MILLER INSTRUMENTS LTD.
1 - 3871 North Fraser Way
Burnaby, B.C. V5J 5G6
Telephone (604) 431-8882
Fax (604) 431-8714
web: www.miller.bc.ca
email: miller@miller.bc.ca

MILLER

CERTIFICATE OF CALIBRATION

CLAS NRC-CNRC CLAS 94-03

Standards Council of Canada Accredited Laboratory Scope of Accreditation 156
Conseil canadien des normes Laboratoire accrédité Portée d'accréditation 156 TM

Certificate No.: 28761
Date of issue: March 13, 2012

Manufacturer: Miller
Model No: IH/TS
Serial No: LC089022
Description: Induction Heating Temperature Station
Customer: Red-D-Arc Ltd.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of Miller Instruments Ltd. and its traceability to the International System of Units (SI) or to the standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS, Certification number 94-03, and the conditions of accreditation granted by the Standards Council of Canada (SCC), Accreditation number No. 156. The ISO/IEC 17025:2005 Standard was used in the above assessment carried out by CLAS.

Date Calibrated: March 13, 2012
Calibration due date: March 13, 2013 (7)
Temperature: 23±1 °C
Relative Humidity: 26±10 %RH

Calibrated by: M. Mohsenin
(Mahkameh Mohsenin, B.Sc.)

Authorized by: S. NISHIE
(S. Nishie, P.Eng. Calibration Manager)

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

Instrument received: [] in-specifications* [x] out-of-specifications*	Instrument when returned: [x] meets test specifications* [] meets limited specifications*
[x] Data supplied	[] Data available upon request
Comments:	The instrument was calibrated after a 30-minute warm-up period.

* The tolerance limits used in this calibration were those defined by the customer.

For measurement results associated with the conformance to a tolerance, the uncertainty in the measurement system did not exceed 25% (4:1 test uncertainty ratio) of the acceptable tolerance for each characteristic calibrated, unless otherwise noted in the report.

Calibration Procedure: CP-591

Calibration Equipment Used:

ID #	Model	Description	Serial Number	Calibration Due Date
163	Fluke 5500A	Multi-Product Calibrator	8855014	Apr 6, 2012

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Calibration data *(as found after repair and as returned)*

Controller (thermocouple K)

Channel No.	Applied (°C)	DUT reading (°C)	Measurement Uncertainty (°C)	Tolerance Limits ± (°C)	Pass/fail
1	23	23	1	4	p
1	200	200	1	4	p
1	500	500	1	4	p
1	750	750	1	4	p
1	1300	1300	1	4	p

Recorder (thermocouple K)

Channel No.	Applied (°C)	DUT reading (°C)	Measurement Uncertainty (°C)	Tolerance Limits ± (°C)	Pass/fail
1	23	23	1	4	p
1	200	200	1	4	p
1	500	500	1	4	p
1	750	751	1	4	p
1	1300	1301	1	4	p
2	23	23	1	4	p
2	200	200	1	4	p
2	500	500	1	4	p
2	750	750	1	4	p
2	1300	1299	1	4	p
3	23	23	1	4	p
3	200	200	1	4	p
3	500	500	1	4	p
3	750	751	1	4	p
3	1300	1302	1	4	p
4	23	23	1	4	p
4	200	200	1	4	p
4	500	500	1	4	p
4	750	750	1	4	p
4	1300	1300	1	4	p
5	23	23	1	4	p
5	200	200	1	4	p
5	500	500	1	4	p
5	750	751	1	4	p
5	1300	1302	1	4	p

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Recorder (thermocouple K)

Channel No.	Applied (°C)	DUT reading (°C)	Measurement Uncertainty (°C)	Tolerance Limits ± (°C)	Pass/fail
6	23	23	1	4	p
6	200	200	1	4	p
6	500	500	1	4	p
6	750	750	1	4	p
6	1300	1300	1	4	p

Note 1: The International Temperature Scale of 1990 (ITS-90) was used to express temperature values.

Note 2: The Miller IH/TS consists of a controller Eurotherm 2408 and a recorder Eurotherm Chessell 5100V. The calibration of the controller and the recorder was performed by sensor simulation using electrical standards only.

Note 3: The NIST Monograph 175 Tables were used to convert the electrical signal to temperature.

Note 4: DUT: Device under test.

Note 5: The DUT was powered by a 120 V AC (60 Hz) line and was calibrated after a 30-minute warm-up period.

Note 6: The uncertainty of this calibration, assuming normally distributed data, was derived from effective standard deviations and has been expanded to obtain a coverage factor of k=2 at a level of confidence of approximately 95%.

Note 7: The calibration due date is shown as requested by the customer.

Note 8: The memory battery was replaced before the above calibration.

Note 9: The Eurotherm 2408 was defective when the DUT was received and was repaired by replacement before the above calibration.