Serial No:	333	Type	Thermocouple	Cal Date	7-Feb-05
Remarks: Limits taken from ASTM E230-02 and are based on brand new unused thermocouples.					
Limited Cal - tested at 0.0 and 150 C					

Function/Range	Test Point	TI Read	Difference	+/-Limit	+/-Uncertainty	Found/Left
	° C	° C	° C	° C	° C	Result
	0.123	0.05	0.07	2.2	0.19	Pass
	150.05	150.51	-0.46	2.2	0.30	Pass
END OF REPORT						