Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

12 August 2002

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	DURO-SENSE J-00
Description:	RTD
Serial Number:	322
Asset Number:	008422
Work Order Number:	444049425

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 75.0 Degrees Fahrenheit Humidity: 45 % RH

Calibration Date: 23 Jul 02 **Calibration Procedure:** CUSTOMER

Condition as Received: SEE ATTACHED DATA

Condition as Returned: SEE ATTACHED DATA

Remarks:

Approved by:

Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:

Vince Morales, Technician

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

As Found/Left

Work Order:	**444049425**	**Mfr.**	Durosense	**Technician**	V.Morales
Asset No.	**8422**	**Model**	J-00	**Procedure**	Customer
Serial No.	**322**	**Type.**	RTD Temperature Probe	**Cal Date.**	July 23, 2002

Remarks:
(1) If no value is listed the uncertainty is >4/1
The results (TI Reading) are provided, it is up to the end user to determine if results meet their need.

Standard	TI Reading	Uncertainty (1)
Deg.C.	Ohms	Ohms
0.11	100.60	0.014
149.89	157.86	0.014

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	**Work Order:**	444053023
Address:	B57	**Date Issued:**	Apr 2, 2003
Contact:	DARRELL DUNN	**Calibration Date:**	Apr 1, 2003
Manufacturer Model:	DURO-SENSE J-00	****Calibration Due:**	Apr 1, 2004
Description:	RTD	**Calibration Location:**	Bldg. 64
Serial No:	322	**Environment:**	Temp. 75.0°F Hum. 45 %RH
Asset No:	008422	***As Found:**	SEE ATTACHED DATA
Procedure:	CUSTOMER	***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/NCSL 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
007001	HEWLETT-PACKARD	3458A/OPT-002	MULTIMETER	Jan 17, 04
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Jul 06, 03
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Jul 06, 03

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Mark Romero
Metrology Technician

m:\Nona2la1.rpt Rev date 15, August 02

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Work Order:	444053023	Mfr.	Duro-Sense	Technician	Mark Anthony Romero
Asset No.	008422	Model	J-00		
Serial No.	322	Type.	RTD (385)	Cal Date.	April 1, 2003

Remarks: Test points and procedure in accordance with customer memo dated Nov. 2000.

The results (TI Reading) are provided, it is up to the end user to determine if results meet their need.
Tolerance: Not specified
Stability: Not specified

Function/Range	Test Point	TI Reading	Difference	Uncertainty
Temp	Deg. C	Deg. C	Deg. C	Deg. C
	0.7829	0.0929	0.6900	0.26
	150.9034	150.0357	0.8677	0.27
Ohms	Ohms	Ohms	Ohms	Ohms
	100.3059	100.0363	0.2696	0.0032
	157.6625	157.3385	0.3240	0.0032

END OF REPORT

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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

ACCREDITED
Certificate #
0972-01

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444058430
Address:	B57	**Date Issued:**	Apr 12, 2004
Contact:	DARRELL DUNN	**Calibration Date:**	Apr 12, 2004
Manufacturer Model:	DURO-SENSE J-00	****Calibration Due:**	Apr 12, 2005
Description:	RTD	**Calibration Location:**	Bldg. 64
Serial No:	322	**Environment:**	Temp. 75.0°F Hum. 31 %RH
Asset No:	008422	***As Found:**	SEE ATTACHED DATA
Procedure:	CUSTOMER	***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/NCSL 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:

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
008920	HART SCIENTIFIC	5614-17660-A-12	PLATINUM RTD	Sep 09, 04
007001	HEWLETT-PACKARD	3458A/OPT-002	MULTIMETER	Feb 19, 05
009137	HART SCIENTIFIC	1575	THERMOMETER	Sep 05, 04

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
Calibration laboratory
Calibration Report

Work Order:	444058430	Mfr.	Duro-Sense	Technician	Mark Romero
Asset No.	008422	Model	J-00		
Serial No.	322	Type.	RTD (385)	Cal Date.	12-Apr-04

Remarks: The results (TI Reading) are provided, it is up to the end user to determine if results meet their need.
Test points and procedure in accordance with customer memo dated Nov. 2000.

Function/Range	Test Point	TI Reading	Difference	+/-Uncertainty
Temp	Deg. C	Deg. C	Deg. C	Deg. C
	0.10	0.77	0.67	0.01
	150.06	150.86	0.80	0.01
Ohms	Ohms	Ohms	Ohms	Ohms
	100.0387	100.3012	0.2625	0.0032
	157.3475	157.6477	0.3002	0.0032

END OF REPORT